# Uintah Basin Association of Governments

**Comprising:**

**Daggett, Duchesne, and Uintah Counties**

# Pre-Disaster Mitigation Plan (PDM)

Prepared By:

Uintah Basin Association of Governments
855 East 200 North (112-3)
Roosevelt, Ut 84066
Phone (435) 722-4518
FAX: (435) 722-4890

Uintah Basin Planning Staff

Executive Director……Laurie Brummond
Planning & Community Coordinator……Yankton Johnson
Mitigation Planner……...Mike Brennan

## TABLE OF CONTENTS


| Subject: | Page: |
|---|---|
| | |
| **Part I – Pre-requisite Adoption by the local jurisdiction** | 6 |
| Letter of Transmittal/copy of signed Resolutions, etc. | 6 |
| Acknowledgements | 7 |
| Preface | 8 |
| Executive Summary | 9 |
| Introduction | 12 |
| Scope | 13 |
| Purpose | 14 |
| Authority | 14 |
| Goals | 15 |
| Short Term | 16 |
| Long Term | 16 |
| Objectives | 17 |
| Environmental Considerations | 18 |
| **Part II – Planning Process (Documentation of the planning process)** | 19 |
| Organize Resources | 19 |
| Public Officials Outreach | 21 |
| Establish Continuity in the Planning Process | 21 |
| Data Acquisition | 22 |
| Hazard Risk Identification Analysis | 22 |
| Planning Process Time Line | 23 |
| County Vulnerability Assessment | 25 |
| Community Goals Assessment | 25 |
| Contact Regional Mitigation Emergency Managers | 26 |
| Mitigation Strategy Development | 26 |
| Prioritization of Identified Mitigation Strategies | 26 |
| State Review | 26 |
| Adoption | 26 |
| Public Involvement | 27 |
| Information Sources | 30 |
| Other Plans | 31 |
| Plan Methodology | 31 |
| Vulnerability Methodology | 32 |
| **Part III – General Regional Data** | 36 |
| Geographic and physiographic background | 36 |
| Demographics | 36 |
| Physiography, Climate, Geology, and Hazards | 37 |
| Hazards | 40 |
| Hazard Table | 41 |
| **Part IV – Regional Annex 1** | ANNEX 1 |
| Tri-County Map | 1 |
| Description of the Study Area | 2 |
| Drought | 3 |
| Drought History | 5 |
| Palmer Drought Index | 5 |
| Palmer Drought Severity Index Chart | 6 |

| | |
|---|---|
| Generic Mitigation | 10 |
| Tornado | 10 |
| Winter Storms | 12 |
| Generic Mitigation | 13 |
| **Part V – Daggett County Annex 2** | ANNEX 2 |
| Past Hazard events in Daggett County | 2 |
| Dam Failure | 4 |
| Generic Mitigation | 6 |
| Dam Failure Map | 7 |
| Earthquake | 9 |
| Peak Ground Acceleration (PGA) | 10 |
| (PGA) Map | 11 |
| Hazus MH Vulnerability Assessment | 12 |
| Generic Mitigation | 14 |
| Earthquake Maps | 15 |
| Flooding | 17 |
| Generic Mitigation | 19 |
| Insect Infestation | 20 |
| Landslide | 21 |
| Generic Mitigation | 23 |
| Landslide Maps | 24 |
| Wildfire | 25 |
| Generic Mitigation | 26 |
| Wildfire Maps | 28 |
| **Mitigation Capabilities** | 29 |
| Current Capabilities | 29 |
| Policy and Program Capability | 30 |
| Political Will Power | 31 |
| **Mitigation Strategies** | 32 |
| Dam Failure | 32 |
| Drought | 33 |
| Earthquake | 36 |
| Flooding | 37 |
| Insect Infestation | 41 |
| Landslide | 42 |
| Severe Weather | 44 |
| Wildfire | 45 |
| **Part VI – Duchesne County Annex 3** | ANNEX 3 |
| Past Hazard events in Duchesne County | 2 |
| Dam Failure | 4 |
| Generic Mitigation | 7 |
| Dam Failure Map | 8 |
| Earthquake | 9 |
| Peak Ground Acceleration (PGA) | 10 |
| (PGA) Map | 11 |
| Hazus MH Vulnerability Assessment | 12 |
| Generic Mitigation | 14 |
| Earthquake Maps | 15 |
| Flooding | 17 |
| Generic Mitigation | 18 |
| Insect Infestation | 19 |

| | |
|---|---|
| Landslide | 20 |
| Generic Mitigation | 22 |
| Landslide Maps | 23 |
| Wildfire | 24 |
| Generic Mitigation | 25 |
| Wildfire Maps | 26 |
| **Mitigation Capabilities** | 28 |
| Current Capabilities | 28 |
| Policy and Program Capability | 29 |
| Political Will Power | 30 |
| **Mitigation Strategies** | 32 |
| Dam Failure | 32 |
| Drought | 33 |
| Earthquake | 38 |
| Flooding | 40 |
| Insect Infestation | 50 |
| Landslide | 52 |
| Severe Weather | 53 |
| Wildfire | 54 |
| **Part VII – Uintah County Annex 4** | ANNEX 4 |
| Past Hazard events in Uintah County | 2 |
| Dam Failure | 4 |
| Generic Mitigation | 7 |
| Dam Failure Map | 8 |
| Earthquake | 9 |
| Peak Ground Acceleration (PGA) | 10 |
| (PGA) Map | 11 |
| Hazus MH Vulnerability Assessment | 12 |
| Generic Mitigation | 14 |
| Earthquake Maps | 15 |
| Flooding | 17 |
| Generic Mitigation | 18 |
| Insect Infestation | 19 |
| Landslide | 20 |
| Generic Mitigation | 21 |
| Landslide Maps | 22 |
| Wildfire | 23 |
| Generic Mitigation | 24 |
| Wildfire Maps | 26 |
| **Mitigation Capabilities** | 27 |
| Current Capabilities | 27 |
| Policy and Program Capability | 29 |
| Political Will Power | 29 |
| **Mitigation Strategies** | 30 |
| Dam Failure | 31 |
| Drought | 33 |
| Earthquake | 36 |
| Flooding | 37 |
| Insect Infestation | 44 |
| Landslide | 46 |
| Severe Weather | 47 |

| | |
|---|---|
| Wildfire | 48 |
| **Part VIII - Conclusion** | Conclusion |
| Monitoring Evaluating and Updating Plan | 1 |
| Implementation through existing Programs | 3 |
| Continued Public Involvement | 21 |
| **Part VIII – Appendix** | |
| Hazard Definitions | Appendix-A |
| Analysis of Critical Facilities | Appendix-B |
| Environmental Policies | Appendix-C |
| Richter Scale | Appendix-D |
| Building Code Effectiveness | Appendix-E |
| FEMA Hazard Profile | Appendix-F |
| Mitigation Strategies | Appendix-G |
| Hazus MH Run | Appendix-H |
| Glossary | Appendix-I |
| Regional Demographics | Appendix-J |
| Promulgation Letter | Appendix-K |
| Questionnaire | Appendix-L |
| Flood Hazard Identification Study | Appendix-M |
| Daggett County Workbook | Appendix-N |

# Part I. Pre-requisite Adoption by the local jurisdiction

The Uintah Basin Executive Board, as well as the counties and communities participated in and promulgated this plan:

**Daggett County**

- Town of Manila

**Duchesne County**

- Town of Altamont, City of Duchense, Myton City, Roosevelt City, Town of Tabiona.

**Uintah County**

- Ballard Town, City of Naples, Vernal City.

Promulgation letter copies have been included in *Appendix K* of this plan.

## Acknowledgements

Uintah Basin Association of Governments would like to extend their appreciation to the following agencies, which assisted in the development of this plan.

- Division of Emergency Services and Homeland Security
- Utah Geologic Survey
- Automated Geographic Reference Center
- United States Army Corps of Engineers
- Division of Water Rights Dam Safety Section
- Federal Emergency Management Agency Region VIII
- National Weather Service
- Utah Division of Forestry Fire, and State Lands
- Councils of Governments (Tribal and local)
- Daggett County Emergency Management
- Duchesne County Emergency Management
- Uintah County Emergency Management
- Uintah Basin Mayors and Commissioners
- Uintah Basin Emergency Managers and city personnel
- Utah Division of Water Resources
- Wasatch Front Regional Council

In addition we offer a sincere thanks to Clackamas County, Dunn County, Salt Lake City, Kidder County, Jefferson County for allowing review of their mitigation plans.

## Preface

Hazard mitigation is any action taken before, during, or after a disaster to permanently eliminate or reduce the long-term risk to human life and property from natural and technological hazards. It is an essential element of emergency management, along with preparedness, response, and recovery. There is a cyclical relationship between the four phases of emergency management. A community prepares for a disaster, and then responds when it occurs. Following the response, there is a transition into the recovery process, during which mitigation measures are evaluated and adopted. This, in turn, improves the preparedness posture of the community for the next incident, and so on. When successful, mitigation will lessen the impacts to such a degree that succeeding incidents will remain incidents and not become disasters.

Hazard mitigation strives to reduce the impact of hazards on people and property through the coordination of resources, programs, and authorities so that, at the very least, communities do not contribute to the increasing severity of the problem by allowing repairs and reconstruction to be completed in such a way as to simply restore damaged property as quickly as possible to pre-disaster conditions. Such efforts expedite a return to “normalcy”; however, replication of pre-disaster conditions results in a cycle of damage, reconstruction, and damage again.

Hazard mitigation is needed to ensure that such cycles are broken, that post-disaster repairs and reconstruction take place after damages are analyzed, and that sounder, less vulnerable conditions are produced. Through a combination of regulatory, administrative, and engineering approaches, losses can be limited by reducing susceptibility to damage. Hazard mitigation provides the mechanism by which communities and individuals can break the cycle of damage, reconstruction, and damage again.

Recognizing the importance of reducing community vulnerability to natural and technological hazards, the Counties of Daggett, Duchesne, and Uintah are actively addressing the issue through the development of this plan in conjunction with Uintah Basin Association of Governments. Implementing this plan is the responsibility of the cities and counties with the Uintah Basin planning district. The many benefits to be realized from this effort include protection of the public health and safety, preservation of essential services, prevention of property damage, and prevention of the local economic base, to mention just a few - will help ensure that the Uintah Basin and all of it’s communities remain vibrant, safe, and enjoyable places in which to live, raise a family, and conduct business. *For information regarding economic and demographic data in the Uintah Basin Region see Appendix J.*

## Executive Summary

### Plan Mission

The mission of the Uintah Basin Association of Governments (UBAOG) Pre-Disaster Mitigation Plan is to substantially and permanently reduce, communities within the UBAOG, vulnerability to natural hazards. The plan is intended to promote sound public policy designed to protect citizens, critical facilities, infrastructure, private property, and the natural environment. This can be achieved by increasing public awareness, documenting resources for risk reduction and loss-prevention, and identifying activities to guide the community towards the development of a safer more sustainable community.

### Plan Organization

The Uintah Basin Association of Governments plan was developed and organized within the rules and regulations established under 44 CRF 201.6. The plan contains a discussion on the purpose and methodology used to develop the plan, a profile on communities within UBAOG, as well as a hazard identification study and a vulnerability analysis of eight hazards. To assist in the explanation of the above-identified contents there are several appendices included which provide more detail on specific subjects. This is intended to improve the ability of community within the UBAOG planning district to handle disasters and will document valuable local knowledge on the most efficient and effective ways to reduce loss.

### Plan Financing

The UBAOG Pre-Disaster Mitigation Plan has been financed and developed under the Pre-Disaster Mitigation Program provided by the Federal Emergency Management Agency (FEMA) and the Department of Public Safety Division of Emergency Services and Homeland Security. The UBAOG aided in funding, providing in-kind assistance to local governments.

### Plan Participation

The UBAOG Pre-Disaster Mitigation Plan has been completed as a result of a collaborative effort between Uintah Basin Association of Governments, Department of Public Safety Division of Emergency Services and Homeland Security, public agencies, and the citizens, elected officials, and public employees of the cities and towns within Daggett, Duchesne, and Uintah Counties. Interviews were conducted with stakeholders from the communities, and a workshop was conducted during the plan developments. Additionally, through public hearings, workshops, and draft plan displays; ample opportunity was provided for public participation. Any comments, questions, and discussions resulting from these activities were given strong consideration in the development of this plan. Completion of this multi-jurisdiction mitigation plan was completed with assistance and input from:

**Daggett County**

- Emergency Manager; Roads Department; GIS Department, and Town of Manila

**Duchesne County**

- Emergency Manager, Roads Department, Sheriff's Department, Town of Altamont, City of Duchesne, Myton City, Roosevelt City, and the Town of Tabiona.

**Uintah County**

- Emergency Manager, Roads Department, Sheriff's Department, Town of Ballard, City of Naples, and Vernal City.

**Hazards Identified**

It was suggested by the Division of Emergency Services and Homeland Security, at a minimum, Uintah Basin Association of Governments address the hazards of: earthquake, flood, landslide, problem soils, wildfire, dam failure, severe weather, and drought. However, there are other hazards that were identified which are not in the minimum criteria established by DESHS that were added to the discussion.

The hazard identification study recognized the following hazards as being the most prevalent and posing the most potential risk to the counties and towns within the UBAOG planning district.

- Dam Failure, Drought, Earthquake, Flood, Insect Infestation, Landslide, Wildfire, and Severe Weather.

**Plan Goals**

In an effort to ensure that the mission of the Uintah Basin Association of Governments Pre-Disaster Mitigation Plan is met, the participants in the development of this plan defined and established a list of goals, which are directly relevant to meeting the mission of the plan.
The following is a list of the goals identified by the participants of this plan:

- Protection of life before, during, and after the occurrence of a disaster.
- Preventing loss of life and reducing the impact of damage where problems cannot be eliminated.
- Protection of emergency response capabilities (critical infrastructure)
- Communication and warning systems
- Emergency medical services and medical facilities
- Mobile resources
- Critical facilities
- Government continuity
- Protection of developed property, homes and businesses, industry, education opportunities and the cultural fabric of a community, by

combining hazard loss reduction with the community's environmental, social and economic needs.

- Protection of natural resources and the environment, when considering mitigation measures.
- Promoting public awareness through education of community hazards and mitigation measures.
- Preserving and/or restoring natural features that provide mitigation such as floodplains.
- Minimize the impacts of flooding
- Minimize the impacts of drought
- Minimize the impacts of severe weather
- Minimize the risk of wildfire

## Introduction

The State of Utah is vulnerable to natural, technological, and man-made hazards that have the possibility of causing serious threat to the health, welfare, and security of our citizens. The cost of response to and recovery from potential disasters can be lessened when attention is turned to mitigating their impacts and effects before they occur or re-occur.

Hazard mitigation actions must be practical, cost effective, and environmentally and politically acceptable. Actions taken to limit the vulnerability of society to hazards must not in themselves be more costly than the value of anticipated damages.

The primary focus of hazard mitigation actions must be at the point at which capital investment decisions are made and based on vulnerability. Capital investments, whether for homes, roads public utilities, pipelines, power plants, chemical plants or warehouses, or public works, determine to a large extent the nature and degree of hazard vulnerability of a community. Once a capital facility is in place, very few opportunities will present themselves over the useful life of the facility to correct any errors in location or construction with respect to hazard vulnerability. It is for these reasons that zoning ordinances, which restrict development in high vulnerability areas, and building codes, which insure that new buildings are built to withstand the damaging forces of hazards, are the most useful mitigation approaches a city can implement.

## What is Hazard Mitigation

Hazard mitigation is defined as any cost-effective action(s) that have the effect of reducing, limiting, or preventing vulnerability of people, property, and the environment to potentially damaging, harmful, or costly hazards. Hazard mitigation measures, which can be used to eliminate or minimize the risk to life and property, fall into three categories. First; are those that keep the hazard away from people, property, and structures. Second; are those that keep people, property, and structures away from the hazard. Third; are those that do not address the hazard at all, but rather reduce the impact of the hazard on the victims such as insurance. This mitigation plan has strategies that fall into all three categories.

Previously, mitigation measures have been the most neglected programs within emergency management. Since the priority to implement mitigation activities is generally low in comparison to the perceived threat, some important mitigation measures take time to implement. Mitigation success can be achieved, however, if accurate information is portrayed through complete hazard identification and impact studies, followed by effective mitigation management. Hazard mitigation is the key to eliminating long-term risk to people and property living in Utah from hazards and their effects. Preparedness for all hazards includes response and recovery plans, training, development, management of resources, and the need to mitigate each jurisdictional hazard.

The State Division of Emergency Management and Homeland Security (DESHS) have identified the following hazards to be analyzed by each county. These hazards include avalanche, dam failure, debris flow, drought, earthquake, flood, flash flooding, infestation, landslide, problem soils, summer storm, tornado, urban and rural fires, and winter storm.

This regional/multi-jurisdictional plan evaluates the impacts, risks and vulnerabilities of natural hazards in a jurisdictional area affected by a disaster. The plan supports, provides assistance, identifies and describes mitigation projects for each annex. The suggestive actions and plan implementation for local and tribal governments could reduce the impact of future disasters. Only through the coordinated partnership with emergency managers, political entities, public works officials, community planners and other dedicated individuals working to implement this program was it accomplished.

To develop the mitigation plan, The Utah DESHS, based on the Governor's Office of Planning and Budget, the Utah League of Cities and Towns, and the U.S. Department of Housing and Urban Development, chose to use the planning services of the Utah Associations of Governments.

Seven regional Associations of Governments:

1. Bear River Association of Governments
2. Wasatch Front Association of Governments / Wasatch Front Regional Council
3. Mountainland Association of Governments
4. Six County Association of Governments
5. Southeast Utah Association of Local Governments
6. Southwestern / Five County Association of Governments
7. Uintah Basin Association of Governments

## Scope

Uintah Basin Association of Governments, which encompasses all of Northeastern Utah, including the counties of Daggett, Duchesne, and Uintah, was placed under contract by the Utah Division of Emergency Services to complete a Pre-Disaster Mitigation Plan, which meets the requirements of the Disaster Mitigation Act of 2000, for the areas they serve.

This plan is applicable of not only the six counties served by the Association but also for the cities, towns, and municipalities within each county. The scope of this plan only includes natural hazards defined as a concern to local counties and jurisdictions. These natural hazards identified by stack holders include: earthquakes, floods, landslides, wildfires, problem soils, dam failures, sever weather, and drought. Although there were the only hazards considered much of the data is applicable to other federally funded planning currently taking place.

Planning included local level data for each incorporated area within the Uintah Basin Region.

## Purpose

The purpose of the Uintah Basin Association of Government Natural Hazard Mitigation Plan is to fulfill federal, state, and local hazard mitigation planning responsibilities; to promote pre and post disaster mitigation measures, short/long range strategies that minimize suffering, loss of life, and damage to property resulting from hazardous or potentially hazardous conditions to which citizens and institutions within the state are exposed; and to eliminate or minimize conditions which would have an undesirable impact on our citizens, the economy, environment, and the well-being of the state of Utah. This plan is to aid in enhancing city and state officials, agencies, and public awareness to the threat hazards pose to property and life and what can be done to help prevent or reduce the vulnerability and risk to jurisdiction with in the Uintah Basin planning area.

## Authority

**Federal:**

Public Law 93-288 as amended, established the basis for federal hazard mitigation activity in 1974. A section of this Act requires the identification, evaluation, and mitigation of hazards as a prerequisite for state receipt of future disaster assistance outlays. Since 1974, many additional programs, regulations, and laws have expanded on the original legislation to establish hazard mitigation as a priority at all levels of government. When PL 93-288 was amended by the Stafford Act, several additional provisions were also added that provide for the availability of significant mitigation measures in the aftermath of Presidential declared disasters. Civil Preparedness Guide 1-3, Chapter 6- Hazard Mitigation Assistance Programs places emphasis on hazard mitigation planning directed toward hazards with a high impact and threat potential.

President Clinton signed the Disaster Mitigation Act of 2000 into Law on October 30, 2000. Section 322, defines mitigation planning requirements for state, local, and tribal governments. Under Section 322 States are eligible for an increase in the Federal share of hazard mitigation (HMGP), if they submit for approval a mitigation plan, which is a summary of local and/or regional mitigation plans, that identifies natural hazards, risks, vulnerabilities, and describes actions to mitigate the hazards risks and vulnerabilities in that plan.

**State:**

- The Governor's Emergency Operation Directive
- The Robert T. Stafford Disaster Relief and Emergency Assistance Act, amendments to Public Law 93-288, as amended.
- Title 44, CFR, Federal Emergency Management Agency Regulations, as amended.
- State Emergency Management Act of 1981, Utah Code 53-2, 63-5.
- Disaster Response Recovery Act, 63-5A.
- Executive Order of the Governor, Executive Order 11
- Emergency Interim Succession Act, 63-5B.

**Uintah Basin Association of Governments:**

The Associations of Governments have been duly constituted under the authority of Title XI, Chapter13, Utah Code Annotated, 1953, as amended (The Inter-local Cooperation Act) and pursuant to Section 3 of the Executive Order of the Governor of the State of Utah, dated May 27, 1970, with the authority to conduct planning studies and to provide services to its constituent jurisdictions.

**Local:**
Local governments play an essential role in implementing effective mitigation, both before and after disaster events. Each local government will review all damages, losses, and related impacts to determine the need or requirement for mitigation action and planning whenever seriously effected by a disaster, or when applying for state or federal recovery assistance. In the counties and cities making up the Uintah Basin Association of Governments the local executive responsible for carrying out plans and policies are the County Commissioners and City Mayors. Local governments must be prepared to participate in the post disaster Hazard Mitigation Team process and the pre-mitigation planning as outlined in this document.

## Goals

To coordinate with each participating local government to develop a regional planning process meeting each plan component identified in the FEMA Region VIII Crosswalk document and any additional State planning expectation, both regionally and specifically, as needed, by gathering local input. Also, to reduce risk from natural hazards in Central Utah, through the implementation and updating of regional plans.

## Short Term Goals

These goals form the basis for the development of the PDM Plan and are shown from highest priority, at the top of the list, to those of lesser importance nearer the bottom.

- Protection of life before, during, and after the occurrence of a disaster.
- Preventing loss of life and reducing the impact of damage where problems cannot be eliminated.
- Protection of emergency response capabilities (critical infrastructure)
- Communication and warning systems
- Emergency medical services and medical facilities
- Mobile resources
- Critical facilities
- Government continuity
    - Protection of developed property, homes and businesses, industry, education opportunities and the cultural fabric of a community, by combining hazard loss reduction with the community's environmental, social and economic needs.
    - Protection of natural resources and the environment, when considering mitigation measures.
    - Promoting public awareness through education of community hazards and mitigation measures.
    - Preserving and/or restoring natural features that provide mitigation such as floodplains.

## Long Term Goals

- Eliminate or reduce the long-term risk to human life and property from identified natural and technologic hazards.
- Aid both the private and public sectors in understanding the risks they may be exposed to and finding mitigation strategies to reduce those risks.
- Avoid risk of exposure to identified hazards.
- Minimize the impacts of those risks when they can not be avoided
- Mitigate the impacts of damage as a result or identified hazards.
- Accomplish mitigation strategies in such away that negative environmental impacts are minimized.
- Provide a basis for funding of projects outlined as hazard mitigation strategies.
- Establish a regional platform to enable the community to take advantage of shared goals, resources, and the availability of outside resources. If an earthquake occurs outside of the county seat it will still affect the county seat. This is similar to many natural hazards.
- Establish a framework and data base for the county seat to use to apply for aid.

## Objectives

The following objectives are meant to serve as a measure upon which individual hazard mitigation projects can be evaluated. These criteria become especially important when two or more projects are competing for limited resources.

- Identification of persons, agency or organization responsible for implementation.
- Projecting a time frame for implementation.
- Explanation of how the project will be financed including the conditions for financing and implementing as information is available.
- Identifying alternative measures, should financing not be available.
- Be consistent with, support, and help implement the goals and objectives or hazard mitigation plans already in place for surrounding counties.
- Be based on the county seat Vulnerability Analysis.
- Have significant potential to reduce damages to public and/or private property and/or reduce the cost of, state, and federal recovery for future disasters.
- Be the most practical, cost-effective, and environmentally sound alternative after consideration of the options.
- Address a repetitive problem, or one that has the potential to have a major impact on an area, reducing the potential for loss of life, loss of essential services and personal.
- Property, damage to critical facilities, economic loss, and hardship or human suffering.
- Meet applicable permit requirements.
- Not encourage development in hazardous areas.
- Contribute to both the short and long term solutions to the hazard vulnerability risk problem.
- Assuring the benefits of a mitigation measure is equal to or exceeds the cost of implementation.
- Have manageable maintenance and modification costs.
- When possible, be designed to accomplish multiple objectives including improvement of life-safety risk, damage reduction, restoration of essential services, protection or critical facilities, security or economic development, recovery, and environmental enhancement.
- Whenever possible, use existing resources, agencies and programs to implement the project.

## Environmental Considerations

Natural hazards are naturally occurring phenomena, only becoming natural disasters when humans and there structures become involved. The events themselves play an integral part in maintaining balance in our world. Meteorological, geological, and hydrological processes have shaped Utah for millions of years and will continue to shape the state for millions more years. Modern engineering has made it possible to prevent damage from natural hazards; however, the economic and environmental costs can be rather high. Tampering with natural systems can also create an imbalance in the natural environment. The effects of many of these imbalances are still unknown. It is better to live will a small amount of risk, respecting the natural process where appropriate, than to construct mitigation at every chance. Nature provides its own mitigation measures that need to be identified, protected and/or strengthened. To ensure that our environment is not harmed through mitigation projects all applicable city codes; county codes, state and federal laws pertaining to the environment will and must be followed. A description of all federal laws can be found in *Appendix C*.

# Part II. Planning Process

## Documentation of the Planning Process

This plan was prepared in the offices of the Uintah Basin Association of Governments by appointed staff members Planning Coordinator, Yankton Johnson, and was supported by Ryan Pietramali of DES. Other local agencies that have aided in the process include the city and county GIS departments of the Uintah Basin region. Elected officials including tribal leaders, local officials, emergency managers, police and fire staff members, planning departments, and local governmental agencies have all aided in the planning and implementation process. The planning process was based on Section 322 requirements of the Disaster Mitigation Act of 2000 and supporting guidance documents developed by FEMA and the Utah Division of Emergency Services and Homeland Security. The planning process included the following steps.

1. Organize Resources
2. Public Officials Out Reach
3. Establish Continuity in Planning Process
4. Data Acquisition
5. Hazard Risk Identification and Analysis
6. County Vulnerability Assessment
7. Community Goals Assessment
8. Contact Regional Mitigation Emergency Managers (County & Tribal)
9. Mitigation Strategy Development
10. Prioritization of Identified Mitigation Strategies
11. State Plan Review
12. Adoption

**Step 1: Organize Resources**

The seven regional Associations of Governments (AOG) were recommended to conduct the planning efforts by the Utah League of Cities and Towns and the Governors office of Planning and Budget to ensure coordination with elected officials, emergency managers, planners, public works departments, and information technology specialists. Utah Division of Emergency Services and Homeland Security contracted the seven AOGs as sub-grantees to coordinate, develop, and write the seven multi-regional hazard mitigation plans under he planning guidelines included in the Disaster Mitigation Act of 2000.

Uintah Basin Association of Governments contracted with by the Division of Emergency Services and Homeland Security (DESHS) to conduct the planning for the Uintah Basin region. The association worked closely with local jurisdictions to ensure their input, was incorporated into the plan.

Uintah Basin Association of Governments designated a core planning team. The core planning team made up of members outlined in Table 1 were the main constituents of the planning process from the initiation of the plan to the development and coordination to the resolution of the plan's adoption. Adjunct to

the core planning team a technical team committee was created on a technical level that is identified in Table 2. Table 3 identifies the Uintah Basin Association of Governments regional Disaster Mitigation Planning committee that was formed to assure that the Natural Disasters were covered region wide. The Executive Board (Table 4) was utilized to assure and affirm their respective county local inputs.

**Table 1. Core Planning Team**

| Name | Organization |
|---|---|
| **Yankton Johnson** | Uintah Basin Association of Government |
| **Mike Brennan** | Uintah Basin Association of Government |
| **Ryan Pietramali** | Division of Emergency Services and Homeland Security |

**Table 2. Technical Team Committee**

| Name | Organization |
|---|---|
| **Ryan Pietramali** | Utah Division of Emergency Services and Homeland Security |
| **Lane Nielson** | Wasatch Front Regional Council |
| **LaNiece Dustman** | Wasatch Front Regional Council |
| **Jeff Adams** | Southeastern Utah Association of Governments |
| **Jim Boes** | Wasatch Front Regional Council |
| **Jeff Gilbert** | Bear River Association of Governments |
| **Ken Sizemore** | Five County Association of Governments |
| **Curt Hutchings** | Five County Association of Governments |
| **Andrew Jackson** | Mountainland Association of Governments |
| **Emery Polelonema** | Six County Association of Governments |
| **Edwin Benson** | Six County Association of Governments |
| **Yankton Johnson** | Uintah Basin Association of Governments |

**Table 3. Region-wide Planning Committee**

| Name | Organization |
|---|---|
| **Melba Markham** | Altamont Town employee |
| **Maris Secrest** | Ballard City Manager |
| **Shirley Slaugh** | Daggett County Emergency Manager |
| **Stewart Leith** | Daggett County Commissioner |
| **Winston Slaugh** | Daggett County Emergency Manager |
| **Clint Park** | Duchesne City Mayor |
| **Georg Adams** | Duchesne County Emergency Manager |
| **Lorna Stradinger** | Duchesne County Commissioner |
| **Chuck Dickison** | Manila Town Mayor |
| **Kathleen Cooper** | Myton Town Mayor |
| **Craig Blunt** | Naples City Manager |
| **Brad Hancock** | Roosevelt City Manager |

| Name | Organization |
|---|---|
| **Jerry Turnbow** | Tabiona Town Mayor |
| **Dale Peterson** | Uintah County Emergency Manager |
| **Jim Abegglen** | Uintah County Commissioner |
| **Mechelle Miller** | Uintah County employee |
| **Russ Pearson** | Vernal City Planner |

**Table 4. Executive Board**

| Name | Organization |
|---|---|
| **Chuck Dickison** | Mayor, Chairman |
| **Kathleen Cooper** | Mayor, 1st Vice Chairperson |
| **Mike McKee** | Uintah County Commissioner, 2nd Vice Chairman |
| **Stewart Leith** | Daggett County Commissioner |
| **Craig Collett** | Daggett County Commissioner |
| **Chad Reed** | Daggett County Commissioner |
| **Kent Peatross** | Duchesne County Commissioner |
| **Lorna Stradinger** | Duchesne County Commissioner |
| **Larry Ross** | Duchesne County Commissioner |
| **Dave Haslem** | Uintah County Commissioner |
| **Jim Abegglen** | Uintah County Commissioner |
| **Loyd Burton** | Roosevelt City Mayor |
| **Clint Park** | Duchesne City Mayor |
| **Travis Mitchell** | Altamont Town Mayor |
| **Jerry Turnbow** | Tabiona Town Mayor |
| **Niles Mott** | Naples City Mayor |
| **William Kremin, Jr.** | Vernal City Mayor |
| **Vaughn Parrish** | Ballard City Mayor |

**Step 2: Public Officials Outreach**
To ensure the planning process had backing from the elected officials a representative from Uintah Basin Association of Government met with each County Commission and each city mayor to inform them of the need for the plan and how it can better help the communities. With local support in place the plan was introduced to commissioners and other elected officials along with public entities by means of an informational brochure that was created by the Wasatch Front AOG *(refer to Appendix L).*

**Step 3: Establish Continuity in the Planning Process**
Mitigation planning within Uintah Basin Association of Governments was part of a Pre-Disaster Mitigation Planning initiative to meet the requirements of the Disaster Mitigation Act of 2000. To meet this requirement the seven Associations of Government were contracted by the Division of Emergency Services and Homeland Security to assist the 29 counties with completion of a mitigation plan, which meets the requirements of sections 322. The Seven Associations of Government formed a Technical Team Planning committee to share ideas and

ensure the plans were similar and that there was little duplication of effort. Planners from the Uintah Basin Association of Governments were involved with this committee. Please refer to Table 2 above.

**Step 4: Data Acquisition**
Contact was made with designated personnel in each city and county to assess what data was available on the local level. Agreements were put in place, where needed, to allow the Association of Governments planning staff use of county and city data. Data layers obtained included some or all of the following: local roads, plot maps, county tax assessor's data, hazard data, flood maps, topographic data, aerial photographs, and land development data.

**Step 5: Hazard Risk Identification and Analysis**
This step was conducted by gathering data on the hazards that occurred in the planning area. This information was gathered from local, state, and federal agencies and organizations, as well as, from newspaper and other local media accounts, state and local weather records, conversations, surveys, interviews, and meetings with key informants within the planning area. Mitigation discussions were held during this process and are explained in further detail in Table 4 below. During these meeting attendees had the opportunity to review the general information on previous hazards and comment on them in a more specific manner. These meeting also provided a forum for discussion on the background information that was needed to gain a general understanding of the geography, geology, recreation, natural resources, and water resources of the Planning Area. These initial contacts with local entities also provided visual understanding of the planning area for planners of the Core Planning Team.

**Table 4. Uintah Basin Association Governments Pre-Disaster Mitigation Planning Process Timeline**

| Date | Activity | Purpose |
|---|---|---|
| **March 29, 2002** | Letter of Intent that identifies the seven Associations of Governments as sub-grantees of the state to write the PDM plans. The AOGs were chosen by the Utah Interagency Technical Team who are part of Nature-Safe Utah (Utah's Pre-Disaster Mitigation Program). | Continue the relationship with local council members and municipalities. |
| **May 15-16, 2002** | Utah's first regional mitigation planning training piloted toward the seven AOGs | Establish a guideline and timeframe. |
| **June 18, 2002** | LEPC meeting on DMP | Introduction of Plan and public comment. |
| **July 12,2002** | News Release from Governor Michael Leavitt announcing the new program to develop local hazard mitigation plans statewide. | Conduct public awareness and involvement. |
| **August, 2002** | Gather information. | Data Collection. |
| **September 10, 2002** | Meeting. Met with all AOGs and DESHS to discuss the planning process. | Identify planning team and available resources. |
| **September 30, 2002** | Contacted Emergency Managers in the Uintah Basin Region. | Identify level of involvement. |
| **October-November, 2002** | Met with all three counties commissions and 9 mayors in the Uintah Basin region to identify hazards. | Hazard Identification. Went over questionnaires with mayors and commissioners. |
| **October 2, 2002** | Met with the Tri-County LEPC in Duchesne to identify regional hazards. | Data Collection |
| **October 17, 2002** | Met with UBAOG board of directors and public | Introduction of plan and public comment. |
| **November 2002** | Gathered community data for regional data section of the plan. | Data Collection. |
| **November 6, 2002** | Public Meeting. Met with Uintah Basin Association of Governments Executive Board. | Obtain Approval to conduct mitigation planning. |

| Date | Activity | Purpose |
|---|---|---|
| **November 12, 2002** | DMP training mtg with State | Purpose of the DMP |
| **November 22, 2002** | Meeting. Met with technical team members. | Solicit public involvement, Army Corps proposal for flood study, GIS training, timeline, review the regional plans |
| **December 19, 2002** | Gathering data. | Data Collection and public input. |
| **January 10, 2003** | Gathering data. | Data Collection. |
| **January 22, 2003** | Public Meeting. AOG executive director's meeting. | Signed contracts for Army Corps flood proposal. |
| **January 27, 2003** | Met with all 3 County Emergency Managers. | Chose to start with Uintah Counties Annex first. |
| **February 2, 2003** | Met with Uintah County, Naples City, and Vernal City. | Data Collection and discussion of progress reviewed the crosswalk. |
| **February 6, 2003** | Met with Uintah County, Naples City, and Vernal City. | Data Collection and discussion of progress. |
| **February 27, 2003** | Meeting. Met with technical team members in St. George. | Review of plans, mapping. |
| **March, 2003** | Information gathering | Data Collection, plan |
| **April, 2003** | Drafting of the plan. | For review. |
| **April 9, 2003** | Partners Mtg. | Data Collection and discussion of progress. |
| **May 14, 2003** | Meeting. UBAOG Executive Board meeting. | Discussion of progress; plans to DESHS by December with additional money. |
| **May 22, 2003** | Meeting. Met with technical team members at DESHS. | Progress report, deadlines, mapping, mitigation actions, internal webpage. |
| **May, 2003** | Gather mapping data. | Complete hazard identification and profile. |
| **June, 2003** | Website addressing Natural Hazards. | Public involvement and comment. |
| **July 17, 2003** | Meeting. Met with technical team members in Orem City. | Discussed mapping and plan review. |
| **September 2, 2003** | Meeting. Met with Duchesne County Commissioner and Emergency Manager | Vulnerability Assessment |
| **September 11, 2003** | Discussed Draft of PDM Plan with Duchesne County | Commissioners and Emergency Manager |

| Date | Activity | Purpose |
|---|---|---|
| **October 6, 2003** | Met with Daggett County Commissioners and Emergency Manager | Hazard Identification. Reviewed draft plan with emergency manger and commissioners. |
| **October 10, 2003** | Discussed Draft of PDM Plan with Executive Board. | Public Involvement |
| **November 20, 2003** | Discussed Draft corrections from the state with the Duchesne County Commissioner and planner | Reviewed corrections to be made and the crosswalk. |
| **November 24, 2003** | Discussed recommended changes for State Review with Daggett County | Public Involvement; Local LEPC members, Mayor of Manila, Emergency Managers and County Commissioner |
| **December 5, 2003** | Discussed Revised Draft of PDM with the Executive Board | Public Involvement |
| **December 11, 2003** | Discussed Mitigation Strategies with Daggett County. | Local LEPC, Mayor of Manila, Emergency Manager, Commissioners |
| **December 17, 2003** | Discussed Revised changes from the Mitigation Strategies | Local LEPC, Mayor of Manila, Emergency Manager in attendance |
| **January 9, 2004** | Discussed Revised changes from the State. | Public involvement and input. |

**Step 6: County Vulnerability Assessment**
This step was conducted through a review of local base maps, topographical maps, floodplain maps, and other data. A detailed vulnerability analysis was completed with the use of Geographic Information Systems for each county within the Uintah Basin Association of Governments. HAZUS MH was used to determine vulnerability to earthquakes, for the hazards such as floods, landslides, and wildfire of loss estimation methodology was developed by the core planning team, with assistance from the technical team, to determine vulnerability to hazards. Each county section explains the data sources and the methodology used can be found in *Appendix H*. During these meetings attendees had the opportunity to review the specific information on all GIS products and to review areas of vulnerability in association with specific hazards.

**Step 7: Community Goals Assessment**
This step was conducted through a review of the governing documents of the planning area, as well as, conversations, interviews, and meetings with key responsible individuals within the planning area. This step identified what goals

are already established and adopted for the planning area and whether or not they promote or deter mitigation activities.

**Step 8: Contact Regional Mitigation Emergency Managers (County & Tribal)**
Daggett, Duchesne, and Uintah counties along with their respective communities were contacted to ascertain mitigation strategies. These counties and communities have volunteers and individuals with an interest in mitigation and public employees with technical expertise pertinent to mitigation. They include elected officials, county/city planners, county staff, and emergency managers. County emergency managers and their assistants were tasked with completing the Mitigation Strategies Workbook issued by the State Division of Emergency Services and Homeland Security.

**Step 9: Mitigation Strategy Development**
Developing the mitigation strategies was a process in which all of the previous steps were taken into account. Each County was asked to evaluate the vulnerability assessment completed by Uintah Basin Association of Governments and complete the Mitigation Strategies Workbook that can be found in Appendix N. Several counties opted to participate in the County PDM Mitigation Grant sponsored by the State of Utah Division of Emergency Services. Counties identified committee members and conducted meetings. These members consisted of City and County Mayors, planners, emergency managers and land managers (see table 3). These committee members then identified mitigation needs be assessing completed vulnerability analysis and looking at in placed county and city plans.

**Step 10: Prioritization of Identified Mitigation Strategies**
The Disaster Mitigation Act of 2000 requires state, tribal, and local governments show how mitigation actions were evaluated and prioritized. This was completed by the AOGs with assistance from each county and city. Prioritization was done using the STAPLEE method explained in the FEMA How to Guide, 386-3, April 2003 (available online at http://www.fema.gov/fima/planning_howto3.shtm). Using this method, mitigation strategies were assigned a priority of low, medium, or high.

**Step 11: State Review**
The Division of Emergency Services and Homeland Security pulled together a formal PDM plan review committee to insure local plans met the requirements of DMA 2000. This committee reviewed the plans from October 15 through November 1, 2003 and again from January 1 to January 15, 2004 subsequent to submission to FEMA for final review and acceptance.

**Step 12: Adoption**
The plan went through a public hearing process on (date) and was adopted by:

**Daggett County**

- Town of Manila

**Duchesne County**

- Town of Altamont, City of Duchense, Myton City, Roosevelt City, Town of Tabiona.

**Uintah County**

- Ballard Town, City of Naples, Vernal City.

## A. Public Involvement

Public involvement opportunities were available throughout the design and completion of this plan. Such opportunities included a public website for comment and review and public meetings. Emergency managers, the Fire Department, Sheriff Department, State and Local Agencies, all community members that could be affected by a natural disaster within the region, business leaders, educators, non-profit organizations, private organizations, and other interested members were all a part of the planning process.

The Uintah Basin Association of Governments (UBAOG) has developed a local Disaster Mitigation Plan. UBAOG was responsible for development of the plan. The UBAOG Planning Coordinator formed a planning team comprised of representatives form Altamont Town, Ballard City, Daggett County, Duchesne City, Manila Town, Myton City, Naples City, Roosevelt City, Tabiona Town, Uintah County, Vernal City, and the State government. Community groups were also involved in the planning process, such as, but not limited to the Partners Committee, the Local Emergency Preparedness Committee, the Tri-County Local Emergency Preparedness Committee, Forest Service, Bureau of Land Management, and the Tri-County Health Department, which are located in the Uintah Basin region. This team met once a week for the first three months, and twice a month for the next six months, and once a month thereafter. The plan was developed over one year.

An effort was made to solicit public input during the planning process and seven public meetings were held during the formation of the plan. Three at the beginning, two after the first draft was produced, and two after the final draft was produced. Feedback received from the public proved valuable in the development of the plan. Listed below are the dates, location, attendance, and discussions that took place during the meetings.

**June 18, 2002,** The Tri-County LEPC meeting held in Duchesne. The Uintah Basin Association of Governments Planning Coordinator discussed the Disaster Mitigation Planning Process. Questionnaire's were handed out to all those who were in attendance to provide input on possible natural disasters within the Tri-County Region. *(See Appendix L)* Those agencies in attendance were; Tri-County emergency managers, Uintah County LEPC, DES & Homeland Security, NRCS, Farm Service Agency, Water Rights, Uintah Water Conservancy, Forest Service, Ballard Water, UBAOG Planning Coordinator, and Tridell/Lapoint Water,

Tri-County Health Department, Representatives from the Oil and Gas producers, and several local citizens representing the Tri-County region.

**October 17, 2002,** UBAOG Board of Directors Meeting held in Vernal City at the Western Park. Notices were posted two days prior to the meeting to allow public involvement. UBAOG Planning Coordinator discussed the Disaster Mitigation Planning Process. Questionnaire's were handed out to all those in attendance to provide input on possible natural hazards within the Tri-County Region. *(Appendix L)* Those in attendance were; Duchesne County Citizens, Uintah County Citizens, two Duchesne County Commissioner's, two Uintah County Commissioner's, Myton City Mayor, Vernal City Mayor, Roosevelt City Citizens, Vernal City Citizens, Daggett County Commissioner, Uintah County Public Lands Specialist, Representation from Senator Bennett's office, Consultant for Public Lands, UBAOG Planning Coordinator, Altamont Town citizen, UBAOG Executive Director, and the Uintah County Building Inspector.

**December 19, 2002,** UBAOG Board of Directors Meeting held in Vernal City at the Western Park. Notices were posted two days prior to the meeting to allow public involvement. UBAOG Planning Coordinator explained that letters have been sent out to each city, town, and county to designate an individual to act in behalf of their jurisdiction. The information will be collected and compiled as a rough draft for public comments and input. Individuals were appointed for each jurisdiction to be a part of the Disaster Mitigation Planning Committee. UBAOG Planning Coordinator explained that the Director of DESHS met with them on November 12, 2002 regarding the Plan. Those in attendance were; All three Duchesne County Commissioner's, Ballard City Mayor, Myton City Mayor, all three Uintah County Commissioner's, Roosevelt City Mayor, two Daggett County Commissioner's, Duchesne County citizens, Uintah County citizens, Uintah County public lands specialist, Representation from Senator Bennett's office, Duchesne County Water Conservancy District, Representation from Congressman Cannon's office, Public lands Consultant, Representation of the local radio station, UBAOG Planning Coordinator, UBAOG Executive Director, and Engineering Services, Inc.

**April 9, 2003,** Partners meeting held at the Vernal BLM office. Notices were emailed to those in attendance two weeks prior to the meeting. UBAOG Planning Coordinator explained the purpose the Disaster Mitigation plan. The Planning Coordinator explained how they would like to get more involvement from the BLM offices and the Forest Service regarding Wildfire, Drought, and Insect Infestation issues. Questionnaire's were handed out to all those who were in attendance to provide input on possible natural disasters within the Tri-County Region. *(See Appendix L)* The Planning Coordinator explained the importance of obtaining information regarding past natural hazards that have occurred for documentation in the plan. The planning Coordinator mentioned that he would like to sit down with the Bureau of Indian Affairs (BIA) and get their involvement and input into the plan. The planning Coordinator mentioned that he is currently

meeting once a week with the Disaster Mitigation Planning Committee every Friday at the Uintah County Building Conference room and extended an invitation to the all those who wanted to attend. Those in attendance were; Dave Howell Vernal Bureau of Land Management (BLM), Walt Donaldson, Division of Wildlife Resources (DWR), Chester D. Mills, Bureau of Indian Affairs (BIA), George Weldon, Forest Service, Larry Ross and Kent Peatross, Duchesne County Commissioners, Heather Hoyt, Uintah County Grants administrator, Howard Cleavinger, BLM, Dave Moore, BLM, Laura West, Forest Service, Rhonda Ayala, Dinosaurland Resource Conservation Development, Craig Collett, Daggett County Commissioner, Robert Specht, BLM, Yankton Johnson, UBAOG Planning Coordinator, and Kirt Higgins, State Institution Trust Lands Association.

**October 10, 2003,** UBAOG Board of Directors Meeting held in Vernal City at the Western Park. Notices were posted two days prior to the meeting to allow public involvement. The UBAOG Planning Coordinator handed out a copy of the Disaster Mitigation rough draft to each of the elected officials for all 12 entities in which the plan will represent. He explained that the portion he was handing out covered each of the 12 entities. He explained, that the portion he was handing out was put together with the help of each Counties Emergency Managers, GIS people, County Commissioner's, City Planner's, and public involvement. The UBAOG Planning Coordinator explained that the plan would be sent back to the state by October 15, 2003 for the first review. Those in attendance included; Myton City Mayor, two Duchesne County Commissioner's, two Daggett County Commissioner's, one Uintah County Commissioner, Ballard City Mayor, Naples City Mayor, Altamont Town citizen, Tabiona Town citizen, Daggett County citizens, Duchesne County citizens, Uintah County citizens, Representative from Senator Bennett's office, Hanna Water and Sewer District, Ballard City citizens, Roosevelt City citizens, UBAOG Executive Director, and Myton City citizen.

**December 5, 2003,** UBAOG Board of Directors Meeting held in Vernal City at the Western Park. Notices were posted two days prior to the meeting to allow public involvement. The UBAOG Planning Coordinator handed out a copy of the Disaster Mitigation rough draft to each of the elected officials for all 12 entities in which the plan will represent. He explained that the portion he was handing out covered each of the 12 entities. He explained, that the portion he was handing out was put together with the help of each Counties Emergency Managers, GIS people, County Commissioner's, City Planner's, and public involvement. The UBAOG Planning Coordinator explained that the plan would be sent back to the state by December 30 for a second review. After which, the following motion was made. **UBAOG MOTION: Commissioner Ross made the motion to move to the second report, Mayor Burton seconded, motion carried.** The Capital Improvements Plan rating and ranking was also discussed and how the Capital Improvements Planning that occurs in the future will contribute and be a reflection of the goals in the Disaster Mitigation Plan. Those in attendance included; Manila Town Mayor, Myton City Mayor, all three Uintah County Commissioner's, two Duchesne County Commissioner's, two Daggett County

Commissioner's, Ballard City Mayor, Roosevelt City Mayor, Duchesne City Mayor, Naples City Planner, Small Business Development Center Representative, Vernal Area Chamber of Commerce, Duchesne County Chamber of Commerce, Uintah County Economic Development, Department of Workforce Services, Executive Assistant to Daggett County, Altamont Town Citizen, Roosevelt City citizens, Ballard City citizens, Uintah County citizens, Daggett County citizens, UBAOG Planning Coordinator, UBAOG Executive Director, and Duchesne County citizens.

**January 9, 2004,** UBAOG Board of Directors Meeting held in Uintah County at the Uintah County Courthouse. Notices were posted two days prior to the meeting to allow public involvement. The UBAOG Planning Coordinator explained that the plan was submitted to the State for review with them responding that it looked really good and only a minimal changes needed to be made. He said, that once he makes the changes he will send it back to the State and if it meets State approval they will forward the plan on to FEMA for final approval. He reminded the Board that between March and June of 2004 he will be requesting signatures from each of the 12 jurisdictions covered in the plan stating that they agree with the contents in the plan and that they will sign a resolution to that affect. The Capital Improvements Plan rating and ranking was also discussed and how the Capital Improvements Planning that occurs in the future will contribute and be a reflection of the goals in the Disaster Mitigation Plan. Those in attendance included; Myton City Mayor, two Uintah County Commissioner's, two Duchesne County Commissioner's, Roosevelt City Mayor, Ballard City Mayor, Naples City Planner, Vernal City Mayor, Daggett County Administrator, Johnson Water District, Sunrise Engineering, Inc., Department of Workforce Services, Duchesne County Chamber of Commerce, Uintah County Economic Development, Duchesne County Economic Development, Vernal City residents, Roosevelt City residents, Altamont Town residents, Uintah County residents, UBAOG Planning Coordinator, and UBAOG Executive Director.

## B. Information Sources

- Federal Emergency Management Agency (How-to Guides).
- National Weather Service (Hazard profile).
- National Climate Data Center (Drought, Severe Weather)
- Army Corps of Engineers (Flood data).
- Utah Division of Emergency Services and Homeland Security (Salt Lake City Mitigation Plan, GIS data, Flood data, HAZUS data for flood and earthquake).
- Utah Geologic Survey (GIS data, Geologic information).
- Utah Division of Forestry, Fire and State Lands (Fire data).
- Utah Avalanche Center, Snow and Avalanches in Utah Annual Report 2001-2002 Forest Service.
- Utah Automated Geographic Resource Center (GIS data).

- University of Utah (drought climate charts from internship students).
- University of Utah Seismic Station (Earthquake data).
- Utah State University (climate data).
- Councils or Government
- Association of Governments
- Daggett County and municipalities (Water Master Plan, Emergency Operations Plans, Histories, mitigation actions, public input, GIS data, Assessor data, Transportation data, Property and Infrastructure data).
- Duchesne County and municipalities (Water Master Plan, Emergency Operations Plans, Histories, mitigation actions, public input, GIS data, Assessor data, Transportation data, Property and Infrastructure data).
- Uintah County and municipalities (Municipal Water Plans, Greenwich Water Plan, Emergency Operations Plans, Histories, mitigation actions, public input, GIS data, Assessor data, Transportation data, Property and Infrastructure data).

**Other Plans:**

- Earthquake Safety in Utah
- Utah Natural Hazard Handbook
- Utah Statewide Fire Risk Assessment Project
- A Strategic Plan for Earthquake Safety in Utah
- Natural Disaster Analysis, State of Utah Office of Emergency Services 1976
- State of Utah Mitigation Plan 1999 and 2001
- State of Utah Wildfire Plan 2002
- State of Utah Drought Plan
- State of Utah Water Plan
- Salt Lake City Mitigation Plan 2002
- Planning for a Sustainable Future
- Town of Merrimack, NH Hazard Mitigation Plan 2002
- Clackamas County Mitigation Plan 2002
- Hazard Mitigation Plan Dunkerton, Iowa
- Dunn County North Dakota Multi-Hazard Mitigation Plan 2001
- Jefferson County West Virginia All Hazard Mitigation Plan 2003

## Plan Methodology

The information in this mitigation plan is based on research from a variety of sources. UBAOG/DES conducted data research and analysis, facilitated steering committee meetings and public workshops, developed the final mitigation plan, and presented the plan for formal adoption with participating jurisdictions. The research methods and various contributions to the plan include:

**State and federal guidelines and requirements for mitigation plans:**

During the completion of this plan UBAOG examined and followed state and federal guidelines and requirements. These guidelines included FEMA planning standards, National Flood Insurance Program's Community Rating system, FEMA Flood Mitigation Assistance Program and various State reference material. A list of guidelines and requirements is as follows:

- FEMA 386-1,2,3,4,5,6,7,8,9
- FEMA Post Disaster Hazard Mitigation Planning Guidance DAP-12
- Disaster Mitigation Act of 2000
- 44 CRF parts 201 and 206, Interim Final Rule
- FEMA Region VIII "crosswalk"

**Previous plans and studies:**
UBAOG examined existing mitigation plans from around the country and incorporated numerous plans and studies from within the jurisdictions they serve. These plans include:

- City of Naples Storm Water Master Plan
- State Water Plan
- Utah State Water Plan Uintah Basin (December, 1999)
- Utah Statewide Fire Risk Assessment Project
- Natural Disaster Hazard Analysis, State of Utah Office of Emergency Services 1976
- Salt Lake City Mitigation Plan 2002
- State of Utah Mitigation Plan 1984, 1985, 1999 and 2001
- State of Utah Wildfire Plan 2002
- State of Utah Drought Plan
- State of Utah Water Plan
- Uintah Basin Flood Hazard Identification Study
- Emergency Operations Plans for Daggett, Duchesne, and Uintah Counties.
- University of Utah Seismograph Stations History of Utah Earthquakes
- National Weather Service "Flood and Flash Flood Deaths in Utah"
- Snow and Avalanches in Utah Annual Report 2001-2002 Forest Service Utah Avalanche Center.
- Town of Merrimack, New Hampshire Hazard Mitigation Plan 2002
- Clackamas County Mitigation Plan 2002
- Dunn County North Dakota Multi-Hazard Mitigation Plan 2001

**Hazard specific research and Vulnerability Methodology**
UBAOG collected data and compiled research on nine hazards: dam failure, drought, earthquake, flooding, infestation, slope failure, problem soils, severe weather, and wildfire. Research materials came from a variety of agencies including DES, AGRC, USGS, USACE, UGS, UFFSL, county GIS, city GIS, County Assessors, and County Emergency Managers. Historical data used to define historic disasters was researched through local newspapers, interviewing residents, local knowledge derived through committee meetings, historic state

publications, Utah Museum of Natural History, and recent and historic scientific documents and studies.

### Vulnerability Methodology

Geographic Information Systems (GIS) were used as the basic analysis tool to complete the hazard analysis for the Uintah Basin Association of Governments Pre-disaster Mitigation Plan. For most hazards a comparison was made between digital hazard data and census 2000 demographic information. Fortunately digital data exist statewide for landslides, quaternary faults, wildfire, dam locations, and epicenter locations. The goal of the vulnerability study is to estimate the number of homes, and infrastructure vulnerable to each hazard and assign a dollar value to this built environment. To this end, census data and natural hazard maps are the basic information used in the analysis. All the analysis takes place within the spatial context of a GIS. With the information available in spatial form, it is a simple task to overlay the natural hazards with census data to extract the desired information.

### Earthquakes

HAZUS MH shorthand for Hazards United States Multi-Hazard was used to determine vulnerability as it relates to seismic hazards for the study area. The HAZUS-MH Earthquake Model is designed to produce loss estimates for use by federal, state, regional and local governments in planning for earthquake risk mitigation, emergency preparedness, response and recovery. The methodology deals with nearly all aspects of the built environment, and a wide range of different types of losses. Extensive national databases are embedded within HAZUS-MH, containing information such as demographic aspects of the population in a study region, square footage for different occupancies of buildings, and numbers and locations of bridges. Embedded parameters have been included as needed. Using this information, users can carry out general loss estimates for a region. The HAZUS-MH methodology and software are flexible enough so that locally developed inventories and other data that more accurately reflect the local environment can be substituted, resulting in increased accuracy.

Uncertainties are inherent in any loss estimation methodology. They arise in part from incomplete scientific knowledge concerning earthquakes and their effects upon buildings and facilities. They also result from the approximations and simplifications that are necessary for comprehensive analyses. Incomplete or inaccurate inventories of the built environment, demographics and economic parameters add to the uncertainty. These factors can result in a range of uncertainty in loss estimates produced by the HAZUS-MH Earthquake Model, possibly *at best* a factor of two or more.

The methodology has been tested against the judgment of experts and, to the extent possible, against records from several past earthquakes. However, limited and incomplete data about actual earthquake damage precludes complete calibration of the methodology. Nevertheless, when used with embedded inventories and parameters, the HAZUS-MH Earthquake Model has provided a credible estimate of such aggregated losses as the total cost of damage and numbers of casualties. The Earthquake Model has done less well in estimating more detailed results - such as the number of buildings or bridges experiencing different degrees of damage.

Such results depend heavily upon accurate inventories. The Earthquake Model assumes the same soil condition for all locations, and this has proved satisfactory for estimating regional losses. Of course, the geographic distribution of damage may be influenced markedly by local soil conditions. In the few instances where the Earthquake Model has been partially tested using actual inventories of structures plus correct soils maps, it has performed reasonably well.

**Landslides and Wildfire**

The methodology used to determined vulnerability for landslides and wildfire within the study area was almost identical. Demographic information from census 2000 was manipulated to obtain vulnerability numbers. The methodology used, assumes and even distribution of built housing across the county and each city within the county. Assuming even distribution a housing density was determined by dividing the total number of homes (census 2000) by the total number of acres. For example the Town of Maeser in Uintah County is 4,153 acres in size and contains 954 housing units. Thus the housing density is .229 i.e. each acre contains .229 housing units.

From this point the number of acres of extreme, high, and moderate wildfire along with acres of historically active landslides were determined for each city and the unincorporated county. Once and acre total was know it was multiplied by the density value for each particular city or county to determine the total number of homes. This new figure was then multiplied by the average housing value as reported by the County assessors office, to determine the total value of potential loss residents. The County assessor gave an average value of $80,000.00 for both Uintah and Duchesne Counties, and $75,000 for Daggett County. In the case of wildfire the value of the land (20% of total) was subtracted from the totals reported in the vulnerability tables. This was done because wildfires do not render the land useless as landslides often do. Additionally content values are not included, which would raise the potential loss numbers for housing by approximately 50%.

Transportation and utilities information was determined using the Geoprocessing Wizard an extension in ArcView 3.2. This extension allows the GIS user to clip one theme based on another. For example the roads theme was clipped by the

landslide theme, resulting in a new shape file containing all of the roads within a historically active landslide area. The new database was then queried through several simple equations to determine the length in miles of each linear feature (pipelines, electric lines, and roads). Once the length of vulnerable infrastructure was determined it was multiplied by cost estimate information from HAZUS MH and the Utah Department of Transportation. These cost include:

| Item | Cost per Mile |
|---|---|
| **Local Roads** | 2,000,000 |
| **State Highways** | 2,413,500 |
| **US Highways** | 2,413,500 |
| **US Interstates** | 3,600,000 |
| **Power Lines** | 48,280 |
| **Gas Lines** | 241,390 |

In addition to the linear features point data such as critical facilities, dams, care facilities, schools, power generation facilities, and substations were analyzed to determine if the feature was within a hazard area. Where point data was determined to be within a hazard area the following values from HAZUS MH were assigned:

| Item | Cost |
|---|---|
| **Small Power Plant** | 100,000,000 |
| **Large Power Plant** | 500,000,000 |
| **Low Voltage Substation 115 KV** | 10,000,000 |
| **Medium Voltage Substation 230 KV** | 20,000,000 |
| **Large Voltage Substation 500 KV** | 50,000,000 |
| **Facility value was assigned based on Square footage.** | |

Limited availability of digital data represented a problem in completing the vulnerability assessment. Potential loss numbers were only determined for earthquakes, landslides, and wildfires in this plan. Additional limitations to the above described analysis method includes:

- Assuming random distribution
- Limited data sets for water, gas, electrical, resulting in, incomplete numbers for these features.
- Lack of digital parcels data from the county assessors office.
- HASUZ MH is not designed for small population counties.
- No digital data for dam failure inundation, flood plains, or infestation.
- Relied on state wide data not intended for manipulation at the scale it was used.
- Data was not field checked, resulting in an analysis wholly dependent on accuracy of data.
- Meta data was lacking on some of the used data sets.

In terms of hazard mapping presentation in this document, simple maps were created to provide a graphical illustration of location. These maps are done at a scale, which allows them to fit on a standard letter sized page rendering the useless. Larger maps can be plotted out upon request. Data manipulation and maps were created as a planning tool, to be used, by interested persons within the Uintah Basin Association of Governments and the jurisdictions the AOG serves. This information should not take the place of accurate field verified mapping from which ordinances need to be based off of.

Effort to analyze hazards related to potential future development areas was also addressed where applicable. This proved to be a very difficult exercise and at best can only identify areas, which need additional research before development should be allowed. No viable source of data exists for this study area to facilitate analysis of future development. Limited zoning data was available but this data does not necessarily indicate which, areas will be developed and which will not.

# Part III. General Regional Data

### Geographic background

Uintah Basin Association of Government UBAG serves the following counties and municipalities with this counties: Daggett, Duchesne, and Uintah. The three counties in the study area are very rural, with the total population of the Uintah Basin being only 40,516. Each counties population is: Daggett 921, Duchesne 14,371, and Uintah 25,244. The principle draining in the area is the Green River with the Duchesne and White Rivers as major tributaries. The Uintah basin is divided into two drainages—the North Slope and the south slope of the Uinta Mountains. Elevations in the basin range from 13,528 feet and Kings Peak in the Uinta Mountains to 4,600 feet along the green river near it’s excite from Uintah

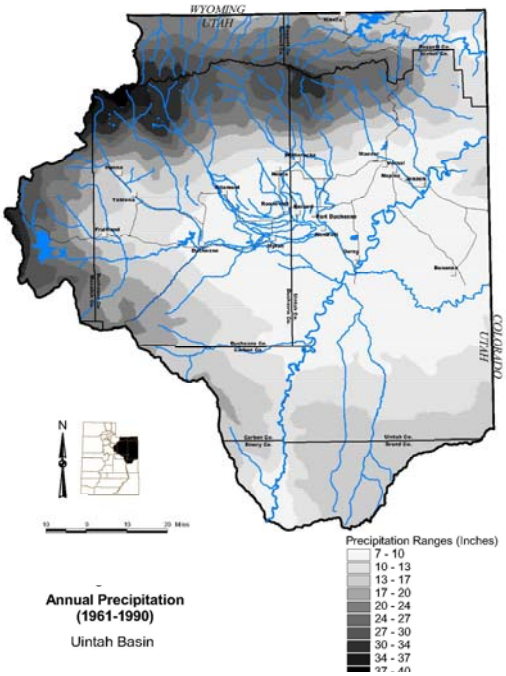
County. *For more information regarding the Demographics, population, and future growth see Appendix J.*

The Uinta Mountain range is unique, being the only major range of mountains in North America running east and west. The Uintah Mountains were extensively glaciated, and glacial features dominate the present landscape. Glacial erosion has created many picturesque examples of horns, arêtes, cirques, and glacial troughs. Lateral and terminal moraines often form natural dams, creating over a thousand small lakes that dot the region.

Numerous small streams exit the north and south slope of the Uinta range. These include such streams as the Sheep Creek, Carter Creek, Currant Creek, Red Creek, Rock Creek, Yellowstone, Whiterocks, and Strawberry River.

**Climate**

Mean annual temperatures in the valleys range from 44° to 47° F. Mean monthly maximum temperatures reach 94.6° F in July, and the mean monthly minimum falls as low as 2.5° F in January. The number of frost-free days ranges from 134 at Roosevelt to 57 near Flaming Gorge. Mean annual precipitation ranges from 7.1 inches at Roosevelt to 12.5 inches at Flaming Gorge Reservoir. The Uinta Mountains receive about 40 inches.




**Geology**

The Uinta Mountain range is Mountains were extensively glaciated, and glacial features dominate the present landscape. Glacial erosion has created many picturesque examples of horns, aretes, cirques and glacial troughs. Deposition by the ice and glacial-melt water has partially filled the many U-shaped valleys with ground moraine and valley trains. It has also lined them with lateral and terminal moraines that have often formed natural dams, creating over a thousand small lakes that dot the region.

**Uintah Basin Generalized Geologic Units**

<u>Quaternary</u>

Qa Unconsolidated deposits of alluvium, colluvium, windblown and landslide origin.

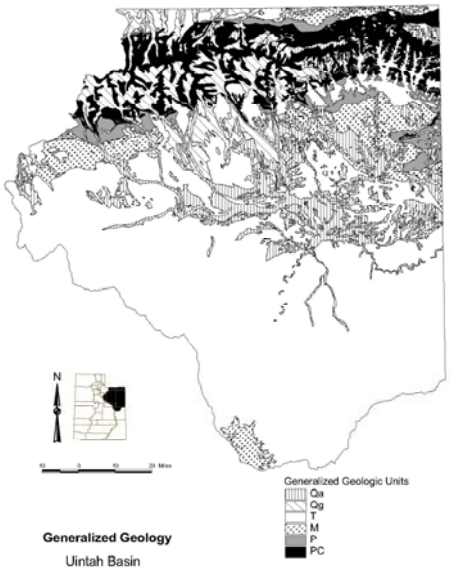
Qg Unconsolidated deposits of glacial origin.

Tertiary

Weakly to semi-consolidated sedimentary basin-filling rocks of the Browns Park, Bishop Conglomerate, Duchesne River, Uinta, Bridger, Green River and Flagstaff formations.

Mesozoic

M Consolidated sedimentary rocks locally include the North Horn, Current Creek, Mesa Verde Group, Mancos Shale, Frontier Sandstone, Mowry Shale, Dakota, Cedar Mountain, Morrison, Curtis, Entrada, Carmel, Nugget (Navajo), Chinle, Moenkopi and Dinwoody Formations.




Paleozoic

P Consolidated sedimentary rocks locally include the following formations: Park City, Weber Sandstone, Morgan, Round Valley Limestone, Doughnut Shale, Humbug, Deseret Limestone, Madison Limestone, Maxfield Limestone and Lodore Sandstone.

Precambrian

Pc Consolidated sedimentary and metamorphic rocks locally include the following: Red Pine Shale, Uinta Mountain Group and Red Creek Quartzite.

## DAGGETT COUNTY

Daggett County identified six natural hazards they wanted addressed in the Daggett County portion of this multi-jurisdictional plan. Through input of the planning committee the following hazards were identified:

- Dam Failure
- Earthquakes
- Flooding
- Insect Infestation
- Landslides
- Wildfire

In identifying these hazards the PDM planning committee relied on technical experts, public input, research of past events, and risk assessments completed by the county emergency manager for their Pre-Disaster Mitigation Plan.

The Daggett County PDM planning committee consisted of one County Commissioner, the Mayor of Manila, the County Emergency Managers, the TRI-County Health Department, the County Planning and Zoning, the Executive Assistant to the County Commissioners, several local citizens and the Uintah Basin Association of Governments planning coordinator.

## DUCHESNE COUNTY

Duchesne County identified six natural hazards they wanted addressed in the Duchesne County portion of this multi-jurisdictional plan. Through input of the planning committee the following hazards were identified:

- Dam Failure
- Earthquakes
- Flooding
- Insect Infestation
- Landslides
- Wildfire.

In identifying these hazards the PDM planning committee relied on technical experts, public input, research of past events, and risk assessments completed by the county emergency manager for their Pre-Disaster Mitigation Plan.

The Duchesne County Disaster Mitigation Planning committee consisted of one County Commissioner, the Mayor of Duchesne, the Mayor of Altamont, the

Mayor of Tabiona, the Roosevelt City Manager, the Mayor of Myton, the County Emergency Manager and the Uintah Basin Association of Governments planning Coordinator.

## UINTAH COUNTY

Uintah County identified six natural hazards they wanted addressed in the Uintah County portion of this multi-jurisdictional plan. Through input of the planning committee the following hazards were identified:

- Dam Failure
- Earthquakes
- Flooding
- Insect Infestation
- Landslides
- Wildfire.

In identifying these hazards the Uintah County PDM planning committee relied on technical experts, public input, research of past events, and risk assessments completed by the county emergency manager for there Pre-Disaster Mitigation Plan.

The Uintah County Disaster Mitigation Planning committee consisted of one County Commissioner, the County Emergency Manager, the Vernal City Planner, the Naples City Manager, and Ballard City in and the Uintah Basin Association of Governments planning coordinator.

### Natural Hazards

Natural hazards differ throughout the state and throughout the UBAOG study area, based on variables such as underlying geology, topography, hydrology, development patterns, and climate. For this reason a risk assessment was conducted by the Uintah Basin Association of Governments to determine what natural hazards might affect the Pre-Disaster Mitigation planning. Table 2 illustrates the results of UBAOG risk assessment and how and why each hazard with the potential of affecting areas within the Uintah Basin Association of Governments was identified. In the annexes of this plan identified hazards are planned for on a county-by-county basis, with the exception of drought and severe weather, these hazards are planned for on a region wide (Daggett, Duchesne, and Uintah Counties) basis. It is understood hazards don't recognized political boundaries, politics and the availability of GIS data dictated the planning scope for this mitigation plan.

Natural Hazard Identification Table 2.

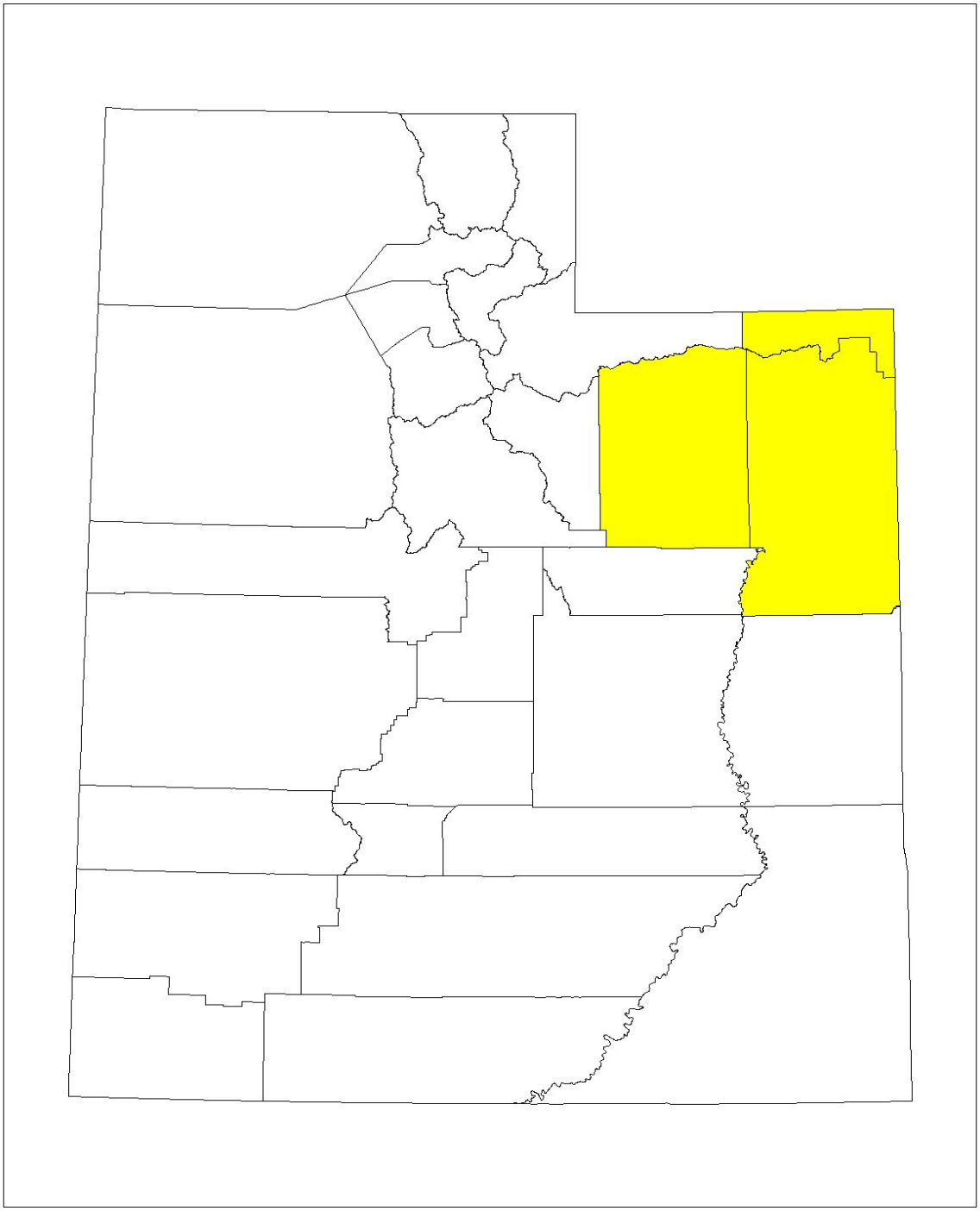
| Hazard | How Identified | Why Identified |
|---|---|---|
| **Dam Failure** | • Review of County Emergency Operations Plans<br>• Assistance from Utah Division of Water Rights, Dam Safety Section<br>• Community's profile | • Can cause serious damage to life and property and have subsequent effects such as flooding, fire, debris flow, etc. |
| **Drought** | • Review of County Emergency Operations Plans<br>• Community's profile<br>• National Climate Data Center<br>• Palmer Drought Severity Index readings | • Affects local economy, water reservoirs, soil<br>• Previous experiences |
| **Earthquake** | • Review of County Emergency Operations Plans<br>• Input from City and County Emergency Operations Managers<br>• United States Geological Survey<br>• Utah Geological Survey<br>• HAZUS analysis | • Utah is predicted, 1/5 chance, to experience a large earthquake within the next fifty years.<br>• Numerous faults throughout Utah<br>• Utah experiences approximately 13 earthquakes a year with a magnitude over 3.0.<br>• Can create fire, flooding, hazardous materials incident, transportation and communication limitations |
| **Flooding** | • Review of County Emergency Operations Plans<br>• Review of past disaster declarations<br>• Input from City and County Emergency Operations Managers<br>• Utah Division of Water Resources<br>• Utah Geological Survey<br>• Flood Insurance Studies<br>• Army Corps of Engineers<br>• Review of County Emergency Operations Plans<br>• Review of past disaster declarations<br>• Input from City and County Emergency Operations Managers<br>• Utah Division of Water Resources<br>• Utah Geological Survey<br>• Army Corps of Engineers | • Associated with drought and dry soils<br>• Several previous incidents have caused severe damage and loss of life<br>• Many of the rivers and streams are located near neighborhoods<br>• Many neighborhoods are located on floodplains, alluvial fans<br>• Associated with drought and dry soils that the State is frequented with<br>• Previous incidents have caused severe damage and loss of life<br>• Many neighborhoods are located near canyon mouths and on floodplains |
| **Infestation** | • Review of County Emergency Operations Plans<br>• Input from County Emergency Managers | • Affects local economy and vegetation |

| Hazard | How Identified | Why Identified |
|---|---|---|
| **Sever Weather (Winter storms, Avalanches, tornados, lightening)** | • Review of County Emergency Operations Plans<br>• Community's profile<br>• Review of County Emergency Operations Plans<br>• Review of past disaster declarations<br>• Input from City and County Emergency Operations Managers<br>• Utah Avalanche Forecast Center<br>• Utah Department of Transportation<br>• Review of County Emergency Operations Plans<br>• National Climate Data Center<br>• National Weather Service Special Publication | • Communities, homes, infrastructure, roads, ski areas, and people can be affected by an Avalanche<br>• Avalanches have caused property damage and loss of life in the past<br>• Have caused property damage and loss of life |
| **Wildland Fire** | • Past Wildfire Occurrences<br>• Review of County Emergency Operations Plans | • Potential structure damage<br>• Watershed damage |
| **Slope Failure (landslide, debris flow and slide)** | • Review of County Emergency Operations Plans<br>• Utah Geological Survey<br>• Input from County Emergency Managers<br>• Community's profile<br>• Community's profile<br>• National Climate Data Center<br>• GIS analysis<br>• Past State Mitigation Plans | • Past incidents have caused loss of life property damage, disruption of power lines and communication<br>• Have caused damage in the past |

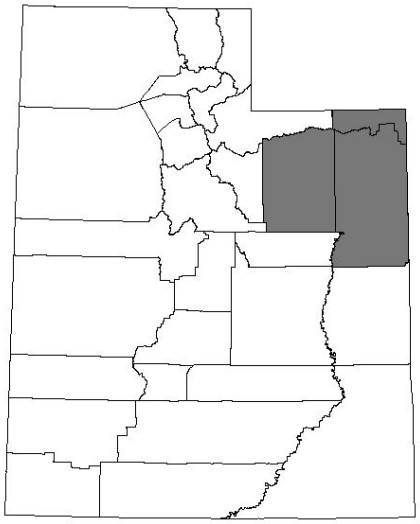
**Annex 1-Uintah Basin Natural Hazard Mitigation Plan Regional Annex**

# Tri-County Regional Annex

**Figure 1: Tri-County Map**



## Description of the Study Area



Uintah Basin Association of Government UBAG serves the following counties and municipalities with this counties: Daggett, Duchesne, and Uintah. The three counties in the study area are very rural, with the total population of the Uintah Basin being only 40,516. Each counties population is: Daggett 921, Duchesne 14,371, and Uintah 25,244. The principle draining in the area is the Green River with the Duchesne and White Rivers as major tributaries. The Uintah basin is divided into two drainages—the North Slope and the south slope of the Uinta Mountains. Elevations in the basin range from 13,528 feet and Kings Peak in the Uinta Mountains to 4,600 feet along the green river near it's excite from Uintah County.

The Uinta Mountain range is unique, being the only major range of mountains in North America running east and west. The Uintah Mountains were extensively glaciated, and glacial features dominate the present landscape. Glacial erosion has created many picturesque examples of horns, arêtes, cirques, and glacial troughs. Lateral and terminal moraines often form natural dams, creating over a thousand small lakes that dot the region. The Uintah Basin is very dependant upon their runoff for water supply. Drought years in the Uintah Basin can be divesting, causing a huge economic impact to the agricultural business. *For more information regarding the economic and demographic data of the region see Appendix J.*

**NATURAL HAZARD: DROUGHT**

**FEMA Hazard Profile for Drought**

| | | | |
|---|---|---|---|
| **Frequency** | Seven – year cycle (currently in fifth year) | | |
| **Severity** | **X** | Catastrophic | **More than 50%** (of the jurisdiction that can be affected) |
| | | Critical | **25 to 50%** (of the jurisdiction that can be affected) |
| | | Limited | **10 to 25%** (of the jurisdiction that can be affected) |
| | | Negligible | **Less than 10%** (of the jurisdiction that can be affected) |
| **Location** | Entire tri- county area, state, or region | | |
| **Seasonal Pattern** | Year – round | | |
| **Duration** | Up to several years, currently area is suffering from 5 years of below average precipitation. | | |
| **Speed of Onset** | Not measurable | | |

**VULNERABILITY:** High

**AFFECT:**

The current drought situation in Daggett, Duchesne, and Uintah County will present a serious threat to the health and safety of its residents, private property, agriculture, the environment and the economy. The severe drought has reduced soil moisture, stream flows, and ground water and reservoir levels. This could result in agricultural, residential and commercial losses of millions of dollars.

The planning areas economy is still tied to agriculture, an economic sector hit hard by drought. Agriculture can with stand one or two years of drought but as the years of below average precipitation grow so do the affects. The affects of drought are cumulative with longer droughts having more affect particularly on the economy and the environment.

Native vegetation has evolved to deal with Utah's dry climate and some amount of variation in precipitation, yet as the length of the drought extends vegetation begins to die off increasing fuel for wildfires. The potential for wildfires throughout the planning area is high and the availability of firefighting resources is expected to be limited as drought conditions worsen. Immediate action is required to protect public health and safety and private property, wildfire, agriculture and the environment. *For a description of drought and possible causes see the drought section in Appendix A*.

**Impacts of Drought**

- Decreased land prices
- Loss to industries directly dependent on agricultural production (machinery and fertilizer manufactures, food processors, dairies, etc)
- Unemployment from drought related declines in production
- Strain on financial institutions (foreclosures, more credit risk, capitol shortfalls)
- Revenue losses to federal, state, and local governments from reduced tax base.
- Reduction of economic development.
- Rural population loss and relocation to larger cities.
- Loss to recreation and tourism industry
- Energy related effects
- Water suppliers revenue shortfalls
- Higher cost of water transport
- Decline in food production causes increase in food prices and increase in importation of food

**Social**

- Mental and physical stress
- Health related low flow problems including cross-connection contamination diminished sewage flows, increased pollutant concentrations, and reduced fire-fighting capabilities.
- Loss of human life
- Public safety concerns caused by increased threat of forest and range fires
- Increases in conflicts of water users.
- Changes lifestyles of those living in rural areas.
- Reduction of modification of recreation activities.
- Public dissatisfaction with government drought response plan

**Environmental**

- Damage to animal species
- Reduction and degradation of fish and wildlife habitat
- Increased contact of wild animals with agricultural producers.
- Loss of biodiversity
- Lower water levels in reservoirs and lakes

- Reduced stream flow.
- Loss of wetlands
- Increased ground water depletion, land subsidence, reduced recharge.
- Increased number and severity of wild fires.
- More dust and pollutants in the air.
- Visual and landscape qualities diminished.

**Generic Mitigation:**

- Educate Daggett County residents on conserving water.
- Reduce water consumption.
- Quickly deal with leaks and breaks in irrigation equipment.
- Monitor water system efficiency.

**Drought History in Uintah Basin**

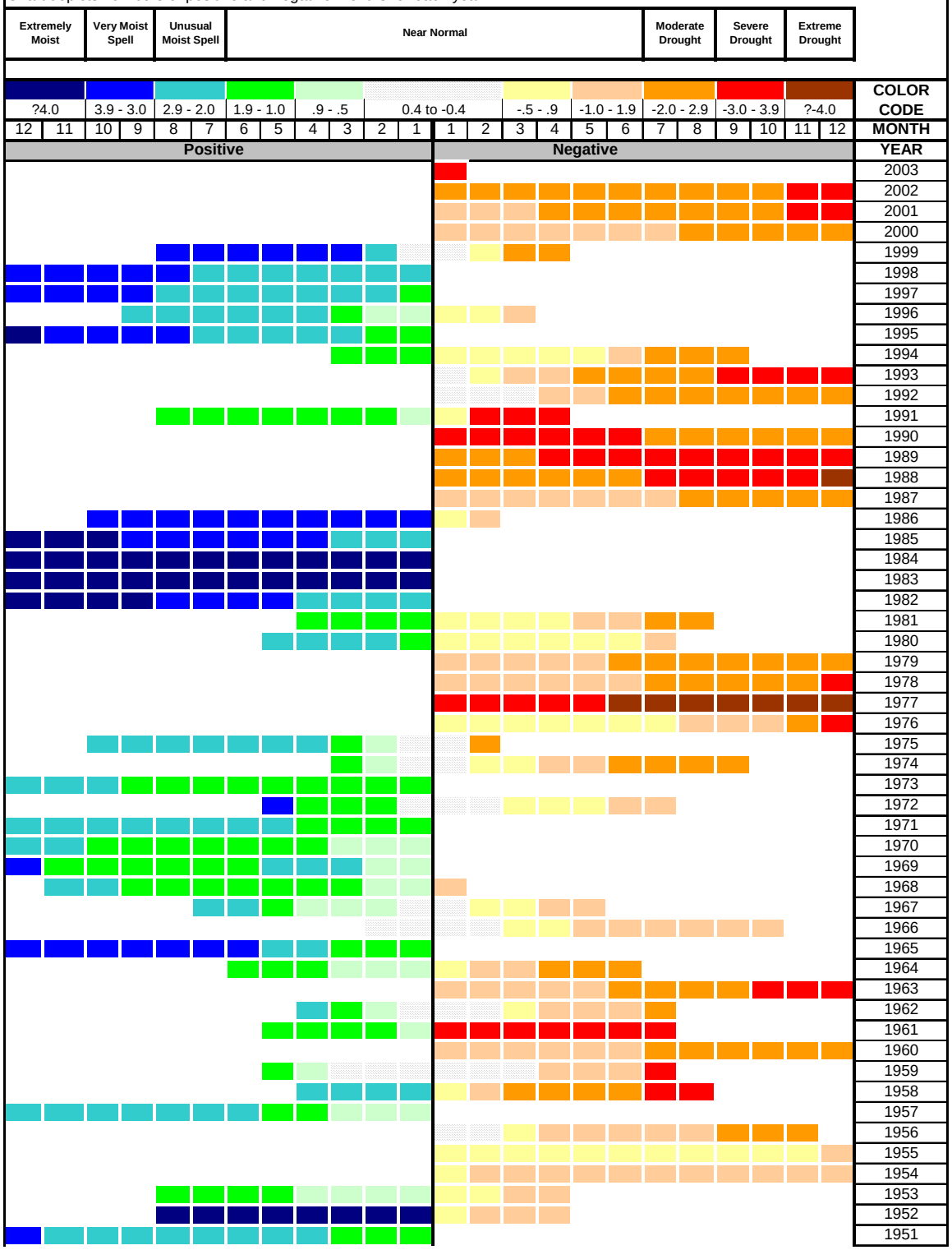
According to Utah's annual Palmer Drought Severity Index Charts, Utah has experienced as many as 60 years of drought out the past 100 years, with several of these being multi-year droughts" (35). Multi-year droughts affecting the entire state occurred during 1896-1905, 1930-1936, 1939-1940, 1953-1956, 1958-1964, 1976-1979, and 1995-1996. Single year droughts occurred during "1924, 1966, and 1974" (State of Utah 35). The Chart below provides a drought history for the Uintah Basin, using date for Utah climate zone five and six, from the present back to 1895. Drought severity is measured using the Palmer Drought Severity Index (PDSI). The PDSI drought severity is represented monthly with a numerical id between +6 and –6 with server droughts having higher negative numbers.

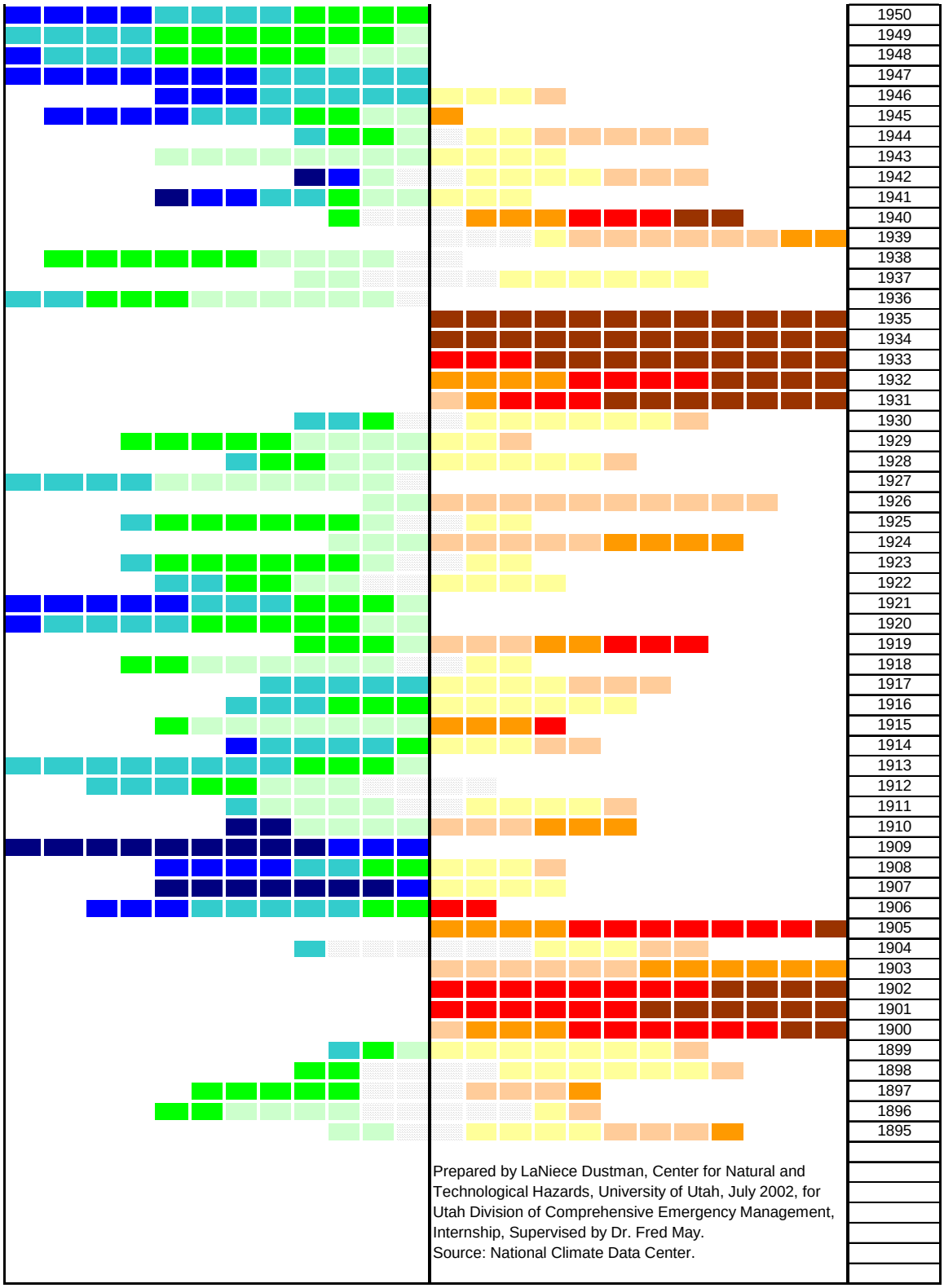
**The Palmer Drought Severity Index**

Palmer Drought Severity Index, an index, developed by Wayne Palmer in the 1960's, which measures drought severity using temperature and rainfall to determine dryness. The Palmer Drought Severity Index or (PDSI) has become the "semi-official" drought index as it is "standardized" to local climate and can be applied to any part of the country. The PDSI uses zero as normal and assigns a monthly numerical id between +6 and -6 with, server droughts having higher negative numbers. Thus, a moderate drought is minus 2, a sever drought minus 3, and extreme drought is minus 4. Excess rain is expressed using plus figures, with plus 2 representing moderate rainfall, etc.

# PALMER DROUGHT SEVERITY INDEX CHART
## UTAH CLIMATE DIVISION 5
## 1895 - 2001

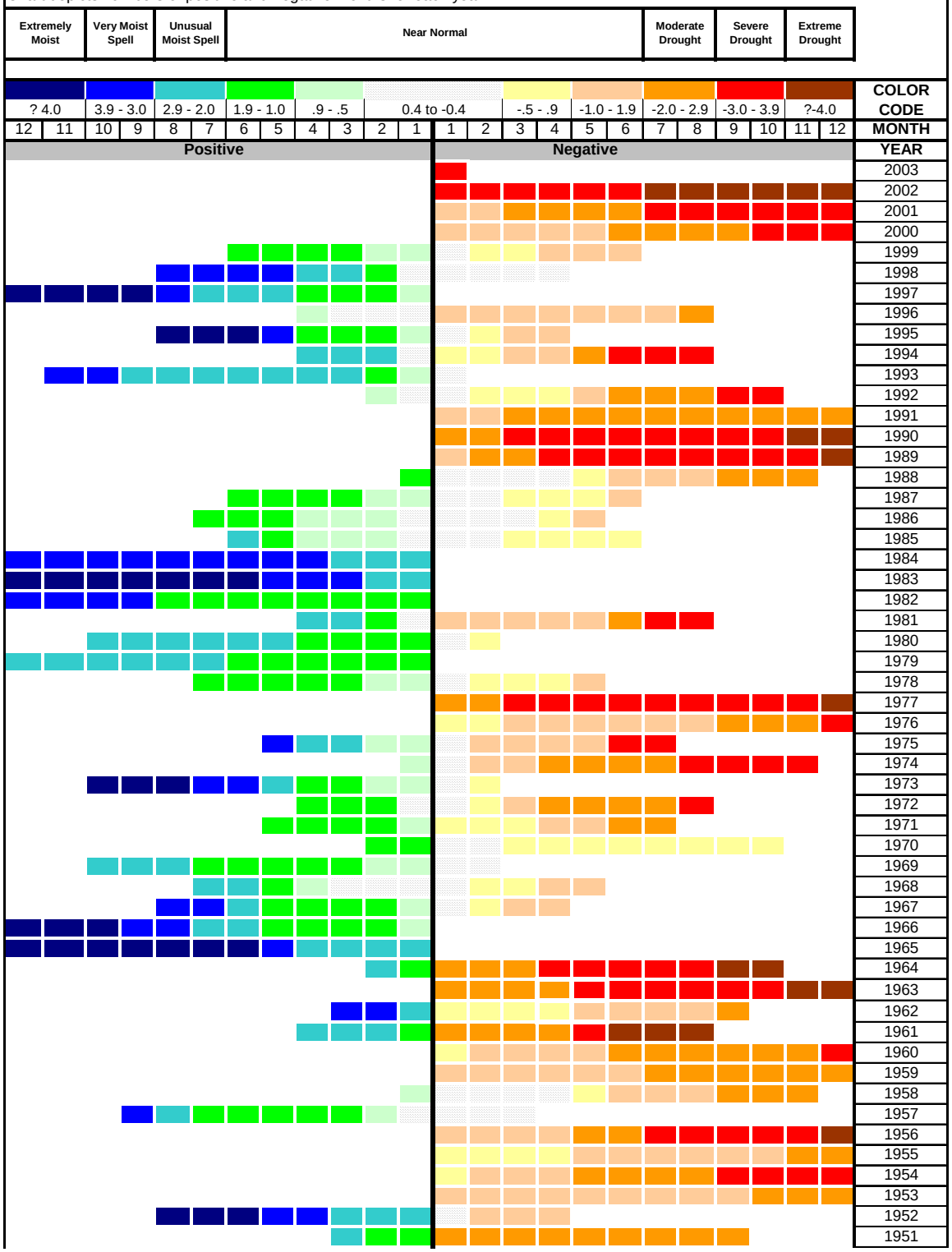
Chart depicts numbers of positive and negative months for each year.

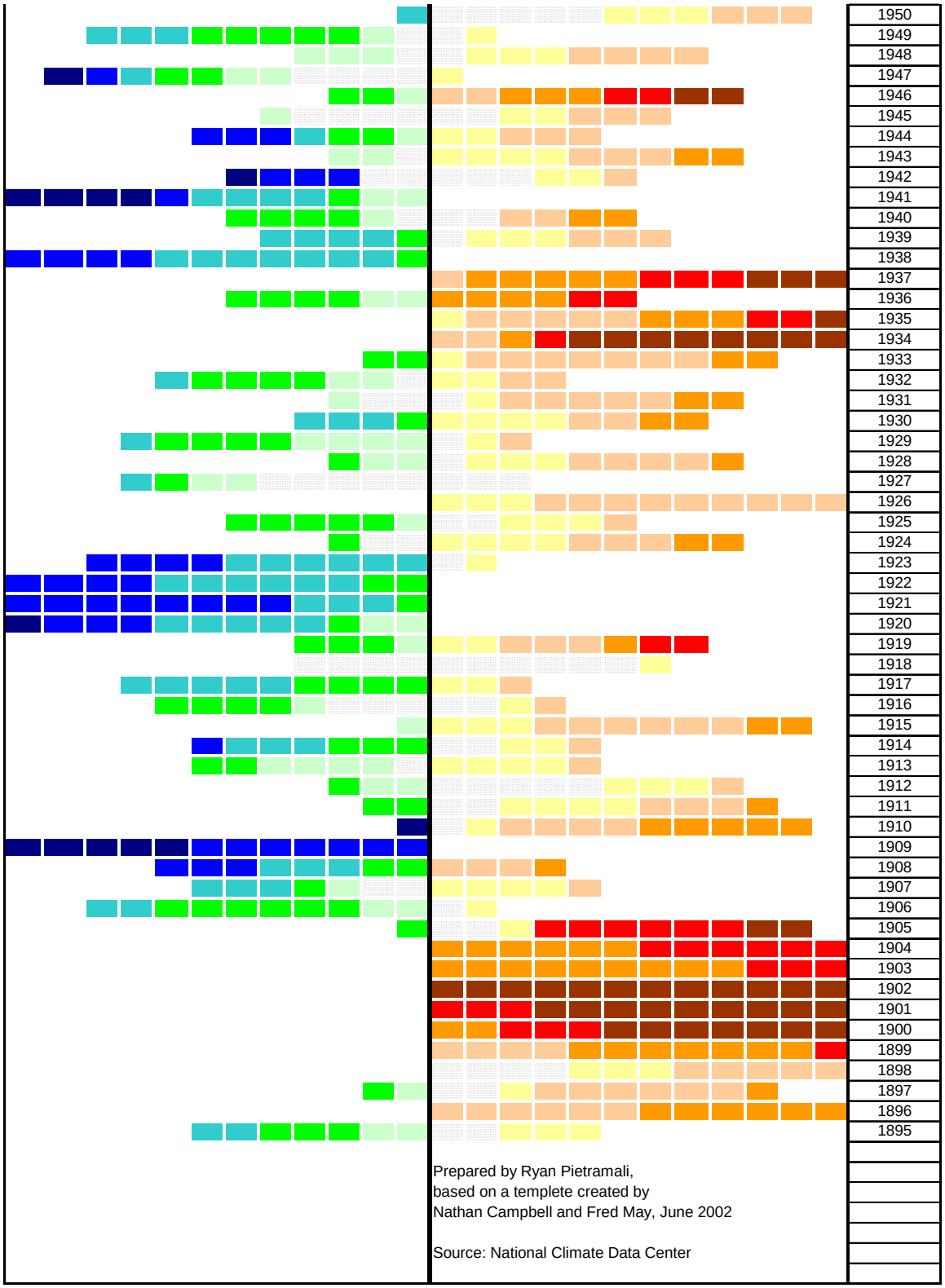



1950
1949
1948
1947
1946
1945
1944
1943
1942
1941
1940
1939
1938
1937
1936
1935
1934
1933
1932
1931
1930
1929
1928
1927
1926
1925
1924
1923
1922
1921
1920
1919
1918
1917
1916
1915
1914
1913
1912
1911
1910
1909
1908
1907
1906
1905
1904
1903
1902
1901
1900
1899
1898
1897
1896
1895
Prepared by LaNiece Dustman, Center for Natural and Technological Hazards, University of Utah, July 2002, for Utah Division of Comprehensive Emergency Management, Internship, Supervised by Dr. Fred May.
Source: National Climate Data Center.

# PALMER DROUGHT SEVERITY INDEX CHART
## UTAH CLIMATE DIVISION 6
## 1895 - 2002

Chart depicts numbers of positive and negative months for each year.




1950
1949
1948
1947
1946
1945
1944
1943
1942
1941
1940
1939
1938
1937
1936
1935
1934
1933
1932
1931
1930
1929
1928
1927
1926
1925
1924
1923
1922
1921
1920
1919
1918
1917
1916
1915
1914
1913
1912
1911
1910
1909
1908
1907
1906
1905
1904
1903
1902
1901
1900
1899
1898
1897
1896
1895
Prepared by Ryan Pietramali,
based on a templete created by
Nathan Campbell and Fred May, June 2002
Source: National Climate Data Center

## NATURAL HAZARD: TORNADO

**FEMA Hazard Profile for Tornado**

| | | | |
|---|---|---|---|
| **Frequency** | | **Highly Likely** | **Near 100% probability in next year** |
| | | **Likely** | **Between 10 and 100% probability in next year, of at least one chance in 10 years** |
| | | **Possible** | **Between 1 and 10% probability in next year, of at least one chance in next 100 years** |
| | **X** | **Unlikely** | **Less than 1% probability in next 100 years** |
| **Severity** | | **Catastrophic** | **More than 50%** (of the jurisdiction that can be affected) |
| | | **Critical** | **25 to 50%** (of the jurisdiction that can be affected) |
| | | **Limited** | **10 to 25%** (of the jurisdiction that can be affected) |
| | **X** | **Negligible** | **Less than 10%** (of the jurisdiction that can be affected) |
| **Location** | Daggett County | | |
| **Seasonal Pattern** | Summer | | |
| **Duration** | Five minutes or less | | |
| **Speed of Onset** | Minimal or no warning | | |

A tornado is a violent windstorm characterized by a twisting, funnel-shaped cloud. It is spawned by a thunderstorm and produced when cool air overrides a layer of warm air, forcing the warm air to rise rapidly. Tornados rarely occur in Utah because of the topography and predominant weather patterns. Several small tornados have occurred in the tri-county area over the past 50 years meaning they could happened again in the future. It is not expected the tornados will be above an F2. It is impossible to predict where tornados will occur, how big they will be, or which areas are more vulnerable or have a hire risk. Research for this plan determined the risk to be the same in any given area.

The damage from a tornado is a result of the high wind velocity and wind-blown debris. Tornado season is generally March through August, although tornadoes can occur at any time of year. They tend to occur in the afternoons and evenings: over 80 percent of all tornadoes strike between noon and midnight.

When a tornado threatens, individuals need to have a safe place to go and time to get there. Even with advances in meteorology, warning times may be short or sometimes not possible. Lives are saved when individuals receive and understand the warning, know what to do, and know the safest place to go.
**Source: http://www.fema.gov/hazards/tornadoes/**
*For a description of tornados and possible causes see the tornados section in Appendix A*.

## NATURAL HAZARD: WINTER STORMS

**FEMA Hazard Profile for Winter Storms**

| | | | |
|---|---|---|---|
| **Frequency** | | **Highly Likely** | **Near 100% probability in next year** |
| | | **Likely** | **Between 10 and 100% probability in next year, of at least one chance in 10 years** |
| | **X** | **Possible** | **Between 1 and 10% probability in next year, of at least one chance in next 100 years** |
| | | **Unlikely** | **Less than 1% probability in next 100 years** |
| **Severity** | **X** | **Catastrophic** | **More than 50%** (of the jurisdiction that can be affected) |
| | | **Critical** | **25 to 50%** (of the jurisdiction that can be affected) |
| | | **Limited** | **10 to 25%** (of the jurisdiction that can be affected) |
| | | **Negligible** | **Less than 10%** (of the jurisdiction that can be affected) |
| **Location** | Duchesne County | | |
| **Seasonal Pattern** | November, December, January, February | | |
| **Duration** | Weeks and sometimes Months | | |
| **Speed of Onset** | 6 to 12 hours warning | | |

A winter storm can range from moderate snow over a few hours to blizzard conditions with blinding wind-driven snow that last several days. Some winter storms may be large enough to affect several states while others may affect only a single community. All winter storms are accompanied by low temperatures and blowing snow, which can severely reduce visibility. A severe winter storm is one that drops four or more inches of snow during a 12- hour period, or six or more inches during a 24-hour span. An ice storm occurs when freezing rain falls from clouds and freezes immediately on impact.
Source: http://www.fema.gov/hazards/winterstorms/

Winter storms can cause havoc in the planning area and in some cases be life threatening. Highway 191 from Vernal to Manila can become impassable during winter storms. Several of the small communities can become isolated during winter storms as the roads become impassable. Because of the elevation and surrounding topography the tri-county planning area has experienced winter storms in the pass and will continue to experience those events.

*For a description of winter storms and possible causes see the severe weather section in Appendix A*.

**VULNERABILITY:** Medium

**AFFECT:**

All winter storms make driving and walking extremely hazardous. The aftermath of a winter storm can impact a community or region for days, weeks, and even months. Storm effects such as extreme cold, flooding, and snow accumulation can cause hazardous conditions and hidden problems for people in the affected area. A harsh winter storm affects the transportation of food and fuel to and from the Wasatch Front, and impacts all retail and grocery stores, restaurants, and gas stations.

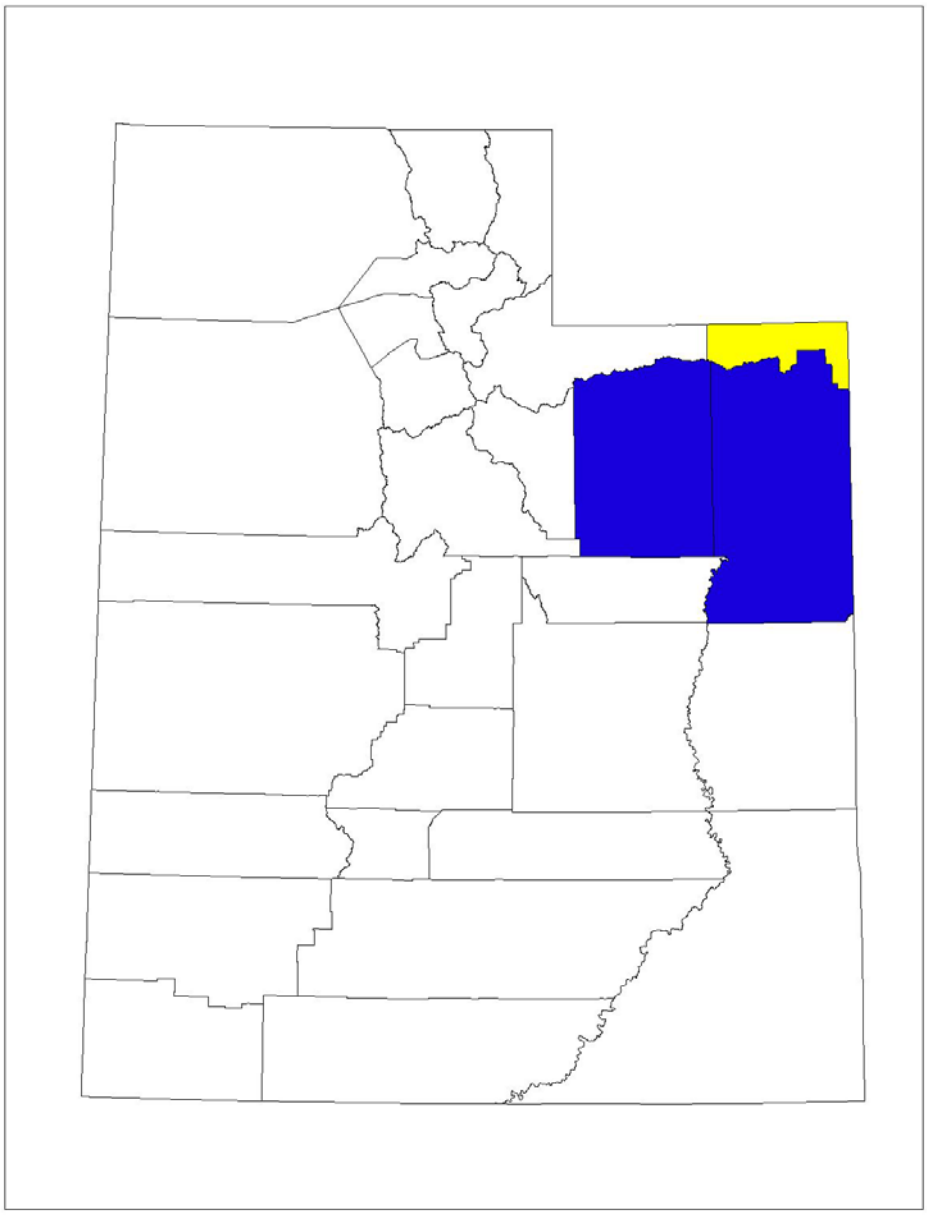
**Generic Mitigation:**

1. Work with UDOT on transportation and road conditions.
2. Revise and up-date building codes for carports, barns and the residential roofs.
3. Public education programs that provide back-up power and heat.
4. Research alternative forms of heat source.
5. Obtain 72 hour kits.
   **http://www.co.multnomah.or.us/sheriff/prepare/supplykit.htm**

Annex 2-Daggett County

# Daggett County Annex

**Figure 1: Tri-county map**



## DAGGETT COUNTY

### Past Hazard Events in Daggett County

Understanding the past is often the key to discovering what the future holds; this is especially true when planning for natural disasters. The fact that the towns within Daggett County have experienced, for example, flooding in the past means flooding can occur in the future. While over time some of the risk has been mitigated, events with low frequency of occurrence often result in hazards with little or no mitigation. Table 1 provides a brief history of Daggett County natural disasters. This table includes only sizable events found during our research, and may not represent the total history.

**Table 1 Daggett County Natural Disaster History**

| Hazards | Date | Location | Critical Facility or Area Impacted | Comments |
|---|---|---|---|---|
| **Flooding** | Summer of 1936 | County Wide | Damage to roads, bridges | No Loss of Life |
| **Flash Flooding** | June 10, 1965 | Palisades Campground | Sheep Creek flash flood took out nearly 10 miles of State Highway | 7 deaths |
| **Drought** | 1977 Summer | All of Daggett County | Heavy impact on agriculture and drinking water for local residents | No Loss of Life |
| **Wildfire** | Summer 1977 | Daggett County | Hundreds of Acres burnt | 3 deaths |
| **Flooding** | Spring of 1983 | County Wide | Damage to culverts and roads. The one lane bridge over Green River was destroyed. | No Loss of Life |
| **Wildfire** | August 18, 1993 | Ruples Assist Fire | Unknown | Unknown |

| Hazards | Date | Location | Critical Facility or Area Impacted | Comments |
|---|---|---|---|---|
| **Drought** | Fall of 2000 | All of Daggett County | Heavy impact on agriculture and drinking water for local residents | No Loss of Life |
| **Wildfire** | Summer of 2002 | Daggett County (Dutch John) | 20,000 acres burnt in Daggett County that cost 1.5 million dollars to put the fire out. | No Loss of Life |
| **Drought** | Currently (2003) | All of Daggett County | Heavy impact on agriculture and drinking water for local residents | No Loss of Life |

Daggett County identified six natural hazards they wanted addressed in the Daggett County portion of this multi-jurisdictional plan. Through input of the planning committee the following hazards were identified:

- Dam Failure
- Earthquakes
- Flooding
- Insect Infestation
- Landslides
- Wildfire

In identifying these hazards the PDM planning committee relied on technical experts, public input, research of past events, and risk assessments completed by the county emergency manager for their Pre-Disaster Mitigation Plan.

The Daggett County PDM planning committee consisted of one County Commissioner, the Mayor of Manila, the County Emergency Managers, the TRI-County Health Department, the County Planning and Zoning, the Executive Assistant to the County Commissioners, several local citizens and the Uintah Basin Association of Governments planning coordinator.

The Disaster Mitigation Plan for Daggett County identifies critical facilities located in the County *(See Appendix B).* A critical facility is defined as a facility in either the public or private sector that provides essential products and services to the general public, is otherwise necessary to preserve the welfare and quality of life in the County, or fulfills important public safety, emergency response, and/or disaster recovery functions. The critical facilities identified in the County were not located in the natural hazard area. *The Uintah Basin Association of Governments did not map the location of the critical facilities in Daggett County. Although GIS analysis found no facilities in hazard prone areas.*

**NATURAL HAZARD: DAM FAILURE**

**FEMA Hazard Profile for Dam Failure**

| | | | |
|---|---|---|---|
| **Frequency** | | **Highly likely** | **Near 100% probability in next year** |
| | | **Likely** | **Between 10 and 100% probability in next year, of at least one chance in 10 years** |
| | **X** | **Possible** | **Between 1 and 10% probability in next year, of at least one chance in next 100 years** |
| | | **Unlikely** | **Less than 1% probability in next 100 years** |
| **Severity** | **X** | **Catastrophic** | **More than 50%** (of the jurisdiction that can be affected) |
| | | **Critical** | **25 to 50%** (of the jurisdiction that can be affected) |
| | | **Limited** | **10 to 25%** (of the jurisdiction that can be affected) |
| | | **Negligible** | **Less than 10%** (of the jurisdiction that can be affected) |
| **Location** | Entire County | | |
| **Seasonal Pattern** | Spring | | |
| **Duration** | Several months to over one year | | |
| **Speed of Onset** | 30 Minutes or less (Minimal or no warning) | | |

## A Word About Dams

Dams are a critical support function for water managers in the State and also act as a flood control measure. If a dam remains stable, does not get overtopped, or is not impaired as the result of an earthquake, then, at a minimum, they do provide incidental flood control. If not then they can add to the flood threat. There are 117 dams within Uintah Basin of these 20 have received an high hazard rating by Utah Division of Water Rights Dam Safety section. The State Dam Safety Section has developed a hazard rating system for all non-federal dams in Utah. Downstream uses, size, height, volume, and incremental risk/damage assessments are a variable used to assign dam safety classification. Using the hazard ratings systems developed by the State Dam Safety Section, dams are placed into one of three classifications high, moderate, and low. Dams receiving a low rating would have insignificant property loss do to dam failure. Moderate hazard dams would cause significant property loss in the event of a breach. High hazard dams would cause a possible loss of life in the event of a rupture. The frequency of dam inspection is designated based on

hazard rating with the Division of Water Rights inspecting high-hazard dams annually, moderate hazard dams biannually, and low-hazard dams every five years. *For a description of dam failure and possible causes dams failure in Daggett County see the Flood Hazard Identification Study in Appendix M.*

**VULNERABLIITY:** High
Low-lying areas down stream from dams are at risk. Under lying geologic conditions in the planning area create difficulties during dam construction. Dams in similar geologic setting in the state have failed in the past; Trial Lake Dam is an example. The aged fractured rock of the Uinta Mountain range contains numerous passages for water through the dams. During dam building these fractures require extensive engineering and grouting.

**AFFECT:**

Dam failure would cause significant downstream flooding to low lying areas. Impacts could include destroyed homes, bridges, roads, crops, utilities, and business loss. Natural dam failures are rare but terrorist could target large dams such as Flaming Gorge.

Description of Hazard

The following high hazard dams exist within Daggett County according to the Utah Division of Dam Safety database.

- Brownie Lake Dam
- East and West Green Lakes
- Flaming Gorge Dam
- Longs Park Dam
- Sheep Creek Lake Dam
- Spirit Lake Dam

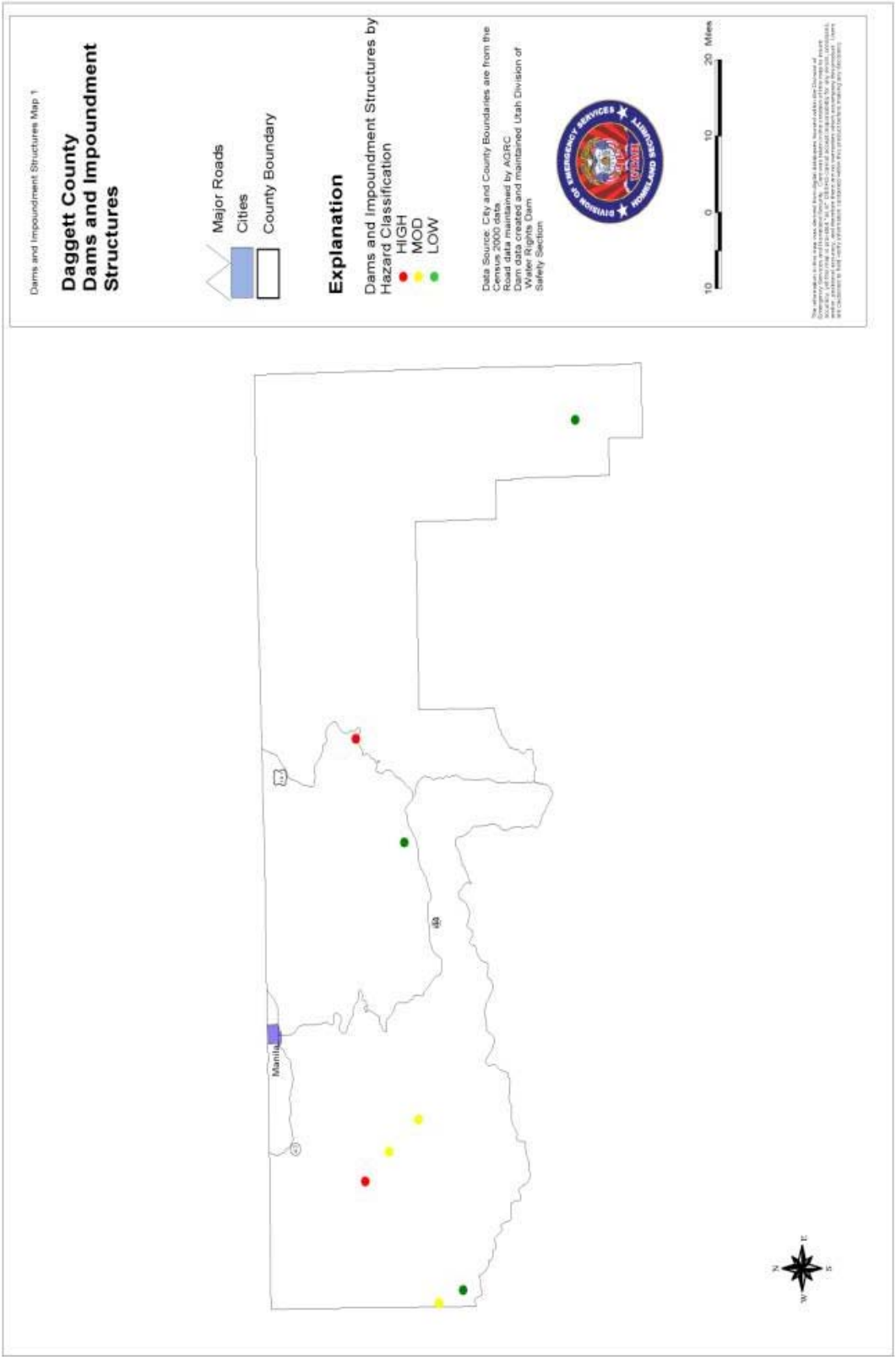
*The map on page 7 illustrates the location of each dam.*

Low-lying areas down stream of these dams are particularly at risk, if a dam were to fail. *For a description of dam failure and possible causes see the dams failure section in Appendix A.*

**Generic Mitigation:**

- Proper mapping of flood plains, including mapping of dam breach flood potential.
- Knowledge must be made public so that emergency managers are aware and the public is aware when they buy and sell property.
- Updated Emergency Action Plans (EAP) and integration with GIS Systems.
- Maintaining proper flood plain and wetland geometry and vegetation will help route floods.

- Flood plain usage should be compatible with flood plain needs.
- More debris dams would help with floods and debris, and mud, and maintaining a flood control pool in existing dams would be beneficial.
- Protection of roads and bridges.
- General infrastructure protection.
- More authority to order releases and better forecasting would help in snowmelt floods and runoff.
- Gather hazard and risk data/information.
- Development of improved mitigation techniques.
- Education of local officials, developers, and citizens.


Dams and Impoundment Structures Map 1
Daggett County
Dams and Impoundment
Structures
Major Roads
Cities
County Boundary
Explanation
Dams and Impoundment Structures by
Hazard Classification
HIGH
MOD
LOW
Data Source: City and County Boundaries are from the
Census 2000 data
Road data maintained by AGRC
Dam data created and maintained Utah Division of
Water Rights Dam
Safety Section
DIVISION OF EMERGENCY SERVICES
HOMELAND SECURITY
10 0 10 20 Miles
Manila
44
7
N
S
E
W

## NATURAL HAZARD: EARTHQUAKE

**FEMA Hazard Profile for Earthquake**

| | | | |
|---|---|---|---|
| **Frequency** | | **Highly Likely** | **Near 100% probability in next year** |
| | | **Likely** | **Between 10 and 100% probability in next year, of at least one chance in 10 years** |
| | **X** | **Possible** | **Between 1 and 10% probability in next year, of at least one chance in next 100 years** |
| | | **Unlikely** | **Less than 1% probability in next 100 years** |
| **Severity** | **X** | Catastrophic | **More than 50%** (of the jurisdiction that can be affected) |
| | | Critical | **25 to 50%** (of the jurisdiction that can be affected) |
| | | Limited | **10 to 25%** (of the jurisdiction that can be affected) |
| | | Negligible | **Less than 10%** (of the jurisdiction that can be affected) |
| **Location** | Entire county | | |
| **Seasonal Pattern** | Near fault lines of the County | | |
| **Duration** | Hours | | |
| **Speed of Onset** | Minimal or no warning | | |

An earthquake is a sudden, rapid shaking of the Earth caused by the breaking and shifting of rock beneath the Earth's surface. This shaking can cause buildings and bridges to collapse; disrupt gas, electric, and phone service; and sometimes trigger landslides, avalanches, flash floods, fires, and huge destructive ocean waves (tsunamis). Buildings with foundations resting on unconsolidated landfill, old waterways, or other unstable soil are most at risk. Buildings or trailers and manufactured homes not tied to a reinforced foundation anchored to the ground are also at risk since they can be shaken off their mountings during an earthquake. Earthquakes can occur at any time of year.
Source: http://www.fema.gov/hazards/earthquakes/
*For a description of earthquakes and possible causes see the earthquake section in Appendix A.*

Daggett County is an area of limited seismic activity. The Pot Creek faults in eastern Daggett County are the only faults located within the County. This poorly understood group of faults has moved within the last 1.6 million years. However,

because of the limited seismic danger Daggett County is zoned for little or no activity. *The map on page 14 and 15 identify Epicenters and Quaternary Faults and gives an explanation for each in Daggett County.*

**VULNERABILITY:** Low

The map on page 10 shows the national Peak Ground Acceleration (PGA) values for the United States with a 10% chance of being exceeded over 50 years. This is a common earthquake measurement that shows three things: the geographic area affected (all colored areas on the map), the probability of an earthquake of each given level of severity (10% chance in 50 years), and the severity (the PGA is indicated by color). ***2. Locate your planning area on the map.***

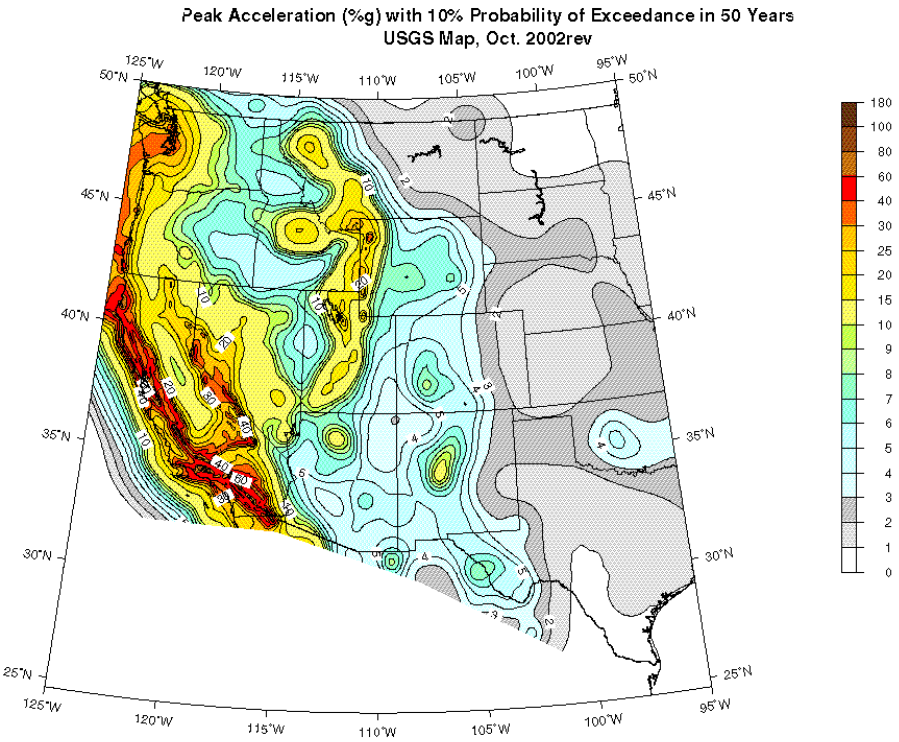
You can also generate maps based on zip codes or longitude and latitude by following the directions on the Website. ***3. Determine your Peak Ground Acceleration.***
Determine the PGA zone(s) in which your planning area is located. This is done by identifying the color associated with your planning area and correlating it with the color key located on the map. Large planning areas may be located in more than one zone.

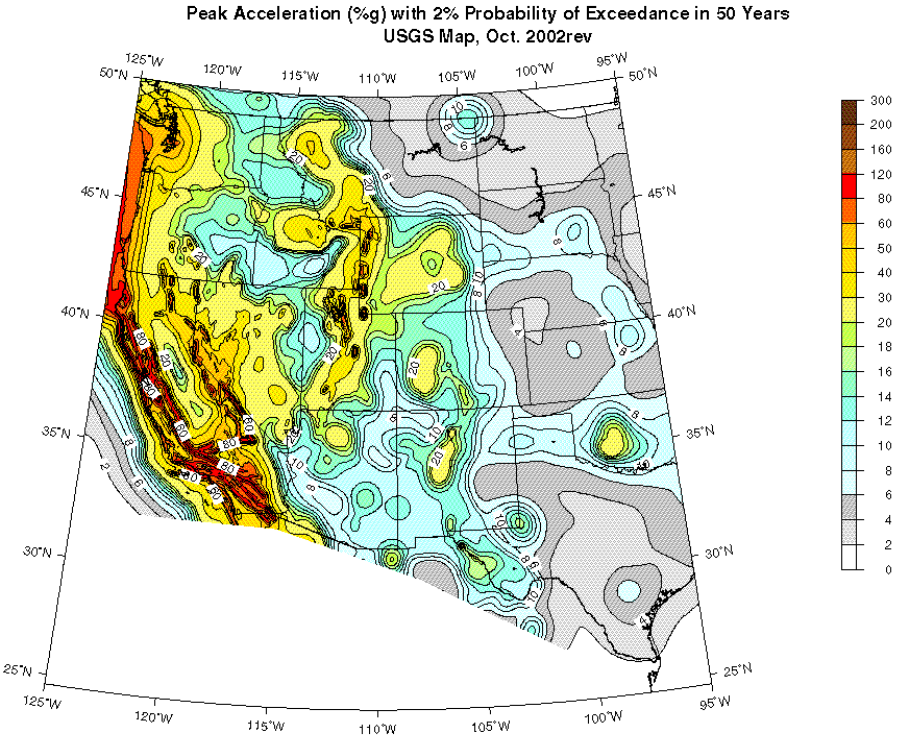
Peak ground acceleration (PGA) is a measure of the strength of ground movements. The PGA measures the rate in change of motion relative to the established rate of acceleration due to gravity (g) (980cm/sec/sec). For example, In an earthquake with an acceleration of the ground surface of 244 cm/sec/sec, the PGA or rate in change of motion is 25% g where:

%g= Ground Surface Acceleration / Rate of Acceleration due to Gravity

%g= 244 cm/sec/sec/980 cm/sec/sec

%g= 25%


Peak Acceleration (%g) with 10% Probability of Exceedance in 50 Years
USGS Map, Oct. 2002rev
125°W
120°W
115°W
110°W
105°W
100°W
95°W
50°N
45°N
40°N
35°N
30°N
25°N
180
100
80
60
40
30
25
20
15
10
9
8
7
6
5
4
3
2
1
0


Peak Acceleration (%g) with 2% Probability of Exceedance in 50 Years
USGS Map, Oct. 2002rev
125°W
120°W
115°W
110°W
105°W
100°W
95°W
50°N
45°N
40°N
35°N
30°N
25°N
300
200
160
120
80
60
50
40
30
20
18
16
14
12
10
8
6
4
2
0

**POTENTIAL AFFECT:**

A potential earthquake could affect water, oil and gas produced for the Uintah Basin as well as the Wasatch Front. An earthquake could affect transportation and dams. Many homes in Daggett County were not built to meet earthquake standards. *A Full Hazus MH Event Report can be found in Appendix H for earthquakes in Daggett County.*

**HAZUS MH Vulnerability Assessment**

**Table 1.1 Casualties**

| | | |
|---|---|---|
| **Casualties** | Nighttime –Minor | 2 |
| | Nighttime –Major | 0 |
| | Nighttime -Fatalities | 0 |
| | Daytime –Minor | 1 |
| | Daytime –Major | 0 |
| | Daytime- Fatalities | 0 |
| | Commute –Minor | 1 |
| | Commute –Major | 0 |
| | Commute-Fatalities | 0 |

**Buildings/Structures**

**Building Damage by Count --** Building damage is classified by HAZUS in five damage states: none, slight, moderate, extensive and complete. Table1.2 lists the number buildings by occupancy, which is estimated to have moderate to complete levels of damage.

**Table 1.2 –Building Damage by Count with Moderate to Complete Damage**

| **Category** | Number of Structures |
|---|---|
| **Residential** | 311 |
| **Commercial** | 1 |
| **Industrial** | 0 |
| **Totals** | 312 |

**Critical facilities**

| Classification | Total | Least Moderate Damage >50% | Complete Damage > 50% | Functionality > 50% at day 1 |
|---|---|---|---|---|
| **Hospitals** | 0 | 0 | 0 | 0 |
| **Schools** | 3 | 0 | 0 | 0 |
| **EOCs** | 0 | 0 | 0 | 0 |
| **Police Stations** | 1 | 0 | 0 | 0 |
| **Fire Stations** | 2 | 0 | 0 | 0 |

**Debris Removal –**Table 1.4 shows how much debris would be generated by the earthquake and how many loads it would take to remove the debris, based on 25 tons per load. One truck can likely haul one load per hour.

A second debris removal issue is landfill space. Fifty thousand tons (50,000) at a weight to volume ratio of one ton per cubic yard would cover more than ten acres to a depth of one yard.

**Table 1.4 –Debris Generated (millions of tons)/Loads to Remove Debris**

| | |
|---|---|
| **Debris Generated** | 0.04 |
| **Loads (25 tons per load)** | 2,000 |

**Fire Following --**The Great San Francisco Earthquake of 1906 illustrated the hazard a Town could face from fire following an earthquake. Multiple ignitions and broken water mains conspired to make firefighting nearly impossible. HAZUS uses the estimated building damages, loss of transportation infrastructure and estimated winds to calculate the estimated area that would be burned following an earthquake. Table 1.5 provides estimates of ignitions, people at risk and the building stock exposed to fires following an earthquake.

**Table 1.5 –Fire Following Event, Population Exposed, and Building Stock Exposed**

| | |
|---|---|
| **Ignitions** | 1 |
| **People Displaced** | 0 |
| **Value Exposed (mill. $)** | 0 |

*The extremely low loss numbers represented by HAZUS MH are due to Daggett County's limited built infrastructure and low seismic risk.

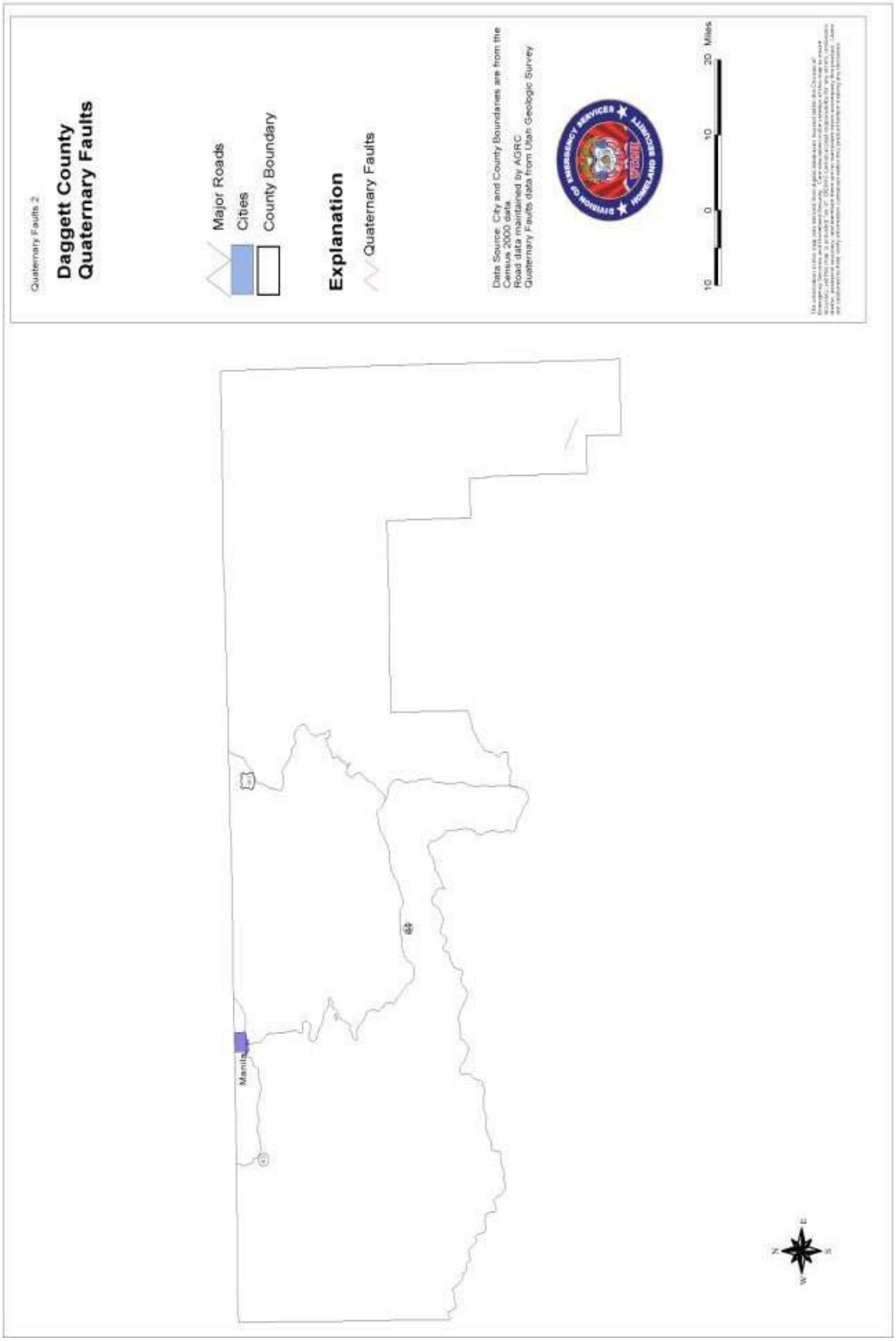
These numbers were derived from a HAZUS MH run based on a probabilistic 2500-year event with a magnitude 7.0 running the soils portion of the model. *The complete HAZUS MH run for Daggett County is available in appendix H.*

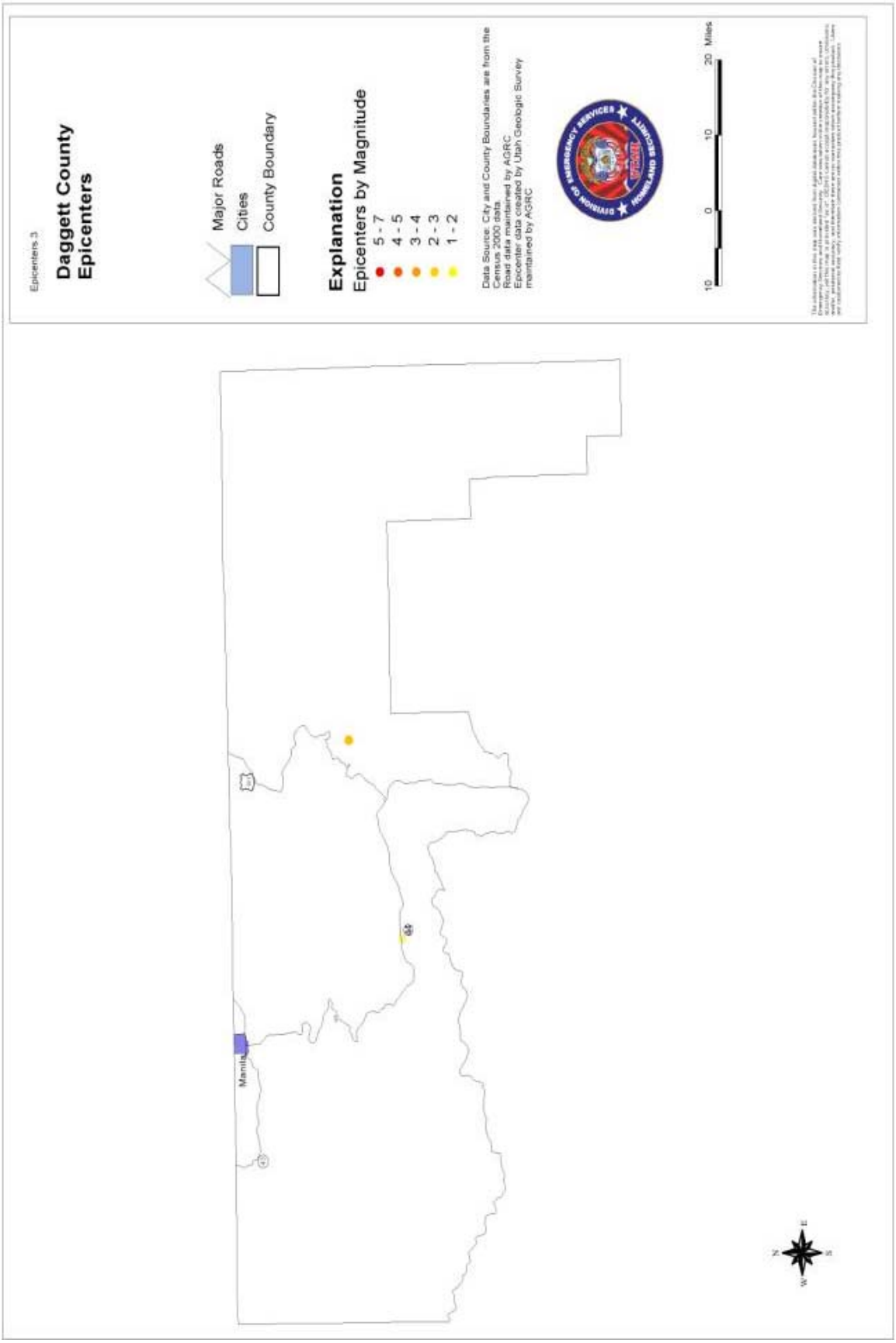
**Generic Mitigation:**

**Generic Ground Shaking Mitigation**
- Understand peak horizontal acceleration and recurrence interval.
- Design appropriately.
- Zoning ordinances and building codes.

**Generic Liquefaction Mitigation**
- Move soil out.
- Densify soils in place.
- Remove ground water.
- Structural design.

**Generic Surface Fault Rupture Mitigation**
- Avoidance
- Zoning ordinances


Quaternary Faults 2
Daggett County
Quaternary Faults
Major Roads
Cities
County Boundary
Explanation
Quaternary Faults
Data Source: City and County Boundaries are from the Census 2000 data.
Road data maintained by AGRC
Quaternary Faults data from Utah Geologic Survey
10 0 10 20 Miles
Manila
44
43
N
E
S
W


Epicenters-3
Daggett County Epicenters
Major Roads
Cities
County Boundary
Explanation
Epicenters by Magnitude
5 - 7
4 - 5
3 - 4
2 - 3
1 - 2
Data Source: City and County Boundaries are from the Census 2000 data
Road data maintained by AGRC
Epicenter data created by Utah Geologic Survey maintained by AGRC
10 0 10 20 Miles
Manila
44
43
N
E
S
W

## NATURAL HAZARD: FLOODING

**FEMA Hazard Profile for Flooding**

| | | | |
|---|---|---|---|
| **Frequency** | | **Highly Likely** | **Near 100% probability in next year** |
| | **X** | **Likely** | **Between 10 and 100% probability in next year, of at least one chance in 10 years** |
| | | **Possible** | **Between 1 and 10% probability in next year, of at least one chance in next 100 years** |
| | | **Unlikely** | **Less than 1% probability in next 100 years** |
| **Severity** | | Catastrophic | **More than 50%** (of the jurisdiction that can be affected) |
| | **X** | Critical | **25 to 50%** (of the jurisdiction that can be affected) |
| | | Limited | **10 to 25%** (of the jurisdiction that can be affected) |
| | | Negligible | **Less than 10%** (of the jurisdiction that can be affected) |
| **Location** | Flooding would affect all communities in the county that are in and along the flood plains | | |
| **Seasonal Pattern** | After spring rains, heavy thunderstorms, or spring thaws | | |
| **Duration** | Rainstorms can last for hours and possibly days. Spring run-off can last weeks | | |
| **Speed of Onset** | Six to twelve hours | | |

Floods are the most common and widespread of all natural disasters except fire. Most communities in the United States have experienced some kind of flooding after spring rains, heavy thunderstorms, or winter snow thaws.

Precipitation in Daggett County originates from two major sources. Moisture laden polar pacific air entering the area from the west or northwest during the winter produces large general storms, which most often result in heavy snowfall in the upper elevations and either snowfall or moderate intensity rainfall in the lower elevations.

The second major source of precipitation in the area arises from tropical air masses entering from the south and southwest out of the Gulf of Mexico during the summer months. Often wrongly referred to as monsoons these air masses cause high intensity convective cloudburst storms, which are augmented by the orthographic lifting which occurs as the air mass passes over neighboring mountains.

Precipitation from these two types of storms can produce flash floods, snowmelt floods, post wildfire/damaged watershed floods, and severe winter weather

**VULNERABILITY:** High

Using the best available data UBAOG planners were unable to determine vulnerable structures. Currently neither Daggett County nor the Town of Manila has flood plain maps. The majority of Manila's 401 homes sit down grade from the Sheep Creek Canal. This unlined earthen canal has failed before causing damage to the KOA camp ground on the western edge of Manila.

Using GIS technology and flow velocity Town models, it would be possible to map the damage that can be expected from flood events over time. It is also possible to pinpoint the effects of certain flood events on individual properties. *For a description of flooding and possible causes see the flooding section in Appendix A.*

At this time, data was insufficient to conduct a risk analysis for flood events in Daggett County. However, the Map Modernization Program being led by the state will result in better data, assisting the county in understanding its flood risk. As part of its efforts to mitigate hazards and protect lives and property from the devastating effects of natural disasters, FEMA has provide planning tools to individuals, businesses, and communities. Information is a key ingredient needed to work proactively to mitigate hazards and prevent losses resulting from disasters. One of the tools developed to provide information is HAZUS MH or Hazards U.S., a natural hazard loss estimation methodology developed by FEMA under contract with the National Institute of Building Sciences. Using Geographic Information Systems (GIS) technology, HAZUS allows users to compute estimates of damage and losses that could result from an earthquake. To support FEMA's mitigation and emergency preparedness efforts, HAZUS has being expanded into HAZUS-MH, a multi-hazard methodology with new modules for estimating potential losses from wind and flood (riverine and coastal) hazards. HAZUS and HAZUS data was used in vulnerability analysis in this plan. It is expected future plan revisions will utilize the flood models available in HAZUS. *For more information regarding Flooding in Daggett County see the Flood Hazard Identification Study in Appendix M.*

**Generic Mitigation:**

- Avoidance
- Better flood routing through communities.
- Annual warning of risk information on how to protect property and lives.
- Flood insurance awareness, emphasis, and marketing.
- Projects such as levees/dams.
- Funding by a storm water tax in cooperation with Federal and State programs.
- Additional SNOTEL sites and enhanced instrumentation.
- Protection of roads and bridges.
- Greater reservoir capacities.
- Curtail development in flood-prone areas.
- General infrastructure protection.
- Develop river corridor parkways.
- Protection of wastewater treatment facilities from excessive inflows.
- Protection of drinking water supply systems.
- Gather hazard and risk data/information.
- Development of improved mitigation techniques.
- Education of local officials, developers, and citizens.

## NATURAL HAZARD: INSECT INFESTATION

**FEMA Hazard Profile for Insect Infestation**

| | | | |
|---|---|---|---|
| **Frequency** | **X** | **Highly Likely** | **Near 100% probability in next year** |
| | | **Likely** | **Between 10 and 100% probability in next year, of at least one chance in 10 years** |
| | | **Possible** | **Between 1 and 10% probability in next year, of at least one chance in next 100 years** |
| | | **Unlikely** | **Less than 1% probability in next 100 years** |
| **Severity** | **X** | **Catastrophic** | **More than 50%** (of the jurisdiction that can be affected) |
| | | **Critical** | **25 to 50%** (of the jurisdiction that can be affected) |
| | | **Limited** | **10 to 25%** (of the jurisdiction that can be affected) |
| | | **Negligible** | **Less than 10%** (of the jurisdiction that can be affected) |
| **Location** | Daggett County | | |
| **Seasonal Pattern** | Spring, summer, and fall | | |
| **Duration** | Months and possibly years | | |
| **Speed of Onset** | Minimal or no warning | | |

Agriculture has historically dominated the economic life of Daggett County. The county remains a significant producer of crops and livestock.
Daggett County has experienced losses in agriculture, livestock, and wildlife as a result of insect infestation. Damage to the economic base and to the health of the citizens is also a direct result of insects. Insects most notable are grasshoppers, Mormon Crickets, Bark Beetles, and mosquitoes. Currently the West Nile Virus spread by mosquitoes is a serious threat to humans and animals in Daggett County.

## NATURAL HAZARD: LANDSLIDE

**FEMA Hazard Profile for Landslide**

| | | | |
|---|---|---|---|
| **Frequency** | | **Highly Likely** | **Near 100% probability in next year** |
| | **X** | **Likely** | **Between 10 and 100% probability in next year, of at least one chance in 10 years** |
| | | **Possible** | **Between 1 and 10% probability in next year, of at least one chance in next 100 years** |
| | | **Unlikely** | **Less than 1% probability in next 100 years** |
| **Severity** | | **Catastrophic** | **More than 50%** (of the jurisdiction that can be affected) |
| | | **Critical** | **25 to 50%** (of the jurisdiction that can be affected) |
| | **X** | **Limited** | **10 to 25%** (of the jurisdiction that can be affected) |
| | | **Negligible** | **Less than 10%** (of the jurisdiction that can be affected) |
| **Location** | Carter Creek and Sheep Creek roads | | |
| **Seasonal Pattern** | After spring rains, heavy thunderstorms, or spring snow thaws | | |
| **Duration** | Depending upon conditions | | |
| **Speed of Onset** | Minimal or no warning | | |

### Overall Summary of Impacts

The Uintah Basin Association of Governments identified and mapped possible landslide threats to Daggett County that would have a potential risk to pedestrians, vehicle traffic, and residential areas.
*The map on page 23 illustrates Landslides and gives an explanation for Landslides in Daggett County.*

In Daggett County there are several areas namely Carter Creek that could have a potential risk to pedestrians and vehicle traffic due to landslides. Landslides exist in Daggett County but the small population puts very few if any people or there structures at risk .

In Daggett County there are approximately 12.8 residential structures at potential risk from landslide. Based upon figures provided by the Daggett County Assessors Office, the market value of those structures is estimated to be

$960,000. *For a description of Landslides and possible causes see the Landslides section in Appendix A.*

**VULNERABILITY:** Low

**Structure Loss and Value as a Percentage of Total Acreage.**

| Town Name | Acres of Historically Active Landslides 1847 to Present | Households Vulnerable to Landslide/Cost |
|---|---|---|
| **Daggett County** | 5551 | 12.8/960,000 |

*Includes value of land.

**Transportation**

| Name | Miles | Estimated Cost |
|---|---|---|
| Local Neighborhood/local/Town street | 4.07 miles | 8,140,000 |
| State Route 44 | .4154 miles | 1,002,567 |

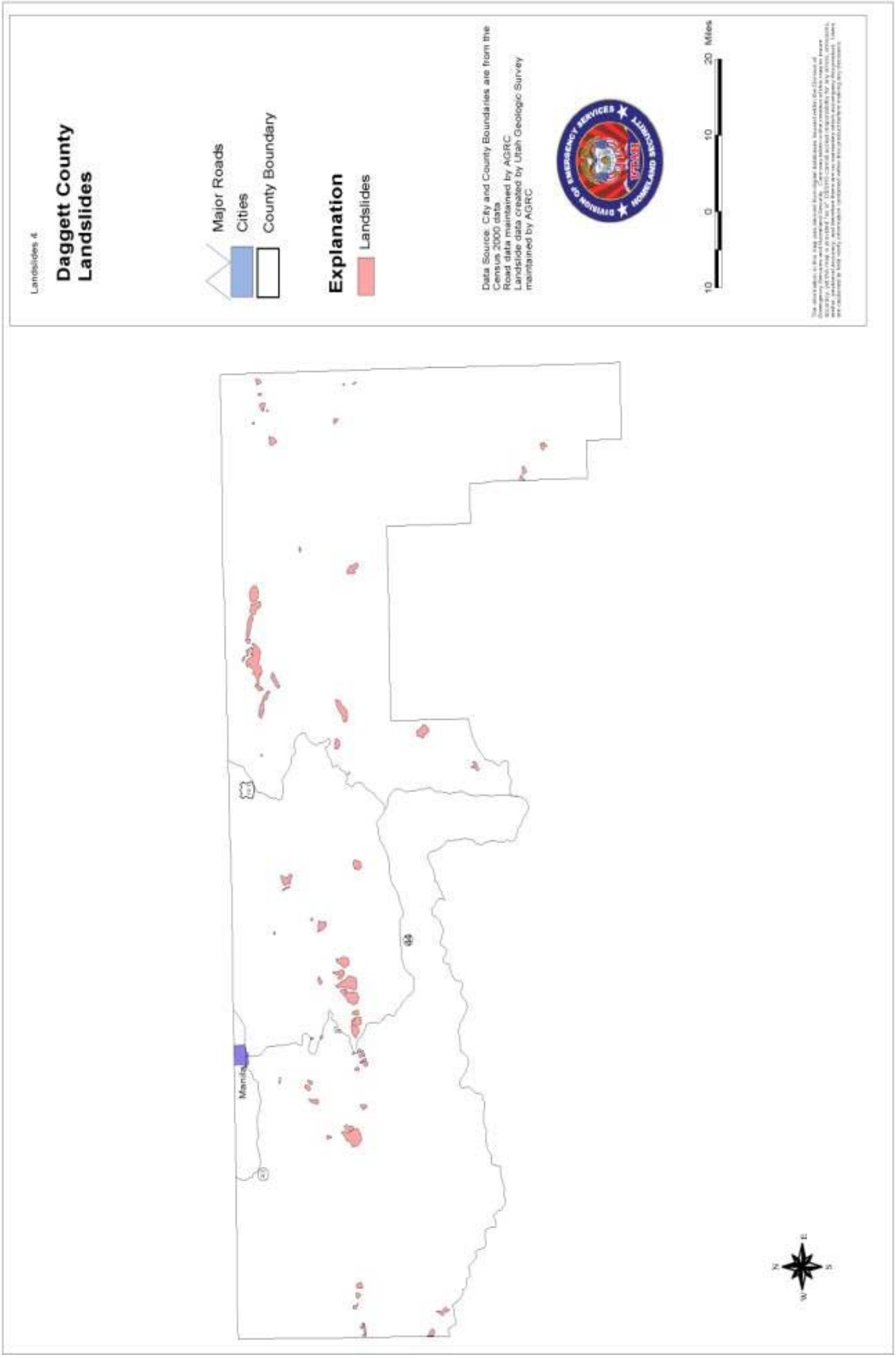
Table data represents total length of roads and rail lines, which overlay historically active landslides.

**Utilities**

| Name | Description | Estimated Cost |
|---|---|---|
| Power lines | .747 miles | 36,065 |

**Generic Mitigation:**

- Avoidance
- Recognize landslide area
- Zoning ordinances
- Remove landslide materials
- Drain subsurface materials
- Install surface drains
- Remove materials for the head of the landslide.
- Re-grade.
- Build buttress or retaining wall at the toe of the slope.
- Install soil nails and rock anchors.
- Maintain natural vegetation.


Landslides 4
Daggett County
Landslides
Major Roads
Cities
County Boundary
Explanation
Landslides
Data Source: City and County Boundaries are from the Census 2000 data.
Road data maintained by AGRC
Landslide data created by Utah Geologic Survey maintained by AGRC
DIVISION OF EMERGENCY SERVICES
HOMELAND SECURITY
10 0 10 20 Miles
Manila
44
43
W
N
E
S

**NATURAL HAZARD: WILDFIRE**

**FEMA Hazard Profile for Wildfire**

| | | | |
|---|---|---|---|
| **Frequency** | **X** | **Highly likely** | **Near 100% probability in next year** |
| | | **Likely** | **Between 10 and 100% probability in next year, of at least one chance in 10 years** |
| | | **Possible** | **Between 1 and 10% probability in next year, of at least one chance in next 100 years** |
| | | **Unlikely** | **Less than 1% probability in next 100 years** |
| **Severity** | **X** | **Catastrophic** | **More than 50%** (of the jurisdiction that can be affected) |
| | | **Critical** | **25 to 50%** (of the jurisdiction that can be affected) |
| | | **Limited** | **10 to 25%** (of the jurisdiction that can be affected) |
| | | **Negligible** | **Less than 10%** (of the jurisdiction that can be affected) |
| **Location** | Daggett County | | |
| **Seasonal Pattern** | June through October | | |
| **Duration** | Minutes to days and months | | |
| **Speed of Onset** | Minimal or no warning | | |

There are three different classes of wild land fires. A **surface fire** is the most common type and burns along the floor of a forest, moving slowly and killing or damaging trees. A **ground fire** is usually started by lightning and burns on or below the forest floor. **Crown fires** spread rapidly by wind and move quickly by jumping along the tops of trees. *For a description of wildfires and possible causes see the wildfire section in Appendix A.*

Wild land fires are usually signaled by dense smoke that fills the area for miles around. Source: http://www.fema.gov/hazards/fires/
*The map on page 27 illustrates fire risk and gives a wildfire explanation for Duchesne County.*

## A Word about Wildfires

Almost every year several communities around the state are flooded and/or affected by post burn debris flows. Wildfire damaged watersheds have

conditions which increase the potential for debris flows which may damage structures and infrastructure in the impacted area. Overall, the heightened risk associated with alluvial fans is always of concern. Post fire revegetation and stabilization efforts in many cases do not alleviate the threat due to flooding and debris flow.

**VULNERABILITY:** High
Daggett County in prime wildfire territory. Current drought conditions have exacerbated the fire problem. In 2002, the Mustang Wildfire started by sparks from a flat tire on a recreational trailer almost consumed Dutch John. This fire qualified under the Fire Management Assistance Grant Program and cost over 3 million dollars in state funding to suppress. Watersheds damaged as a result of the fire have resulted in erosion problems and post fire damage. The county contains an abundance of forested land susceptible to wildfires.

**Generic Mitigation:**

- Avoidance.
- Define, create, and maintain a defensible space.
- Plant drought and fire resistant vegetation.
- Ordinances.

| County Name | Acres of Extreme | Acres of High | Acres of Moderate | Acres of Low/Very Low |
|---|---|---|---|---|
| **Daggett** | N/A | 67,693 | 204,401 | 189,792 |

**Unincorporated County**

| County | Households in Extreme/Cost | Households in High/Cost | Households in Moderate/Cost |
|---|---|---|---|
| **Daggett** | None | 159/9,540,000 | 479/28,740,000 |

**Cities of Daggett County**

| Town Name | Acres of Extreme | Acres of High | Acres of Moderate |
|---|---|---|---|
| **Manila** | None | None | 93 |

**Structures in Wildfire Area**

| Town | Households | Households | Households in |
|---|---|---|---|

| Name | in Extreme/Cost | in High/Cost | Moderate/Cost |
|---|---|---|---|
| **Manila** | None | None | 72/4,320,000 |

*Excludes content value, which would result in, and increase of 50% to the values listed.

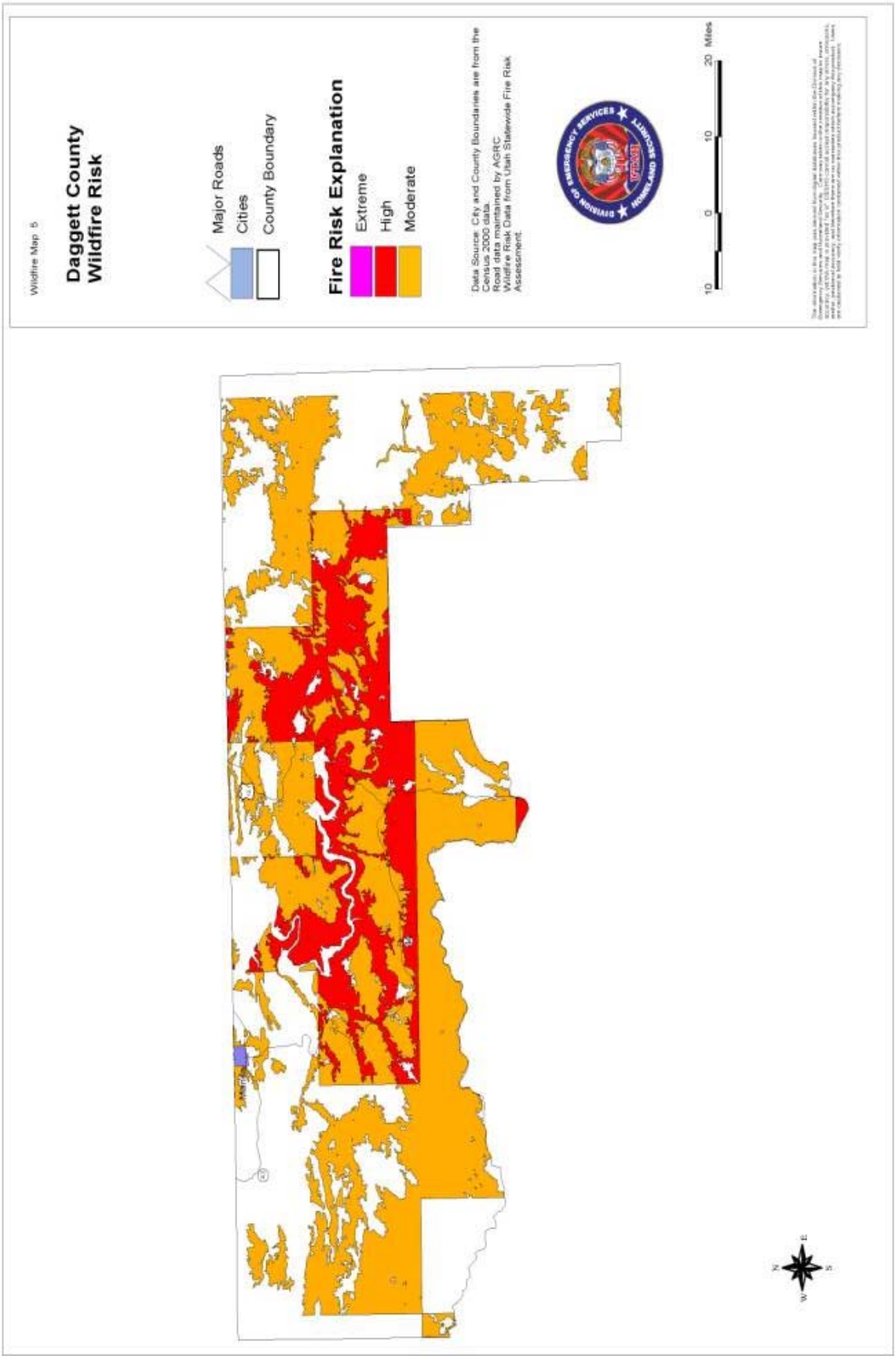
**Transportation Roads, highways, and Rail Lines**

| Name | Miles | Estimated Cost |
|---|---|---|
| **Local Neighborhood/local/Town street** | 218.1 | 436,200,000 |
| **State Route 43** | 1.18 | 2,847,930 |
| **State Route 44** | 21.31 | 51,431,685 |
| **US Highway 191** | 21 | 50,683,500 |

Table data includes road lengths within areas determined to have an extreme, high, or moderate risk to wildfire as determined by the Utah Statewide Fire Risk Assessment.

**Utilities**

| Name | Description | Estimated Cost |
|---|---|---|
| **Flaming Gorge** | Power Generation | 50,000,000 |
| **Power lines** | 53.45 Miles | 2,580,566 |
| **KV-230** | 4.25 Miles | 205,190 |
| **Gas** | 6.41 Miles of Questar | 1,547,309 |


Wildfire Map 5
Daggett County
Wildfire Risk
Major Roads
Cities
County Boundary
Fire Risk Explanation
Extreme
High
Moderate
Data Source: City and County Boundaries are from the Census 2000 data.
Road data maintained by AGRC
Wildfire Risk Data from Utah Statewide Fire Risk Assessment.
DIVISION OF EMERGENCY SERVICES AND HOMELAND SECURITY
10 0 10 20 Miles
N
W
E
S

## Mitigation Capabilities of Daggett County

This portion of the Plan assesses Daggett County's current capabilities to mitigate the effects of the natural hazards identified within the plan. The assessment includes an examination of the following local government capabilities:

1. Staff & Organizational Capability
2. Technical Capability
3. Development Trends
4. Fiscal Capability
5. Policy and Program Capabilities
6. Political Willpower

The capabilities assessment serves as the foundation for designing an effective hazard mitigation strategy. It not only helps establish the goals and objectives for Daggett County to pursue under this Plan, but also ensures that those goals and objectives are realistically achievable under given local conditions.

### 1. Staff and Organizational Capability

Daggett County has **Very Limited** staff and organizational capability to implement hazard mitigation strategies. Daggett County is Utah's least populated county, containing only 753 people. While the County has a number of professional staff members to serve residents and carry out day-to-day administrative activities, much of the staff is part time or is tasked with numerous duties.

The County of Daggett does have an Emergency Manager who is responsible for the mitigation, preparedness, response and recovery operations that deal with both natural and man-made disaster events.

### 2. Technical Capability

Daggett County has **very limited** technical capability to implement hazard mitigation strategies.

#### *Technical Expertise*

Daggett County does have an, emergency manager to administer the County's hazard mitigation programs. The County does not have a licensed engineer or related technical expert on staff, and has in the past relied upon outside contractors/consultants to perform a majority of any required technical work.

#### *Internet Access*

Daggett County does provide its employees and citizens with high speed broadband Internet. Internet access opens up an enormous door for local officials to keep abreast of the latest information relative to their work and makes

receiving government services more affordable and convenient. It is believed that Internet access will help further the County's hazard mitigation awareness programs, but should be supplemented with more traditional (and less technical) means as well.

**3. Development Trends**
Daggett County is approximately 90% federal land. Out of the remaining 10% around 8% is used for agricultural purposes. This leaves approximately 2% of the land available for development. Therefore, future development in Daggett County will be minimal.

**4. Fiscal capability**
Daggett County has **very limited** fiscal capability to implement hazard mitigation strategies.

Under the Disaster Mitigation Act of 2000, FEMA has made special accommodations for "small and impoverished communities", who will be eligible for a 90% Federal share, 10% non-Federal cost split for projects funded through the Pre-Disaster Mitigation Grant Program. Daggett County is not yet classified as small and impoverished but it is thought they meet the requirements.

**5. Policy and program capability**

**Emergency Operations Plan**
Daggett County has developed and adopted an Emergency Operations Plan, which predetermines actions to be taken by government agencies and private organizations in response to an emergency or disaster event. The Plan was adopted April 12, 2000. For the most part, the Plan describes the County's capabilities to respond to emergencies and establishes the responsibilities and procedures for responding effectively to the actual occurrence of a disaster. The Plan does not specifically address hazard mitigation, but it does identify the specific operations to be undertaken by the County to protect lives and property immediately before, during and immediately following an emergency. There are no foreseeable conflicts between this Hazard Mitigation Plan and Daggett County's Emergency Management Plan, primarily because they are each focused on two separate phases of emergency management (mitigation vs. preparedness and response).

***Daggett County Emergency Management Program***
Daggett County has an emergency management program headed by Shirley Slaugh. Very few counties in the country of similar size have been able to fund and sustain an emergency management program. The emergency management program is tasked with protecting the life safety of the residents of Daggett County, utilizing the four phases of emergency management, one of which is mitigation. Daggett is constantly looking for low or no cost mitigation and has accomplished much through partnerships. Daggett County emergency

management personnel have attended state sponsored mitigation training and provided support for this PDM planning effort.

***Floodplain Management Plan***
Daggett County does not currently participate in the National Flood Insurance Program. However, this Hazard Mitigation Plan recommends that Daggett County participate in the NFIP.

***Storm water Management Plan***
Daggett County Currently has no formal Storm water Management Plan.

***County Ordinances***
The Daggett County currently does not have any county ordinance that addresses natural disasters. However, the planning committee was in attendance at our Natural Disaster meetings and agreed to work on implementing and adopting new County Ordinances that are relevant to hazard mitigation.

**6. Political Willpower**
Most Daggett County residents are quite knowledgeable about the potential hazards that their community faces. Recent wildfires have increased the understanding and need for mitigation within the government structure of Daggett County.

The Uintah Basin Association of Governments used historical data to estimate to the best of their ability (with the data available at the time) the potential dollar losses if the County were to experience flooding and wildfires, the two most likely hazards to occur in the County. The estimated costs are as follows:

**Potential flood losses:**
At this time, data was insufficient to conduct a loss analysis for flood events in Daggett County. However, the current mapping projects being led by the county and by the state will result in better data that will assist in understanding potential losses due to flooding.

**Potential wildfire losses:**
At this time, data was insufficient to conduct a loss analysis for wildfire events in Daggett County. However, the current mapping projects being led by the county and by the state will result in better data that will assist in understanding potential losses due to wildfires. Wildfires pose little threat to the residential and commercial properties, as well as, the local school system located within Daggett County.

**Daggett County**

The Daggett County Local Emergency Prepardness Committee which consists of one County Commissioner, the Mayor of Manila, the County Emergency Managers, the TRI-County Health Department, the County Planning and Zoning, the Executive Assistant to the County Commissioners, and several local citizens in conjunction with the Uintah Basin Association of Governments held a 3 day round table discussion to review and analyze the risk assessment studies that were performed for the County. The goals listed were determined to be those goals that would have the greatest benefit in hazard reduction to the County. The goals, objectives and actions represent a long-term vision for hazard reduction or enhancement of mitigation capabilities. Listed below is our definition of goals and objectives. *Daggett County participated in the County Pre-Disaster Mitigation Planning Grant and their complete Mitigation Strategies Workbook can be found in Appendix N.*

**Goals:** General guidelines that explain what you want to achieve. They are usually long-term and represent global visions, such as "eliminate flood damage."

**Objectives:** Define strategies or implementation steps to attain the identified goals. Unlike goals, objectives are specific, measurable, and have a defined completion date. Objectives are more specific, such as "adopt a zoning ordinance prohibiting new development in the floodplain."

The Local Emergency Prepardness Committee and the Uintah Basin AOG Mitigation Planner decided upon the following goals, objectives, action items, and priorities for each of the natural hazards. The priorities for each hazard are ranked in the following order: High, Medium, and Low. Each hazard is ranked by order of importance; however, this does not mean the ranking of each hazard will not potentially change over time.

**Mitigation Strategies**

## Dam Failure

**Daggett County**

**GOAL 1:** Reduce future flooding in Daggett County due to dam failure.

**Medium Priority**

**Objective 1.1**

- Use technology to aid in prevention of flood loss due to dam failure

**Action 1.1.1:**

- Digitize high hazard dam failure inundation maps

**Time Frame:** ongoing
**Funding:** state government
**Estimated Cost:** 500 dollars per dam
**Staff:** Utah Dam Safety Section, and AGRC

**Action 1.1.2:**

- Update Emergency Operations Plan to include GIS dam failure estimates

**Time Frame:** Next EOP update
**Funding:** County
**Estimated Cost:** Undetermined
**Staff:** County GIS and Emergency Manager

**Action 1.1.3:**

- Educate the local elected officials, developers, and citizens.

**Time Frame:** Within the next two years
**Funding:** County
**Estimated Cost:** Minimal
**Staff:** County employees

**Action 1.1.4**

- Updated Emergency Action Plans (EAP) and integration with GIS Systems**.**

**Time Frame:** Ongoing
**Funding:** FEMA, State and Local
**Estimated Cost:** Unknown
**Staff:** State and Local

**Action 1.1.5:**

- Implementation of more debris dams would assist in controlling floods, reducing the amount of debris and mud that come through. Maintenance of flood control pools in existing dams would also be very beneficial.

**Time Frame:** Ongoing
**Funding:** Town and County funds
**Estimated Cost:** minimal
**Staff:** Water surveyor and newsletter editor

**Background:** Numerous technological advancements have been made which will help reduce the likely hood of dam failure and reduce the risk to town stream populations should a dam fail. These techniques will only reduce the risk if they are properly understood and implemented. The above mitigation recommendations when implemented will represent a first step into this new technology for Daggett County. The county understands there are additional technologic steps that can be taken such as increase number of telemeter snow and stream gauges. Look for these advances in future revisions to the mitigation plan.

## Drought

**Daggett County**

**GOAL 1:** Reduce water loss within Daggett County.

### High Priority

**Objective 1.1**

- Conserve culinary water by educating the public.

**Action 1.1.1:**

- The Local LEPC will hold meetings semi-annually to educate the public on the need to be water wise.

**Time Frame:** Ongoing
**Funding:** County funds
**Estimated Cost:** minimal
**Staff:** Water surveyor and newsletter editor

**Background:** Use a newsletter to educate the public

**Objective 1.2:**

- Develop more water storage tanks within the County.

**Action 1.1.2:**

- Conduct a feasibility study.

**Time Frame:** Ongoing
**Funding:** Town and County funds
**Estimated Cost:** unknown
**Staff:** Water surveyor and newsletter editor

**Action 1.1.3:**

- Install new wheel lines to improve efficiency of water.

**Time Frame:** Ongoing
**Funding:** Federal, and State funding
**Estimated Cost:** Unknown
**Staff:** NRCS, UACD, USU, Extension, ect.

**Action 1.1.4:**

- Implement and enforce water laws that prohibit the use of extensive amounts of water.

**Time Frame:** Ongoing
**Funding:** Town and County funds
**Estimated Cost:** Unknown
**Staff:** Water surveyor and newsletter editor

## Drought

**Manila**

**GOAL 1:** Reduce water loss within the Town of Manila.
**Problem Identification:** Cyclical periods of drought place a strain on availability of community culinary water and irrigation water resources.

### High Priority

**Objective 1.1**

- Meet current and future water needs of community. Conserve culinary water by educating the public

**Action 1.1.1:**

- Develop additional water storage tanks as well as implement conservation plans.

**Time Frame:** Ongoing
**Funding:** Town funds, State and Federal Government loans and/or grants
**Estimated Cost:** To be determined
**Staff:** Manila Town Staff, Professional Services, and Contractors

**Objective 1.2**

- Conserve culinary water by conservation

**Action 1.1.2:**

- Maintain and enforce rate policies that encourage water conservation

**Time Frame:** Ongoing
**Funding:** Town and County funds
**Estimated Cost:** minimal
**Staff:** Water surveyor and newsletter editor

**Background:** The Town should continue to maintain and implement a tiered water rate structure.

## Earthquake

**Daggett County**

**GOAL 1:** Reduce potential confusion with the citizens of Daggett County by providing public awareness regarding possible earthquakes.
**Problem Identification:** Transportation and utilities services could be severely impacted.

### Medium Priority

**Objective 1.1**

- Provide for emergency response and relief

**Action 1.1.1:**

- Identify and maintain critical transportation and utility services

**Time Frame:** ongoing
**Funding:** Local governments and possible grants
**Estimated Cost:** Unknown- Determined by the extent of damage anticipated.
**Staff:** Town staff.
**Background:** Critical transportation systems

**Objective 1.2**

- Public Awareness

**Action 1.1.2:**

- Conduct a public awareness campaign.

**Time Frame:** ongoing
**Funding:** Local governments and possible grants
**Estimated Cost:** Unknown
**Staff:** Agency personnel and volunteers

**Background:** Contact DESHS earthquake program specialist. Enhance earthquake instructions in school.

**GOAL 2:** Identify the number of seismically unsafe structures within the County.
**Problem Identification:** Unknown number of seismically unsafe structures around the county.

**High Priority**

**Objective 1.2**

- Have a study done to determine seismic resistance of structures within the county i.e. Elementary and high schools, public buildings, high traffic areas, ECT.

**Action 1.1.2:**

- Structural and non-structural earthquake hazard assessment.

**Time Frame:** ongoing
**Funding:** Unknown
**Estimated Cost:** Unknown
**Staff:** Unknown

**Background:** Critical transportation systems

## Flooding

**Daggett County**

**GOAL 1:** Reduce flood damage in Daggett County.
**Problem Identification:** Control flooding in residential areas of Daggett County, Including but not limited to the Town of Manila and the unincorporated Dutch John. Flooding occurs from heavy rains and fast moving thunderstorms. *For more information regarding Flooding in Daggett County see the Flood Hazard Identification Study in Appendix M.*

**High Priority**

**Objective 1.1:**

- Obtain Aerial photography with contours of each residential area in Daggett County.

**Action 1.1.1:**

- Set horizontal and vertical survey control and order aerial photography with contours for each residential area in the county.

**Time Frame:** Ongoing
**Funding:** Local, State and Federal grants
**Estimated Cost:** Unknown
**Staff:** State, Local, and possibly Federal
**Background:** Aerial Topography is needed for master storm drainage design.

**Objective 1.2:**

- Design master storm drainage plans for residential areas.

**Action 1.1.2:**

- Design master storm drainage plans to handle storm water runoff through residential areas.

**Time Frame:** 3 months to 2 years, (depending on number of areas worked on)
**Funding:** Grants
**Estimated Cost:** $10,000.00 per residential area, depending on size
**Staff:** County Staff and contracted staff.

**Background:** Engineers design master storm drainage plans for the residential areas.

**Objective 1.3:**

- Implement storm drainage plans throughout the residential areas of Daggett County.

**Action 1.1.3:**

- Provide information to the public on how the storm drainage plans will assist in preventing flood damage to the residents of Daggett County.

**Time Frame:** 2 years or as soon as the storm drainage plans are finished.
**Funding:** State and Federal grants
**Estimated Cost:** unknown, will depend on the finals plans and what is required for facilities
**Staff:** County and contracted staff

**Background:** Construct storm drainage facilities and require all new developments to meet county storm drainage plans.

**Manila**

**GOAL 1:** Reduce flooding in Manila related to the Sheep Creek Canal. The Majority of the Town of Manila's 401 homes sit down grade from the Sheep Creek
**Problem Identification:** This unlined earthen canal has failed before causing damage to the KOA camp ground on the Western edge of Manila.

**High Priority**

**Objective 1.1:**

- Use technology to aid in prevention of flood loss due to canal failure.

**Action 1.1.1:**

- Daggett County and the Town of Manila will form a partnership with the current owners of the Sheep Creek Canal. In doing so, this will enable them to work together in the lining or piping of portions of the canal as funding becomes available.

**Time Frame:** Ongoing
**Funding**: FEMA, state and local.
**Estimated Cost:** Unknown at this time
**Staff:** County and Town Employees, Local Volunteers

**Action 1.1.2:**

- Put in an application to the Army Corps. Of Engineers for updated and revised flood plain maps for the populated areas in Daggett County.

**Time Frame:** Within the next two years
**Funding**: FEMA, state and local.
**Estimated Cost:** Unknown
**Staff:** County and Town Employees, Local Volunteers

**Action 1.1.3:**

- Place a restrictive clause in the County and Town Ordinances that will prohibit any new development in the County floodplain.

**Time Frame:** Within the next year
**Funding**: FEMA, state and local.
**Estimated Cost:** Unknown at this time
**Staff:** County and Town Employees, Local Volunteers

**Action 1.1.4:**

- Place a restrictive clause in the County and Town Ordinances that will prohibit any undercutting of the canal.

**Time Frame:** Within the next year
**Funding**: FEMA, state and local
**Estimated Cost:** Unknown at this time
**Staff:** County and Town Employees, Local Volunteers

**Action 1.1.5:**

- Educate the public on Canal maintaince and repair.

**Time Frame:** Ongoing
**Funding:** FEMA, state and local.
**Estimated Cost:** Unknown at this time
**Staff:** County and Town Employees, Local Volunteers
**Background:** Past and future flooding

**Action 1.1.6:**

- County and Town building inspectors and the planning committee will implement a maintenance and inspection schedule in coordination with the owners of the canal.

**Time Frame:** Ongoing
**Funding**: FEMA, state and local.
**Estimated Cost:** Unknown at this time
**Staff:** County and Town Employees, Local Volunteers
**Background:** Past and future flooding

**Action 1.1.7:**

- County and Town building inspectors and planning committee will make sure that the Zoning Ordinance is up-dated or revised every 5 to 6 years.

**Time Frame:** Ongoing
**Funding**: FEMA, state and local.
**Estimated Cost:** Unknown at this time
**Staff:** County and Town Employees, Local Volunteers

**Action 1.1.8:**

- The County Emergency Managers will research grant opportunities for potential funding.

**Time Frame:** Ongoing
**Funding**: FEMA, state and local.
**Estimated Cost:** Unknown at this time
**Staff:** County and Town Employees, Local Volunteers

**Action 1.1.9:**

- Implement a flood ordinance that will cover the County and Town with flood insurance.

**Time Frame:** Ongoing
**Funding**: FEMA, state and local.
**Estimated Cost:** Unknown at this time

**Staff:** County and Town Employees, Local Volunteers

## Insect Infestation

**Daggett County**

**GOAL 1:** Reduce insect Infestation to the agricultural businesses'
**Problem Identification:** South and west sides of Daggett County are vulnerable to Mormon cricket and Cutworm infestations as well as some mosquito problems.

**High Priority**

**Objective 1.1**

- Reduce the impact of insects

**Action 1.1.1:**

- Spread insect bait and spray for mosquitoes

**Time Frame:** When required
**Funding:** Town and County funds, Mosquito abatement funds come from property tax
**Estimated Cost:** Approximately $3.00 per property owner per month
**Staff:** County Mosquito Abatement District

**Objective 1.2:**

- Reduce the severity of infestations

**Action 1.1.2:**

- The County has applied for a $6,000.00 grant to assist in purchasing 4 Mosquito magnets, propane tanks to run the magnets and to assist in salaries for the county employees to maintain the magnets.

**Time Frame:** Spring and summer of 2004
**Funding:** $6,000.00 in grants
**Estimated Cost:** $6,000.00
**Staff:** County employees

**Background:** Several agricultural fields surround Daggett County; these fields have been subjected to insect infestation especially during the recent years of drought.

**Objective 1.3:**

- Reduce the threat of West Nile Virus within Daggett County

**Action 1.1.3:**

- Educate the public on the importance of vaccinating their animals.

**Time Frame:** Spring and summer of 2004
**Funding:** State and local funding
**Estimated Cost:** $6,000.00
**Staff:** County employees

**Background:** Several of the Daggett County residents have horses that could be affected by the West Nile virus.

**Manila**

**GOAL 1:** Reduce grasshopper infestations within residential areas of the Town of Manila.
**Problem Identification:** Periodic Grasshopper infestations tend to be more sever on the edge of the developed town area and in the fields surrounding the town.

**High Priority**

**Objective 1.1:**

- Reduce the severity of infestations

**Action 1.1.1:**

- Conduct aerial spraying to reduce infestations.

**Time Frame:** As infestations occur
**Funding:** By private individuals in most cases
**Estimated Cost:** Varies, depending on acreage treated
**Staff:** Contractor

**Background:** Many agricultural fields surround Daggett County and the Town of Manila. These fields have been subjected to insect infestation especially during the recent years of drought.

## Landslide

**Daggett County**

**GOAL 1:** Protect vehicle traffic from possible accidents due to the Carter Creek rockslides.
**Problem Identification:** There is a potential risk to pedestrians and vehicle traffic due to the Carter Creek rockslides, which are located in areas identified by the county as landslide risk areas.

## High Priority

**Objective 1.1**

- Reduce potential landslide risk on highway 44 in areas of known landslide potential.

**Action 1.1.1:**

- Assess the probability of landslides and identify specific structures at risk

**Time Frame:** Undetermined
**Funding:** Property owner
**Estimated Cost:** Unknown
**Staff:** Unknown

**Background:** Soil surveys and other engineering surveys are needed.

**Action 1.1.2:**

- Coordinate with all government agencies' that would assist in sloping of the hillside near Carter Creek. The county will need to contact the following agency's on the possibility of implementing some kind of protective netting or fencing that would eliminate the rock's from tumbling down on to Highway 44.

**Time Frame:** Undetermined
**Funding:** Unknown
**Estimated Cost:** Unknown
**Staff:** Unknown

**Background:** Soil surveys and other engineering surveys are needed.

**Action 1.1.3:**

- The county's and town's planning committee will review and update the zoning ordinances within the County and Town to make sure that individuals are not constructing new homes near potential landslide areas.

**Time Frame:** Undetermined
**Funding:** Unknown
**Estimated Cost:** Unknown
**Staff:** Unknown

**Background:** Hold monthly planning and zoning meetings within the town and county.

## Severe Weather

### Daggett County

**GOAL 1:** Reduce structural damage to both residential and commercial buildings due to Severe Weather.
**Problem Identification:** Daggett experiences occasional, damaging high winds and snowstorms.

**High Priority**

**Objective 1.1**

- Reduce damage to structures through strict adherence to building codes

**Action 1.1.1:**

- Ensure that 80 MPH wind load requirement is met by builders

**Time Frame:** Ongoing
**Funding:** Fees from Building permits
**Estimated Cost:** Minimal
**Staff:** Building Inspector

**Background:** Adherence to building code requirement for tying roof structures to supporting walls will minimize damage from high wind events

### Manila

**GOAL 1:** Provide protection for the citizens from possible power line failure.
**Problem Identification:** Power lines are at risk from seasonal high winds.

**High Priority**

**Objective 1.1**

- Reduce service disruptions and damage to power lines

**Action 1.1.1:**

- Provide adequate clearances for power lines and conduct ongoing line maintenance. Maintain outage plan.

**Time Frame:** Ongoing
**Funding:** Possible Grants
**Estimated Cost:** To be determined
**Staff:** County and town employees

**Background:** Extreme winds have occurred, utilities disruption has occurred in past years due to damage to power poles and transmission lines by high winds.

## Wildfire

### Daggett County

**GOAL 1:** To develop mitigation strategies that will improve the protection of the citizens of Daggett County from wildfires.
**Problem Identification:** Continuing non-compliance with existing building codes and fire codes.

**High Priority**

**Objective 1.1**

- Increase compliance with existing building and fire codes.

**Action 1.1.1:**

- Develop and enforce current local, state and national codes

**Time Frame:** Ongoing
**Funding:** Local, state and federal grants
**Estimated Cost:** Unknown
**Staff:** Local, state and federal agencies

**Background:** Implement and enforce rules, regulations and codes

### Manila

**GOAL 1:** Reduce the threat of wildfires within the Town of Manila.
**Problem Identification:** Specific areas of the county are susceptible to wildland fire danger.

**High Priority**

**Objective 1.1**

- Educate homeowners on how to reduce risk of wildfire damage

**Action 1.1.1:**

- The local LEPC will provide semi-annual training for the citizens of Daggett County and the Town of Manila.

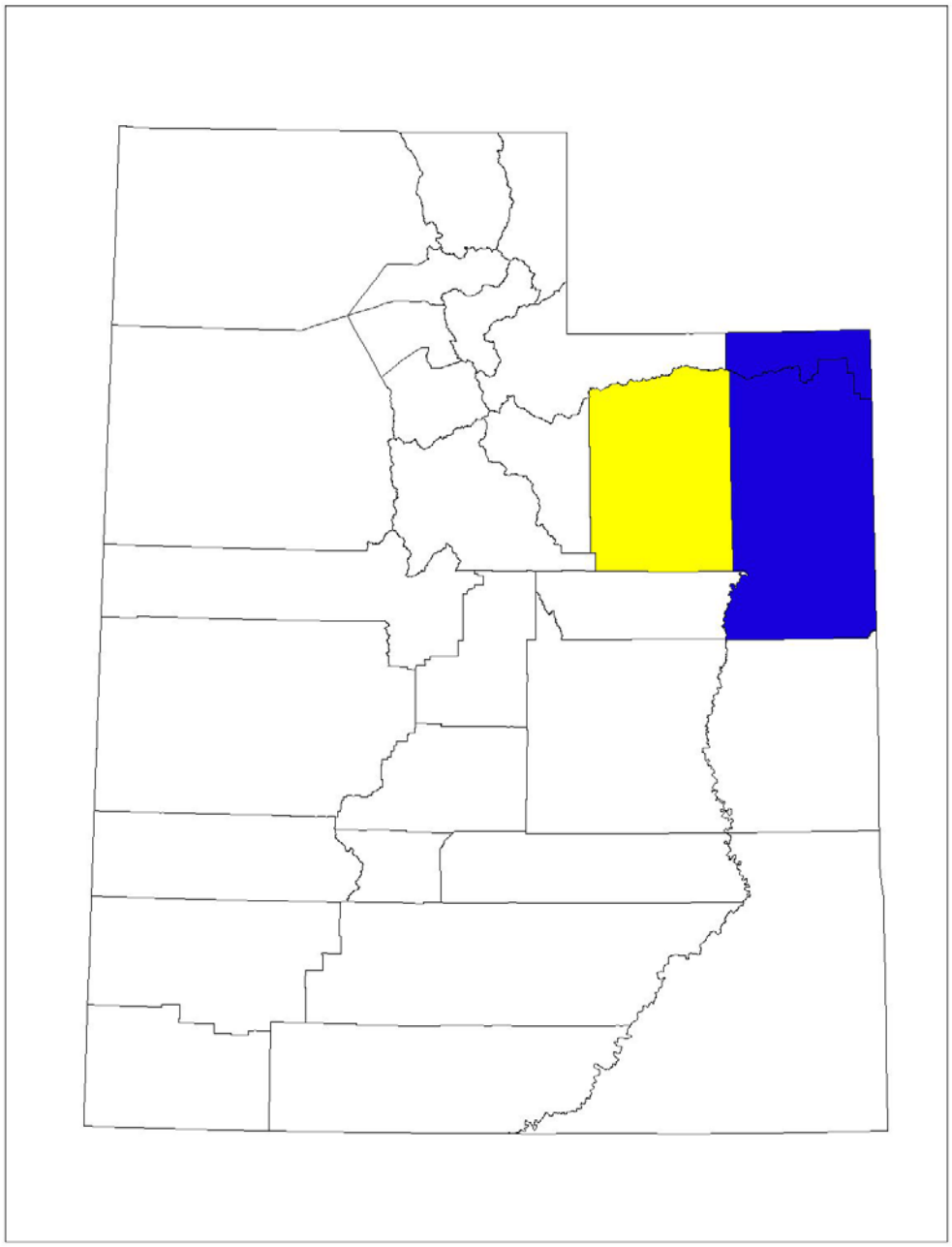
**Time Frame:** Starting 2004
**Funding:** State and local
**Estimated Cost:** Minimal
**Staff:** County

**Background:** Educate the public on how to reduce the risk of wildfires.

Annex 3- Duchesne County

# Duchesne County Annex

**Figure 1: Tri-county map**



## DUCHESNE COUNTY

### Past Hazard Events in Duchesne County

Understanding the past is often the key to discovering what the future holds; this is especially true when planning for natural disasters. The fact that cities within Duchesne County have experienced, for example, flooding in the past means flooding can occur in the future. While over time some of this has been mitigated for the low frequency of occurrence often results in hazards with little or no mitigation. Table 1 provides a brief history of Duchesne County natural disasters. This table includes only sizable events found during our research, and may not represent the total history.

**Table 1 Duchesne County Natural Disaster History**

| Hazard | Date | Location | Critical Facility or area impacted | Comments |
|---|---|---|---|---|
| **Flood** | September 13, 1940 | Duchesne | Damage in Indian Canyon and roads flooded | No loss of life |
| **Flood** | August 7, 1941 | Mountain Home | Destroyed bridges washed out road over Kofford wash and caused damage in Rock Creek | No loss of life |
| **Flood** | August 7, 1945 | Strawberry Creek area | Damage to roads, ranches, and irrigation diversions near Strawberry Creek | No loss of life |
| **Flood** | August 1, 1953 | Sowers Canyon | Damage to farm house and 200 acres | No loss of life |

| Hazard | Date | Location | Critical Facility or area impacted | Comments |
|---|---|---|---|---|
| **Flood** | August 5, 1957 | Tabiona/Hanna | Damage to homes, roads, farms, and crops | Farm Creek |
| **Flood** | September 2, 1960 | Hanna | Flood homes and damaged approximately 100 acres of farmland | No loss of life |
| **Flood** | August 11, 1969 | Duchesne | Damage to town due to flooding | Source Yellowstone river, Strawberry river, Duchesne River, and Reed Creek |

Duchesne County identified six natural hazards they wanted addressed in the Duchesne County portion of this multi-jurisdictional plan. Through input of the planning committee the following hazards were identified:

- Dam Failure
- Earthquakes
- Flooding
- Insect Infestation
- Landslides
- Wildfire.

In identifying these hazards the PDM planning committee relied on technical experts, public input, research of past events and plan, and risk assessments completed by the county emergency manager for their Pre-Disaster Mitigation Plan.

The Duchesne County Disaster Mitigation Planning committee consisted of one County Commissioner, the Mayor of Duchesne, the Mayor of Altamont, the Mayor of Tabiona, the Roosevelt City Manager, the Mayor of Myton, the County Emergency Manager and the Uintah Basin Association of Governments planning Coordinator.

The Disaster Mitigation Plan for Duchesne County identifies critical facilities located in the County *(See Appendix B).* A critical facility is defined as a facility in either the public or private sector that provides essential products and services to the general public, is otherwise necessary to preserve the welfare and quality of life in the County, or fulfills important public safety, emergency response, and/or disaster recovery functions. The critical facilities identified in the County were not located in the natural hazard area. *The Uintah Basin Association of Governments did not map the location of the critical facilities in Duchesne County. Through GIS analysis no critical facilities were found in hazard areas.*

**NATURAL HAZARD: DAM FAILURE**

**FEMA Hazard Profile for Dam Failure**

| | | | |
|---|---|---|---|
| **Frequency** | | **Highly likely** | **Near 100% probability in next year** |
| | | **Likely** | **Between 10 and 100% probability in next year, of at least one chance in 10 years** |
| | | **Possible** | **Between 1 and 10% probability in next year, of at least one chance in next 100 years** |
| | **X** | **Unlikely** | **Less than 1% probability in next 100 years** |
| **Severity** | **X** | **Catastrophic** | **More than 50%** (of the jurisdiction that can be affected) |
| | | **Critical** | **25 to 50%** (of the jurisdiction that can be affected) |
| | | **Limited** | **10 to 25%** (of the jurisdiction that can be affected) |
| | | **Negligible** | **Less than 10%** (of the jurisdiction that can be affected) |
| **Location** | Entire county | | |
| **Seasonal Pattern** | Spring | | |
| **Duration** | Several months to over one year | | |
| **Speed of Onset** | Range from 35 minutes to three hours | | |

## A Word About Dams

Dams are a critical support function for water managers in the State and also act as a flood control measure. If a dam remains stable, does not get overtopped, or is not impaired as the result of an earthquake, then, at a minimum, they do provide incidental flood control. If not then they can add to the flood threat. There are 117 dams within Uintah Basin of these 20 have received an high hazard rating by Utah Division of Water Rights Dam Safety section. The State Dam Safety Section has developed a hazard rating system for all non-federal dams in Utah. Downstream uses, size, height, volume, and incremental risk/damage assessments are a variable used to assign dam safety classification. Using the hazard ratings systems developed by the State Dam Safety Section, dams are placed into one of three classifications high, moderate, and low. Dams receiving a low rating would have insignificant property loss do to dam failure. Moderate hazard dams would cause significant property loss in the event of a breach. High hazard dams would cause a possible loss of life in the event of a rupture. The frequency of dam inspection is designated based on hazard rating with the Division of Water Rights inspecting high-hazard dams

annually, moderate hazard dams biannually, and low-hazard dams every five years. *For a description of dam failure and possible causes dams failure in Duchesne County see the Flood Hazard Identification Study in Appendix M.*

**VULNERABLIITY:** High
Low-lying areas down stream from dams are at risk. Under lying geologic conditions in the planning area create difficulties during dam construction. Dams in similar geologic setting in the state have failed in the past; Trial Lake Dam is an example. The aged fractured rock of the Uinta Mountain range contains numerous passages for water through the dams. During dam building these fractures require extensive engineering and grouting.

Description of Hazard

The following high hazard dams exist within Duchesne County according to the Utah Division of Dam Safety database.

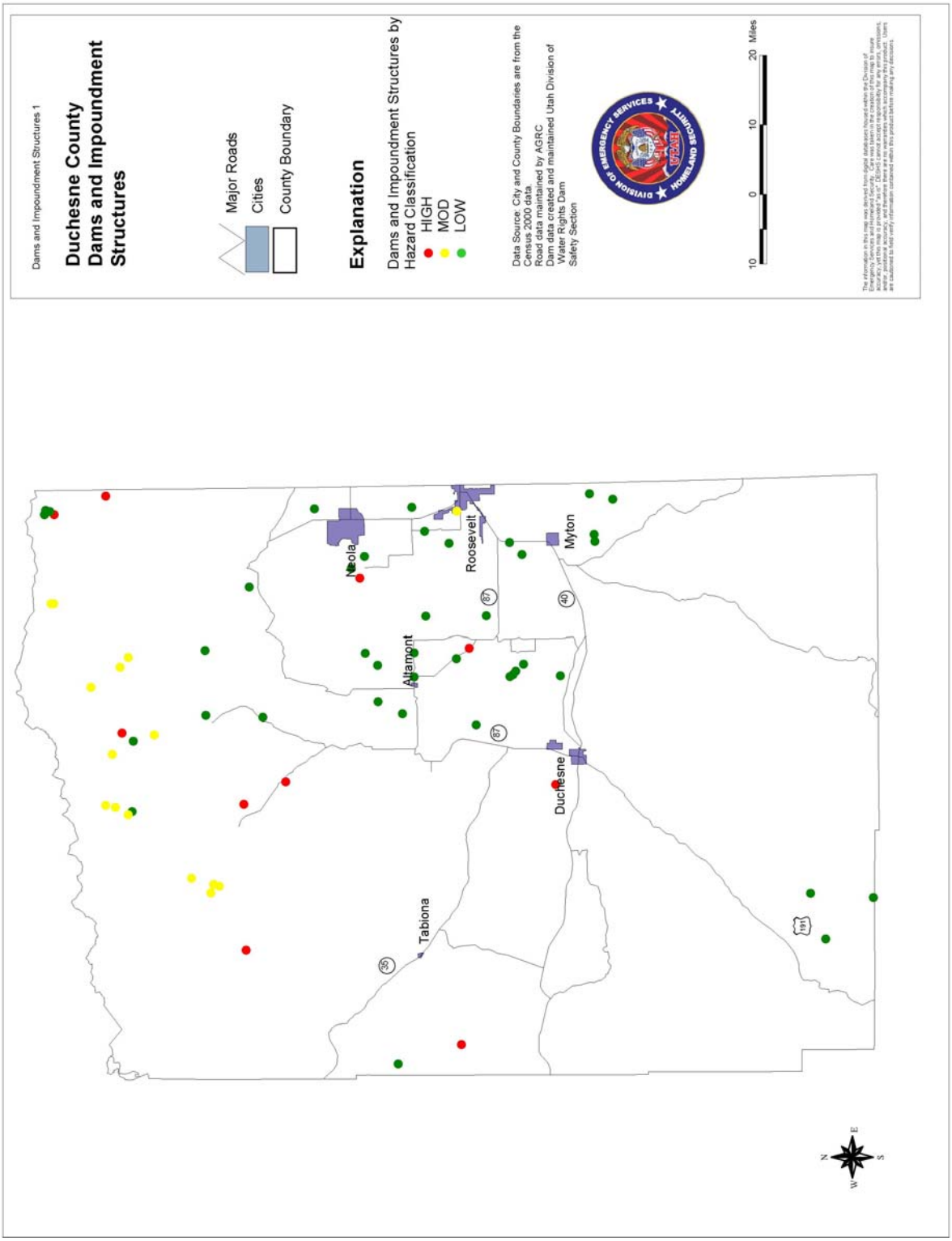
- Cliff Lake
- Browns Draw
- Starvation
- Twin Pots
- Moon Lake
- East Timothy
- Red Creek
- Chepeta Lake
- Stillwater
- Big Sand Wash

*The map on page 7 illustrates the location of each dam.*
Low lying areas down stream of these dams are particularly at risk, if a dam were to fail. *For a description of dam failure and possible causes see the dams failure section in Appendix A.*

**Generic Mitigation:**

- Proper mapping of flood plains, including mapping of dam breach flood potential.
- Knowledge must be made public so that emergency managers are aware and the public is aware when they buy and sell property.
- Updated Emergency Action Plans (EAP) and integration with GIS Systems.
- Maintaining proper flood plain and wetland geometry and vegetation will help route floods.
- Flood plain usage should be compatible with flood plain needs.
- More debris dams would help with floods and debris, and mud, and maintaining a flood control pool in existing dams would be beneficial.
- Protection of roads and bridges.

- General infrastructure protection.
- More authority to order releases and better forecasting would help in snowmelt floods and runoff.
- Gather hazard and risk data/information.
- Development of improved mitigation techniques.
- Education of local officials, developers, and citizens.


Dams and Impoundment Structures 1
Duchesne County
Dams and Impoundment
Structures
Major Roads
Cities
County Boundary
Explanation
Dams and Impoundment Structures by
Hazard Classification
HIGH
MOD
LOW
Data Source: City and County Boundaries are from the
Census 2000 data
Road data maintained by AGRC
Dam data created and maintained Utah Division of
Water Rights Dam
Safety Section
DIVISION OF EMERGENCY SERVICES
HOMELAND SECURITY
UTAH
10 0 10 20 Miles
Neola
Roosevelt
Myton
Altamont
Duchesne
Tabiona
40
87
35
191
N
E
S
W

## NATURAL HAZARD: EARTHQUAKE

**FEMA Hazard Profile for Earthquake**

| | | | |
|---|---|---|---|
| **Frequency** | | **Highly Likely** | **Near 100% probability in next year** |
| | | **Likely** | **Between 10 and 100% probability in next year, of at least one chance in 10 years** |
| | | **Possible** | **Between 1 and 10% probability in next year, of at least one chance in next 100 years** |
| | **X** | **Unlikely** | **Less than 1% probability in next 100 years** |
| **Severity** | **X** | Catastrophic | **More than 50%** (of the jurisdiction that can be affected) |
| | | Critical | **25 to 50%** (of the jurisdiction that can be affected) |
| | | Limited | **10 to 25%** (of the jurisdiction that can be affected) |
| | | Negligible | **Less than 10%** (of the jurisdiction that can be affected) |
| **Location** | Entire county | | |
| **Seasonal Pattern** | Near fault zones County Wide | | |
| **Duration** | Hours | | |
| **Speed of Onset** | Minimal or no warning | | |

An earthquake is a sudden, rapid shaking of the Earth caused by the breaking and shifting of rock beneath the Earth's surface. This shaking can cause buildings and bridges to collapse; disrupt gas, electric, and phone service; and sometimes trigger landslides, avalanches, flash floods, and fires. Buildings with foundations resting on unconsolidated landfill, old waterways, or other unstable soil are most at risk. Buildings or trailers and manufactured homes not tied to a reinforced foundation anchored to the ground are also at risk since they can be shaken off their mountings during an earthquake. Earthquakes can occur at any time of year. Source: http://www.fema.gov/hazards/earthquakes/
*For a description of earthquakes and possible causes see the earthquake section in Appendix A.*

Duchesne County contains the Towanta Flat Graben and the Duchesne Pleasant Valley Fault system. The Duchesne Pleasant valley system is a poorly understood system with fault traces running east and west. This east west orientation is at odds with contemporary tectonic stress regimes so it has not been determined if this fault could produce a large magnitude earthquake or not. Research indicates the Towanta Flat fault last moved in the mid to late Quaternary period. Duchesne County is an area of limited seismic hazard due to

the long recurrence intervals along the Towanta Flat and Pleasant Valley Fault zones. Duchesne being zoned for little or no seismic activity is warranted.

**VULNERABILITY:** Low

The map on page 10 shows the national Peak Ground Acceleration (PGA) values for the United States with a 10% chance of being exceeded over 50 years. This is a common earthquake measurement that shows three things: the geographic area affected (all colored areas on the map), the probability of an earthquake of each given level of severity (10% chance in 50 years), and the severity (the PGA is indicated by color). ***2. Locate your planning area on the map.***

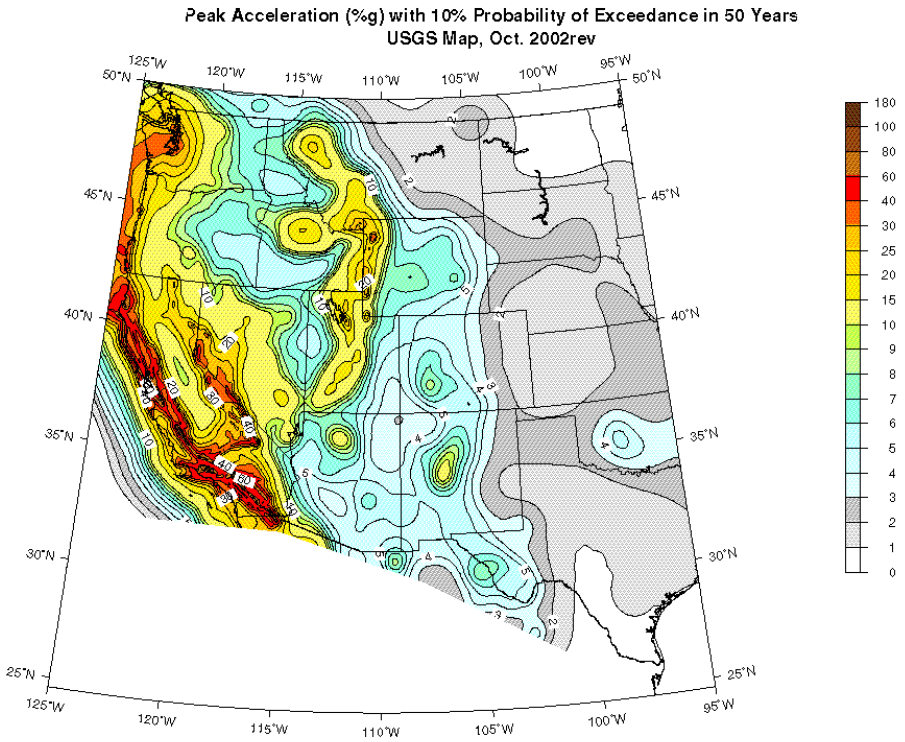
You can also generate maps based on zip codes or longitude and latitude by following the directions on the Website. ***3. Determine your Peak Ground Acceleration.***
Determine the PGA zone(s) in which your planning area is located. This is done by identifying the color associated with your planning area and correlating it with the color key located on the map. Large planning areas may be located in more than one zone.

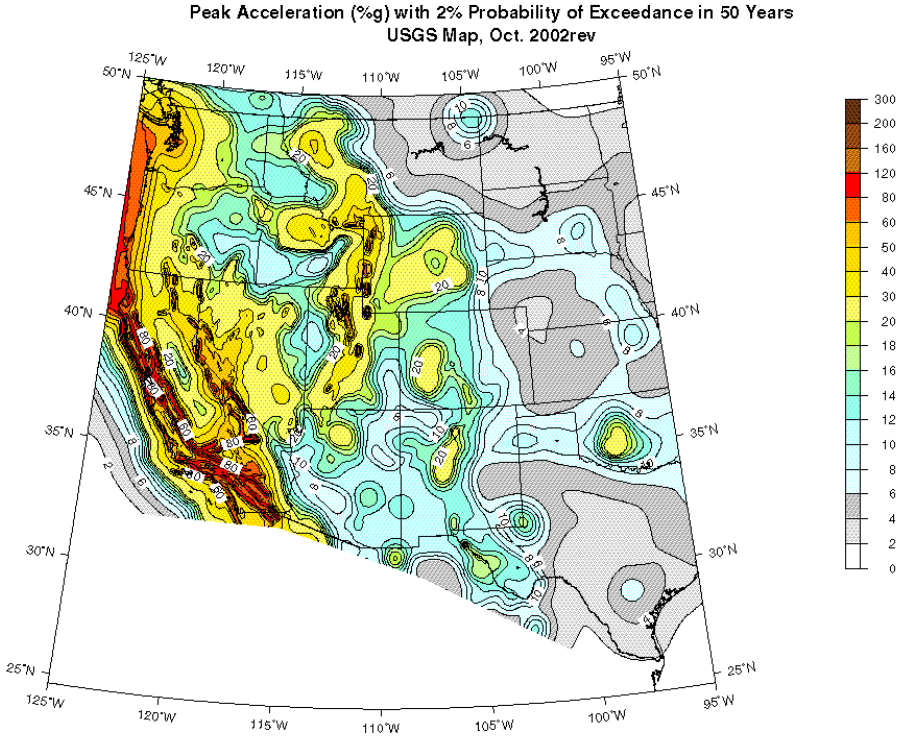
Peak Ground Acceleration (PGA) is a measure of the strength of ground movements. The PGA measures the rate in change of motion relative to the established rate of acceleration due to gravity (g) (980 cm/sec/sec). For example, In an earthquake with an acceleration of the ground surface of 244 cm/sec/sec, the PGA or rate in change of motion is 25% g where:

%g= Ground Surface Acceleration/ Rate of Acceleration due to Gravity

%g= 244 cm/sec/sec/980 cm/sec/sec

%g= 25%


Peak Acceleration (%g) with 10% Probability of Exceedance in 50 Years
USGS Map, Oct. 2002rev
125°W
120°W
115°W
110°W
105°W
100°W
95°W
50°N
45°N
40°N
35°N
30°N
25°N
180
100
80
60
40
30
25
20
15
10
9
8
7
6
5
4
3
2
1
0


Peak Acceleration (%g) with 2% Probability of Exceedance in 50 Years
USGS Map, Oct. 2002rev
125°W
120°W
115°W
110°W
105°W
100°W
95°W
50°N
45°N
40°N
35°N
30°N
25°N
300
200
160
120
80
60
50
40
30
20
18
16
14
12
10
8
6
4
2
0

**POTENTIAL AFFECT:**

A potential earthquake could affect water, oil and gas produced for the Uintah Basin as well as the Wasatch Front. An earthquake could affect transportation and dams. Many homes in Duchesne County were not built to meet earthquake standards. *The map on page 14 and 15 identify Epicenters and Quaternary Faults and gives an explanation for each in Duchesne County.*

HAZUS MH Vulnerability Assessment

**Table 1.1 Casualties**

| | | |
|---|---|---|
| **Casualties** | Nighttime –Minor | 33 |
| | Nighttime –Major | 1 |
| | Nighttime -Fatalities | 1 |
| | Daytime –Minor | 31 |
| | Daytime –Major | 1 |
| | Daytime- Fatalities | 2 |
| | Commute –Minor | 28 |
| | Commute –Major | 1 |
| | Commute-Fatalities | 1 |

**Buildings/Structures**

**Building Damage by Count --** Building damage is classified by HAZUS in five damage states: none, slight, moderate, extensive and complete. Table1.2 lists the number buildings by occupancy, which is estimated to have moderate to complete levels of damage.

**Table 1.2 –Building Damage by Count with Moderate to Complete Damage**

| **Category** | Number of Structures |
|---|---|
| **Residential** | 1,011 |
| **Commercial** | 9 |
| **Industrial** | 3 |
| **Totals** | 1,023 |

**Critical facilities**

| Classification | Total | Least Moderate Damage >50% | Complete Damage > 50% | Functionality > 50% at day 1 |
|---|---|---|---|---|
| **Hospitals** | 1 | 0 | 0 | 1 |
| **Schools** | 16 | 0 | 0 | 2 |
| **EOCs** | 0 | 0 | 0 | 0 |
| **Police Stations** | 1 | 0 | 0 | 1 |
| **Fire Stations** | 2 | 0 | 0 | 0 |

**Debris Removal –**Table 1.4 shows how much debris would be generated by the earthquake and how many loads it would take to remove the debris, based on 25 tons per load. One truck can likely haul one load per hour.

A second debris removal issue is landfill space. Fifty thousand tons (50,000) at a weight to volume ratio of one ton per cubic yard would cover more than ten acres to a depth of one yard.

**Table 1.4 –Debris Generated (millions of tons)/Loads to Remove Debris**

| | |
|---|---|
| **Debris Generated** | 0.04 |
| **Loads (25 tons per load)** | 2,000 |

**Fire Following --**The Great San Francisco Earthquake of 1906 illustrated the hazard a city could face from fire following an earthquake. Multiple ignitions and broken water mains conspired to make firefighting nearly impossible. HAZUS uses the estimated building damages, loss of transportation infrastructure and estimated winds to calculate the estimated area that would be burned following an earthquake. Table 1.5 provides estimates of ignitions, people at risk and the building stock exposed to fires following an earthquake.

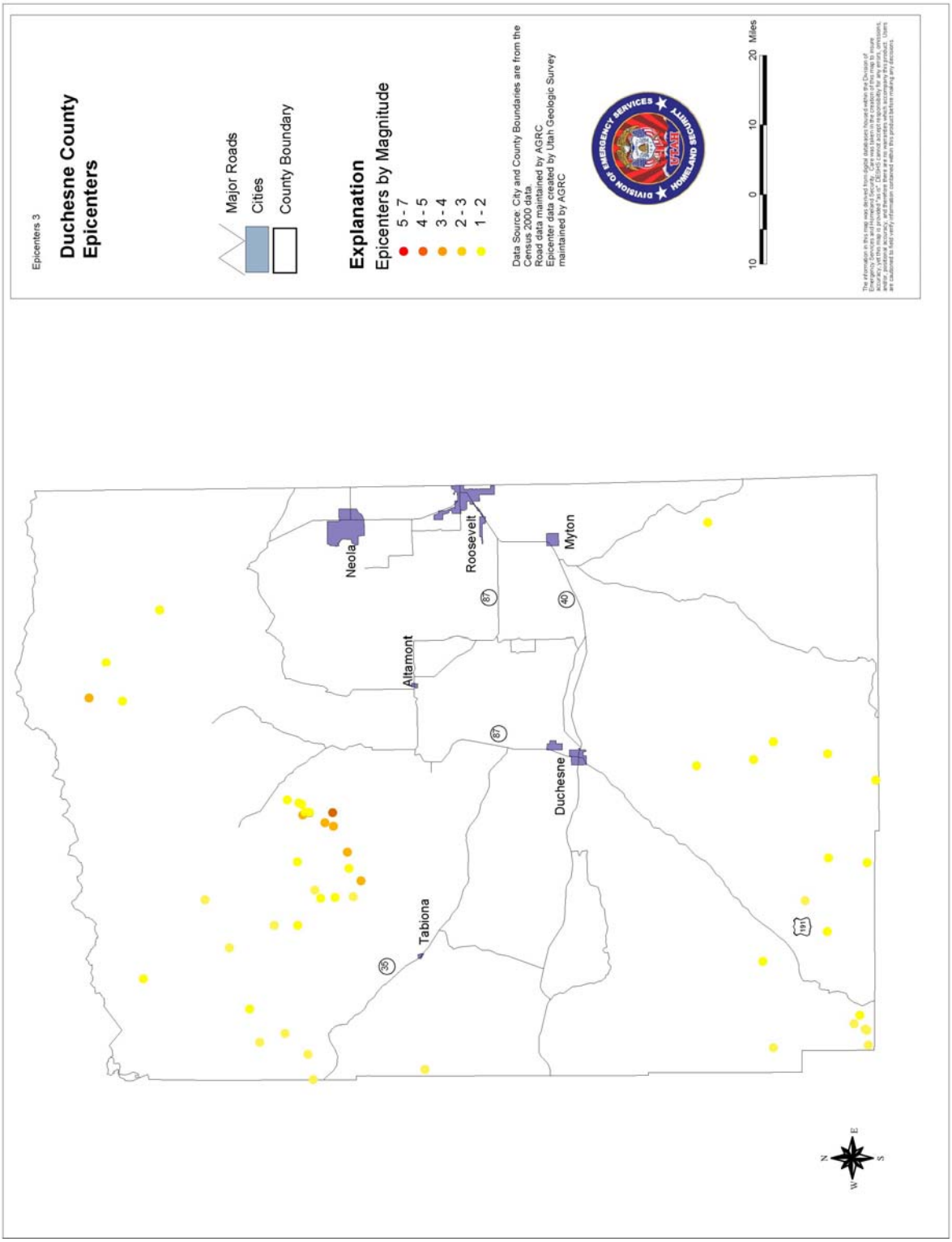
**Table 1.5 –Fire Following Event, Population Exposed, and Building Stock Exposed**

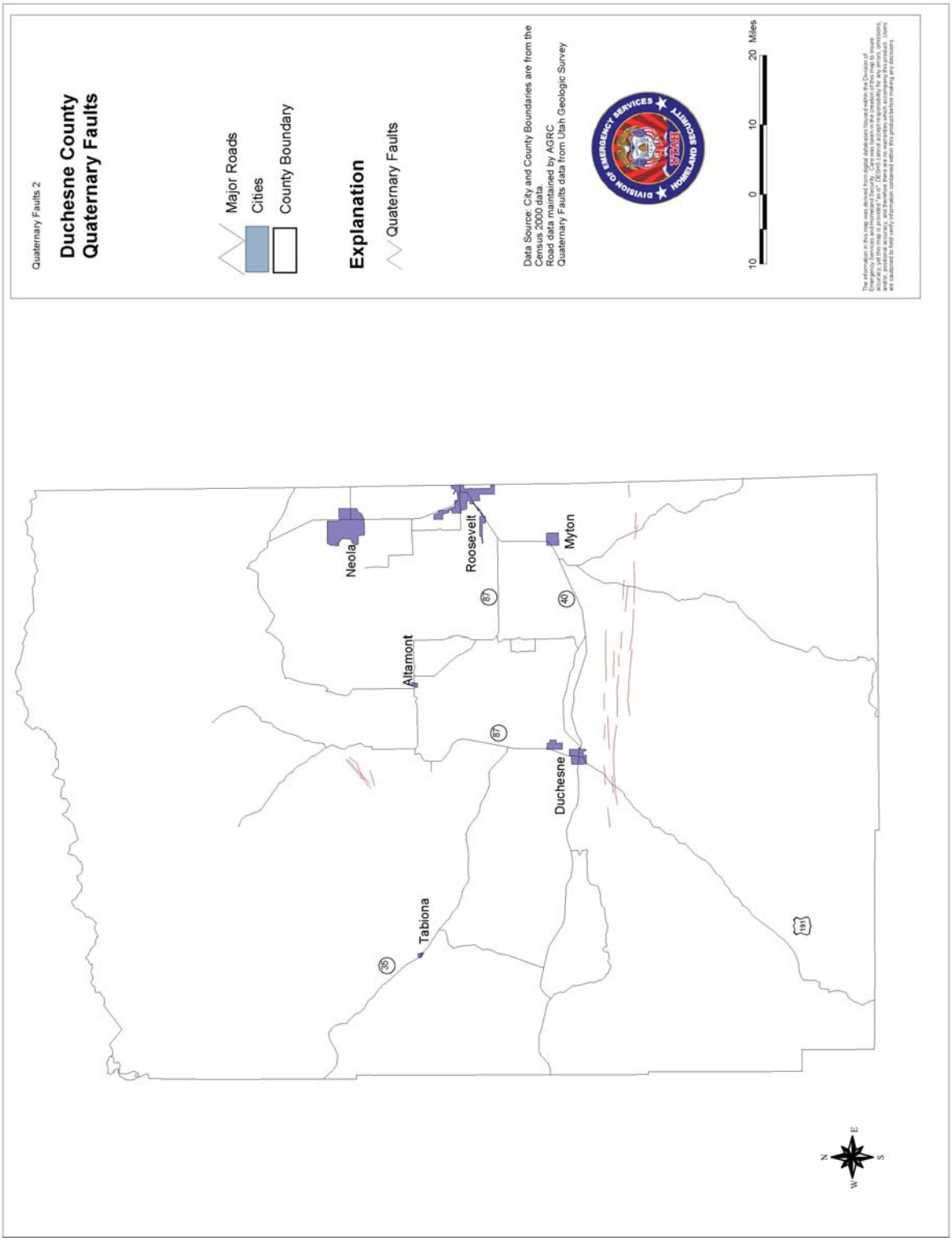
| | |
|---|---|
| **Ignitions** | 1 |
| **People Displaced** | 0 |
| **Value Exposed (mill. $)** | 0 |

These numbers were derived from a HAZUS MH run based on a probabilistic 2500-year event with a magnitude 7.0 running the soils portion of the model. *The complete HAZUS MH run for Duchesne County is available in appendix H.*

**Generic Mitigation:**

- Avoidance
- Build all homes and building's to meet the standards and code of earthquakes. County adopts building codes on all new construction.
- Educate the public on potential hazards.
- Working with local LEPC on exercising plans in existence.
- Educate local school systems to utilize LEPC.


Epicenters 3
Duchesne County
Epicenters
Major Roads
Cities
County Boundary
Explanation
Epicenters by Magnitude
5 - 7
4 - 5
3 - 4
2 - 3
1 - 2
Data Source: City and County Boundaries are from the Census 2000 data
Road data maintained by AGRC
Epicenter data created by Utah Geologic Survey maintained by AGRC
DIVISION OF EMERGENCY SERVICES HOMELAND SECURITY
UTAH
10 0 10 20 Miles
Neola
Roosevelt
Myton
Altamont
Duchesne
Tabiona
87
40
35
191
N
E
S
W


Quaternary Faults 2
Duchesne County
Quaternary Faults
Major Roads
Cities
County Boundary
Explanation
Quaternary Faults
Data Source: City and County Boundaries are from the Census 2000 data
Road data maintained by AGRC
Quaternary Faults data from Utah Geologic Survey
DIVISION OF EMERGENCY SERVICES AND HOMELAND SECURITY
UTAH
10 0 10 20 Miles
Neola
Roosevelt
Myton
Altamont
Duchesne
Tabiona
40
87
35
191
N
E
S
W

## NATURAL HAZARD: FLOODING

**FEMA Hazard Profile for Flooding**

| | | | |
|---|---|---|---|
| **Frequency** | | **Highly likely** | **Near 100% probability in next year** |
| | **X** | **Likely** | **Between 10 and 100% probability in next year, of at least one chance in 10 years** |
| | | **Possible** | **Between 1 and 10% probability in next year, of at least one chance in next 100 years** |
| | | **Unlikely** | **Less than 1% probability in next 100 years** |
| **Severity** | | Catastrophic | **More than 50%** (of the jurisdiction that can be affected) |
| | | Critical | **25 to 50%** (of the jurisdiction that can be affected) |
| | | Limited | **10 to 25%** (of the jurisdiction that can be affected) |
| | **X** | Negligible | **Less than 10%** (of the jurisdiction that can be affected) |
| **Location** | Flooding would affect all communities in the county that are in and along the flood plains | | |
| **Seasonal Pattern** | After spring rains, heavy thunderstorms, or spring thaws | | |
| **Duration** | Rainstorms can last for hours and possibly days. Spring run-off can last weeks | | |
| **Speed of Onset** | Six to twelve hours | | |

Floods are the most common and widespread of all natural disasters except fire. Most communities in the United States have experienced some kind of flooding after spring rains, heavy thunderstorms, or winter snow thaws.

A flood, as defined by the National Flood Insurance Program is: "A general and temporary condition of partial or complete inundation of two or more acres of normally dry land area or of two or more properties (at least one of which is your property) from:

- Overflow of inland or tidal waters.
- Unusual and rapid accumulation or runoff of surface waters from any source, or
- A mudflow.

[The] collapse or subsidence of land along the shore of a lake or similar body of water as a result of erosion or undermining caused by waves or currents of water exceeding anticipated cyclical levels that result in a flood." *For a description of flooding and possible causes see the flooding section in Appendix A.*

Floods can be slow, or fast rising but generally develop over a period of days. Mitigation includes any activities that prevent an emergency, reduce the chance of an emergency happening, or lessen the damaging effects of unavoidable emergencies. Investing in mitigation steps now, such as, engaging in floodplain management activities, constructing barriers, such as levees, and purchasing flood insurance will help reduce the amount of structural damage to your home and financial loss from building and crop damage should a flood or flash flood occur.
Source: http://www.fema.gov/hazards/floods/

*For more information regarding Flooding in Duchesne County see the Flood Hazard Identification Study in Appendix M.*

**VULNERABILITY:** High
Flood plain maps were analyzed during completion of this plan. These maps were all quite dated and not geo-referenced preventing us from performing a GIS based vulnerability analysis. The Flood Hazard Identification Study completed by the Army Corps of Engineers can be found in Appendix M. This study assessed vulnerability and suggested potential mitigation projects.

**Generic Mitigation:**

- Avoidance
- Revise and up-date building ordinances for new construction that takes place to help eliminate bridges and buildings from being washed away.
- Manufactured homes need to be installed properly and inspected.
- Enforce zoning
- Protection of roads and bridges.
- Protection of drinking water supply systems.
- Education of local officials, developers, and citizens.
- Better flood routing through communities.
- Development of improved mitigation techniques.

## NATURAL HAZARD: INSECT INFESTATION

**FEMA Hazard Profile for Insect Infestation**

| | | | |
|---|---|---|---|
| **Frequency** | **X** | **Highly likely** | **Near 100% probability in next year** |
| | | **Likely** | **Between 10 and 100% probability in next year, of at least one chance in 10 years** |
| | | **Possible** | **Between 1 and 10% probability in next year, of at least one chance in next 100 years** |
| | | **Unlikely** | **Less than 1% probability in next 100 years** |
| **Severity** | **X** | Catastrophic | **More than 50%** (of the jurisdiction that can be affected) |
| | | Critical | **25 to 50%** (of the jurisdiction that can be affected) |
| | | Limited | **10 to 25%** (of the jurisdiction that can be affected) |
| | | Negligible | **Less than 10%** (of the jurisdiction that can be affected) |
| **Location** | Duchesne County | | |
| **Seasonal Pattern** | Spring, summer, and fall | | |
| **Duration** | Not applicable | | |
| **Speed of Onset** | Not applicable | | |

Agriculture has historically dominated the economic life of Duchesne County. The county remains a significant producer of crops and livestock. Duchesne County has experienced losses in agriculture, livestock, and wildlife as a result of insect infestation. Damage to the economic base and to the health of the citizens is also a direct result of insect infestation. Insects most notable are grasshoppers, Mormon Crickets, Bark Beetles, and mosquitoes. Currently the West Nile Virus spread by mosquitoes is a serious threat to humans and animals in Duchesne County.

**Generic Mitigation:**

- Avoidance
- Spread insect bait and spray for mosquitoes
- Vaccinate

## NATURAL HAZARD: LANDSLIDE

**FEMA Hazard Profile for Landslide**

| | | | |
|---|---|---|---|
| **Frequency** | | **Highly likely** | **Near 100% probability in next year** |
| | **X** | **Likely** | **Between 10 and 100% probability in next year, of at least one chance in 10 years** |
| | | **Possible** | **Between 1 and 10% probability in next year, of at least one chance in next 100 years** |
| | | **Unlikely** | **Less than 1% probability in next 100 years** |
| **Severity** | | **Catastrophic** | **More than 50%** (of the jurisdiction that can be affected) |
| | | **Critical** | **25 to 50%** (of the jurisdiction that can be affected) |
| | **X** | **Limited** | **10 to 25%** (of the jurisdiction that can be affected) |
| | | **Negligible** | **Less than 10%** (of the jurisdiction that can be affected) |
| **Location** | Dye Dugway, Indian Canyon, Ravola Dougway, and Wolf Creek Pass in Duchesne County. | | |
| **Seasonal Pattern** | After spring rains, heavy thunderstorms, or spring snow thaws. | | |
| **Duration** | Depending upon conditions. | | |
| **Speed of Onset** | Not applicable. | | |

**VULNERABILITY:** Low
A large amount of landslides exist in Duchesne County, these landslides primarily occur on federal lands would mainly affect roads and utility distribution lines. The City of Neola has mapped landslides within its city boarders. These slides could impact a large number of structures and people.

Additionally some areas of known landslides are near city boundaries. If and when cities annex additional land they should take into account landslides.

**AFFECT:**
In 1983, the Dye Dugway moved and peeled off the side. Damages were approximately $50,000. Other areas that incur landslides are Indian Canyon, Ravola Dugway, and Wolf Creek Pass.

**Overall Summary of Impacts**
The Uintah Basin Association of Governments identified and mapped possible landslide threats to Duchesne County that would have a potential risk to pedestrians, vehicle traffic, and residential areas.
*The map on page 22 illustrates Landslides and gives an explanation for Landslides in Duchesne County.*

In Duchesne County there are several areas namely Indian Canyon, Ravola Dugway, and Wolf Creek Pass that could have a potential risk to pedestrians and vehicle traffic due to landslides. Based upon the information we had available at that time we were unable to come up with any hard value figures that these landslides would have on Duchesne County.

In Duchesne County there are approximately 253 residential structures at potential risk from landslide. Based upon figures provided by the Duchesne County Assessors Office, the market value of those structures is estimated to be $20,240,000. *For a description of Landslides and possible causes see the Landslides section in Appendix A.*

**Structure Loss and Value as a Percentage of Total Acreage.**

| City Name | Acres of Historically Active Landslides 1847 to Present | Households Vulnerable to Landslide/Cost |
|---|---|---|
| **Duchesne County** | 82,560 | 253/$20,240,000 |
| **Duchesne** | 1 | .373/$29,840 |
| **Neola** | 182 | 7.6/$611,520 |

*Includes value of land.

**Vulnerable Transportation Within Duchesne County**

| Name | Miles | Estimated Cost |
|---|---|---|
| Local Neighborhood/local/city street | 95.95 | 191,900,000 |
| State Route 87 | .268 | 646,818 |
| State Route 40 | .448 | 1,081,248 |

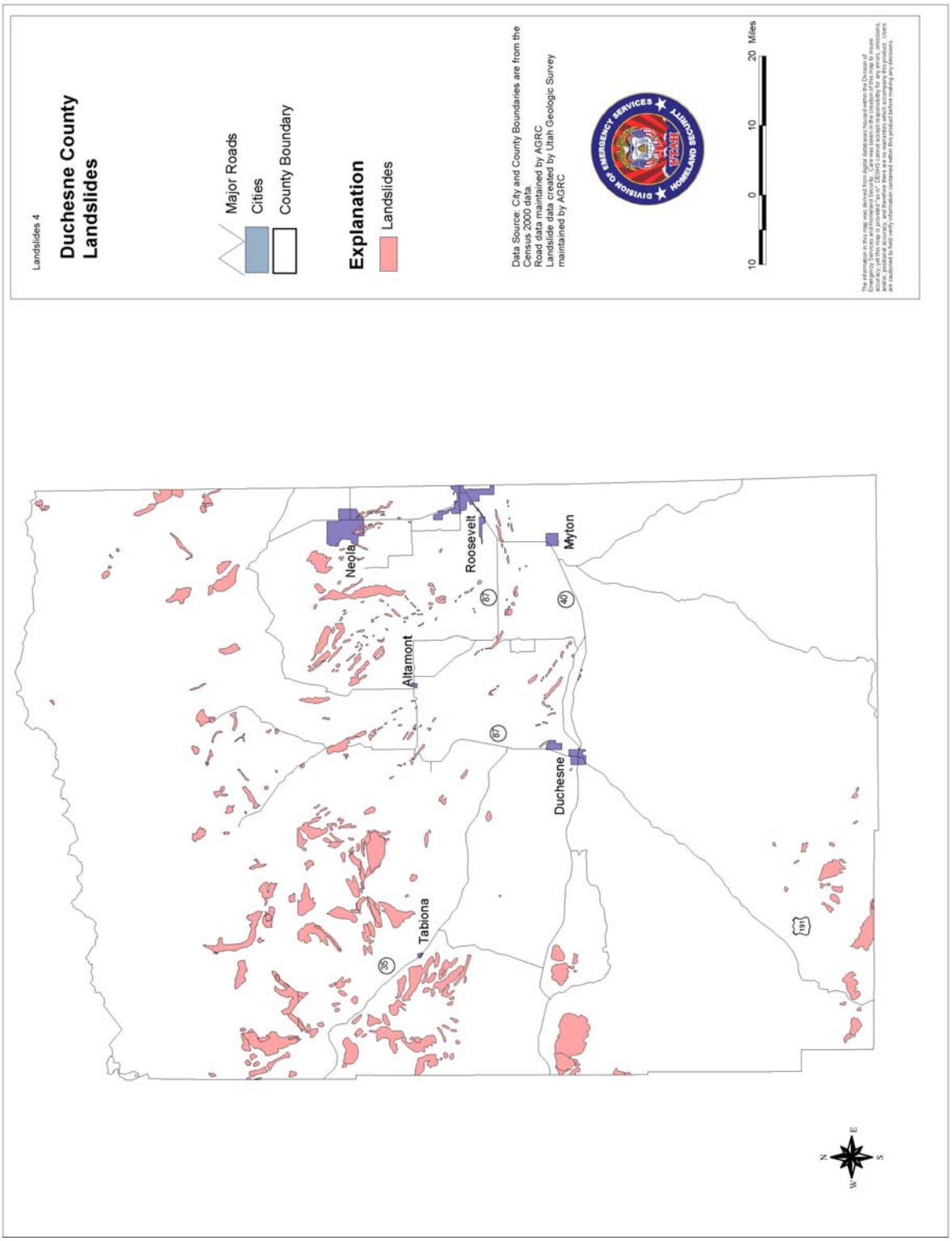
Table data represents total length of roads, which overlay historically active landslides.

**Vulnerable Utilities Within Duchesne County**

| Name | Description | Estimated Cost |
|---|---|---|
| KV-138 Lines | 1.929 miles | 93,132 |
| Other power lines | 9.27 miles | 447,555 |
| Gas lines | 1.62 miles Questar | 391,051 |

**Generic Mitigation:**

- Avoidance
- Recognize landslide areas
- Zoning Ordinances
- Install surface drains
- Remove materials from the head of the landslide
- Install a pipeline for run-off.
- Seed hillsides to prevent landslides
- Re-grade


Landslides 4
Duchesne County
Landslides
Major Roads
Cities
County Boundary
Explanation
Landslides
Data Source: City and County Boundaries are from the Census 2000 data
Road data maintained by AGRC
Landslide data created by Utah Geologic Survey maintained by AGRC
DIVISION OF EMERGENCY SERVICES & HOMELAND SECURITY
UTAH
10 0 10 20 Miles
Neola
Roosevelt
Myton
Altamont
Duchesne
Tabiona
40
87
191
N
E
S
W

## NATURAL HAZARD: WILDFIRE

**FEMA Hazard Profile for Wildfire**

| | | | |
|---|---|---|---|
| **Frequency** | **X** | **Highly likely** | **Near 100% probability in next year** |
| | | **Likely** | **Between 10 and 100% probability in next year, of at least one chance in 10 years** |
| | | **Possible** | **Between 1 and 10% probability in next year, of at least one chance in next 100 years** |
| | | **Unlikely** | **Less than 1% probability in next 100 years** |
| **Severity** | **X** | **Catastrophic** | **More than 50%** (of the jurisdiction that can be affected) |
| | | **Critical** | **25 to 50%** (of the jurisdiction that can be affected) |
| | | **Limited** | **10 to 25%** (of the jurisdiction that can be affected) |
| | | **Negligible** | **Less than 10%** (of the jurisdiction that can be affected) |
| **Location** | Duchesne County | | |
| **Seasonal Pattern** | June through October | | |
| **Duration** | Minutes to days and months | | |
| **Speed of Onset** | Minimal or no warning | | |

There are three different classes of wild land fires. A **surface fire** is the most common type and burns along the floor of a forest, moving slowly and killing or damaging trees. A **ground fire** is usually started by lightning and burns on or below the forest floor. **Crown fires** spread rapidly by wind and move quickly by jumping along the tops of trees.

Wild land fires are usually signaled by dense smoke that fills the area for miles around.
Source: http://www.fema.gov/hazards/fires/

*The map on page 26 illustrates fire risk and gives a wildfire explanation for Duchesne County.*

### A Word about Wildfires

Almost every year several communities around the state are flooded and/or affected by post burn debris flows. Wildfire damaged watersheds have conditions which increase the potential for debris flows which may damage structures and infrastructure in the impacted area. Overall, the heightened risk associated with alluvial fans is always of concern. Post fire revegetation and

stabilization efforts in many cases do not alleviate the threat due to flooding and debris flow.

**VULNERABILITY:** High
Duchesne County and cities within the county are not as vulnerable to wildfire as other jurisdictions in the planning area, a risk is still exists. Some of the vegetative regimes within the county have short natural burn cycles; this is compounded by drought and non-native species of grass.

**Generic Mitigation:**

- The County cannot mitigate because the forest service won't allow counties to manage their land.
- Poor land management on BLM and forestlands.
- Obtain fire-fighting equipment to control wildfires in rough terrain.
- Provide wild land fire training.
- Obtain fire grant from FEMA for personnel equipment.
- Weed control.

| County Name | Acres of Extreme | Acres of High | Acres of Moderate | Acres of Low/Very Low |
|---|---|---|---|---|
| **Duchesne** | N/A | 10,842 | 569,861 | 1,496,417 |

**Unincorporated County**

| County | Households in Extreme/Cost | Households in High/Cost | Households in Moderate/Cost |
|---|---|---|---|
| **Duchesne** | N/A | 2.86/163,840 | 150.1/9,606,400 |

**Duchesne County**

| City Name | Acres of Extreme | Acres of High | Acres of Moderate |
|---|---|---|---|
| **Duchesne City** | | | 659 |
| **Roosevelt City** | | | 87 |
| **Neola** | | | 552 |

**Structures in Wildfire Area**

| City Name | Households in Extreme/Cost | Households in High/Cost | Households in Moderate/Cost |
|---|---|---|---|
| **Duchesne City** | | | 245.8/15,731,200 |
| **Roosevelt City** | | | 40.5/2,592,000 |
| **Neola** | | | 23.18/1,483,520 |

*Excludes content value, which would result in, and increase of 50% to the values listed.

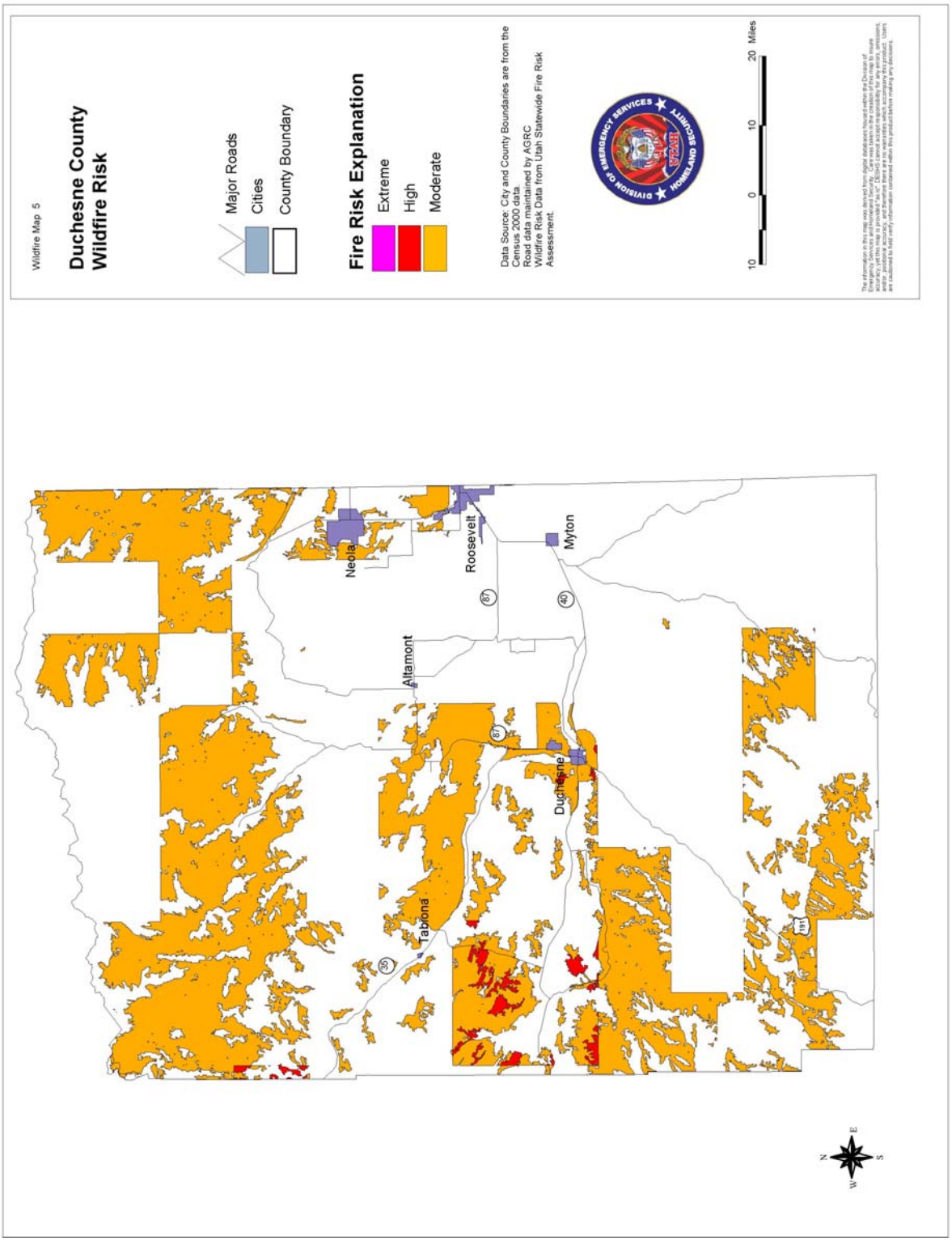
**Transportation Roads, highways, and Rail Lines**

| Name | Miles | Estimated Cost |
|---|---|---|
| **Local Neighborhood/local/city street** | 618.918 | 1,237,836,000 |
| **State Route 35** | 1.1 | 2,654,850 |
| **State Route 87** | 13.07 | 31,544,445 |
| **State Route 121** | .90 | 2,172,150 |
| **State Route 150** | 3.68 | 8,881,680 |
| **State Route 191** | 4.88 | 11,777,880 |
| **State Route 208** | 5.85 | 14,118,975 |
| **State Route 311** | 2.59 | 6,250,965 |

Table data includes road lengths within areas determined to have an extreme, high, or moderate risk to wildfire as determined by the Utah Statewide Fire Risk Assessment.

**Utilities**

| Name | Description | Estimated Cost |
|---|---|---|
| **KV-138** | 6.01 miles | 290,162 |
| **Uncoded Power lines** | 46.27 miles | 2,233,915 |
| **Mono Lake Plant** | Power Generation | 10,000,000 |
| **Gas lines** | 9.37 miles of Questar | 2,261,824 |


Wildfire Map 5
Duchesne County
Wildfire Risk
Major Roads
Cities
County Boundary
Fire Risk Explanation
Extreme
High
Moderate
Data Source: City and County Boundaries are from the Census 2000 data.
Road data maintained by AGRC
Wildfire Risk Data from Utah Statewide Fire Risk Assessment.
DIVISION OF EMERGENCY SERVICES & HOMELAND SECURITY
UTAH
10 0 10 20 Miles
Neola
Roosevelt
Myton
Altamont
Duchesne
Tabiona
40
87
191
N
E
S
W

## Mitigation Capabilities of Duchesne County

This portion of the Plan assesses Duchesne County's current capacity to mitigate the effects of the natural hazards identified within the plan. The assessment includes an examination of the following local government capabilities:

1. Staff & Organizational Capability
2. Technical Capability
3. Development Trends
4. Fiscal Capability
5. Policy and Program Capabilities
6. Political Willpower

The capabilities assessment serves as the foundation for designing an effective hazard mitigation strategy. It not only helps establish the goals and objectives for Duchesne County to pursue under this Plan, but also ensures that those goals and objectives are realistically achievable under given local conditions.

### 1. Staff and Organizational Capability

Duchesne County has **Very Limited** staff and organizational capability to implement hazard mitigation strategies. Duchesne County is Utah's 15$^{th}$ most populated county, containing only 14,759 people. While the County has a number of professional staff members to serve residents and carry out day-to-day administrative activities, much of the staff is part time or is tasked with numerous duties.

The County of Duchesne does have an Emergency Manager who is responsible for the mitigation, preparedness, response and recovery operations that deal with both natural and man-made disaster events.

### 2. Technical Capability

Duchesne County has **very limited** technical capability to implement hazard mitigation strategies.

#### *Technical Expertise*

Duchesne County does have an, emergency manager to administer the County's hazard mitigation programs. The County does not have a licensed engineer or related technical expert on staff, and has in the past relied upon outside contractors/consultants to perform a majority of any required technical work.

#### *Internet Access*

Duchesne County does provide its employees and citizens with high speed broadband Internet. Internet access opens up an enormous door for local officials to keep abreast of the latest information relative to their work and makes receiving government services more affordable and convenient. It is believed that Internet access will help further the County's hazard mitigation awareness

programs, but should be supplemented with more traditional (and less technical) means as well.

**3. Development Trends**

Agriculture has historically dominated the economic life of Duchesne County. The county remains a significant producer of crops and livestock. However, during the second half of the 20th Century, the development of oil and gas reserves provided an important boost to the economy, and this industry remains a major contributor to growth. Other expanding industries include government and trade. Duchesne County includes part of the tribal lands of the Uintah-Ouray Indian Reservation. New retail and service developments on tribal lands help sustain the Native American population and add to the economic vitality of the area.
For the third consecutive quarter, nonfarm employment in Duchesne County reported a year-over decline. Second quarter data for 1999 showed a decrease of 4.2 percent. Slowdowns in oil and gas activity continue to stymie economic growth in the area. Duchesne County's unemployment rate jumped from 7.2 percent in second quarter 1998 to 8.4 percent in second quarter 1999, one of the highest rates in Utah.

Slower economic growth has slowed the demand for construction in Duchesne County. The total valuation of second quarter permit-authorized construction slipped from $6.8 million in 1998 $4.6 million in 1999. Residential construction continued to slow, as new dwelling unites fell from 88 to 73. The value of residential construction declined from $5.2 million to $3.4 million. Nonresidential building slowed from building slowed from $1.0 million in 1998 to $820,600 in 1999 as fewer nonresidential projects were authorized. Total additions, alternations, and repairs dropped 29.2 percent in valuation; however, renovations to commercial structure did improve slightly. *For more information regarding Duchesnes County's development trends see Appendix L.*

**4. Fiscal Capability**

Duchesne County has **very limited** fiscal capability to implement hazard mitigation strategies.

**5. Policy and Program Capability**

**Emergency Operations Plan**

Duchesne County has developed and adopted an Emergency Operations Plan, which predetermines actions to be taken by government agencies and private organizations in response to an emergency or disaster event. The Plan was last updated in 1997. For the most part, the Plan describes the County's capabilities to respond to emergencies and establishes the responsibilities and procedures for responding effectively to the actual occurrence of a disaster.
The Plan does not specifically address hazard mitigation, but it does identify the specific operations to be undertaken by the County to protect lives and property immediately before, during and immediately following an emergency. There are

no foreseeable conflicts between this Hazard Mitigation Plan and Duchesne County's Emergency Management Plan, primarily because they are each focused on two separate phases of emergency management (mitigation vs. preparedness and response).

***Emergency Management Program***
Duchesne County has an emergency manager and active emergency management program. One of the four phases of emergency management is mitigation, and the county as implemented low or no cost mitigation.

***Floodplain Management Plan***
Although Duchesne County currently participates in the National Flood Plain Insurance Program they do not have a current Floodplain Management Plan. However, this Disaster Mitigation Plan recommends that Duchesne County work on updating and/or revising their Floodplain Management Plan.

***Stormwater Management Plan***
Duchesne County Currently has no formal Storm water Management Plan.

***County Ordinances***
The Duchesne County currently does not have any county ordinances that address natural disasters. However, a member of the planning committee was in attendance at our Natural Disaster meetings and agreed to work on implementing and adopting new County Ordinances that are relevant to hazard mitigation.

**6. Political Willpower**
Most Duchesne County residents are quite knowledgeable about the potential hazards that their community faces. Recent wildfires have increased the understanding and need for mitigation within the government structure of Duchesne County.

The Uintah Basin Association of Governments used historical data to estimate to the best of their ability (with the data available at the time) the potential dollar losses if the County were to experience flooding and wildfires, the two most likely hazards to occur in the County. The estimated costs are as follows:

**Potential flood losses:**

- Residential properties (including senior citizens home): Depending upon the location of the flood, losses could result into millions of dollars. *Approximately; 4 to 5 million dollars*
- Local Hospital: The local Hospital in Duchesne County is located in Roosevelt City, which currently does not have a flood plain map. However, it is not likely that potential floods would affect the hospital. Past floods that have occurred in Duchesne County have not affected the

Hospital. Minimal damages would occur if the Hospital were affected by potential flooding. *Approximately; $100,000.00*

- Schools: The Schools located in Duchesne City, are likely to be affected by a flood. The elementary school and the High School are located in the flood plain. *Approximately; 4 to 5 million dollars*
- Communication utility company: Due to the fact that the communications and the utility companies are not located in the flood plain minimal damages would result from a flood. *Approximately; $100,000.00*
- Waste water treatment plant: It is not likely that the wastewater treatment plant would have any damages due to flooding. *Approximately; $100,000.00*

**Potential wildfire losses:**

- Residential properties: Depending upon the location of the flood, losses could result into excess of millions of dollars. *Approximately; 4 to 5 million dollars*
- Hospital: The Duchesne County Hospital would have minimal damages if any that would result from potential wildfire losses. *Approximately; $100,000.00*
- Secondary School: Duchesne County does have a couple of school systems located on the outskirts of the County that could have potential damages due to wildfires. *Approximately; 1 to 2 million dollars*

**Duchesne County**

The Duchesne County Disaster Mitigation Planning committee, which consists of one County Commissioner, the Mayor of Duchesne, the Mayor of Altamont, the Mayor of Tabiona, the Roosevelt City Manager, the Mayor of Myton, the County Emergency Manager in conjunction with the Uintah Basin Association of Governments meet on several different occasions to review and analyze the risk assessment studies that were performed for the County. The goals listed were determined to be those goals that would have the greatest benefit in hazard reduction to the County. The goals, objectives and actions represent a long-term vision for hazard reduction or enhancement of mitigation capabilities. Listed below is our definition of goals and objectives.

**Goals:** General guidelines that explain what you want to achieve. They are usually long-term and represent global visions, such as "eliminate flood damage."

**Objectives:** Define strategies or implementation steps to attain the identified goals. Unlike goals, objectives are specific, measurable, and have a defined completion date. Objectives are more specific, such as "adopt a zoning ordinance prohibiting new development in the floodplain."

The Duchesne County Disaster Mitigation Planning Committee and the Uintah Basin AOG Mitigation Planner decided upon the following goals, objectives, action items, and priorities for each of the natural hazards. The priorities for each hazard are ranked in the following order: High, Medium, and Low. Each hazard is ranked by order of importance; however, this does not mean the ranking of each hazard will not potentially change over time.

## Mitigation Strategies

## Dam Failure

### Duchesne County

**GOAL 1:** Help reduce future flooding in Duchesne County due to dam failure.
**Problem Identification**: Reduce down stream loss in Duchesne County due to dam failure.

### High Priority

**Objective 1.1**

- Use technology to aid in prevention of flood loss due to dam failure

**Action 1.1.1:**

- Digitize high hazard dam failure inundation maps

  **Time Frame:** ongoing
  **Funding:** state government
  **Estimated Cost:** 500 dollars per dam
  **Staff: Utah Dam** Safety Section, and AGRC

**Action 1.1.2:**

- Update Emergency Operations Plan to include GIS dam failure estimates

  **Time Frame:** Next EOP update
  **Funding:** County
  **Estimated Cost:** Undetermined
  **Staff:** County GIS and Emergency Manager

**Action 1.1.3:**

- Educate the local elected officials, developers, and citizens.

  **Time Frame:** Within the next two years
  **Funding:** County
  **Estimated Cost:** Minimal
  **Staff:** County employees

**Action 1.1.4**

- Updated Emergency Action Plans (EAP) and integration with GIS Systems**.**

  **Time Frame:** Ongoing
  **Funding:** FEMA, State and Local
  **Estimated Cost:** Unknown
  **Staff:** State and Local

**Action 1.1.5:**

- Implementation of more debris dams would assist in controlling floods, reducing the amount of debris and mud that come through. Maintenance of flood control pools in existing dams would also be very beneficial.

  **Time Frame:** Ongoing
  **Funding:** Town and County funds
  **Estimated Cost:** minimal
  **Staff:** Water surveyor and newsletter editor

**Background:** Numerous technological advancements have been made which will help reduce the likely hood of dam failure and reduce the risk to down stream populations should a dam fail. These techniques will only reduce the risk if they are properly understood and implemented. The above mitigation recommendations when implemented will represent a first step into this new technology for Duchesne County. The county understands there are additional technologic steps that can be taken such as increase number of telemeter snow and stream gauges. Look for these advances in future revisions to the mitigation plan.

## Drought

**Duchesne County**

**GOAL 1:** Reduce water loss within Duchesne County due to drought.
**Problem Identification:** Current, past and future drought issues within Duchesne County.

**High Priority**

**Objective 1.1**

- Conserve culinary water by educating the public

**Action 1.1.1:**

- Educate the public on the need to be water wise

**Time Frame:** Ongoing
**Funding:** County funds
**Estimated Cost:** minimal
**Staff:** Water surveyor and newsletter editor

**Background:** Use a newsletter to educate the public

**Objective 1.2:**
- Develop more water storage tanks within the County

**Action 1.1.2:**
- Conduct a feasibility study

**Time Frame:** Ongoing
**Funding:** County funds
**Estimated Cost:** minimal
**Staff:** Water surveyor and newsletter editor

**Action 1.1.3:**
- Install new wheel lines to improve the water efficiency.

**Time Frame:** Ongoing
**Funding:** Federal, and State funding
**Estimated Cost:** Unknown
**Staff:** NRCS, UACD, USU, Extension, ect.

**Action 1.1.4:**
- Implement and enforce water laws that prohibit the use of extensive amounts of water.

**Time Frame:** Ongoing
**Funding:** County funds
**Estimated Cost:** Unknown
**Staff:** Water surveyor and newsletter editor

## Drought

**Altamont Town**

**GOAL 1:** Reduce water loss within the town of Altamont.
**Problem Identification:** Cyclical periods of drought place a strain on availability of community culinary water and irrigation water resources.

**High Priority**

**Objective 1.1**

- Meet current and future water needs of community. Conserve culinary water by educating the public

**Action 1.1.1:**

- Develop additional water storage tanks as well as implement conservation plans.

**Time Frame:** Ongoing
**Funding:** Town funds, State and Federal Government loans and/or grants
**Estimated Cost:** To be determined
**Staff:** Altamont Town Staff, Professional Services, and Contractors

**Objective 1.2**

- Conserve culinary water by conservation

**Action 1.1.2:**

- Maintain and enforce rate policies that encourage water conservation

**Time Frame:** Ongoing
**Funding:** Town and County funds
**Estimated Cost:** minimal
**Staff:** Water surveyor and newsletter editor

**Background:** The Town should continue to maintain and implement a tiered water rate structure.

**Duchesne City**

**GOAL 1:** Reduce water loss within Duchesne City.
**Problem Identification:** Cyclical periods of drought place a strain on availability of community culinary water and irrigation water resources.

**High Priority**

**Objective 1.1**

- Meet current and future water needs of community. Conserve culinary water by educating the public

**Action 1.1.1:**

- Develop additional water storage tanks as well as implement conservation plans.

**Time Frame:** Ongoing
**Funding:** City funds, State and Federal Government loans and/or grants
**Estimated Cost:** To be determined

**Staff:** City Staff, Professional Services, and Contractors

**Objective 1.2**

- Conserve culinary water by conservation

**Action 1.1.2:**

- Maintain and enforce rate policies that encourage water conservation

**Time Frame:** Ongoing
**Funding:** City and County funds
**Estimated Cost:** minimal
**Staff:** Water surveyor and newsletter editor

**Background:** The City should continue to maintain and implement a tiered water rate structure.

**Myton City**

**GOAL 1:** Reduce water loss within Myton City.
**Problem Identification:** Cyclical periods of drought place a strain on availability of community culinary water and irrigation water resources.

**High Priority**

**Objective 1.1**

- Meet current and future water needs of community. Conserve culinary water by educating the public

**Action 1.1.1:**

- Develop additional water storage tanks as well as implement conservation plans.

**Time Frame:** Ongoing
**Funding:** City funds, State and Federal Government loans and/or grants
**Estimated Cost:** To be determined
**Staff:** Myton City Staff, Professional Services, and Contractors

**Objective 1.2**

- Conserve culinary water by conservation

**Action 1.1.2:**

- Maintain and enforce rate policies that encourage water conservation

**Time Frame:** Ongoing
**Funding:** City and County funds

**Estimated Cost:** minimal
**Staff:** Water surveyor and newsletter editor

**Background:** The City should continue to maintain and implement a tiered water rate structure.

**Roosevelt City**

**GOAL 1:** Reduce water loss within Roosevelt City.
**Problem Identification:** Cyclical periods of drought place a strain on availability of community culinary water and irrigation water resources.

**High Priority**

**Objective 1.1**

- Meet current and future water needs of community. Conserve culinary water by educating the public

**Action 1.1.1:**

- Develop additional water storage tanks as well as implement conservation plans.

**Time Frame:** Ongoing
**Funding:** City funds, State and Federal Government loans and/or grants
**Estimated Cost:** To be determined
**Staff:** Roosevelt City staff, Professional Services, Contractors

**Objective 1.2**

- Conserve culinary water by conservation

**Action 1.1.2:**

- Maintain and enforce rate policies that encourage water conservation

**Time Frame:** Ongoing
**Funding:** City and County funds
**Estimated Cost:** minimal
**Staff:** Water surveyor and newsletter editor

**Background:** The City should continue to maintain and implement a tiered water rate structure.

**Tabiona Town**

**GOAL 1:** Reduce water loss within the town of Tabiona.
**Problem Identification:** Cyclical periods of drought place a strain on availability of community culinary water and irrigation water resources.

**High Priority**

**Objective 1.1**

- Meet current and future water needs of community. Conserve culinary water by educating the public

**Action 1.1.1:**

- Develop additional water storage tanks as well as implement conservation plans.

**Time Frame:** Ongoing
**Funding:** Town funds, State and Federal Government loans and/or grants
**Estimated Cost:** To be determined
**Staff:** Tabiona Town Staff, Professional Services, and Contractors

**Objective 1.2**

- Conserve culinary water by conservation

**Action 1.1.2:**

- Maintain and enforce rate policies that encourage water conservation

**Time Frame:** Ongoing
**Funding:** Town and County funds
**Estimated Cost:** minimal
**Staff:** Water surveyor and newsletter editor

**Background:** The Town should continue to maintain and implement a tiered water rate structure.

## Earthquake

**Duchesne County**

**GOAL1:** Provide public awareness regarding earthquakes.
**Problem Identification:** Transportation and utilities services could be severely impacted.

**High Priority**

**Objective 1.1**

- Provide for emergency response and relief.

**Action 1.1.1:**

- Identify and maintain critical transportation and utility services.

**Time Frame:** ongoing
**Funding:** Local governments and possible grants

**Estimated Cost:** Unknown- Determined by the extent of damage anticipated.
**Staff:** Town staff.

**Background:** Critical transportation systems

**Objective 1.2**
- Public Awareness

**Action 1.1.2:**
- Conduct a public awareness campaign.

**Time Frame:** ongoing
**Funding:** Local governments and possible grants
**Estimated Cost:** Unknown
**Staff:** Agency personnel and volunteers

**Background:** Contact DESHS earthquake program specialist. Enhance earthquake instructions in school.

**Duchesne County**

**Goal 2:** Identify the number of seismically unsafe structures within the County.
**Problem Identification:** Unknown number of seismically unsafe structures around the county.

**High Priority**

**Objective 1.1**
- Have a study done to determine seismic resistance of structures within the county i.e. Elementary and high schools, public buildings, high traffic areas, ECT.

**Action 1.1.1:**
- Structural and non-structural earthquake hazard assessment.

**Time Frame:** ongoing
**Funding:** Unknown
**Estimated Cost:** Unknown
**Staff:** Unknown

**Background:** Critical transportation systems

## Flooding

**Duchesne County**

**GOAL 1:** Reduce flood damage in Duchesne County.
**Problem Identification:** Control flooding in residential areas of Duchesne County, Including but not limited to the Town of Altamont, Duchesne City, Roosevelt City, and the town of Tabiona. Flooding occurs from heavy rains and fast moving thunderstorms. *For more information regarding Flooding in Duchesne County see the Flood Hazard Identification Study in Appendix M.*

### High Priority

**Objective 1.1:**
- Obtain Aerial photography with contours of each residential area in Duchesne County.

**Action 1.1.1:**
- Set horizontal and vertical survey control and order aerial photography with contours for each residential area in the county.

**Time Frame:** Ongoing
**Funding:** Local, State and Federal grants
**Estimated Cost:** Unknown
**Staff:** State, Local, and possibly Federal

**Background:** Aerial Topography is needed for master storm drainage design.

**Objective 1.2:**
- Design master storm drainage plans for residential areas.

**Action 1.1.2:**
- Design master storm drainage plans to handle storm water runoff through residential areas.

**Time Frame:** 3 months to 2 years, (depending on number of areas worked on)
**Funding:** Grants
**Estimated Cost:** $10,000.00 per residential area, depending on size
**Staff:** County Staff and contracted staff.

**Background:** Engineers design master storm drainage plans for the residential areas.

**Objective 1.3:**
- Implement storm drainage plans throughout the residential areas of Duchesne County.

**Action 1.1.3:**

- Implement storm drainage plans throughout the residential areas of Duchesne County.

**Time Frame:** 2 years or as soon as the storm drainage plans are finished.
**Funding:** State and Federal grants
**Estimated Cost:** unknown, will depend on the finals plans and what is required for facilities
**Staff:** County and contracted staff

**Background:** Construct storm drainage facilities and require all new developments to meet county storm drainage plans.

**Altamont Town**

**GOAL 1:** Reduce flooding in the town of Altamont.
**Problem Identification:** Control flooding in the Town of Altamont. Flooding occurs from heavy rains and fast moving thunderstorms.

**High Priority**

**Objective 1.1:**

- Use technology to aid in prevention of flood loss.

**Action 1.1.1:**

- Put in an application to the Army Corps. Of Engineers for updated and revised flood plain maps for the town of Altamont.

**Time Frame:** Within the next two years
**Funding**: FEMA, state and local.
**Estimated Cost:** Unknown
**Staff:** County and Town Employees, Local Volunteers

**Action 1.1.2:**

- Place a restrictive clause in the Town Ordinances that will prohibit any new development in the floodplain.

**Time Frame:** Within the next year
**Funding**: FEMA, state and local.
**Estimated Cost:** Unknown at this time
**Staff:** County and Town Employees, Local Volunteers

**Action 1.1.3:**

- Town building inspectors and the planning committee will revise and update building ordinances for new construction that takes place to help eliminate bridges and buildings from being washed away..

**Time Frame:** Ongoing
**Funding**: FEMA, state and local.
**Estimated Cost:** Unknown at this time
**Staff:** County and Town Employees, Local Volunteers

**Action 1.1.4:**

- Town building inspectors and planning committee will make sure that the Zoning Ordinance is up-dated or revised every 5 to 6 years.

**Time Frame:** Ongoing
**Funding**: FEMA, state and local.
**Estimated Cost:** Unknown at this time
**Staff:** County and Town Employees, Local Volunteers

**Action 1.1.5:**

- The County Emergency Managers will research grant opportunities for potential funding.

**Time Frame:** Ongoing
**Funding**: FEMA, state and local.
**Estimated Cost:** Unknown at this time
**Staff:** County and Town Employees, Local Volunteers

**Action 1.1.6:**

- Implement a flood ordinance that will cover the County and Town with flood insurance.

**Time Frame:** Ongoing
**Funding**: FEMA, state and local.
**Estimated Cost:** Unknown at this time
**Staff:** County and Town Employees, Local Volunteers

**Action 1.1.7:**

- Implement a zoning ordinance to ensure that manufactured homes are being installed properly and inspected.

**Time Frame:** Ongoing
**Funding**: FEMA, state and local.
**Estimated Cost:** Unknown at this time

**Staff:** County and Town Employees, Local Volunteers

**Action 1.1.8:**

- Enforce Zoning laws.

**Time Frame:** Ongoing
**Funding**: FEMA, state and local.
**Estimated Cost:** Unknown at this time
**Staff:** County and Town Employees, Local Volunteers

**Background:** Past and future flooding

**Duchesne City**

**High Priority**

**GOAL 1:** Reduce flooding in Duchesne City.
**Problem Identification:** Control flooding in Duchesne City. Flooding occurs from heavy rains and fast moving thunderstorms.

**Objective 1.1:**

- Use technology to aid in prevention of flood loss.

**Action 1.1.1:**

- Put in an application to the Army Corps. Of Engineers for updated and revised flood plain maps for the Duchesne City.

**Time Frame:** Within the next two years
**Funding**: FEMA, state and local.
**Estimated Cost:** Unknown
**Staff:** County and City Employees, Local Volunteers

**Action 1.1.2:**

- Place a restrictive clause in the City Ordinance that will prohibit any new development in the floodplain.

**Time Frame:** Within the next year
**Funding**: FEMA, state and local.
**Estimated Cost:** Unknown at this time
**Staff:** County and City Employees, Local Volunteers

**Action 1.1.3:**

- County and City building inspectors and the planning committee will revise and update building ordinances for new construction that takes place to help eliminate bridges and buildings from being washed away.

**Time Frame:** Ongoing
**Funding**: FEMA, state and local.
**Estimated Cost:** Unknown at this time
**Staff:** County and City Employees, Local Volunteers

**Action 1.1.4:**

- County and City building inspectors and planning committee will make sure that the Zoning Ordinance is up-dated or revised every 5 to 6 years.

**Time Frame:** Ongoing
**Funding**: FEMA, state and local.
**Estimated Cost:** Unknown at this time
**Staff:** County and City Employees, Local Volunteers

**Action 1.1.5:**

- The County Emergency Managers will research grant opportunities for potential funding.

**Time Frame:** Ongoing
**Funding**: FEMA, state and local.
**Estimated Cost:** Unknown at this time
**Staff:** County and City Employees, Local Volunteers

**Action 1.1.6:**

- Implement a flood ordinance that will cover the County and City with flood insurance.

**Time Frame:** Ongoing
**Funding**: FEMA, state and local.
**Estimated Cost:** Unknown at this time
**Staff:** County and City Employees, Local Volunteers

**Action 1.1.7:**

- Implement a zoning ordinance to ensure that manufactured homes are being installed properly and inspected.

**Time Frame:** Ongoing
**Funding**: FEMA, state and local.
**Estimated Cost:** Unknown at this time
**Staff:** County and City Employees, Local Volunteers

**Action 1.1.8:**

- Enforce Zoning laws.

**Time Frame:** Ongoing
**Funding**: FEMA, state and local.
**Estimated Cost:** Unknown at this time
**Staff:** County and City Employees, Local Volunteers

**Myton City**

**High Priority**

**GOAL 1:** Reduce flooding in Myton City.
**Problem Identification:** Control flooding in Myton City. Flooding occurs from heavy rains and fast moving thunderstorms.

**Objective 1.1:**

- Use technology to aid in prevention of flood loss.

**Action 1.1.1:**

- Put in an application to the Army Corps. Of Engineers for updated and revised flood plain maps for the Myton City.

**Time Frame:** Within the next two years
**Funding**: FEMA, state and local.
**Estimated Cost:** Unknown
**Staff:** County and City Employees, Local Volunteers

**Action 1.1.2:**

- Place a restrictive clause in the City Ordinance that will prohibit any new development in the floodplain.

**Time Frame:** Within the next year
**Funding**: FEMA, state and local.
**Estimated Cost:** Unknown at this time
**Staff:** County and City Employees, Local Volunteers

**Action 1.1.3:**

- County and City building inspectors and the planning committee will revise and update building ordinances for new construction that takes place to help eliminate bridges and buildings from being washed away.

**Time Frame:** Ongoing
**Funding**: FEMA, state and local.
**Estimated Cost:** Unknown at this time
**Staff:** County and City Employees, Local Volunteers

**Action 1.1.4:**

- County and City building inspectors and planning committee will make sure that the Zoning Ordinance is up-dated or revised every 5 to 6 years.

**Time Frame:** Ongoing
**Funding**: FEMA, state and local.
**Estimated Cost:** Unknown at this time
**Staff:** County and City Employees, Local Volunteers

**Action 1.1.5:**

- The County Emergency Managers will research grant opportunities for potential funding.

**Time Frame:** Ongoing
**Funding**: FEMA, state and local.
**Estimated Cost:** Unknown at this time
**Staff:** County and City Employees, Local Volunteers

**Action 1.1.6:**

- Implement a flood ordinance that will cover the County and City with flood insurance.

**Time Frame:** Ongoing
**Funding**: FEMA, state and local.
**Estimated Cost:** Unknown at this time
**Staff:** County and City Employees, Local Volunteers

**Action 1.1.7:**

- Implement a zoning ordinance to ensure that manufactured homes are being installed properly and inspected.

**Time Frame:** Ongoing
**Funding**: FEMA, state and local.
**Estimated Cost:** Unknown at this time
**Staff:** County and City Employees, Local Volunteers

**Action 1.1.8:**

- Enforce Zoning laws.

**Time Frame:** Ongoing
**Funding**: FEMA, state and local.
**Estimated Cost:** Unknown at this time
**Staff:** County and City Employees, Local Volunteers

**Roosevelt City**

**High Priority**

**GOAL 1:** Reduce flooding in Roosevelt City.

**Objective 1.1:**

- Use technology to aid in prevention of flood loss.

**Action 1.1.1:**

- Put in an application to the Army Corps. Of Engineers for updated and revised flood plain maps for the Roosevelt City.

**Time Frame:** Within the next two years
**Funding**: FEMA, state and local.
**Estimated Cost:** Unknown
**Staff:** County and City Employees, Local Volunteers

**Action 1.1.2:**

- Place a restrictive clause in the County and City Ordinances that will prohibit any new development in the floodplain.

**Time Frame:** Within the next year
**Funding**: FEMA, state and local.
**Estimated Cost:** Unknown at this time
**Staff:** County and City Employees, Local Volunteers

**Action 1.1.3:**

- County and City building inspectors and the planning committee will revise and update building ordinances for new construction that takes place to help eliminate bridges and buildings from being washed away.

**Time Frame:** Ongoing
**Funding**: FEMA, state and local.
**Estimated Cost:** Unknown at this time
**Staff:** County and City Employees, Local Volunteers

**Action 1.1.4:**

- County and City building inspectors and planning committee will make sure that the Zoning Ordinance is up-dated or revised every 5 to 6 years.

**Time Frame:** Ongoing
**Funding**: FEMA, state and local.
**Estimated Cost:** Unknown at this time

**Staff:** County and City Employees, Local Volunteers

**Action 1.1.5:**

- The County Emergency Managers will research grant opportunities for potential funding.

**Time Frame:** Ongoing
**Funding**: FEMA, state and local.
**Estimated Cost:** Unknown at this time
**Staff:** County and City Employees, Local Volunteers

**Action 1.1.6:**

- Implement a flood ordinance that will cover the County and City with flood insurance.

**Time Frame:** Ongoing
**Funding**: FEMA, state and local.
**Estimated Cost:** Unknown at this time
**Staff:** County and City Employees, Local Volunteers

**Action 1.1.7:**

- Implement a zoning ordinance to ensure that manufactured homes are being installed properly and inspected.

**Time Frame:** Ongoing
**Funding**: FEMA, state and local.
**Estimated Cost:** Unknown at this time
**Staff:** County and City Employees, Local Volunteers

**Action 1.1.8:**

- Enforce Zoning laws.

**Time Frame:** Ongoing
**Funding**: FEMA, state and local.
**Estimated Cost:** Unknown at this time
**Staff:** County and City Employees, Local Volunteers

**Tabiona Town**

**High Priority**

**GOAL 1:** Reduce flooding in the Town of Tabiona.

**Objective 1.1:**

- Use technology to aid in prevention of flood loss.

**Action 1.1.1:**

- Put in an application to the Army Corps. Of Engineers for updated and revised flood plain maps for the town of Tabiona.

**Time Frame:** Within the next two years
**Funding**: FEMA, state and local.
**Estimated Cost:** Unknown
**Staff:** County and town Employees, Local Volunteers

**Action 1.1.2:**

- Place a restrictive clause in the County and Town Ordinances that will prohibit any new development in the floodplain.

**Time Frame:** Within the next year
**Funding**: FEMA, state and local.
**Estimated Cost:** Unknown at this time
**Staff:** County and Town Employees, Local Volunteers
**Background:** Past and future flooding

**Action 1.1.3:**

- County and town building inspectors and the planning committee will revise and update building ordinances for new construction that takes place to help eliminate bridges and buildings from being washed away..

**Time Frame:** Ongoing
**Funding**: FEMA, state and local.
**Estimated Cost:** Unknown at this time
**Staff:** County and Town Employees, Local Volunteers

**Action 1.1.4:**

- County and town building inspectors and planning committee will make sure that the Zoning Ordinance is up-dated or revised every 5 to 6 years.

**Time Frame:** Ongoing
**Funding**: FEMA, state and local.
**Estimated Cost:** Unknown at this time
**Staff:** County and Town Employees, Local Volunteers

**Action 1.1.5:**

- The County Emergency Managers will research grant opportunities for potential funding.

**Time Frame:** Ongoing
**Funding**: FEMA, state and local.

**Estimated Cost:** Unknown at this time
**Staff:** County and Town Employees, Local Volunteers

**Action 1.1.6:**

- Implement a flood ordinance that will cover the County and Town with flood insurance.

**Time Frame:** Ongoing
**Funding**: FEMA, state and local.
**Estimated Cost:** Unknown at this time
**Staff:** County and Town Employees, Local Volunteers

**Action 1.1.7:**

- Implement a zoning ordinance to ensure that manufactured homes are being installed properly and inspected.

**Time Frame:** Ongoing
**Funding**: FEMA, state and local.
**Estimated Cost:** Unknown at this time
**Staff:** County and Town Employees, Local Volunteers

**Action 1.1.8:**

- Enforce Zoning laws.

**Time Frame:** Ongoing
**Funding**: FEMA, state and local.
**Estimated Cost:** Unknown at this time
**Staff:** County and Town Employees, Local Volunteers

## Insect Infestation

**Duchesne County**

**GOAL 1:** Reduce insect infestation
**Problem Identification:** Duchesne County has experienced losses in agriculture, livestock, and wildlife as a result of insect infestation.

**Priority High**

**Objective 1.1**

- Reduce the impact of insects

**Action 1.1.1:**

- Spread insect bait and spray for mosquitoes

**Time Frame:** When required
**Funding:** Town and County funds, Mosquito abatement funds come from property tax
**Estimated Cost:** Approximately $3.00 per property owner per month
**Staff:** County Mosquito Abatement District

**Objective 1.2:**

- Reduce the severity of infestations

**Action 1.1.2:**

- Apply for grants to purchase Mosquito magnets and propane tanks to run the magnets.

**Time Frame:** Spring and summer of 2004
**Funding:** $6,000.00 in grants
**Estimated Cost:** $6,000.00
**Staff:** County employees

**Background:** Several agricultural fields surround Duchesne County; these fields have been subjected to insect infestation especially during the recent years of drought.

**Objective 1.3:**

- Reduce the threat of West Nile Virus within Duchesne County

**Action 1.1.3:**

- Educate the public on the importance of vaccinating their animals.

**Time Frame:** Spring and summer of 2004
**Funding:** State and local funding
**Estimated Cost:** minimal
**Staff:** County employees

**Background:** Several of the Duchesne County residents have horses that could be affected by the west nile virus.

**Duchesne County**

**GOAL 1:** Reduce grasshopper infestations.
**Problem Identification:** Periodic Grasshopper infestations more sever in the rural areas of Duchesne County.

**High Priority**

**Objective 1.1:**

- Reduce the severity of infestations

**Action 1.1.1:**

- Conduct aerial spraying to reduce infestations.

**Time Frame:** As infestations occur
**Funding:** By private individuals in most cases
**Estimated Cost:** Varies, depending on acreage treated
**Staff:** Contractor

**Background:** Many agricultural fields surround Duchesne County. These fields have been subjected to insect infestation especially during the recent years of drought.

## Landslide

**Duchesne County**

**GOAL 1:** Protect residential areas from potential landslides.
**Problem Identification:** There is a potential risk to residential and commercial buildings due to rockslides, which are located in areas identified by the county as landslide risk areas.

### High Priority

**Objective 1.1**

- Reduce potential landslides to residential and commercial areas.

**Action 1.1.1:**

- Assess the probability of landslides and identify specific structures at risk

**Time Frame:** Undetermined
**Funding:** Property owner
**Estimated Cost:** Unknown
**Staff:** Unknown

**Background:** Soil surveys and other engineering surveys are needed.

**Action 1.1.2:**

- The county's, city's and town's planning committee will review and update the zoning ordinances within the County to make sure that individuals are not constructing new homes near potential landslide areas.

**Time Frame:** Undetermined
**Funding:** Unknown
**Estimated Cost:** Unknown

**Staff:** Unknown

**Background:** Hold monthly planning and zoning meetings within the town and county.

**Duchesne County**

**GOAL 2:** Protect vehicle traffic from future accidents due to landslides.
**Problem Identification:** In Duchesne County there are several areas namely Indian Canyon, Ravola Dugway, and Wolf Creek Pass that could have a potential risk to pedestrians and vehicle traffic due to landslides.

**High Priority**

**Objective 1.1**

- Reduce potential landslides to residential and commercial areas.

**Action 1.1.1:**

- Assess the probability of landslides and identify specific structures at risk

**Time Frame:** Undetermined
**Funding:** Property owner
**Estimated Cost:** Unknown
**Staff:** Unknown

**Background:** Soil surveys and other engineering surveys are needed.

## Severe Weather

**Duchesne County**

**Goal 1:** Reduce Structural damage to both residential and commercial buildings due to Severe Weather.
**Problem Identification:** Duchesne County experiences occasional, damaging high winds and snowstorms.

**High Priority**

**Objective 1.1**

- Reduce damage to structures through strict adherence to building codes

**Action 1.1.1:**

- Ensure that 80 MPH wind load requirement is met by builders

**Time Frame:** Ongoing
**Funding:** Fees from Building permits
**Estimated Cost:** Minimal
**Staff:** Building Inspector

**Background:** Adherence to building code requirement for tying roof structures to supporting walls will minimize damage from high wind events

**Duchesne County**

**Goal 2:** Provide protection for citizens regarding power line failure.
**Problem Identification:** Power lines are at risk from seasonal high winds.

**Priority High**

**Objective 1.1**

- Reduce service disruptions and damage to power lines

**Action 1.1.1:**

- Provide adequate clearances for power lines and conduct ongoing line maintenance. Maintain outage plan.

**Time Frame:** Ongoing
**Funding:** Possible Grants
**Estimated Cost:** To be determined
**Staff:** County and town employees

**Background:** Extreme winds have occurred, utilities disruption has occurred in past years due to damage to power poles and transmission lines by high winds.

## Wildfire

**Duchesne County**

**Goal:** Reduce the threat of wildfires within Duchesne County.
**Problem Identification:** Continuing non-compliance with existing building codes and fire codes.

**High Priority**

**Objective 1.1**

- Increase compliance with existing building and fire codes.

**Action:**

- Develop and enforce current local, state and national codes

**Time Frame:** Ongoing
**Funding:** Local, state and federal grants
**Estimated Cost:** Unknown
**Staff:** Local, state and federal agencies
**Background:** Implement and enforce rules, regulations and codes

**Duchesne County**

**Goal 1:** Reduce wildfire danger within the County.
**Problem Identification:** Specific areas of the county are susceptible to wildland fire danger.

**Objective 1.2**

- Educate homeowners on how to reduce risk of wildfire damage

**Action 1.1.2:**

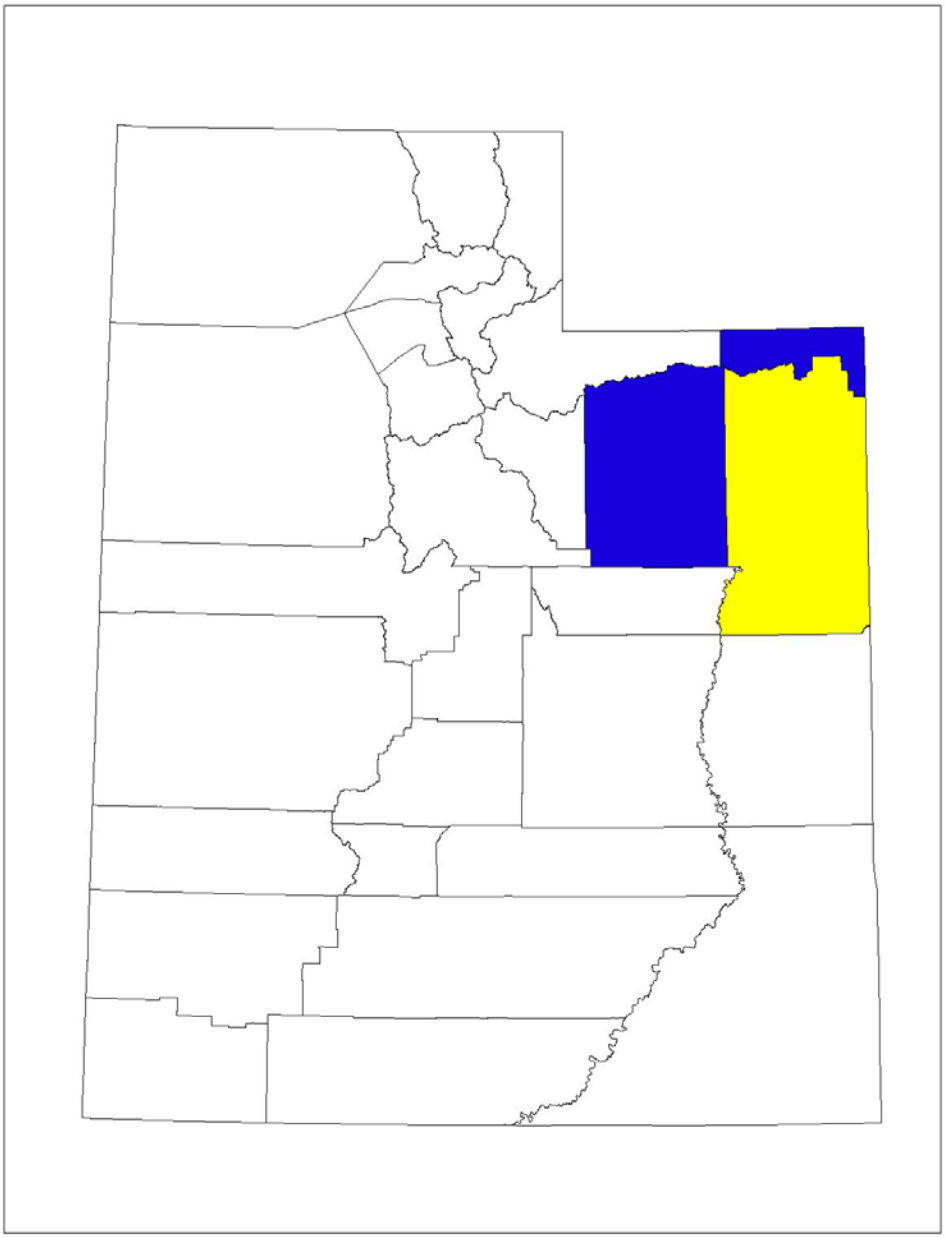
- The local LEPC will provide semi-annual training for the citizens of Duchesne County.

**Time Frame:** Starting 2004
**Funding:** State and local
**Estimated Cost:** Minimal
**Staff:** County
**Background:** Educate the public on how to reduce the risk of wildfires.

Annex 4-Uintah County

# Uintah County Annex

**Figure 1: Tri-county map**



## UINTAH COUNTY

### Past Hazard Events in Uintah County

Understanding the past is often the key to discovering what the future holds; this is especially true when planning for natural disasters. The fact that cities within Uintah County have experienced, for example, flooding in the past means flooding can occur in the future. While over time some of this has been mitigated for the low frequency of occurrence often results in hazards with little or no mitigation. Table 1 provides a brief history of Uintah County natural disasters. This table includes only sizable events found during our research, and may not represent the total history.

**Table 1 Uintah County Natural Disaster History**

| Hazards | Date | Location | Critical Facility or Area Impacted | Comments |
|---|---|---|---|---|
| **Flash flood** | September 1, 1909 | Ashley River near Vernal | 1 Death | Man crossing Ashley Creek with a wagon |
| **Flash flood** | July 4, 1925 | Five Mile Canyon near Vernal | 1 Death | Child swept from automobile |
| **Flood** | August 9, 1941 | Vernal/Jensen | Approximately $75,000.00 to crops was caused by heavy rain and hail. Red Wash bridge damaged | No loss of life |
| **Flood** | August 25, 1955 | Lapoint | $3,000.00 in damage to bridges and roads | No loss of life |
| **Flood** | July 30, 1956 | Jensen | $25,000 damage to farmlands and crops | No loss of life |
| **Flood** | June 10, 1965 | Maeser/Ouray | Damage to homes, crops, and waterlines | Source: Ashley Creek, Dry Fork, The Green, White, and Duchesne rivers |

| Hazards | Date | Location | Critical Facility or Area Impacted | Comments |
|---|---|---|---|---|
| **Flood** | 1983 | County Wide | Limited | Source |
| **Wildfire** | July 23, 1988 | Green River Fire | Unknown | No loss of life |
| **Wildfire** | September 17, 1992 | Diamond Mountain Bonus | Unknown | No loss of life |
| **Wildfire** | August 16, 1996 | Diamond Rim #2 | Unknown | No loss of life |
| **Wildfire** | June 25, 1999 | Walsh Knolls | 1096 Acres | No loss of life |
| **Wildfire** | June 27, 1999 | WhiteRocks | Unknown | No loss of life |
| **Wildfire** | March 26, 2000 | Max Assist | Unknown | No loss of life |
| **Wildfire** | May 29, 2000 | Sweetwater Complex | 3700 Acres | No loss of life |
| **Wildfire** | July 28, 2000 | Pot Creek | Unknown | No loss of life |

Uintah County identified six natural hazards they wanted addressed in the Uintah County portion of this multi-jurisdictional plan. Through input of the planning committee the following hazards were identified:

- Dam Failure
- Earthquakes
- Flooding
- Insect Infestation
- Landslides
- Wildfire.

In identifying these hazards the Uintah County PDM planning committee relied on technical experts, public input, research of past events and completed plans, and risk assessments completed by the county emergency manager for there Pre-Disaster Mitigation Plan.

The Uintah County Disaster Mitigation Planning committee consisted of one County Commissioner, the County Emergency Manager, the Vernal City Planner, the Naples City Manager, and Ballard City and the Uintah Basin Association of Governments planning coordinator.

The Disaster Mitigation Plan for Uintah County identifies critical facilities located in the County *(See Appendix B).* A critical facility is defined as a facility in either the public or private sector that provides essential products and services to the general public, is otherwise necessary to preserve the welfare and quality of life in the County, or fulfills important public safety, emergency response, and/or disaster recovery functions. The critical facilities identified in the County were not located in the natural hazard area. *The Uintah Basin Association of Governments did not map the location of the critical facilities in Uintah County. Through GIS analysis no critical facilities were found in the hazard area.*

## NATURAL HAZARD: DAM FAILURE

**FEMA Hazard Profile for Dam Failure**

| | | | |
|---|---|---|---|
| **Frequency** | | **Highly Likely** | **Near 100% probability in next year** |
| | | **Likely** | **Between 10 and 100% probability in next year, of at least one chance in 10 years** |
| | | **Possible** | **Between 1 and 10% probability in next year, of at least one chance in next 100 years** |
| | **X** | **Unlikely** | **Less than 1% probability in next 100 years** |
| **Severity** | **X** | **Catastrophic** | **More than 50%** (of the jurisdiction that can be affected) |
| | | **Critical** | **25 to 50%** (of the jurisdiction that can be affected) |
| | | **Limited** | **10 to 25%** (of the jurisdiction that can be affected) |
| | | **Negligible** | **Less than 10%** (of the jurisdiction that can be affected) |
| **Location** | Entire county | | |
| **Seasonal Pattern** | Spring | | |
| **Duration** | Several months to over one year | | |
| **Speed of Onset** | Range from 35 minutes to three hours | | |

## A Word About Dams

Dams are a critical support function for water managers in the State and also act as a flood control measure. If a dam remains stable, does not get overtopped, or is not impaired as the result of an earthquake, then, at a minimum, they do provide incidental flood control. If not then they can add to the flood threat. There are 117 dams within Uintah Basin of these 20 have received an high hazard rating by Utah Division of Water Rights Dam Safety section. The State Dam Safety Section has developed a hazard rating system for all non-federal dams in Utah. Downstream uses, size, height, volume, and incremental risk/damage assessments are a variable used to assign dam safety classification. Using the hazard ratings systems developed by the State Dam Safety Section, dams are placed into one of three classifications high, moderate, and low. Dams receiving a low rating would have insignificant property loss do to dam failure. Moderate hazard dams would cause significant property loss in the event of a breach. High hazard dams would cause a possible loss of life in the event of a rupture. The frequency of dam inspection is designated based on hazard rating with the Division of Water Rights inspecting high-hazard dams annually, moderate hazard dams biannually, and low-hazard dams every five years. *For a description of dam failure and possible causes dams failure in Uintah County see the Flood Hazard Identification Study in Appendix M.*

**VULNERABLIITY:** High
Low-lying areas down stream from dams are at risk. Under lying geologic conditions in the planning area create difficulties during dam construction. Dams in similar geologic setting in the state have failed in the past; Trial Lake Dam is an example. The aged fractured rock of the Uinta Mountain range contains numerous passages for water through the dams. During dam building these fractures require extensive engineering and grouting.
Description of Hazard

The following high hazard dams exist within Uintah County according to the Utah Division of Dam Safety database.

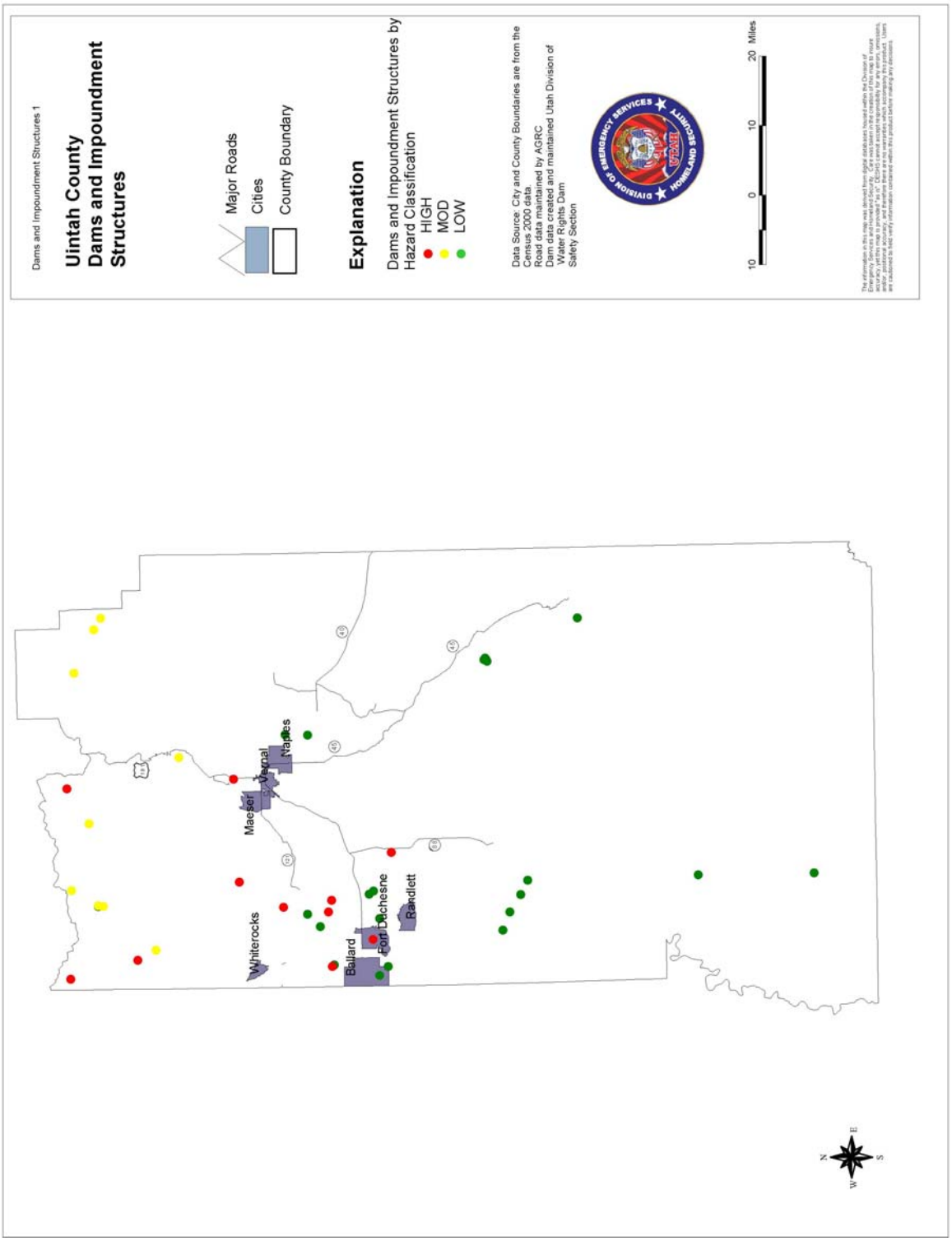
- Brough
- Whiterocks
- East Park
- Paradise Park
- Bullock Draw
- Lapoint
- Montes Creek
- Cottonwood
- Steineker
- Red Fleet

*The map on page 7 illustrates the location of each dam.*

Low lying areas down stream of these dams are particularly at risk, if a dam were to fail. *For a description of dam failure and possible causes see the dams failure section in Appendix A.*

**Generic Mitigation:**

- Proper mapping of flood plains, including mapping of dam breach flood potential.
- Knowledge must be made public so that emergency managers are aware and the public is aware when they buy and sell property.
- Updated Emergency Action Plans (EAP) and integration with GIS Systems.
- Maintaining proper flood plain and wetland geometry and vegetation will help route floods.
- Flood plain usage should be compatible with flood plain needs.
- More debris dams would help with floods and debris, and mud, and maintaining a flood control pool in existing dams would be beneficial.
- Protection of roads and bridges.
- General infrastructure protection.
- More authority to order releases and better forecasting would help in snowmelt floods and runoff.
- Gather hazard and risk data/information.
- Development of improved mitigation techniques.
- Education of local officials, developers, and citizens.


Dams and Impoundment Structures 1
Uintah County
Dams and Impoundment
Structures
Major Roads
Cities
County Boundary
Explanation
Dams and Impoundment Structures by
Hazard Classification
HIGH
MOD
LOW
Data Source: City and County Boundaries are from the
Census 2000 data
Road data maintained by AGRC
Dam data created and maintained Utah Division of
Water Rights Dam
Safety Section
DIVISION OF EMERGENCY SERVICES
HOMELAND SECURITY
UTAH
10 0 10 20 Miles
Maeser
Vernal
Naples
Whiterocks
Ballard
Fort Duchesne
Randlett
N
W
E
S

## NATURAL HAZARD: EARTHQUAKE

**FEMA Hazard Profile for Earthquake**

| | | | |
|---|---|---|---|
| **Frequency** | | **Highly Likely** | **Near 100% probability in next year** |
| | | **Likely** | **Between 10 and 100% probability in next year, of at least one chance in 10 years** |
| | | **Possible** | **Between 1 and 10% probability in next year, of at least one chance in next 100 years** |
| | **X** | **Unlikely** | **Less than 1% probability in next 100 years** |
| **Severity** | **X** | **Catastrophic** | **More than 50%** (of the jurisdiction that can be affected) |
| | | **Critical** | **25 to 50%** (of the jurisdiction that can be affected) |
| | | **Limited** | **10 to 25%** (of the jurisdiction that can be affected) |
| | | **Negligible** | **Less than 10%** (of the jurisdiction that can be affected) |
| **Location** | Entire county | | |
| **Seasonal Pattern** | Near fault lines located in the County | | |
| **Duration** | Months and possibly years | | |
| **Speed of Onset** | Minimal or no warning | | |

An earthquake is a sudden, rapid shaking of the Earth caused by the breaking and shifting of rock beneath the Earth's surface. This shaking can cause buildings and bridges to collapse; disrupt gas, electric, and phone service; and sometimes trigger landslides, avalanches, flash floods, fires, and huge destructive ocean waves (tsunamis). Buildings with foundations resting on unconsolidated landfill, old waterways, or other unstable soil are most at risk. Buildings or trailers and manufactured homes not tied to a reinforced foundation anchored to the ground are also at risk since they can be shaken off their mountings during an earthquake. Earthquakes can occur at any time of year.
Source: http://www.fema.gov/hazards/earthquakes/

*For a description of earthquakes and possible causes see the earthquake section in Appendix A.*

The Diamond Gulch Fault in Uintah County is the only source area for a large magnitude earthquake. Uintah County is similar to the other counties within the

Uintah Basin and has a low seismic hazard, as it is uncertain if the Diamond Gulch Fault has moved during the quaternary period.

**VULNERABILITY:** Low

The map on page 10 shows the national Peak Ground Acceleration (PGA) values for the United States with a 10% chance of being exceeded over 50 years. This is a common earthquake measurement that shows three things: the geographic area affected (all colored areas on the map), the probability of an earthquake of each given level of severity (10% chance in 50 years), and the severity (the PGA is indicated by color). ***2. Locate your planning area on the map.***

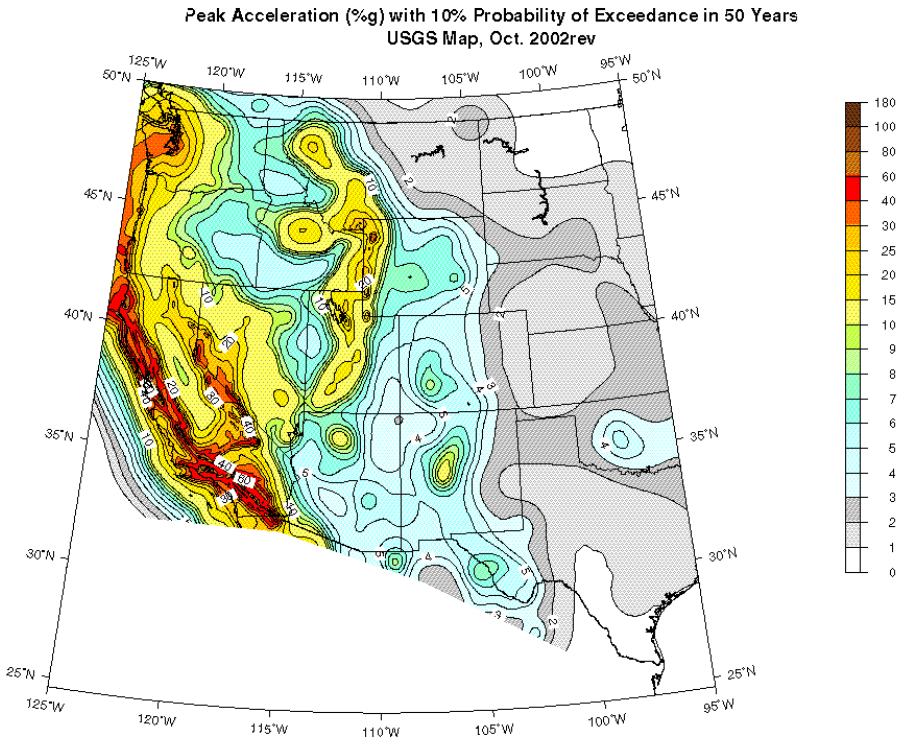
You can also generate maps based on zip codes or longitude and latitude by following the directions on the Website. ***3. Determine your Peak Ground Acceleration.***
Determine the PGA zone(s) in which your planning area is located. This is done by identifying the color associated with your planning area and correlating it with the color key located on the map. Large planning areas may be located in more than one zone.

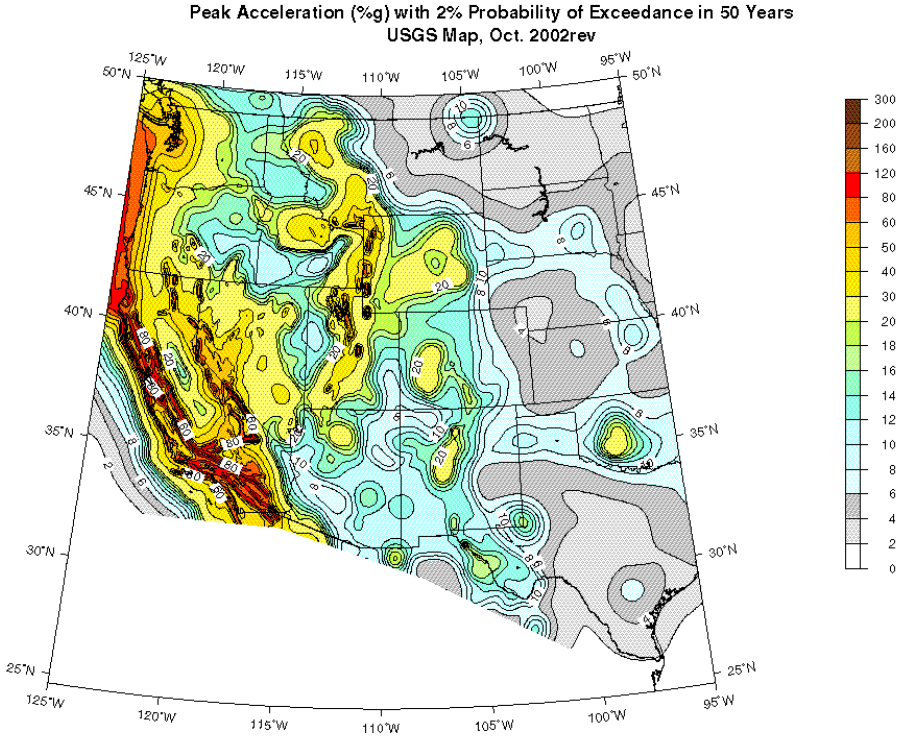
Peak Ground Acceleration (PGA) is a measure of the strength of ground movements. The PGA measures the rate in change of motion relative to the established rate of acceleration due to gravity (g) (980 cm/sec/sec). For example, in an earthquake with an acceleration of the ground surface of 244 cm/sec/sec, the PGA or rate in change of motion is 25% g where:

%g= Ground Surface Acceleration/ Rate of Acceleration due to Gravity

%g= 244 cm/sec/sec/980 cm/sec/sec

%g= 25%


Peak Acceleration (%g) with 10% Probability of Exceedance in 50 Years
USGS Map, Oct. 2002rev
125°W
120°W
115°W
110°W
105°W
100°W
95°W
50°N
45°N
40°N
35°N
30°N
25°N
180
100
80
60
40
30
25
20
15
10
9
8
7
6
5
4
3
2
1
0


Peak Acceleration (%g) with 2% Probability of Exceedance in 50 Years
USGS Map, Oct. 2002rev
125°W
120°W
115°W
110°W
105°W
100°W
95°W
50°N
45°N
40°N
35°N
30°N
25°N
300
200
160
120
80
60
50
40
30
20
18
16
14
12
10
8
6
4
2
0

**AFFECT:**

The Diamond Gulch Fault in Uintah County is the only source area for a large magnitude earthquake. Uintah County is similar to the other counties within the Uintah Basin and has a low seismic hazard, as it is uncertain if the Diamond Gulch Fault has moved during the quaternary period.

**POTENTIAL AFFECT:**

A potential earthquake could affect water, oil and gas produced for the Uintah Basin as well as the Wasatch Front. An earthquake could affect transportation and dams. Many homes in Uintah County were not built to meet earthquake standards. *The map on page 14 and 15 identify Epicenters and Quaternary Faults and gives an explanation for each in Uintah County.*

**HAZUS MH Vulnerability Assessment**

**Table 1.1 Casualties**

| | | |
|---|---|---|
| **Casualties** | Nighttime –Minor | 57 |
| | Nighttime –Major | 1 |
| | Nighttime -Fatalities | 2 |
| | Daytime –Minor | 52 |
| | Daytime –Major | 1 |
| | Daytime- Fatalities | 2 |
| | Commute –Minor | 48 |
| | Commute –Major | 1 |
| | Commute-Fatalities | 2 |

**Buildings/Structures**

**Building Damage by Count --** Building damage is classified by HAZUS in five damage states: none, slight, moderate, extensive and complete. Table1.2 lists the number buildings by occupancy, which is estimated to have moderate to complete levels of damage.

**Table 1.2 –Building Damage by Count with Moderate to Complete Damage**

| **Category** | Number of Structures |
|---|---|
| **Residential** | 731 |
| **Commercial** | 29 |
| **Industrial** | 10 |
| **Totals** | 770 |

**Critical facilities**

| Classification | Total | Least Moderate Damage >50% | Complete Damage > 50% | Functionality > 50% at day 1 |
|---|---|---|---|---|
| **Hospitals** | 1 | 0 | 0 | 1 |
| **Schools** | 10 | 0 | 0 | 0 |
| **EOCs** | 1 | 0 | 0 | 1 |
| **Police Stations** | 3 | 0 | 0 | 0 |
| **Fire Stations** | 2 | 0 | 0 | 0 |

**Debris Removal –**Table 1.4 shows how much debris would be generated by the earthquake and how many loads it would take to remove the debris, based on 25 tons per load. One truck can likely haul one load per hour.

A second debris removal issue is landfill space. Fifty thousand tons (50,000) at a weight to volume ratio of one ton per cubic yard would cover more than ten acres to a depth of one yard.

**Table 1.4 –Debris Generated (millions of tons)/Loads to Remove Debris**

| | |
|---|---|
| **Debris Generated** | 0.04 |
| **Loads (25 tons per load)** | 2,000 |

**Fire Following --**The Great San Francisco Earthquake of 1906 illustrated the hazard a city could face from fire following an earthquake. Multiple ignitions and broken water mains conspired to make firefighting nearly impossible. HAZUS uses the estimated building damages, loss of transportation infrastructure and estimated winds to calculate the estimated area that would be burned following an earthquake. Table 1.5 provides estimates of ignitions, people at risk and the building stock exposed to fires following an earthquake.

**Table 1.5 –Fire Following Event, Population Exposed, and Building Stock Exposed**

| | |
|---|---|
| **Ignitions** | 1 |
| **People Displaced** | 8 |
| **Value Exposed (mill. $)** | 0 |

These numbers were derived from a HAZUS MH run based on a probabilistic 2500-year event with a magnitude 7.0 running the soils portion of the model. *The complete HAZUS MH run is available in Appendix H.*

**Generic Mitigation:**

- Build all homes and building's to meet the standards and code of earthquakes. County adopts building codes on all new construction.
- Educate the public on potential hazards.
- Working with local LEPC on exercising plans in existence.
- Educate local school systems to utilize LEPC.

**Generic Ground Shaking Mitigation**

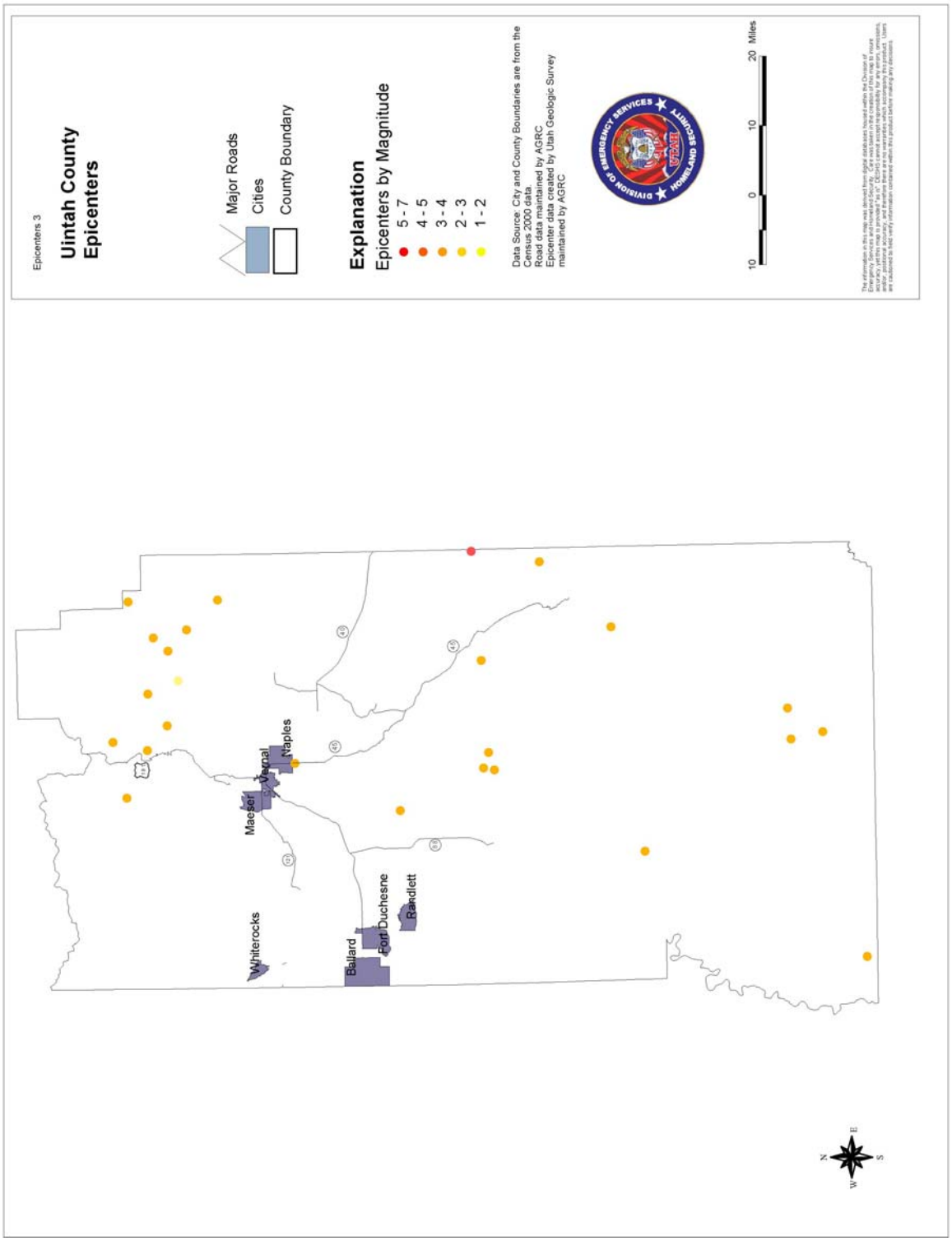
- Understand peak horizontal acceleration and recurrence interval.
- Design appropriately.
- Zoning ordinances and building codes.

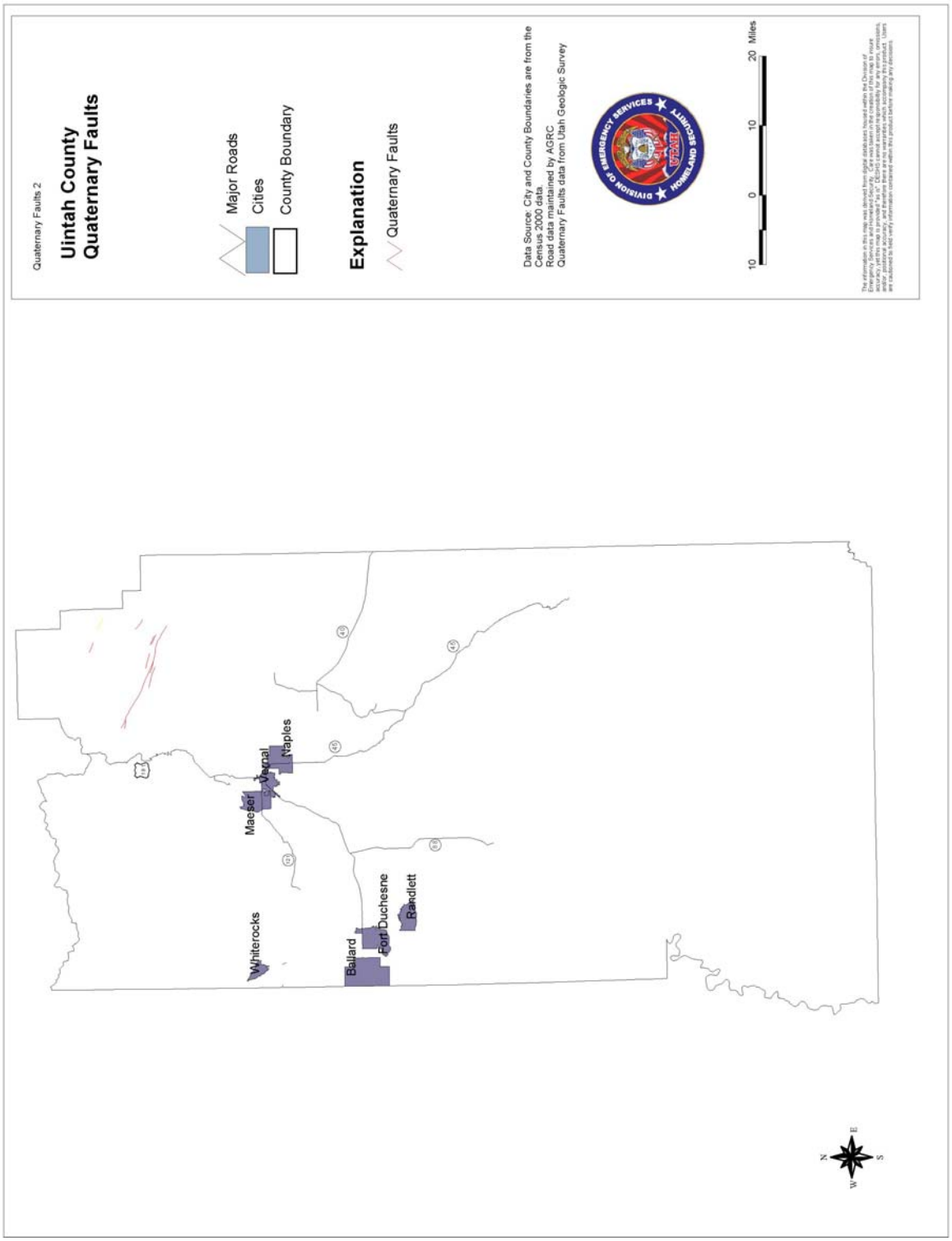
**Generic Liquefaction Mitigation**

- Move soil out.
- Densify soils in place.
- Remove ground water.
- Structural design.

**Generic Surface Fault Rupture Mitigation**

- Avoidance
- Zoning ordinances


Epicenters 3
Uintah County
Epicenters
Major Roads
Cities
County Boundary
Explanation
Epicenters by Magnitude
5 - 7
4 - 5
3 - 4
2 - 3
1 - 2
Data Source: City and County Boundaries are from the Census 2000 data
Road data maintained by AGRC
Epicenter data created by Utah Geologic Survey maintained by AGRC
10 0 10 20 Miles
Naples
Vernal
Maeser
Whiterocks
Ballard
Fort Duchesne
Randlett
N
E
S
W


Quaternary Faults 2
Uintah County
Quaternary Faults
Major Roads
Cities
County Boundary
Explanation
Quaternary Faults
Data Source: City and County Boundaries are from the Census 2000 data
Road data maintained by AGRC
Quaternary Faults data from Utah Geologic Survey
DIVISION OF EMERGENCY SERVICES & HOMELAND SECURITY
UTAH
10 0 10 20 Miles
Naples
Vernal
Maeser
Whiterocks
Ballard
Fort Duchesne
Randlett
N
W
E
S

## NATURAL HAZARD: FLOODING

**FEMA Hazard Profile for Flooding**

| | | | |
|---|---|---|---|
| **Frequency** | | **Highly Likely** | **Near 100% probability in next year** |
| | **X** | **Likely** | **Between 10 and 100% probability in next year, of at least one chance in 10 years** |
| | | **Possible** | **Between 1 and 10% probability in next year, of at least one chance in next 100 years** |
| | | **Unlikely** | **Less than 1% probability in next 100 years** |
| **Severity** | | **Catastrophic** | **More than 50%** (of the jurisdiction that can be affected) |
| | **X** | **Critical** | **25 to 50%** (of the jurisdiction that can be affected) |
| | | **Limited** | **10 to 25%** (of the jurisdiction that can be affected) |
| | | **Negligible** | **Less than 10%** (of the jurisdiction that can be affected) |
| **Location** | Flooding would affect all communities in the county that are in and along the flood plains | | |
| **Seasonal Pattern** | After spring rains, heavy thunderstorms, or spring thaws | | |
| **Duration** | Rainstorms can last for hours and possibly days. Spring run-off can last weeks | | |
| **Speed of Onset** | Six to twelve hours | | |

Floods are the most common and widespread of all natural disasters except fire. Most communities in the United States have experienced some kind of flooding after spring rains, heavy thunderstorms, or winter snow thaws.

A flood, as defined by the National Flood Insurance Program is: "A general and temporary condition of partial or complete inundation of two or more acres of normally dry land area or of two or more properties (at least one of which is your property) from:

- Overflow of inland or tidal waters.
- Unusual and rapid accumulation or runoff of surface waters from any source, or
- A mudflow.

[The] collapse or subsidence of land along the shore of a lake or similar body of water as a result of erosion or undermining caused by waves or currents of water exceeding anticipated cyclical levels that result in a flood." *For a description of floods and possible causes see the floods section in Appendix A.*

Floods can be slow, or fast rising but generally develop over a period of days. Mitigation includes any activities that prevent an emergency, reduce the chance of an emergency happening, or lessen the damaging effects of unavoidable emergencies. Investing in mitigation steps now, such as, engaging in floodplain management activities, constructing barriers, such as levees, and purchasing flood insurance will help reduce the amount of structural damage to your home and financial loss from building and crop damage should a flood or flash flood occur. Source: http://www.fema.gov/hazards/floods/

**VULNERABILITY:** High
Low lying particularly those along the river course are vulnerable to flooding. Flood plain maps were looked at during the completion of this plan but these maps are not geo-referenced prohibiting full GIS analysis. Unfortunately the flood model in HAZUS is too computationally intensive to complete a vulnerability assessment at this time.

**AFFECT:**
Naples City had some structural damage due to microbursts. Uintah County has had four to five flash floods in the last twenty years with little damage. However, some bridges were lost costing Uintah County approximately $200,000.00 and Vernal City around, $2,000.00. *For more information regarding Flooding in Uintah County see the Flood Hazard Identification Study in Appendix M.*

**Generic Mitigation:**

- Avoidance
- Revise and up-date building ordinances for new construction that takes place to help eliminate bridges and buildings from being washed away.
- Manufactured homes need to be installed properly and inspected.
- Enforce zoning.
- Flood insurance awareness, emphasis, and marketing.
- Curtail development in flood-prone areas.
- Greater reservoir capacities.
- Gather hazard and risk data/information.
- Protection of drinking water supply.
- Education of local officials, developers, and citizens.
- Better flood routing through communities.
- Funding by a storm water tax in cooperation with Federal and State programs.

## NATURAL HAZARD: INSECT INFESTATION

**FEMA Hazard Profile for Insect Infestation**

| | | | |
|---|---|---|---|
| **Frequency** | **X** | **Highly Likely** | **Near 100% probability in next year** |
| | | **Likely** | **Between 10 and 100% probability in next year, of at least one chance in 10 years** |
| | | **Possible** | **Between 1 and 10% probability in next year, of at least one chance in next 100 years** |
| | | **Unlikely** | **Less than 1% probability in next 100 years** |
| **Severity** | **X** | **Catastrophic** | **More than 50%** (of the jurisdiction that can be affected) |
| | | **Critical** | **25 to 50%** (of the jurisdiction that can be affected) |
| | | **Limited** | **10 to 25%** (of the jurisdiction that can be affected) |
| | | **Negligible** | **Less than 10%** (of the jurisdiction that can be affected) |
| **Location** | Uintah County. | | |
| **Seasonal Pattern** | Spring, summer, and fall | | |
| **Duration** | Months | | |
| **Speed of Onset** | Minimal or no warning | | |

Agriculture has historically dominated the economic life of Uintah County. The county remains a significant producer of crops and livestock.
Uintah County has experienced losses in agriculture, livestock, and wildlife as a result of insect infestation. Damage to the economic base and to the health of the citizens is also a direct result of insect infestation. Insects most notable are grasshoppers, Mormon Crickets, Bark Beetles, and mosquitoes. Currently the West Nile Virus spread by mosquitoes is a serious threat to humans and animals in Uintah County.

**Generic Mitigation:**

- Avoidance
- Spread insect bait and spray for mosquitoes
- Vaccinate

## NATURAL HAZARD: LANDSLIDE

**FEMA Hazard Profile for Landslide**

| | | | |
|---|---|---|---|
| **Frequency** | | **Highly Likely** | **Near 100% probability in next year** |
| | | **Likely** | **Between 10 and 100% probability in next year, of at least one chance in 10 years** |
| | | **Possible** | **Between 1 and 10% probability in next year, of at least one chance in next 100 years** |
| | **X** | **Unlikely** | **Less than 1% probability in next 100 years** |
| **Severity** | | **Catastrophic** | **More than 50%** (of the jurisdiction that can be affected) |
| | **X** | **Critical** | **25 to 50%** (of the jurisdiction that can be affected) |
| | | **Limited** | **10 to 25%** (of the jurisdiction that can be affected) |
| | | **Negligible** | **Less than 10%** (of the jurisdiction that can be affected) |
| **Location** | Uintah County | | |
| **Seasonal Pattern** | After spring rains, heavy thunderstorms, or spring snow thaws. | | |
| **Duration** | Depending upon conditions. | | |
| **Speed of Onset** | Not applicable. | | |

**VULNERABILITY:** Low

The Uintah Basin Association of Governments identified and mapped possible landslide threats to Uintah County that would have a potential risk to pedestrians, vehicle traffic, and residential areas. *The map on page 21 illustrates Landslides and gives an explanation for Landslides in Uintah County.*

In Uintah County there are several areas namely, Blue Mountain, Diamond Mountain, Dry Fork Canyon, and the Book Cliffs that could have a potential risk to pedestrians and vehicle traffic due to landslides. Based upon the information we had available at that time we were unable to come up with any hard value figures that these landslides would have on Uintah County.

In Uintah County there are approximately 66 residential structures at potential risk from landslide. Based upon figures provided by the Uintah County Assessors Office, the market value of those structures is estimated to be $5,280,000.00.

*For a description of Landslides and possible causes see the Landslides section in Appendix A.*

**Structure Loss and Value as a Percentage of Total Acreage.**

| City Name | Acres of Historically Active Landslides 1847 to Present | Households Vulnerable to Landslide/Cost |
|---|---|---|
| **Uintah County** | 20,982.9 | 66/5,280,000 |

*Includes value of land.
Data set indicates no active landslides exist within the jurisdictions of Uintah County.

**Transportation**

| Name | Miles | Estimated Cost |
|---|---|---|
| **Local Neighborhood/local/city street** | 23 | 46,000,000 |

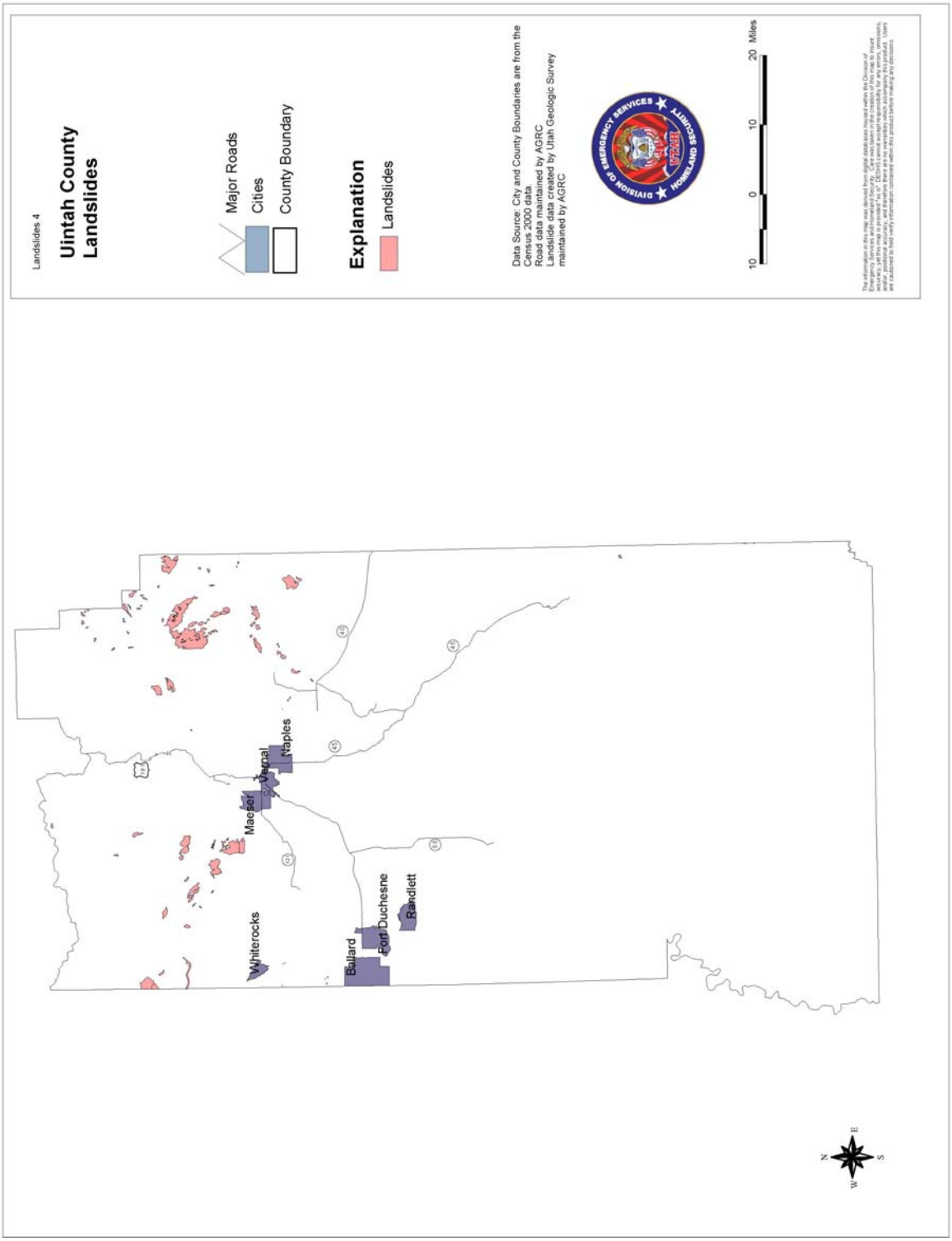
Table data represents total length of roads and rail lines, which overlay historically active landslides.

**Utilities**

| Name | Description | Estimated Cost |
|---|---|---|
| **Questar Gas Pipeline** | 1 mile | 241,390 |
| **Uncoded Power Lines** | .032 mile | 1,544 |

**<u>Generic Mitigation:</u>**

- Install a pipeline for run-off.
- Seed hillsides to prevent landslides.


Landslides 4
Uintah County
Landslides
Major Roads
Cities
County Boundary
Explanation
Landslides
Data Source: City and County Boundaries are from the Census 2000 data
Road data maintained by AGRC
Landslide data created by Utah Geologic Survey maintained by AGRC
DIVISION OF EMERGENCY SERVICES & HOMELAND SECURITY
UTAH
10 0 10 20 Miles
Naples
Vernal
Maeser
Whiterocks
Ballard
Fort Duchesne
Randlett
N
W
E
S

**NATURAL HAZARD: WILDFIRE**

**FEMA Hazard Profile for Wildfire**

| | | | |
|---|---|---|---|
| **Frequency** | | **Highly Likely** | **Near 100% probability in next year** |
| | **X** | **Likely** | **Between 10 and 100% probability in next year, of at least one chance in 10 years** |
| | | **Possible** | **Between 1 and 10% probability in next year, of at least one chance in next 100 years** |
| | | **Unlikely** | **Less than 1% probability in next 100 years** |
| **Severity** | **X** | **Catastrophic** | **More than 50%** (of the jurisdiction that can be affected) |
| | | **Critical** | **25 to 50%** (of the jurisdiction that can be affected) |
| | | **Limited** | **10 to 25%** (of the jurisdiction that can be affected) |
| | | **Negligible** | **Less than 10%** (of the jurisdiction that can be affected) |
| **Location** | Uintah County. | | |
| **Seasonal Pattern** | June through October. | | |
| **Duration** | Minutes to days and months. | | |
| **Speed of Onset** | Not applicable. | | |

There are three different classes of wild land fires. A **surface fire** is the most common type and burns along the floor of a forest, moving slowly and killing or damaging trees. A **ground fire** is usually started by lightning and burns on or below the forest floor. **Crown fires** spread rapidly by wind and move quickly by jumping along the tops of trees.

Wild land fires are usually signaled by dense smoke that fills the area for miles around. Source: http://www.fema.gov/hazards/fires/
*The map on page 25 illustrates fire risk and gives a wildfire explanation for Uintah County.*

## A Word about Wildfires

Almost every year several communities around the state are flooded and/or affected by post burn debris flows. Wildfire damaged watersheds have conditions which increase the potential for debris flows which may damage structures and infrastructure in the impacted area. Overall, the heightened risk

associated with alluvial fans is always of concern. Post fire revegetation and stabilization efforts in many cases do not alleviate the threat due to flooding and debris flow.

**VULNERABILITY:** High
The current drought has resulted in a high death rate among certain vegetative communities. Although vegetation in Utah has evolved in to meet climate demands the cumulative affect of years of drought have resulted in a high vegetation mortality rates. This has resulted in an abundance of fuel should a wildfire start. Structures build in the unincorporated county surrounded by native vegetation are at a higher risk in Uintah County than those structures build in the cities. It is suggested that all property owners in interface areas initiate defensible space practices.

**Generic Mitigation:**

- The County cannot mitigate because the forest service won't allow counties to manage their land.
- Poor land management on BLM and forestlands.
- Obtain fire-fighting equipment to control wildfires in rough terrain.
- Provide wild land fire training.
- Obtain fire grant from FEMA for personnel equipment.
- Weed control.

| County Name | Acres of Extreme | Acres of High | Acres of Moderate | Acres of Low/Very Low |
|---|---|---|---|---|
| **Uintah County** | N/A | 74,927 | 631,257 | 2,177,549 |

**Unincorporated County**

| County | Households in Extreme/Cost | Households in High/Cost | Households in Moderate/Cost |
|---|---|---|---|
| **Uintah County** | | 235/15,040,000 | 1,982/126,848,000 |

**Uintah County**

| City Name | Acres of Extreme | Acres of High | Acres of Moderate |
|---|---|---|---|
| **Ballard** | | | 4,355.83 |
| **Naples** | | | 206.721 |
| **Fort Duchesne** | | | 2,474.9 |
| **Maeser** | | 6.04 | 10.209 |

| | | | |
|---|---|---|---|
| | | | |

**Structures in Wildfire Area**

| City Name | Households in Extreme/Cost | Households in High/Cost | Households in Moderate/Cost |
|---|---|---|---|
| **Ballard** | | | 95/6,080,000 |
| **Naples** | | | 20.5/1,312,000 |
| **Fort Duchesne** | | | 91.5/5,856,000 |
| **City Name** | **Households in Extreme/Cost** | **Households in High/Cost** | **Households in Moderate/Cost** |
| **Maeser** | | 1.4/89,600 | 2.3/147,200 |

*Excludes content value, which would result in, and increase of 50% to the values listed.

**Transportation**

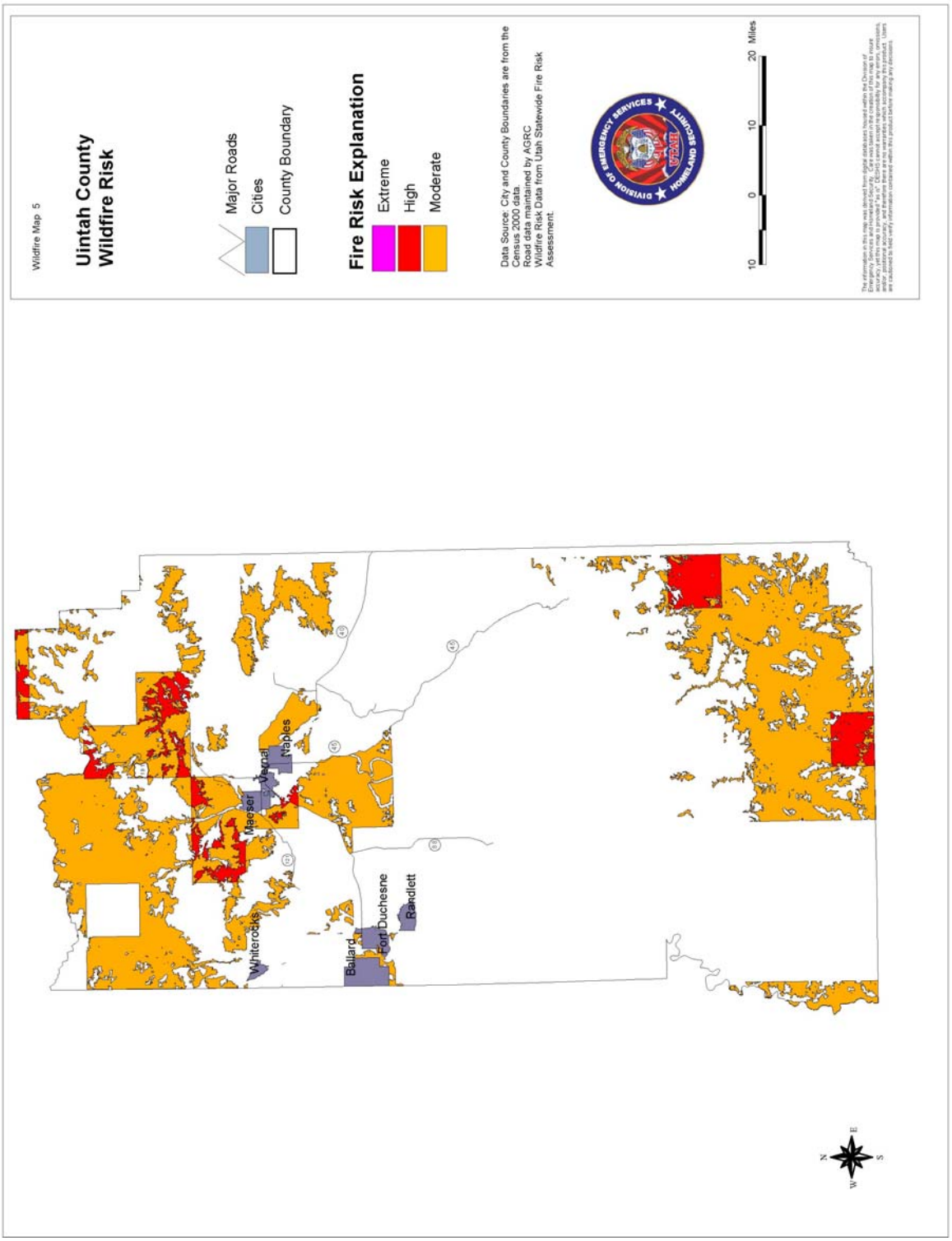
| Name | Miles | Estimated Cost |
|---|---|---|
| **Local Neighborhood/local/city street** | 918.7 | 1,837,400,000 |
| **US Highway 40** | 11.7 | 28,237,950 |
| **US Highway 191** | 15.2 | 36,685,200 |
| **State Route 121** | 2.4 | 5,792,400 |
| **State Route 301** | 2.2 | 5,309,700 |
| **State Route 45** | 3.8 | 9,171,300 |

Table data includes road lengths within areas determined to have an extreme, high, or moderate risk to wildfire as determined by the Utah Statewide Fire Risk Assessment.

**Utilities**

| Name | Description | Estimated Cost |
|---|---|---|
| Maeser | Power Generation | 10,000,000 |
| Chevron Resources | Power Generation | 10,000,000 |
| Uncoded Power lines | 108.3 miles | 5,228,724 |
| KV-12.5 or less | 4.5 miles | 217,260 |
| KV – 69 | 6.7 miles | 323,476 |

| | | |
|---|---|---|
| KV – 138 | 4 miles | 193,120 |
| Questar Gas Pipeline | 20.2 miles | 4,876,078 |


Wildfire Map 5
Uintah County
Wildfire Risk
Major Roads
Cities
County Boundary
Fire Risk Explanation
Extreme
High
Moderate
Data Source: City and County Boundaries are from the Census 2000 data
Road data maintained by AGRC
Wildfire Risk Data from Utah Statewide Fire Risk Assessment.
DIVISION OF EMERGENCY SERVICES
HOMELAND SECURITY
UTAH
10 0 10 20 Miles
Naples
Vernal
Maeser
Whiterocks
Ballard
Fort Duchesne
Randlett
N
E
S
W

## Mitigation Capabilities of Uintah County

This portion of the Plan assesses Uintah County's current capacity to mitigate the effects of the natural hazards identified within the plan. The assessment includes an examination of the following local government capabilities:

1. Staff & Organizational Capability
2. Technical Capability
3. Development Trends
4. Fiscal Capability
5. Policy and Program Capabilities
6. Political Willpower

The capabilities assessment serves as the foundation for designing an effective hazard mitigation strategy. It not only helps establish the goals and objectives for Uintah County to pursue under this Plan, but also ensures that those goals and objectives are realistically achievable under given local conditions.

### 1. Staff and Organizational Capability

Uintah County has **Very Limited** staff and organizational capability to implement hazard mitigation strategies. Uintah County is Utah's 11 most populated county, containing 25,224 people. While the County has a number of professional staff members to serve residents and carry out day-to-day administrative activities, much of the staff is part time or is tasked with numerous duties.

The County of Uintah does have an Emergency Manager who is responsible for the mitigation, preparedness, response and recovery operations that deal with both natural and man-made disaster events.

### 2. Technical Capability

Uintah County has **very limited** technical capability to implement hazard mitigation strategies.

#### *Technical Expertise*

Uintah County does have an, emergency manager/building inspector to administer the County's hazard mitigation programs. The County does not have a licensed engineer or related technical expert on staff, and has in the past relied upon outside contractors/consultants to perform a majority of any required technical work.

#### *Geographic Information Systems (GIS)*

GIS systems can best be described as a set of tools (hardware, software and people) used to collect, manage, analyze and display spatially-referenced data. Many local governments are now incorporating GIS systems into their existing planning and management operations. Uintah County currently has GIS capability,

and it has been identified as a needed enhancement for both the Planning Department and the Building Inspections office to further hazard mitigation goals.

***Internet Access***
Uintah County does provide its employees and citizens with high speed broadband Internet. Internet access opens up an enormous door for local officials to keep abreast of the latest information relative to their work and makes receiving government services more affordable and convenient. It is believed that Internet access will help further the County's hazard mitigation awareness programs, but should be supplemented with more traditional (and less technical) means as well.

**3. Development Trends**
Uintah County's economy has always relied on agriculture and mining to sustain its growth. The area has benefited from the development of several geologic deposits, such as gilsonite, oil shale, tar sand and oil, which have shaped its economic growth. While mining and agriculture remain significant to the economy, other industries such as government services, trade and the Ute Indian Tribe, are developing. These new industries help stabilize and diversify the economy.

Nonagricultural employment in Uintah County rose 2.3 percent to 8,745 by adding nearly 200 jobs between the second quarter of 1998 and the second quarter of 1999. Increased construction activity and service employment sustained economic growth. Uintah County's unemployment rate rose to 6.3 percent in 1998 to 6.4 percent for the comparable period of 1999.

**Construction** employment jumped 50.8 percent by adding 190 positions. All of the growth was in heavy construction for water, sewer, pipeline and communications systems. Residential, nonresidential, and special trade contractors reported slight growth. **Services** added 170 positions, and 8.4 percent year-over growth. Home health care, offices and clinics of doctors, video rental stores, temporary help agencies, residential care facilities, and tribal organizations reported growth, while jobs for equipment rental declined.
**Government** jobs increased 4.6 percent by adding 81 positions. Increases were reported for federal, state and local government, although local government positions dominated growth. Federal jobs related to land and wildlife management increased moderately, while state employment reported slight increases in several areas. Local positions rose for roadwork, recreation and education, but contracted for environmental and transportation services. **Manufacturing** employment experienced an increase of 17 jobs both durable and nondurable goods manufacturing added positions. Wood kitchen cabinet manufacturing, construction machinery, and publishing accounted for the growth. Oil and gas equipment reported a decline. **Finance, Insurance** and **Real Estate** year-over data indicate a net increase of one position. Real estate and insurance agents expanded, while banking/lending positions declined.

**4. Fiscal Capability**
Uintah County has **very limited** fiscal capability to implement hazard mitigation strategies.

**5. Policy and Program Capability**

**Emergency Operations Plan**
Uintah County has developed and adopted an Emergency Operations Plan, which predetermines actions to be taken by government agencies and private organizations in response to an emergency or disaster event. The Plan was adopted June 1986. For the most part, the Plan describes the County's capabilities to respond to emergencies and establishes the responsibilities and procedures for responding effectively to the actual occurrence of a disaster.

The Plan does not specifically address hazard mitigation, but it does identify the specific operations to be undertaken by the County to protect lives and property immediately before, during and immediately following an emergency. There are no foreseeable conflicts between this Hazard Mitigation Plan and Uintah County's Emergency Management Plan, primarily because they are each focused on two separate phases of emergency management (mitigation vs. preparedness and response).

***Emergency Management Program***
Uintah County has an emergency management program, which participates in the state EMPG program. The emergency management program is tasked with protection of life and property in Uintah County and mitigation is a big part of this task.

***Floodplain Management Plan***
Although Uintah County currently participates in the National Flood Plain Insurance Program they do not have a current Floodplain Management Plan. However, this Disaster Mitigation Plan recommends that Uintah County work on updating and/or revising their Floodplain Management Plan.

***Stormwater Management Plan***
Uintah County Currently has no formal Storm water Management Plan.
***County Ordinances***
The Uintah County currently does not have any county ordinances that address natural disasters. However, a member of the planning committee was in attendance at our Natural Disaster meetings and agreed to work on implementing and adopting new County Ordinances that are relevant to hazard mitigation.

**6. Political Willpower**
Most Uintah County residents are quite knowledgeable about the potential hazards that their community faces. Recent wildfires have increased the understanding and need for mitigation within the government structure of Uintah County.

The Uintah Basin Association of Governments used historical data to estimate to the best of their ability (with the data available at the time) the potential dollar losses if the County were to experience flooding and wildfires, the two most likely hazards to occur in the County. The estimated costs are as follows:

**Potential flood losses:**

- Residential properties (including senior citizens home): Depending upon the location of the flood, losses could result into millions of dollars. *Approximately; 3 to 4 million dollars*
- Local Hospital: The local Hospital in Uintah County is not in the flood plain, and would, therefore not likely be affected by a flood. *Approximately; $100,000.00*
- Schools: The Schools located in Uintah County, are not likely be affected by a flood. None of the schools are located in the flood plain. *Approximately; $100,000.00*
- Communication utility company: Due to the fact that the communications and the utility companies are not located in the flood plain minimal damages would result from a flood. *Approximately; $100,000.00*
- Waste water treatment plant: Due to the fact that the waste water treatment plant are not located in the flood plain minimal damages would result from a flood. *Approximately; $100,000.00*

**Potential wildfire losses:**

- Residential properties: Depending upon the location of the flood, losses could result into excess of millions of dollars. *Approximately; 4 to 5 million dollars*
- Hospital: The Uintah County Hospital would have minimal damages if any that would result from potential wildfire losses. *Approximately; $100,000.00*
- Secondary School: Uintah County does have two school systems located on the outskirts of City that could have potential damages due to wildfires. *Approximately; 1 to 2 million dollars*

**Uintah County**

The Uintah County Disaster Mitigation Planning committee, which consists of one County Commissioner, the County Emergency Manager, the Vernal City Planner, the Naples City Manager, and Ballard City in conjunction with the Uintah Basin Association of Governments meet on several different occasions to review and analyze the risk assessment studies that were performed for the County. The goals listed were determined to be those goals that would have the greatest benefit in hazard reduction to the County. The goals, objectives and actions represent a long-term vision for hazard reduction or enhancement of mitigation capabilities. Listed below is our definition of goals and objectives.

**Goals:** General guidelines that explain what you want to achieve. They are usually long-term and represent global visions, such as "eliminate flood damage."

**Objectives:** Define strategies or implementation steps to attain the identified goals. Unlike goals, objectives are specific, measurable, and have a defined completion date. Objectives are more specific, such as "adopt a zoning ordinance prohibiting new development in the floodplain."

The Uintah County Disaster Mitigation Planning Committee and the Uintah Basin AOG Mitigation Planner decided upon the following goals, objectives, action items, and priorities for each of the natural hazards. The priorities for each hazard are ranked in the following order: High, Medium, and Low. Each hazard is ranked by order of importance; however, this does not mean the ranking of each hazard will not potentially change over time.

**Mitigation Strategies**

## Dam Failure

**Uintah County**

**GOAL 1:** Help reduce future flooding in Uintah County due to dam failure.
**Problem Identification**: Reduce down stream loss in Uintah County due to dam failure.

### High Priority

**Objective 1.1**

- Use technology to aid in prevention of flood loss due to dam failure

**Action 1.1.1:**

- Digitize high hazard dam failure inundation maps

  **Time Frame:** ongoing
  **Funding:** state government
  **Estimated Cost:** 500 dollars per dam
  **Staff: Utah Dam** Safety Section, and AGRC

**Action 1.1.2:**

- Update Emergency Operations Plan to include GIS dam failure estimates

  **Time Frame:** Next EOP update
  **Funding:** County
  **Estimated Cost:** Undetermined
  **Staff:** County GIS and Emergency Manager

**Action 1.1.3:**

- Educate the local elected officials, developers, and citizens.

  **Time Frame:** Within the next two years
  **Funding:** County
  **Estimated Cost:** Minimal
  **Staff:** County employees

**Action 1.1.4**

- Updated Emergency Action Plans (EAP) and integration with GIS Systems**.**

  **Time Frame:** Ongoing
  **Funding:** FEMA, State and Local
  **Estimated Cost:** Unknown
  **Staff:** State and Local

**Action 1.1.5:**

- Implementation of more debris dams would assist in controlling floods, reducing the amount of debris and mud that come through. Maintenance of flood control pools in existing dams would also be very beneficial.

  **Time Frame:** Ongoing
  **Funding:** Town and County funds
  **Estimated Cost:** minimal
  **Staff:** Water surveyor and newsletter editor

**Background:** Numerous technological advancements have been made which will help reduce the likely hood of dam failure and reduce the risk to down stream populations should a dam fail. These techniques will only reduce the risk if they are properly understood and implemented. The above mitigation recommendations when implemented will represent a first step into this new technology for Duchesne County. The county understands there are additional technologic steps that can be taken such as increase number of telemeter snow and stream gauges. Look for these advances in future revisions to the mitigation plan.

## Drought

**Uintah County**

**GOAL 1:** Reduce water loss within Uintah County due to drought.
**Problem Identification:** Current, past and future drought issues within Uintah County.

### High Priority

**Objective 1.1**

- Conserve culinary water by educating the public

**Action 1.1.1:**

- Educate the public on the need to be water wise

**Time Frame:** Ongoing
**Funding:** County funds
**Estimated Cost:** minimal
**Staff:** Water surveyor and newsletter editor

**Background:** Use a newsletter to educate the public

**Objective 1.2:**

- Develop more water storage tanks within the County

**Action 1.1.2:**

- Conduct a feasibility study

**Time Frame:** Ongoing
**Funding:** County funds
**Estimated Cost:** minimal
**Staff:** Water surveyor and newsletter editor

**Action 1.1.3:**

- Install new wheel lines to improve the water efficiency.

**Time Frame:** Ongoing
**Funding:** Federal, and State funding
**Estimated Cost:** Unknown
**Staff:** NRCS, UACD, USU, Extension, ect.

**Action 1.1.4:**

- Implement and enforce water laws that prohibit the use of extensive amounts of water.

**Time Frame:** Ongoing
**Funding:** County funds
**Estimated Cost:** Unknown
**Staff:** Water surveyor and newsletter editor

## Drought

**Ballard City**

**GOAL 1:** Reduce water loss within Ballard City.
**Problem Identification:** Cyclical periods of drought place a strain on availability of community culinary water and irrigation water resources.

**High Priority**

**Objective 1.1**

- Meet current and future water needs of community. Conserve culinary water by educating the public

**Action 1.1.1:**

- Develop additional water storage tanks as well as implement conservation plans.

**Time Frame:** Ongoing
**Funding:** City funds, State and Federal Government loans and/or grants
**Estimated Cost:** To be determined
**Staff:** Ballard City staff, Professional Services, Contractors

**Objective 1.2**

- Conserve culinary water by conservation

**Action 1.1.2:**

- Maintain and enforce rate policies that encourage water conservation

**Time Frame:** Ongoing
**Funding:** City and County funds
**Estimated Cost:** minimal
**Staff:** Water surveyor and newsletter editor

**Background:** The city should continue to maintain and implement a tiered water rate structure.

**Naples City**

**GOAL 1:** Reduce water loss within Naples City.
**Problem Identification:** Cyclical periods of drought place a strain on availability of community culinary water and irrigation water resources.

**High Priority**

**Objective 1.1**

- Meet current and future water needs of community. Conserve culinary water by educating the public

**Action 1.1.1:**

- Develop additional water storage tanks as well as implement conservation plans.

**Time Frame:** Ongoing
**Funding:** City funds, State and Federal Government loans and/or grants
**Estimated Cost:** To be determined
**Staff:** Naples City staff, Professional Services, Contractors

**Objective 1.2**

- Conserve culinary water by conservation

**Action 1.1.2:**

- Maintain and enforce rate policies that encourage water conservation

**Time Frame:** Ongoing
**Funding:** City and County funds
**Estimated Cost:** minimal
**Staff:** Water surveyor and newsletter editor

**Background:** The City should continue to maintain and implement a tiered water rate structure.

**Vernal City**

**GOAL 1:** Reduce water loss within Vernal City.
**Problem Identification:** Cyclical periods of drought place a strain on availability of community culinary water and irrigation water resources.

**High Priority**

**Objective 1.1**

- Meet current and future water needs of community. Conserve culinary water by educating the public

**Action 1.1.1:**

- Develop additional water storage tanks as well as implement conservation plans.

**Time Frame:** Ongoing
**Funding:** City funds, State and Federal Government loans and/or grants
**Estimated Cost:** To be determined
**Staff:** Vernal City staff, Professional Services, Contractors

**Objective 1.2**

- Conserve culinary water by conservation

**Action 1.1.2:**

- Maintain and enforce rate policies that encourage water conservation

**Time Frame:** Ongoing
**Funding:** City and County funds
**Estimated Cost:** minimal
**Staff:** Water surveyor and newsletter editor

**Background:** The City should continue to maintain and implement a tiered water rate structure.

## Earthquake

**Uintah County**

**GOAL1:** Provide public awareness regarding earthquakes.
**Problem Identification:** Transportation and utilities services could be severely impacted.

### High Priority

**Objective 1.1**

- Provide for emergency response and relief.

**Action 1.1.1:**

- Identify and maintain critical transportation and utility services.

**Time Frame:** ongoing
**Funding:** Local governments and possible grants
**Estimated Cost:** Unknown- Determined by the extent of damage anticipated.
**Staff:** Town staff.

**Background:** Critical transportation systems

**Objective 1.2**

- Public Awareness

**Action 1.1.2:**

- Conduct a public awareness campaign.

**Time Frame:** ongoing
**Funding:** Local governments and possible grants
**Estimated Cost:** Unknown
**Staff:** Agency personnel and volunteers

**Background:** Contact DESHS earthquake program specialist. Enhance earthquake instructions in school.

**Uintah County**

**GOAL 2:** Identify the number of seismically unsafe structures within the County.
**Problem Identification:** Unknown number of seismically unsafe structures around the county.

**High Priority**

**Objective 1.1**

- Have a study done to determine seismic resistance of structures within the county i.e. Elementary and high schools, public buildings, high traffic areas, ECT.

**Action 1.1.1:**

- Structural and non-structural earthquake hazard assessment.

**Time Frame:** ongoing
**Funding:** Unknown
**Estimated Cost:** Unknown
**Staff:** Unknown

**Background:** Critical transportation systems

**Flooding**

**Uintah County**

**GOAL 1:** Reduce flood damage in Uintah County.
**Problem Identification:** Control flooding in residential areas of Uintah County, Including but not limited to Ballard City, Naples City, and Vernal City. Flooding occurs from heavy rains and fast moving thunderstorms. *For more information regarding Flooding in Uintah County see the Flood Hazard Identification Study in Appendix M.*

## High Priority

**Objective 1.1:**

- Obtain Aerial photography with contours of each residential area in Uintah County.

**Action 1.1.1:**

- Set horizontal and vertical survey control and order aerial photography with contours for each residential area in the county.

**Time Frame:** Ongoing
**Funding:** Local, State and Federal grants
**Estimated Cost:** Unknown
**Staff:** State, Local, and possibly Federal

**Background:** Aerial Topography is needed for master storm drainage design.

**Objective 1.2:**

- Design master storm drainage plans for residential areas.

**Action 1.1.2:**

- Design master storm drainage plans to handle storm water runoff through residential areas.

**Time Frame:** 3 months to 2 years, (depending on number of areas worked on)
**Funding:** Grants
**Estimated Cost:** $10,000.00 per residential area, depending on size
**Staff:** County Staff and contracted staff.

**Background:** Engineers design master storm drainage plans for the residential areas.

**Objective 1.3:**

- Implement storm drainage plans throughout the residential areas of Uintah County.

**Action 1.1.3:**

- Implement storm drainage plans throughout the residential areas of Uintah County.

**Time Frame:** 2 years or as soon as the storm drainage plans are finished.
**Funding:** State and Federal grants
**Estimated Cost:** unknown, will depend on the finals plans and what is required for facilities
**Staff:** County and contracted staff

**Background:** Construct storm drainage facilities and require all new developments to meet county storm drainage plans.

**Ballard City**

**GOAL 1:** Reduce flooding in Ballard City.
**Problem Identification:** Control flooding in Ballard City. Flooding occurs from heavy rains and fast moving thunderstorms.

**High Priority**

**Objective 1.1:**
- Use technology to aid in prevention of flood loss.

**Action 1.1.1:**
- Put in an application to the Army Corps. Of Engineers for updated and revised flood plain maps for Ballard City.

**Time Frame:** Within the next two years
**Funding**: FEMA, state and local.
**Estimated Cost:** Unknown
**Staff:** County and City Employees, Local Volunteers

**Action 1.1.2:**
- Place a restrictive clause in the City Ordinances that will prohibit any new development in the floodplain.

**Time Frame:** Within the next year
**Funding**: FEMA, state and local.
**Estimated Cost:** Unknown at this time
**Staff:** County and City Employees, Local Volunteers

**Action 1.1.3:**
- City building inspectors and the planning committee will revise and update building ordinances for new construction that takes place to help eliminate bridges and buildings from being washed away.

**Time Frame:** Ongoing
**Funding**: FEMA, state and local.
**Estimated Cost:** Unknown at this time
**Staff:** County and Town Employees, Local Volunteers

**Action 1.1.4:**
- City building inspectors and planning committee will make sure that the Zoning Ordinance is up-dated or revised every 5 to 6 years.

**Time Frame:** Ongoing
**Funding**: FEMA, state and local.
**Estimated Cost:** Unknown at this time
**Staff:** County and City Employees, Local Volunteers

**Action 1.1.5:**

- The County Emergency Managers will research grant opportunities for potential funding.

**Time Frame:** Ongoing
**Funding**: FEMA, state and local.
**Estimated Cost:** Unknown at this time
**Staff:** County and City Employees, Local Volunteers

**Action 1.1.6:**

- Implement a flood ordinance that will cover the County and City with flood insurance.

**Time Frame:** Ongoing
**Funding**: FEMA, state and local.
**Estimated Cost:** Unknown at this time
**Staff:** County and Town Employees, Local Volunteers

**Action 1.1.7:**

- Implement a zoning ordinance to ensure that manufactured homes are being installed properly and inspected.

**Time Frame:** Ongoing
**Funding**: FEMA, state and local.
**Estimated Cost:** Unknown at this time
**Staff:** County and City Employees, Local Volunteers

**Action 1.1.8:**

- Enforce Zoning laws.

**Time Frame:** Ongoing
**Funding**: FEMA, state and local.
**Estimated Cost:** Unknown at this time
**Staff:** County and City Employees, Local Volunteers

**Background:** Past and future flooding

**Naples City**

**High Priority**

**GOAL 1:** Reduce flooding in Naples City.
**Problem Identification:** Control flooding in Naples City. Flooding occurs from heavy rains and fast moving thunderstorms.

**Objective 1.1:**
- Use technology to aid in prevention of flood loss.

**Action 1.1.1:**
- Put in an application to the Army Corps. Of Engineers for updated and revised flood plain maps for the Naples City.

**Time Frame:** Within the next two years
**Funding**: FEMA, state and local.
**Estimated Cost:** Unknown
**Staff:** County and City Employees, Local Volunteers

**Action 1.1.2:**
- Place a restrictive clause in the City Ordinance that will prohibit any new development in the floodplain.

**Time Frame:** Within the next year
**Funding**: FEMA, state and local.
**Estimated Cost:** Unknown at this time
**Staff:** County and City Employees, Local Volunteers

**Action 1.1.3:**
- County and City building inspectors and the planning committee will revise and update building ordinances for new construction that takes place to help eliminate bridges and buildings from being washed away..

**Time Frame:** Ongoing
**Funding**: FEMA, state and local.
**Estimated Cost:** Unknown at this time
**Staff:** County and City Employees, Local Volunteers

**Action 1.1.4:**
- County and City building inspectors and planning committee will make sure that the Zoning Ordinance is up-dated or revised every 5 to 6 years.

**Time Frame:** Ongoing
**Funding**: FEMA, state and local.

**Estimated Cost:** Unknown at this time
**Staff:** County and City Employees, Local Volunteers

**Action 1.1.5:**

- The County Emergency Managers will research grant opportunities for potential funding.

**Time Frame:** Ongoing
**Funding**: FEMA, state and local.
**Estimated Cost:** Unknown at this time
**Staff:** County and City Employees, Local Volunteers

**Action 1.1.6:**

- Implement a flood ordinance that will cover the County and City with flood insurance.

**Time Frame:** Ongoing
**Funding**: FEMA, state and local.
**Estimated Cost:** Unknown at this time
**Staff:** County and City Employees, Local Volunteers

**Action 1.1.7:**

- Implement a zoning ordinance to ensure that manufactured homes are being installed properly and inspected.

**Time Frame:** Ongoing
**Funding**: FEMA, state and local.
**Estimated Cost:** Unknown at this time
**Staff:** County and City Employees, Local Volunteers

**Action 1.1.8:**

- Enforce Zoning laws.

**Time Frame:** Ongoing
**Funding**: FEMA, state and local.
**Estimated Cost:** Unknown at this time
**Staff:** County and City Employees, Local Volunteers

**Vernal City**

**High Priority**

**GOAL 1:** Reduce flooding in Vernal City.

**Objective 1.1:**

- Use technology to aid in prevention of flood loss.

**Action 1.1.1:**

- Put in an application to the Army Corps. Of Engineers for updated and revised flood plain maps for the Vernal City.

**Time Frame:** Within the next two years
**Funding**: FEMA, state and local.
**Estimated Cost:** Unknown
**Staff:** County and City Employees, Local Volunteers

**Action 1.1.2:**

- Place a restrictive clause in the County and City Ordinances that will prohibit any new development in the floodplain.

**Time Frame:** Within the next year
**Funding**: FEMA, state and local.
**Estimated Cost:** Unknown at this time
**Staff:** County and City Employees, Local Volunteers

**Action 1.1.3:**

- County and City building inspectors and the planning committee will revise and update building ordinances for new construction that takes place to help eliminate bridges and buildings from being washed away..

**Time Frame:** Ongoing
**Funding**: FEMA, state and local.
**Estimated Cost:** Unknown at this time
**Staff:** County and City Employees, Local Volunteers

**Action 1.1.4:**

- County and City building inspectors and planning committee will make sure that the Zoning Ordinance is up-dated or revised every 5 to 6 years.

**Time Frame:** Ongoing
**Funding**: FEMA, state and local.
**Estimated Cost:** Unknown at this time
**Staff:** County and City Employees, Local Volunteers

**Action 1.1.5:**

- The County Emergency Managers will research grant opportunities for potential funding.

**Time Frame:** Ongoing
**Funding**: FEMA, state and local.

**Estimated Cost:** Unknown at this time
**Staff:** County and City Employees, Local Volunteers

**Action 1.1.6:**

- Implement a flood ordinance that will cover the County and City with flood insurance.

**Time Frame:** Ongoing
**Funding**: FEMA, state and local.
**Estimated Cost:** Unknown at this time
**Staff:** County and City Employees, Local Volunteers

**Action 1.1.7:**

- Implement a zoning ordinance to ensure that manufactured homes are being installed properly and inspected.

**Time Frame:** Ongoing
**Funding**: FEMA, state and local.
**Estimated Cost:** Unknown at this time
**Staff:** County and City Employees, Local Volunteers

**Action 1.1.8:**

- Enforce Zoning laws.

**Time Frame:** Ongoing
**Funding**: FEMA, state and local.
**Estimated Cost:** Unknown at this time
**Staff:** County and City Employees, Local Volunteers

## Insect Infestation

**Uintah County**

**GOAL 1:** Reduce insect infestation
**Problem Identification:** Uintah County has experienced losses in agriculture, livestock, and wildlife as a result of insect infestation.

**Priority High**

**Objective 1.1**

- Reduce the impact of insects

**Action 1.1.1:**

- Spread insect bait and spray for mosquitoes

**Time Frame:** When required
**Funding:** County funds, Mosquito abatement funds come from property tax
**Estimated Cost:** Approximately $3.00 per property owner per month
**Staff:** County Mosquito Abatement District

**Objective 1.2:**

- Reduce the severity of infestations

**Action 1.1.2:**

- Apply for grants to purchase Mosquito magnets and propane tanks to run the magnets.

**Time Frame:** Spring and summer of 2004
**Funding:** $6,000.00 in grants
**Estimated Cost:** $6,000.00
**Staff:** County employees

**Background:** Several agricultural fields surround Uintah County; these fields have been subjected to insect infestation especially during the recent years of drought.

**Objective 1.3:**

- Reduce the threat of West Nile Virus within Uintah County

**Action 1.1.3:**

- Educate the public on the importance of vaccinating their animals.

**Time Frame:** Spring and summer of 2004
**Funding:** State and local funding
**Estimated Cost:** minimal
**Staff:** County employees

**Background:** Several of the Uintah County residents have horses that could be affected by the West Nile virus.

**Uintah County**

**GOAL 1:** Reduce grasshopper infestations.
**Problem Identification:** Periodic Grasshopper infestations more sever in the rural areas of Uintah County.

**High Priority**

**Objective 1.1:**

- Reduce the severity of infestations

**Action 1.1.1:**

- Conduct aerial spraying to reduce infestations.

**Time Frame:** As infestations occur
**Funding:** By private individuals in most cases
**Estimated Cost:** Varies, depending on acreage treated
**Staff:** Contractor

**Background:** Many agricultural fields surround Uintah County. These fields have been subjected to insect infestation especially during the recent years of drought.

## Landslide

**Uintah County**

**GOAL 1:** Protect residential areas from potential landslides.
**Problem Identification:** There is a potential risk to residential and commercial buildings due to rockslides, which are located in areas identified by the county as landslide risk areas.

### High Priority

**Objective 1.1**

- Reduce potential landslides to residential and commercial areas.

**Action 1.1.1:**

- Assess the probability of landslides and identify specific structures at risk

**Time Frame:** Undetermined
**Funding:** Property owner
**Estimated Cost:** Unknown
**Staff:** Unknown

**Background:** Soil surveys and other engineering surveys are needed.

**Action 1.1.2:**

- The county's, city's and town's planning committee will review and update the zoning ordinances within the County to make sure that individuals are not constructing new homes near potential landslide areas.

**Time Frame:** Undetermined
**Funding:** Unknown
**Estimated Cost:** Unknown
**Staff:** Unknown

**Background:** Hold monthly planning and zoning meetings within the town and county.

**Uintah County**

**GOAL 2:** Protect vehicle traffic from future accidents due to landslides.
**Problem Identification:** In Uintah County there are several areas namely, Blue Mountain, Diamond Mountain, and Dry Fork Canyon that could have a potential risk to pedestrians and vehicle traffic due to landslides.

**High Priority**

**Objective 1.1**

- Reduce potential landslides to residential and commercial areas.

**Action 1.1.1:**

- Assess the probability of landslides and identify specific structures at risk

**Time Frame:** Undetermined
**Funding:** Property owner
**Estimated Cost:** Unknown
**Staff:** Unknown

**Background:** Soil surveys and other engineering surveys are needed.

## Severe Weather

**Uintah County**

**GOAL 1:** Reduce Structural damage to both residential and commercial buildings due to Severe Weather.
**Problem Identification:** Uintah County experiences occasional, damaging high winds and snowstorms.

**High Priority**

**Objective 1.1**

- Reduce damage to structures through strict adherence to building codes

**Action 1.1.1:**

- Ensure that 80 MPH wind load requirement is met by builders

**Time Frame:** Ongoing
**Funding:** Fees from Building permits

**Estimated Cost:** Minimal
**Staff:** Building Inspector

**Background:** Adherence to building code requirement for tying roof structures to supporting walls will minimize damage from high wind events

**Uintah County**

**GOAL 2:** Provide protection for citizens regarding power line failure.
**Problem Identification:** Power lines are at risk from seasonal high winds.

**High Priority**

**Objective 1.1**

- Reduce service disruptions and damage to power lines

**Action 1.1.1:**

- Provide adequate clearances for power lines and conduct ongoing line maintenance. Maintain outage plan.

**Time Frame:** Ongoing
**Funding:** Possible Grants
**Estimated Cost:** To be determined
**Staff:** County and town employees

**Background:** Extreme winds have occurred, utilities disruption has occurred in past years due to damage to power poles and transmission lines by high winds.

## Wildfire

**Uintah County**

**GOAL 1:** Reduce the threat of wildfires within Uintah County.
**Problem Identification:** Continuing non-compliance with existing building codes and fire codes.

**High Priority**

**Objective 1.1**

- Increase compliance with existing building and fire codes.

**Action:**

- Develop and enforce current local, state and national codes

**Time Frame:** Ongoing
**Funding:** Local, state and federal grants
**Estimated Cost:** Unknown

**Staff:** Local, state and federal agencies
**Background:** Implement and enforce rules, regulations and codes

**Uintah County**

**GOAL 1:** Reduce wildfire danger within the County.
**Problem Identification:** Specific areas of the county are susceptible to wildland fire danger.

**Objective 1.2**

- Educate homeowners on how to reduce risk of wildfire damage

**Action 1.1.2:**

- The local LEPC will provide semi-annual training for the citizens of Uintah County.

**Time Frame:** Starting 2004
**Funding:** State and local
**Estimated Cost:** Minimal
**Staff:** County
**Background:** Educate the public on how to reduce the risk of wildfires.

# Plan Maintenance Procedures

## Monitoring, Evaluating and Updating the Plan

Periodic monitoring and reporting of the Plan is required to ensure that the goals and objectives for Uintah Basin are kept current and that local mitigation efforts are being carried out. The Plan has therefore been designed to be user-friendly in terms of monitoring implementation and preparing regular progress reports.

Annual Reporting Procedures

The Plan shall be reviewed annually, as required by the Executive Council, or as situations dictate such as following a disaster declaration. Each year the UBAOG Community Development Department Staff will review the plan and ensure the following:

1. The Executive Director and the Executive Council will receive an annual report and/or presentation on the implementation status of the Plan at the January Executive Council Meeting.

2. The report will include an evaluation of the effectiveness and appropriateness of the mitigation actions proposed in the Plan.

3. The report will recommend, as appropriate, any required changes or amendments to the Plan.

If the UBAOG Executive Council determines that a modification of the Plan is warranted, the Council may initiate a Plan amendment.

Revisions and Updates

Periodic revisions and updates of the Plan are required to ensure that the goals and objectives for the Uintah Basin are kept current. More importantly, revisions may be necessary to ensure the Plan is in full compliance with Federal regulations and State statutes. This portion of the Plan outlines the procedures for completing such revisions and updates. Plan maintenance and significant revision is contingent upon availability of funding.

Five (5) Year Plan Review

The entire plan including any background studies and analysis should be reviewed every five (5) years to determine if there have been any significant changes in the Uintah Basin, which would affect the Plan. Increased development, increased exposure to certain hazards, the development of new mitigation capabilities or techniques and changes to Federal or State legislation are examples of changes that may affect the condition of the Plan.

The Pre-Disaster Hazard Mitigation Plan Ad-Hoc Committee, with a potential membership representing every jurisdiction in the UBAOG, will be reconstituted for the five (5) year review/update process. Typically, the same process that was used to create the original plan will be used to prepare the update.

Further, following a disaster declaration, the Plan will need to be revised to reflect on lessons learned or to address specific circumstances arising out of the disaster.

The results of this five (5) year review should become summarized in the annual report prepared for this Plan under the direction of the Community Development Director. The annual report will include an evaluation of the effectiveness and appropriateness of the Plan, and will recommend, as appropriate, any required changes or amendments to the Plan.

If the Executive Council determines that the recommendations warrant modification to the Plan, the Council may either initiate a Plan amendment as described below, or, if conditions justify, may direct the UBAOG Community Development Department to undertake a complete update of the Plan.

Plan Amendments

An amendment to the Plan should be initiated only by the Executive Council, either at its own initiative or upon the recommendation of the Executive Director, Community Development Director or Mayor of an affected community.

Upon initiation of an amendment to the Plan, UBAOG will forward information on the proposed amendment to all interested parties including, but not limited to, all affected city or county departments, residents and businesses. Depending on the magnitude of the amendment, the full Ad-Hoc committee may be reconstituted. At a minimum, the information will be made available through public notice in a newspaper of general circulation and on the Uintah Basin or DES Website. Information will also be forwarded to the Utah Department of Public Safety, Division of Emergency Services and Homeland Security. This information will be sent out in order to seek input on the proposed Plan amendment for not less than a forty-five (45) day review and comment period.

At the end of the comment period, the proposed amendment and all review comments will be forwarded to the Executive Director (or his/her designee) for consideration. If no comments are received from the reviewing parties within the specified review period, such will be noted accordingly. The Executive Director (or his/her designee) will review the proposed amendment along with comments received from other parties and submit a recommendation to the Executive Council within sixty (60) days.

In determining whether to recommend approval or denial of a Plan amendment request, the following factors will be considered:

1. There are errors or omissions made in the identification of issues or needs during the preparation of the Plan; and/or

2. New issues or needs have been identified which were not adequately addressed in the Plan; and/or

3. There has been a change in information, data or assumptions from those on which the Plan was based.

4. The nature or magnitude of risks has changed.

5. There are implementation problems, such as technical, political, legal or coordination issues with other agencies.

Upon receiving the recommendation of the Executive Director or his/her designee, the Executive Council will hold a public hearing. The Executive Council will review the recommendation (including the factors listed above) and any oral or written comments received at the public hearing. Following that review, the Executive Council will take one of the following actions:

1. Adopt the proposed amendment as presented.

2. Adopt the proposed amendment with modifications.

3. Refer the amendment request back to the Executive Director for further consideration.

4. Defer the amendment request for further consideration and/or hearing.

5. Reject the amendment request.

## Implementation through Existing Programs

Implementation

Each jurisdiction included in the Uintah Basin Association of Governments Pre-Disaster Hazard Mitigation Plan has a current Capital Improvements Plan (CIP). The Capital Improvement Planning that occurs in the future will contribute and be a reflection of the goals in the Hazard Mitigation Plan. It will be the responsibility of Mayor/Council/Commissioner(s) of each jurisdiction, as he/she/they see fit, to include within the Capital Improvements Plan action items that have been

outlined within the Mitigation Plan and ensure these actions are carried out no later than the target dates unless reasonable circumstances prevent their implementation (i.e. lack of funding availability).

Many mitigation strategies can be implemented through existing federal, state, and county programs and administered by the county emergency manager. Examples include the National Flood Insurance Program, Fire Wise, Living With Fire Committee, and Storm Ready.

Prioritization

For this plan projects were prioritized using that STAPLEE method and given a rating of high, medium or low. These rating take into account the following evaluation criteria: social, technical, administrative, political, legal, and funding. Emphasis was given to funding which is a fundamental consideration in any hazard mitigation project. Benefit cost analysis was not formally conducted on any of the projects suggested in the mitigation strategies. With few exceptions, none of the projects in the plan were developed far enough to derive a meaningful benefit to cost ratio. Should funding become available the extent by which benefits are maximized with regard to cost, would play a significant roll in determining which, projects get funded and which do not.

Administrative

Project administration is purely a function of project size for the jurisdictions within the planning area. The jurisdictions have self-funded or received state and federal funding for numerous projects in the past. The larger the project the more administration would be needed. Local jurisdictions or counties with current staff could administer small projects. Larger projects would still by managed “in-house” but would require additional staff be hired.

Funding Sources

Although all mitigation techniques will likely save money by avoiding losses, many projects are costly to implement. Uintah Basin jurisdictions will continue to seek outside funding assistance for mitigation projects in both the pre- and post-disaster environment. This portion of the Plan identifies the primary Federal and State grant programs for Uintah Basin jurisdictions to consider, and also briefly discusses local and non-governmental funding sources.

Federal

The following federal grant programs have been identified as funding sources which specifically target hazard mitigation projects:

Title: Pre-Disaster Mitigation Program

Agency: Federal Emergency Management Agency

Through the Disaster Mitigation Act of 2000, Congress approved the creation of a national program to provide a funding mechanism that is not dependent on a Presidential Disaster Declaration. The Pre-Disaster Mitigation (PDM) program provides funding to states and communities for cost-effective hazard mitigation activities that complement a comprehensive mitigation program and reduce injuries, loss of life, and damage and destruction of property.

The funding is based upon a 75% Federal share and 25% non-Federal share. The non-Federal match can be fully in-kind or cash, or a combination. Special accommodations will be made for "small and impoverished communities", who will be eligible for 90% Federal share/10% non-Federal.

FEMA provides PDM grants to states that, in turn, can provide sub-grants to local governments for accomplishing the following eligible mitigation activities:

- State and local hazard mitigation planning
- Technical assistance (e.g. risk assessments, project development)
- Mitigation Projects
- Acquisition or relocation of vulnerable properties
- Hazard retrofits
- Minor structural hazard control or protection projects
- Community outreach and education (up to 10% of State allocation)

Title: Flood Mitigation Assistance Program
Agency: Federal Emergency Management Agency

FEMA's Flood Mitigation Assistance program (FMA) provides funding to assist states and communities in implementing measures to reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes and other structures insurable under the National Flood Insurance Program (NFIP). FMA was created as part of the National Flood Insurance Reform Act of 1994 (42 USC 4101) with the goal of reducing or eliminating claims under the NFIP.

FMA is a pre-disaster grant program, and is available to states on an annual basis. This funding is available for mitigation planning and implementation of mitigation measures only, and is based upon a 75% Federal share/25% non-Federal share. States administer the FMA program and are responsible for selecting projects for funding from the applications submitted by all communities within the state. The state then forwards selected applications to FEMA for an eligibility determination. Although individuals cannot apply directly for FMA funds, their local government may submit an application on their behalf.

Title: Hazard Mitigation Grant Program
Agency: Federal Emergency Management Agency

The Hazard Mitigation Grant Program (HMGP) was created in November 1988 through Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistant Act. The HMGP assists states and local communities in implementing long-term mitigation measures following a Presidential disaster declaration.

To meet these objectives, FEMA can fund up to 75% of the eligible costs of each project. The state or local cost-share match does not need to be cash; in-kind services or materials may also be used. With the passage of the Hazard Mitigation and Relocation Assistance Act of 1993, federal funding under the HMGP is now based on 15% of the federal funds spent on the Public and Individual Assistance programs (minus administrative expenses) for each disaster.

The HMGP can be used to fund projects to protect either public or private property, so long as the projects in question fit within the state and local governments overall mitigation strategy for the disaster area, and comply with program guidelines. Examples of projects that may be funded include the acquisition or relocation of structures from hazard-prone areas, the retrofitting of existing structures to protect them from future damages; and the development of state or local standards designed to protect buildings from future damages.

Eligibility for funding under the HMGP is limited to state and local governments, certain private nonprofit organizations or institutions that serve a public function, Indian tribes and authorized tribal organizations. These organizations must apply for HMPG project funding on behalf of their citizens. In turn, applicants must work through their state, since the state is responsible for setting priorities for funding and administering the program.

Title: Public Assistance (Infrastructure) Program, Section 406
Agency: Federal Emergency Management Agency

FEMA's Public Assistance Program, through Section 406 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, provides funding to local governments following a Presidential Disaster Declaration for mitigation measures in conjunction with the repair of damaged public facilities and infrastructure. The mitigation measures must be related to eligible disaster related damages and must directly reduce the potential for future, similar disaster damages to the eligible facility. These opportunities usually present themselves during the repair/replacement efforts.

Proposed projects must be approved by FEMA prior to funding. They will be evaluated for cost effectiveness, technical feasibility and compliance with statutory, regulatory and executive order requirements. In addition, the evaluation must ensure that the mitigation measures do not negatively impact a facility's operation or risk from another hazard.

Public facilities are operated by state and local governments, Indian tribes or authorized tribal organizations and include:

- Roads, bridges & culverts
- Draining & irrigation channels
- Schools, city halls & other buildings
- Water, power & sanitary systems
- Airports & parks

Private nonprofit organizations are groups that own or operate facilities that provide services otherwise performed by a government agency and include, but are not limited to the following:

- Universities and other schools
- Hospitals & clinics
- Volunteer fire & ambulance
- Power cooperatives & other utilities
- Custodial care & retirement facilities
- Museums & community centers

Title: SBA Disaster Assistance Program
Agency: US Small Business Administration

The SBA Disaster Assistance Program provides low-interest loans to businesses following a Presidential disaster declaration. The loans target businesses to repair or replace uninsured disaster damages to property owned by the business, including real estate, machinery and equipment, inventory and supplies. Businesses of any size are eligible, along with non-profit organizations.

SBA loans can be utilized by their recipients to incorporate mitigation techniques into the repair and restoration of their business.

Title: Community Development Block Grants
Agency: US Department of Housing and Urban Development

The Community Development Block Grant (CDBG) program provides grants to local governments for community and economic development projects that primarily benefit low- and moderate-income people. The CDBG program also provides grants fro post-disaster hazard mitigation and recovery following a Presidential disaster declaration. Funds can be used for activities such as acquisition, rehabilitation or reconstruction of damaged properties and facilities and for the redevelopment of disaster areas.

## STATE PROGRAMS

The state of Utah maintains a philosophy of local responsibility for hazard mitigation. State agencies still provide an integrated network of support, services, and resources for hazard mitigation activities. As demonstrated during past disasters, these agencies are well organized in their delivery and coordination of services. The following is a review of State departments with disaster responsibilities describing their existing and planned mitigation programs.

An evaluation of the laws, regulations, authorities, policies, and programs used in Utah to mitigate hazards demonstrate that they work exceptionally well, as evidenced by the massive amount of mitigation accomplished in Utah, the few numbers of disasters, and the limited nature of those emergencies that do occur. According to the Utah SHMT, the only changes that could be considered by the Legislature might be ones that parallel the Federal Disaster Mitigation Act of 2000, which would integrate pre-disaster mitigation considerations into the code of various state agencies.

### Utah Division of Emergency Services and Homeland Security (DESHS)

The capabilities of DESHS Hazard Mitigation Program include:

- Prepare, implement, and maintain programs and plans to provide for preventions and minimization of injury and damage caused by disasters.
- Identify areas particularly vulnerable to disasters.
- Coordinate hazard mitigation and other preventive and preparedness measures designed to eliminate or reduce disasters.
- Assist local officials in designing local emergency actions plans.
- Coordinate federal, state, and local emergency activities.
- Coordinate emergency operations plans with emergency pans of the federal governments.

Through the State Hazard Mitigation Program, the following occurs:

- Provides a state coordinator for hazard mitigation, the State Hazard Mitigation Officer.
- Provides a central location of the coordination of state hazard mitigation activities.
- Provides coordination for the Federal Pre-Disaster Mitigation Program.
- Provide for coordination of Project Impact.
- Provide coordination for Comprehensive Multi-hazard Mitigation Plan development, implementation, and monitoring.
- Provide for interagency coordination
- Provide development of procedures for grant administration and project evaluation.
- Provide State Hazard Mitigation Team assistance to local governments.

- Provide for development of specific hazard mitigation plans, such as drought and wildfire.
- Provide for local hazard and risk analysis.
- Provide for development of SHMT mitigation recommendations following disasters.

**Utah Department of Agriculture**

The Utah Department of Agriculture administers programs serving the state's large agricultural sector. The department's response role during and after a disaster period has been to coordinate damage reports for funding needs and provides loan and recovery program information and assistance to disaster victims. This service is provided for flood, drought, insect infestation, fire, livestock disease, and frost.

Assistance During Drought Disasters

A damage reporting network coordinated through the existing County Emergency Board was established during the drought disaster of 1996. Each county agent assembled damage reports in his area and transmitted them through a computer network based at Utah State University. The individual damage reports from each county were recapped in the Department of Agriculture and formed the basis of documentation for an appeal to the legislature for additional funds to mitigate the damage.

Loans Handbook

The department has prepared a handbook listing the types of loans available for flood damage to agriculture, the funding requirements, and applications procedures. This includes loans from both state and federal sources. There are three loan programs operated by the agriculture department, all of which can be used for flood damage:

1) Rural Rehabilitation Loan Program (federally funded and operated by the state)
2) Agriculture Resource Development Loan Program (state funded)
3) Emergency Loan Program (state funded)

Soil Conservation Program

The Department of Agriculture also administers the ongoing Soil Conservation Program. In each of the state's thirty-nine soil conservation districts, three unpaid, elected supervisors offer technical assistance and consultation on watershed protection. The state offers limited technical and planning assistance through a staff member. The program works cooperatively with the federal Soil Conservation Service, which provides most of the technical assistance. The ongoing program is not regulatory, but is directed towards improved water use and soil conservation.

Disaster Easements
Because of the similarity between past events, the department is now working on a permanent hazard mitigation concept known as “Disaster Easements”, which may have widespread agreements with irrigation companies, water districts, or water users’ associations for the purpose of routing flood water through local communities.

Monitoring Ground Water Quality
The Department also monitors the quality of groundwater, including individual wells and springs throughout the State.

Non-Point Source Pollution
The Department’s Non-Point Source Pollution Program focuses on flood prevention through reduction of erosion, vegetating streams, and restoring “natural stream structure”. The Department also monitors drought conditions, which are a precursor to wildfire.

**Department of Community and Economic Development**

Community Impact Board
The Utah Permanent Community Impact Fund Board provides loans and/or grants to state agencies and sub-divisions of the state, which may be socially or economically impacted by mineral resource development of federal lands.

Permanent Community Impact Fund
The Permanent Community Impact Fund provides loans and/or grants to state agencies and subdivisions of the state, which are or may be socially or economically impacted, directly or indirectly, by mineral resource development on federal lands.

Under the Federal Mineral Lease Act of 1920, leaseholders on public land make royalty payments to the federal government for the development and production of non-metalliferous minerals. In Utah, the primary source of these royalties is the commercial production of fossil fuels on federal land held by the U.S. Forest Service and the Bureau of Land Management. Since the enactment of the Minerals Lease Act of 1920, a portion of these royalty payments, called mineral lease payments, have been returned to the state in an effort to help mitigate the local impact of energy and mineral developments on federal lands.

Funding Options
The Board has the option of funding projects with loans and/or grants. The Board’s preferred financing mechanism is an interest-bearing loan.

Loan Requirements
In providing financial assistance in the form of a loan, the Board may purchase an applicant's bonds only if the bonds are accompanied by legal opinion of recognized municipal bond counsel to the effect that the bonds are legal and binding under applicable Utah Law.

The Board may purchase either a taxable or tax-exempt bond. The board may purchase taxable bonds if it determines, after evaluating all relevant circumstances, including the applicant's ability to pay, that the purchase of the taxable bonds is in the best interest of the state and the applicant.

Grants
Grants may be provided only when the other financing mechanisms cannot be utilized, where no reasonable method of repayment can be identified, or in emergency situations regarding public health and/or safety.

Community Development Block Grant
The Community Development Block Grant, or CDBG program, provides funding from the federal government's Department of Housing and Urban Development or HUD, to small cities and counties in the State of Utah.

Utah Division of State History

The Utah State Historical Society, Utah's Division of State History, was founded in 1897 on the 50th anniversary of the first settlement in the Salt Lake Valley by the Mormon Pioneers. The Society became a state agency in 1917, now housed in the historic Rio Grande Depot since 1980. The Division stimulates archaeological research, study; oversees the protection and orderly development of sites; collects and preserves specimens; administers site surveys; keeps excavation records; encourage and supports the preservation of historic and pre-historic sites and publishes antiquities records. The Division also issues archaeological permits and consults with agencies and individuals doing archaeological work.

Preserving and Sharing Utah's Past
The mission of the State Division of History is "preserving and sharing Utah's past for the present and the future".

State Historical Preservation Officer (SHPO)
The SHPO administers the Section 106 process (national Historic Preservation Act) in Utah. The SHPO also serves on the Utah State Hazard Mitigation Team, providing guidance on historical and cultural preservation regulations.

Historic properties include districts, buildings, structures, objects, landscapes, archeological sites, and traditional cultural properties that are included in, or

eligible for inclusion in, the National Register of Historic Places. These properties are not just “old buildings” or “well-known historic sites, but places important in local, state, or national history. Facilities as diverse as bridges and water treatment plants my, be considered historic.

**Utah Geological Survey (UGS)**

The Utah Geologic and Mineral Survey is the principal state agency concerned with geologic hazards. Through years of study, the UGS has developed considerable information on Utah’s geologic hazards. When geologic events occur or threaten to occur, the UGS is consulted by other state agencies, local governments, and private organizations for assistance in defining the threat from natural hazards. The UGS works in partnership with other agencies, such as DESHS, in relating the threats from natural hazard to the communities at risk.

Functions

The functions of the UGS include the following:

- Evaluation of individual geological hazards;
- Participation on local government and state agency technical teams;
- Prediction of the performance on individual slides once they began to move;
- Coordination and awareness of research efforts undertaken by other agencies;
- Provide information on status of individual geologic hazards;
- Reconnaissance reports on status of hazards statewide;
- Advise Division of Water Rights on geologic hazards associated with dam sites; and
- Provide geologic information for use during planning of remedial actions.

**Laws/authorities/policies of the Utah Geological Survey for conducting mitigation**

Utah Code Annotated

Chapter 73 Geological and Mineral Survey

Section 68-73-6 Objectives of Survey

(1) Determine and investigate areas of geologic and topographic hazards that could affect the safety of, or cause economic loss to, the citizens of this state; (f) assist local and state government agencies in their planning, zoning, and building regulations functions by publishing maps, delineating appropriately wide special earthquake risk areas, and, at the request of state agencies, review the citing of critical facilities:

Utah State Office of Education (USOE) Rule R277-455 Standards and Procedures for building plan review

R277-455-4 Criteria for Approval; to receive approval of a proposed building site, the local school district must certify that:

Staff of the Utah Geologic Survey have reviewed and recommended approval of the geologic hazards report provided by the school districts geo-technical consultant.

**Division of Water Resources**
The Divisions role of planning, funding and constructing water projects serves as both active and passive hazard mitigation against drought and flood situations throughout the state. The various State water plans contain brief summaries of flood threat and risk for each drainages.

The Division is one of seven agencies in the State Department of Natural Resources. The eight member Water Resources Board, appointed by the governor, administers three state water conservation and development funds. These include:

- Revolving Construction fund – This fund started in 1947 with 1 million legislative appropriation to help construct irrigation projects, wells and rural culinary water systems. Further appropriations have added to this fund.
- Conservation and Development Fund – This fund was created in 1978 wit the sale of 25 million in general obligations bonds. Money was added to this fund with bond sales in 1980 and 1983. The C & D Fund generally helps sponsors finance larger multi-purpose dams and water systems.
- Cities Water Loan Fund – Established with an initial legislative appropriation of 2 million dollars in 1974, and with continued appropriations, this fund provides financing to help construct new culinary water projects for cities, towns, improvement districts, and special service districts.

Construction Funds
In addition to overseeing these three construction funds, the Division also manages the State funds appropriated each year for renovation and reconstruction of unsafe dams. As the funding arm of the state for water resource projects the Division works closely with Water Rights, the Regulatory arm of the state charged with jurisdiction over all private and state owned dams.

Water Resource Planning
The Division is also charged with the general water resource planning for the state. The State Water Plan is a process that is coordinated to evaluate existing water resources in the state, determine water-related issues that should be confronted and recommend how and by whom issues can be resolved. The plan identifies programs and practices of state and federal

agencies, water user groups and environmental interests and describes the state's current, future, and long-term water related needs. The plan is continually updated using current hydrologic databases, river basin simulations, water supply and demand models and water related land use inventories. Revisions reflect the latest water conservation and development options concerning water rights, water transfers, population, zoning, and many other complex issues for the next 50 years in the state's major river basins.

**Utah Division of Forestry, Fire, and State Lands**

The Division of Forestry, Fire & State Lands utilizes the principles of stewardship and ecosystem management to assist non-federal landowners in management of their natural resources. The agency provides wildland fire protection for non-federal landowners commensurate with risk; and optimizes the benefits from ecosystem based, multiple-use management of resources held in the public trust. Wildfires are managed from six area offices 1) Bear River Office, 2) Northeast Area, 3)Wasatch Front Area, 4) Central Area, 5) Southwest Area, and 5) Southeast Area. The Division operates under the authority of the Utah Code Annotated 65-A-3-1 though 10.

<u>The Flame-n-Go's (pronounced Flamingoes)</u>

In 1978 the Division of Forestry, Fire, and State Lands and the Utah State Prison signed a cooperative agreement establishing Utah's first volunteer, inmate wildland fire hand-crew. The inmates named themselves the "Flame-N-Go's" and designed a logo that has become well known in the wildland fire fighting community.

All Flame-N-Go's are carefully screened for the program. They must complete rigorous training and sign a yearly contract committing themselves to preserving Utah's natural resources and building responsible lives.

The Flame-N-Go's are divided into three crews, each of which can respond to fires anywhere in the United States. A twenty-man type II hand line crew is the backbone of the group, responding to each assignment with all tools and equipment needed to do battle on the fire line. An Engine Strike Team, (five fire engines, outfitted with men and equipment) is ready to respond when needed as an Engine Strike Team or a Type II Hand line Crew. The Hotshot crew is trained to tackle the most dangerous fires in the most rugged terrain. All crews during peak fire season are on 24-hour call to respond within an hour's notice. These crews respond to an average of 50 fires per year and typically spend 45,000 hours fighting fires each season. At least one Division of Forestry, Fire, and State Lands supervisor and two Department of Corrections staff accompany each crew.

Each year, Flame-N-Go's are put through at least 80 hours of extensive training including classroom work and practical field exercises. Safety, individual, and team skills, and professionalism are stressed.

National Fire Plan
The Division administers the State responsibilities of the National fire Plan, a current emphasis of the U.S. Congress, which also addresses hazard and risk analysis and hazard mitigation.

Living With Fire Committee
The Division works in partnership with the U.S. Forest Service, Bureau of Land Management, and various other entities tasked with suppressing wildland fires on the "Living With Fire" program promoting wildland fire mitigation.

**Utah Division of State Parks and Recreation**
The goal of the Division of Parks and Recreation is to enhance the quality of life for residents and visitors of our state through parks, people, and programs. They are responsible for protecting, preserving, and managing many of Utah's natural and heritage resources.

Hazard and Risk Analyses
The Division develops hazard and risk analyses for the State Parks as part of the park resource management plans. The Utah Division of Emergency Services and Homeland Security produced one analysis for Snow Canyon State Park in Washington County.

Non-Motorized Trail Program
The Recreational Trails Act of 1991 charged Utah State Parks and Recreation with coordinating the development of a statewide network of non-motorized trails. The Non-Motorized Trail program makes state and federal funds available on a 50/50 matching basis to any federal, state, or local government agency, or special improvement district for the planning, acquisition, and development of recreational trails.

Grants from State Parks Boards
The council advises the Division of Parks and Recreation on non-motorized trail matters, reviews requests for matching grant fiscal assistance, rates and ranks proposed trail projects and along with State Park's staff provides recommendations for funding to the State Parks Board.

Riverway Enhancement Program
In 1986, the Utah Legislature passed a bill, which established the Riverway Enhancement Program. The program makes state funds available on a 50/50 matching basis to state agencies, counties, cities, towns, and/or special improvement districts for property acquisition and/or development for

recreation, flood control, conservation, and wildlife management, along rivers and streams that are impacted by high density populations or are prone to flooding. Public outdoor recreation should be the primary focus of the project.

**Utah Division of Water Rights**

The Division of Water Rights is the state agency that regulated appropriation and distribution of water in the State of Utah. It is an office of public record. The Utah State Engineer's Office was created in 1897. The State Engineer's Office is the chief water rights administrative officer. A complete "water code" was enacted in 1903 and was revised and reenacted in 1919. This law, with succeeding complete reenactments of State statutes, and as amended, is presently in force mostly as *Utah Code, Title 73*. In 1963, the name was changed from State Engineers office to the Division of Water Rights.

All water in Utah are public property. A water right is a right to the use of water based upon 1) quantity, 2) source, 3) priority date, 4) nature of use, 5) point of diversion, and 6) physically putting water to beneficial use.

Regulate Dams

The State engineer has the authority to regulate dams for the purpose of protecting public safety. Dams are classified according to hazard, size, and use. The dam inventory gives the identification, location, construction parameters, and the operation and maintenance history of the dams in Utah.

Stream Alterations Program

The Utah State Engineer's Office administers a Stream alterations program with the purpose of regulation activities affecting the bed or banks or natural streams. The State Engineer's working definition of a natural stream is any natural waterway in the state, which has flows of sufficient duration to develop a characteristic ecosystem distinguishing it from the surrounding environments. Any individual planning an activity that will affect a natural stream must first obtain a Stream Alterations Permit from this office.

Most proposals reviewed by the State, are covered by General Permit 40, which authorizes the state to have its Stream Alteration Permit fulfill the requirements of Section 404 of the Clean Water Act for most activities. General permit 40 does not apply in some instances and a U.S. Army Corps of Engineers Individual Permit is required. Projects requiring this additional permit include those involving wetlands, threatened or endangered species, properties listed on the National Historic Register, stream relocation, or the pushing of streambed material against a stream bank.

Dam Safety Program

The Dam Safety Section of the Division of Water Rights was established under Chapters 73-5a 101 thru 73-5a 702 including chapters 73-2-22 for Flood Control and the Chapter 63-30-10 Waiver of Immunity of the Utah Code

and Rules R655-10 thru R655-12-6A. The program basically has jurisdiction over all private and state owned dams in the state during design, construction, operation, and decommissioning. This involved periodic inspections according to hazard classifications, inventory maintenance, design, and construction approval and systematic upgrade of all the high hazard structures to current dam safety Minimum Standards and creation of Emergency Action Plans for High Hazard dams. Since 1991, detailed dam reviews have been undertaken by the staff and by private consulting firms. Since 1995, the State Legislature has provided 3-4 million dollars per year to finance 50 % of the instrumentation, investigations, and design and 80 to 90 % of the construction costs of retrofitting and upgrading deficient dams, starting with the worst dams in the most hazardous locations.

The impetus for this dam safety program has been in reaction to dam failures, both in Utah and in other states, including the Teton Dam in Idaho and the Trial Lake Dam in Summit County and the Quail Creek Dam near St. George Utah. Since the establishment of our Minimum Standards program we have fostered the repair of dozens of dams and have not had a catastrophic failure since.

Future recommendations include continuation of the funding for dam upgrades for all the high hazard dams, and then the moderate hazard dams, continued annual inspections for maintenance items and dangerous deficiencies, upgrading EAP, and hazard assessment to reflect downstream development. Inclusion of the scanned design drawings and inundation maps from the EAP studies is being considered for our web page for public information and emergency access. Possible expansion of the program to cover canals and dikes has been considered.

**Utah Division of Wildlife Resources**

It is the mission of the Utah Division of Wildlife Resources to serve people of Utah as trustee and guardian of the State's wildlife. Regulates hunting, fishing and trapping, and promotes recreational, educational, scientific and aesthetic enjoyment of wildlife.

Wildlife Habitats and Hazards

Wildlife species and/or their habitats are frequently exposed to hazards. These may be either natural or human influenced (i.e. drought, flood, fire, wind, snow, wetland drainage, water diversions, hazardous material spills, improper/illegal chemical use, earthquake, and other land or water construction/development). Impact resulting either directly or indirectly, from individuals or an accumulation of several hazards, may cause but not be limited to: decreased water supply, stream/lake channel/basin morphology change, riparian/upland vegetation loss or degradation, and impairment of water quality. These in turn have a varying influence, in the extreme causing death or at a minimum temporary stress, on wildlife populations and their

habitats. Hazards mentioned may affect a fairly large geographic area or be very localized in nature.

While the Division of Wildlife Resources (DNR) is charged with the management of wildlife, they do not have regulatory authority over water appropriations, water quality, development, or land management; except as allowed or occurring on properties they own. Therefore, when hazards occur, outside DWR property, DWR is limited to be a participating influence only through comments to the other regulatory agencies or individuals.

DWR management of wildlife is carried out largely through regulation of taking controlling, disturbance and/or possession of wildlife, and introduction of movement of species. However, there are numerous non-regulatory means (i.e. conservation agreements, memorandum of understanding, contract, lease agreements, cooperative agreements, and technical assistance) by which DWR interacts with other agencies, groups and individuals, to have an influence on wildlife and/or their habitat.

Hazard Areas of Commentary Interaction

While not being able to control/regulate many of the elements necessary for the benefit of wildlife; DWR provides technical comments for the maintenance, protection, and enhancement of wildlife and/or habitats for various value reasons. It is too extensive list all the areas of comment; however, the following are examples of fairly frequent concern:

- Steam Channel Alteration Permit Applications
- Water Rights Filings
- Energy and Mineral Exploration and Extraction Applications
- Federal Agency land management plans
- Waste Water Discharge Permit Applications
- Hydroelectric plant licensing or regimenting
- Urban and rural development project planning
- Utility transmission line style and locations
- Wetland alteration
- Federal land management planning
- Highway constructions

**The Utah Division of Drinking Water**

Division of Drinking Water's Mission Statement is to " protect the public against waterborne heath risks through assistance, educations, and oversight". The Division acts as the administrative arm of the Utah Drinking Water Board. It implements the rules, which they adopt. As such, it is engaged in a variety of activities related to the design and operation of Utah's public drinking water system. The Utah Drinking Water Board is an 11-person board appointed by the Governor. It is empowered by Title 19, Chapter 4 of the Utah Code to adopt rules

governing the design, operations, and maintenance of Utah's "public drinking water system".

Safe Drinking Water Act
There is a Federal Safe Drinking Water Act, which applies to all public drinking water systems in the country. The U.S. Environmental Protection Agency (EPA) has given Utah "primacy" for enforcing the federal act within its boundaries. To qualify for this Utah's laws and rules governing public drinking water systems must be at least as strict as the federal law.

Sanitary Surveys
The Division performs sanitary surveys on the water systems, which is a compliance action that identifies system deficiencies.

Emergency Response Plans
The Division of Drinking Water requires water utilities to prepare emergency response plans under the State Safe Drinking Water Act, Utah Code Section 19-4. The Division operates according to DDW Rules: R309 gives them authority to administer actions: R309-301 through R309-104 and R309-113, R309-150, R309-301, and R309-211.

**Utah Division of Solid and Hazardous Waste**
The Tier II Chemical Inventory report, required by the Federal Emergency Planning and community Right-to-Know Act, requires facilities to submit lists of hazardous chemicals present on site. These reports are computerized and the information is provided to local emergency planning committees, the general public, and others for contingency planning purposes. To implement the Federal law, the State operates under Utah State Code, Section 63-5-5. The Division of Solid and Hazardous Waste requires that hazardous waste treatment storage and disposal facilities prepare and emergency response plan as required by regulations authorized by the State Solid and Hazardous Waste Act, Utah Code Section 19-6.

Other Agency programs are regulatory in nature requiring proper use or disposal of hazardous substances or pollutants. For example the Division of Solid and Hazardous Waste regulates the disposal of hazardous waste, the Division of Radiation Control regulates the proper usage and disposal of radioactive materials. As such there is a threat mitigation nature to these programs.

**Utah Division of Water Quality**
The Utah Division of Water Quality protects, maintains, and enhances the quality of Utah's surface and underground water for appropriate beneficial uses; the Division of Water Quality regulates discharge of pollutants into surface water, and protects the public health through eliminating and preventing water related health hazards which can occur as a result of improper disposal of human,

animal, or industrial wastes while giving reasonable consideration to the economic impact.

Water Quality Fund and Wastewater Treatment Project Fund: The Division Manages the Water Quality Revolving Fund that can be used by local governments for water quality projects and a Wastewater Treatment Project Fund.

Abating Watershed Pollution: Federal and State regulations charge the Division with “preventing, controlling, and abating” watershed pollution. Other state and local agencies have similar responsibilities. The Watershed Approach forms partnerships with these groups to pool resources and increase the effectiveness of existing programs. For each watershed management unit, a watershed plan will be prepared. The watershed plan addresses management actions at several spatial scales ranging from those that encompass a watershed management unit to specific sites that are tailored to specific environmental conditions. Ground water hydrologic basins and eco-region areas encompassed within the units will also be delineated.

State Revolving Fund Program

In 1987, Congress replaced the Construction Grants Program, with the State Revolving Fund Program. Rather than provide direct grants to communities, the federal government provides each state with a series of grants, then each state contributes a 20 percent state match. Grants from the federal government are combined with state funds in the Water Quality Project Assistance Program (WQPAP) and are used to capitalize a perpetual source of funds to finance water quality construction control activities at below market interests rates. Projects eligible for WQPAP financing include such traditional activities as construction of wastewater treatment plants and sewers. The program also will finance non-traditional water quality-related activities such as agricultural runoff control, landfill closures, contaminated industrial property (Brownfield) remediation, stream bank restoration, and wellhead protection.

LOCAL

Local governments depend upon local property taxes as their primary source of revenue. These taxes are typically used to finance services that must be available and delivered on a routine and regular basis to the general public. If local budgets allow, these funds are used to match Federal or State grant programs when required for large-scale projects.

NON-GOVERNMENTAL

Another potential source of revenue for implementing local mitigation projects are monetary contributions from non-governmental organizations, such as private

sector companies, churches, charities, community relief funds, the Red Cross, hospitals, Land Trusts and other non-profit organizations.

Paramount to having a plan deemed to be valid is its implementation. There is currently no new fiscal note attached to the implementation of this Plan.

**Continued Public Involvement**

Throughout the planning process, public involvement has been and will be critical to the development of the Plan and its updates. On a yearly basis the plan will be profiled at Uintah Basin's Annual Open House, which is held in the fall of every year. There are typically 250-300 local citizens who attend the Open House. The plan will also be available on the UBAOG website to provide additional opportunities for public participation and comment.

Uintah Basin Association of Governments staff has been designated by its Executive Council as the lead agency in preparing and submitting the Uintah Basin Pre-Disaster Hazard Mitigation Plan, which includes coverage for all incorporated cities and counties within the three county region, of Daggett, Duchesne, and Uintah. The strategy of the Association of Governments in preparing the plan is to use available resources and manpower in the most efficient and cost effective manner to allow our cities and counties continued access to data, technical planning assistance and FEMA eligibility. In addition, the AOG will reach out to non-profits, public agencies, special needs organizations, groups and individuals in allowing them input and access to the plan. With limited resources, however, it becomes difficult to both identify and to individually contact the broad range of potential clients that may stand to benefit from the plan. This being the case, we have established the following course of action:

STEP 1. The AOG will publicly advertise all hearings, requests for input and meetings directly related to the Pre-Disaster Hazard Mitigation Plan process. Executive Council meetings where plan items are discussed and where actions are taken will not receive special notifications as they are already advertised according to set standards. All interested parties are welcome and invited to attend such meetings and hearings, as they are public and open to all. Advertisement will be done according to the pattern set in previous years, i.e. the AOG will advertise each hearing and request for input at least seven days (7) in advance of the activity and will publish notices of the event in the Uintah Basin Standard. The notices will advertise both the hearing and the means of providing input outside the hearing if an interested person is unable to attend.

STEP 2. The AOG has established a mailing list of many local agencies and individuals that may have an interest in the Pre-Disaster Hazard Mitigation Plan. Each identified agency or person will be mailed a notice of the hearings and open houses.

STEP 3. Comments, both oral and written, will be solicited and accepted from any interested party. Comments, as far as possible, will be included in the final draft of the Hazard Mitigation Plan; however, the AOG reserves the right to limit comments that are excessively long due to the size of the Plan.

STEP 4. Specific to risk assessment and hazard mitigation, needs analysis, and capital investment strategies, the AOG will make initial contact and solicitation for input from each incorporated jurisdiction within the region. All input is voluntary. Staff time and resources do not allow personal contact with other agencies or groups, however, comments and strategies are welcomed as input to the planning process from any party via regular mail, FAX, e-mail, phone call, etc. In addition, every public jurisdiction advertises and conducts public hearings on their planning, budget, etc. where most of these mitigation projects are initiated. Input can be received from these prime sources by the region as well.

STEP 5. The final draft of the Hazard Mitigation Plan will be presented to the Uintah Basin Executive Council at its regularly scheduled monthly meeting for adoption and approval to submit the document to State authorities. Executive Council policies on adoption or approval of items will be in force and adhered to. This document is intended to be flexible and in constant change so comments can be taken at any time of the year for consideration and inclusion in the next update. Additionally, after FEMA approval of the Plan, the Plan will be promulgated for each local jurisdiction for adoption by resolution.

STEP 6. The following policies will guide AOG staff in making access and input to the Hazard Mitigation Plan as open and convenient as possible:

**A. Participation:** All citizens of the region are encouraged to participate in the planning process, especially those who may reside within identified hazard areas. The AOG will take whatever actions possible to accommodate special needs of individuals including the impaired, non-English speaking, persons of limited mobility, etc.

**B. Access to Meetings:** Adequate and timely notification to all area residents will be given as outlined above to all hearings, forums, and meetings.

**C. Access to Information:** Citizens, public jurisdictions, agencies and other interested parties will have the opportunity to receive information and submit comments on any aspect of the Hazard Mitigation Plan, and/or any other documents prepared for distribution by the Association of Governments that may be adopted as part of the plan by reference. The AOG may charge a nominal fee for printing of documents that are longer than three pages.

**D. Technical Assistance:** Residents as well as local jurisdictions may request assistance in accessing the program and interpretation of mitigation projects. AOG staff will assist to the extent practical, however, limited staff time and resources may prohibit staff from giving all the assistance requested. The AOG will be the sole determiner of the amount of assistance given all requests.

**E. Public Hearings:** The AOG will plan and hold public hearings according to the following priorities: 1- Hearings will be conveniently timed for people who might benefit most from Mitigation programs, 2- Hearings will be accessible to people with disabilities (accommodations must be requested in advance according to previously established policy), and 3- Hearings will be adequately publicized. Hearings may be held for a number of purposes or functions including to: a-identify and profile hazards, b-develop mitigation strategies, and c-review plan goals, performance, and future plans.

**F. Comment Period:** The AOG will sponsor a 30-day public comment period prior to final plan submission. The comment period will begin with a public hearing to open the 30-day solicitation of input. Comments may be made orally, or in writing, and as far as possible, will be included in the final Pre-Disaster Hazard Mitigation Plan according to the outlined participation rules.

References:

Utah State Water Plan Uintah Basin._ Utah Division of Water Resources, December 1999.

# Hazard Definitions

## Flooding

Flooding is a temporary overflow of water onto lands not normally inundated by water producing measurable property damage or forcing evacuation of people and vital resources. Floods frequently cause loss of life; property damage and destruction; damage and disruption of communications, transportation, electric service, and community services; crop and livestock damage and loss, and interruption of business. Floods also increase the likelihood of hazard such as transportation accidents, contamination of water supplies, and health risk increase after a flooding event.

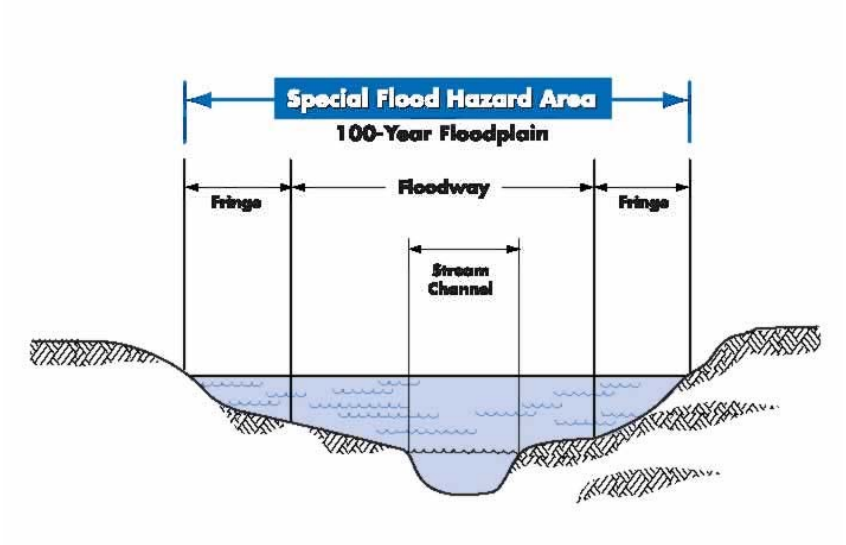
Several factors determine the severity of floods including rainfall intensity, duration and rapid snowmelt. A large amount of rainfall over a short time span can result in flash flood conditions. Small amounts of rain can also result in flooding at locations where the soil has been previously saturated or if rain concentrates in an area having, impermeable surfaces such as large parking lots, paved roadways, or post burned areas with hydrophobic soils. Topography and ground cover are also contributing factors for floods. Water runoff is greater in areas with steep slopes and little or no vegetative ground cover.

Frequency of inundation depends on the climate, soil, and channel slope. In regions where substantial precipitation occurs during a particular season or in regions where annual flooding is due to spring melting of winter snow pack, areas at risk may be inundated nearly every year.

**Conditions which my exacerbate floods:**
Impermeable surfaces
Steeply sloped watersheds
Constrictions
Obstructions
Debris
Contamination
Soil saturation
Velocity

**Explanation of Common Flood Terms**

**FIRM:** Flood Insurance Rate Map




**100-year flood:** Applies to an area that has a 1 percent chance, on average, of flooding in any given year. However, a 100-year flood could occur two years in a row, or once every 10 years. The 100 year-flood is also referred to as the base flood.

**Base Flood:** Is the standard that has been adopted for the NFIP. It is a national standard that represents a compromise between minor floods and the greatest flood likely to occur in a given area and provides a useful benchmark.

**Base Flood Elevation (BFE):** As shown on the FIRM, is the elevation of the water surface resulting from a flood that has a 1% chance of occurring in any given year. The BFE is the height of the base flood, usually in feet, in relation to the National Geodetic Vertical Datum (NGVD) or 1929, the North American Vertical Datum (NAVD) of 1988, or other datum referenced in the FIS report.

**Special Flood Hazard Area (SFHA):** Is the shaded area on a FIRM that identifies an area that has a 1% chance of being flooded in any given year (100-year floodplain).

**Floodway:** Is the stream channel and that portion of the adjacent floodplain that must remain open to permit passage of the base flood without raising that water surface elevation by more than one foot.

## Earthquakes

An earthquake is the abrupt shaking of the earth caused by the sudden breaking of rocks when they can no longer withstand the stresses, which build up deep beneath the earth's surface. The rocks tend to rupture along weak zones referred to as faults. When rocks break they produce seismic waves that are transmitted through the rock outward producing ground shaking. Earthquakes are unique multi-hazard events, with the potential to cause huge amounts of

damage and loss. Secondary effects of a sudden release of seismic energy (earthquake) include: ground shaking, surface fault rupture, liquefaction, tectonic subsidence, slope failure, and various types of flooding.

**The Intermountain Seismic Belt**

The Intermountain Seismic Belt (ISB), is a zone of pronounced earthquake activity up to 120 miles wide extending in a north south direction 800 miles from Montana to northern Arizona. The Utah portion of the ISB trends from the Tremonton Cache Valley area south through the center of the state, along the Wasatch Front, and the southwest through Richfield and Cedar City concluding in St. George. "The zone generally coincides with the boundary between the Basin and Range physiographic province to the west and the Middle Rocky Mountains and Colorado Plateau physiographic provinces to the east" (Eldredge 6).

**Secondary Earthquake Threats**

The major secondary effects of earthquakes include: ground shaking, surface fault rupture, liquefaction, tectonic subsidence, avalanches, rock fall, slope failure, and various types of flooding. Other sections discuss landslides, and flooding therefore they will not be discussed under secondary effects of earthquakes yet importance needs to be given to the fact that earthquakes can increase the likelihood of flooding and landslides.

**Ground Shaking**

Ground shaking causes the most impact during an earthquake because it affects large areas and is the origin of many secondary effects associated with earthquakes. Ground shaking, which generally lasts 10 to 30 seconds in large earthquakes, is caused by the passage of seismic waves generated by earthquakes. Earthquake waves vary in both frequency and amplitude. High frequency low amplitude waves cause more damage to short stiff structures, where as low frequency high amplitude waves have a greater effect on tall (high-rise) structures. Ground shaking is measured using Peak Ground Acceleration (PGA). The PGA measures the rate in change of motion relative to the established rate of acceleration due to gravity.

Local geologic conditions such as depth of sediment and sediment make up, affect earthquake waves. Deep valley sediments increase the frequency of seismic waves relative to bedrock. In general, ground shaking increases with increased thickness of sediments" (Eldredge 8). Findings in recent geologic research done by Ivan Wong indicate that earthquakes in Salt Lake County would produce higher PGA values than previously expected near faults and areas of near surface bedrock.

**Surface Fault Rupture**

During a large earthquake fault movement may propagate along a fault plain to the surface, resulting in surface rupture along the fault plain. The Wasatch fault is a normal (mountain building) fault with regards to movement, meaning the footwall of the fault moves upward and the hanging wall moves in a down direction. Thus faulting is on a vertical plain, which results in the formation of large fault scarps. Surface fault rupture along the Wasatch fault is expected for earthquakes with magnitudes of 6.5 or larger. The largest probable earthquake that could strike the Uintah Basin region is an earthquake with an estimated magnitude between 7.0 and 7.5; an earthquake of this magnitude, based on current research, would create "surface fault rupture with a displacement of between 16 to 20 feet in height with break segments 12 to 44 miles long" (Eldredge 10). In historic time surface fault rupture has only occurred once in Utah; the 1934 Hansel Valley earthquake with a magnitude 6.6 produced 1.6 feet of vertical offset.

Surface fault rupture presents several hazards, anything built on top of the fault or crossing the fault has a high potential of destroyed in the event of displacement. Foundations will be cracked, building torn apart, damage to roads, utility lines, pipelines, or any other utility line crossing the fault. It is almost impossible to design anything within reasonable cost parameters to withstand an estimated displacement of 16 to 20 feet.

Picture 1.1 Displacement in excavation near Rose Wagner Performing Arts Center.

Surface fault rupture doesn't occur on a single distinct plain; instead it occurs over a zone often several hundred feet wide known as the zone of deformation. This zone of deformation occurs mainly on the down thrown side of the main fault trace. Tectonic subsidence, caused by antithetic faults moving in the opposite direction of the main fault, slide down hill on the main fault scarp creating grabens (down dropped blocks) within the zone of deformation.

**Liquefaction**

Soil liquefaction occurs when water-saturated cohesion less sandy soils is subject to ground shaking. When liquefaction occurs soils behave more like a viscous liquid (quicksand) and lose they're bearing capacity and shear strength. Two conditions must be met in order for soils to liquefy: (1) the soils must be susceptible to liquefaction (sandy, loose, water-saturated, soils typically between 0 and 30 feet below the ground surface) (2) ground shaking must be strong

enough to cause susceptible soils to liquefy (lips). The loss of shear strength and bearing capacity due to liquefaction causes buildings to settle or tip and light buoyant structures such as buried storage tanks and empty swimming pools to float upward. Liquefaction can occur during earthquakes of magnitude 5.0 or greater.

**Lateral Spread**
Soils, once liquefied, can flow on slopes with angles of .5 to 5 percent this movement of liquefied soils is known as lateral spread. "The surficial soil layers break up and sections move independently, and are displaced laterally over a liquefied layer" (Eldredge 10). Liquefaction can cause damage in several ways, with lateral spreading being one of the most common. Displacement of three (3) or more feet may occur and be accompanied by ground cracking and vertical displacement. Lateral spreading causes roads, buildings, buried utilities, and any other buried or surface structure to be pulled apart.

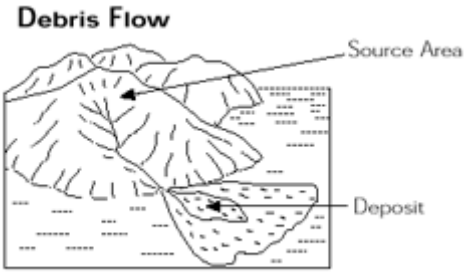
**Various Flooding Issues Related to Earthquakes**
Earthquakes could cause flooding due to the tilting of the valley floor, dam failure and seiches in lakes and reservoirs. Flooding can also result from the disruption of rivers and streams. Water tanks, pipelines, and aqueducts may be ruptured, or canals and streams altered by ground shaking, surface faulting, ground tilting, and land sliding.

**Seiches**
Standing bodies of water are susceptible to earthquake ground motion. Water in lakes and reservoirs may be set in motion and slosh from one end to the other, much like in a bathtub. This motion is called a seiche (pronounced “saysh”). A seiche may lead to dam failure or damage along shorelines.

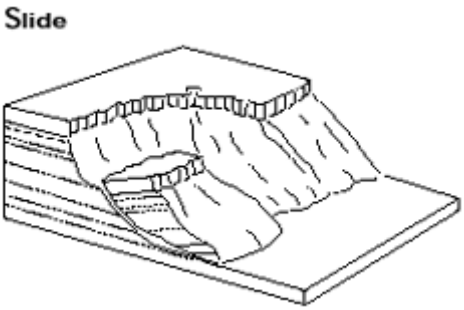
## Landslides

Landslides are a “down slope movement of a mass of rock, earth, or debris”. Landslides, often referred to as mass wasting or slope failures, are one of the most common natural disasters. (Cruden 36). Slope failures can vary considerably in shape, rate of movement, extent, and effect on surrounding areas. Slope failures are classified by there types of movement, and types of material. The types of movement are classified as falls, slides, topples, and flows. “The types of material include rock, debris (coarse grained soil) and earth (fine grained soil)” (Eldredge 17). “Types of slope failures then are identified as rock falls, rock slides, debris flows, debris slides, and so on” (Eldredge 17). Slope failures occur because of either an increase in the driving forces (weight of slope and slope gradient) or a decrease in the resisting forces (friction, or the strength of the material making up a slope). “Geology (rock type and structure), topography (slope gradient), water content, vegetative cover, and slope aspect are important factors of slope stability” (Eldredge 18).

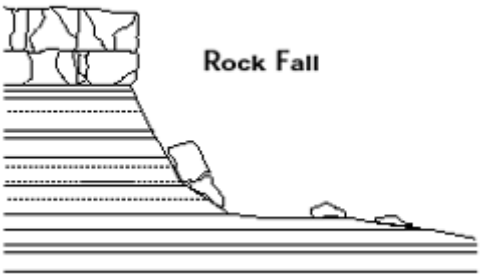
## Three Common Types of Landslides in Utah




Debris flows consist of sediment-water mixtures that flow down a streambed or hillside, commonly depositing sediment at canyon mouths in fan like deposits know as alluvial fans.




Slides are down slope movements of soil or rock on slopes.




Rock falls consist of rock(s) falling from a cliff or cut slope and are very common in the canyon country of southern Utah.

## Conditions That Make Slopes More Susceptible to Landslides

- Discontinuities: faults, joints, bedding surfaces.
- Massive Materials over soft materials.
- Orientations of dip slope: bedding plans that dip out of slope.
- Loose structure and roundness.
- Adding weight to the head of a slide area: rain, snow, landslides, mine waste piles, buildings, leaks from pipes, sewers, and canals, construction materials fill materials.
- Ground shaking: earthquakes or vibrations.
- Increase in lateral spread caused by mechanical weathering.
- Removal of lateral support.
- Human activities: cut and fill practices, quarries, mine pits, road cuts, lowering of reservoirs.
- Removing underlying support: under cutting of banks in a river.

- Increase in pore water pressure: snow melt, rain, and irrigation.
- Loss of cohesion.

## Wildfire

### Identifying Hazards

A wildfire is an uncontrolled fire spreading through vegetative fuel often exposing or consuming structures. Wildfires often begin unnoticed and spread quickly and are usually sighted by dense smoke. Wildfires are placed into two classifications Wildland and Urban-Wildland Interface. Wildland fires are those occurring in an area where development is essentially nonexistent, except for roads, railroads, or power lines. Urban-Wildland Interface fire is a wildfire in a geographical area where structures and other human development meet or intermingle with wildland or vegetative fuels. URWIN areas are divided into three subclasses.

- **Occluded**
  Occluded interface, are areas of wildlands within an urban area for example a park bordered by urban development such as homes.

- **Intermixed**
  Mixed or intermixed interface areas contain structures scattered throughout rural areas covered predominately by native flammable vegetation.

- **Classic**
  Classic interface areas are those areas where homes press against wildland vegetation along a broad front.

When discussing wildfires it is important to remember that fires are part of a natural process and are needed to maintain a healthy ecosystem. Three basic elements are needed for a fire to occur (1) a heat source (2) oxygen and (3) fuel. Major ignition sources for wildfire are lightning and human causes such as arson, recreational activities, burning debris, and carelessness with fireworks. On average, 65 percent of all wild fires started in Utah can be attributed to human activities. Once a wildfire has started, vegetation, topography and weather are all conditions having an affect wildfire behavior.

## Severe Weather

For the purpose of this mitigation plan the term severe weather is used to represent downbursts, lightening, heavy snowstorms, blizzards, avalanches, hail, and tornados.

**Downbursts**
A downburst is a severe localized wind, blasting from a thunderstorm. Depending on the size and location of these events, the destruction to property may be devastating. Downbursts fall into two categories by size. Microbursts, which cover and area less than 2.5 miles in diameter, and macrobursts, which cover an area with a diameter larger 2.5 miles.

**Lightening**
During the development of a thunderstorm, the rapidly rising air within the cloud, combined with the movement of the precipitation within the cloud, causes electrical charges to build. Generally, positive charges build up near the top of the cloud, while negative charges build up near the bottom. Normally, the earth's surface has a slight negative charge. However, as the negative charges build up near the base of the cloud, the ground beneath the cloud and the area surrounding the cloud becomes positively charged. As the cloud moves, these induced positive charges on the ground follow the cloud like a shadow. Lightening is a giant spark of electricity that occurs between the positive and negative charges within the atmosphere or between the atmosphere and the ground. In the initial stages of development, air acts as an insulator between the positive and negative charges. When the potential between the positive and negative charges becomes to great, there is a discharge of electricity that we know as lightning.

**Heavy Snowstorms**
A severe winter storm deposits four or more inches of snow during a 12-hour period or six inches of snow during a 24-hour period. According to the official definition given by the U.S. Weather Service, the winds must exceed 35 miles per hour and the temperature must drop to 20° F or lower. All winter storms make driving extremely dangerous.

**Blizzards**
A blizzard is a snowstorm with sustained winds of 40 miles per hour (mph) or more or gusting winds up to at least 50 mph with heavy falling or blowing snow, persisting for one hour or more, temperatures of ten degrees Fahrenheit or colder and potentially life-threatening travel conditions. The definition includes the conditions under which dry snow, which has previously fallen, is whipped into the air and creates a diminution of visual range.

**Avalanches**
Avalanches are a rapid down-slope movement of snow, ice, and debris. Snow avalanches are a significant mountain hazard in Utah, and nationally account for more deaths each year than earthquakes. Avalanches are the result of snow accumulation on a step slope and can be triggered by ground shaking, sound, or a person. Avalanches consist of a starting zone, a track, and a run-out zone. The starting zone is where the ice or snow breaks loose and starts to slide. The Track

is the grade or channel down which an avalanche travels. The run-out zone is where an avalanche stops and deposits the snow.

The two main factors affecting avalanche activity include weather and terrain, large frequent storms combined with steep slopes result in avalanche danger. Additional factors that contributing to slope stability are amount of snow, rate of accumulation, moisture content, snow crystal types and the wind speed and direction. In Utah, the months of January through April have the highest avalanche risk.

Topography plays a vital role avalanche dynamics. Slope angles between 30 to 45 degrees are optimum for avalanches with 38 degrees being the bulls-eye. Slopes with and angle above 45 degrees continually sluff eliminating large accumulation. The risk of avalanches decreases on slope angles below 30 degrees.

**Types of Avalanches Common in Utah:**

**Dry or slab avalanches:** occur when a cohesive slab of snow fractures as a unit and slides on top of weaker snow, breaking apart as it slides. Slab avalanches occur when additional weight is added quickly to the snow pack, overloading a buried weaker layer. Dry snow avalanches usually travel between 60-80 miles per hour, reaching this speed within 5 seconds of the fracture, resulting in the deadliest form of snow avalanche.

**Wet avalanches:** occur when percolating water dissolves the bonds between the snow grains in a pre-existing snow pack, this decrease the strength of the buried weak layer. Strong sun or warm temperatures can melt the snow and create wet avalanches. Wet avalanches usually travel about 20 miles per hour.

**Hail Storms**

Hailstones are large pieces of ice that fall from powerful thunderstorms. Hail forms when strong updrafts within the convection cell of a cumulonimbus cloud carries water droplets upward causing them to freeze. Once the droplet freezes, it collides with other liquid droplets that freeze on contact. These rise and fall cycles continue until the hailstone becomes too heavy and falls from the cloud.

**Tornados**

A tornado is a violently rotating column of air extending from a thunderstorm to the ground. Tornados often occur at the edge of an updraft or within the air coming down from a thunderstorm. Tornadoes can have wind speeds of 250 miles per hour or more, causing a damage zone of 50 miles in length and 1 mile wide. Most tornados have winds less than 112 miles per hour and zones of damage less than 100 feet wide

**Waterspout**
Waterspouts are simply tornadoes that form over warm water. This typically occurs in Utah during a cold fall or late winter storms.

**Scale**
Tornadoes are classified by wind damage using the Fujita Scale. The National Weather Service has used the Fujita Scale since 1973. This scale uses numbers from 0 through 5 with higher numbers assigned based on the amount and type of wind damage.

**Fujita Scale**

| | | |
|---|---|---|
| Category F0 | Gale tornado (40-72 mph) | Light damage. Some damage to chimneys; break branches off trees; push over shallow-rooted trees; damage to sign boards. |
| Category F1 | Moderate tornado (73-112 mph) | Moderate damage. The lowers limit is the beginning of hurricane wind speed; peel surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off roads. |
| Category F2 | Significant tornado (113-157 mph) | Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light-object missiles generated. |
| Category F3 | Severe tornado (158-206 mph) | Severe damage. Roofs and some walls torn off well constructed houses; trains overturned; most trees in forest uprooted; cars lifted off ground and thrown. |
| Category F4 | Devastating tornado (207-260 mph) | Devastating damage. Well-constructed houses leveled; structure with weak foundation blown off some distance; cars thrown and large missiles generated. |
| Category F5 | Incredible tornado (261-318 mph) | Incredible damage. Strong frame houses lifted off foundations and carried considerable distance to disintegrate; automobiles-size missiles fly through the air in excess of 100 yards; trees debarked; incredible phenomena will occur. |

## Drought

Drought is a normal recurrent feature of climate, although many, in Utah, erroneously consider it a rare and random event. It occurs in virtually all-climatic zones, while its characteristics vary significantly from one region to another. Droughts, simple put, are cumulative hazards, which result from long periods of below normal precipitation. Drought is a temporary aberration and differs from aridity since the latter is restricted to low rainfall regions and is a permanent feature of climate.

The State or Utah, uses the Palmer Drought Severity Index or (PDSI) to quantify the existence of a drought. Using the PDSI, drought is expressed as a negative number. Much of the basis, used by the State, to determine drought years, or drought periods, comes from the PDSI. In addition, the PDSI is used by the State Climatologist, the National Geophysical Data Center of NOAA, and the National Drought Mitigation Center.

For the most part droughts no longer affect the availability of drinking water, thus it no longer places peoples lives at risk, and the same cannot be said for a individual's livelihood. Numerous water projects throughout the state have placed enough water in storage to insure drinking water. Prolonged droughts have a significant affect on agricultural and agribusinesses, within the state dependent on irrigation water. Droughts also stress wildlife, and heighten the risk of wildfire.

## Dam Failure

Dam failures result from the failure of a man made water impoundment structure, which often results in catastrophic down grade flooding. Dam failures are caused by one or a combination of the following: "breach from flooding or overtopping, ground shaking from earthquakes, settlement from liquefaction, slope failure, internal erosion from piping, failure of foundations and abutments, outlet leaks or failures, vegetation and rodents, poor construction, lack of maintenance and repair, misuse, improper operation, terrorism, or a combination of any of these" (Eldredge 46). The Utah State Engineer has been charged with regulating non-federal dams in the State dams since 1919. "In the late 1970's Utah started its own Dam Safety Section within the State of Utah Engineers Office to administer all non-federal dams in response to the Federal Dam Safety Act (PL-92-367)" (Eldredge 46).

The State Dam Safety Section has developed a hazard rating system for all non-federal dams in Utah. Downstream uses, the size, height, volume, and incremental risk/damage assessments or dams are all variables used to assign dam hazard ratings in Dam Safety's classification system. Using the hazard ratings systems developed by the Dam Safety Section, dams are placed into one of three classifications high, moderate, and low. Dams receiving a low rating would have insignificant property loss do to dam failure. Moderate hazard dams

would cause significant property loss in the event of a breach. High hazard dams would cause a possible loss of life in the event of a rupture. The frequency of dam inspection is designated based on hazard rating with the Division of Water Rights inspecting high-hazard dams annually, moderate hazard dams biannually, and low-hazard dams every five years.

## Problem Soils

Problem soils and rock constitute a widespread geologic hazard in Utah, covering approximately 18 to 20 percent of the state, and underlie many urbanized areas. The nine types of problem soil and rock in Utah are:

- Expansive Soil
- Collapsible Soil
- Limestone and Karst Terrain
- Gypsiferous Soil
- Soil Subject to Piping
- Dunes
- Peat
- Mine Subsidence
- Sodium Sulfate

### Expansive Soil and Rock

Clay minerals found in soils and rock expand and contract due to changes in moisture content. The most common clay mineral associated with expansive soils in Utah is montmorillonite, “which expands up to 2,000 times its original size, and can exert pressures up to 11,000 pounds per square foot” (Eldredge 30). The cracks created by the expansion and contraction process create a positive feed back mechanism that allows more water to enter during the next storm cycle. Problems associated with expansive materials are cracked foundations, heaving and cracking of road surfaces, failure of wastewater disposal systems, and broken water lines.

### Collapsible Soil

Collapsible soil causes ground-surface subsidence when loose, dry, low density deposits decrease in volume when saturated for the first time since deposition. Frequently the water introduced into these soils is from human sources such as irrigation, water impoundment, lawn watering, and alterations to natural drainages, and/or wastewater disposal.

### Limestone and Karst Terrain

Closed depressions, caverns, and streams that abruptly disappear underground are characteristics of karst terrain. Limestone, dolomite, and gypsum are all common in the Six County region and susceptible to dissolution by ground water and surface water thus forming karst terrain. Karst features affect surface and

subsurface drainage causing a collapse of the ground surface and often the contamination of ground water. The cavernous nature of the terrain allows surface or subsurface sources of pollution from landfills, waste water disposal systems, and buried gasoline tanks to enter the groundwater system.

**Gypsiferous Soil**
Gypsum is a primary component in some rocks, and the soils derived from them. Gypsiferous deposits, when wetted, are subject to settlement, causing sinkholes similar to those found in karst terrains. Weathered gypsum forms sulfuric acid and sulphate, which reacts with certain types of cement often weakening foundations. Gypsum is also a week material with a low bonding strength.

**Piping**
Piping is a type of subsurface erosion caused by ground water moving along a permeable layer in unconsolidated materials and exiting at a free face, which intersects the unconsolidated layer. The movement of underground water removes fine-grained particles (silts and clay) creating subsurface voids, which act like channels directing the movement of water. These channels increase in size, as more and more water is collected, until the walls and roof can no longer support the weight and collapse. Over time this process forms a gully, which further concentrates erosion.

**Dunes**
Dunes form when sand derived from weathered rock or an unconsolidated deposit is blown by the wind into mounds or ridges. Migrating dunes can bury roads, and structures, clog waste and storm water systems, and cause contamination of local ground water.

In Utah, three types of material commonly form dunes: silica, gypsum, and oolites.

**Silica Dunes** comprised mainly of silica, are typically found along the western side mountain ranges in western Utah.

**Gypsum Dunes** are principally derived from the evaporation of playas and are found in Great Salt Lake Desert and along the lee side of many playas in the basins west of Delta.

**Oolitic Dunes** are composed of calcium carbonate, which is generally precipitated around brine shrimp fecal pellets. Oolitic dunes form in shallow water areas of the Great Salt Lake and are reworked by wind during low water lake cycles.

Many inactive or vegetated dunes in Utah are being reactivated by development and motorized recreation. Once dunes are denuded of there vegetation they begin to migrate once again.

**Mine Subsidence**
Utah has a long history of mining and there are numerous mines within Utah. Mining removes rock and leaves voids that, if not supported, can collapse and cause subsidence of the ground surface and sinkholes. Subsidence can occur in both active and abandoned mines.

**Peat**
Peat consists of partially decomposed plant remains. Peat usually accumulated in areas of shallow ground water and near standing water where oxygen depletion limits organic decay. Hazards associated with peat can include subsidence when water is removed, oxidations, and compression and settlement under. Peat deposits are considered a localized hazard occurring primarily along the shores of the Great Salt Lake, Utah Lake, and low lying areas formerly occupied by Lake Bonneville. Mountainous areas commonly have localized small areas of peat, forming in head scarps created by landslides and behind glacial moraines. (Eldredge 33)

**Sodium Sulfate**
Sodium Sulfate is derived from the evaporation of playas and for the weathering of bedrock. “Soils with high concentrations of water-soluble sulfates exhibit an expansive phenomenon resembling that of expansive clays and frost heave.” (Eldredge 33)

**Critical Facilities**
**Duchesne County**

| Name or Description Of Asset | Sources Of Information | Critical Facility | Vulnerable Populations | Hazardous Material | Infrastructure | Economic Assets | Special Considerations | Historic/Other Considerations | Size of Building (sq. ft. | Replacement Value (Estimated) | Contents Value * |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Critical Facilities** | | | | | | | | | | | |
| Altamont Fire Dept | AGRC | X | | | | | | | | | |
| Duchesne Fire Dept | AGRC | X | | | | | | | | | |
| Ft. Duchesne Fire Dept | AGRC | X | | | | | | | | | |
| Fruitland Fire Dept | AGRC | X | | | | | | | | | |
| South Myton Fire Dept | AGRC | X | | | | | | | | | |
| Tabiona Fire Dept | AGRC | X | | | | | | | | | |
| Duchesne County Sheriff | AGRC | X | | | | | | | | | |
| Roosevelt Police Dept | AGRC | X | | | | | | | | | |
| Uintah Basin Medical Center | AGRC | X | X | | | X | X | | | | |
| Roosevelt Fire Dept. | AGRC | X | | | | | | | | | |
| Neola Fire Dept. | AGRC | X | | | | | | | | | |
| **Care Facilities** | | | | | | | | | | | |
| Stewarts Care Center | AGRC | X | X | | | | X | | | | |
| **Schools** | | | | | | | | | | | |
| East School Duchesne | AGRC | | X | | | | X | | | | |
| Duchesne District Office | AGRC | | X | | | | X | | | | |
| Altamont School | AGRC | | X | | | | X | | | | |
| Altamont High School | AGRC | | X | | | | X | | | | |
| Duchesne High School | AGRC | | X | | | | X | | | | |
| Duchesne School | AGRC | | X | | | | X | | | | |
| Ioka School | AGRC | | X | | | | X | | | | |
| Myton School | AGRC | | X | | | | X | | | | |
| Neola School | AGRC | | X | | | | X | | | | |
| Union High School | AGRC | | X | | | | X | | | | |
| Roosevelt Middle School | AGRC | | X | | | | X | | | | |
| Tabiona School | AGRC | | X | | | | X | | | | |
| Con Amore Train Ctr | AGRC | | X | | | | X | | | | |
| **Hazardous Material Storage Sites** | | | | | | | | | | | |
| Chevron Pipe Line Myton Station | RCRA | | | | | | X | | | | |
| Duchesne City Corp | RCRA | | | | | | X | | | | |
| Chevron Pipe Line Altamont Station | RCRA | | | | | | X | | | | |

| Name or Description Of Asset | Sources Of Information | Critical Facility | Vulnerable Populations | Hazardous Material | Infrastructure | Economic Assets | Special Considerations | Historic/Other Considerations | Size of Building (sq. ft. | Replacement Value (Estimated) | Contents Value * |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Chevron Pipe Line Hanna Station | RCRA | | | | | | X | | | | |
| Chevron Pipe Line Bluebell Station | RCRA | | | | | | X | | | | |
| Pennzoil Company (Seagull) | RCRA | | | | | | X | | | | |
| Moon Lake Electric | RCRA | | | | | | X | | | | |
| NL Baroid Roosevelt Service Center | RCRA | | | | | | X | | | | |
| Altamont Gas Plant | RCRA | | | | | | X | | | | |
| Petro-Way INC #1 | RCRA | | | | | | X | | | | |
| Desert Drain Oil | RCRA | | | | | | X | | | | |
| National Oilwell | RCRA | | | | | | X | | | | |
| Atkinson Storage Altamont | RCRA | | | | | | X | | | | |
| Rocket Sanitation | RCRA | | | | | | X | | | | |
| Koch Hydrocarbon Cedar Rim | RCRA | | | | | | X | | | | |
| Koch Services | RCRA | | | | | | X | | | | |
| Chevron USA Inc Duchesne Terminal | RCRA | | | | | | X | | | | |
| MI Drilling Fluids | RCRA | | | | | | X | | | | |
| GWEC Altonah Gas Plant | RCRA | | | | | | X | | | | |
| Darryl B Taylor Transportation | RCRA | | | | | | X | | | | |
| US Forest Service Stockmore Ranger station | RCRA | | | | | | X | | | | |
| Bluebell Recovery | RCRA | | | | | | X | | | | |
| **Power Substations** | | | | | | | | | | | |
| Moon Lake Plant | AGRC | X | | | X | | X | | | | |
| Pole Creek Plant | AGRC | X | | | X | | X | | | | |
| Roosevelt | AGRC | X | | | X | | X | | | | |
| Duchesene | AGRC | X | | | X | | X | | | | |
| Pleasant Valley Moon Lake REA | AGRC | X | | | X | | X | | | | |
| Upalco | AGRC | X | | | X | | X | | | | |
| Tabiona Chevron Pipeline Sub | AGRC | X | | | X | | X | | | | |
| Myton | AGRC | X | | | X | | X | | | | |
| Pariette | AGRC | X | | | X | | X | | | | |
| | | | | | | | | | | | |
| **Companies Employing Greater than 50 People** | | | | | | | | | | | |
| Flying J Outfitters | AGRC | | | | | X | X | | | | |
| Uintah Basin Medical Ctr | AGRC | | | | | X | X | | | | |
| Utah State University | AGRC | | | | | X | X | | | | |

| Name or Description Of Asset | Sources Of Information | Critical Facility | Vulnerable Populations | Hazardous Material | Infrastructure | Economic Assets | Special Considerations | Historic/Other Considerations | Size of Building (sq. ft | Replacement Value (Estimated) | Contents Value * |
|---|---|---|---|---|---|---|---|---|---|---|---|
| UBET Wireless | AGRC | | | | | X | X | | | | |
| IGA Foodliner | AGRC | | | | | X | X | | | | |
| Darryl Taylor Transportation | AGRC | | | | | X | X | | | | |
| Sand Star Family Entertainment | AGRC | | | | | X | X | | | | |
| Uintah Basin Medical Clinic | AGRC | | | | | X | X | | | | |
| Stewart's Care & Rehab | AGRC | | | | | X | X | | | | |
| Inland Production Co | AGRC | | | | | X | X | | | | |
| UBTA Network & Internet SVC | AGRC | | | | | X | X | | | | |
| Duchesne School District | AGRC | | | | | X | X | | | | |
| Uintah Basin Applied Tech Ctr | AGRC | | | | | X | X | | | | |
| Inland Production | AGRC | | | | | X | X | | | | |
| Frontier Motel | AGRC | | | | | X | X | | | | |
| Duchesne County Sheriff | AGRC | | | | | X | X | | | | |
| Uinatah Basin Telephone | AGRC | | | | | X | X | | | | |
| Stewart's Thriftway | AGRC | | | | | X | X | | | | |
| Moon Lake Electric Assn Inc | AGRC | | | | | X | X | | | | |
| Davis Jubilee IGA | AGRC | | | | | X | X | | | | |
| Burdick Paving Corp | AGRC | | | | | X | X | | | | |
| Basin Western Inc | AGRC | | | | | X | X | | | | |

**Daggett County**

| Name or Description Of Asset | Sources Of Information | Critical Facility | Vulnerable Populations | Hazardous Material | Infrastructure | Economic Assets | Special Considerations | Historic/Other Considerations | Size of Building (sq. ft. | Replacement Value (Estimated) | Contents Value * |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Critical Facilities** | | | | | | | | | | | |
| Daggett County Medical Center | AGRC | X | X | | | X | X | | | | |
| Daggett County Fire Department | AGRC | X | | | | | | | | | |
| Manila Fire Department | AGRC | X | | | | | | | | | |
| Dagget Administration Building | AGRC | X | | | | | | | | | |
| Daggett County Sheriff Dep. | AGRC | X | | | | | | | | | |
| **Schools** | | | | | | | | | | | |
| Daggett County School District | AGRC | | X | | | | X | | | | |

| Name or Description Of Asset | Sources Of Information | Critical Facility | Vulnerable Populations | Hazardous Material | Infrastructure | Economic Assets | Special Considerations | Historic/Other Considerations | Size of Building (sq. ft | Replacement Value (Estimated) | Contents Value * |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Manila High School | AGRC | | X | | | | X | | | | |
| **Hazardous Materials Storage Sites** | | | | | | | | | | | |
| US Forest Service Lucerne Valley | RCRA | | | X | | | X | | | | |
| US Bureau of Rec. Flaming Gorge Dam | RCRA | | | X | | | X | | | | |
| **Power Substations** | | | | | | | | | | | |
| Flaming Gorge | AGRC | X | | | X | | X | | | | |
| USBR Flaming Gorge Plant | AGRC | X | | | X | | X | | | | |
| **Companies Employing Greater Than 25 People** | | | | | | | | | | | |
| Daggett County Health Dept. | AGRC | | | | | X | X | | | | |
| US Post Office | AGRC | | | | | X | X | | | | |
| US Forest Service Ranger Station | AGRC | | | | | X | X | | | | |
| US Bureau of Reclamation | AGRC | | | | | X | X | | | | |
| Daggett County Jail | AGRC | | | | | X | X | | | | |
| Uintah Basin Public Health Dept | AGRC | | | | | X | X | | | | |
| Utah State University | AGRC | | | | | X | X | | | | |

**Uintah County**

| Name or Description Of Asset | Sources Of Information | Critical Facility | Vulnerable Populations | Hazardous Material | Infrastructure | Economic Assets | Special Considerations | Historic/Other Considerations | Size of Building (sq. ft. | Replacement Value (Estimated) | Contents Value * |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Critical Facilities** | | | | | | | | | | | |
| Uintah County Admin Building | AGRC | X | | | | | | | | | |
| Avalon Fire Dept. | AGRC | X | | | | | | | | | |
| Jensen Fire Dept. | AGRC | X | | | | | | | | | |
| Vernal Fire Dept. | AGRC | X | | | | | | | | | |
| Ute Indian Tribe | AGRC | X | | | | | | | | | |
| Lapoint Fire Dept | AGRC | X | | | | | | | | | |
| Naples Fire Dept | AGRC | X | | | | | | | | | |
| Randlett Fire Dept | AGRC | X | | | | | | | | | |
| Vernal Fire Dept | AGRC | X | | | | | | | | | |

| Name or Description Of Asset | Sources Of Information | Critical Facility | Vulnerable Populations | Hazardous Material | Infrastructure | Economic Assets | Special Considerations | Historic/Other Considerations | Size of Building (sq. ft | Replacement Value (Estimated) | Contents Value * |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ashley Valley Medical Center | AGRC | X | X | | | X | X | | | | |
| Ft. Duchesne Fire Department | AGRC | X | | | | | | | | | |
| Vernal City Police Dept | AGRC | X | | | | | | | | | |
| BIA Police | AGRC | X | | | | | | | | | |
| Naples City Police Dept | AGRC | X | | | | | | | | | |
| Uintah County Sheriff's Dept | AGRC | X | | | | | | | | | |
| Health Dept | AGRC | X | X | | | X | X | | | | |
| **Care Facilities** | | | | | | | | | | | |
| Vernal Care Center | AGRC | X | X | | | | X | | | | |
| Beehive Homes of Vernal | AGRC | X | X | | | | X | | | | |
| **Schools** | | | | | | | | | | | |
| Ft. Duchesne School | AGRC | | X | | | | X | | | | |
| Lapoint School | AGRC | | X | | | | X | | | | |
| Uintah County School Dist | AGRC | | X | | | | X | | | | |
| Vernal School | AGRC | | X | | | | X | | | | |
| Ute Indian Tribe School | AGRC | | X | | | | X | | | | |
| Utah State University Branch | AGRC | | | | | X | X | | | | |
| Applied Technology Center | AGRC | | | | | | X | | | | |
| **Hazardous Material Storage Sites** | | | | | | | | | | | |
| Vernal Avenue TCE Plume | RCRA | | | | | | X | | | | |
| American Gilsonite | RCRA | | | | | | X | | | | |
| Great Lake Timber Company | RCRA | | | | | | X | | | | |
| Ouray Utah Haz Waste Site | RCRA | | | | | | X | | | | |
| Murray's Disposal Service | RCRA | | | | | | X | | | | |
| US EPA Abandoned Waste Response | RCRA | | | | | | X | | | | |
| BIA Uintah & Ouray Agency | RCRA | | | | | | X | | | | |
| AMF Tuboscope | RCRA | | | | | | X | | | | |
| Dowell | RCRA | | | | | | X | | | | |
| Industrial Mechanisms | RCRA | | | | | | X | | | | |
| Chevron Resources | RCRA | | | | | | X | | | | |
| Wheeler Machinery | RCRA | | | | | | X | | | | |
| Schlumberger Well Services | RCRA | | | | | | X | | | | |
| Western Company | RCRA | | | | | | X | | | | |
| Dowell Schlumberger Inc | RCRA | | | | | | X | | | | |
| Nowcam Services | RCRA | | | | | | X | | | | |
| Baker Oil Tools | RCRA | | | | | | X | | | | |
| J & Sons Drum Cleaners | RCRA | | | | | | X | | | | |

| Name or Description Of Asset | Sources Of Information | Critical Facility | Vulnerable Populations | Hazardous Material | Infrastructure | Economic Assets | Special Considerations | Historic/Other Considerations | Size of Building (sq. ft | Replacement Value (Estimated) | Contents Value * |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Westrock Warehouse | RCRA | | | | | | X | | | | |
| PAMCO | RCRA | | | | | | X | | | | |
| Halliburton | RCRA | | | | | | X | | | | |
| Oil Field Rental | RCRA | | | | | | X | | | | |
| H and H Bico Rental | RCRA | | | | | | X | | | | |
| Chevron Service Station #73272 | RCRA | | | | | | X | | | | |
| NATCO | RCRA | | | | | | X | | | | |
| Weatherford US | RCRA | | | | | | X | | | | |
| Smith Detroit Allison | RCRA | | | | | | X | | | | |
| Questar Pipeline | RCRA | | | | | | X | | | | |
| West Hazmat Trucking | RCRA | | | | | | X | | | | |
| NL Petroleum Service | RCRA | | | | | | X | | | | |
| AZ Grant International | RCRA | | | | | | X | | | | |
| Miller Packers Inc. | RCRA | | | | | | X | | | | |
| Pacificorp | RCRA | | | | | | X | | | | |
| Perry Motors Company | RCRA | | | | | | X | | | | |
| West End Laundromat | RCRA | | | | | | X | | | | |
| USFS Vernal Ranger District | RCRA | | | | | | X | | | | |
| Crop Air Inc | RCRA | | | | | | X | | | | |
| Colorado Interstate Gas | RCRA | | | | | | X | | | | |
| Bowen Tools Inc | RCRA | | | | | | X | | | | |
| Paraho Commercial Shale Oil | RCRA | | | | | | X | | | | |
| Pipe Renewal Service | RCRA | | | | | | X | | | | |
| Natural Gas Pipeline Co | RCRA | | | | | | X | | | | |
| Northwest Pipeline | RCRA | | | | | | X | | | | |
| **Power Substations and Plants** | | | | | | | | | | | |
| La Point Generating Station | AGRC | X | | | X | | | | | | |
| USBR Vernal | AGRC | X | | | X | | | | | | |
| Bonanza | AGRC | X | | | X | | | | | | |
| Ashley | AGRC | X | | | X | | | | | | |
| Naples | AGRC | X | | | X | | | | | | |
| Maeser | AGRC | X | | | X | | | | | | |
| Chevron Resources | AGRC | X | | | X | | | | | | |
| **Companies Employing Greater than 50 People** | | | | | | | | | | | |
| Ashley Valley Medical Ctr | AGRC | | | | | X | | | | | |
| Wal-Mart Discount | AGRC | | | | | X | | | | | |
| JC Penny Co | AGRC | | | | | X | | | | | |
| S F Phosphates | AGRC | | | | | X | | | | | |

| Name or Description Of Asset | Sources Of Information | Critical Facility | Vulnerable Populations | Hazardous Material | Infrastructure | Economic Assets | Special Considerations | Historic/Other Considerations | Size of Building (sq. ft | Replacement Value (Estimated) | Contents Value * |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Halliburton Energy | AGRC | | | | | X | | | | | |
| Smith's Food & Drug | AGRC | | | | | X | | | | | |
| J West | AGRC | | | | | X | | | | | |
| Deseret Generation Co-op | AGRC | | | | | X | | | | | |
| J West Oil Field | AGRC | | | | | X | | | | | |
| J West Transportation | AGRC | | | | | X | | | | | |
| Uintah Care Ctr | AGRC | | | | | X | | | | | |
| Colorado Outward Bound | AGRC | | | | | X | | | | | |
| Uintah School District | AGRC | | | | | X | | | | | |
| Bureau of Land Management | AGRC | | | | | X | | | | | |
| White Pine Ear Nose & Throat | AGRC | | | | | X | | | | | |
| Ute Head Start Program | AGRC | | | | | X | | | | | |
| Gold Cross Ambulance Svc | AGRC | | | | | X | | | | | |
| Davis Jubilee IGA | AGRC | | | | | X | | | | | |
| American Gilsonite | AGRC | | | | | X | | | | | |
| Ute Plaza Supermarket | AGRC | | | | | X | | | | | |
| Christensen's Departments Store | AGRC | | | | | X | | | | | |
| BJ Services Co | AGRC | | | | | X | | | | | |
| K Mart Discount Stores | AGRC | | | | | X | | | | | |
| Target Trucking Inc. | AGRC | | | | | X | | | | | |
| Bob's Big Boy Restaurant | AGRC | | | | | X | | | | | |
| LDS Church | AGRC | | | | | X | | | | | |

RCRA - Hazardous Waste Sites in Utah, locations were determined from addresses furnished by the Utah Department of Environmental Quality.

AGRC – State Automated Geographic Reference Center, houses GIS data for the state of Utah.

## Environmental Considerations

Natural disasters are naturally occurring phenomena. They play an integral part in maintaining balance in our world. Meteorological, geological, or hydrological processes have shaped Utah for millions of years and will continue to shape the valley for millions more years. These unique phenomena only cause disasters when they affect humans and their structure. Modern engineering has made it possible to prevent damage from natural hazards, however the economic and environmental costs can be rather high. Tampering with the natural systems also can create an imbalance in the natural environment. The effects of many of these imbalances are still unknown. It is better to live will a small amount of risk, respect the natural process where appropriate, than to construct mitigation at every chance. Nature provides it's own mitigation measures that need to be identified, protected and/or strengthened. To ensure that our environment is not harmed through mitigation measures all applicable city codes; county codes, state and federal laws pertaining to the environment must be followed. The majority of the proposed mitigation programs in this plan will be funded through federal programs, thus tied to federal funding.

"44 CFR 10.8(d)(2)(iii) excludes this rule from the preparation of an environmental assessment or environmental impact statement, where the rule relates to actions that qualify for categorical exclusions under 44 CFR 10.8(d)(2)(iii), such as the development of plans under this section" (44 Code).

The following acts will be taken into consideration and will be incorporated when needed while organizing and implementing the PDM plan; Clean Air Act, Clean Water Act, Endangered Species Act, Floodplain Management, National Historic Preservation Act.

**Clean Air Act (CAA) 1970:** The Clean Air Act is the comprehensive Federal Law that covers the entire country under the Environmental Policy Act (EPA) regulating air emissions from area, stationary, and mobile sources. This law sets limits or National Ambient Air Quality Standards (NAAQS) on how much of a pollutant can be in the air anywhere in the United States, this controls the emissions of air pollutants. These limits ensure that all Americans have the same basic health and environmental protections. Maximum pollutant standards were set and states may have stronger pollution controls on an individual basis, but not weaker pollution controls than those set for the whole country. Each state explains how it will do its job under the Clean Air Act by developing a mandated "state implementation plan" (SIP) that has to be approved by EPA. The 1977 amendment was to set new dates for areas of the country that failed to meet the initial deadlines for achieving NAAQS. The 1990 amendments addressed problems such as acid rain, ground-level ozone, stratospheric ozone depletion, and air toxics. This act required that facilities with large amounts of certain hazardous chemicals to have special emergency planning requirement. Based

on a facilities potential threat or risk from chemical spills, fires, explosions, etc. a Risk Management Plan (RMP) is prepared that includes hazard identification, assessments, design and maintenance of a safe facility, necessary steps to prevent releases and ways to minimize the consequences from an accidental release (Clean Air).

**Clean Water Act (CWA):** The Federal Water Pollution Control Act Amendments of 1972 came about because of the growing awareness for controlling water pollution. As amended in 1977, this law became known as the Clean Water Act whose mission is to establish the basic structure for regulating discharges of pollutants into the waters of the United States, and to reduce and maintain the chemical, biological, and physical veracity. The act gave the Environmental Policy Act (EPA) the authority to set wastewater standards for industry. The act also required that each state adopt water quality standards, act to protect wetlands, and limit industrial and municipal discharges into navigable waters unless permitted. It funded the construction of wastewater treatment plants for nearly every city in the United States, under construction grant programs from the EPA and recognized the need for planning for future problems that posed a threat from nonpoint source pollution (Clean Water).

**Clean Water Act, Section 404-Wetland Preservation:** This act regulates activities in wetland areas and authorizes EPA to restrict or prohibit the use of an area as a disposal site for dredged or fill material if the discharge will have unacceptable adverse affects on municipal water supplies, shellfish beds and fishery areas, wildlife and/ or recreational areas. A permit must be issued that is based on regulatory guidelines developed in coincidence with the U.S. Army Corps of Engineers and the EPA (CWA Sec. 404).

**Endangered Species Act of 1973:** This act provides a plan for the protection of threatened and endangered plants and animals and the habitats in which they are found. Congress finds and declares that various species of fish, wildlife, and plants in the United States have been caused to become extinct, or are so depleted in numbers they are in danger of becoming extinct, as a result of economic development and expansion without adequate concern for conservation. Aesthetic, ecological, educational, historical, recreational, and scientific importance come from these species and are a value to our nation and its people. The U.S. will conserve, to a practicable extent, the species that face extinction and will encourage the States through federal assistance to develop and maintain conservation programs. The reason for the Act is to provide a means in which ecosystems with endangered and threatened species will be conserved. It is also declared that all state and local agencies resolve water resource issues in connections with conservation of endangered species (Endangered).

**Floodplain Management Policy:** The main points of the policy are to reduce the loss of life and property and the disruption of societal and economic pursuits

caused by flooding or facility operations as well as to restore, sustain, and enhance the natural resources, ecosystems, and other functions of the floodplains. Activities will search for a balance between the, sometimes competing, uses of floodplains in a way that makes the most benefit to society. To pursue and encourage appropriate use of floodplains and to avoid long and short term negative impacts associated with the inhabitants and modification of floodplains and to avoid direct and indirect support of floodplain development, whenever there is a practicable alternative. **"**Functions (Natural) of floodplains include natural moderation of floods; fish, wildlife, and plant resources and habitat; groundwater recharge; and water quality maintenance. Uses of floodplains include storm water management; erosion control; open space; natural beauty, opportunity for scientific study, outdoor education, recreation, and cultural preservation; and compatible economic utilization of floodplain resources by human society" (Floodplain, Reclamation).

**National Historic Preservation Act of 1966:** This act was found and declared by Congress because "the spirit and direction of the Nation are founded upon and reflected in its historic heritage…the historical and cultural foundations of the Nation should be preserved as a living part of our community life and development in order to give a sense of orientation to the American people." Some of the other main points of the act include the awareness of historic properties that are being lost or substantially altered. The preservation will continue a legacy of cultural, educational, aesthetic, inspirational, economic, and energy benefits for future generations. The knowledge of historic resources and "the encouragement of their preservations will improve the planning and execution of Federal and federally assisted projects and will assist economic growth and development. The act would like to use measures that will foster conditions in which historic resources can exist in productive harmony with present and future generations (National).

Section 106 of NHPA "requires all Federal agencies to take into account the effects of their actions on historic properties, and provide ACHP with a reasonable opportunity to comment on those actions and the manner in which Federal agencies are taking historic properties into account in their decisions" beginning at the early stages of planning to mitigate any adverse effects on historic properties (Section 106).

The Richter Magnitude Scale

The Richter Magnitude Scale

Seismic waves are the vibrations from earthquakes that travel through the earth; they are recorded on instruments called seismographs. Seismographs record a zig-zag trace that shows the varying amplitude of ground oscillations beneath the instrument. Sensitive seismographs, which greatly magnify these ground motions, can detect strong earthquakes from sources anywhere in the world. The time, locations, and magnitude of an earthquake can be determined from the data recorded by seismograph stations.

The Richter magnitude scale was developed in 1953 by Charles F. Richter of the California Institute of Technology as a mathematical device to compare the size of earthquakes. The magnitude of an earthquake is determined from the logarithm of the amplitude of waves recorded by seismographs. Adjustments are included for the variation in the distance between the various seismographs and the epicenter of the earthquake. On the Richter scale, magnitude is expressed in the whole numbers and decimal fractions. For example, a magnitude 5.3 might be computed for a moderate earthquake, and a strong earthquake might be rated as magnitude 6.3. Because of the logarithmic basis of the scale, each whole number increase in magnitude represents a tenfold increase in measured amplitude; as an estimate of energy, each whole number step in the magnitude scale corresponds to the release of about 31 times more energy that the amount associated with the preceding whole number value.

At first, the Richter Scale could be applied only to the records from instruments of identical manufacture. Now, instruments are carefully calibrated with respect to each other. Thus, magnitude can be computed from the record or any calibrated seismograph.

Earthquakes with magnitude of about 2.0 or less are usually called micro earthquakes; they are not commonly felt by people and are generally recorded only on local seismographs. Events with magnitudes of about 4.5 or greater are strong enough to be recorded by sensitive seismographs all over the world. Great earthquakes such as the 1964 Good Friday earthquake in Alaska have magnitudes of 8.0 or higher.
*Description of Richter Scale from USGS Earthquake Hazards Program*

Modified Mercalli Intensity and PGA Equivalents

| MMI | Acceleration (%g) PGA | Perceived Shaking | Potential Damage |
|---|---|---|---|
| I | <0.17 | Not Felt | None |
| II | 0.17-1.4 | Weak | None |
| III | 0.17-1.4 | Weak | None |
| IV | 1.4-3.9 | Light | None |
| V | 3.9-9.2 | Moderate | Very Light |
| VI | 9.2-18 | Strong | Light |
| VII | 18-34 | Very Strong | Moderate |
| VIII | 34-65 | Severe | Moderate to Heavy |
| IX | 65-124 | Violent | Heavy |
| X | >124 | Extreme | Very Heavy |
| XI | >124 | Extreme | Very Heavy |
| XII | >124 | Extreme | Very Heavy |

Table expressing relationship of peak horizontal ground acceleration (PGA) to Modified Mercalli Intensity (MMI) adapted after (Wald et al., 1999).

The map shows the national Peak Ground Acceleration (PGA) values for the United States with a 10% chance of being exceeded over 50 years. This is a common earthquake measurement that shows three things: the geographic area affected (all colored areas on the map), the probability of an earthquake of each given level of severity (10% chance in 50 years), and the severity (the PGA is indicated by color). ***2. Locate your planning area on the map.***

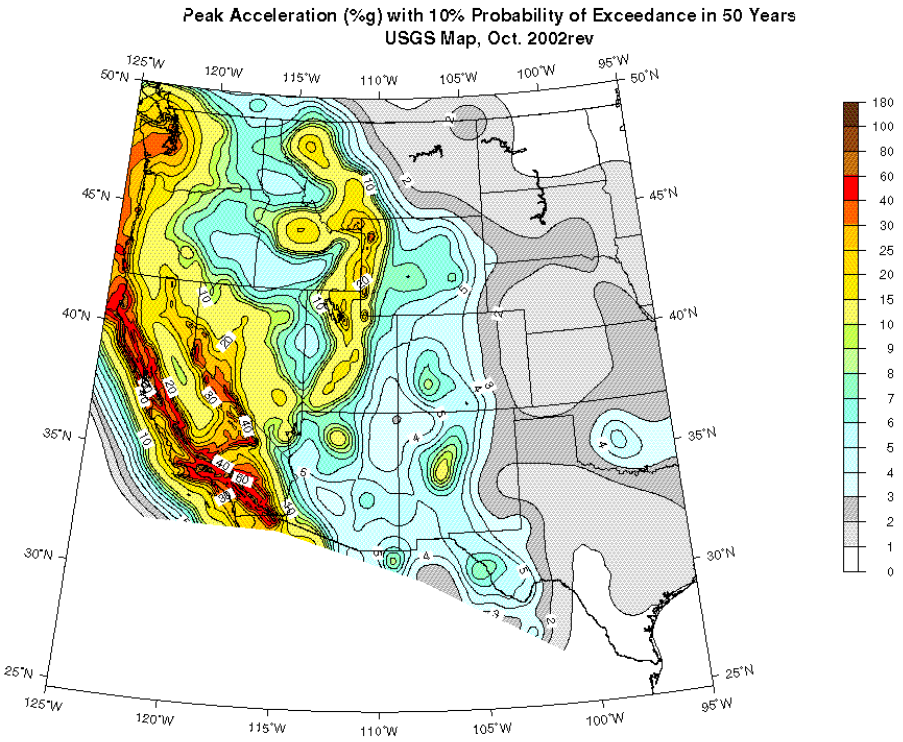
You can also generate maps based on zip codes or longitude and latitude by following the directions on the Website. ***3. Determine your Peak Ground Acceleration.***
Determine the PGA zone(s) in which your planning area is located. This is done by identifying the color associated with your planning area and correlating it with the color key located on the map. Large planning areas may be located in more than one zone.

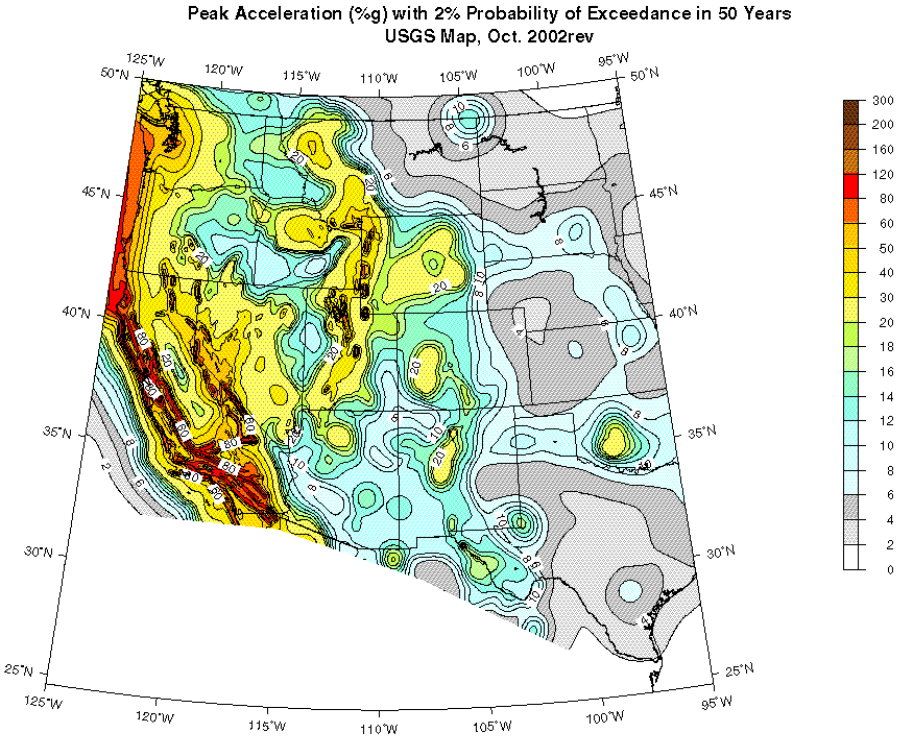
Peak Ground Acceleration (PGA) is a measure of the strength of ground movements. The PGA measures the rate in change of motion relative to the established rate of acceleration due to gravity (g) (980 cm/sec/sec). For example, In an earthquake with an acceleration of the ground surface of 244 cm/sec/sec, the PGA or rate in change of motion is 25% g where:

%g= Ground Surface Acceleration/ Rate of Acceleration due to Gravity

%g= 244 cm/sec/sec/980 cm/sec/sec

%g= 25%


Peak Acceleration (%g) with 10% Probability of Exceedance in 50 Years
USGS Map, Oct. 2002rev
125°W
120°W
115°W
110°W
105°W
100°W
95°W
50°N
45°N
40°N
35°N
30°N
25°N
180
100
80
60
40
30
25
20
15
10
9
8
7
6
5
4
3
2
1
0


Peak Acceleration (%g) with 2% Probability of Exceedance in 50 Years
USGS Map, Oct. 2002rev
125°W
120°W
115°W
110°W
105°W
100°W
95°W
50°N
45°N
40°N
35°N
30°N
25°N
300
200
160
120
80
60
50
40
30
20
18
16
14
12
10
8
6
4
2
0

## Building Code Effectiveness Grading Report

The Building Code Effectiveness Grading Report was implemented in 1995 to evaluate current building codes in a particular community and determine how well the community enforces its building codes. This program assigns each municipality a grade of 1 to 10 with one showing excellent commitment to building code enforcement. Insurance Services Office Inc, developed and uses the rating classifications 1-3, 4-7, 8-9, 10. Insurance Services Office Inc. gives insurers BCEGS classifications, BCEGS advisory Credits, and related underwriting information. The concept of the Building Code Effectiveness Grading Reports (BCEGS) is for those communities with effective, well-enforced building codes. These communities should sustain less damage in the event of a natural disaster, and insurance rates can reflect that. The prospect of lessening natural hazard related damage and ultimately lowering insurance costs provides an incentive for communities to enforce their building codes rigorously. In addition, FEMA uses these scores to give higher credits in competitive grant programs to those communities with lower scores.

| **Building Code Effectiveness Grading Report** | | | |
|---|---|---|---|
| **City** | **County** | **BCEGS Res/Com** | **Date** |
| Uintah CO | Uintah | 4/4 | 2003 |
| Vernal | Uintah | 2/2 | 2001 |
| Manila | Daggett | 4/4 | 2003 |
| Duchesne | Duchesne | Unclassified | 1999 |
| Duchesne CO | Duchesne | Unclassified/3 | 2003 |
| Roosevelt | Duchesne | Unclassifed/5 | 2001 |

Explanation of FEMA Hazard Profile

A hazard profile was created for each hazard in each county within Uintah Basin Association of Governments jurisdiction. These profiles including potential severity or magnitude, frequency, location, seasonal pattern, duration, and speed of onset, were developed based on a model suggested by FEMA Region VIII. The information within each field of the table was derived by the Counties participating in the mitigation planning process based on GIS risk analysis, history of occurrence, and expert advice.

**FEMA Hazard Profile**

| | |
|---|---|
| **Frequency** | Possible |
| **Severity** | Catastrophic |
| **Location** | A large magnitude earthquake would produce ground shaking felt throughout the entire region. Surface fault rupture is expected in areas of known historic fault movements, for earthquake with a magnitude 6.5 or greater. |
| **Seasonal Pattern** | None |
| **Duration** | Actual ground shaking will be under one minute yet after shocks may occur for weeks after. |
| **Speed of Onset** | No warning |

Frequency:

- Highly Likely
  Near 100% probability in next year.
- Likely
  Between 10% and 100 % probability in the next year, or at least one chance in 10 year period.
- Possible
  Between 1% and 10% probability in the next year, or at least one chance in next 100 years.
- Unlikely
  Less than 1% probability in the next 100 years.

Severity or Magnitude:

- Catastrophic
  - Multiple fatalities if event were to occur
  - Complete shutdown of facilities for 30 days or more
  - More than 50 percent of property is severely damaged

- Critical
    - Injuries and/or illnesses results in permanent disability
    - Complete shutdown or critical facilities for at least 2 weeks
    - More than 25 percent of property is severely damaged
- Limited
    - Injuries and/or illnesses result in permanent disability
    - Complete shut down of critical facilities for more than one week
    - More than 10 percent of property is severely damaged
- Negligible
    - Injuries and/or illnesses are treatable with first aid
    - Minor quality of life lost
    - Shutdown of critical facilities and services for 24 hours or less
    - Less than 10 percent of property is severely damaged

Location:
Areas most likely to be affected or the sectors most likely to be affected.

Seasonal Pattern:
The particular season the event is most likely to occur. Examples include tornado season and hurricane season.

Duration:
The amount of time between when an event starts to when the event ends. For example the ground shaking caused by an earthquake is only a minute (where as a hurricane event can be several days.)

Speed of Onset:
Probable amount of warning time before an event occurs.

- Minimal or no warning time
- 6 to 12 hours warning time
- 12 to 24 hours warning time
- More than 24 hours warning

Warning time is vital as it allows people to seek safe locations or shelters and prepare their property in hopes of reducing damages.

## Flood

### Prevention
- Planning and zoning
- Floodplain open space preservation
- Building construction regulations
- Regulation of other facilities (critical)
- Stormwater management

### Property Protection
- Relocation
- Acquistion
- Building Elevation
- Floodproofing
- Lifeline protection
- Flood insurance

### Natural Resource Protection
- Wetland protection
- Erosion and sediment control

### Emergency Services
- Flood threat recognition
- Warning dissemination
- Flood response
- Critical facilities protection
- Health and safety maintenance
- Post-Disaster recovery and mitigation

### Structural Projects
- Reserviors/impoudments
- Levees
- Diversions
- Channel and drainage modifications
- Channel and basin maintenance

### Public Information
- Flood hazard Maps

## Earthquake

### Prevention
- Planning and zoning
- Building construction regulations
- Regulation of other facilities (critical)

### Property Protection
- Non-Structural Methods
- Retrofit upgrades
- Earthquake insurance

### Natural Resource Protection
- Identified fault rupture zones
- Identified secondary impact

### Emergency Services
- Earthquake threat recognition
- Emergency planning for secondary impact
- Emergency response (mutual aid, CERT)
- Critical facilities protection
- Health and safety maintenance
- Post-Disaster recovery and mitigation

### Structural Projects
- Rebuild or retrofit critical facilities higher seismic code

- Map information
- Outreach projects
- Real estate disclosure
- Library
- Technical Assistance
- Environmental education

## Dam Failure

### Prevention

- Dam failure inundation maps
- Planning, zoning, open space preservation in risk area
- Building codes with elevation based on dam failure
- Dam safety inspections
- Rigorous dam maintenance schedule
- Draining dam when conditions are unsafe

### Property Protection

- Acquisition of structures in inundation path
- Flood Insurance

### Natural Resource Protection

- Prohibit development in high-risk areas.

### Emergency Services

- Monitor condition dam
- Warning and evacuation plans based on dam failure
- Develop and conduct dam failure emergency exercise

### Structural Projects

- Dam improvements, spillway enlargements
- Remove unsafe dams

### Public Information

- Seismic maps; liquefaction, faults, zones
- Map information
- Outreach projects
- Real estate disclosure
- Library
- Technical Assistance
- Education

## Wildfire

### Prevention

- Zoning ordinances to reflect fire risk zones
- Restrict development areas near fire protection and water resource
- Planning to include; spacing of buildings, firebreaks, on-site water storage, wide roads, multiple accesses
- Code standards for roof materials and fire protection systems
- Maintenance programs to clear dead and dry brush
- Regulations on open fires
- Open space around structures

### Property Protection

- Retrofitting roofs, add spark arrestors
- Create and maintain defensible space
- Insurance
- Eliminate ladder fuels
- Install sprinkling systems
- Develop fire resistant plans
- Have home addresses displayed
- Clean out rain gutter

**Public Information**

- Develop outreach materials on dams, dam failure and community emergency plan for dam failure

## Landslides

**Prevention**

- Monitor and evaluate areas after wildfire
- Install ground monitoring instruments on landslides for movement
- Restrict development in landslide-prone areas
- Establish codes (grading, construction, excavation), in landslide-prone areas
- Slope grading

**Property Protection**

- Control and monitor surface and groundwater drainage
- Control building in areas of landslides
- Evaluate property maintenance in areas of landslides (over watering)
- Avoid ground level windows that face upslope

**Natural Resource Protection**

- Complete a watershed management plan
- Limit use of ATV's in areas of landslides to manage erosion
- Evaluate impact of wildfire in areas of landslides
- Restrict development in landslide-prone areas
- Maintain natural vegetation

**Emergency Services**

- Monitor and warning systems

**Natural Resource Protection**

- Prohibit development in high-risk areas
- Understand impact of non-native vegetation
- Promote tread soft ATV use
- Develop watershed management plan
- Maintain watershed
- Establish and promote fuel reduction

**Emergency Services**

- Mutual aid agreements for fire fighting
- Participate in State Wildfire Suppression Fund
- Develop and exercise local wildfire response plan and evacuation plans

**Structural Projects**

- Construct wildfire fuel breaks
- Install heliport water stations
- Tree and underbrush thinning in critical areas
- Increase number of fire hydrants
- Install water tanks

**Public Information**

- Develop maps for wildfire hazard area
- Wildfire information mailout to high risk residents
- Develop urban wildfire "how to protect your home from wildfires" book
- Newspaper article on wild fires
- Presentation on wildfires at community meetings
- Develop wildfire displays for display in public building

- Evacuation plans and exercises

**Structural Projects**

- Build buttress, retaining walls other engineered structures
- Install subsurface drainage materials
- Remove landslide materials
- Constructing Debris Basins
- Control rock falls, catch fences, tie back walls, rock bolts, cut benches and berms

**Public Information**

- Updated maps of landslide areas
- Real estate disclosure
- Develop outreach material (newsletters, articles, displays)
- Notice to homeowners in landslide areas detailing hazard

## Drought

**Prevention**

- Establish economic incentives for water conservation
- Encourage water conservation
- Develop early warning system, monitoring
- Implement water metering and leak detection programs
- Develop early warning system, monitoring program

**Property Protection**

- Evaluate potential wildfire due to drought
- Identify secondary affects from drought
- Real estate disclosure of high hazard wild fire area.

## Severe Weather

**Prevention**

- Early warning and notification systems
- Building codes to address wind and snow load
- Properly ground structures for lightning
- Public education for severe weather conditions
- Restrict development in areas of avalanche

**Property Protection**

- Structural tie down of roofs for high winds
- Restrict development in areas of avalanche
- Monitor NWS weather warnings and watches

**Natural Resource Protection**

- Evaluate impact of severe weather
- Restrict development in areas of avalanche

**Emergency Services**

- Monitor NWS weather warnings and watches
- Develop plans and exercises for severe weather related incidents

**Structural Projects**

- Install sheds over roads below avalanche terrain
- Install drift fences along snow drift areas
- Install avalanche fencing along ridgelines

**Natural Resource Protection**

- Legislation to protect stream flow
- Protect water aquifers

**Emergency Services**

- Alert procedures for water quality issues
- Create inventory of pumps, filters, other equipment
- Establish water hauling program
- List livestock watering location
- Establish hay hotline
- Fund water system improvements (wells, systems)
- Lower well intakes
- Develop drought contingency plan
- Issue emergency permits for water use

**Structural Projects**

- Redesign or create new reservoir storage
- Provide pumps and piping for distribution

**Public Information**

- Develop drought education material
- Water conservation outreach material
- Other outreach for awareness

**Public Information**

- Develop outreach document on avalanche safety
- Become and NWS Storm Ready Community
- Promote lightning safety week
- Develop cold weather safety materials

## Problem Soils

**Prevention**

- Planning and zoning restrictions and regulations
- Open space
- Building codes
- Drain system maintenance

**Property Protection**

- Insurance
- Remove Soil
- Ensure rain gutters extend away from structures

**Natural Resource Protection**

- Leave area as open space

**Emergency Services**

- Identify structures impacted by problem soils

**Structural Projects**

- Presoak and/or compact soils
- Install drain fields
- Bring in fill
- Remove soils

**Public Information**

- Develop information on problem soils
- Outreach materials on problem soil mitigation

# HAZUS-MH: Earthquake Event Report

**Region Name:** ***Daggett County 2500 Year Event***

**Earthquake Scenario:** ***Daggett County 2500 Year Event***

**Print Date:** ***October 20, 2003***

***Disclaimer:***
*The estimates of social and economic impacts contained in this report were produced using HAZUS loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific earthquake. These results can be improved by using enhanced inventory, geotechnical, and observed ground motion data.*

# Table of Contents


| Section | Page # |
|---|---|
| General Description of the Region | 3 |
| Building and Lifeline Inventory | 4 |
| Buiding Inventory | |
| Critical Facility Inventory | |
| Transportation and Utility Lifeline Inventory | |
| Earthquake Scenario Parameters | 6 |
| Direct Earthquake Damage | 7 |
| Buildings Damage | |
| Critical Facilities Damage | |
| Transportation and Utility Lifeline Damage | |
| Induced Earthquake Damage | 11 |
| Fire Following Earthquake | |
| Debris Generation | |
| Social Impact | 12 |
| Shelter Requirements | |
| Casualties | |
| Economic Loss | 13 |
| Building Losses | |
| Transportation and Utility Lifeline Losses | |
| Long-term Indirect Economic Impacts | |

Appendix A: County Listing for the Region

Appendix B: Regional Population and Building Value Data

## General Description of the Region

HAZUS is a regional earthquake loss estimation model that was developed by the Federal Emergency Management Agency and the National Institute of Building Sciences. The primary purpose of HAZUS is to provide a methodology and software application to develop earthquake losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from earthquakes and to prepare for emergency response and recovery.

The earthquake loss estimates provided in this report was based on a region that includes 1 county(ies) from the following state(s):

Utah

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 721.94 square miles and contains 1 census tracts. There are over 0 thousand households in the region and has a total population of 921 people (2000 Census Bureau data). The distribution of population by State and County is provided in Appendix B.

There are an estimated 0 thousand buildings in the region with a total building replacement value (excluding contents) of 88 (millions of dollars). Approximately 100.00 % of the buildings (and 94.00% of the building value) are associated with residential housing.

The replacement value of the transportation and utility lifeline systems is estimated to be 503 and 66 (millions of dollars) , respectively.

# Building and Lifeline Inventory

## Building Inventory

HAZUS estimates that there are 0 thousand buildings in the region which have an aggregate total replacement value of 88 (millions of dollars) . Appendix B provides a general distribution of the building value by State and County.

In terms of building construction types found in the region, wood frame construction makes up 41% of the building inventory. The remaining percentage is distributed between the other general building types.

## Critical Facility Inventory

HAZUS breaks critical facilites into two (2) groups: essential facilities and high potential loss (HPL) facilities. Essential facilities include hospitals, medical clinics, schools, fire stations, police stations and emergency operations facilities. High potential loss facilities include dams, levees, military installations, nuclear power plants and hazardous material sites.

For essential facilities, there are 0 hospitals in the region with a total bed capacity of 0 beds. There are 3 schools, 2 fire stations, 1 police stations and 0 emergency operation facilities. With respect to HPL facilities, there are 5 dams identified within the region. Of these, 2 of the dams are classified as 'high hazard'. The inventory also includes 0 hazardous material sites, 0 military installations and 0 nuclear power plants.

## Transportation and Utility Lifeline Inventory

Within HAZUS, the lifeline inventory is divided between transportation and utility lifeline systems. There are seven (7) transportation systems that include highways, railways, light rail, bus, ports, ferry and airports. There are six (6) utility systems that include potable water, wastewater, natural gas, crude & refined oil, electric power and communications. The lifeline inventory data is provided in Tables 2 and 3.

The total value of the lifeline inventory is over 569.00 (millions of dollars). This inventory includes over 103 kilometers of highways, 10 bridges, 0 kilometers of pipes.

**Table 2: Transportation System Lifeline Inventory**

| System | Component | # locations/ # Segments | Replacement value (millions of dollars) |
|---|---|---|---|
| **Highway** | Bridges | 10 | 5.40 |
| | Segments | 6 | 390.40 |
| | Tunnels | 0 | 0.00 |
| | | Subtotal | **395.80** |
| **Railways** | Bridges | 0 | 0.00 |
| | Facilities | 0 | 0.00 |
| | Segments | 0 | 0.00 |
| | Tunnels | 0 | 0.00 |
| | | Subtotal | **0.00** |
| **Light Rail** | Bridges | 0 | 0.00 |
| | Facilities | 0 | 0.00 |
| | Segmens | 0 | 0.00 |
| | Tunnels | 0 | 0.00 |
| | | Subtotal | **0.00** |
| **Bus** | Facilities | 0 | 0.00 |
| | | Subtotal | **0.00** |
| **Ferry** | Facilities | 0 | 0.00 |
| | | Subtotal | **0.00** |
| **Port** | Facilities | 0 | 0.00 |
| | | Subtotal | **0.00** |
| **Airport** | Facilities | 3 | 16.00 |
| | Runways | 3 | 91.40 |
| | | Subtotal | **107.40** |
| | | Total | **503.20** |

**Table 3: Utility System Lifeline inventory**

| System | Component | # Locations / Segments | Replacement value (millions of dollars) |
|---|---|---|---|
| **Potable Water** | Facilities | 0 | 0.00 |
| | Pipelines | 0 | 0.00 |
| | | Subtotal | **0.00** |
| **Waste Water** | Facilities | 1 | 65.30 |
| | Pipelines | 0 | 0.00 |
| | | Subtotal | **65.30** |
| **Natural Gas** | Facilities | 1 | 1.10 |
| | Pipelines | 0 | 0.00 |
| | | Subtotal | **1.10** |
| **OIL Systems** | Facilities | 0 | 0.00 |
| | Pipelines | 0 | 0.00 |
| | | Subtotal | **0.00** |
| **Electrical Power** | Facilities | 0 | 0.00 |
| | | Subtotal | **0.00** |
| **Communication** | Facilities | 0 | 0.00 |
| | | Subtotal | **0.00** |
| | | Total | **66.30** |

## Earthquake Scenario

HAZUS uses the following set of information to define the earthquake parameters used for the earthquake loss estimate provided in this report.

| | |
|---|---|
| **Scenario Name** | Daggett County 2500 Year Event |
| **Type of Earthquake** | Probabilistic |
| **Fault Name** | NA |
| **Historical Epicenter ID #** | |
| **Probabilistic Return Period** | 2,500 |
| **Longitude of Epicenter** | 0.00 |
| **Latitude of Epicenter** | 0.00 |
| **Earthquake Magnitude** | 7.00 |
| **Depth (Km)** | 0 |
| **Rupture Length (Km)** | 0.00 |
| **Rupture Orientation (degrees)** | 0.00 |
| **Attenuation Function** | |

# Building Damage

## Building Damage

HAZUS estimates that about 341 thousand buildings will be at least moderately damaged. This is over 37.00 % of the total number of buildings in the region. There are an estimated 9 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the HAZUS technical manual. Table 4 below summaries the expected damage by general occupancy for the buildings in the region. Table 5 summaries the expected damage by general building type.

**Table 4: Expected Building Damage by Occupancy**

| | None | | Slight | | Moderate | | Extensive | | Complete | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Count | (%) | Count | (%) | Count | (%) | Count | (%) | Count | (%) |
| Agriculture | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Commercial | 0 | 0.11 | 0 | 0.08 | 0 | 0.11 | 0 | 0.16 | 0 | 0.26 |
| Education | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Government | 0 | 0.11 | 0 | 0.08 | 0 | 0.11 | 0 | 0.16 | 0 | 0.22 |
| Industrial | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Religion | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Residential | 116 | 35.19 | 115 | 45.05 | 166 | 66.94 | 61 | 73.74 | 7 | 72.6 |
| Single Family | 213 | 64.60 | 140 | 54.79 | 82 | 32.83 | 22 | 25.95 | 3 | 26.8 |
| **Total** | **330** | | **256** | | **249** | | **83** | | **10** | |

**Table 5: Expected Building Damage by Building Type (All Design Levels)**

| | None | | Slight | | Moderate | | Extensive | | Complete | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Count | (%) | Count | (%) | Count | (%) | Count | (%) | Count | (%) |
| Concrete | 0 | 0.00 | 0 | 0.00 | 0 | 0.01 | 0 | 0.01 | 0 | 0.01 |
| MH* | 116 | 35.19 | 115 | 45.05 | 166 | 66.94 | 61 | 73.74 | 7 | 72.68 |
| Precast | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.01 | 0 | 0.02 |
| RM* | 30 | 8.97 | 11 | 4.31 | 18 | 7.21 | 10 | 11.95 | 1 | 7.94 |
| Steel | 0 | 0.04 | 0 | 0.03 | 0 | 0.04 | 0 | 0.04 | 0 | 0.11 |
| UM* | 3 | 0.97 | 3 | 1.21 | 4 | 1.61 | 2 | 2.94 | 1 | 12.15 |
| Wood | 181 | 54.72 | 126 | 49.31 | 60 | 24.06 | 9 | 11.16 | 1 | 6.92 |
| **Total** | **330** | | **256** | | **249** | | **83** | | **10** | |

*Note:

RM Reinforced Masonry
URM Unreiforced Masonry
MH Manufactured Housing

## Essential Facility Damage

Before the earthquake, the region had 0 hospital beds available for use. On the day of the earthquake, the model estimates that only 0 hospital beds (0.00%) are available for use by patients already in the hospital and those injured by the earthquake. After one week, 0.00% of the beds will be back in service. By 30 days, 0.00% will be operational.

**Table 6: Expected Damage to Essential Facilities**

| | | # Facilities | | |
|---|---|---|---|---|
| **Classification** | **Total** | **Least Moderate Damage > 50%** | **Complete Damage > 50%** | **Functionality > 50% at day 1** |
| **Hospitals** | 0 | 0 | 0 | 0 |
| **Schools** | 3 | 0 | 0 | 0 |
| **EOCs** | 0 | 0 | 0 | 0 |
| **PoliceStations** | 1 | 0 | 0 | 0 |
| **FireStations** | 2 | 0 | 0 | 0 |

## Transportation and Utility Lifeline Damage

Table 7 provides damage estimates for the transportation system.

**Table 7: Expected Damage to the Transportation Systems**

| System | Component | Number of Locations | | | | |
|---|---|---|---|---|---|---|
| | | Locations/ Segments | With at Least Mod. Damage | With Complete Damage | With Functionality > 50 % | |
| | | | | | After Day 1 | After Day 7 |
| Highway | Segments | 6 | 0 | 0 | 6 | 6 |
| | Bridges | 10 | 0 | 0 | 10 | 10 |
| | Tunnels | 0 | 0 | 0 | 0 | 0 |
| Railways | Segments | 0 | 0 | 0 | 0 | 0 |
| | Bridges | 0 | 0 | 0 | 0 | 0 |
| | Tunnels | 0 | 0 | 0 | 0 | 0 |
| | Facilities | 0 | 0 | 0 | 0 | 0 |
| Light Rail | Segments | 0 | 0 | 0 | 0 | 0 |
| | Bridges | 0 | 0 | 0 | 0 | 0 |
| | Tunnels | 0 | 0 | 0 | 0 | 0 |
| | Facilities | 0 | 0 | 0 | 0 | 0 |
| Bus | Facilities | 0 | 0 | 0 | 0 | 0 |
| Ferry | Facilities | 0 | 0 | 0 | 0 | 0 |
| Port | Facilities | 0 | 0 | 0 | 0 | 0 |
| Airport | Facilities | 3 | 0 | 0 | 3 | 3 |
| | Runways | 3 | 0 | 0 | 3 | 3 |

Note: Roadway segments, railroad tracks and light rail tracks are assumed to be damaged by ground failure only. If ground failure maps are not provided, damage estimates to these components will not be computed.

Tables 8-10 provide information on the damage to the utility lifeline systems. Table 8 provides damage to the utility system facilities. Table 9 provides estimates on the number of leaks and breaks by the pipelines of the utility systems. For electric power and potable water, HAZUS performs a simplified system performance analysis. Table 10 provides a summary of the system performance information.

**Table 8 : Expected Utility System Facility Damage**

| System | # of Locations | | | | |
|---|---|---|---|---|---|
| | Total # | With at Least Moderate Damage | With Complete Damage | with Functionality > 50 % | |
| | | | | After Day 1 | After Day 7 |
| Potable Water | 0 | 0 | 0 | 0 | 0 |
| Waste Water | 1 | 0 | 0 | 1 | 1 |
| Natural Gas | 1 | 0 | 0 | 1 | 1 |
| Oil Systems | 0 | 0 | 0 | 0 | 0 |
| Electrical Power | 0 | 0 | 0 | 0 | 0 |
| Communication | 0 | 0 | 0 | 0 | 0 |

**Table 9 : Expected Utility System Pipeline Damage**

| System | Total Pipelines Length (kms) | Number of Leaks | Number of Breaks |
|---|---|---|---|
| Potable Water | 0 | 0 | 0 |
| Waste Water | 0 | 0 | 0 |
| Natural Gas | 0 | 0 | 0 |
| Oil | 0 | 0 | 0 |

**Table 10: Expected Potable Water and Electric Power System Performance**

| | Total # of Households | Number of Households without Service | | | | |
|---|---|---|---|---|---|---|
| | | At Day 1 | At Day 3 | At Day 7 | At Day 30 | At Day 90 |
| Potable Water | 340 | 0 | 0 | 0 | 0 | 0 |
| Electric Power | | 340 | 340 | 340 | 340 | 340 |

# Induced Earthquake Damage

## Fire Following Earthquake

Fires often occur after an earthquake. Because of the number of fires and the lack of water to fight the fires, they can often burn out of control. HAZUS uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area. For this scenario, the model estimates that there will be 0 ignitions that will burn about 0.00 sq. mi 0.00 % of the region's total area.) The model also estimates that the fires will displace about 0 people and burn about 0 (millions of dollars) of building value.

## Debris Generation

HAZUS estimates the amount of debris that will be generated by the earthquake. The model breaks the debris into two general categories: a) Brick/Wood and b) Reinforced Concrete/Steel. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 0 million tons of debris will be generated. Of the total amount, Brick/Wood comprises 46.00% of the total, with the remainder being Reinforced Concrete/Steel. If the debris tonnage is converted to an estimated number of truckloads, it will require 0 truckloads (@25 tons/truck) to remove the debris generated by the earthquake.

# Social Impact

## Shelter Requirement

HAZUS estimates the number of households that are expected to be displaced from their homes due to the earthquake and the number of displaced people that will require accommodations in temporary public shelters. The model estimates (1 households to be displaced due to the earthquake. Of these, 0 people (out of a total population of 921 will seek temporary shelter in public shelters.

## Casualties

HAZUS estimates the number of people that will be injured and killed by the earthquake. The casualties are broken down into four (4) severity levels that describe the extent of the injuries. The levels are described as follows;

- Severity Level 1: Injuries will require medical attention but hospitalization is not needed.
- Severity Level 2: Injuries will require hospitalization but are not considered life-threatening
- Severity Level 3: Injuries will require hospitalization and can become life threatening if not promptly treated.
- Severity Level 4: Victims are killed by the earthquake.

The casualty estimates are provided for three (3) times of day: 2:00 AM, 2:00 PM and 5:00 PM. These times represent the periods of the day that different sectors of the community are at their peak occupancy loads. The 2:00 AM estimate considers that the residential occupancy load is maximum, the 2:00 PM estimate considers that the educational, commercial and industrial sector loads are maximum and 5:00 PM represents peak commute time.

Table 11 provides a summary of the casualties estimated for this earthquake

**Table 11: Casualty Estimates**

| | | Level 1 | Level 2 | Level 3 | Level 4 |
|---|---|---|---|---|---|
| 2 AM | Commercial | 0 | 0 | 0 | 0 |
| | Commuting | 0 | 0 | 0 | 0 |
| | Educational | 0 | 0 | 0 | 0 |
| | Hotels | 0 | 0 | 0 | 0 |
| | Industrial | 0 | 0 | 0 | 0 |
| | Residential | 1 | 0 | 0 | 0 |
| | Single Family | 1 | 0 | 0 | 0 |
| | **Total** | **2** | **0** | **0** | **0** |
| 2 PM | Commercial | 1 | 0 | 0 | 0 |
| | Commuting | 0 | 0 | 0 | 0 |
| | Educational | 0 | 0 | 0 | 0 |
| | Hotels | 0 | 0 | 0 | 0 |
| | Industrial | 0 | 0 | 0 | 0 |
| | Residential | 0 | 0 | 0 | 0 |
| | Single Family | 0 | 0 | 0 | 0 |
| | **Total** | **1** | **0** | **0** | **0** |
| 5 PM | Commercial | 1 | 0 | 0 | 0 |
| | Commuting | 0 | 0 | 0 | 0 |
| | Educational | 0 | 0 | 0 | 0 |
| | Hotels | 0 | 0 | 0 | 0 |
| | Industrial | 0 | 0 | 0 | 0 |
| | Residential | 0 | 0 | 0 | 0 |
| | Single Family | 0 | 0 | 0 | 0 |
| | **Total** | **1** | **0** | **0** | **0** |

# Economic Loss

The total building-related economic loss estimated for the earthquake is $7.06 (millions of dollars), which represents % of the total replacement value of the region's buildings. The following three sections provide more detailed information about these losses.

## Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the earthquake. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the earthquake.

The total building-related losses were 7.06 (millions of dollars); 7 % of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 90 % of the total loss. Table 12 below provides a summary of the losses associated with the building damage.

**Table 12: Building-Related Economic Loss Estimates**

(Millions of dollars)

| Category | Area | Single Family | Other Residential | Commercial | Industrial | Others | Total |
|---|---|---|---|---|---|---|---|
| **Income Loses** | | | | | | | |
| | Wage | 0.00 | 0.05 | 0.05 | 0.00 | 0.02 | 0.11 |
| | Capital-Related | 0.00 | 0.02 | 0.05 | 0.00 | 0.00 | 0.08 |
| | Rental | 0.17 | 0.08 | 0.02 | 0.00 | 0.01 | 0.27 |
| | Relocation | 0.02 | 0.01 | 0.00 | 0.00 | 0.00 | 0.02 |
| | **Subtotal** | **0.18** | **0.15** | **0.12** | **0.00** | **0.03** | **0.49** |
| **Capital Stock Loses** | | | | | | | |
| | Structural | 0.81 | 0.40 | 0.07 | 0.00 | 0.06 | 1.34 |
| | Non_Structural | 2.85 | 1.01 | 0.13 | 0.00 | 0.13 | 4.12 |
| | Content | 0.84 | 0.15 | 0.06 | 0.00 | 0.06 | 1.11 |
| | Inventory | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | **Subtotal** | **4.49** | **1.56** | **0.26** | **0.00** | **0.26** | **6.57** |
| | **Total** | **4.67** | **1.71** | **0.38** | **0.00** | **0.29** | **7.06** |

## Transportation and Utility Lifeline Losses

For the transportation and utility lifeline systems, HAZUS computes the direct repair cost for each component only. There are no losses computed by HAZUS for business interruption due to lifeline outages. Tables 13 & 14 provide a detailed breakdown in the expected lifeline losses.

HAZUS estimates the long-term economic impacts to the region for 15 years after the earthquake. The model quantifies this information in terms of income and employment changes within the region. Table 15 presents the results of the region for the given earthquake.

**Table 13: Transportation System Economic Losses**
(Millions of dollars)

| System | Component | Inventory Value | Economic Loss | Loss Ratio (%) |
|---|---|---|---|---|
| **Highway** | Segments | 390 | 0 | 0.00 |
| | Bridges | 5 | 0 | 2.38 |
| | Tunnels | 0 | 0 | 0.00 |
| | Subtotal | **395.80** | **0.10** | |
| **Railways** | Segments | 0 | 0 | 0.00 |
| | Bridges | 0 | 0 | 0.00 |
| | Tunnels | 0 | 0 | 0.00 |
| | Facilities | 0 | 0 | 0.00 |
| | Subtotal | **0.00** | **0.00** | |
| **Light Rail** | Segments | 0 | 0 | 0.00 |
| | Bridges | 0 | 0 | 0.00 |
| | Tunnels | 0 | 0 | 0.00 |
| | Facilities | 0 | 0 | 0.00 |
| | Subtotal | **0.00** | **0.00** | |
| **Bus** | Facilities | 0 | 0 | 0.00 |
| | Subtotal | **0.00** | **0.00** | |
| **Ferry** | Facilities | 0 | 0 | 0.00 |
| | Subtotal | **0.00** | **0.00** | |
| **Port** | Facilities | 0 | 0 | 0.00 |
| | Subtotal | **0.00** | **0.00** | |
| **Airport** | Facilities | 16 | 3 | 21.45 |
| | Runways | 91 | 0 | 0.00 |
| | Subtotal | **107.40** | **3.40** | |
| | **Total** | **503.20** | **3.60** | |

**Table 14: Utility System Economic Losses**

(Millions of dollars)

| System | Component | Inventory Value | Economic Loss | Loss Ratio (%) |
|---|---|---|---|---|
| Communication | Facilities | 0.00 | 0.00 | 0.00 |
| | **Subtotal** | **0.00** | **$0.00** | |
| Electrical Power | Facilities | 0.00 | 0.00 | 0.00 |
| | **Subtotal** | **0.00** | **$0.00** | |
| Natural Gas | Pipelines | 0.00 | 0.00 | 0.00 |
| | Facilities | 1.10 | 0.00 | 0.00 |
| | **Subtotal** | **1.07** | **$0.00** | |
| Oil Systems | Pipelines | 0.00 | 0.00 | 0.00 |
| | Facilities | 0.00 | 0.00 | 0.00 |
| | **Subtotal** | **0.00** | **$0.00** | |
| Potable Water | Pipelines | 0.00 | 0.00 | 0.00 |
| | Facilities | 0.00 | 0.00 | 0.00 |
| | **Subtotal** | **0.00** | **$0.00** | |
| Waste Water | Pipelines | 0.00 | 0.00 | 0.00 |
| | Facilities | 65.30 | 0.00 | 0.00 |
| | **Subtotal** | **65.27** | **$0.00** | |
| | **Total** | **66.34** | **$0.00** | |

**Table 15. Indirect Economic Impact**
**(with outside aid)**

| | LOSS | Total | % |
|---|---|---|---|
| **First Year** | | | |
| | Employment Impact | 0 | 0.00 |
| | Income Impact | 0 | -2.50 |
| **Second Year** | | | |
| | Employment Impact | 0 | 0.00 |
| | Income Impact | 0 | -7.61 |
| **Third Year** | | | |
| | Employment Impact | 0 | 0.00 |
| | Income Impact | 0 | -9.79 |
| **Fourth Year** | | | |
| | Employment Impact | 0 | 0.00 |
| | Income Impact | 0 | -9.79 |
| **Fifth Year** | | | |
| | Employment Impact | 0 | 0.00 |
| | Income Impact | 0 | -9.79 |
| **Years 6 to 15** | | | |
| | Employment Impact | 0 | 0.00 |
| | Income Impact | 0 | -9.79 |

## Appendix A: County Listing for the Region

- Daggett,UT

## Appendix B: Regional Population and Building Value Data

| State | County Name | Population | Building Value (millions of dollars) | | |
|---|---|---|---|---|---|
| | | | Residential | Non-Residential | Total |
| **Utah** | | | | | |
| | Daggett | 921 | 83 | 4 | 88 |
| **Total State** | | **921** | **83** | **4** | **88** |
| **Total Region** | | **921** | **83** | **4** | **88** |

# HAZUS-MH: Earthquake Event Report

**Region Name:** ***Duchesne County 2500 Year Event***

**Earthquake Scenario:** ***Duchesne County 2500 Year Event***

**Print Date:** ***October 20, 2003***

***Disclaimer:***
*The estimates of social and economic impacts contained in this report were produced using HAZUS loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific earthquake. These results can be improved by using enhanced inventory, geotechnical, and observed ground motion data.*

# Table of Contents


| Section | Page # |
|---|---|
| General Description of the Region | 3 |
| Building and Lifeline Inventory | 4 |
| Buiding Inventory | |
| Critical Facility Inventory | |
| Transportation and Utility Lifeline Inventory | |
| Earthquake Scenario Parameters | 6 |
| Direct Earthquake Damage | 7 |
| Buildings Damage | |
| Critical Facilities Damage | |
| Transportation and Utility Lifeline Damage | |
| Induced Earthquake Damage | 11 |
| Fire Following Earthquake | |
| Debris Generation | |
| Social Impact | 12 |
| Shelter Requirements | |
| Casualties | |
| Economic Loss | 13 |
| Building Losses | |
| Transportation and Utility Lifeline Losses | |
| Long-term Indirect Economic Impacts | |

Appendix A: County Listing for the Region

Appendix B: Regional Population and Building Value Data

## General Description of the Region

HAZUS is a regional earthquake loss estimation model that was developed by the Federal Emergency Management Agency and the National Institute of Building Sciences. The primary purpose of HAZUS is to provide a methodology and software application to develop earthquake losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from earthquakes and to prepare for emergency response and recovery.

The earthquake loss estimates provided in this report was based on a region that includes 1 county(ies) from the following state(s):

Utah

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 3,251.34 square miles and contains 4 census tracts. There are over 4 thousand households in the region and has a total population of 14,371 people (2000 Census Bureau data). The distribution of population by State and County is provided in Appendix B.

There are an estimated 5 thousand buildings in the region with a total building replacement value (excluding contents) of 780 (millions of dollars). Approximately 99.00 % of the buildings (and 80.00% of the building value) are associated with residential housing.

The replacement value of the transportation and utility lifeline systems is estimated to be 950 and 130 (millions of dollars) , respectively.

# Building and Lifeline Inventory

## Building Inventory

HAZUS estimates that there are 5 thousand buildings in the region which have an aggregate total replacement value of 780 (millions of dollars) . Appendix B provides a general distribution of the building value by State and County.

In terms of building construction types found in the region, wood frame construction makes up 55% of the building inventory. The remaining percentage is distributed between the other general building types.

## Critical Facility Inventory

HAZUS breaks critical facilites into two (2) groups: essential facilities and high potential loss (HPL) facilities. Essential facilities include hospitals, medical clinics, schools, fire stations, police stations and emergency operations facilities. High potential loss facilities include dams, levees, military installations, nuclear power plants and hazardous material sites.

For essential facilities, there are 1 hospitals in the region with a total bed capacity of 42 beds. There are 16 schools, 2 fire stations, 1 police stations and 0 emergency operation facilities. With respect to HPL facilities, there are 38 dams identified within the region. Of these, 11 of the dams are classified as 'high hazard'. The inventory also includes 0 hazardous material sites, 0 military installations and 0 nuclear power plants.

## Transportation and Utility Lifeline Inventory

Within HAZUS, the lifeline inventory is divided between transportation and utility lifeline systems. There are seven (7) transportation systems that include highways, railways, light rail, bus, ports, ferry and airports. There are six (6) utility systems that include potable water, wastewater, natural gas, crude & refined oil, electric power and communications. The lifeline inventory data is provided in Tables 2 and 3.

The total value of the lifeline inventory is over 1,080.00 (millions of dollars). This inventory includes over 174 kilometers of highways, 80 bridges, 0 kilometers of pipes.

**Table 2: Transportation System Lifeline Inventory**

| System | Component | # locations/ # Segments | Replacement value (millions of dollars) |
|---|---|---|---|
| **Highway** | Bridges | 80 | 34.90 |
| | Segments | 28 | 843.80 |
| | Tunnels | 0 | 0.00 |
| | | Subtotal | **878.70** |
| **Railways** | Bridges | 0 | 0.00 |
| | Facilities | 0 | 0.00 |
| | Segments | 0 | 0.00 |
| | Tunnels | 0 | 0.00 |
| | | Subtotal | **0.00** |
| **Light Rail** | Bridges | 0 | 0.00 |
| | Facilities | 0 | 0.00 |
| | Segmens | 0 | 0.00 |
| | Tunnels | 0 | 0.00 |
| | | Subtotal | **0.00** |
| **Bus** | Facilities | 0 | 0.00 |
| | | Subtotal | **0.00** |
| **Ferry** | Facilities | 0 | 0.00 |
| | | Subtotal | **0.00** |
| **Port** | Facilities | 0 | 0.00 |
| | | Subtotal | **0.00** |
| **Airport** | Facilities | 2 | 10.70 |
| | Runways | 2 | 60.90 |
| | | Subtotal | **71.60** |
| | | Total | **950.30** |

**Table 3: Utility System Lifeline inventory**

| System | Component | # Locations / Segments | Replacement value (millions of dollars) |
|---|---|---|---|
| **Potable Water** | Facilities | 0 | 0.00 |
| | Pipelines | 0 | 0.00 |
| | | Subtotal | **0.00** |
| **Waste Water** | Facilities | 2 | 130.50 |
| | Pipelines | 0 | 0.00 |
| | | Subtotal | **130.50** |
| **Natural Gas** | Facilities | 0 | 0.00 |
| | Pipelines | 0 | 0.00 |
| | | Subtotal | **0.00** |
| **OIL Systems** | Facilities | 4 | 0.40 |
| | Pipelines | 0 | 0.00 |
| | | Subtotal | **0.40** |
| **Electrical Power** | Facilities | 0 | 0.00 |
| | | Subtotal | **0.00** |
| **Communication** | Facilities | 0 | 0.00 |
| | | Subtotal | **0.00** |
| | | Total | **130.90** |

## Earthquake Scenario

HAZUS uses the following set of information to define the earthquake parameters used for the earthquake loss estimate provided in this report.

| | |
|---|---|
| **Scenario Name** | Duchesne County 2500 Year Event |
| **Type of Earthquake** | Probabilistic |
| **Fault Name** | NA |
| **Historical Epicenter ID #** | |
| **Probabilistic Return Period** | 2,500 |
| **Longitude of Epicenter** | 0.00 |
| **Latitude of Epicenter** | 0.00 |
| **Earthquake Magnitude** | 7.00 |
| **Depth (Km)** | 0 |
| **Rupture Length (Km)** | 0.00 |
| **Rupture Orientation (degrees)** | 0.00 |
| **Attenuation Function** | |

# Building Damage

## Building Damage

HAZUS estimates that about 1,722 thousand buildings will be at least moderately damaged. This is over 30.00 % of the total number of buildings in the region. There are an estimated 92 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the HAZUS technical manual. Table 4 below summaries the expected damage by general occupancy for the buildings in the region. Table 5 summaries the expected damage by general building type.

**Table 4: Expected Building Damage by Occupancy**

| | None | | Slight | | Moderate | | Extensive | | Complete | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Count | (%) | Count | (%) | Count | (%) | Count | (%) | Count | (%) |
| Agriculture | 2 | 0.08 | 1 | 0.08 | 1 | 0.09 | 1 | 0.12 | 0 | 0.17 |
| Commercial | 30 | 1.05 | 3 | 0.23 | 5 | 0.43 | 3 | 0.64 | 1 | 1.00 |
| Education | 1 | 0.03 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Government | 2 | 0.07 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Industrial | 3 | 0.12 | 1 | 0.10 | 2 | 0.18 | 1 | 0.23 | 0 | 0.35 |
| Religion | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Residential | 551 | 19.17 | 335 | 29.10 | 606 | 53.83 | 340 | 67.46 | 65 | 70.0 |
| Single Family | 2,283 | 79.47 | 812 | 70.49 | 512 | 45.47 | 159 | 31.54 | 26 | 28.4 |
| **Total** | **2,873** | | **1,153** | | **1,126** | | **504** | | **92** | |

**Table 5: Expected Building Damage by Building Type (All Design Levels)**

| | None | | Slight | | Moderate | | Extensive | | Complete | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Count | (%) | Count | (%) | Count | (%) | Count | (%) | Count | (%) |
| Concrete | 8 | 0.03 | 0 | 0.01 | 0 | 0.02 | 0 | 0.02 | 0 | 0.04 |
| MH* | 529 | 18.43 | 335 | 29.06 | 606 | 53.79 | 340 | 67.41 | 65 | 69.94 |
| Precast | 5 | 0.15 | 0 | 0.04 | 1 | 0.09 | 1 | 0.20 | 0 | 0.32 |
| RM* | 313 | 10.87 | 60 | 5.21 | 117 | 10.38 | 82 | 16.20 | 11 | 11.68 |
| Steel | 10 | 0.04 | 0 | 0.01 | 0 | 0.03 | 0 | 0.07 | 0 | 0.11 |
| UM* | 50 | 1.75 | 16 | 1.35 | 24 | 2.11 | 18 | 3.48 | 11 | 12.02 |
| Wood | 1,956 | 67.89 | 739 | 64.09 | 374 | 33.18 | 61 | 12.18 | 5 | 5.28 |
| **Total** | **2,873** | | **1,153** | | **1,126** | | **504** | | **92** | |

*Note:

RM Reinforced Masonry
URM Unreiforced Masonry
MH Manufactured Housing

## Essential Facility Damage

Before the earthquake, the region had 42 hospital beds available for use. On the day of the earthquake, the model estimates that only 42 hospital beds (100.00%) are available for use by patients already in the hospital and those injured by the earthquake. After one week, 100.00% of the beds will be back in service. By 30 days, 100.00% will be operational.

**Table 6: Expected Damage to Essential Facilities**

| | | # Facilities | | |
|---|---|---|---|---|
| **Classification** | **Total** | **Least Moderate Damage > 50%** | **Complete Damage > 50%** | **Functionality > 50% at day 1** |
| **Hospitals** | 1 | 0 | 0 | 1 |
| **Schools** | 16 | 0 | 0 | 2 |
| **EOCs** | 0 | 0 | 0 | 0 |
| **PoliceStations** | 1 | 0 | 0 | 1 |
| **FireStations** | 2 | 0 | 0 | 0 |

## Transportation and Utility Lifeline Damage

Table 7 provides damage estimates for the transportation system.

**Table 7: Expected Damage to the Transportation Systems**

| System | Component | Number of Locations | | | | |
|---|---|---|---|---|---|---|
| | | Locations/ Segments | With at Least Mod. Damage | With Complete Damage | With Functionality > 50 % | |
| | | | | | After Day 1 | After Day 7 |
| Highway | Segments | 28 | 0 | 0 | 28 | 28 |
| | Bridges | 80 | 2 | 0 | 80 | 80 |
| | Tunnels | 0 | 0 | 0 | 0 | 0 |
| Railways | Segments | 0 | 0 | 0 | 0 | 0 |
| | Bridges | 0 | 0 | 0 | 0 | 0 |
| | Tunnels | 0 | 0 | 0 | 0 | 0 |
| | Facilities | 0 | 0 | 0 | 0 | 0 |
| Light Rail | Segments | 0 | 0 | 0 | 0 | 0 |
| | Bridges | 0 | 0 | 0 | 0 | 0 |
| | Tunnels | 0 | 0 | 0 | 0 | 0 |
| | Facilities | 0 | 0 | 0 | 0 | 0 |
| Bus | Facilities | 0 | 0 | 0 | 0 | 0 |
| Ferry | Facilities | 0 | 0 | 0 | 0 | 0 |
| Port | Facilities | 0 | 0 | 0 | 0 | 0 |
| Airport | Facilities | 2 | 0 | 0 | 2 | 2 |
| | Runways | 2 | 0 | 0 | 2 | 2 |

Note: Roadway segments, railroad tracks and light rail tracks are assumed to be damaged by ground failure only. If ground failure maps are not provided, damage estimates to these components will not be computed.

Tables 8-10 provide information on the damage to the utility lifeline systems. Table 8 provides damage to the utility system facilities. Table 9 provides estimates on the number of leaks and breaks by the pipelines of the utility systems. For electric power and potable water, HAZUS performs a simplified system performance analysis. Table 10 provides a summary of the system performance information.

**Table 8 : Expected Utility System Facility Damage**

| System | # of Locations | | | | |
|---|---|---|---|---|---|
| | Total # | With at Least Moderate Damage | With Complete Damage | with Functionality > 50 % | |
| | | | | After Day 1 | After Day 7 |
| Potable Water | 0 | 0 | 0 | 0 | 0 |
| Waste Water | 2 | 0 | 0 | 1 | 2 |
| Natural Gas | 0 | 0 | 0 | 0 | 0 |
| Oil Systems | 4 | 0 | 0 | 1 | 4 |
| Electrical Power | 0 | 0 | 0 | 0 | 0 |
| Communication | 0 | 0 | 0 | 0 | 0 |

**Table 9 : Expected Utility System Pipeline Damage**

| System | Total Pipelines Length (kms) | Number of Leaks | Number of Breaks |
|---|---|---|---|
| Potable Water | 0 | 0 | 0 |
| Waste Water | 0 | 0 | 0 |
| Natural Gas | 0 | 0 | 0 |
| Oil | 0 | 0 | 0 |

**Table 10: Expected Potable Water and Electric Power System Performance**

| | Total # of Households | Number of Households without Service | | | | |
|---|---|---|---|---|---|---|
| | | At Day 1 | At Day 3 | At Day 7 | At Day 30 | At Day 90 |
| Potable Water | 4,559 | 0 | 0 | 0 | 0 | 0 |
| Electric Power | | 4,559 | 4,559 | 4,559 | 4,559 | 4,559 |

# Induced Earthquake Damage

## Fire Following Earthquake

Fires often occur after an earthquake. Because of the number of fires and the lack of water to fight the fires, they can often burn out of control. HAZUS uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area. For this scenario, the model estimates that there will be 1 ignitions that will burn about 0.00 sq. mi 0.00 % of the region's total area.) The model also estimates that the fires will displace about 0 people and burn about 0 (millions of dollars) of building value.

## Debris Generation

HAZUS estimates the amount of debris that will be generated by the earthquake. The model breaks the debris into two general categories: a) Brick/Wood and b) Reinforced Concrete/Steel. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 0 million tons of debris will be generated. Of the total amount, Brick/Wood comprises 40.00% of the total, with the remainder being Reinforced Concrete/Steel. If the debris tonnage is converted to an estimated number of truckloads, it will require 0 truckloads (@25 tons/truck) to remove the debris generated by the earthquake.

# Social Impact

## Shelter Requirement

HAZUS estimates the number of households that are expected to be displaced from their homes due to the earthquake and the number of displaced people that will require accommodations in temporary public shelters. The model estimates (28 households to be displaced due to the earthquake. Of these, 6 people (out of a total population of 14,371 will seek temporary shelter in public shelters.

## Casualties

HAZUS estimates the number of people that will be injured and killed by the earthquake. The casualties are broken down into four (4) severity levels that describe the extent of the injuries. The levels are described as follows;

- Severity Level 1: Injuries will require medical attention but hospitalization is not needed.
- Severity Level 2: Injuries will require hospitalization but are not considered life-threatening
- Severity Level 3: Injuries will require hospitalization and can become life threatening if not promptly treated.
- Severity Level 4: Victims are killed by the earthquake.

The casualty estimates are provided for three (3) times of day: 2:00 AM, 2:00 PM and 5:00 PM. These times represent the periods of the day that different sectors of the community are at their peak occupancy loads. The 2:00 AM estimate considers that the residential occupancy load is maximum, the 2:00 PM estimate considers that the educational, commercial and industrial sector loads are maximum and 5:00 PM represents peak commute time.

Table 11 provides a summary of the casualties estimated for this earthquake

**Table 11: Casualty Estimates**

| | | Level 1 | Level 2 | Level 3 | Level 4 |
|---|---|---|---|---|---|
| 2 AM | Commercial | 0 | 0 | 0 | 0 |
| | Commuting | 0 | 0 | 0 | 0 |
| | Educational | 0 | 0 | 0 | 0 |
| | Hotels | 1 | 0 | 0 | 0 |
| | Industrial | 0 | 0 | 0 | 0 |
| | Residential | 13 | 2 | 0 | 0 |
| | Single Family | 14 | 3 | 0 | 1 |
| | **Total** | **28** | **5** | **1** | **1** |
| 2 PM | Commercial | 11 | 3 | 0 | 1 |
| | Commuting | 0 | 0 | 0 | 0 |
| | Educational | 5 | 1 | 0 | 0 |
| | Hotels | 0 | 0 | 0 | 0 |
| | Industrial | 3 | 1 | 0 | 0 |
| | Residential | 3 | 0 | 0 | 0 |
| | Single Family | 3 | 1 | 0 | 0 |
| | **Total** | **25** | **6** | **1** | **2** |
| 5 PM | Commercial | 10 | 3 | 0 | 1 |
| | Commuting | 0 | 0 | 0 | 0 |
| | Educational | 0 | 0 | 0 | 0 |
| | Hotels | 0 | 0 | 0 | 0 |
| | Industrial | 2 | 0 | 0 | 0 |
| | Residential | 5 | 1 | 0 | 0 |
| | Single Family | 6 | 1 | 0 | 0 |
| | **Total** | **23** | **5** | **1** | **1** |

# Economic Loss

The total building-related economic loss estimated for the earthquake is $52.09 (millions of dollars), which represents % of the total replacement value of the region's buildings. The following three sections provide more detailed information about these losses.

## Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the earthquake. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the earthquake.

The total building-related losses were 52.09 (millions of dollars); 8 % of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 78 % of the total loss. Table 12 below provides a summary of the losses associated with the building damage.

**Table 12: Building-Related Economic Loss Estimates**

(Millions of dollars)

| Category | Area | Single Family | Other Residential | Commercial | Industrial | Others | Total |
|---|---|---|---|---|---|---|---|
| **Income Loses** | | | | | | | |
| | Wage | 0.00 | 0.27 | 0.85 | 0.07 | 0.02 | 1.21 |
| | Capital-Related | 0.00 | 0.11 | 0.76 | 0.05 | 0.02 | 0.94 |
| | Rental | 1.15 | 0.43 | 0.43 | 0.03 | 0.00 | 2.04 |
| | Relocation | 0.11 | 0.03 | 0.02 | 0.00 | 0.00 | 0.16 |
| | **Subtotal** | **1.26** | **0.83** | **2.05** | **0.16** | **0.05** | **4.35** |
| **Capital Stock Loses** | | | | | | | |
| | Structural | 5.71 | 2.13 | 1.23 | 0.50 | 0.65 | 10.22 |
| | Non_Structural | 18.93 | 5.69 | 2.56 | 1.29 | 0.58 | 29.04 |
| | Content | 5.17 | 0.83 | 1.11 | 0.79 | 0.37 | 8.28 |
| | Inventory | 0.00 | 0.00 | 0.04 | 0.12 | 0.04 | 0.20 |
| | **Subtotal** | **29.80** | **8.66** | **4.93** | **2.70** | **1.65** | **47.73** |
| | **Total** | **31.07** | **9.49** | **6.98** | **2.85** | **1.69** | **52.09** |

## Transportation and Utility Lifeline Losses

For the transportation and utility lifeline systems, HAZUS computes the direct repair cost for each component only. There are no losses computed by HAZUS for business interruption due to lifeline outages. Tables 13 & 14 provide a detailed breakdown in the expected lifeline losses.

HAZUS estimates the long-term economic impacts to the region for 15 years after the earthquake. The model quantifies this information in terms of income and employment changes within the region. Table 15 presents the results of the region for the given earthquake.

**Table 13: Transportation System Economic Losses**
(Millions of dollars)

| System | Component | Inventory Value | Economic Loss | Loss Ratio (%) |
|---|---|---|---|---|
| **Highway** | Segments | 844 | 0 | 0.00 |
| | Bridges | 35 | 1 | 2.09 |
| | Tunnels | 0 | 0 | 0.00 |
| | Subtotal | **878.70** | **0.70** | |
| **Railways** | Segments | 0 | 0 | 0.00 |
| | Bridges | 0 | 0 | 0.00 |
| | Tunnels | 0 | 0 | 0.00 |
| | Facilities | 0 | 0 | 0.00 |
| | Subtotal | **0.00** | **0.00** | |
| **Light Rail** | Segments | 0 | 0 | 0.00 |
| | Bridges | 0 | 0 | 0.00 |
| | Tunnels | 0 | 0 | 0.00 |
| | Facilities | 0 | 0 | 0.00 |
| | Subtotal | **0.00** | **0.00** | |
| **Bus** | Facilities | 0 | 0 | 0.00 |
| | Subtotal | **0.00** | **0.00** | |
| **Ferry** | Facilities | 0 | 0 | 0.00 |
| | Subtotal | **0.00** | **0.00** | |
| **Port** | Facilities | 0 | 0 | 0.00 |
| | Subtotal | **0.00** | **0.00** | |
| **Airport** | Facilities | 11 | 2 | 21.25 |
| | Runways | 61 | 0 | 0.00 |
| | Subtotal | **71.60** | **2.30** | |
| | **Total** | **950.30** | **3.00** | |

**Table 14: Utility System Economic Losses**

(Millions of dollars)

| System | Component | Inventory Value | Economic Loss | Loss Ratio (%) |
|---|---|---|---|---|
| Communication | Facilities | 0.00 | 0.00 | 0.00 |
| | **Subtotal** | **0.00** | **$0.00** | |
| Electrical Power | Facilities | 0.00 | 0.00 | 0.00 |
| | **Subtotal** | **0.00** | **$0.00** | |
| Natural Gas | Pipelines | 0.00 | 0.00 | 0.00 |
| | Facilities | 0.00 | 0.00 | 0.00 |
| | **Subtotal** | **0.00** | **$0.00** | |
| Oil Systems | Pipelines | 0.00 | 0.00 | 0.00 |
| | Facilities | 0.40 | 0.04 | 9.46 |
| | **Subtotal** | **0.39** | **$0.04** | |
| Potable Water | Pipelines | 0.00 | 0.00 | 0.00 |
| | Facilities | 0.00 | 0.00 | 0.00 |
| | **Subtotal** | **0.00** | **$0.00** | |
| Waste Water | Pipelines | 0.00 | 0.00 | 0.00 |
| | Facilities | 130.50 | 8.30 | 6.36 |
| | **Subtotal** | **130.54** | **$8.30** | |
| | **Total** | **130.93** | **$8.33** | |

**Table 15. Indirect Economic Impact**
**(with outside aid)**

| | LOSS | Total | % |
|---|---|---|---|
| **First Year** | | | |
| | Employment Impact | 0 | 0.00 |
| | Income Impact | 0 | -0.79 |
| **Second Year** | | | |
| | Employment Impact | 0 | 0.00 |
| | Income Impact | (1) | -2.42 |
| **Third Year** | | | |
| | Employment Impact | 0 | 0.00 |
| | Income Impact | (2) | -3.11 |
| **Fourth Year** | | | |
| | Employment Impact | 0 | 0.00 |
| | Income Impact | (2) | -3.11 |
| **Fifth Year** | | | |
| | Employment Impact | 0 | 0.00 |
| | Income Impact | (2) | -3.11 |
| **Years 6 to 15** | | | |
| | Employment Impact | 0 | 0.00 |
| | Income Impact | (2) | -3.11 |

## Appendix A: County Listing for the Region

- Duchesne,UT

## Appendix B: Regional Population and Building Value Data

| State | County Name | Population | Building Value (millions of dollars) | | |
|---|---|---|---|---|---|
| | | | Residential | Non-Residential | Total |
| **Utah** | | | | | |
| | Duchesne | 14,371 | 628 | 152 | 780 |
| **Total State** | | **14,371** | **628** | **152** | **780** |
| **Total Region** | | **14,371** | **628** | **152** | **780** |

# HAZUS-MH: Earthquake Event Report

**Region Name:** ***Uintah County 2500 year Event***

**Earthquake Scenario:** ***Uintah County 2500 Year Event***

**Print Date:** ***October 20, 2003***

***Disclaimer:***
*The estimates of social and economic impacts contained in this report were produced using HAZUS loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific earthquake. These results can be improved by using enhanced inventory, geotechnical, and observed ground motion data.*

# Table of Contents


| Section | Page # |
|---|---|
| General Description of the Region | 3 |
| Building and Lifeline Inventory | 4 |
| Buiding Inventory | |
| Critical Facility Inventory | |
| Transportation and Utility Lifeline Inventory | |
| Earthquake Scenario Parameters | 6 |
| Direct Earthquake Damage | 7 |
| Buildings Damage | |
| Critical Facilities Damage | |
| Transportation and Utility Lifeline Damage | |
| Induced Earthquake Damage | 11 |
| Fire Following Earthquake | |
| Debris Generation | |
| Social Impact | 12 |
| Shelter Requirements | |
| Casualties | |
| Economic Loss | 13 |
| Building Losses | |
| Transportation and Utility Lifeline Losses | |
| Long-term Indirect Economic Impacts | |

Appendix A: County Listing for the Region

Appendix B: Regional Population and Building Value Data

## General Description of the Region

HAZUS is a regional earthquake loss estimation model that was developed by the Federal Emergency Management Agency and the National Institute of Building Sciences. The primary purpose of HAZUS is to provide a methodology and software application to develop earthquake losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from earthquakes and to prepare for emergency response and recovery.

The earthquake loss estimates provided in this report was based on a region that includes 1 county(ies) from the following state(s):

Utah

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 4,492.86 square miles and contains 5 census tracts. There are over 8 thousand households in the region and has a total population of 25,224 people (2000 Census Bureau data). The distribution of population by State and County is provided in Appendix B.

There are an estimated 7 thousand buildings in the region with a total building replacement value (excluding contents) of 1,199 (millions of dollars). Approximately 99.00 % of the buildings (and 80.00% of the building value) are associated with residential housing.

The replacement value of the transportation and utility lifeline systems is estimated to be 1,469 and 284 (millions of dollars) , respectively.

# Building and Lifeline Inventory

## Building Inventory

HAZUS estimates that there are 7 thousand buildings in the region which have an aggregate total replacement value of 1,199 (millions of dollars) . Appendix B provides a general distribution of the building value by State and County.

In terms of building construction types found in the region, wood frame construction makes up 66% of the building inventory. The remaining percentage is distributed between the other general building types.

## Critical Facility Inventory

HAZUS breaks critical facilites into two (2) groups: essential facilities and high potential loss (HPL) facilities. Essential facilities include hospitals, medical clinics, schools, fire stations, police stations and emergency operations facilities. High potential loss facilities include dams, levees, military installations, nuclear power plants and hazardous material sites.

For essential facilities, there are 1 hospitals in the region with a total bed capacity of 29 beds. There are 10 schools, 2 fire stations, 3 police stations and 1 emergency operation facilities. With respect to HPL facilities, there are 32 dams identified within the region. Of these, 12 of the dams are classified as 'high hazard'. The inventory also includes 9 hazardous material sites, 0 military installations and 0 nuclear power plants.

## Transportation and Utility Lifeline Inventory

Within HAZUS, the lifeline inventory is divided between transportation and utility lifeline systems. There are seven (7) transportation systems that include highways, railways, light rail, bus, ports, ferry and airports. There are six (6) utility systems that include potable water, wastewater, natural gas, crude & refined oil, electric power and communications. The lifeline inventory data is provided in Tables 2 and 3.

The total value of the lifeline inventory is over 1,753.00 (millions of dollars). This inventory includes over 349 kilometers of highways, 62 bridges, 0 kilometers of pipes.

**Table 2: Transportation System Lifeline Inventory**

| System | Component | # locations/ # Segments | Replacement value (millions of dollars) |
|---|---|---|---|
| **Highway** | Bridges | 62 | 26.30 |
| | Segments | 32 | 1,182.30 |
| | Tunnels | 0 | 0.00 |
| | | Subtotal | **1,208.60** |
| **Railways** | Bridges | 0 | 0.00 |
| | Facilities | 0 | 0.00 |
| | Segments | 1 | 15.10 |
| | Tunnels | 0 | 0.00 |
| | | Subtotal | **15.10** |
| **Light Rail** | Bridges | 0 | 0.00 |
| | Facilities | 0 | 0.00 |
| | Segmens | 0 | 0.00 |
| | Tunnels | 0 | 0.00 |
| | | Subtotal | **0.00** |
| **Bus** | Facilities | 1 | 1.10 |
| | | Subtotal | **1.10** |
| **Ferry** | Facilities | 0 | 0.00 |
| | | Subtotal | **0.00** |
| **Port** | Facilities | 0 | 0.00 |
| | | Subtotal | **0.00** |
| **Airport** | Facilities | 6 | 32.00 |
| | Runways | 7 | 213.20 |
| | | Subtotal | **245.30** |
| | | Total | **1,469.90** |

**Table 3: Utility System Lifeline inventory**

| System | Component | # Locations / Segments | Replacement value (millions of dollars) |
|---|---|---|---|
| **Potable Water** | Facilities | 0 | 0.00 |
| | Pipelines | 0 | 0.00 |
| | | Subtotal | **0.00** |
| **Waste Water** | Facilities | 1 | 65.30 |
| | Pipelines | 0 | 0.00 |
| | | Subtotal | **65.30** |
| **Natural Gas** | Facilities | 3 | 3.20 |
| | Pipelines | 0 | 0.00 |
| | | Subtotal | **3.20** |
| **OIL Systems** | Facilities | 2 | 0.20 |
| | Pipelines | 0 | 0.00 |
| | | Subtotal | **0.20** |
| **Electrical Power** | Facilities | 2 | 215.60 |
| | | Subtotal | **215.60** |
| **Communication** | Facilities | 5 | 0.50 |
| | | Subtotal | **0.50** |
| | | Total | **284.80** |

## Earthquake Scenario

HAZUS uses the following set of information to define the earthquake parameters used for the earthquake loss estimate provided in this report.

| | |
|---|---|
| **Scenario Name** | Uintah County 2500 Year Event |
| **Type of Earthquake** | Probabilistic |
| **Fault Name** | NA |
| **Historical Epicenter ID #** | |
| **Probabilistic Return Period** | 2,500 |
| **Longitude of Epicenter** | 0.00 |
| **Latitude of Epicenter** | 0.00 |
| **Earthquake Magnitude** | 7.00 |
| **Depth (Km)** | 0 |
| **Rupture Length (Km)** | 0.00 |
| **Rupture Orientation (degrees)** | 0.00 |
| **Attenuation Function** | |

# Building Damage

## Building Damage

HAZUS estimates that about 2,138 thousand buildings will be at least moderately damaged. This is over 28.00 % of the total number of buildings in the region. There are an estimated 58 buildings that will be completely destroyed. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the HAZUS technical manual. Table 4 below summaries the expected damage by general occupancy for the buildings in the region. Table 5 summaries the expected damage by general building type.

**Table 4: Expected Building Damage by Occupancy**

| | None | | Slight | | Moderate | | Extensive | | Complete | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Count | (%) | Count | (%) | Count | (%) | Count | (%) | Count | (%) |
| Agriculture | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Commercial | 23 | 0.74 | 14 | 0.62 | 18 | 1.15 | 9 | 1.85 | 2 | 2.81 |
| Education | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 |
| Government | 2 | 0.05 | 1 | 0.05 | 1 | 0.09 | 1 | 0.14 | 0 | 0.20 |
| Industrial | 6 | 0.19 | 4 | 0.20 | 6 | 0.37 | 3 | 0.61 | 1 | 0.99 |
| Religion | 1 | 0.04 | 1 | 0.03 | 1 | 0.05 | 0 | 0.07 | 0 | 0.09 |
| Residential | 427 | 13.50 | 394 | 17.81 | 521 | 32.51 | 188 | 39.23 | 22 | 37.8 |
| Single Family | 2,705 | 85.47 | 1,799 | 81.29 | 1,054 | 65.83 | 278 | 58.10 | 34 | 58.1 |
| **Total** | **3,165** | | **2,212** | | **1,602** | | **478** | | **59** | |

**Table 5: Expected Building Damage by Building Type (All Design Levels)**

| | None | | Slight | | Moderate | | Extensive | | Complete | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Count | (%) | Count | (%) | Count | (%) | Count | (%) | Count | (%) |
| Concrete | 11 | 0.02 | 0 | 0.02 | 1 | 0.04 | 0 | 0.05 | 0 | 0.10 |
| MH* | 346 | 10.94 | 339 | 15.30 | 485 | 30.30 | 177 | 37.09 | 21 | 35.55 |
| Precast | 5 | 0.10 | 2 | 0.08 | 3 | 0.21 | 3 | 0.54 | 0 | 0.78 |
| RM* | 392 | 12.35 | 145 | 6.55 | 236 | 14.71 | 131 | 27.30 | 10 | 17.67 |
| Steel | 11 | 0.04 | 1 | 0.04 | 2 | 0.15 | 2 | 0.42 | 0 | 0.63 |
| UM* | 43 | 1.36 | 42 | 1.88 | 54 | 3.34 | 33 | 6.83 | 16 | 27.14 |
| Wood | 2,357 | 74.31 | 1667 | 75.33 | 800 | 49.92 | 125 | 26.13 | 9 | 16.03 |
| **Total** | **3,165** | | **2,212** | | **1,602** | | **478** | | **59** | |

*Note:

RM Reinforced Masonry
URM Unreiforced Masonry
MH Manufactured Housing

## Essential Facility Damage

Before the earthquake, the region had 29 hospital beds available for use. On the day of the earthquake, the model estimates that only 29 hospital beds (100.00%) are available for use by patients already in the hospital and those injured by the earthquake. After one week, 100.00% of the beds will be back in service. By 30 days, 100.00% will be operational.

**Table 6: Expected Damage to Essential Facilities**

| | | # Facilities | | |
|---|---|---|---|---|
| **Classification** | **Total** | **Least Moderate Damage > 50%** | **Complete Damage > 50%** | **Functionality > 50% at day 1** |
| **Hospitals** | 1 | 0 | 0 | 1 |
| **Schools** | 10 | 0 | 0 | 0 |
| **EOCs** | 1 | 0 | 0 | 1 |
| **PoliceStations** | 3 | 0 | 0 | 0 |
| **FireStations** | 2 | 0 | 0 | 0 |

## Transportation and Utility Lifeline Damage

Table 7 provides damage estimates for the transportation system.

**Table 7: Expected Damage to the Transportation Systems**

| System | Component | Number of Locations | | | | |
|---|---|---|---|---|---|---|
| | | Locations/ Segments | With at Least Mod. Damage | With Complete Damage | With Functionality > 50 % | |
| | | | | | After Day 1 | After Day 7 |
| Highway | Segments | 32 | 0 | 0 | 32 | 32 |
| | Bridges | 62 | 0 | 0 | 62 | 62 |
| | Tunnels | 0 | 0 | 0 | 0 | 0 |
| Railways | Segments | 1 | 0 | 0 | 1 | 1 |
| | Bridges | 0 | 0 | 0 | 0 | 0 |
| | Tunnels | 0 | 0 | 0 | 0 | 0 |
| | Facilities | 0 | 0 | 0 | 0 | 0 |
| Light Rail | Segments | 0 | 0 | 0 | 0 | 0 |
| | Bridges | 0 | 0 | 0 | 0 | 0 |
| | Tunnels | 0 | 0 | 0 | 0 | 0 |
| | Facilities | 0 | 0 | 0 | 0 | 0 |
| Bus | Facilities | 1 | 0 | 0 | 1 | 1 |
| Ferry | Facilities | 0 | 0 | 0 | 0 | 0 |
| Port | Facilities | 0 | 0 | 0 | 0 | 0 |
| Airport | Facilities | 6 | 0 | 0 | 6 | 6 |
| | Runways | 7 | 0 | 0 | 7 | 7 |

Note: Roadway segments, railroad tracks and light rail tracks are assumed to be damaged by ground failure only. If ground failure maps are not provided, damage estimates to these components will not be computed.

Tables 8-10 provide information on the damage to the utility lifeline systems. Table 8 provides damage to the utility system facilities. Table 9 provides estimates on the number of leaks and breaks by the pipelines of the utility systems. For electric power and potable water, HAZUS performs a simplified system performance analysis. Table 10 provides a summary of the system performance information.

**Table 8 : Expected Utility System Facility Damage**

| System | # of Locations | | | | |
|---|---|---|---|---|---|
| | Total # | With at Least Moderate Damage | With Complete Damage | with Functionality > 50 % | |
| | | | | After Day 1 | After Day 7 |
| Potable Water | 0 | 0 | 0 | 0 | 0 |
| Waste Water | 1 | 0 | 0 | 1 | 1 |
| Natural Gas | 3 | 0 | 0 | 1 | 3 |
| Oil Systems | 2 | 0 | 0 | 1 | 2 |
| Electrical Power | 2 | 0 | 0 | 1 | 2 |
| Communication | 5 | 0 | 0 | 1 | 5 |

**Table 9 : Expected Utility System Pipeline Damage**

| System | Total Pipelines Length (kms) | Number of Leaks | Number of Breaks |
|---|---|---|---|
| Potable Water | 0 | 0 | 0 |
| Waste Water | 0 | 0 | 0 |
| Natural Gas | 0 | 0 | 0 |
| Oil | 0 | 0 | 0 |

**Table 10: Expected Potable Water and Electric Power System Performance**

| | Total # of Households | Number of Households without Service | | | | |
|---|---|---|---|---|---|---|
| | | At Day 1 | At Day 3 | At Day 7 | At Day 30 | At Day 90 |
| Potable Water | 8,187 | 0 | 0 | 0 | 0 | 0 |
| Electric Power | | 8,187 | 8,187 | 8,187 | 8,187 | 8,187 |

# Induced Earthquake Damage

## Fire Following Earthquake

Fires often occur after an earthquake. Because of the number of fires and the lack of water to fight the fires, they can often burn out of control. HAZUS uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area. For this scenario, the model estimates that there will be 1 ignitions that will burn about 0.02 sq. mi 0.00 % of the region's total area.) The model also estimates that the fires will displace about 8 people and burn about 0 (millions of dollars) of building value.

## Debris Generation

HAZUS estimates the amount of debris that will be generated by the earthquake. The model breaks the debris into two general categories: a) Brick/Wood and b) Reinforced Concrete/Steel. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 0 million tons of debris will be generated. Of the total amount, Brick/Wood comprises 34.00% of the total, with the remainder being Reinforced Concrete/Steel. If the debris tonnage is converted to an estimated number of truckloads, it will require 0 truckloads (@25 tons/truck) to remove the debris generated by the earthquake.

# Social Impact

## Shelter Requirement

HAZUS estimates the number of households that are expected to be displaced from their homes due to the earthquake and the number of displaced people that will require accommodations in temporary public shelters. The model estimates (104 households to be displaced due to the earthquake. Of these, 26 people (out of a total population of 25,224 will seek temporary shelter in public shelters.

## Casualties

HAZUS estimates the number of people that will be injured and killed by the earthquake. The casualties are broken down into four (4) severity levels that describe the extent of the injuries. The levels are described as follows;

- Severity Level 1: Injuries will require medical attention but hospitalization is not needed.
- Severity Level 2: Injuries will require hospitalization but are not considered life-threatening
- Severity Level 3: Injuries will require hospitalization and can become life threatening if not promptly treated.
- Severity Level 4: Victims are killed by the earthquake.

The casualty estimates are provided for three (3) times of day: 2:00 AM, 2:00 PM and 5:00 PM. These times represent the periods of the day that different sectors of the community are at their peak occupancy loads. The 2:00 AM estimate considers that the residential occupancy load is maximum, the 2:00 PM estimate considers that the educational, commercial and industrial sector loads are maximum and 5:00 PM represents peak commute time.

Table 11 provides a summary of the casualties estimated for this earthquake

**Table 11: Casualty Estimates**

| | | Level 1 | Level 2 | Level 3 | Level 4 |
|---|---|---|---|---|---|
| 2 AM | Commercial | 0 | 0 | 0 | 0 |
| | Commuting | 0 | 0 | 0 | 0 |
| | Educational | 0 | 0 | 0 | 0 |
| | Hotels | 1 | 0 | 0 | 0 |
| | Industrial | 1 | 0 | 0 | 0 |
| | Residential | 14 | 2 | 0 | 0 |
| | Single Family | 33 | 6 | 1 | 1 |
| | **Total** | **49** | **8** | **1** | **2** |
| 2 PM | Commercial | 21 | 5 | 1 | 1 |
| | Commuting | 0 | 0 | 0 | 0 |
| | Educational | 8 | 2 | 0 | 0 |
| | Hotels | 0 | 0 | 0 | 0 |
| | Industrial | 4 | 1 | 0 | 0 |
| | Residential | 3 | 0 | 0 | 0 |
| | Single Family | 7 | 1 | 0 | 0 |
| | **Total** | **43** | **9** | **1** | **2** |
| 5 PM | Commercial | 19 | 4 | 1 | 1 |
| | Commuting | 0 | 0 | 0 | 0 |
| | Educational | 0 | 0 | 0 | 0 |
| | Hotels | 0 | 0 | 0 | 0 |
| | Industrial | 2 | 1 | 0 | 0 |
| | Residential | 5 | 1 | 0 | 0 |
| | Single Family | 13 | 2 | 0 | 0 |
| | **Total** | **40** | **8** | **1** | **2** |

# Economic Loss

The total building-related economic loss estimated for the earthquake is $105.80 (millions of dollars), which represents % of the total replacement value of the region's buildings. The following three sections provide more detailed information about these losses.

## Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the earthquake. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the earthquake.

The total building-related losses were 105.80 (millions of dollars); 11 % of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 68 % of the total loss. Table 12 below provides a summary of the losses associated with the building damage.

**Table 12: Building-Related Economic Loss Estimates**

(Millions of dollars)

| Category | Area | Single Family | Other Residential | Commercial | Industrial | Others | Total |
|---|---|---|---|---|---|---|---|
| **Income Loses** | | | | | | | |
| | Wage | 0.00 | 0.46 | 2.67 | 0.20 | 0.17 | 3.50 |
| | Capital-Related | 0.00 | 0.19 | 2.26 | 0.13 | 0.03 | 2.62 |
| | Rental | 2.08 | 1.23 | 1.58 | 0.03 | 0.09 | 5.02 |
| | Relocation | 0.20 | 0.04 | 0.08 | 0.01 | 0.02 | 0.34 |
| | **Subtotal** | **2.28** | **1.93** | **6.60** | **0.37** | **0.30** | **11.48** |
| **Capital Stock Loses** | | | | | | | |
| | Structural | 10.13 | 2.11 | 4.13 | 1.38 | 0.67 | 18.42 |
| | Non_Structural | 35.78 | 7.91 | 7.88 | 3.63 | 1.38 | 56.58 |
| | Content | 10.56 | 1.67 | 3.86 | 2.03 | 0.71 | 18.84 |
| | Inventory | 0.00 | 0.00 | 0.16 | 0.31 | 0.02 | 0.48 |
| | **Subtotal** | **56.48** | **11.69** | **16.02** | **7.35** | **2.78** | **94.32** |
| | **Total** | **58.76** | **13.62** | **22.62** | **7.72** | **3.08** | **105.80** |

## Transportation and Utility Lifeline Losses

For the transportation and utility lifeline systems, HAZUS computes the direct repair cost for each component only. There are no losses computed by HAZUS for business interruption due to lifeline outages. Tables 13 & 14 provide a detailed breakdown in the expected lifeline losses.

HAZUS estimates the long-term economic impacts to the region for 15 years after the earthquake. The model quantifies this information in terms of income and employment changes within the region. Table 15 presents the results of the region for the given earthquake.

**Table 13: Transportation System Economic Losses**
(Millions of dollars)

| System | Component | Inventory Value | Economic Loss | Loss Ratio (%) |
|---|---|---|---|---|
| **Highway** | Segments | 1,182 | 0 | 0.00 |
| | Bridges | 26 | 0 | 0.30 |
| | Tunnels | 0 | 0 | 0.00 |
| | Subtotal | **1208.60** | **0.10** | |
| **Railways** | Segments | 15 | 0 | 0.00 |
| | Bridges | 0 | 0 | 0.00 |
| | Tunnels | 0 | 0 | 0.00 |
| | Facilities | 0 | 0 | 0.00 |
| | Subtotal | **15.10** | **0.00** | |
| **Light Rail** | Segments | 0 | 0 | 0.00 |
| | Bridges | 0 | 0 | 0.00 |
| | Tunnels | 0 | 0 | 0.00 |
| | Facilities | 0 | 0 | 0.00 |
| | Subtotal | **0.00** | **0.00** | |
| **Bus** | Facilities | 1 | 0 | 0.00 |
| | Subtotal | **1.10** | **0.00** | |
| **Ferry** | Facilities | 0 | 0 | 0.00 |
| | Subtotal | **0.00** | **0.00** | |
| **Port** | Facilities | 0 | 0 | 0.00 |
| | Subtotal | **0.00** | **0.00** | |
| **Airport** | Facilities | 32 | 7 | 22.04 |
| | Runways | 213 | 0 | 0.00 |
| | Subtotal | **245.30** | **7.10** | |
| | **Total** | **1469.90** | **7.10** | |

**Table 14: Utility System Economic Losses**

(Millions of dollars)

| System | Component | Inventory Value | Economic Loss | Loss Ratio (%) |
|---|---|---|---|---|
| Communication | Facilities | 0.50 | 0.05 | 10.55 |
| | **Subtotal** | **0.49** | **$0.05** | |
| Electrical Power | Facilities | 215.60 | 13.35 | 6.19 |
| | **Subtotal** | **215.60** | **$13.35** | |
| Natural Gas | Pipelines | 0.00 | 0.00 | 0.00 |
| | Facilities | 3.20 | 0.25 | 7.89 |
| | **Subtotal** | **3.20** | **$0.25** | |
| Oil Systems | Pipelines | 0.00 | 0.00 | 0.00 |
| | Facilities | 0.20 | 0.01 | 6.68 |
| | **Subtotal** | **0.20** | **$0.01** | |
| Potable Water | Pipelines | 0.00 | 0.00 | 0.00 |
| | Facilities | 0.00 | 0.00 | 0.00 |
| | **Subtotal** | **0.00** | **$0.00** | |
| Waste Water | Pipelines | 0.00 | 0.00 | 0.00 |
| | Facilities | 65.30 | 0.00 | 0.00 |
| | **Subtotal** | **65.27** | **$0.00** | |
| | **Total** | **284.76** | **$13.67** | |

**Table 15. Indirect Economic Impact**
**(with outside aid)**

| | LOSS | Total | % |
|---|---|---|---|
| **First Year** | | | |
| | Employment Impact | 0 | 0.00 |
| | Income Impact | (23) | -14.36 |
| **Second Year** | | | |
| | Employment Impact | 0 | 0.00 |
| | Income Impact | (25) | -15.69 |
| **Third Year** | | | |
| | Employment Impact | 0 | 0.00 |
| | Income Impact | (26) | -16.18 |
| **Fourth Year** | | | |
| | Employment Impact | 0 | 0.00 |
| | Income Impact | (26) | -16.18 |
| **Fifth Year** | | | |
| | Employment Impact | 0 | 0.00 |
| | Income Impact | (26) | -16.18 |
| **Years 6 to 15** | | | |
| | Employment Impact | 0 | 0.00 |
| | Income Impact | (26) | -16.18 |

## Appendix A: County Listing for the Region

Uintah,UT

## Appendix B: Regional Population and Building Value Data

| State | County Name | Population | Building Value (millions of dollars) | | |
|---|---|---|---|---|---|
| | | | Residential | Non-Residential | Total |
| **Utah** | | | | | |
| | Uintah | 25,224 | 955 | 244 | 1,199 |
| **Total State** | | **25,224** | **955** | **244** | **1,199** |
| **Total Region** | | **25,224** | **955** | **244** | **1,199** |

## Glossary of Terms

**Abutment** (dam) - the valley side against which a dam is constructed.

**Acre-foot of water** - approximately 326,000 gallons of water, or approximately a football field covered by one foot of water.

**Active Faults** - An active fault is defined as a fault displaying evidence of displacement along one or more of its traces during Holocene time (about the last 11,000 years).

**Aftershocks** - earthquakes during the seconds, hours, days to months following a larger earthquake (main shock) in the same general region.

**Alluvial fan** - a cone-shaped deposit of stream sediments, generally deposited at the base of a mountain where a stream encounters flatter terrain.

**Amplitude** (seismic waves) - the maximum height of a wave crest or depth of a trough. Amount the ground moves as a seismic wave passes, as measured from a seismogram.

**ATV** All Terrain Vehicle

**Avalanche path** - the area in which a snow avalanche runs; generally divided into starting zone, track, and runout zone.

**Basin and Range physiographic province** - consists of north-south-trending mountain ranges separated by valleys, bounded by the Rocky Mountains and the Colorado Plateau to the east and the Sierra-Cascade Mountains to the west (includes western Utah).

**Bearing capacity** - the load per unit area which the ground can safely support without excessive yield.

**Bedrock** - solid in-place rock, sometimes exposed and sometimes concealed beneath the soil.

**Collapsible soil** (hydrocompaction) - loose, dry, low-density soil that decreases in volume or collapses when saturated for the first time following deposition.

**Critical Areas -** Environmentally sensitive areas which include wetlands fish and wildlife habitat conservation areas; geologically hazardous areas; areas with a critical recharging effect on aquifers used for potable water; and frequently

flooded areas. Critical areas have measurable characteristics which, when combined, create a value for or potential risk to public health, safety and welfare.

**Critical/Essential Facilities -** Structures meeting one or more of the following criteria:

- Fire stations, police stations, storage facilities for vehicles/equipment needed after a hazard event, and emergency operation centers.
- Hospitals, nursing homes, and housing which is likely to contain occupants who may not be sufficiently mobile to avoid injury or death as a result of a hazardous event
- Public and private utility facilities, which are vital to maintaining or restoring normal services to, damaged areas after a hazardous event.
- Structures or facilities that produce, store, or use highly flammable, explosive, volatile, toxic and/or water reactive materials

**Debris flow** - involves the relatively rapid, viscous flow of surficial material that is predominantly coarsegrained.

**Debris slide** - involves predominantly coarse-grained material moving mainly along a planar surface.

**Delta** - a deposit of sediment formed at the mouth of a river where it enters an ocean or lake.

**Earth flow** - involves fine-grained material that slumps away from the top or upper part of a slope, leaving a scarp, and flows down to form a bulging toe.

**Earthquake** - a sudden motion or trembling in the earth as fracture and movement of rocks along a fault release stored elastic energy.

**Earthquake Fault Zone** - earthquake fault zones are regulatory zones around active faults. The zones are used to prohibit the location of critical facilities and structures designed for human occupancy from being built astride an active fault. Earthquake Fault Zones are plotted on topographic maps at a scale of 1-inch equals 2,000 feet. The zones vary in width, but average about one-quarter mile wide.

**Earthquake induced Seiches -** Earthquake generated water waves causing inundation around shores or lakes and reservoirs.

**Epicenter** - the point on the earth's surface directly above the focus of an earthquake.

**Erosion** - the removal of earth or rock material by many types of processes, for example, water, wind, or ice action.

**Expansive soil and rock** - soil and rock which contain clay minerals that expand and contract with changes in moisture content.

**Fault** - A -break in the earth along which movement occurs.

**Fault segment** - section of a fault that behaves independently from adjacent sections.

**Fault zone** - an area containing numerous faults.

**FEMA** - The Federal Emergency Management Agency was authorized under Section 404 of the Stanford Act. Provides funding for hazard mitigation projects that are cost-effective and comply with existing post-disaster mitigation programs and activities. These projects cannot be funded through other programs to be eligible.

**Fill** - material used to raise the surface of the land generally in a low area.

**Fire-resistant vegetation** - plants that do not readily ignite and burn when subjected to fire because of inherent physiological characteristics of the species such as moisture content, fuel loading, and fuel arrangement.

**Flood plain** - an area adjoining a body of water or natural stream that has been or may be covered by flood water.

**Flood way** - An area of land immediately adjacent to a stream or river channel that, in times of flooding, becomes an enlarged stream or river channel and carries the floodwater with the highest velocity.

**Floodplain** - an area adjoining a body of water or natural stream that has been or may be covered by floodwater.

**Floodplain (100 year)** - Floodplains that have the potential to flood once every 100 years or that has a one percent chance of flooding equal to or in excess of that in any given year.

**Fluvial** - concerning or pertaining to rivers or streams.

**Focus** - the point of origin of an earthquake within the earth, and the origin of the earthquake's seismic waves.

**Formation** (geologic) - a mappable rock unit consisting of distinctive features/rock types separate from units above and below.

**Frequency** (seismic waves) - the number of complete cycles of a seismic wave passing a point during one second.

**Fuel** (fire) - vegetation, building material, debris, and other substances that will support combustion.

**Fuel break** - a change in fuel continuity, type of fuel, or degree of flammability of fuel in a strategically located strip of land to reduce or hinder the rate of fire spread.

**Fuel type** - a category of vegetation used to indicate the predominate cover of an area.
**Glacial moraine** - debris (sand to boulders) transported and deposited by glacial ice along a glacier's sides or terminus.

**Graben** - a block of earth downdropped between two faults.

**Gradient** (slope) - a measure of the slope of the land surface.

**Ground failure** - a general term referring to any type of ground cracking or subsidence, including landslides and liquefaction-induced cracks.

**Ground shaking** - the shaking or vibration of the ground during an earthquake.

**Ground water** - that portion of subsurface water which is in the zone of saturation.

**Gypsiferous deposits** - soil or rock containing gypsum, which can be subject to dissolution.

**Gypsum** - a mineral composed of hydrated calcium sulfate. A common mineral of evaporites.

**Hazard Mitigation Plan** - The plan resulting from a systematic evaluation of the nature and extent of vulnerabilities posed by a hazard present in society that includes the strategies needed to minimize future vulnerability to hazards.

**Hazard Mitigation** - Any action taken to reduce or permanently eliminate the long-term risk to human life and property and the environment posed by a hazard.

**HAZUS -** Hazard United States. Earthquake Loss estimation software using GIS databases developed by FEMA.

**Head** (landslide) - the upper parts of the slide material along the contact between the disturbed material and the main scarp.

**Holocene** - geologic epoch covering the last 10,000 years (after the last Ice Age).

**Igneous rocks** - rocks formed by cooling and hardening of hot liquid material (magma), including rocks cooled within the earth (for example, granite) and those that cooled at the ground surface as lavas (such as basalt).

**Impermeable** - materials having a texture that does not permit water to move through.
Intermountain seismic belt - zone of pronounced seismicity, up to 120 miles wide and 800 miles long, extending from Arizona through central Utah to northwestern Montana.

**Lacustrine** - concerning or pertaining to lakes.

**Lake Bonneville** - a large, ancient lake that existed 30,000 to 12,000 years ago and covered nearly 20,000 square miles in Utah, Idaho, and Nevada. The lake covered many of Utah's valleys, and was almost 1,000 feet deep in the area of the present Great Salt Lake.

**Lake Bonneville sediments** - sediments deposited by Lake Bonneville, found in the valleys, which range from gravels and sands to clays.

**Landslide** - a general term for a mass of earth or rock, which moves down slope by flowing, spreading, sliding, toppling, or falling (see slope failure).

**Lateral spread** - lateral down slope displacement of soil layers, generally several feet or more, above a liquefied layer.

**Levee** (flood) - a berm or dike used to contain or direct water, usually without an outlet or spillway.

**Liquefaction** - sudden large decrease in shear strength of a cohesionless soil (generally sand or silt) caused by collapse of soil structure and temporary increase in pore-water pressure during earthquake ground shaking.

**Magnitude** (earthquake) - a quantity characteristic of the amplitude of the ground motion of an earthquake. The most commonly used measurement is the Richter magnitude scale; a logarithmic scale based on the motion that would be measured by a standard type of seismograph 60 miles from the earthquake's epicenter.

**Metamorphic rocks** - rocks formed by high temperatures and/or pressures (for example, quartzite formed from sandstone).

**Middle Rocky Mountains physiographic province** - consists of mountainous terrain of high relief, extending from northern Utah to Wyoming, Idaho, and Montana (includes the Wasatch Range and Uinta Mountains in Utah).

**Modified Mercalli intensity** (MMI) - the most commonly used intensity scale in the U.S.; it is a measure of the severity of earthquake shaking at a particular site as determined from its effect on the earth's surface, man, and man's structures.

**Montmorillonite** - a clay mineral characterized by expansion upon wetting and shrinking upon drying.

**Natural vegetation** - native plant life existing on a piece of land before any form of development.

**Normal fault** - fault caused by crustal extension in which relative movement on opposite sides is primarily vertical; for example, the Wasatch fault.

**Oolite** - spherical grains of carbonate sand with a brine shrimp fecal pellet nucleus.
Outlet (dam) - a conduit through which controlled releases can be made from the reservoir.

**Peat** - unconsolidated surficial deposit of partially decomposed plant remains.

**Period** (geologic) - a standard (world-wide) geologic time unit.

**Permeability** - the capacity of a porous rock or soil for transmitting a fluid.

**Physiographic province** - a region whose pattern of relief features or landforms differs significantly from that of adjacent regions.

**Piping** (problem soil and rock) - a weak incoherent layer in unconsolidated deposits that acts as a channel directing the movement of water. As the layer becomes saturated it conducts water to a free face (cliff or stream bank for example) that intersects the layer, and material exits out a "pipe" formed in the free face. Piping can occur in a dam as the result of progressive development of internal erosion by seepage.

**Pore space** - the open spaces in a rock or soil between solid grains. The spaces may be filled with gas (usually air) or liquid (usually water).

**Porosity** - the ratio of the volume of pore space in rock or soil to the volume of its mass, expressed as percentage.

**Probable Maximum Flood** (PMF) - a flood that would result from the most severe combination of critical meteorological and hydrologic conditions possible in a region.

**Probable Maximum Precipitation** (PMP) - the maximum amount and duration of precipitation that can be expected to occur on a drainage basin.
Problem soil and rock - geologic materials that are susceptible to volumetric changes, collapse, subsidence, or other engineering geologic problems.

**Project Impact -** An initiative of the Federal Emergency Management Agency intended to modify the way in which the United States handles natural disasters. The Goal of Project Impact from a Federal Government perspective is to reduce the personal and economic costs of hazard events by bringing together the private and public sector to better enable the citizens of a community to protect themselves from natural hazards.

**Quaternary** - a geologic time period covering the last 1.6 million years.

**Recurrence interval** - the length of time between occurrences of a particular event (an earthquake, for example).

**Rock fall**- abrupt free fall or down slope movement, such as rolling or sliding, of loosened blocks or boulders from an area of bedrock. The rock-fall runout zone is the area below a rock-fall source which is at risk from falling rocks.

**Rock topple** - forward rotation movement of a rock unit(s) about some pivot point.

**Runout zone** (avalanche) - where a snow avalanche slows down and comes to rest (deposition zone). For large avalanches, the runout zone can include a powder- or wind-blast zone that extends far beyond the area of snow deposition.

**Sand boil** (earthquake) - deposit of sandy sediment ejected as water and sand to the surface, formed when ground shaking has caused liquefaction at depth.

**Scarp** - a relatively steeper slope separating two more gentle slopes. Scarps can form as result of earthquake faulting.

**Sediment** - material that is in suspension, is being transported, or has been moved from its site of origin by water, ice, or wind, and has come to rest on the earth's surface either above or below the sea level.

**Sedimentary rocks** - rocks formed from loose sediment such as sand, mud, or gravel deposited by water, ice, or wind, and then hardened into rock (for example, sandstone); or formed by dissolved minerals precipitating out of solution to form rock (for example, tufa).

**Seiche** - a standing wave generated in a closed body of water such as a lake or reservoir. Ground shaking, tectonic tilting, sub aqueous fault rupture, or landsliding into water can all generate a seiche.

**Seismic waves** - vibrations in the earth produced during earthquakes.

**Seismicity** - seismic or earthquake activity.

**Sensitive clay** - clay soil that experiences a particularly large loss of strength when disturbed. Deposits of sensitive clay are subject to failure during earthquake ground shaking.

**Shear strength** - the internal resistance that tends to prevent adjacent parts of a solid from "shearing" or sliding past one another parallel to the plane of contact. It is measured by the maximum shear stress that can be sustained without failure.

**Shear stress** - a stress causing adjacent parts of a solid to slide past one another parallel to the plane of contact.

**Slope failure** - a general term referring to any type of natural ground movement on a sloping surface (see landslide).
**Slump** - a slope failure that slides along a concave rupture surface. Generally slumps do not move very far from the source area.

**Snow avalanche** - a rapid down slope movement of a mass of snow, ice, and debris.

**Stafford Act** Robert T. Stafford Disaster Relief and emergency Assistance Act, PL 100-707, signed into law November 23 1988: amended the Disaster Relief Act of 1974, PL 93-288

**Starting zone** (avalanche) - where the unstable snow or ice breaks loose and starts to slide.
**Subsidence** - a settling or sinking of the earth's crust.

**Surface fault rupture** (surface faulting) - propagation of an earthquake-generated fault rupture to the ground surface, displacing the surface and forming a scarp.

**Tectonic subsidence** - subsidence (down dropping) and tilting of a basin on the down dropped side of a fault during an earthquake.

**Toe** (landslide) - the margin of disturbed material most distant from the main scarp.

**Track** (avalanche) - the slope or channel down which a snow avalanche moves at a fairly uniform speed.

**Unconsolidated basin fill** - uncemented and nonindurated sediment, chiefly clay, silt, sand, and gravel, deposited in basins.

**Urban area** - a geographical area, usually of incorporated land, covered predominately by engineered structures including homes, schools, commercial buildings, service facilities, and recreational facilities.

**Urban/Wildland Interface** (Urwin) - a geographical area where two different environments, wildland and urban residential, meet and affect each other.

**Velocity** (ground motion) - the rate of displacement of an earth particle caused by passage of a seismic wave.

**Wasatch fault** - a normal fault that extends over 200 miles from Malad City, Idaho to Fayette, Utah, and trends along the western front of the Wasatch Range.

**Watershed** - the area of land above a reference point on a stream or river, which contributes runoff to that stream.

**Weathering** - a group of processes (such as the chemical action of air, rain water, plants, and bacteria and the mechanical action of temperature changes) whereby rocks on exposure to the weather change in character, decay, and finally crumble into soil.
**Wildfire** - uncontrolled fire burning in vegetation.

**Wildland area** - a geographical area of unincorporated land covered predominately by natural vegetation.

**Wildland Urban Interface -** Wildland vegetation and forested areas adjacent to or intermingled with residential developments.

**Zone of deformation** (earthquake) - the width of the area of surface faulting over which earth materials have been disturbed by fault rupture, tilting, or subsidence.

## List of Acronyms and Recognized Abbreviations

| | |
|---|---|
| AGRC | Automated Geographic Reference Center |
| AOG | Association of Governments |
| Assoc. | Association |
| ATV | All Terrain Vehicle |
| Bldg. | Building |
| BLM | Bureau of Land Management |
| BOR | Bureau of Reclamation |
| Bur. | Bureau |
| CEM | Comprehensive Emergency Management |
| Corp. | Corporation |
| CRS | Community Rating System |
| Dept. | Department |
| DESHS | Division of Emergency Services and Homeland Security |
| Div | Division |
| DMA 2000 | Disaster Mitigation Act of 2000 |
| DOT | Department of Transportation |
| DNR | Division of Natural Resources |
| EOC | Emergency Operations Center |
| EOP | Emergency Operations Plan |
| EPA | Environmental Protection Agency |
| ESRI | Environmental Systems Research Institute |

| | |
|---|---|
| FEMA | Federal Emergency Management Agency |
| FFSL | Forestry Fire and State Lands |
| FIRM | Flood Insurance Rate Map |
| FIS | Flood Insurance Study |
| FS | Forest Service |
| GIS | Geographic Information Systems |
| HAZMAT | Hazardous Materials |
| HAZUS MH | Hazards United States |
| ICS | Incident Command System |
| LEPC | Local Emergency Planning Committee |
| MSL | Mean Sea Level |
| NOAA | National Oceanic and Atmospheric Administration |
| NPS | National Park Service |
| OSHA | Occupational Safety and Health Administration |
| PDM | Pre-Disaster Mitigation |
| PDSI | Palmer Drought Severity Index |
| SCS | Soil Conservation Service |
| SEUALG | Southeastern Utah Association of Local Governments |
| SLC | Salt Lake City |
| SPI | Standardized Precipitation Index |
| SWSI | Surface Water Supply Index |
| UGS | Utah Geological Survey |
| URWIN | Urban-Rural Wildland Interface Zone |

| | |
|---|---|
| USACE | United States Army Corps of Engineers |
| USGS | United States Geological Survey |
| UT. | Utah |
| WFRC | Wasatch Front Regional Council |

## POPULATION

The Uintah Basin was originally established as a farming and ranching region by a sparse population of Caucasian settlers around the turn of the century and did not see a significant increase in population until oil was first discovered in Uintah County in 1948. Then in the late 1950's and early 1960's the Uintah and Daggett County populations increased dramatically during the construction of Flaming Gorge Dam.

> Upon completion of the project, Daggett County suffered a tremendous out-migration and lost about 60 percent of its population by 1965. Daggett County's population in 1970 was 666, 1980 - 769 and 1990 - 690.

The most impressive growth took place with the "oil boom"in the early 1970s when the Uintah Basin grew at nearly twice the overall rate of the state after being behind in the statewide growth for at least 40 years. The growth took place primarily in Uintah and Duchesne Counties. Duchesne County's population began its largest increase with the development of the Altamont and Bluebell oil fields.

> Duchesne County experienced a net increase of 5,250 people between 1970 and 1980--compared to only 220 people during the 1960s. Duchesne County had 7,299 in 1970 and increased by 71 percent to 12,565 people by 1980, and 12,645 in 1990.

Uintah County's growth from 1960 to 1980 was the direct result of large construction projects--like Flaming Gorge Dam, Central Utah Water Projects, and the start-up phases of the White River Oil Shale facilities and the Deseret Generation &Transmission Power Plant, as well as, the exploration and extraction of oil.

Uintah County experienced a net growth of 1,200 people between 1960 and 1970, and grew by 7,822 people between 1970 and 1980 representing a 62 percent population increase. Uintah County' population in 197- was 12,684, 1980 - 20,506, and 1990 - 22,211.

Population figures for the Uintah Basin from 1990 to 1999 further illustrate the instability of the area's economic base. Growth rates between 1994 to 1996 show the latest boom or economic upswing and the three years following show the results of the most recent recessionary period and bust side of the cycle: decreasing population growths - Daggett County -6.2% and -5.3%, Duchesne County -0.2% and Uintah County -0.8%. Population forecasts by the Utah State Office of Planning and Budget for the Uintah Basin are projected to increase, but at very low growth rates. These estimates are based on the feeling that oil prices will not dramatically increase and that the development of a synfuels (oil shale and tar sands) will not emerge again until the energy prices and demands justify it.

The latest population ***estimate*** for the Uintah Basin stands at 40,147 (December 1999). Of this amount, 25,029 of the people reside in Uintah County with about 7,111of those in Vernal City (the largest community in the Basin) and 1,466 in neighboring Naples City. Duchesne County consists of 14,381 of the population, with about 4,292 people residing in Roosevelt City and 1,447 in Duchesne City. Daggett County only consists of 737 of the Basin's population with about 256 residing in the Town of Manila.

## UINTAH BASIN POPULATION ESTIMATES

| DAGGETT COUNTY | | | | | | |
|---|---|---|---|---|---|---|
| As of July 1 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 |
| Total Population | 750 | 768 | 803 | 753 | 713 | 737 |
| of Change from Prior Year | 7.1% | 2.4% | 4.6% | -6.2% | -5.3% | 3.4% |

| DUCHESNE COUNTY | | | | | | |
|---|---|---|---|---|---|---|
| As of July 1 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 |
| Total Population | 13,500 | 13,549 | 14,032 | 14,402 | 14,376 | 14,381 |
| % of Change from Prior Year | 2.3% | .04% | 3.6% | 2.6% | -0.2% | .035% |

| UINTAH COUNTY | | | | | | |
|---|---|---|---|---|---|---|
| As of July 1 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 |
| Total Population | 24,700 | 24,335 | 24,276 | 24,637 | 24,436 | 25,029 |
| % of Change from Prior Year | 4.7% | -1.5% | -0.2% | 1.5% | -0.8% | 2.4% |

| STATE OF UTAH | | |
|---|---|---|
| As of July 1 | 1998 | 1999 |
| Total Population | 2,082,502 | 2,121,053 |
| % of Change from Prior Year | | 1.9% |

**1998 Population Estimates for Cities & Towns in the Region**

| DAGGETT COUNTY | | DUCHESNE COUNTY | | UINTAH COUNTY | |
|---|---|---|---|---|---|
| Manila Town | 256 | Roosevelt City | 4,292 | Vernal City | 7,111 |
| Remainder | 457 | Duchesne City | 1,447 | Naples City | 1,466 |
| | | Myton City | 519 | Ballard City | 735 |
| | | Altamont Town | 192 | Remainder | 15,124 |
| | | Tabiona Town | 137 | | |
| | | Remainder | 6,587 | | |

Source: Utah Governor's Office of Planning and Budget

Native Americans are a significant segment of the Uintah Basin population. Approximately 3,350 members of the Ute Tribe live on the Uintah and Ouray Indian Reservation. There are 1,270 Hispanics, 142 Asian/ Pacific Islander, and 30 Blacks for a total minority population of 4,801.

Based on 1996 estimates, "Population by Ethnic Groups and Sex show that Daggett County has a total population of 750, with 27 minorities. The total female population is 367 with 14 being minority. Duchesne County has a total population of 13,500, with 1,375 minorities. The total female population is 6,683 with 722 being minority. Uintah County has a total population of 24,700 with 3,435 minorities. The total female population is 12,477 with 1,771 being minority.

## POPULATION AND EMPLOYMENT BY ETHNIC GROUP AND SEX FOR DAGGETT

| DAGGETT COUNTY | Total Population | Civilian Labor Force | Total Employed |
|---|---|---|---|
| Both Sexes Total | 750 | 441 | 418 |
| Black | 0 | 0 | 0 |
| Native American | 7 | 5 | 5 |
| Asian/Pacific | 4 | 0 | 0 |
| Hispanic | 16 | 6 | 6 |
| Total Minority | 27 | 11 | 11 |
| Non-Minority | 723 | 430 | 407 |
| Females Total | 367 | 171 | 150 |
| Black | 0 | 0 | 0 |
| Native American | 1 | 0 | 0 |
| Asian/Pacific | 2 | 0 | 0 |
| Hispanic | 11 | 3 | 3 |
| Total Minority | 14 | 3 | 3 |
| Non-Minority | 354 | 168 | 147 |

## POPULATION AND EMPLOYMENT BY ETHNIC GROUP AND SEX FOR DUCHESNE COUNTY

| DUCHESNE COUNTY | Total Population | Civilian Labor Force | Total Employed |
|---|---|---|---|
| Both Sexes Total | 13500 | 5657 | 5093 |
| Black | 15 | 8 | 7 |
| Native American | 795 | 268 | 212 |
| Asian/Pacific | 41 | 17 | 16 |
| Hispanic | 524 | 199 | 149 |
| Total Minority | 1375 | 492 | 384 |
| Non-Minority | 12125 | 5165 | 4709 |
| Females Total | 6683 | 2266 | 2053 |
| Black | 6 | 3 | 3 |
| Native American | 424 | 111 | 94 |
| Asian/Pacific | 29 | 9 | 9 |
| Hispanic | 263 | 94 | 74 |
| Total Minority | 722 | 218 | 180 |
| Non-Minority | 5961 | 2048 | 1873 |

## POPULATION AND EMPLOYMENT BY ETHNIC GROUP AND SEX FOR UINTAH COUNTY

| UINTAH COUNTY | Total Population | Civilian Labor Force | Total Employed |
|---|---|---|---|
| Both Sexes Total | 24700 | 9911 | 9180 |
| Black | 15 | 11 | 11 |
| Native American | 2581 | 814 | 649 |
| Asian/Pacific | 95 | 34 | 32 |
| Hispanic | 744 | 243 | 225 |
| Total Minority | 3435 | 1102 | 917 |
| Non-Minority | 21265 | 8809 | 8263 |
| Females Total | 12477 | 4068 | 3810 |
| Black | 5 | 2 | 2 |
| Native American | 1343 | 357 | 281 |
| Asian/Pacific | 53 | 16 | 15 |
| Hispanic | 370 | 93 | 85 |
| Total Minority | 1771 | 467 | 383 |
| Non-Minority | 10706 | 3601 | 3427 |

## POPULATION AND EMPLOYMENT BY ETHNIC GROUP AND SEX FOR THE UINTAH BASIN

| UINTAH BASIN | Total Population | Civilian Labor Force | Total Employed |
|---|---|---|---|
| Both Sexes Total | 38950 | 16009 | 14691 |
| Black | 30 | 19 | 18 |
| Native American | 3350 | 1075 | 652 |
| Asian/Pacific | 142 | 54 | 51 |
| Hispanic | 1279 | 447 | 379 |
| Total Minority | 4801 | 1595 | 1304 |
| Non-Minority | 34149 | 14414 | 13387 |
| Females Total | 19527 | 6505 | 6013 |
| Black | 11 | 5 | 5 |
| Native American | 1753 | 464 | 382 |
| Asian/Pacific | 86 | 25 | 24 |
| Hispanic | 642 | 189 | 162 |
| Total Minority | 2491 | 684 | 563 |
| Non-Minority | 11462 | 3828 | 3615 |

Source: Utah Department of Employment Security, Labor Market Info. Services, 1996

Even though actual births have out numbered the amount of deaths within the Uintah Basin since 1970, the boom and bust cycles have been most evident in the migration patterns in and out of the area. The downturn period of the late1970's, mid 1980's and early 1990's have shown a tremendous exit of people from the area. Regardless of this pattern, along with a lower population growth forecast for the next 25 years, emphasizes the need for economic development and stabilized growth in order to keep individuals in the area.

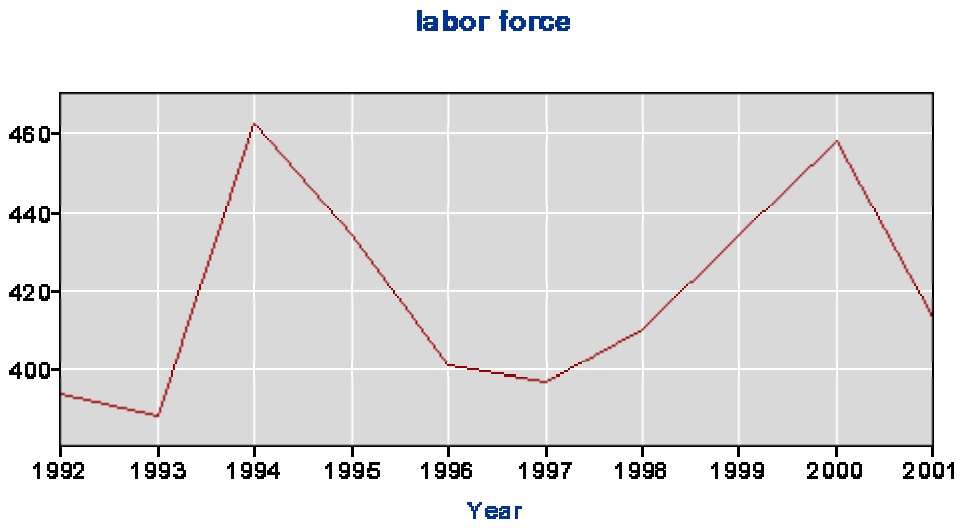
# EMPLOYMENT

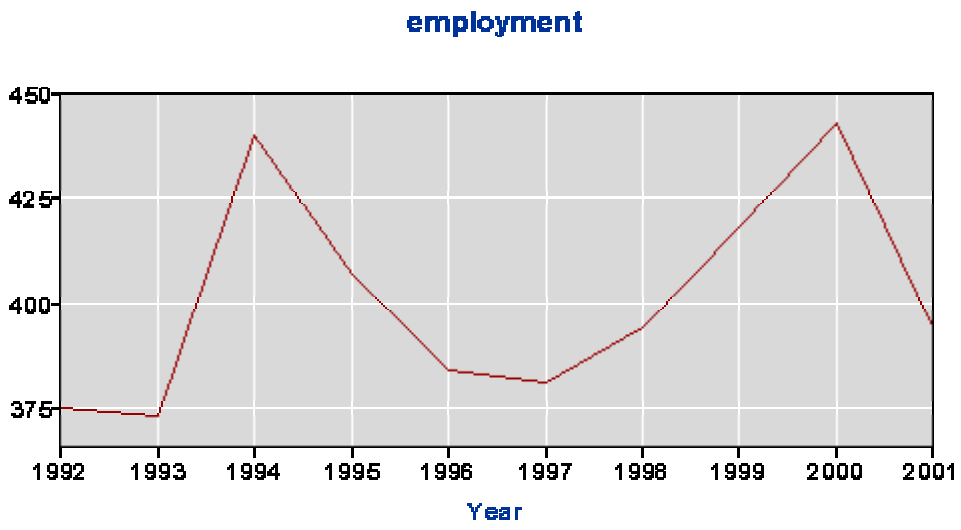
## Daggett County

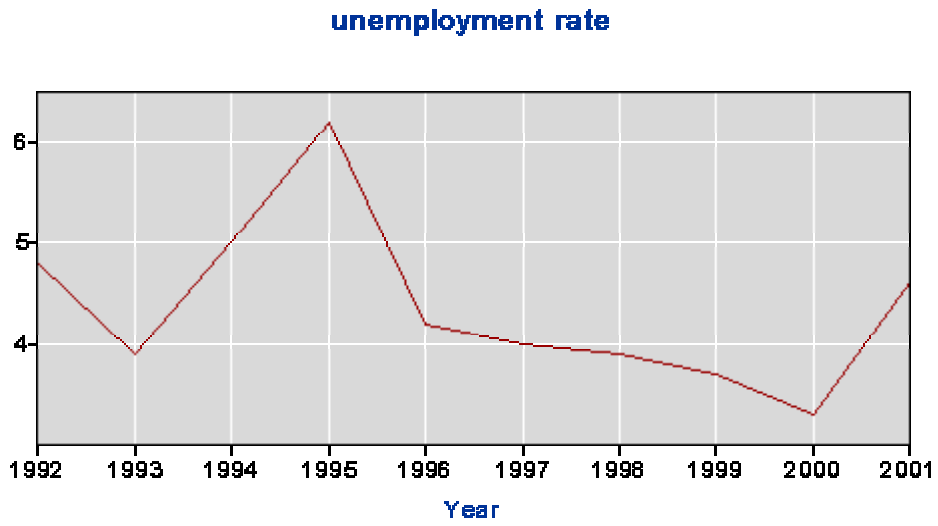
**Area:** Daggett County, UT

**Area Type:** **COUNTIES** AND EQUIVALENTS

**State/Region/Division:** UTAH






| Year | Period | labor force | employment | unemployment | unemployment rate |
|---|---|---|---|---|---|
| 1992 | Annual | 394 | 375 | 19 | 4.8 |
| 1993 | Annual | 388 | 373 | 15 | 3.9 |
| 1994 | Annual | 463 | 440 | 23 | 5.0 |
| 1995 | Annual | 434 | 407 | 27 | 6.2 |
| 1996 | Annual | 401 | 384 | 17 | 4.2 |
| 1997 | Annual | 397 | 381 | 16 | 4.0 |
| 1998 | Annual | 410 | 394 | 16 | 3.9 |
| 1999 | Annual | 434 | 418 | 16 | 3.7 |
| 2000 | Annual | 458 | 443 | 15 | 3.3 |
| 2001 | Annual | 413 | 394 | 19 | 4.6 |

## DAGGETT COUNTY MAJOR EMPLOYERS

| | | |
|---|---|---|
| Flaming Gorge Lodge | Daggett County | Daggett Co. School Dist. |
| US Forest Service | Red Canyon Lodge | US Bureau of Reclamation |
| | Flaming Gorge Corp. | |

Source: Utah Governor's Office of Planning & Budget, Department of Workforce Services

Second quarter 1999 nonfarm employment in Daggett County rose 3.1 percent, from 456 to 470 jobs, compared to second quarter 1998 data. The employment rate in Daggett County was reduced from an estimated 4.7 percent for second quarter 1998 to 3.6 percent in second quarter 1999.
Trade added nine new positions, most at grocery stores and a few at eating and drinking establishments. **Government** grew 2.3 percent by adding five jobs. Federal and state positions decreased for environmental and social services. Local government jobs expanded for roadwork and corrections, but contracted for education and transportation. **Services** reported only slight growth. Lodging saw an increase, but these were offset by losses for engineering and management services. Finally, **Construction** also increased slightly as road repair and plumbing/hearing/air conditioning grew. However, losses in concrete work nearly offset the gains. **Manufacturing** reported no change in employment, while **Transportation, Communications** and **Public Utilities** showed a decrease of two portions related to electric and gas service.

"Covered agriculture" jobs in Daggett County remained unchanged, as sic jobs were reported in the second quarter of 1998 and in second quarter 1999. Ranching activities dominated. It should be noted that "covered agricultural" employment is not included in total nonagricultural employment discussed above. Moreover, many jobs in agriculture are not subject to unemployment insurance reporting requirements. As a result they are not discussed in this report.

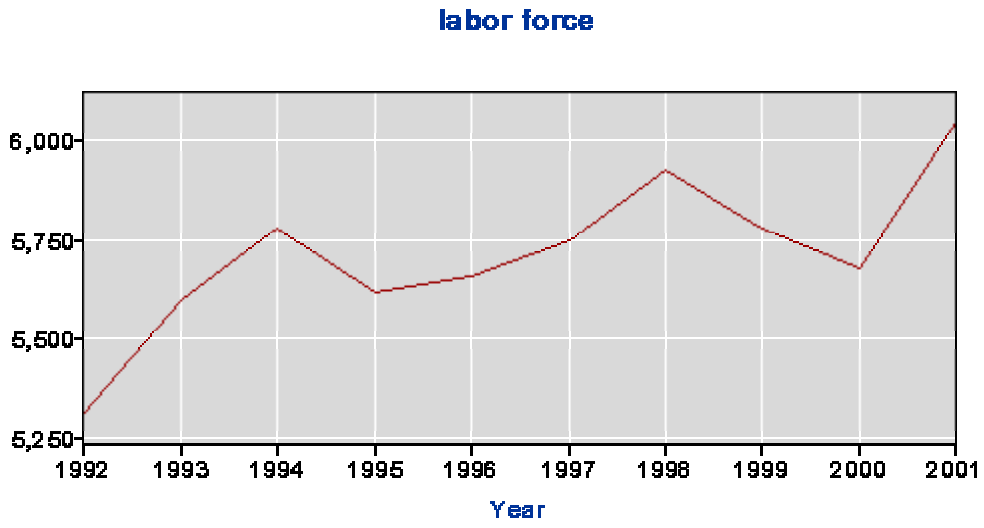
Second quarter 1999 data indicate that new car and truck registration improved compared to the same time period for 1998. No **permit-authorized construction** activity was reported during the second quarter of 1999.

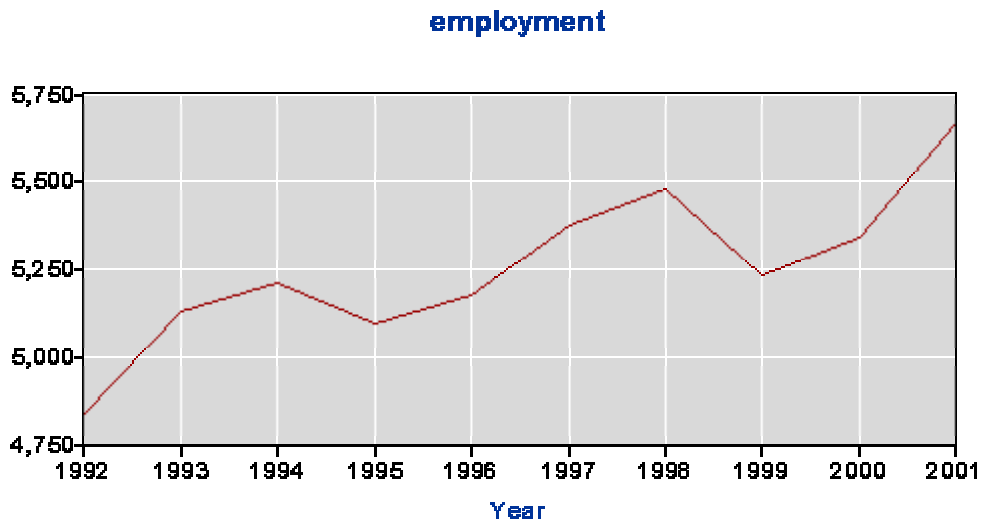
## Duchesne County

**Area:** Duchesne County, UT

**Area Type:** COUNTIES AND EQUIVALENTS

**State/Region/Division:** UTAH



| Year | Period | labor force | employment | unemployment | unemployment rate |
|---|---|---|---|---|---|
| 1992 | Annual | 5309 | 4832 | 477 | 9.0 |
| 1993 | Annual | 5596 | 5129 | 467 | 8.3 |
| 1994 | Annual | 5780 | 5209 | 571 | 9.9 |
| 1995 | Annual | 5618 | 5094 | 524 | 9.3 |
| 1996 | Annual | 5660 | 5175 | 485 | 8.6 |
| 1997 | Annual | 5747 | 5376 | 371 | 6.5 |
| 1998 | Annual | 5925 | 5477 | 448 | 7.6 |
| 1999 | Annual | 5781 | 5231 | 550 | 9.5 |
| 2000 | Annual | 5679 | 5343 | 336 | 5.9 |
| 2001 | Annual | 6048 | 5671 | 377 | 6.2 |

Agriculture has historically dominated the economic life of Duchesne County. The county remains a significant producer of crops and livestock. However, during the second half of the 20th Century, the development of oil and gas reserves provided an important boost to the economy, and this industry remains a major contributor to growth. Other expanding industries include government and trade. Duchesne County includes part of the tribal lands of the Uintah-Ouray Indian Reservation. New retail and service developments on tribal lands help sustain the Native American population and add to the economic vitality of the area.
For the third consecutive quarter, nonfarm employment in Duchesne County reported a year-over decline. Second quarter data for 1999 showed a decrease of 4.2 percent. Slowdowns in oil and gas activity continue to stymie economic growth in the area. Duchesne County's unemployment rate jumped from 7.2 percent in second quarter 1998 to 8.4 percent in second quarter 1999, one of the highest rates in Utah.

**Mining** again reported the greatest decline among industries, as 171 positions were lost between second quarter 1998 and second quarter 1999. Even with rising oil prices, oil and gas drilling and exploration has failed to increase employment, as firms remain cautious over price stability and profit. **Transportation, Communications,** and **Public Utilities** experienced a 6.1 percent decline in jobs with a loss of 31 positions. Over-the-road trucking felt the pinch of declining oil and gas operations as positions decreased. However, local trucking and communication jobs did report improvements. **Manufacturing** suffered a decrease of 54 jobs, a year-over 24.0 percent decline. Durable and nondurable manufacturing goods contracted, particularly for petroleum refining, bottled/canned beverages, and industrial measuring instruments. **Finance, Insurance** and **Real Estate** position declined 9.3 percent, or by 11 jobs, mostly among multifamily property management. A few additional jobs were reported in banking. **Trade** lost a scant two positions. All of the losses were in wholesale trade as recreational goods declined. Retail trade jobs rose 0. Percent as grocery stores and eating and drinking places added workers. However, retail trade lost nearly the same number of jobs in hardware and variety stores and at gasoline service stations.

Three industrial divisions showed increased employment between second quarter 1998 and 1999. However the increases were modest. **Services** added 35 positions among skilled nursing care facilities, auto repair services and non-vocational youth education. **Government** reported 19 more jobs, a 1.1 percent increase. Overall, federal jobs showed a slight increase, while state government jobs declined for social services. Local government accounted for most of the growth as road work, recreation and education expanded. **Construction** jobs increased 4.8 percent, or 11 positions. Highway and road construction accounted for most of the growth. Residential and non-residential contractors grew moderately, as did special trade contractors.

Agriculture is an important component of the economic strength of Duchesne County. Unfortunately, agricultural employment data is generally not available the only source of employment information due to reporting required by unemployment insurance laws, which cover only a few agricultural jobs. Most of Duchesne County's agricultural employment falls outside the reporting requirements. Duchesne County's "covered agricultural" reported only two persons employed during the second quarter of 1999. These are not included in the "nonagricultural" figures reported above.

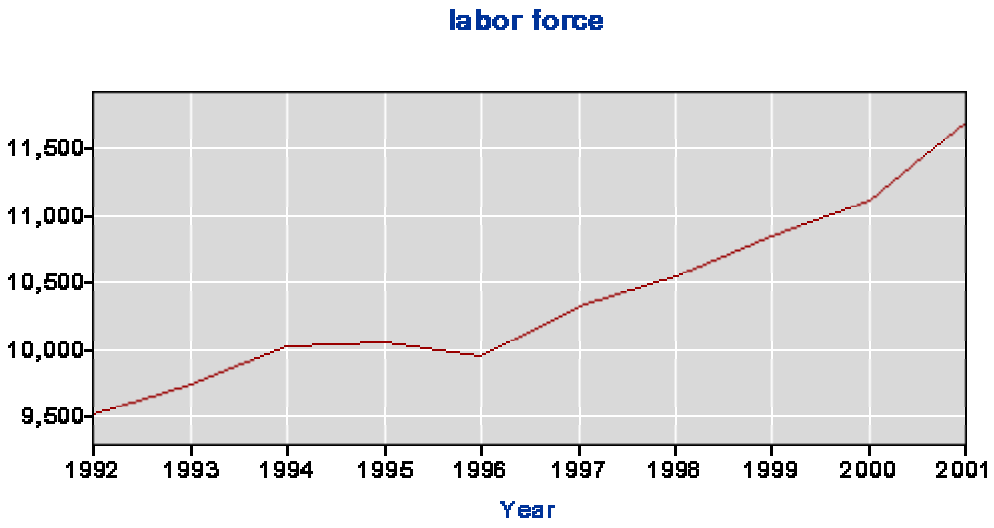
Slower economic growth has slowed the demand for construction in Duchesne County. The total valuation of second quarter permit-authorized construction slipped from $6.8 million in 1998 $4.6 million in 1999. Residential construction continued to slow, as new dwelling unites fell from 88 to 73. The value of residential construction declined from $5.2 million to $3.4 million. Nonresidential building slowed from building slowed from $1.0 million in 1998 to $820,600 in 1999 as fewer nonresidential projects were authorized. Total additions, alternations, and repairs dropped 29.2 percent in valuation; however, renovations to commercial structure did improve slightly.

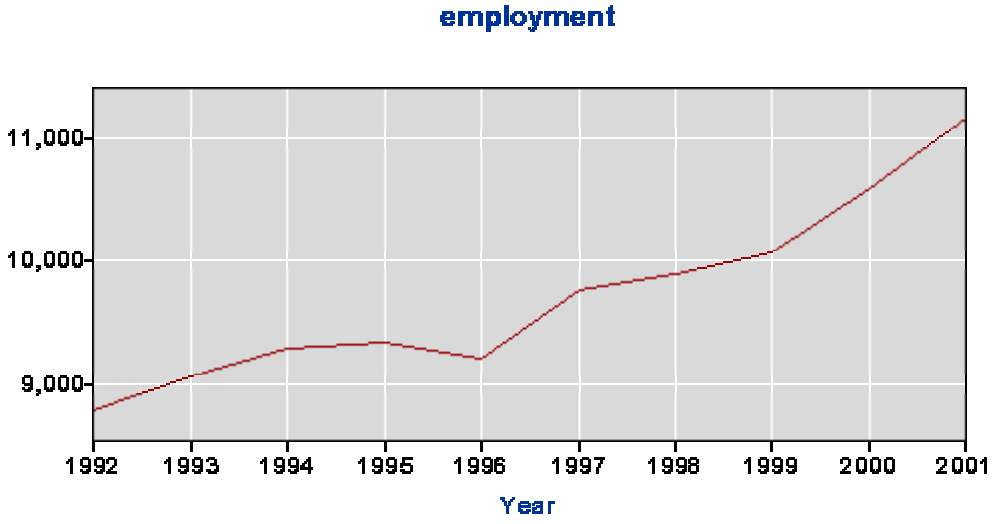
## Uintah County

**Area:** Uintah County, UT

**Area Type:** COUNTIES AND EQUIVALENTS

**State/Region/Division:** UTAH



| Year | Period | labor force | employment | unemployment | unemployment rate |
|---|---|---|---|---|---|
| 1992 | Annual | 9516 | 8785 | 731 | 7.7 |
| 1993 | Annual | 9751 | 9061 | 690 | 7.1 |
| 1994 | Annual | 10032 | 9294 | 738 | 7.4 |
| 1995 | Annual | 10061 | 9345 | 716 | 7.1 |
| 1996 | Annual | 9953 | 9216 | 737 | 7.4 |
| 1997 | Annual | 10330 | 9759 | 571 | 5.5 |
| 1998 | Annual | 10544 | 9897 | 647 | 6.1 |
| 1999 | Annual | 10847 | 10076 | 771 | 7.1 |
| 2000 | Annual | 11112 | 10587 | 525 | 4.7 |
| 2001 | Annual | 11707 | 11165 | 542 | 4.6 |

Uintah County's economy has always relied on agriculture and mining to sustain its growth. The area has benefitted from the development of several geologic deposits, such as gilsonite, oil shale, tar sand and oil, which have shaped its economic growth. While mining and agriculture remain significant to the economy, other industries such as government services, trade and the Ute Indian Tribe, are developing. These new industries help stabilize and diversify the economy.

Nonagricultural employment in Uintah County rose 2.3 percent to 8,745 by adding nearly 200 jobs between the second quarter of 1998 and the second quarter of 1999. Increased construction activity and service employment sustained economic growth. Uintah County's unemployment rate rose to 6.3 percent in 1998 to 6.4 percent for the comparable period of 1999.

**Construction** employment jumped 50.8 percent by adding 190 positions. All of the growth was in heavy construction for water, sewer, pipeline and communications systems. Residential, nonresidential, and special trade contractors reported slight growth. **Services** added 170 positions, and 8.4 percent year-over growth. Home health care, offices and clinics of doctors, video rental stores, temporary help agencies, residential care facilities, and tribal organizations reported growth, while jobs for equipment rental declined. **Government** jobs increased 4.6 percent by adding 81 positions. Increases were reported for federal, state and local government, although local government positions dominated growth. Federal jobs related to land and wildlife management increased moderately, while state employment reported slight increases in several areas. Local positions rose for roadwork, recreation and education, but contracted for environmental and transportation services. **Manufacturing** employment experienced an increase of 17 jobs both durable and nondurable goods manufacturing added positions. Wood kitchen cabinet manufacturing, construction machinery, and publishing accounted for the growth. Oil and gas equipment reported a decline. **Finance, Insurance** and **Real Estate** year-over data indicate a net increase of one position. Real estate and insurance agents expanded, while banking/lending positions declined.

The **Transformation, Communications** and **Public Utilities** division showed a loss of 21 jobs, a 3.9 percent decrease. Cutbacks in local trucking, related to weakness in mining activity, accounted for the losses. **Trade** positions declined by 2.2 percent as retail job losses were felt at grocery stores, gas service stations, and eating and drinking establishments. Wholesale trade jobs fell for industrial machinery, medical equipment, and computer equipment. Wholesale trade did report a moderate employment increase in grocery products, while retail jobs expanded at sporting goods and bookstores. **Mining** remained in the doldrums, as firms are reluctant to add to payrolls. Rising energy prices should increase demand for employment and production, but apparently firms are remaining cautious waiting for overseas production and

crude prices to stabilize. Mining lost nearly 200 year-over second quarter jobs in the oil and gas industry.
"Covered agriculture" jobs in Uintah County rose between second quarter 1998 (38 jobs) and second quarter 1999 (53 jobs). The growth was concentrated in livestock production. It should be noted that "covered agricultural" employment is not included in total nonagricultural employment discussed above. Moreover, many jobs in agriculture are not subject to unemployment insurance reporting requirements. As a result they are not discussed in this report.

Construction activity in Uintah County, as measured by permit authorizations, declined during the year ending second quarter of 1999. The total value of permit-authorized construction fell 14.0 percent form $4.4 million in 1998 to $3.8 million in 1999. Residential building reported an increase in dwelling units from 29 to 36, primarily due to the construction of a 19-unit apartment complex. The value of residential construction decreased slightly: from $2.3 million to $2.2 million. Nonresidential construction values, which can fluctuate dramatically, plummeted, from $1.7 million to a mere $172,000. A dearth of new major nonresidential projects resulted in this decline. Additions, alterations and repairs reported a strong increase, with a meteoric rise in the valuation of renovations to residential structures.

**Percent of Total Employment and Average Monthly Wage for Selected Industries**

**Daggett County**

| | % | Ave. Monthly Wage |
|---|---|---|
| Government | 53.0 | $2,341 |
| Services | 24.4 | $1,304 |
| Trans., Comm., Public Utilities | 10.4 | $1,806 |
| Trade | 10.2 | $ 790 |
| Construction | 1.5 | $3,046 |
| Manufacturing | 0.5 | b |

b = not shown to avoid disclosure of individual firm data
Average Annual Wage (all industries combined) $21,960

**Duchesne County**

| | % | Ave. Monthly Wage |
|---|---|---|
| Government | 35.8 | $2,003 |
| Trade | 21.2 | $1,215 |
| Services | 10.7 | $1,208 |
| Mining | 10.5 | $2,820 |
| Trans., Comm., Public Utilities | 9.5 | $2,475 |
| Manufacturing | 5.1 | $2,519 |
| Construction | 4.6 | $1,891 |
| Finance, Insur., & Real Estate | 2.5 | $1,385 |

Average Annual Wage (All Industries combined) $20,076

**Uintah County**

| | % | Ave. Monthly Wage |
|---|---|---|
| Trade | 24.0 | $1,121 |
| Services | 22.9 | $1,422 |
| Government | 22.6 | $2,134 |
| Mining | 14.3 | $2,933 |
| Trans., Comm., Public Utilities | 7.5 | $2,777 |
| Construction | 4.0 | $1,621 |
| Manufacturing | 3.0 | $1,382 |
| Fin., Insur., R.E. “F.I.R.E,” | 1.6 | $1,544 |

Average Annual Wage (all industries combined) $20,940

| YEAR | DAGGETT | DUCHESNE | UINTAH | STATE OF UTAH |
|---|---|---|---|---|
| 1994 | $1,845.00 | $1,591.00 | $1,686.00 | $1,867.00 |
| 1995 | $1,771.00 | $1,626.00 | $1,702.00 | $1,936.00 |
| 1996 | $1,763.00 | $1,640.00 | $1,720.00 | $2,017.00 |
| 1997 | $1,770.00 | $1,749.00 | $1,842.00 | $2,114.00 |
| 1998 | $1,690.00 | $1,869.00 | $1,929.00 | $2,207.00 |
| 1999 | $1,677.00 | $1,781.00 | $1,931.00 | N/A |

## FEDERAL INCOME TAX RETURNS DATA BY COUNTY
### Average adjusted gross income per year

| COUNTY | 1996 | 1997 | 1998 |
|---|---|---|---|
| Beaver | 23,390.00 | 24,710.00 | 23,233.00 |
| Box Elder | 31,625.00 | 32,393.00 | 33,788.00 |
| Cache | 29,636.00 | 30,930.00 | 32,927.00 |
| Carbon | 29,428.00 | 30,686.00 | 31,912.00 |
| **Daggett** | 29,982.00 | 31,926.00 | 28,996.00 |
| Davis | 36,702.00 | 38,439.00 | 40,230.00 |
| **Duchesne** | 23,514.00 | 25,523.00 | 26,169.00 |
| Emery | 28,806.00 | 30,337.00 | 30,778.00 |
| Garfield | 21,758.00 | 22,821.00 | 23,474.00 |
| Grand | 24,990.00 | 25,933.00 | 27,003.00 |
| Iron | 25,730.00 | 26,695.00 | 28,083.00 |
| Juab | 25,027.00 | 26,864.00 | 28,462.00 |
| Kane | 22,222.00 | 23,072.00 | 24,129.00 |
| Millard | 25,715.00 | 27,249.00 | 25,392.00 |
| Morgan | 34,728.00 | 36,617.00 | 38,059.00 |
| Piute | 20,533.00 | 20,425.00 | 22,568.00 |
| Rich | 22,650.00 | 25,896.00 | 27,337.00 |
| Salt Lake | 35,748.00 | 37,929.00 | 40,022.00 |
| San Juan | 23,934.00 | 25,086.00 | 26,480.00 |
| Sanpete | 24,351.00 | 25,506.00 | 26,825.00 |
| Sevier | 26,508.00 | 27,531.00 | 28,969.00 |
| Summit | 55,160.00 | 57,666.00 | 61,224.00 |
| Tooele | 31,539.00 | 33,288.00 | 35,012.00 |
| **Uintah** | 25,474.00 | 27,457.00 | 28,725.00 |
| Utah | 31,447.00 | 32,871.00 | 35,011.00 |
| Wasatch | 33,452.00 | 34,857.00 | 37,584.00 |

| | | | |
|---|---|---|---|
| Washington | 30,344.00 | 31,456.00 | 33,358.00 |
| Wayne | 20,912.00 | 21,751.00 | 24,122.00 |
| Weber | 33,067.00 | 34,941.00 | 35,999.00 |

Source: Utah State Tax Commission 1998-99 Annual Report

## UNEMPLOYMENT

Job growth in Utah continues to increase, and the State maintains one of the lowest unemployment rates in the nation. Joblessness in the Uintah Basin however remains among the highest in the State.

**RESOLUTION NO. #12**

**A RESOLUTION ADOPTING THE UINTAH BASIN ASSOCIATION OF GOVERNMENTS PRE-DISASTER HAZARD MITIGATION PLAN AS REQUIRED BY THE FEDERAL DISASTER MITIGATION AND COST REDUCTION ACT OF 2000.**

WHEREAS, President William J. Clinton signed H.R. 707, the *Disaster Mitigation and Cost Reduction Act of 2000*, into law on October 30, 2000.

WHEREAS, the Disaster Mitigation Act of 2000 requires all jurisdictions to be covered by a Pre-Disaster Hazard Mitigation Plan to be eligible for Federal Emergency Management Agency post-disaster funds,

WHEREAS, Uintah Basin Association of Governments (UBAOG) has been contracted by the State of Utah to prepare a Pre-Disaster Mitigation Plan covering all of the jurisdictions in the UBAOG Area, and

WHEREAS, the UBAOG Executive Council approved UBAOG Staff to write the plan on October 2002, and

WHEREAS, Vernal City is within the UBAOG Area, and

WHEREAS, Vernal City is concerned about mitigating potential losses from natural disasters before they occur, and

WHEREAS, the plan identifies potential hazards, potential loses and potential mitigation measures to limit loses, and

WHEREAS, Vernal City has determined that it would be in the best interest of the community as a whole to adopt the Pre-Disaster Hazard Mitigation Plan as it pertains to the City, therefore

BE IT RESOLVED BY VERNAL CITY THAT:

The attached "Uintah Basin Association of Governments Pre-Disaster Mitigation Plan" be adopted to meet the requirements of the Disaster Mitigation and Cost Reduction Act of 2000.

This Resolution shall be effective on the date it is adopted.

DATED this _____ day of _____, 2003.

_____
William Kremin, Jr., Mayor
Vernal City

ATTEST:

_____
, Recorder

A new federal law was passed to try and reduce the cost of natural disasters. Local governments now have to plan ways to reduce the impacts of disasters in order to be eligible for certain types of federal disaster assistance. With the counties and cities help communities can have a plan in place that will make them eligible for mitigation grants to address hazards identified in the plan. Please answer the following questions about your town, city, or county.

**HAZARD PROFILE**

**HAZARD**:

- ❑ Avalanche
- ❑ Dam Failure
- ❑ Drought
- ❑ Earthquake
- ❑ Flash flooding
- ❑ Flooding
- ❑ Infestation
- ❑ Landslide
- ❑ Soil Subsidence
- ❑ Tornado
- ❑ Wildfire
- ❑ Winter/Summer Storms
- ❑ Other

**HISTORY (please include History information for all hazards on an attached page)**:

- ❑ Year
  ⇒
- ❑ Location
  ⇒
- ❑ Event Description
  ⇒
- ❑ Response and Recovery Costs
  ⇒
- ❑ Comments
  ⇒

**MITIGATION PROJECTS**:

- ❑ Present
  - ⇒ Hazard_____
  - ⇒ Location_____
  - ⇒ Year_____
  - ⇒ Reason_____
- ❑ Potential
  - ⇒ Hazard_____
  - ⇒ Location_____
  - ⇒ Year_____

**ORDINANCES (please attach a copy):**

- ❑ Storm water management

| |
|---|
| ❑ Zoning<br>❑ Stream maintenance<br>❑ Subdivisions<br>❑ Erosion control<br>❑ Floodplain management<br>❑ Natural hazards<br><br>**Current Building Codes:**<br>⇒ Date of update_____<br><br>⇒ Which codes are used_____ |
| **National Flood Insurance Program**:<br>Currently in Good Standing with the NFIP? |
| **Previous Hazard Mitigation Plan:**<br>⇒ Date published_____<br><br>⇒ Date of update_____ |
| **Fire Insurance Rating (ISO):**<br>⇒ |

# Flood Hazard Identification Study
# Uintah Basin Association of Governments

**By:**
**United States Army Corps of Engineers**
**Utah Division of Emergency Services and Homeland Security**

**August 1, 2003**

## Introduction

The US Army Corps of Engineers Sacramento District completed this flood hazard identification study through a contract with the seven Associations of Governments. Funding was provided under the USACE Planning Assistance to States Program (Section 22). The intent of the study is to aid in detailing natural hazards associated with fluvial process for entities within each AOG currently unmapped as part of the National Flood Insurance Program or mapped as D zone areas.

## Acknowledgements

The following agencies aided in preparation, interpretation, and completion of this flood hazard investigation study.

Utah Associations of Governments
Uintah Basin Association of Governments
Sacramento District Corps of Engineers
Utah Division of Emergency Services and Homeland Security

## Scope of Work

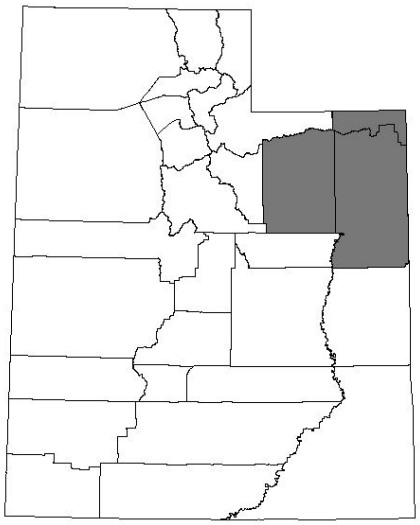
This study will evaluate and identify areas with a high flood hazard and identify potential mitigation solutions. The areas evaluated in this study include the three unincorporated counties of Daggett, Duchesne, and Uintah. Municipalities within the three counties were studied if they met the following criteria:

1. Jurisdiction has not been mapped by FEMA,
2. Jurisdiction mapped by FEMA as a Zone D, area of undetermined flood hazard.

Fluvial hazards within the cities and towns of Dutch John, Manila, Altamont, Roosevelt, Tabiona, Ballard, and Naples were studied.

## Description of the Study Area

Uintah Basin Association of Government UBAG serves the following counties and municipalities with this counties: Daggett, Duchesne, and Uintah. The three counties in the study area are very rural, with the total population of the Uintah Basin being only 40,516. Each counties population is: Daggett 921, Duchesne 14,371, and Uintah 25,244. The principle draining in the area is the Green River with the Duchesne and White Rivers as major tributaries. The Uintah basin is divided into



two drainages—the North Slope and the south slope of the Uinta Mountains. Elevations in the basin range from 13,528 feet and Kings Peak in the Uinta Mountains to 4,600 feet along the green river near it's excite from Uintah County.

The Uinta Mountain range is unique, being the only major range of mountains in North America running east and west. The Uintah Mountains were extensively glaciated, and glacial features dominate the present landscape. Glacial erosion has created many picturesque examples of horns, arêtes, cirques, and glacial troughs. Lateral and terminal moraines often form natural dams, creating over a thousand small lakes that dot the region.

Numerous small streams exit the north and south slope of the Uinta range. These include such streams as the Sheep Creek, Carter Creek, Currant Creek, Red Creek, Rock Creek, Yellowstone, Whiterocks, and Strawberry River.

**Discussion, Data, and Observations**

Data presented in this study are from the following sources:

- Daggett County Emergency Response Plan
- Uintah County Emergency Response Plan
- Duchesne County Emergency Response Plan
- City of Naples Storm Water Master Plan
- State Water Plan
- Utah State Water Plan Uintah Basin (December, 1999)

In addition to incorporating existing studies and plans completed in the area, this flood hazard study also contains information from technical experts familiar with the study area. The mitigation projects are purely suggested actions, which based on past experience, will reduce or eliminate the identified fluvial hazard. These mitigation recommendations in no way represent the only measure to attain fluvial mitigation. In many cases the proposed or best solution is simply avoidance. This method of mitigation is implemented through the use of zoning, and represents in most cases the lowest cost mitigation measure.

**Disclaimer**

The information provided in this study was developed from a number of sources including:

- Past USACE studies done within the region and drainage basins,
- Personal knowledge,
- Limited onsite visits,
- Map interpolations,
- Current GIS work.

Even though care was taken to ensure a measure of correctness and field checks were preformed on the information and data gathered, it is important to note this flood hazard study is presented "as is". The United States Army Corps of Engineers, Division of Emergency Service and Homeland Security, or any other agency assisting in completion of this study cannot accept any responsibilities for errors, omissions, or accuracy. There are no warranties, which

accompany this product. Users are cautioned to field verify information provided in this product before making any decisions. In no way does the mapping presented in this study take the place of a regulatory FEMA Flood Insurance Rate Map (FIRM), or replace any flood hazard identification product developed by FEMA / National Flood Insurance Program (NFIP).

**Need For Additional Research**

Additional research should be conducted to better map communities currently mapped as a FEMA Zone D, or currently unmapped communities, and communities with out dated Flood Insurance Rate Maps. Communities would benefit from knowing peak flows and stages on tributaries of concern.

**How Communities Where Ranked**

The communities within this study were ranked based on a committee's evaluation. The evaluation committee consisted of the:

- Utah State Floodplain Program Manager
- Utah State Hazard Mitigation Officer,
- Natural Hazard Mitigation Planner,
- U.S. Army Corp of Engineers,
- State Earthquake Program Manager.

This committee researched each of the twenty-nine counties and all 269 incorporated areas within the State of Utah. Each jurisdiction was assigned one of five ratings: Very High, High, Moderate, Low, or Not Rated. These ratings in no way reflect actual flood threat. The ratings were assigned based on the following variables:

- Perceived flood threat based on topography, past flooding occurrences, and experience of committee members.
- Participation in the National Flood Insurance Program (NFIP).
- Past studies included, but not limited to, regulatory FEMA/NFIP Flood Insurance Studies (FIS), other flood studies, and reconnaissance reports.
- Population growth within the jurisdiction.
- If the community is mapped by FEMA/National Flood Insurance Program NFIP), and type of map which identifies high, moderate and low flood threats

Ratings were used to set the scope of work for each community within this study**.** Information on excluded communities was added were available.

**A Word about Wildfires**

Almost every year several communities around the state are flooded and/or affected by post burn debris flows. Wildfire damaged watersheds have conditions which increase the potential for debris flows which may damage structures and infrastructure in the impacted area. Overall, the heightened risk associated with alluvial fans is always of concern. Post fire revegetation and stabilization efforts in many cases do not alleviate the threat due to flooding and debris flow.

**A Word About Dams**

Dams are a critical support function for water managers in the State and also act as a flood control measure. If a dam remains stable, does not get overtopped, or is not impaired as the result of an earthquake, then, at a minimum, they do provide incidental flood control. If not then they can add to the flood threat. There are 117 dams within Uintah Basin of these 20 have received an high hazard rating by Utah Division of Water Rights Dam Safety section. The State Dam Safety Section has developed a hazard rating system for all non-federal dams in Utah. Downstream uses, size, height, volume, and incremental risk/damage assessments are a variable used to assign dam safety classification. Using the hazard ratings systems developed by the State Dam Safety Section, dams are placed into one of three classifications high, moderate, and low. Dams receiving a low rating would have insignificant property loss do to dam failure. Moderate hazard dams would cause significant property loss in the event of a breach. High hazard dams would cause a possible loss of life in the event of a rupture. The frequency of dam inspection is designated based on hazard rating with the Division of Water Rights inspecting high-hazard dams annually, moderate hazard dams biannually, and low-hazard dams every five years.

**Daggett County**

- Flaming Gorge
- Long Park

**Duchesne County**

- Cliff Lake
- Browns Draw
- Starvation
- Twin Pots
- Moon Lake
- East Timothy
- Red Creek
- Chepeta Lake
- Stillwater
- Big Sand Wash

**Uintah County**

- Brough
- Whiterocks
- East Park
- Paradise Park
- Bullock Draw
- Lapoint
- Montes Creek
- Cottonwood

## Daggett County

| COUNTY | CITY/TOWN | POPULATION | STATE MAP LOCATION | NFIP STATUS | THREAT (or NSFHA-eligible) |
|---|---|---|---|---|---|
| Daggett | **Unincorporated** | 413 | | **Not Participating** | Green River & Tribs |
| Daggett | **Dutch John** | 200 | D8 | **Not Participating** | Dutch John Canyon |
| Daggett | **Manila** | 308 | D8 | **Not Participating** | Sheep Creek Canal |

**Daggett County Flood and Dam failure History**

| Hazards | Date | Location | Critical Facility or Area Impacted | Comments |
|---|---|---|---|---|
| Flash Flood Daggett | June 10, 1965 | Palisades Campground | 7 deaths | Source Sheep Creek |
| Flood Daggett Presidential | 1983 | County wide | Damage to culverts and roads. The one lane bridge over Green River was destroyed | Source Birch, Red, Crouse, and Pat Creeks. |

(All dollar values for given are for year of disaster)

**Daggett County Flood Mitigation Goals -**

**Goal 1 Reduce Risk of Potential Flooding**

**Unincorporated Daggett County – Problem Identification:** Daggett is one of the smallest counties in the state both in terms of population and size. However, almost half of its residents live in the unincorporated county making that population one of the largest percentages in the state. The County does not participate in the National Flood Insurance Program. No major rivers threaten existing urban development. Therefore, no structural flood control projects are warranted at this time. Flood sources include the Green River, Sheep, Carter, Pott Creeks, and their tributaries, and other potential flood sources such as Flaming Gorge Reservoir.

**Objective:** Minimize future flood damage in the unincorporated County

**Action:** Nonstructural measures appear to be the most prudent option for the county to implement in the unincorporated areas. Zoning to prevent development of structures near all rivers, creeks, and lakes would be prudent

(100 ft minimum setback or greater) as well as not allowing development on alluvial fans. New development near canals should also be discouraged, as there have been several potentially deadly flood events in the state due to flooding caused by canal failures. The cost of modifying county laws to include these is minimal and the benefits substantial (although there will be a small percentage of the population that will oppose any zoning or other changes in the laws for that matter).

**Timeframe:**
**Funding:**
**Estimated Cost:** Minimal – almost nothing.
**Staff:**

**Dutch John – Problem Identification:** Dutch John, one of Utah's smallest communities, does not participate in the National Flood Insurance Program. No major rivers threaten Dutch John. Dutch John Canyon Creek and the other unnamed drainages would; however, pose threats during a major flood event.

**Objective:** Minimize future flood damage in Dutch John.

**Alternative Action:** A structural mitigation project for this community could be a deflector levee from the canyon mouth, extending west past all development for distance of about a mile.

**Timeframe:**
**Funding:**
**Estimated Cost:** The preliminary cost for the levee project would be about $250,000.
**Staff:**

**Alternative Action:** A nonstructural project could consist of zoning of the flood prone area to insure that all new developments are sited as far away from the channels as possible (or at least constructed so as to be higher in elevation than the flood threat). This however, would do nothing to protect existing development.

**Timeframe:**
**Funding:**
**Estimated Cost:** minimal.
**Staff:**

**Manila** – **Problem Identification:** Manila does not participate in the National Flood Insurance Program. No major rivers flow through or threaten Manila. However, flooding could be experienced from the Sheep Creek Canal if overtopped or if failure were to occur. The drainages surrounding Manila in the unincorporated county create a less severe flood threat from time to time.

**Objective:** Minimize future flood damage in Manila.

**Alternative Action:** In light of several canal failures around the state, a stability study of the Sheep Creek Canal could be conducted. If study findings reveal deficiencies, perform all remedial measures identified. Also, all new development could be permitted a safe distance away from the unnamed drainages surrounding Manila.

**Timeframe:**
**Funding:**
**Estimated Cost:** A detailed canal stability study could be up to $50,000.
**Staff:**

**Alternative Action:** A nonstructural project could consist of zoning of the flood prone area to insure that all new developments are sited as far away from the channels as possible (or at least constructed so as to be higher in elevation than the flood threat). This however, would do nothing to protect existing development.

**Timeframe:**
**Funding:**
**Estimated Cost:** minimal.
**Staff:**

## Duchesne County

| COUNTY | CITY/TOWN | POPULATION | STATE MAP LOCATION | NFIP STATUS | THREAT (or NSFHA-eligible) |
|---|---|---|---|---|---|
| Duchesne | **Unincorporated** | 7798 | | **Not Participating** | Duchesne River and Tributaries |
| Duchesne | **Altamont** | 178 | E7 | **Not Participating** | Unnamed drainages east & west of town |
| Duchesne | Duchesne | 1408 | E7 | D-490055 - 2/4/88 | |
| Duchesne | Myton | 539 | E7 | 490056 - 2/4/88 | |
| Duchesne | **Roosevelt** | 4299 | E7 | **Not Participating** | Cottonwood Creek and tributary |
| Duchesne | **Tabiona** | 149 | E6 | **Not Participating** | Duchesne River and Tributaries |

### Duchesne County Flood and Dam failure History

| Hazards | Date | Location | Critical Facility or Area Impacted | Comments |
|---|---|---|---|---|
| Flood Duchesne | September 13, 1940 | Duchesne | Damage in Indian Canyon and roads flooded | Source: Indian Canyon |
| Flood Duchesne | August 7, 1941 | Mountain Home | Destroyed bridges washed out road over Kofford wash in caused damage in Rock Creek | |
| Flood Duchesne | August 7, 1945 | Strawberry Creek area | Damage to roads, ranches, and irrigation diversions near Strawberry Creek. | Source Strawberry Creek. |
| Flood Duchesne | August 1, 1953 | Sowers Canyon | Damage to farm house and 200 acres of farmland | |

| Hazards | Date | Location | Critical Facility or Area Impacted | Comments |
|---|---|---|---|---|
| Flood Duchesne | August 5, 1957 | Tabiona/Hanna | Damage to homes, roads, farms, and crops | Farm Creek |
| Flood Duchesne | September 2, 1960 | Hanna | Flood homes and damaged approximately 100 acres of farmland | |
| Flood Duchesne | August 11, 1969 | Duchesne | Damage to town due to flooding | Source Strawberry Creek and Indian Creek. |
| Flood Duchesne Presidential | 1983 | County Wide | Damage to roadways, stream embankments, blockage of culverts, and bridges. | Source Yellowstone River, Strawberry River, Duchesne River, and Red Creek. |
| Flood Duchesne Presidential | | | | |

(All dollar values for given are for year of disaster)

**Duchesne County Flood Mitigation Goals -**

**Goal 1 Reduce Risk of Potential Flooding**

**Unincorporated Duchesne County - Problem Identification:** Well over 50 percent of the population lives in unincorporated areas of the county – one of the highest percentages in the state – many in the vicinity of Roosevelt. The highest point in the state, Kings Peak at 13,528 ft is located in northern Duchesne County, making the Duchesne Watershed a significant resource. These high mountain watersheds provide much needed water but also pose flood threats from time to time. The County does not participate in the National Flood Insurance Program, therefore flood studies are not available. Flood threats include the Duchesne River and its numerous tributaries. Other potential flood sources include Starvation and other reservoirs.

**Objective:** Minimize future flood damage in the unincorporated County

**Action:** Nonstructural measures appear to be the most prudent option for the county to implement in the unincorporated areas. Zoning to prevent development of structures near all rivers, creeks, and lakes would be prudent (100 ft minimum setback or greater) as well as not allowing development on alluvial fans. New development near canals should also be discouraged, as there have been several potentially deadly flood events in the state due to flooding caused by canal failures. The cost of modifying county laws to include these is minimal and the benefits substantial (although there will be a small percentage of the population that will oppose any zoning or other changes in the laws for that matter).

**Timeframe:**
**Funding:**
**Estimated Cost:** Minimal – almost nothing.
**Staff:**

**Altamont – Problem Identification:** Altamont does not participate in the NFIP. This community and Mt. Evans just to the southeast appear to have a moderate flood threat from unnamed channels in the immediate vicinity.

**Objective:** Minimize future flood damage in Altamont.

**Alternative Action:** A structural mitigation project for this community could be a deflector levee around the community, extending south on both sides past existing development. The overall length would be about a mile.

**Timeframe:**
**Funding:**
**Estimated Cost:** The preliminary cost for the levee project would be about $250,000.
**Staff:**

**Alternative Action:** Zoning to prevent development of structures near all drainages would be prudent (100 ft minimum setback or greater). The cost of modifying city ordinances to include these is minimal and the benefits substantial (although this would not reduce the flood threat to existing structures).

**Timeframe:**
**Funding:**
**Estimated Cost:** Minimal – almost nothing**.**
**Staff:**

**Roosevelt – Problem Identification:** This community does not participate in the NFIP. Although Cottonwood Creek runs through the north and east parts of town, the channel appears to be very incised and, as a result, would only pose a flood threat during major events. (There is also a tributary through the south side of town that the same would hold true for.)

**Objective:** Minimize future flood damage in Roosevelt.

**Alternative Action:** Maintaining the channel clear of debris and snags would be a very low cost method of minimizing flood damages in Roosevelt.

**Timeframe:**
**Funding:**
**Estimated Cost:** Minimal – city crews and equipment could be used when they are available.
**Staff:**

**Alternative Action:** Zoning to prevent development of structures near all drainages would be prudent (100 ft minimum setback or greater). The cost of modifying city ordinances to include these is minimal and the benefits substantial (although this would not reduce the flood threat to existing structures).

**Timeframe:**
**Funding:**
**Estimated Cost:** Minimal – almost nothing**.**
**Staff:**

**Tabiona – Problem Identification:** This community is the smallest incorporated town in Duchesne County with 149 residents. It does not participate in the NFIP. Tabiona is bounded by flood threats from virtually every side. The Duchesne River runs along the southwest side of town and two tributaries are located to the east and to the west – all posing flood threats.

**Objective:** Minimize future flood damage in Tabiona.

**Alternative Action:** Given the relatively few number of existing structures, flood proofing may be a viable alternative – especially for those structures with a history of being flooded. Zoning to prevent new structures from being built in the floodplain would be very helpful and cost effective.

**Timeframe:**
**Funding:**
**Estimated Cost:** $10k - $30k for the average home to flood proof.
**Staff:**

**Alternative Action:** A structural mitigation project for this community could be a deflector levee on the east side of the community, extending north and south past existing development. The overall length would be about a mile.

**Timeframe:**
**Funding:**
**Estimated Cost:** The preliminary cost for the levee project would be about $250,000.
**Staff:**

## Uintah County

| COUNTY | CITY/TOWN | POPULATION | STATE MAP LOCATION | NFIP STATUS | THREAT (or NSFHA-eligible) |
|---|---|---|---|---|---|
| Uintah | **Unincorporated** | 15664 | | 490147 – 2/1/86(L) | Green River, Ashley Creek, and Tribs |
| Uintah | **Ballard** | 566 | E7 | **Not Participating** | NSFHA-eligible |
| Uintah | **Naples** | 1300 | E8 | **Not Participating** | Ashley Creek Tribs |
| Uintah | Vernal | 7714 | E8 | 490149 - 3/18/86(M) | |

**Uintah County Flood and Dam failure History**

| Hazards | Date | Location | Critical Facility or Area Impacted | Comments |
|---|---|---|---|---|
| Flash Flood Uintah | September 1, 1909 | Ashley River near Vernal | 1 death | Man crossing Ashley Creek with a wagon |
| Flash Flood Uintah | July 4, 1925 | Five Mile Canyon near Vernal | 1 death | Child swept from automobile |
| Flood Uintah | August 9, 1941 | Vernal/Jensen | Approximately $75,000 to crops was caused by heavy rain and hail. Red Wash bridge damaged | |
| Flood Uintah | August 25, 1955 | Lapoint | $3,000 in damage to bridges and roads | |
| Flood Uintah | July 30, 1956 | Jensen | $25,000 damage to farmlands and crops | |
| Flood Uintah | June 10, 1965 | Maeser/Ouray | Damage to homes, crops, and waterlines | Source: Ashley Creek, Dry Fork, The Green, White, and Duchesne Rivers. |

| Hazards | Date | Location | Critical Facility or Area Impacted | Comments |
|---|---|---|---|---|
| Flood Uintah Presidential | 1983 | County Wide | Limited flooding in Vernal, damage to roads, and bridges | Source Ashley and Deep Creeks and the Green River. |
| Flood Uintah Presidential | | | | |

(All dollar values for given are for year of disaster)

**Uintah County Flood Mitigation Goals -**

**Goal 1 Reduce Risk of Potential Flooding**

**Unincorporated Uintah County - Problem Identification:** Well over half of its residents – 62 percent live in the unincorporated county – many in the area surrounding Vernal - making that population one of the highest percentages in the state. Flood sources include the Green River, Ashley Creek, and their tributaries. Other potential flood sources include Steinaker and Red Fleet and smaller Reservoirs.

**Objective:** Minimize future flood damage in the unincorporated County.

**Action:** Nonstructural measures appear to be the most prudent option for the county to implement in the unincorporated areas. Zoning to prevent development of structures near all rivers, creeks, and lakes would be prudent (100 ft minimum setback or greater) as well as not allowing development on alluvial fans. New development near canals should also be discouraged, as there have been several potentially deadly flood events in the state due to flooding caused by canal failures. The cost of modifying county laws to include these is minimal and the benefits substantial (although there will be a small percentage of the population that will oppose any zoning or other changes in the laws for that matter).

**Timeframe:**
**Funding:**
**Estimated Cost:** Minimal.
**Staff:**

**Ballard – Problem Identification:** While not participating in the NFIP, this community does not appear to be subject to flood threats from any rivers, creeks, or streams and is; therefore, probably eligible for a NSFHA designation.

**Objective:** Minimize future flood damage in Ballard.

**Action:** Identify Ballard as a NSFHA-eligible community.

**Timeframe:**
**Funding:**
**Estimated Cost:** Minimal
**Staff:**

**Naples – Problem Identification:** This community does not participate in the NFIP. It does have a relatively serious flood threat as evidenced by the many washes that run through it to the Ashley Creek on the east side. The county floodplain map identifies the flood threat on both sides of Naples in the unincorporated area. It can be assumed that a similar (or probably greater) threat exists for the town itself.

**Objective:** Minimize future flood damage in Naples.

**Alternative Action:** Because there are multiple drainages, a levee would likely not be viable. Flood proofing of individual structures; however, may be a viable alternative – especially for those structures with a history of being flooded.

**Timeframe:**
**Funding:**
**Estimated Cost:** $10k - $30k for the average home to flood proof.
**Staff:**

**Alternative Action:** An alternative action would be zoning to prevent new structures from being built in the floodplain would be very helpful and cost effective. However it would NOT reduce flood damages to existing development.

**Timeframe:**
**Funding:**
**Estimated Cost:** Minimal.
**Staff:**

## Daggett County Mitigation Strategies

Note: Countywide in this document refers to a mitigation strategy benefiting the cities, towns and communities of: Dutch John and Manila

### Wildfire

**County-Wide**

**Problem Identification:** Continuing non-compliance with existing building and fire codes.

### Goal 1- Priority High

**Objective 1.1** -Decrease non-compliance with existing building and fire codes.

**Action:** Develop and enforce current local, state and national codes.
**Time Frame:** Ongoing
**Funding:** Local, state and federal grants
**Estimated Cost:** Unknown
**Staff:** Local, state and federal agencies
**Background:** Implement and enforce rules, regulations and codes.

**Problem Identification:** Specific areas of the county are susceptible to wildland fire danger.

### Goal 2- Priority High

**Objective 2.1** - Reduce the threat of Wildfire

**Action:** Complete a community fire plan for the entire County with the assistance of the Regional State Fire Warden, local Fire Chief, USFS and BLM.
**Time Frame:** next fiscal year
**Funding:** Local, state, federal
**Estimated Cost:** Minimal
**Staff:** Regional State Fire Warden, local, state and federal agencies (ie. BLM, USFS)
**Background:** There have been repeated wildfires in the county; the majority of wildfires have started on federal lands. The fire in 1977 took the lives of 3 firefighters. The 2002 Mustang fire caused the entire Dutch John area to be evacuated the cost was 1.5 million dollars. This fire effected the county, the cost to the county was not just the money to extinguish the fire, the economic impact still lingers presently. The cost to the Bridger Valley

Electric power company was approximately $250,000; several other power companies also lost money. There was also a cost to the pipeline companies. The county is able to address the private lands and educate the public, however they have no control over the Federal agencies and how they manage the land.

## Landslide

**County-Wide**

**Problem Identification:** Potential landslides Highway 44 & 191

### Goal 1- Priority High

**Objective 1.1** - Reduce landslide impact on Hwy 44 and 191, the potential for damage to either Hwy. 44 or 191 would necessitate a plan to reroute traffic and repair the damage to the highway. Damage repair would be coordinated as needed.
.

**Action:** Assess the probability of landslides and identify specific area at risk. Determine hazard and refer to UDOT
. **Time Frame:** According to UDOT.
**Funding:** According to UDOT funding.
**Estimated Cost:** Undetermined
**Staff:** UDOT
**Background:** Rocks that falls on highway 44 cause a danger to motorists from falling as well as a hazard in the road, the problem will be referred to UDOT.

**Problem Identification:** Potential risk to structures in mountainous areas that could be damaged by landslides.

### Goal 2- Priority Medium

**Objective 2.1** - Reduce potential landslide risk on commercial and residential structures on upper elevations.

**Action:** Assessing possibility of landslides.
**Time Frame:** 5 years
**Funding:** USFS
**Estimated Cost:** Unknown
**Staff:** USFS

**Background:** Soil surveys and other engineer surveys are needed.

## Earthquake

**County-Wide**

**Problem Identification:** Unknown number of seismically unsafe structures around the county.

### Goal 1- Priority Medium

**Objective 1.1** - Have a study done to determine seismic resistance of structures within the county ie. elementary school, high schools, public buildings, and highways. etc.

**Action:** Structural and non-structural earthquake hazard assessment.
**Time Frame:** 3 to 4 years
**Funding:** Unknown
**Estimated Cost:** Unknown
**Staff:** Unknown
**Background:** Contact DESHS earthquake program specialist. Several seismographic tests have been done within the county most likely for oil.

**Problem Identification:** Residents uneducated about earthquakes.

### Goal 2- Priority Medium

**Objective 1.2** - Public Awareness

**Action:** Conduct pubic awareness campaign. Enhance earthquake instructions in school.
**Time Frame:** Ongoing
**Funding:** Federal and state grants, local sources.
**Estimated Cost:** Minimal
**Staff:** LEPC, volunteers and school administration.
**Background:** Contact DESHS earthquake program specialist.

### Goal 2- Priority Medium

**Objective 2.1** – Verify Building Codes are updated

**Action:** Check with Planning and Zoning on building codes.
**Time Frame:** Ongoing
**Funding:** Local sources.

**Estimated Cost:** Minimal
**Staff:** County and Town Planning and Zoning.
**Background:** It is unclear if earthquake building codes are in place.

## Flood

### County-Wide

**Problem Identification:** There is not enough flood information on flood areas in Daggett County to identify the problem at this time.

### Goal 1- Priority Medium

**Objective 1.1** - Identify flood prone areas in County

**Action:** County flood mapping of potential flood areas.
**Time Frame:** Unknown
**Funding:** FEMA
**Estimated Cost:** Undetermined
**Staff:** State and FEMA personnel.
**Background:** Contact DESHS flood map specialist.

**Action:** Join NFIP
**Time Frame:** Immediate
**Funding:** None required
**Estimated Cost:** None
**Staff:** County Emergency Management and State Floodplain Office
**Background:** Daggett County has yet to be mapped with Special Flood Hazard Areas. Flood insurance is not available in the County because the County has yet to join NFIP.

**Problem Identification:** Possible flood because of the 2002 Mustang Fire, high spring run off, or thunderstorms due to lack of vegetation.

**Goal 2- Priority High**

**Objective 2.1** - To reduce the threat of flood in the Dutch John area that may occur because of the Mustang Fire.

**Action:** Flood Ordnance
**Time Frame:** Ongoing
**Funding:** FEMA, state flood plan manager and local.
**Estimated Cost:** Minimal
**Staff:** County Emergency Management, County Commission, State DES.
**Background:** The Mustang 2002 Fire could cause flooding or mudslides to the residents of Dutch John, there was a flash flooding last summer at Littlehole due to no vegetation to hold back water. High run off in the spring could cause flooding. Contact DESHS flood map specialist.

**Problem Identification:** Control flooding in Town of Manila flooding occurs from heavy rains and fast moving thunderstorms.

**Goal 3- Priority Medium**

**Objective 3.1** - To reduce the threat of flood of the Manila.

**Action:** Technical Analysis on the irrigation canals
**Time Frame:** Ongoing
**Funding:** FEMA, state and local.
**Estimated Cost:** Unknown.
**Staff: :** Unknown
**Background:** There has been flooding in the Town of Manila in the past due to heavy rains and high run off in the spring.

**Objective 3.2-** Reduce debris in Sheep Creek Canal.

**Action:** Develop a debris removal plan
**Time Frame:** 3 months to 2 years (depending on funding)
**Funding:** Local, State and Federal grants
**Estimated Cost:** Unknown
**Staff:** Town of Manila, Sheep Creek Irrigation

**Background:** The canal is used as a storm drain during high water debris such as weeds, garbage and trees back up canal causing flooding. The canal needs to be kept free of obstructions.

**Objective 3.3-** Reduce debris in Sheep Creek Canal.

**Action:** Public Education
**Time Frame:** 2 years
**Funding:** Local state and federal grants
**Estimated Cost:** Unknown
**Staff:** Town of Manila, Sheep Creek Irrigation
**Background:** The canal is used as a storm drain during high water, the tourists throw garbage in the canal causing flooding of canal.

**Objective 3.4-** - Identify flood prone areas in Manila.

**Action:** Flood mapping of potential flood areas in Manila.
**Time Frame**: Unknown (depending on funding)
**Funding:** FEMA grants
**Estimated Cost:** Unknown
**Staff:** Unknown
**Background:** Flooding has happened in the past, we were unable to establish which areas were at risk.

**Objective 3.5:** Design master storm drainage plans for residential areas.

**Action:** Design master storm drainage plans to handle storm water runoff in residential areas.
**Time Frame:** 5 years, (depending on funding)
**Funding:** Grants
**Estimated Cost:** Unknown
**Staff:** Unknown
**Background:** Engineers need to design master storm drainage plans for the residential areas as well as new subdivisions.

## Drought

**County-Wide**

**Problem Identification:** Limited water supplies, increasing population and several years of drought place a strain on availability of community culinary water resources Water Storage

### Goal 1 – Priority High

**Objective 1.1** Excessive water used for landscaping

**Action:** Develop and enforce policies to limit the amount of area that can be used as water requiring landscape.
**Time Frame:** Ongoing
**Funding:** minimal
**Estimated Cost:** To be determined
**Staff:** Special Service District
**Background:** Daggett County has had several years of drought and has at time been unable to supply water to residents on the Manila side of the county.

**Objective 1.2** - Develop more water storage tanks in several areas in the county.

**Action:** Conduct feasibility study.
**Time Frame:** 5 years
**Funding:** Grants
**Estimated Cost:** Unknown
**Staff:** Unknown
**Background:** Daggett County on the Manila side has had several years of drought and does not have enough storage to enable the water district to store spring run off for summer use. There have been several years that the water district was unable to supply water to residents due to not enough storage.

**Problem Identification:** Earthen irrigation systems throughout the County.

**Goal 2- Priority Medium**

**Objective 2.1** - Upgrading irrigation systems.

**Action:** Improve canal in order to have better efficiency of water.
**Time Frame:** Unknown (depends on funding)
**Funding:** State and Federal grants and loans.
**Estimated Cost:** Unknown
**Staff:** NRCS, UACD, USU Extension, etc. Irrigation Company
**Background:** Several years of drought and a need for water conservation.

**Problem Identification:** There has not been enforcement of water law.

**Goal 3** - **Priority High**

**Objective 3.1** -The County has not enforced water law.

**Action:** Find out who is responsible to enforce the water law, then enforce it.
**Time Frame:** Unknown
**Funding:** Unknown
**Estimated Cost:** Unknown
**Staff:** County Commission and Special Service District.
**Background:** May start by litigation.

**Problem Identification:** Lack of public awareness of efficient water usage.

**Goal 4** - **Priority High**

**Objective 4.1** - Education

**Action:** Use several ways in educating the public on efficient water usage.
**Time Frame:** Ongoing
**Funding:** State, Federal grants, city and county funds, irrigation companies.
**Estimated Cost:** Minimal
**Staff:** LEPC, County, Town.

**Background:** Create programs to make the public aware. Use newsletters and the newspapers..

## Insect Infestation

**County-Wide**

**Problem Identification:** Heavy infestations of Mormon crickets and grasshoppers.

### Goal 1- Priority High

**Objective 1.1** - Have government agencies develop better control methods on federal state and county grounds.

**Action:** Eradicate crickets and grasshoppers.
**Time Frame:** Ongoing.
**Funding:** Federal government.
**Estimated Cost:** Unknown
**Staff:** BLM and other federal and state agencies.
**Background:** The County has heavy infestation of crickets and grasshoppers, a particular type was created by the drought.

**Problem Identification:** The County has infestations of mosquitoes.

### Goal 2 - Priority High

**Objective 2.1** Reduce the impact of insects and West Nile Virus

**Action:** Spread insect bait and spray for mosquitoes
**Time Frame:** When required
**Funding:** Federal, State and County funds. Mosquito abatement funds (come from property tax).
**Estimated Cost:** Unknown
**Staff:** County Mosquito Abatement District
**Background:** Mosquito's are of particular concern to elderly residents because of the West Nile Virus, the virus has been identified in the counties that surround Daggett County namely Sweetwater Wy., Moffat Co., and Uintah Co. Ut.

## Severe Weather

**County-Wide**

**Problem Identification:** Wind damage to property and resulting loss of power to facilities in the County.

## Goal 1- Priority High

**Objective 1.1** - Reduce power outages.

**Action:** Improve infrastructures to minimize power outages.
**Time Frame:** Ongoing
**Funding:** Unknown
**Estimated Cost:** Unknown
**Staff:** Local utilities.
**Background:** Contact utilities on current situation.

**Problem Identification:** Strong winds can cause trees to fall on power lines, causing power outages

## Goal 2 – Priority High

**Objective 2.1** Improve electrical power system reliability by reducing risk from damage by trees falling in windstorms.

**Action:** Prune trees back from power lines.
**Time Frame:** Unknown
**Funding:** Power Companies
**Estimated Cost:** Not determined, minimal to moderate
**Staff:** Power Companies
**Background:** The County has a history of severe windstorms and thunderstorm activity.

**Problem Identification:** Wind damage to crops and structures.

## Goal 3- Priority Medium

**Objective 3.1** - Reduce damage to crops and structures.

**Action:** Improve conditions to reduce soil erosion.
**Time Frame:** Ongoing
**Funding:** USDA and other government programs.
**Estimated Cost:** Unknown
**Staff:** NRCS, FSA
**Background:** Encourage people to sign up for assistance and education.

**Problem Identification:** The County has a history of damaging high winds.

## Goal 4 – Priority High

**Objective 4.1** Reduce damage to structures through strict adherence to building codes

**Action:** Ensure that High wind load requirement are established and are met by builders
**Time Frame:** Ongoing
**Funding:** Fees from Building permits
**Estimated Cost:** Minimal
**Staff:** Building Inspector
**Background:** Adherence to building code requirement for tying roof structures to supporting walls will minimize damage from high wind events.