Agency Review Draft

GEM COUNTY HAZARD MITIGATION PLAN

VOLUME 1: COUNTYWIDE ELEMENTS

January 2019

TETRA TECH

Gem County Hazard Mitigation Plan—
Volume 1: Countywide Elements

January 2019

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EXECUTIVE SUMMARY

Hazard mitigation is the use of long-term and short-term policies, programs, projects, and other activities to alleviate the death, injury, and property damage that can result from a disaster. Gem County and a partnership of local governments within the County, have developed the 2018 *Gem County Hazard Mitigation Plan* to reduce risks from natural disasters. The plan complies with federal Disaster Mitigation Act hazard mitigation planning requirements and establishes eligibility for funding under Federal Emergency Management Agency (FEMA) grant programs. Participating planning partners are listed in Table ES-1.

Table ES-1. Municipal Planning Partners

Jurisdiction	Point of Contact	Title
Gem County	Laurie Boston	Gem County Emergency Manager
City of Emmett	Bruce Evans	Superintendent of Public Works
Emmett School District #221	Wayne Rush	Superintendent
Gem County Fire District #1	Rick Welch	Fire Chief
Gem County Fire District #2	Bev Martin	Commissioner

PREVIOUS HAZARD MITIGATION PLANNING IN GEM COUNTY

Gem County and a group of planning partners prepared an initial hazard mitigation plan that was approved by FEMA in 2004. Federal regulations require updates of hazard mitigation plans, in order to reevaluate recommendations, monitor the impacts of actions that have been accomplished, and determine if there is a need to change the focus of mitigation strategies. A jurisdiction covered by a plan that has expired is no longer in compliance with the federal requirements for hazard mitigation planning. To meet the federal requirements for updating plans, the 2004 plan was comprehensively updated in 2012. The 2012 update represented a significant enhancement of the 2004 plan in content, scope and coverage. The 2018 *Gem County Hazard Mitigation Plan* represents an update of the 2012 plan.

PLAN UPDATE PROCESS

To develop the 2018 Gem County Hazard Mitigation Plan, the County followed a process that had the following primary objectives:

- Secure grant funding—This planning effort was supplemented by a grant from FEMA under the Pre-Disaster Mitigation grant program.
- Form a planning team—The planning team implementing the update consisted of County staff assisted by professional consultant Tetra Tech, Inc.
- Reestablish a planning partnership—The planning partnership for the update consists of the jurisdictions listed in Table ES-1.
- Define the planning area—The planning area for the update was defined as all of Gem County.
- Establish a steering committee—A 23-member steering committee of public and private stakeholders was established to meet regularly to review and direct the update planning process.

- Coordinate with other agencies—As the plan update process proceeded, regional, state and federal agencies were invited to participate and were kept apprised of plan development milestones.
- Review existing programs—The planning team identified and reviewed programs and documents with the potential to impact development of an updated hazard mitigation plan.
- Engage the public—Broad public participation in the planning process helped ensure that diverse points of view about the planning area's needs were considered and addressed.

RISK ASSESSMENT METHODOLOGY

Risk assessment is the process of measuring the potential loss of life, personal injury, economic injury, and property damage resulting from natural hazards. This process assesses the vulnerability of people, buildings and infrastructure to natural hazards. Risk assessment models were enhanced with new data and technologies that have become available since 2012. Planning partners used the risk assessment to rank risk and to gauge the potential impacts of each hazard of concern on their jurisdiction. The risk assessment included the following:

- Hazard identification and profiling
- Assessment of the impact of hazards on physical, social and economic assets
- Vulnerability identification
- Estimates of the cost of potential damage.

RISK ASSESSMENT RESULTS

Based on the risk assessment, hazards were ranked for the risk they pose to the overall planning area as shown in Table ES-2.

Table ES-2. Hazard Risk Ranking

Hazard Ranking	Hazard Event	Category
1	Wildfire	High
1	Severe Weather	High
2	Flood	Medium
3	Earthquake	Medium
4	Dam Failure	Medium
5	Landslide	Low
6	Drought	Low

Each planning partner also ranked hazards for its own area. Table ES-3 summarizes the categories of high, medium and low (relative to other rankings) that all jurisdictions assigned each hazard. The results indicate the following general patterns:

- The earthquake and wildfire hazards were most commonly ranked as high risk.
- The flood and severe weather hazards were most commonly ranked as medium risk.
- The dam failure, drought and landslide hazards were most commonly ranked as low risk.

Table ES-3. Summary of Hazard Ranking Results

	Number of Jurisdictions Assigning Ranking to Hazard		
	High	Medium	Low
Dam Failure	2		3
Drought			5
Earthquake	4	1	
Flood	2	3	
Landslide		1	4
Severe weather	2	3	
Wildfire	3	1	1

MITIGATION PURPOSE STATEMENT, GOALS AND OBJECTIVES

The following purpose statement guided the Steering Committee and the planning partnership in selecting the actions contained in this plan update:

> Institutionalize and promote a countywide hazard mitigation ethic through leadership, professionalism and excellence, leading the way to a safe, sustainable Gem County.

The Steering Committee and the planning partnership established the following goals for the plan update:

- Prevent loss of life and reduce personal injury from future hazards and conditions.
- Minimize loss and damage to private and public property.
- Increase public awareness of Gem County hazards and promote opportunities to reduce exposure to risk.
- Increase and enhance the resilience of Gem County's critical infrastructure, economic base and unique/changing environments.
- Ensure high level of communication and cooperation among local, state and federal government to avoid significant disruption of services during a disaster.

The following objectives were identified that meet multiple goals, helping to establish priorities for recommended mitigation actions:

1. Reduce hazard-related risks and vulnerability to potentially isolated populations within the planning area.
2. Maintain/enhance the understanding of hazards and the risk they pose using the best available data and science.
3. Retrofit, purchase or relocate structures and critical facilities based on one or more of the following criteria: level of exposure, repetitive loss history or previous damage from hazards.
4. Seek mitigation projects that provide the highest degree of hazard protection at the least cost.
5. Minimize disruption of local government, commerce and public operations caused by hazard events.
6. Strengthen codes and code enforcement to ensure that new construction of property and infrastructure can withstand the impacts of all hazards that impact the Gem County planning area.
7. Educate the public on the risk exposure to hazards and ways to increase the public's ability to prepare, respond, recover and mitigate the impacts of these events.
8. Utilize the best available data and science on the impacts of hazards to inform future land uses in the planning area.
9. Increase resilience and the continuity of operations of identified critical facilities and infrastructure within the planning area.
10. Establish partnerships with stakeholders to improve capabilities and implement methods to protect the people, property and environment of Gem County.

11. Seek ways to enhance emergency management capability within the planning area.
12. Use incentive-based programs, such as the Community Rating System, Firewise and Storm/Ready, to promote proactive risk reduction at both the public and private scale.

MITIGATION ACTIONS

Mitigation actions presented in this update are activities designed to reduce or eliminate losses resulting from natural hazards. The update process resulted in the identification of 63 mitigation actions for implementation by individual planning partners, as presented in Volume 2 of this plan. In addition, the steering committee and planning partnership identified five countywide actions benefiting the whole partnership, as listed in Table ES-4.

Table ES-4. County-Wide Mitigation Actions

Hazards Addressed	Lead Agency	Possible Funding Sources	Time Line	Objectives
CW-1—Continue outreach to irrigation districts to encourage their participation as planning partners in the hazard mitigation plan.				
Flood, Severe Weather, Earthquake, Dam/Canal Failure	Emergency Management	Local Funding	Short term	2, 7, 10
CW-2—Continue to maintain a countywide hazard mitigation plan web link on the County website to house the plan and plan updates, in order to provide the public an opportunity to monitor plan implementation and progress. Each planning partner may support the initiative by including an initiative in its action plan and creating a web link to the website.				
All Hazards	Gem County Emergency Management	General Fund	Short term/ ongoing	2, 7, 10
CW-3—Coordinate all mitigation planning and project efforts, including grant application support, to maximize all resources available to the planning partnership.				
All Hazards	Gem County Emergency Management/ All Planning Partners	General Fund, FEMA mitigation grants	Short term/ ongoing	1, 4, 10
CW-4—Provide coordination and technical assistance in grant application preparation that includes assistance in cost-benefit analysis for grant-eligible projects.				
All Hazards	Gem County Emergency Management	General Fund, FEMA mitigation grants	Short term/ ongoing	2, 7, 10
CW-5—Where appropriate, support retrofitting, purchase, or relocation of structures or infrastructure located in hazard-prone areas to protect structures/infrastructure from future damage, with repetitive loss and severe repetitive loss properties as priority when applicable.				
All Hazards	Al Planning Partners	FEMA mitigation grants	Long term	7, 8, 9, 10

IMPLEMENTATION

Full implementation of the recommendations of this plan will require time and resources. The measure of the plan’s success will be its ability to adapt to changing conditions. Gem County and its planning partners will assume responsibility for adopting the recommendations of this plan and committing resources toward implementation. The framework established by this plan commits all planning partners to pursue actions when the benefits of a project exceed its costs. The planning partnership developed this plan with extensive public input, and public support of the actions identified in this plan will help ensure the plan’s success.

Part 1. BACKGROUND AND METHODS

1. INTRODUCTION TO THE PLANNING PROCESS

1.1 WHY PREPARE THIS PLAN?

1.1.1 The Big Picture

Hazard mitigation is defined as any action taken to reduce or alleviate the loss of life, personal injury, and property damage that can result from a disaster. It involves long- and short-term actions implemented before, during and after disasters. Hazard mitigation activities include planning efforts, policy changes, programs, studies, improvement projects, and other steps to reduce the impacts of hazards.

For many years, federal disaster funding focused on relief and recovery after disasters occurred, with limited funding for hazard mitigation planning in advance. The Disaster Mitigation Act (DMA), passed in 2000, shifted the emphasis toward planning for disasters before they occur. The DMA requires state and local governments to develop hazard mitigation plans as a condition for federal disaster grant assistance. Regulations developed to fulfill the DMA's requirements are included in Title 44 of the Code of Federal Regulations (44 CFR).

The responsibility for hazard mitigation lies with many, including private property owners, commercial interests, and local, state and federal governments. The DMA encourages cooperation among state and local authorities in pre-disaster planning. The enhanced planning network called for by the DMA helps local governments to articulate accurate needs for mitigation, resulting in faster allocation of funding and more cost-effective risk-reduction projects.

The DMA also promotes sustainability in hazard mitigation. To be sustainable, hazard mitigation needs to incorporate sound management of natural resources and address hazards and mitigation in the largest possible social and economic context.

1.1.2 Local Concerns

The inevitability of natural hazards in Gem County create an urgent need to develop strategies, coordinate resources, and increase public awareness to reduce risk and prevent loss from future hazard events. Identifying risks posed by hazards and developing strategies to reduce the impact of a hazard event can assist in protecting life and property of citizens and communities. Local residents and businesses can work together with the County to create a hazard mitigation plan that addresses the potential impacts of hazard events.

Following its tradition of proactive planning and preparedness for all phases of emergency management, Gem County led a multi-jurisdictional planning effort pursuant to the requirements of the DMA in 2004. The *Gem County All Hazards Mitigation Plan* was adopted by the County and three planning partners in December 2004. It received Federal Emergency Management Agency (FEMA) approval on February 15, 2006, establishing compliance with the DMA for the County and its planning partners. An update to the plan in 2012, with six participating jurisdictions, addressed seven identified hazards: dam or canal failure, drought, flood, landslide, earthquake, severe weather and wildfire. The update received FEMA approval on December 18, 2012, maintaining the partners' DMA compliance. The plan is now undergoing its second comprehensive update in accordance with federal requirements.

1.1.3 Purposes for Planning

This planning effort represents the second comprehensive update to the Gem County hazard mitigation plan since its initial development in 2004. This update identifies resources, information, and strategies for reducing risk from natural hazards. Elements and strategies in the plan were selected because they meet a program requirement and because they best meet the needs of the planning partners and their citizens.

In preparing this update, Gem County has again partnered with local communities and special-purpose districts. One of the benefits of multi-jurisdictional planning is the ability to pool resources and eliminate redundant activities within a planning area that has uniform risk exposure and vulnerabilities. FEMA encourages multi-jurisdictional planning under its guidance for the DMA. The plan will help guide and coordinate mitigation activities throughout the planning area. The main purpose of this planning effort was to identify risks posed by hazards and to develop strategies to reduce the impact of hazard events on people and property in Gem County; however, the plan was also developed to meet the following objectives:

- Meet or exceed requirements of the DMA.
- Enable all planning partners to continue using federal grant funding to reduce risk through mitigation.
- Meet the needs of each planning partner as well as state and federal requirements.
- Create a risk assessment that focuses on Gem County hazards of concern.
- Create a single planning document that integrates all planning partners into a framework that supports partnerships within the county and puts all partners on the same planning cycle for future updates.
- Meet the planning requirements of FEMA's Community Rating System (CRS), allowing planning partners that participate in the CRS program to maintain or enhance their CRS classifications.
- Coordinate existing plans and programs so that high-priority actions to mitigate possible disaster impacts are funded and implemented.

1.2 WHO WILL BENEFIT FROM THIS PLAN?

All citizens and businesses of Gem County are the ultimate beneficiaries of this hazard mitigation plan. The plan reduces risk for those who live in, work in, and visit the county. It provides a viable planning framework for all foreseeable natural hazards that may impact the county. Participation in development of the plan by key stakeholders in the county helped ensure that outcomes will be mutually beneficial. The resources and background information in the plan are applicable countywide, and the plan's goals and recommendations can lay groundwork for the development and implementation of local mitigation activities and partnerships.

1.3 HOW TO USE THIS PLAN

This plan has been set up in two volumes so that elements that are jurisdiction-specific can easily be distinguished from those that apply to the whole planning area:

- **Volume 1**—Volume 1 includes all federally required elements of a disaster mitigation plan that apply to the entire planning area. This includes the description of the planning process, public involvement strategy, goals and objectives, countywide hazard risk assessment, countywide mitigation actions, and a plan maintenance strategy. The following appendices provided at the end of Volume 1 include information or explanations to support the main content of the plan:
  - Appendix A—Ground rules established for the hazard mitigation plan steering committee
  - Appendix B—Public outreach information, including the hazard mitigation questionnaire and summary of results.
  - Appendix C—Concepts and methods used for hazard mapping

- Appendix D—Plan adoption resolutions from Planning Partners
- Appendix E—A template for progress reports to be completed as this plan is implemented.

- **Volume 2**—Volume 2 includes all federally required jurisdiction-specific elements, in annexes for each participating jurisdiction. It includes a description of the participation requirements established by the Steering Committee, as well as instructions and templates that the partners used to complete their annexes. Volume 2 also includes “linkage” procedures for eligible jurisdictions that did not participate in development of this plan but wish to adopt it in the future.

Each planning partner will adopt Volume 1 in its entirety, its own jurisdiction-specific annex in Volume 2, and at least the introduction and appendices to Volume 2. Partners may at their discretion adopt Volume 2 in its entirety.

2. PLAN UPDATE—WHAT HAS CHANGED?

2.1 PREVIOUS PLANS

2.1.1 The 2004 Plan

The 2004 Gem County All Hazards Mitigation Plan was developed through a collaborative process involving multiple stakeholders in a defined planning area. The County Commissioners' office contacted these stakeholders directly to invite their participation and scheduled meetings of a planning committee. The planning process was completed in five steps:

- **Step 1, Collection of Data** about the extent and periodicity of hazards in and around Gem County. This included an area encompassing Adams, Boise, Payette, Valley, and Washington Counties to ensure a robust dataset for making inferences about hazards in Gem County.
- **Step 2, Field Observations and Estimations** about risks, juxtaposition of structures and infrastructure to risk areas, access, and potential treatments.
- **Step 3, Mapping** of data relevant to pre-disaster mitigation control and treatments, structures, resource values, infrastructure, risk assessments, and related data.
- **Step 4, Facilitation of Public Involvement** from the formation of the planning committee, to a public mail survey, news releases, public meetings, public review of draft documents, and acknowledgement of the final plan by the signatory representatives.
- **Step 5, Analysis and Drafting of the Report** to integrate the results of the planning process, providing ample review and integration of committee and public input, followed by signature of the final document.

A principal objective of the planning process was the integration of the National Fire Plan, the Idaho Statewide Implementation Strategy, the Healthy Forests Restoration Act, the Idaho State Hazard Mitigation Plan 2004, the Gem Community Comprehensive Plan, and FEMA requirements for a countywide all hazards mitigation plan. The effort used the best and most appropriate science from all partners, integrating local and regional knowledge about hazards while meeting the needs of local citizens, the regional economy and the significance of this region to the rest of Idaho and the Inland West.

The plan was published in three volumes: Volume I addressed flood, landslide, earthquake and severe weather; Volume II was the wildfire mitigation plan; and Volume III contained appendices. The plan identified and prioritized 20 strategies to address flood, landslide, earthquake and severe weather and 25 strategies addressing wildfire mitigation.

2.1.2 The 2012 Plan

Gem County used the plan update process to comprehensively revise the original hazard mitigation plan. This plan differed from its predecessor for a variety of reasons:

- Better guidance existed at the time of its development on what is required to meet the intent of the DMA.

- The scope of the plan was expanded to include special purpose district planning partners not involved in the initial planning effort. These district planning partners were considered to be true stakeholders in mitigation within the planning area.
- Newly available data and tools provided for a more detailed and accurate risk assessment. The initial plan did not use tools such as FEMA's Hazards U.S. (Hazus) computer model or new geographic information system (GIS) data available from the County.
- The risk assessment was prepared to better support future grant applications by providing risk and vulnerability information that would directly support the measurement of "cost-effectiveness" required under FEMA mitigation grant programs.
- Science and technology had improved since the development of the initial plan.
- The plan was developed such that it met program requirements of the Community Rating System (CRS), thus reducing flood insurance premiums in participating jurisdictions.
- The update was a more user-friendly document that was not overly technical.
- The plan identified actions rather than strategies. Strategies provide direction, but actions are fundable under grant programs. This plan replaced strategies with a guiding principal, goals and objectives. The identified actions met multiple objectives that were measurable, so that each planning partner can measure the effectiveness of their mitigation actions.
- The plan identified 12 county-wide actions and 92 jurisdiction-specific actions to be implanted by the planning partnership. The status of these actions was monitored over the plan performance period by a plain maintenance strategy identified in the plan that included annual progress reporting.

2.2 PLAN PROGRESS

The 2012 Plan outlined a comprehensive plan maintenance strategy that included a protocol for the annual review of actions identified in the plan and the preparation of an annual progress report. The strategy called for the report to be posted to the hazard mitigation plan website as a method of continuing public involvement. Components of the plan maintenance strategy were applied during the performance period of this plan, with reporting on the completion of actions through the Local Emergency Planning Committee (LEPC). However, no formal progress reports using the template from the 2012 plan were prepared or posted to the website. The Steering Committee used lessons learned from the implementation of the 2012 plan maintenance protocol to inform the plan maintenance strategy included in this plan update. Annual progress reports are not required under 44 CFR but are required for plans approved for credit under FEMA's Community Rating System (CRS) program, in which Gem County does participate. Revisions to the plan maintenance strategy are noted in Table 2-1.

2.3 WHY UPDATE?

44 CFR stipulates that hazard mitigation plans must present a schedule for monitoring, evaluating and updating the plan. This provides an opportunity to reevaluate recommendations, monitor the impacts of actions that have been accomplished, and determine if there is a need to change the focus of mitigation strategies. A jurisdiction covered by a plan that has expired is not able to pursue elements of federal funding under the Robert T. Stafford Act for which a current hazard mitigation plan is a prerequisite.

2.4 THE UPDATED PLAN—WHAT IS DIFFERENT?

Due to the success of the prior plan, no major changes were made to the format and function for this update. The plan has been significantly enhanced using recently available best available data and technology, especially in the risk assessment portion. This plan update followed the same basic planning process as was used for the initial effort. A Steering Committee was once again the critical planning component in the process. Table 2-1 indicates the major changes between the 2012 plan and this update as they relate to 44 CFR planning requirements.

Table 2-1. Plan Changes Crosswalk

44 CFR Requirement	2012 Plan	Updated Plan
Requirement §201.6(b): In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include: 1. An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval; 2. An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other private and non-profit interests to be involved in the planning process; and 3. Review and incorporation, if appropriate, of existing plans, studies, reports and technical information.	The 2012 plan followed an outreach strategy using multiple media developed and approved by the Steering Committee. This strategy involved: • Public participation on an oversight Steering Committee. • Establishment of a plan informational website. • Press releases. • Use of a public information survey Stakeholders were identified and coordinated with throughout the process. A comprehensive review of relevant plans and programs was performed by the planning team.	Building upon the success of the 2012 plan, the 2018 planning effort deployed the same public engagement methodology. Enhancements included: • Utilization of social media • Web deployed survey • Enhanced press coverage The 2018 planning process identified key stakeholders and coordinated with them throughout the process. A comprehensive review of relevant plans and programs was performed by the planning team
§201.6(c)(2): The plan shall include a risk assessment that provides the factual basis for activities proposed in the strategy to reduce losses from identified hazards. Local risk assessments must provide sufficient information to enable the jurisdiction to identify and prioritize appropriate mitigation actions to reduce losses from identified hazards.	The 2012 plan included a comprehensive risk assessment of seven hazards of concern. Risk was defined as (probability x impact), where impact is the impact on people, property and economy of the planning area. All planning partners ranked risk as it pertained to their jurisdiction. The potential impacts of climate change were discussed for each hazard.	The same methodology, using new, updated data, was deployed for the 2018 plan update.
§201.6(c)(2)(i): [The risk assessment shall include a] description of the … location and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.	The 2012 plan presented a risk assessment of each hazard of concern. Each chapter included the following components: • Hazard profile, including maps of extent and location, historical occurrences, frequency, severity and warning time. • Secondary hazards • Climate change impacts • Exposure of people, property, critical facilities and environment • Vulnerability of people, property, critical facilities and environment. • Future trends in development • Scenarios • Issues	The same format, using new, updated data, was deployed for the 2018 plan update. Climate change was addressed as a stand-alone chapter.

44 CFR Requirement	2012 Plan	Updated Plan
§201.6(c)(2)(ii): [The risk assessment shall include a] description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i). This description shall include an overall summary of each hazard and its impact on the community	Vulnerability was assessed for all hazards of concern. The Hazus computer model was used for the dam failure, earthquake and flood hazards. These were Level 2 analyses using city and county data. Site-specific data on County-identified critical facilities were entered into the Hazus model. Hazus outputs were generated for other hazards by applying an estimated damage function to an asset inventory extracted from Hazus.	The same methodology was deployed for the 2018 plan update, using new and updated data.
§201.6(c)(2)(ii): [The risk assessment] must also address National Flood Insurance Program insured structures that have been repetitively damaged floods	There were no repetitive loss properties identified in the Gem County planning area at the time of the last update. However, a comprehensive flood insurance analysis that looks at policy coverage and claims history was performed as part of the flood hazard risk assessment.	The repetitive loss status remained unchanged for the 2018 plan update. A comprehensive flood insurance analysis that looks at policy coverage and claims history was re-run with current up-to-date data as part of the flood hazard risk assessment.
Requirement §201.6(c)(2)(ii)(A): The plan should describe vulnerability in terms of the types and numbers of existing and future buildings, infrastructure and critical facilities located in the identified hazard area.	A complete inventory of the numbers and types of buildings exposed was generated for each hazard of concern. The Steering Committee defined "critical facilities" for the planning area, and these were inventoried by exposure. Each hazard chapter provided a discussion on future development trends.	The same methodology was deployed for the 2018 plan update, using new and updated data.
Requirement §201.6(c)(2)(ii)(B): [The plan should describe vulnerability in terms of an] estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(i)(A) and a description of the methodology used to prepare the estimate.	Loss estimates were generated for all hazards of concern. These were generated by Hazus for the dam failure, earthquake and flood hazards. For the other hazards, loss estimates were generated by applying a regionally relevant damage function to the exposed inventory. In all cases, a damage function was applied to an asset inventory. The asset inventory was the same for all hazards and was generated in Hazus.	The same methodology was deployed for the 2018 plan update, using new and updated data.
Requirement §201.6(c)(2)(ii)(C): [The plan should describe vulnerability in terms of] providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.	There was a discussion of future development trends as they pertain to each hazard of concern. This discussion looked predominantly at the existing land use and the regulatory environment that dictated this land use.	The same methodology was deployed for the 2018 plan update, using new and updated data. In addition, a look at the change in risk due to new development over the performance period of the plan was performed for each hazard of concern.

44 CFR Requirement	2012 Plan	Updated Plan
§201.6(c)(3): The plan shall include a mitigation strategy that provides the jurisdiction's blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools.	The plan contained a guiding principal, goals, objectives and actions. The guiding principal, goals and objectives were regional and covered all planning partners. All planning partners identified actions that could be implemented within their capabilities. The actions were jurisdiction-specific and strived to meet multiple objectives. All objectives meet multiple goals and stood alone as components of the plan. Each planning partner completed an assessment of its regulatory, technical and financial capabilities.	The same methodology for setting goals, objectives and actions was applied to the 2018 plan update. The Steering Committee reviewed and reconfirmed the mission statement, goals and objectives for the plan. Each planning partner reviewed the status of their prior actions during the phased deployment of the jurisdictional annex process. Actions that were completed or no longer considered to be feasible were removed. The rest of the actions were carried over to the 2018 plan and in some cases, new actions were added to the action plan.
Requirement §201.6(c)(3)(i): [The hazard mitigation strategy shall include a] description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.	The Steering Committee identified a mission statement, five goals and 12 objectives. These were completely new goals and objectives targeted specifically for this hazard mitigation plan update. They were not carried over from any other planning document and were identified based on the capabilities of the planning partnership. These planning components supported the actions identified in the plan.	The same methodology for setting goals, objectives and actions was applied to the 2018 plan update. The Steering Committee reviewed and reconfirmed the mission statement, goals and objectives for the plan.
Requirement §201.6(c)(3)(ii): [The mitigation strategy shall include a] section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.	Chapter 15 included a catalog of hazard mitigation alternatives that was developed through a facilitated process. This catalog identified actions that manipulate the hazard, reduce exposure to the hazard, reduce vulnerability, or increase mitigation capability. The catalog further categorized actions by scale of implementation. A table in the action plan section analyzed each action by mitigation type to illustrate the range of actions selected.	The mitigation catalog was reviewed and updated by the Steering Committee for the 2018 update. As with the 2012 plan, the catalog has been included in the 2018 plan to represent the comprehensive range of alternatives considered by each planning partner. The analysis of mitigation action was again used in jurisdictional annexes to the plan.
Requirement: §201.6(c)(3)(ii): [The mitigation strategy] must also address the jurisdiction's participation in the National Flood Insurance Program, and continued compliance with the program's requirements, as appropriate.	Both the City of Emmett and Gem County participate in the National Flood Insurance Program (NFIP). Both communities identified an action stating their commitment to maintain compliance and good standing under the program. Gem County participates in the Community Rating System and identified actions to maintain or enhance its standing under the CRS.	The same methodology was deployed for the 2018 plan update, using new and updated data.

44 CFR Requirement	2012 Plan	Updated Plan
Requirement: §201.6(c)(3)(iii): [The mitigation strategy shall describe] how the actions identified in section (c)(3)(ii) will be prioritized, implemented and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.	Each recommended action was prioritized using a qualitative methodology based on the objectives the project would meet, the timeline for completion, how the project would be funded, the impact of the project, the benefits of the project and the costs of the project.	The same methodology was deployed for the 2018 plan update, using new and updated data.
Requirement §201.6(c)(4)(i): [The plan maintenance process shall include a] section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.	This update presented a plan maintenance strategy that included the following components: • Annual progress reporting • Maintaining a steering committee • Continuing public involvement • Incorporation into other plans • Plan update	The 2012 plan maintenance strategy was carried over to the 2018 plan with minor enhancements for clarity.
Requirement §201.6(c)(4)(ii): [The plan shall include a] process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate.	This update detailed recommendations for incorporating the plan into other planning mechanisms such as: • Partners' emergency response plans • Capital improvement programs • Municipal codes • Community design guidelines • Water-efficient landscape design guidelines • Stormwater management programs • Water system vulnerability assessments • Community Wildfire Protection Plans.	The 2012 plan maintenance strategy was carried over to the 2018 plan with minor enhancements for clarity.
Requirement §201.6(c)(4)(iii): [The plan maintenance process shall include a] discussion on how the community will continue public participation in the plan maintenance process.	This update detailed a strategy for continuing public involvement	The 2012 plan maintenance strategy was carried over to the 2018 plan with minor enhancements for clarity.
Requirement §201.6(c)(5): [The local hazard mitigation plan shall include] documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval of the plan (e.g., City Council, County Commissioner, Tribal Council).	Six planning partners sought DMA compliance for this plan. Appendix D presented the resolutions of all planning partners that adopted this update.	The 2018 plan achieves DMA compliance for five planning partners. The Gem County Mosquito Abatement District withdrew from this plan update process. Resolutions for each partner adopting the plan can be found in Appendix D of this volume.

3. PLANNING METHODOLOGY

To develop the 2018 Gem County Hazard Mitigation Plan, the County followed a process that had the following primary objectives:

- Secure grant funding
- Form a planning team
- Reestablish a planning partnership
- Define the planning area
- Establish a steering committee
- Coordinate with other agencies
- Review existing programs
- Engage the public.

3.1 GRANT FUNDING

This planning effort was supplemented by a grant from FEMA under the Pre-Disaster Mitigation (PDM) grant program. Gem County was the applicant agent for the grant. The grant was applied for in 2016, and funding was appropriated in 2017. It covered 75 percent of the cost for development of this plan; the County and its planning partners covered the balance through in-kind contributions.

3.2 FORMATION OF THE PLANNING TEAM

Gem County hired Tetra Tech, Inc. to assist with development and implementation of the plan. Contract personnel assumed the role of the lead planner, reporting directly to a County-designated project manager. A planning team was formed to lead the planning effort, made up of the following members:

- Laurie Boston, Gem County Emergency Manager
- Rob Flaner (Tetra Tech) — Project Manager/Lead project planner
- Carol Bauman (Tetra Tech) — Hazus/GIS lead
- Stephen Veith (Tetra Tech) — GIS/cartography
- Kristen Gelino (Tetra Tech) — Planner

3.3 ESTABLISHMENT OF THE PLANNING PARTNERSHIP

Gem County opened this planning effort to all planning partners from the 2012 planning effort and any eligible local governments within the County not currently covered by a hazard mitigation plan. Gem County has an active Local Emergency Planning Committee (LEPC) that provided the basis for the Steering Committee (see Section 3.5) as well as access to eligible local governments within the County. The planning team made a presentation to the LEPC on November 29, 2017 to introduce the mitigation plan update, organize a Steering Committee and solicit planning partner commitment to the plan update process.

Each jurisdiction wishing to join the planning partnership was asked to provide a "letter of intent to participate" that designated a point of contact for the jurisdiction and confirmed the jurisdiction's commitment to the process and understanding of expectations. Linkage procedures have been established (see Volume 2 of this plan) for any jurisdiction wishing to link to the Gem County plan in the future. The planning partners that provided a letter of intent to participate in the plan update process are shown in Table 3-1.

Table 3-1. Planning Partners

Jurisdiction	Point of Contact	Title
Gem County	Laurie Boston	Gem County Emergency Manager
City of Emmett	Bruce Evans	Superintendent of Public Works
Emmett School District #221	Wayne Rush	Superintendent
Gem County Fire District #1	Rick Welch	Fire Chief
Gem County Fire District #2	Bev Martin	Commissioner
Gem County Mosquito Abatement District[a]	Jason R. Kinley	Director

a. Gem County Mosquito Abatement District withdrew from this plan update process before the plan's completion

3.4 DEFINING THE PLANNING AREA

The planning area consists of all of Gem County. All partners to this plan have jurisdictional authority within this planning area.

3.5 THE STEERING COMMITTEE

Hazard mitigation planning enhances collaboration and support among diverse parties whose interests can be affected by hazard losses. A steering committee was formed to oversee all phases of the plan update. The Planning Team leveraged the effectiveness of Gem County's LEPC by operating the hazard mitigation plan Steering Committee as a sub-committee to the LEPC. Many of the Steering Committee members for this plan update also serve on the LEPC. All Steering Committee meetings were scheduled for the same day as LEPC meetings, immediately following the LEPC meeting. Steering Committee members included key planning partner staff, citizens and other stakeholders from within the planning area. Table 3-2 lists the committee members.

Leadership roles and ground rules were established during the Steering Committee's initial meeting on November 29, 2017. The ground rules are provided in Appendix A. The Steering Committee agreed to meet monthly as needed throughout the course of the plan's development. The planning team facilitated each Steering Committee meeting, which addressed a set of objectives based on the work plan established for the update. The Steering Committee met seven times from November 2017 through October 2018. Meeting agendas, notes and attendance logs are available for review upon request. All Steering Committee meetings were open to the public, and agendas and meeting notes were posted to the hazard mitigation plan website. All open public meeting laws and policies were adhered to during the facilitation of these steering committee meetings. Summaries of all the steering committee meetings are included with the public outreach materials provided in Appendix B.

3.6 COORDINATION WITH OTHER AGENCIES

44 CFR requires that opportunities for involvement in the planning be provided to neighboring communities, agencies involved in hazard mitigation, agencies that regulate development, businesses, academia and other private interests (Section 201.6.b.2). The initial coordination activity was an invitation to agencies to provide representatives to participate on the Steering Committee.

Table 3-2. Steering Committee Members

Name	Title	Jurisdiction/Agency
Bruce Evans (Chair)	Superintendent of Public Works	City of Emmett
Chuck Rolland (Vice-Chair)	Sheriff	Gem County
Laurie Boston	Emergency Manager	Gem County
Rick Sego	EAP Program Coordinator	Bureau of Reclamation
Rick Johnston	County Assessor	Gem County
Neal Capps	Director	Gem County Road & Bridge
Bill Butticci	Board Chair of the County Commissioners	Gem County
Bryan Elliott	County Commissioner and Board Chair of Southwest District Health	SW District Health
Mark Rekow	County Commissioner	Gem County
Shelly Tilton	County Clerk	Gem County
Jay Hummel		Emmett School District No. 221
Bev Martin	Commissioner	Gem County Fire District #/
Dennis Weaver	Citizen	Ola representative
Jennifer Kharrl	Planning Director	Gem County Planning & Zoning
Ken Sheldon	Deputy Chief	Gem County EMS
Curt Christensen	Fire Chief	Emmett Fire Department
Rick Welch	Fire Chief	Gem County Fire District #1
Michele Chadwick	Board Member	Gem County Mosquito Abatement District
Myra Church	Citizen	Sweet Representative
Chris Davidson	Physical Security & Business Continuity Manager	Idaho Power
Terry Wilson	Planner	SW District Health
Dale Nalder	SW Area Field Officer	Idaho Office of Emergency Management
Lorrie Pahl	Mitigation Planner	Idaho Office of Emergency Management

As the plan update process proceeded, the following agencies were invited to participate and were kept apprised of plan development milestones:

- Idaho Office of Emergency Management
- Idaho Department of Water Resources (IDWR) State NFIP Coordinating Office
- Gem County Irrigation Districts
- U.S. Bureau of Reclamation
- U.S. Army Corps of Engineers
- Idaho Silver Jackets
- Idaho Power
- Southwest District Health
- National Weather Service
- Ada County
- Squaw Creek Ditch Company

These agencies received meeting announcements, agendas, and minutes by e-mail throughout the plan update process. They supported the effort by attending meetings or providing feedback on issues. All the agencies were provided an opportunity to comment on this plan update, primarily through the hazard mitigation plan website. Each was sent an e-mail message informing them that draft portions of the plan were available for review. In addition, the complete draft plan was sent to FEMA Region X, the Idaho Office of Emergency Management, and the Insurance Service Office (ISO) for a pre-adoption review to ensure program compliance.

3.7 REVIEW OF EXISTING PROGRAMS

44 CFR states that hazard mitigation planning must include review and incorporation, if appropriate, of existing plans, studies, reports and technical information (Section 201.6.b(3)). Chapter 5 of this volume provides a review of laws and ordinances in effect within the planning area that can affect hazard mitigation actions. In addition, the following programs can affect mitigation within the planning area:

- Gem Community Comprehensive Plan (March 2010)
- The City of Emmett and Gem County Municipal Codes
- Idaho State Hazard Mitigation Plan
- Gem County Hazard Mitigation Plan (2012)
- Gem County Wildfire Mitigation Plan (2004b)
- Gem County Comprehensive Emergency Management Plan (2014).
- Gem County Terrorism & Civil Unrest Plan (2004)
- Gem County Capital Improvement Program.

An assessment of all planning partners' regulatory, technical and financial capabilities to implement hazard mitigation actions is presented in the individual jurisdiction-specific annexes in Volume 2. Many of these relevant plans, studies and regulations are cited in the capability assessment.

One of the Steering Committee's first action items was to review the Idaho State Hazard Mitigation Plan. The Steering Committee identified hazards listed in the state plan to which the Gem County planning area is susceptible, in order to determine if there was a need to expand the scope of the risk assessment. The committee also reviewed the goals, objectives and strategies of the state plan in order to select goals, objectives and actions for the plan that are consistent with those of the state.

3.8 PUBLIC INVOLVEMENT

Broad public participation in the planning process helps ensure that diverse points of view about the planning area's needs are considered and addressed. The public must have opportunities to comment on disaster mitigation plans during the drafting stages and prior to plan approval (44 CFR, Section 201.6(b)(1)). The Community Rating System expands on these requirements by making CRS credits available for optional public involvement activities. The strategy for involving the public in this plan update emphasized the following elements:

- Include members of the public on the Steering Committee.
- Use a questionnaire to determine if the public's perception of risk and support of hazard mitigation has changed since the initial planning process.
- Utilize/leverage existing public outreach efforts implemented by Gem County
- Attempt to reach as many planning area citizens as possible using multiple media, including social media.
- Identify and involve planning area stakeholders.

3.8.1 Stakeholders and the Steering Committee

Stakeholders are the individuals, agencies and jurisdictions that have a vested interest in the recommendations of the hazard mitigation plan, including planning partners. All planning partners are stakeholders in the process. The diversity brought to the table by special purpose districts and private non-profit entities creates an opportunity to leverage partnerships between entities that typically do not work together in the field of hazard mitigation.

The effort to include stakeholders in this process included stakeholder participation on the Steering Committee. All members of the Steering Committee live or work in the planning area. Two members represented Gem County citizen and property owner interests, and four represented state, federal or private sector interests. The Steering Committee met throughout the course of the plan's development, and all meetings were open to the public. Protocols for handling public comments were established in the ground rules developed by the Steering Committee.

3.8.2 Hazard Mitigation Survey

The Steering Committee deployed a survey (see Figure 3-1) to gain information from all portions of the County. The survey was used to gauge household preparedness for natural hazards and the level of knowledge of tools and techniques that assist in reducing risk and loss from natural hazards.

Gem County Survey: 2018 Hazard Mitigation Plan Update

Survey Introduction

A partnership of local governments and other stakeholders in Gem County are working together to update the Gem County All Hazards Mitigation Plan. This is in response to Federal programs that will enable the partnership to use pre- and post-disaster financial assistance to reduce the exposure of County residents to risks associated with natural hazards.

In order to identify and plan for future natural disasters, we need your assistance. This questionnaire is designed to help us gauge the level of knowledge local citizens already have about natural disaster issues and to find out from local residents about areas vulnerable to various types of natural disasters. The information you provide will help us coordinate activities to reduce the risk of injury or property damage in the future.

The survey consists of 28 questions plus an opportunity for any additional comments at the end. The survey should take less than 5 minutes to complete and is anonymous. When you have finished the survey, please click "Done" on the final page.

The Gem County Hazard Mitigation Planning Partnership thanks you for taking the time to participate in this information-gathering process.

*** 1. Where in Gem County do you live?**

- Emmett
- Ola
- Letha
- Sweet
- Montour
- The "bench"
- Other (please specify)

2. Do you work in Gem County?

- Yes
- Retired
- No

Figure 3-1. Sample Page from Questionnaire Distributed to the Public

This questionnaire was designed to help identify areas vulnerable to natural hazards. Responses helped guide the Steering Committee in selecting goals, objectives and mitigation strategies. A web-based survey tool was used to develop and track the results of the survey. The survey was disseminated via the hazard mitigation plan website, social media (Facebook and Twitter), and direct e-mail to a list of emergency management stakeholders maintained by Gem County Emergency Management. The survey and the website were advertised via multiple means during the survey period. The survey was conducted from February through September of 2018. Over 420 surveys were completed, covering all geographic locations in the County. This response was much greater than the 100 surveys received for the 2012 planning effort. This success is attributed to the power of social media tools such as Facebook and Twitter as well as the stakeholder coordination performed by Gem County Emergency Management. The questionnaire and a summary of results are included in Appendix B.

3.8.3 Public Meetings

Open-house public meetings were held on March 15, 2018 in Ola and on April 3, 2018 in Emmett; Figure 3-2 and Figure 3-3 show the fliers used to promote these events. The meetings allowed attendees to examine maps and handouts and have direct conversations with project staff. Reasons for planning and information generated for the risk assessment were shared with open house attendees via a PowerPoint presentation. The Hazard Mitigation Survey was also made available at these public meetings.

Figure 3-2. Ola Public Open House Announcement

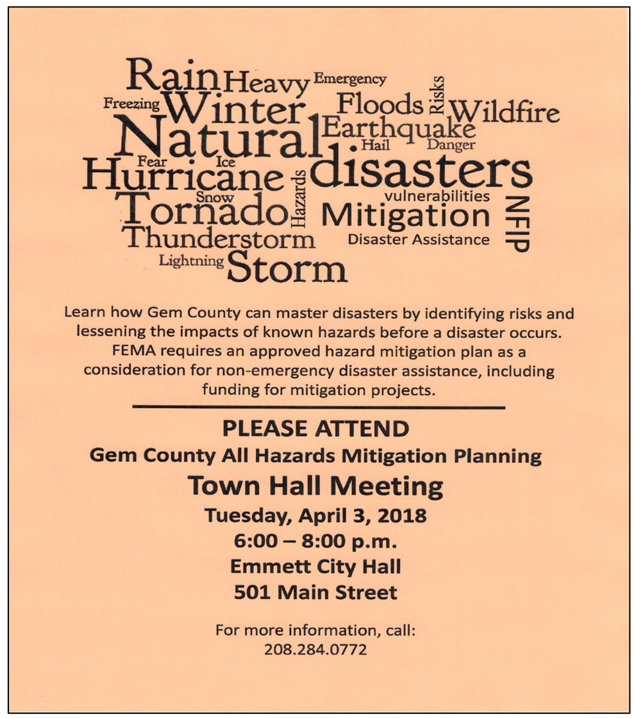


Figure 3-3. Emmett Public Open House Announcement

Attendees were asked to provide input on the County's core capabilities by completing a "dot exercise." Posters with 30 statements of core capability were placed on a wall (see Figure 3-4). Meeting attendees were provided sheets of colored dots (red and green). Attendees were asked to place a green dot by the statement if they felt the capability statement was a core strength for the planning area, and to place a red dot next to the statement if they felt it was a core weakness for the planning area. Over 30 citizens participated in the exercises between the two open house sessions. Findings from the exercises are summarized in Section 3.8.7 and the aggregate results are provided in Appendix B. Attendance to these meetings is summarized in Section 3.8.7.

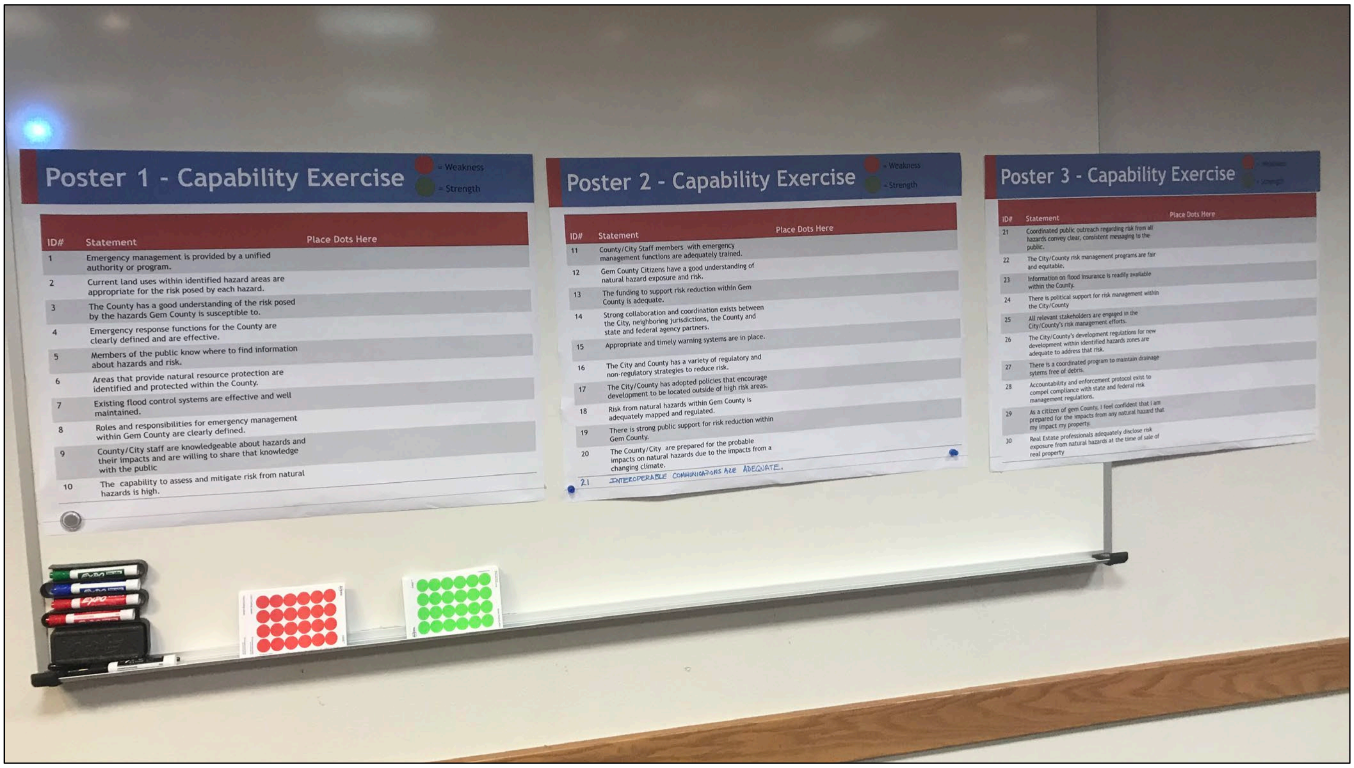


Figure 3-4. “Dot” Exercise Posters

3.8.4 Press Coverage

A press release announcing the plan update process and the mitigation plan web site was disseminated to all media outlets on February 16, 2018. A press release announcing the final public comment period was disseminated to all media outlets on Monday, December 3, 2018. The planning effort received the following press coverage:

- Emmett Messenger Index, March 2, 2018. “County hazard mitigation planning process in progress” (www.idahopress.com/emmett/news/county-hazard-mitigation-planning-process-in-progress/article_8e9a34b0-a8c3-5c05-8f54-bc4630255f8b.html)
- Emmett Messenger Index, March 12, 2018. “County Hazard Mitigation hosts Ola Town Hall Meeting” (www.idahopress.com/emmett/news/county-hazard-mitigation-hosts-ola-town-hall-meeting/article_8859fd70-ee37-5629-82ab-f2ef424de209.html)
- Emmett Messenger Index, April 13, 2018. “Hazard response plan nearing completion” (www.idahopress.com/emmett/news/hazard-response-plan-nearing-completion/article_05b21d1c-adba-5e0c-ad06-9fc115d75118.html?utm_medium=social&utm_source=email&utm_campaign=user-share)
- Emmet Messenger Index, December 6, 2009. “Squaw Creek Quake 2019?” https://www.idahopress.com/emmett/news/squaw-creek-quake/article_cc5f82b0-7449-57ed-8a69-c56f85794b74.html

3.8.5 Internet

At the beginning of the plan update process, a website was created to keep the public posted on plan development milestones and to solicit relevant input (see Figure 3-5): http://www.gemcounty.org/disaster-services/ahmp/.

The site's address was publicized in all press releases, mailings, questionnaires and public meetings. Information on the plan development process, the Steering Committee, the questionnaire and phased drafts of the plan was made available to the public on the site throughout the process. The County intends to keep a website active after the plan's completion to keep the public informed about successful mitigation projects and future plan updates.

Figure 3-5. Hazard Mitigation Plan Web Site

3.8.6 Review of Draft Plan

Once the Steering Committee approved a public review draft of the plan, a final public comment period was initiated. A 14-day public comment period was opened on December 6, 2018 and ran through December 19, 2018. The hazard mitigation website acted as the primary means for the public to provide comment on the draft plan. Notices of the comment period, with direction on how to view the plan and provide comments via the web site, were posted on the website and distributed in a press release from Gem County Emergency Management to all media outlets. All stakeholders identified in Section 3.6 were informed of the draft plan during this public comment period and asked to provide comments along with the members of the public.

Two public meetings were conducted during this comment period to present the draft plan and to provide further public opportunities to comment. The first meeting was held on December 11, 2018 in Emmett during the City Council Meeting, and the second was held on December 12, 2018 in Sweet at the Elementary School (Figure 3-6).

From the public review, the planning team received no formal comments that resulted in changes for the final plan, which was submitted to the state and FEMA for review.

Figure 3-6. December 12, 2018, Phase 2 Public Meeting in Sweet

3.8.7 Public Involvement Results

Meeting Attendance and Participation

By engaging the public through the public involvement strategy, the concept of mitigation was introduced to the public and the Steering Committee received feedback that was used in developing the components of the plan. All citizens of the planning area were provided ample opportunities to provide comment during all phases of this plan update. Details of attendance and comments received from the public meetings are summarized in Table 3-3.

Table 3-3. Summary of Public Meetings

Date	Location	Number of Citizens in Attendance	Number of Comments Received	Number of Questionnaires Received
March 15, 2018	Ola, ID	22	0	5
April 3, 2018	Emmett, ID	10	0	5
December 11, 2018	Emmett, ID	16	0	N/A
December 12, 2018	Sweet	32	0	N/A
Total		**80**	**0**	**10**

Summary of Survey Findings

The planning team reviewed the findings from the over 400 surveys received and provided the following feedback to the Steering Committee:

- Number of hard copy surveys received—14
- Number of surveys completed via the internet— 409
- Total surveys analyzed— 423
- Surveys were received from all six of the planning areas identified; the greatest portion (68.8 percent) came from Emmett and the lowest portion (2.13 percent) came from Montour.
- Survey respondents ranked wildland/household fire as the hazard of highest concern, followed by severe weather and flood.
- The majority of respondents felt that they could survive for 4 to 7 days following a hazard event.
- Almost 60 percent of respondents stated that they did not consider the impacts of natural hazards before purchasing their home; over 80 percent of respondents stated that the presence of natural hazard risk was not disclosed to them at the time of purchase.
- Over 50 percent of respondents were not sure if they had hazard-specific insurance coverage
- The majority of the surveys were completed by females, by people age 61 or older, and by high school graduates with some college or trade school post-high school education.
- 26 "write-in" comments received from the surveys were provided to the Steering Committee.

All survey results were provided to the Steering Committee for review in support of confirming the guiding principle, goals, objectives and county-wide actions for this plan update. Additionally, the survey results were included in the toolkit provided to each planning partner through the jurisdictional annex process described in Volume 2. Each planning partner was instructed to use the survey results to help frame mitigation actions and public outreach strategies to include in their action plans.

Summary of Dot Exercise Results

The dot exercise identified core capabilities that the public considers to be strengths that could be utilized by the planning partnership to enhance mitigation actions. It also identified the lack of core capabilities as perceived by the public; these lacks should be considered as gaps in core capability that need to be filled. Detailed results of the exercise can be found in Appendix B.

"Unanimous" strengths were identified based on 90 percent or more of respondents agreeing with the following statements:

- Emergency management is provided by a unified authority or program.
- Roles and responsibilities for emergency management within Gem County are clearly defined.
- City/county staff are knowledgeable about hazards and their impacts and are willing to share that knowledge with the public.
- All relevant stakeholders are engaged in the city/county's risk management efforts.

"Unanimous" weaknesses were identified based on 90 percent or more of respondents disagreeing with the following statements:

- Members of the public know where to find information about hazards and risk.
- Areas that provide natural resource protection are identified and protected within the County.
- Gem County citizens have a good understanding of natural hazard exposure and risk.
- The funding to support risk reduction within Gem County is adequate.
- Appropriate and timely warning systems are in place.

- The city and county have a variety of regulatory and non-regulatory strategies to reduce risk.
- The city/county has adopted policies that encourage development to be located outside of high risk areas.
- Risk from natural hazards within Gem County is adequately mapped and regulated.
- There is strong public support for risk reduction within Gem County.
- Interoperable communications are adequate
- Coordinated public outreach regarding risk from all hazards convey clear, consistent messaging to the public.
- The risk management programs are fair and equitable.
- The city/county's regulations for new development within identified hazards zones are adequate to address that risk.
- There is a coordinated program to maintain drainage systems free of debris.
- Accountability and enforcement protocol exist to compel compliance with state and federal risk management regulations.
- Real estate professionals adequately disclose risk exposure from natural hazards at the time of sale of real property.

3.9 PLAN DEVELOPMENT CHRONOLOGY/MILESTONES

Table 3-4 summarizes important milestones in the development of the plan update.

Table 3-4. Plan Development Milestones

Date	Event	Description	Attendance
2017			
10/18	County selects Tetra Tech to facilitate plan update	• Facilitation contractor secured	N/A
11/29	Steering Committee Meeting #1	• Project overview • Organize planning partnership • Organize Steering Committee and establish ground rules • Plan review (state plan and prior plan) • Discuss public involvement strategy	19
12/19	Steering Committee Meeting #2	• Planning process • Old business (confirm charter, approve minutes, public comment) • Plan review homework—discuss observations • Confirm guiding principle, goals and objectives	19
2018		•	
1/16	Steering Committee Meeting #3	• Planning process • Old business (approve minutes, confirm guiding principle, goals and objectives, planning partners status, public comment) • Define critical facilities/infrastructure • Discuss Phase 1 public involvement strategy	18
2/16	Public Outreach Strategy	• Press release # 1 distributed to all media outlets	N/A

2/20	Steering Committee Meeting #4	• Hazard scenarios for risk assessment
		• Critical facility inventory
		• Public involvement strategy
		  ○ Press release
		  ○ Confirm final survey
		  ○ Phase 1 public meeting logistics
			17

2/28	Public Outreach Strategy	Press coverage in the Messenger Index	N/A
3/14	Public Outreach Strategy	Press coverage in the messenger Index	N/A

Date	Event	Description	Attendance
3/15	Public Meeting #1	Ola Open House	22

3/20	Steering Committee Meeting #5	• Plan maintenance strategy
		• Phase 1, jurisdictional annex process
		• Public involvement strategy
		  ○ Survey status
		  ○ Phase 1 Public Meeting #1 recap
		  ○ Public Meeting #2 logistics
			13

4/3	Public Meeting #2	Emmett open house	10
4/13	Public Outreach Strategy	Press coverage in the Messenger Index	N/A

4/17	Steering Committee Meeting #6	• Risk assessment results
		• Phase 2, jurisdictional annex process
		• Public involvement strategy
		  ○ Survey status
		  ○ Phase 1 Public Meeting #2 recap
			11

7/6	Phase 2-3 Jurisdictional Annex Workshop	• Phase 1 Status
		• Phase 2 of the Jurisdictional Annex Template
		  ○ Capability Assessment-Municipal
		    • Phase 3 of the Jurisdictional Annex Template
		  ○ Natural Hazard Event History
		    ○ Jurisdiction Specific Vulnerabilities
		  ○ Risk Ranking-an overview
		  ○ New Action Plan
		  ○ Review and incorporation of resources
		  ○ Template submittal Deadline
			8

10/23	Steering Committee Meeting # 7	• Plan Review
		  ○ Volume 1
		  ○ Volume 2
		• County Wide actions
		• Public Involvement Strategy
		  ○ Survey Status, when to shut it down?
		  ○ Public Comment period, how long?
		  ○ Public meetings during the public comment period
		• Plan submittal timeline
		  ○ Submittal to the state
		  ○ Anticipated time frame for APA
		Plan adoption	

11/3	Plan Review	Internal review draft of the plan distributed to the Steering Committee for review and approval	N/A
12/3	Public Outreach	Press release distributed to media outlets announcing the final public comment period	N/A
12/5	Public Outreach	Initiation of the 14-day final public comment period	N/A
12/6	Public Outreach	Press coverage in the Messenger Index	N/A
12/11	Public Meeting #3	Public meeting held during the Emmett City Council Meeting to present the draft plan and provide an opportunity for the public to provide comment during a formal public comment period	16
12/12	Public Meeting #4	Public meeting held in Sweet to present the draft plan and provide an opportunity for the public to provide comment during a formal public comment period	32
12/19	Public Outreach	Closure of the final public comment period	N/A

Date	Event	Description	Attendance
2019			
1/11	Plan Review	Submittal draft of the plan submitted to Idaho Office of Emergency Management for review and approval	N/A
TBD	Plan Review	Approval Pending Adoption (APA) received from FEMA Region X	N/A
TBD	Adoption	Adoption window for planning partners opens	N/A
TBD	Approval	Proof of adoption documentation submitted to FEMA Region X and IDOEM	N/A
TBD	Approval	Final approval of the plan by FEMA Region X	N/A

4. GEM COUNTY PROFILE

Gem County covers 566 square miles in the West Central Highlands of Idaho. It is the 19th most populous county in the state. Emmett, in the southern part of the county, is the county seat and the only incorporated city in the county. Neighboring counties are Payette County to the west, Canyon County to the southwest, Ada County to the south, Boise County to the east, Valley County to the northeast, Adams County to the north, and Washington County to the northwest.

The Payette River crosses Gem County from east to west. Located 30 miles northwest of Boise on Highway 16, the valley of the Payette is 35 miles long and averages 6 miles wide in Gem County. At Emmett, the valley elevation is about 2,400 feet above sea level. Rising to 5,906 feet, the Squaw Butte at the north end of the valley is a prominent land feature in Gem County. Elevations across the county range from 2,225 feet above sea level to 8,329 feet.

The Gem County planning area is shown in Figure 4-1.

4.1 JURISDICTIONS AND DEVELOPMENT

Rural character, inexpensive bare land and rural homes with acreage are what set the Gem Community apart from the rest of the Treasure Valley. Most development in Gem County is in the Emmett Valley along the Payette River. Populated places in Gem County besides the City of Emmett include the unincorporated towns of Letha, Montour, Ola and Sweet. The northern part of the county is mountainous and sparsely populated, much of it lying within the Boise National Forest.

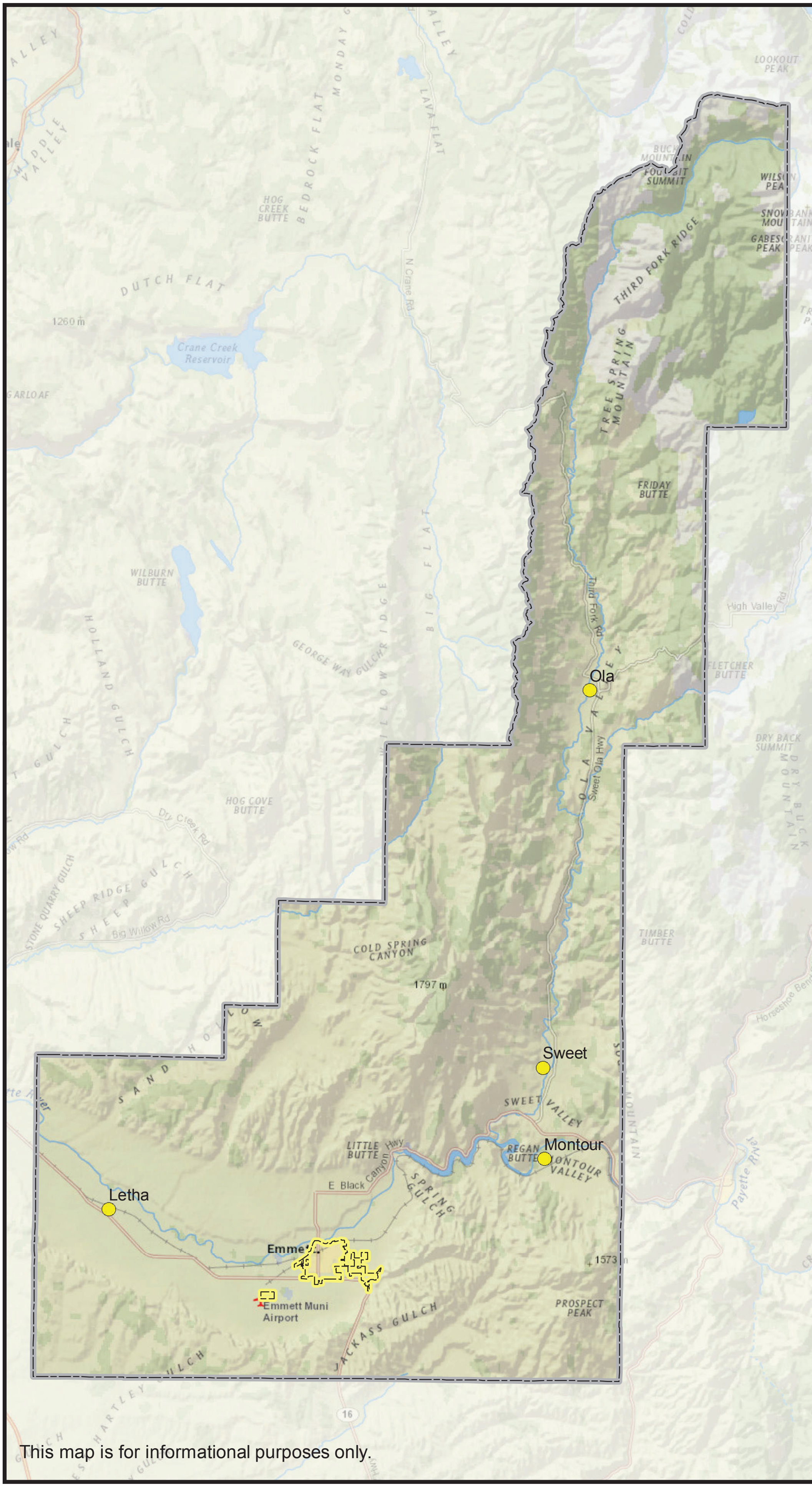
Rangeland and agriculture are the largest land use types in the planning area and will continue to be the dominant category. Many existing dwelling units in the county are older housing stock built prior to 1970 and are in aging condition. The period from 1970 to 1979 saw the most substantial building with 1,545 units. Next largest was the period from 1990 to 1999 with 1,263 units built. 2000 to 2007 has seen 508 stick-built units and 325 manufactured homes.

Due to its proximity to Ada County, housing has increased in value faster in Gem County than in most of the state. The average sale price for a residential dwelling was $42,000 in 1990 and had increased to $65,000 by 1993 and $97,000 by 2000, when the statewide average sales price was $106,300. Average sales price in 2008 was $174,085.

About 22 percent of the county is a productive agricultural area, with good soils, a long growing season, and the availability of water. Agriculture is an important sector of the county’s economy.

Gem County

Figure 4-1.
Planning Area



Gem County Boundary

City of Emmett

Gem County Planning Communities

N
W E
S

0 2 4 8
Miles

TETRA TECH

This map is for informational purposes only.

Map Data Sources: National Geographic, Gem County, State of Idaho

4.2 HISTORICAL OVERVIEW

Gem County was established on March 15, 1915 and named for the Idaho state nickname, “Gem State.” Fur trappers were in the area as early as 1818 and explorer Alexander Ross explored Squaw Creek in 1824. Permanent settlement began in the early 1860s, after gold discoveries in the Boise Basin brought people over already established stage and pack train routes. Two of these trails joined at the Payette River, and in 1863 Nathaniel Martin and Jonathan Smith decided to build a ferry to cross the river, which swelled to over a mile wide each spring. The community of Martinsville grew up around this ferry site, which handled not only local trade, but also heavy traffic from the Basin Trail.

Six miles from Emmett was the Payette River Ranch, also called the Government Ranch because of the government stockpiles there. The Martinsville Post Office moved to the Payette River Ranch in 1870 and was renamed Emmett, for the son of Tom Cahalan, who had the name recorded in Washington, D.C. When the post office moved back to Martinsville a year later, the recorded name remained with it, and Martinsville eventually became Emmett.

In 1883 James Wardwell had the town platted, and in 1900 the town was incorporated as Emmett. After the closing of the pearl mines in 1906, power lines were extended to Emmett. A series of irrigation projects made it possible for more rapid expansion of the town as the major service center for a farming and fruit-growing valley.

4.3 MAJOR PAST HAZARD EVENTS

Presidential disaster declarations are typically issued for hazard events that cause more damage than state and local governments can handle without federal assistance. A presidential disaster declaration puts federal recovery programs into motion to help disaster victims, businesses and public entities. The planning area has experienced three events since 1956 for which presidential disaster declarations were issued, as listed in Table 4-1.

Table 4-1. Presidential Disaster Declarations for Hazard Events in the Planning Area

Type of Event	Disaster Declaration #	Date
Heavy Rains & Flooding	DR-186	12/31/1964
Severe Storms/Flooding	DR-1154	01/04/1997
Severe Storms and Flooding	DR-1927	07/27/2010

Review of these events helps identify targets for risk reduction and ways to increase a community’s capability to avoid large-scale events in the future. Still, many natural hazard events do not trigger federal disaster declaration protocol but have significant impacts on their communities. These events are also important to consider in establishing recurrence intervals for hazards of concern.

4.4 PHYSICAL SETTING

4.4.1 Topography

The terrain in the Emmett area is generally level to gently sloping. The planning area ranges from Emmett Valley to the peaks of the panhandle section above Ola.

4.4.2 Soils

Soils in Emmett include the Moulton-Falk association, consisting of sandy loam to loose gravel and sand on bottom lands along the Payette River. Most of Emmett is on the Emerson-Wardwell-Quenzer association. This sandy loam is well-drained on low terraces. Emmett soils are excellent for agriculture.

In the north and east portions of the county, the Brownlee-Rainey-Ola, Gem-Newell, and Gwin-Mehlhorn-Jacknife associations are prevalent. In the western and southern parts of the county, the Emerson-Wardwell-Quenzer, Harpt-Cashmere, Moulton-Falk, PowerPurdam, Letha-Baldock-Lahontan, Sweet-Kepler, Chilcott-Lanktree-Lolalita, Haw-Payette-Van Dusen, Lickskillet-Bakeoven associations can be found. Specific information on these soils can be obtained from the USDA Soil Conservation Service and from the Gem County Area, Idaho, Soil Survey issued in 1965. Generally, soils in Gem County are suitable for diverse uses, ranging from dryland crops to pasture and range to various agricultural uses.

4.4.3 Hydrology

Surface water in Emmett includes the Payette River, which passes to the north of Emmett. The Payette River is the major waterway of Gem County and a tributary of the Snake River.

Various creeks, drains, and canals traverse the County in addition to the Payette River. Among these is Squaw Creek, a tributary of the Payette River that runs the north-south length of Gem County. Other creeks tributary to the Payette River include Anderson Creek, Antelope Creek, Bear Creek, Bent Creek, Bissel Creek, Bristol Creek, Sucker Creek, Timber Creek and Timber Flat Creek.

During irrigation season, much of the creek flow is diverted before it reaches the Payette River. The Farmers Co-op Canal is diverted from the Payette and enters the City of Emmett flowing southwest along Riverside Street and then south along Lincoln Avenue. Drainage Canal and Last Chance Canal cross the southeast portion of the City.

Individual subsurface sewage disposal systems present a threat of groundwater pollution unless central sewage facilities are provided. There appears to be adequate water deep beneath Gem County for deep well development. The City of Emmett uses four deep wells to provide excellent drinking water.

4.4.4 Climate

The City of Emmett is in a climate typical of semi-arid regions in the Payette River Valley, with warm, dry summers and winters that are usually relatively mild for an inland area at 44 degrees north latitude. The average range of temperatures in the valley is from about 18ºF in winter to the mid-90s in summer. Precipitation normally peaks from November through February, with a secondary peak in May. July and August are nearly always dry, in fact, occasionally rainless. The average rainfall at Emmett rarely exceeds the annual average of 12 inches. Annual snowfall averages 17 inches at Emmett, but this, varies widely from year to year.

The climate of Gem County varies greatly with changes in topography. Temperatures and monthly precipitation elsewhere in Gem County are much the same as those of Emmett. However, average rainfall in Ola is 17 or more inches, and annual snowfall there is close to 71 inches.

4.5 DEVELOPMENT

4.5.1 Land Use

A key element in risk assessment is to look at existing land use in hazard areas that have a delineated extent, since land use affects the level of risk. For example, an agricultural, low-density use faces a lower risk in a floodplain than a high density, residential use. Gem County is committed to orderly, logical and fiscally sound growth, guiding development so that existing citizens and taxpayers are not burdened with more than their fair share of the cost of development. Growth for the City of Emmett and the unincorporated portions of Gem County is directed by the *Gem Community Comprehensive Plan*, last updated in February 2014. The joint city/county effort was undertaken due to the growing awareness that the futures of the urban and rural areas of the County were inseparable and that urban and rural problems often require a common solution and common planning. According to the 2014 *Gem Community Comprehensive Plan*, the following social, economic and environmental factors and trends will influence future land use in the Gem community through 2025:

- Increasing population and increasing employment
- Providing for housing diversity
- Increasing demand for business development
- Increasing development along the Payette River

Gem County land use includes 13 categories: Prime Agriculture, Rural Transitional Agriculture, Rural Agriculture, Residential Transition, Rural Residential, Multi-Family Residential, Commercial 1, Commercial 2, Light Industrial, Heavy Industrial, Planned Community, Public, and Mixed Use. Figure 4-2 shows the distribution of land use for the Gem County planning area.

4.5.2 Land Ownership

Table 4-2 shows the division of land ownership within Gem County among private, state and federal lands.

Table 4-2. Gem County Land Ownership

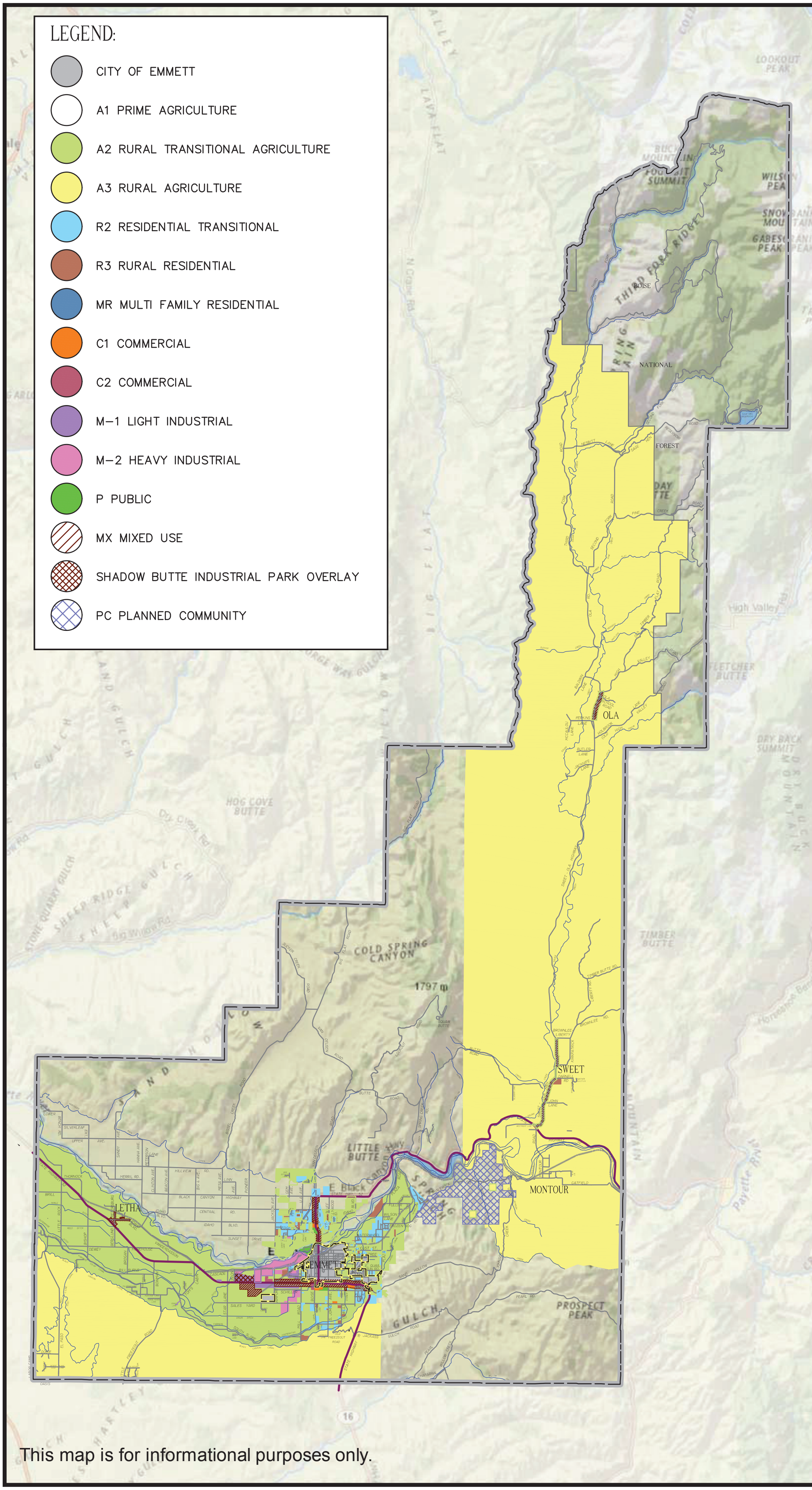
Land Ownership	Acres	Percentage
Private Land	202,825	56.6%
Federal Land	135,009	37.7%
State Lands	20,325	5.7%
Total	**358,159**	**100%**

Source: 2014 Gem Community Comprehensive Plan

4.5.3 Critical Facilities and Infrastructure

Critical facilities and infrastructure are those that are essential to the health and welfare of the population. These become especially important after a hazard event. Critical facilities typically include police and fire stations, schools and emergency operations centers. Critical infrastructure can include the roads and bridges that provide ingress and egress and allow emergency vehicles access to those in need, and the utilities that provide water, electricity and communication services to the community. Also included are “Tier II” facilities and railroads, which hold or carry significant amounts of hazardous materials with a potential to impact public health and welfare in a hazard event. Through a facilitated exercise, the Steering Committee crafted the following definition of “critical facilities” for this plan:

- A critical facility is one that is deemed vital to the Gem County planning area’s ability to provide essential services while protecting life and property. A critical facility may be a system or an asset, either physical or virtual, the loss of which would have a profound impact on security, economy, public health or safety, environment, or any combination of thereof, across the planning area. For this hazard mitigation plan, critical facilities include, but are not limited to, the following:
    - Police stations, fire stations, paramedic stations, emergency vehicle and equipment storage facilities, and emergency operations and communications centers needed for disaster response before, during and after hazard events.
    - Public and private utilities and infrastructure vital to maintaining or restoring normal services to areas damaged by hazard events. These include water (potable, wastewater, stormwater, drainage and irrigation), utilities (transmission and distribution facilities for natural gas, power, geothermal) and communications that support interoperability within the planning area (land-based telephone, cell phone, the internet, emergency broadcast facilities and emergency radios).



Gem County

Figure 4-2. Planning Area Land Use

Gem County Boundary

City of Emmett

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Map Data Sources: National Geographic, Gem County, State of Idaho

- Public gathering places that could be used as evacuation centers during large-scale disasters. These facilities include, but are not limited to, churches, recreation centers and fairgrounds.
- Hospitals, extended care facilities, urgent care facilities and housing that may contain occupants not sufficiently mobile to avoid death or injury during a hazard event.
- Transportation systems that convey vital supplies and services to and throughout the community. These include roads, bridges, railways, airports and pipelines.
- Government and educational facilities central to governance and quality of life, along with response and recovery actions taken because of a hazard event (fairgrounds, armory, libraries, etc.).
- Structures or facilities that produce, use or store highly volatile, flammable, explosive, toxic and/or water-reactive materials.
- Infrastructure designed to help safely convey high-water events from the event source to the perimeter of the planning area.
- Impoundments (dams) and irrigation conveyance facilities (diversion structures, head gates and canals).
- Facilities that may be utilized for post-disaster debris management

General locations of identified critical facilities and critical infrastructure are shown on Figure 4-3 and Figure 4-4, respectively. Due to the sensitivity of this information, a detailed list of facilities is not provided. The list is on file with each planning partner. Table 4-3 and Table 4-4 provide summaries of the general types of critical facilities and infrastructure, respectively, in the planning area as defined for this update process. All critical facilities/infrastructure were analyzed in Hazus to help rank risk and identify mitigation actions. The risk assessment for each hazard qualitatively discusses critical facilities with regard to that hazard.

Table 4-3. Critical Facilities by Jurisdiction and Category

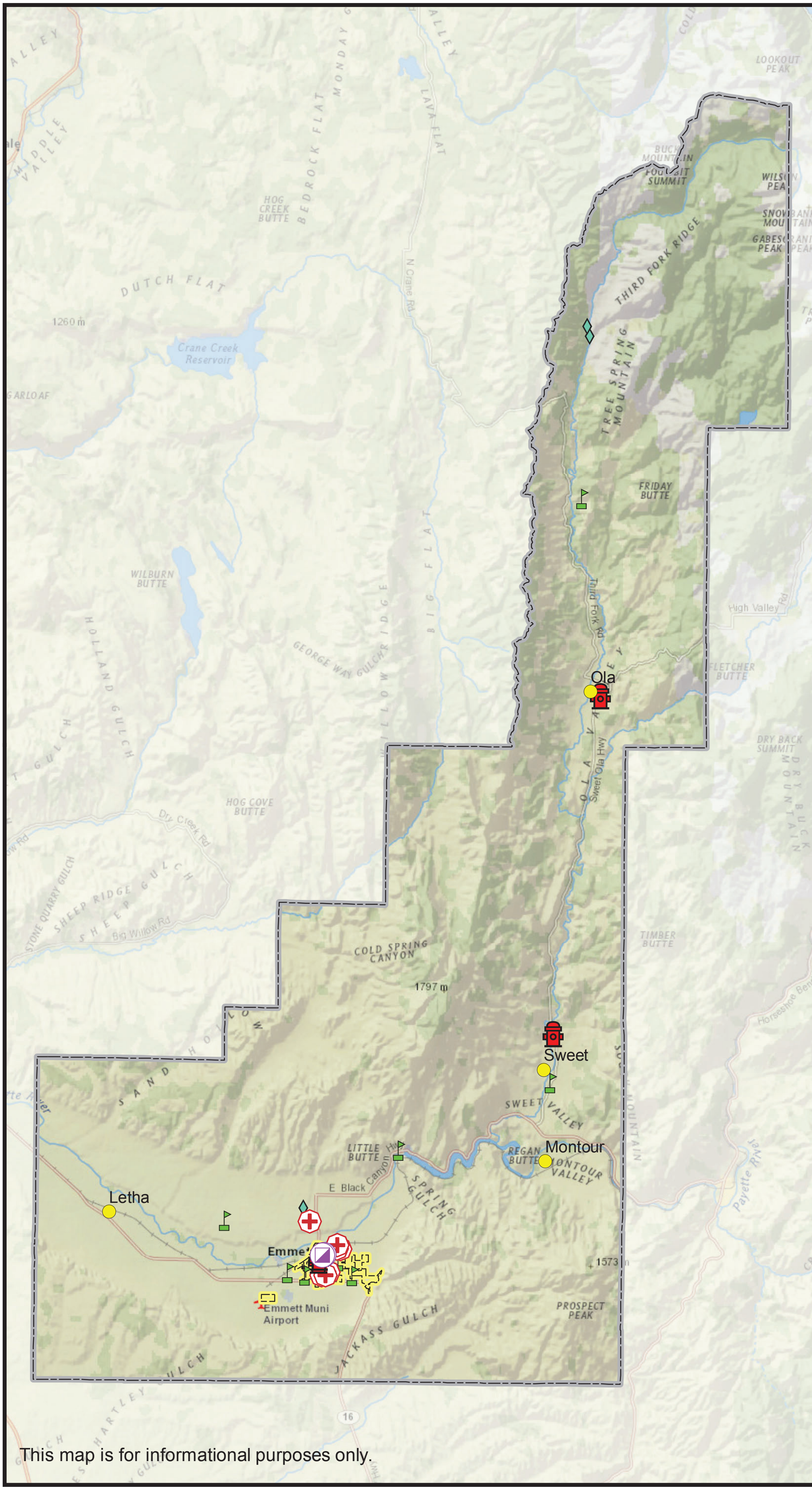
Facility Type	Emmett	Letha	Montour	Ola	Sweet	Unincorporated	Total
Medical and Health	10	0	0	0	0	0	**10**
Mass Gathering/Government Functions	1	0	0	3	0	0	**4**
Protective Functions	6	0	0	1	1	0	**8**
Schools	8	0	0	1	1	0	**10**
Total	**25**	**0**	**0**	**5**	**2**	**0**	**32**

Table 4-4. Critical Infrastructure by Jurisdiction and Category

Facility Type	Emmett	Letha	Montour	Ola	Sweet	Unincorporated	Total
Bridges	24	1	5	7	3	13	**53**
Communication	1	0	0	1	0	1	**13**
Natural Gas	0	0	0	0	0	2	**2**
Power	5	0	0	1	1	0	**7**
Waste Water	13	0	0	0	0	0	**13**
Water	14	0	0	2	1	0	**17**
Total	**57**	**1**	**5**	**11**	**5**	**16**	**105**

Gem County

Figure 4-3. Critical Facilities



Emergency Operations Center
Fire Stations
Medical Care Facilities
Police Stations
School Facilities
Mass Gathering / Government Facilities
Gem County Boundary
City of Emmett
Gem County Planning Communities

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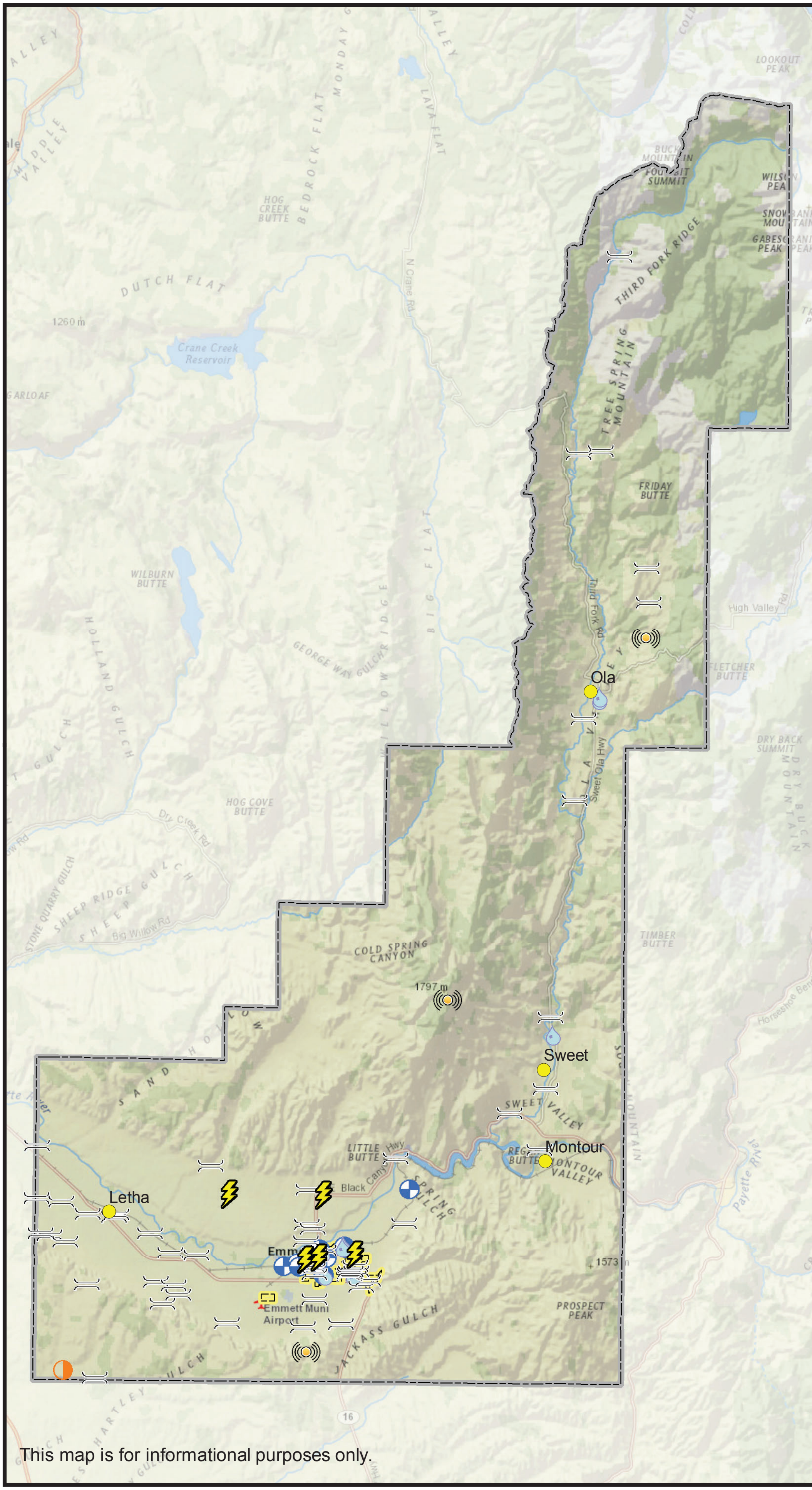
Map Data Sources: National Geographic, Gem County, State of Idaho

Gem County

Figure 4-4
Critical Infrastructure



- Communication Facilities
- Electric Power Facilities
- Highway Bridges
- Natural Gas Facilities
- Potable Water Facilities
- Waste Water Facilities
- Gem County Boundary
- City of Emmett
- Gem County Planning Communities

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GEM COUNTY

Map Data Sources: National Geographic, Gem County, State of Idaho

4.5.4 Development Trends

The 2014 *Gem Community Comprehensive Plan* is the primary document that guides land use within the City of Emmett, the "area of city impact," and Gem County. This plan is to be used as a tool to ensure that all accountable governing bodies are taking actions that the community has determined to be the most orderly, beneficial and supportive of the community vision statement. Decision-makers will guide development through the application of broad-based strategies to every issue pertaining to growth. These strategies provide direction to public and private planning processes, with guidelines for making consistent rational decisions for future development.

This hazard mitigation plan will work together with comprehensive plan programs to support wise land use in the future by providing vital information on the risk associated with natural hazards in the planning area. The 2014 update to the *Gem Community Comprehensive Plan* incorporated by reference the *Gem County Hazard Mitigation Plan* and its subsequent updates. This will ensure that all future trends in development can be established with the benefits of the information on risk and vulnerability to natural hazards identified in this plan.

4.6 DEMOGRAPHICS

Some populations are at greater risk from hazard events because of decreased resources or physical abilities. Elderly people, for example, may be more likely to require additional assistance. Research has shown that people living near or below the poverty line, the elderly (especially older single men), the disabled, women, children, ethnic minorities and renters all experience, to some degree, more severe effects from disasters than the general population. These vulnerable populations may vary from the general population in risk perception, living conditions, access to information before, during and after a hazard event, capabilities during an event, and access to resources for post-disaster recovery. Indicators of vulnerability—such as disability, age, poverty, and minority race and ethnicity—often overlap spatially and often in the geographically most vulnerable locations. Detailed spatial analysis to locate areas where there are higher concentrations of vulnerable community members would assist the County in extending focused public outreach and education to these most vulnerable citizens.

4.6.1 Population Characteristics

Knowledge of the composition of the population and how it has changed in the past and how it may change in the future is needed for making informed decisions about the future. Information about population is a critical part of planning because it directly relates to land needs such as housing, industry, stores, public facilities and services, and transportation. Gem County is the 19th largest of Idaho's 44 counties. The U.S. Census Bureau estimated Gem County's population at 17,379 as of 2017.

Table 4-5 shows the population of the City of Emmett and the unincorporated areas in Gem County from 2008 to 2017. Unincorporated areas accounted for about 62 percent of the planning area's population in 2008 and about 61 percent in 2017. Overall growth in unincorporated areas was 3.9 percent from 2008 to 2017, while the City of Emmett grew about 7.3 percent during the same timeframe.

Population changes are useful socio-economic indicators. A growing population generally indicates a growing economy, while a decreasing population signifies economic decline. Figure 4-5 shows the population growth rate in the planning area from 1970 to 2017 compared to that of the State of Idaho.

Table 4-5. City and County Population Data

	City of Emmett	Unincorporated County	Total
2008	6,325	10,130	**16,455**
2009	6,357	10,156	**16,513**
2010	6,557	10,162	**16,719**
2011	6,530	10,149	**16,679**
2012	6,501	10,124	**16,625**
2013	6,471	10,091	**16,562**
2014	6,513	10,137	**16,650**
2015	6,535	10,147	**16,682**
2016	6,638	10,341	**16,979**
2017	6,829	10,550	**17,379**

Data Source: https://lmi.idaho.gov/census

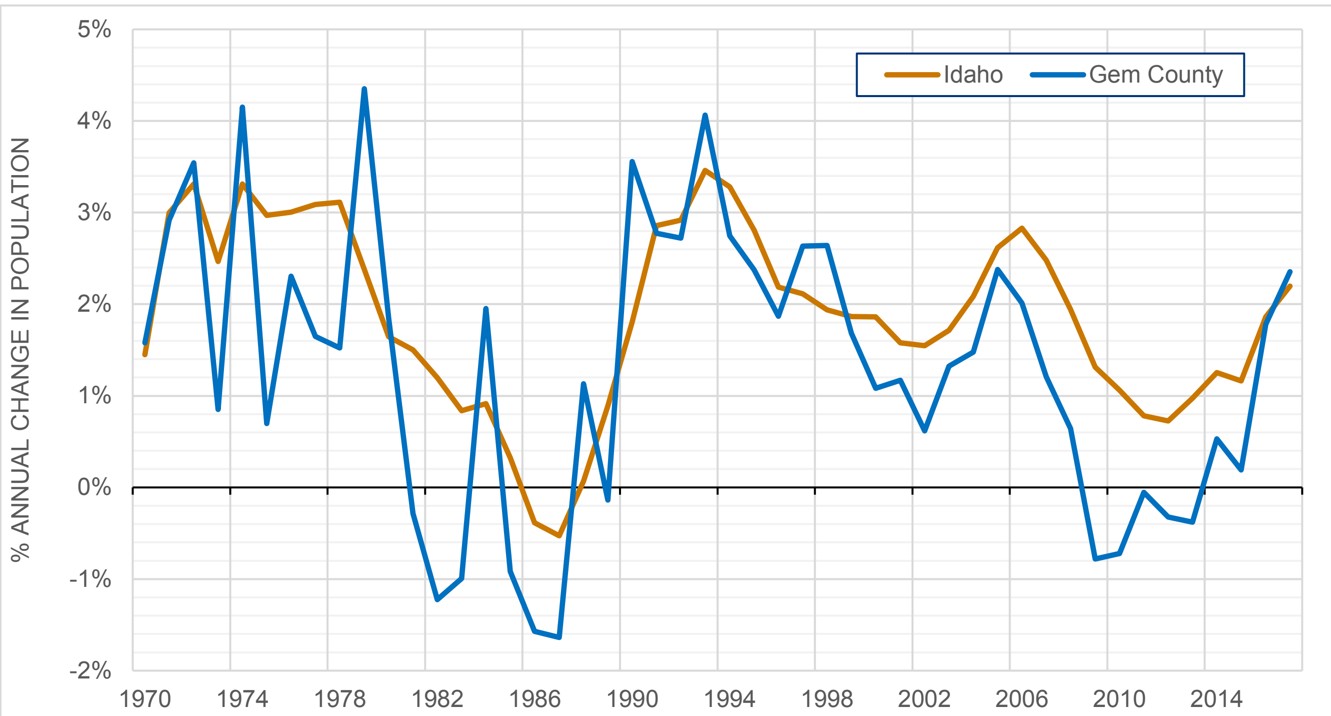


Figure 4-5. Idaho and Gem County Population Growth

4.6.2 Age Distribution

As a group, the elderly are more apt to lack the physical and economic resources necessary for response to hazard events and are more likely to suffer health-related consequences making recovery slower. They are more likely to be vision, hearing and/or mobility impaired, and more likely to experience mental impairment or dementia. Additionally, the elderly are more likely to live in assisted-living facilities where emergency preparedness occurs at the discretion of facility operators. These facilities are typically identified as “critical facilities” by emergency managers because they require extra notice to implement evacuation. Elderly residents living in their own homes may have more difficulty evacuating their homes and could be stranded in dangerous situations. This population group is more likely to need special medical attention, which may not be readily available during natural disasters due to isolation caused by the event. Specific planning attention for the elderly is an important consideration given the current aging of the American population.

Children under 14 are particularly vulnerable to disaster events because of their young age and dependence on others for basic necessities. Very young children may additionally be vulnerable to injury or sickness; this vulnerability can be worsened during a natural disaster because they may not understand the measures that need to be taken to protect themselves from hazards.

The overall age distribution for Gem County is illustrated in Figure 4-6. Based on Census Bureau estimates, 21.4 percent of the planning area’s population is 65 or older, compared to the state average of 12.3 percent; 18.2 percent of the County’s population is 14 or younger, compared to the state average of 23 percent. According to U.S. Census data, 15.5 percent of the County’s over-65 population have incomes below the poverty line. Children under 18 account for 32.2 percent of individuals who are below the poverty line.

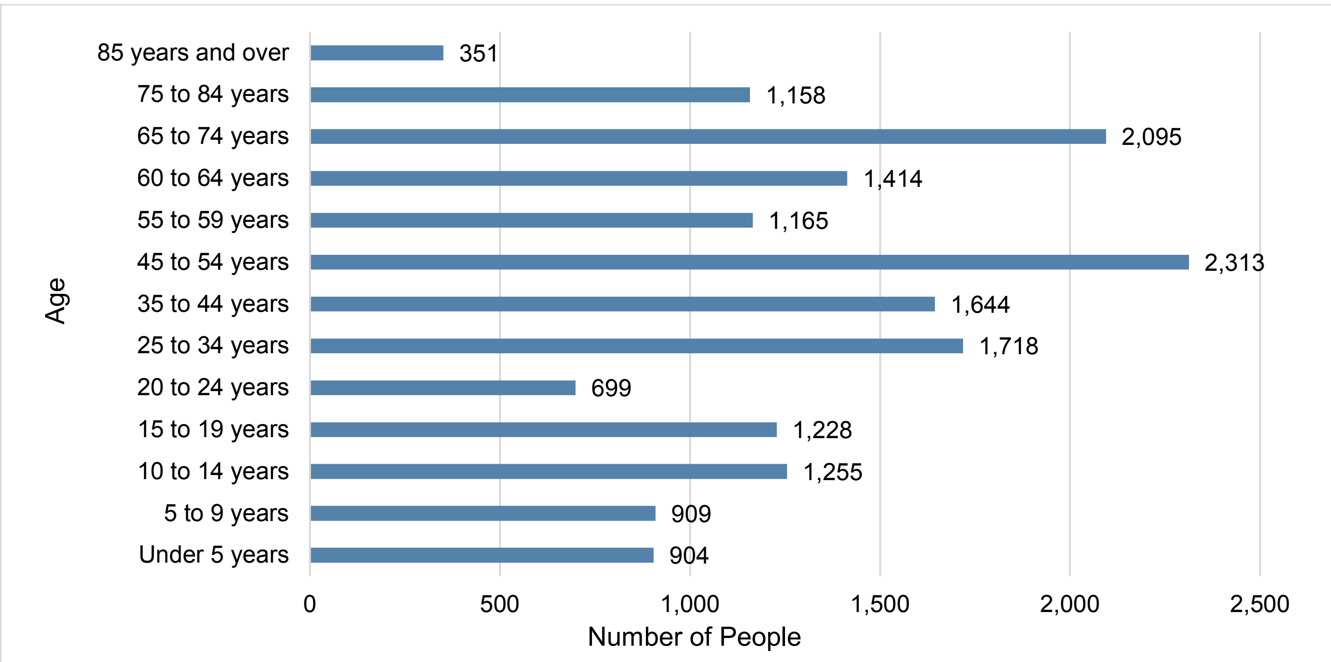


Figure 4-6. Planning Area Age Distribution

4.6.3 Race, Ethnicity and Language

Research shows that minorities are less likely to be involved in pre-disaster planning and experience higher mortality rates during a disaster event. Since higher proportions of ethnic minorities live below the poverty line than the majority white population, poverty can compound vulnerability.

According to the U.S. Census, the racial composition of the planning area is predominantly white, at 93.8 percent. The largest non-white racial segments are “some other race” at 1.6 percent and “two or more races” at 2.4 percent. Figure 4-7 shows the racial distribution in the planning area.

Gem County has a 3.2-percent foreign-born population. Other than English, the most commonly spoken language in Gem County is Spanish. The census estimates 2.0 percent of the county’s residents speak English “less than very well.”

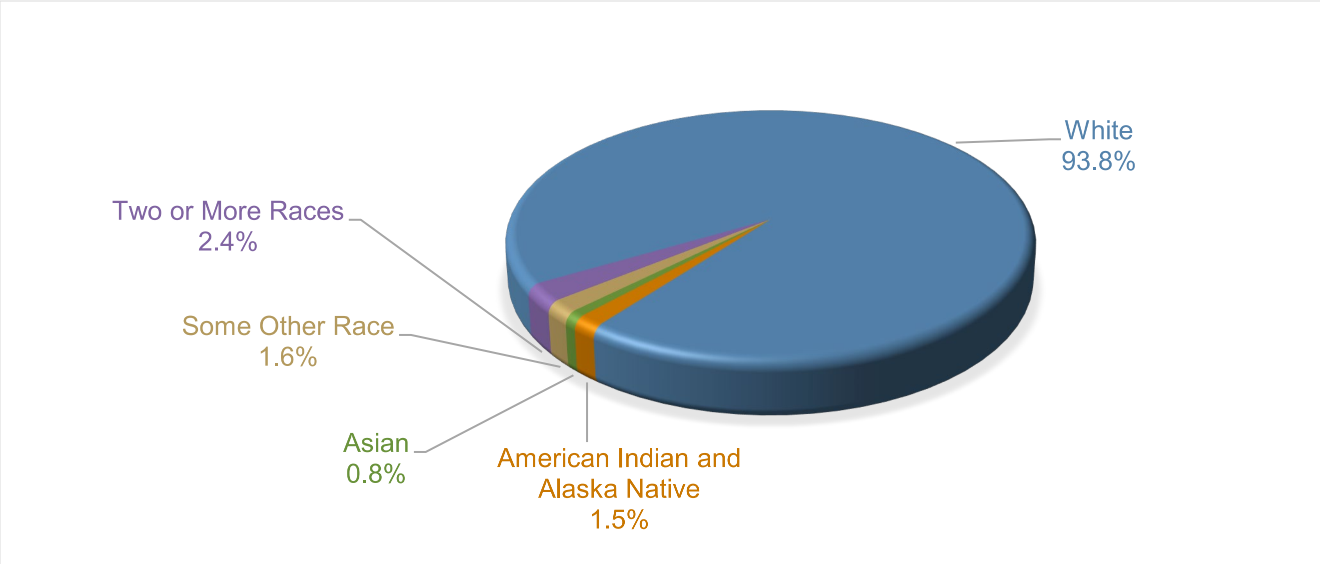


Figure 4-7. Planning Area Race Distribution

4.6.4 Disabled Populations

People living with disabilities are significantly more likely to have difficulty responding to a hazard event than the general population. According to U.S. Census figures, roughly one-fifth of the U.S. population lives with a disability. Disabled populations are increasingly integrated into society. This means that a relatively large segment of the population will require assistance during the 72 hours after a hazard event, the period generally reserved for self-help. Disabilities can vary greatly in severity and permanence, making populations difficult to define and track. There is no "typical" disabled person, which can complicate disaster-planning processes that attempt to incorporate them. Disability is likely to be compounded with other vulnerabilities, such as age, economic disadvantage and ethnicity, all of which mean that housing is more likely to be substandard.

Table 4-6 summarizes the estimates of disabled people in the planning area. According to U.S. Census data, 20.3 percent of the County's non-institutionalized civilian population has a disability.

Table 4-6. Disability Status of Non-Institutionalized Population

Age	Persons with a Disability	Percent of Age Group
Under 18 years	139	3.6
Age 18 to 64 years	1,630	17.6
Age 65 years and over	1,629	45.9

4.7 ECONOMY

4.7.1 Income

Because households in the United States use private resources to prepare for, respond to and recover from disasters, households living in poverty are disadvantaged when confronting hazards. These households typically occupy more poorly built and inadequately maintained housing. Mobile or modular homes, for example, are more susceptible to damage in earthquakes and floods than other types of housing. In urban areas, the poor often live in older houses and apartment complexes, which are more likely to be made of un-reinforced masonry, which is particularly susceptible to damage during earthquakes. Furthermore, residents below the poverty level are less likely to have insurance to compensate for losses incurred from natural disasters. This means that these residents face high risk from hazards and are least prepared to deal with losses. The events following Hurricane Katrina in 2005 illustrated that personal household economics significantly impact people's decisions on evacuation.

Based on U.S. Census Bureau estimates, per capita income in Gem County in 2016 was $18,745, and the median household income was $40,767. According to the Census Bureau's American Community Survey, 6.0 percent of households in the county receive an income between $100,000 and $149,999 per year and 2.8 percent of the county's household incomes are above $150,000 annually. The Census Bureau estimated 15.7 percent of families in Gem County below the poverty level in 2016.

4.7.2 Industry, Businesses and Institutions

The major components of Idaho's economy are agriculture, mining, timber and tourism. The Gem community is an important player in the agricultural component of Idaho's economy. Gem County farms and ranching operations account for 2 percent of the state's agricultural employment.

According to the US Census, Gem County's economy is strongly based in the education/health care/social assistance industry (26.3 percent), followed by the retail trade (9.0 percent) and construction industry (8.1 percent). The information and wholesale trade industries make up the smallest sources of the county's economy (0.8 percent and 3.7 percent, respectively). Figure 4-8 shows the breakdown of industry types in Gem County.

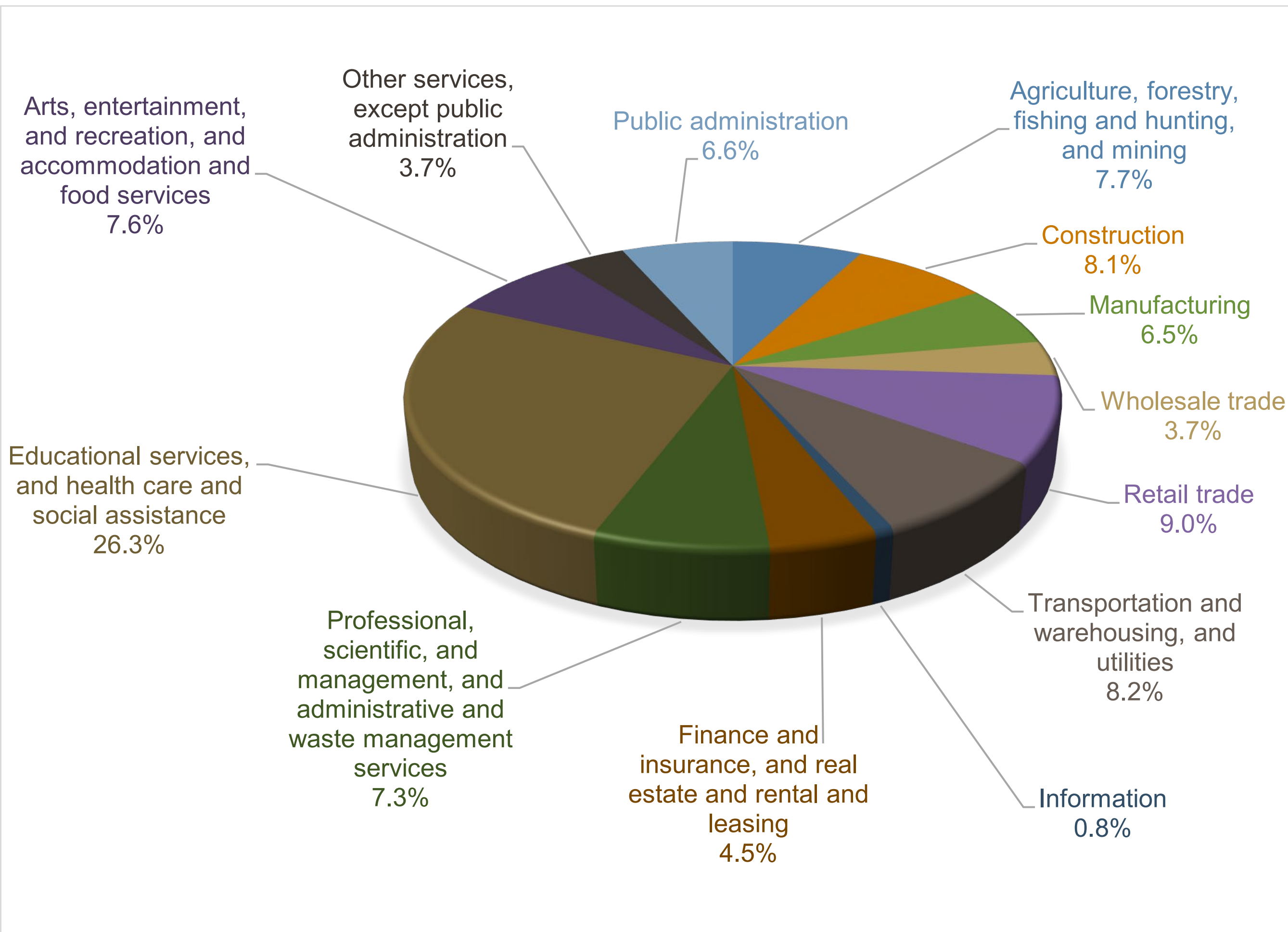


Figure 4-8. Industry in the Planning Area

Major employers in Gem County include the County, Elderly Opportunity Agency Inc., Walter Knox Memorial Hospital, the Emmett School District, Community Partnerships of Idaho Inc., Albertsons, the City of Emmett, and Emmett Valley and Shoshone Livestock. The largest employers in the county are Gem County and the Emmett School District, each with 100 to 249 employees.

4.7.3 Employment Trends and Occupations

According to the U.S. Census American Community Survey, 48.4 percent of Gem County's population over the age of 16 was in the labor force as of 2016. Figure 4-9 compares Idaho's and Gem County's unemployment trends from 2007 through 2016. During that period, Gem County's unemployment rate was lowest in 2007, at 3.6 percent. Unemployment rates since then trended upward until 2013. After 2013 the rate began to decline again.

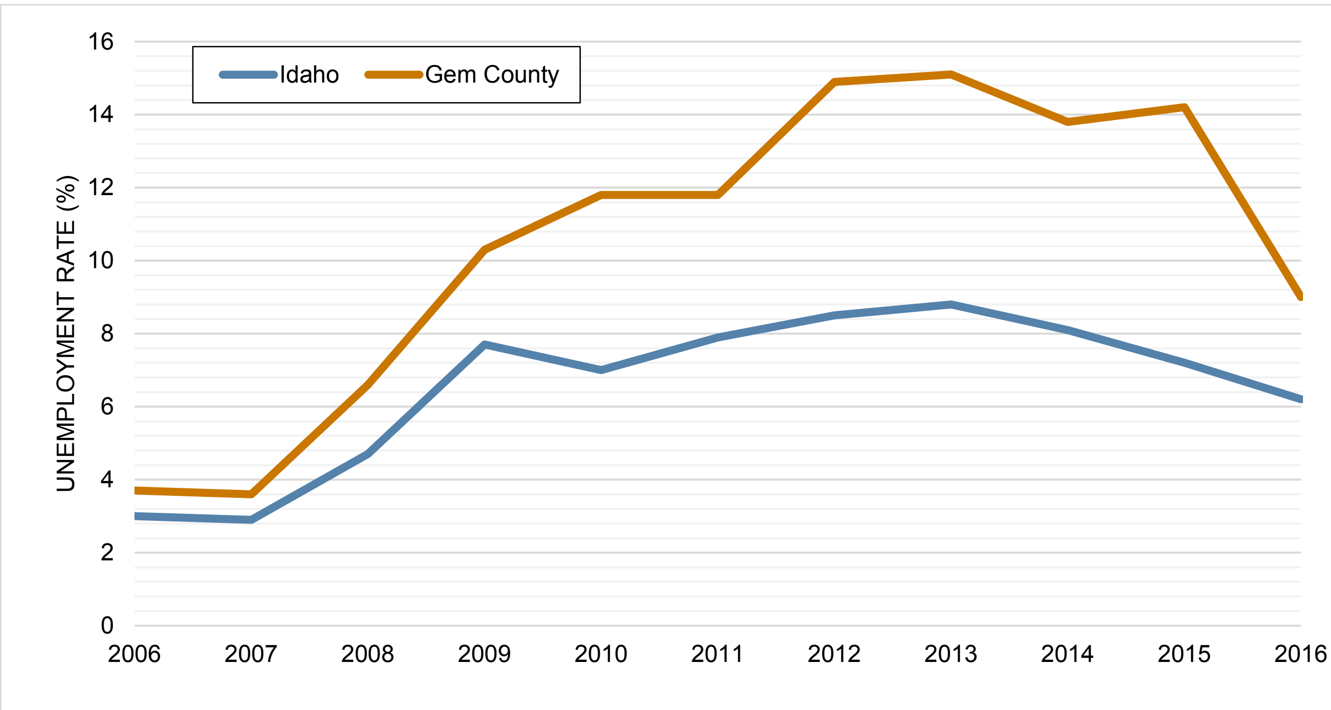


Figure 4-9. Idaho and Gem County Unemployment Rate

Management/business/science/arts and service occupations make up more than half the jobs in the planning area. Other major occupations are sales/office (21.5 percent) and natural resources/construction/maintenance (14.8 percent) (see Figure 4-10).

The U.S. Census estimates that 77.2 percent of Gem County workers commute alone (by car, truck or van) to work and 10.3 percent carpool. The mean travel time to work in the county is 27.9 minutes.

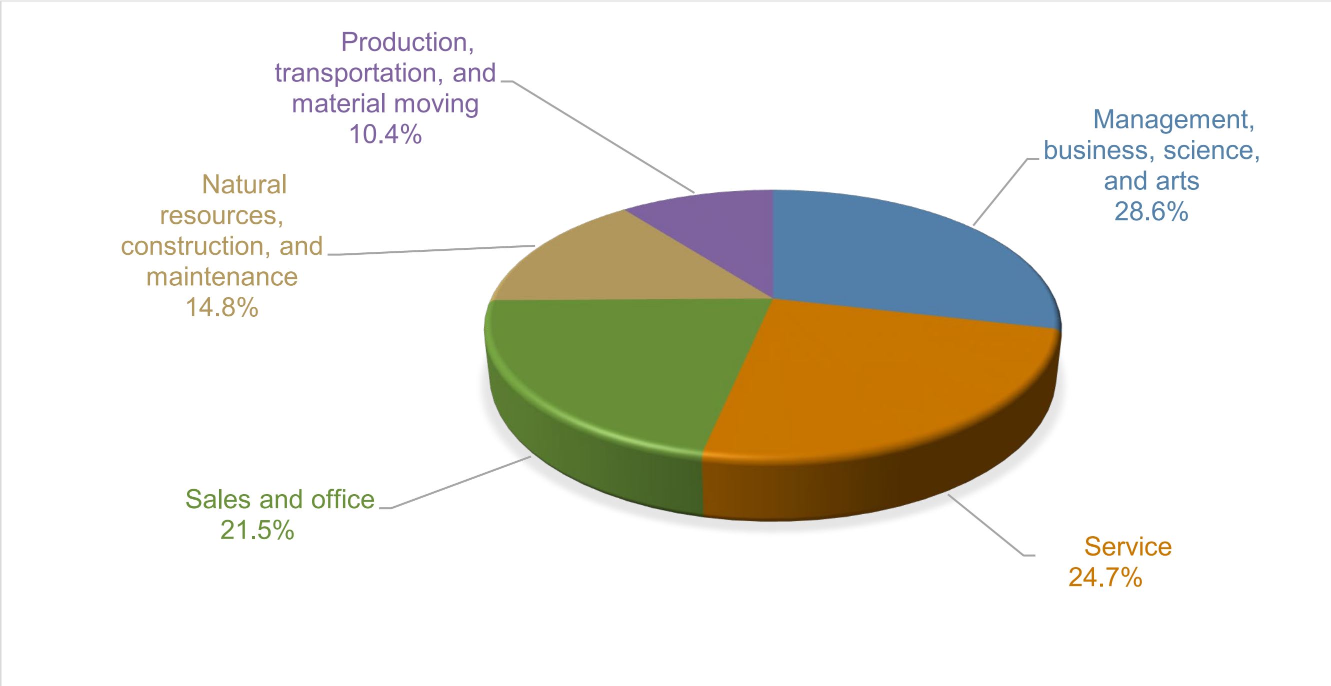


Figure 4-10. Occupations in the Planning Area

5. Relevant Laws, Ordinances and Programs

Existing laws, ordinances, plans and programs at the federal, state and local level can support or impact hazard mitigation actions identified in this plan. Hazard mitigation plans are required to include a review and incorporation, if appropriate, of existing plans, studies, reports, and technical information as part of the planning process (44 CFR, Section 201.6(b)(3)). The following federal and state programs have been identified as programs that may interface with the actions identified in this plan. Each program enhances capabilities to implement mitigation actions or has a nexus with a mitigation action in this plan. Each planning partner used information in this chapter to review local capabilities to implement hazard mitigation actions, as presented in the jurisdictional annexes of Volume 2.

5.1 FEDERAL

5.1.1 Disaster Mitigation Act

The DMA is the current federal legislation addressing hazard mitigation planning. It emphasizes planning for disasters before they occur. It specifically addresses planning at the local level, requiring plans to be in place before Hazard Mitigation Grant Program funds are available to communities. This plan is designed to meet the requirements of DMA, improving the planning partners' eligibility for future hazard mitigation funds.

5.1.2 Endangered Species Act

The federal Endangered Species Act (ESA) was enacted in 1973 to conserve species facing depletion or extinction and the ecosystems that support them. The act sets forth a process for determining which species are threatened and endangered and requires the conservation of the critical habitat in which those species live. The ESA provides broad protection for species of fish, wildlife and plants that are listed as threatened or endangered. Provisions are made for listing species, as well as for recovery plans and the designation of critical habitat for listed species. The ESA outlines procedures for federal agencies to follow when taking actions that may jeopardize listed species and contains exceptions and exemptions. It is the enabling legislation for the Convention on International Trade in Endangered Species of Wild Fauna and Flora. Criminal and civil penalties are provided for violations of the ESA and the Convention.

Federal agencies must seek to conserve endangered and threatened species and use their authorities in furtherance of the ESA's purposes. The ESA defines three fundamental terms:

- **Endangered** means that a species of fish, animal or plant is "in danger of extinction throughout all or a significant portion of its range." (For salmon and other vertebrate species, this may include subspecies and distinct population segments.)
- **Threatened** means that a species "is likely to become endangered within the foreseeable future." Regulations may be less restrictive for threatened species than for endangered species.
- **Critical habitat** means "specific geographical areas that are…essential for the conservation and management of a listed species, whether occupied by the species or not."

Five sections of the ESA are of critical importance to understanding it:

- **Section 4: Listing of a Species**—The National Oceanic and Atmospheric Administration Fisheries Service (NOAA Fisheries) is responsible for listing marine species; the U.S. Fish and Wildlife Service is responsible for listing terrestrial and freshwater aquatic species. The agencies may initiate reviews for listings, or citizens may petition for them. A listing must be made "solely on the basis of the best scientific and commercial data available." After a listing has been proposed, agencies receive comment and conduct further scientific reviews for 12 to 18 months, after which they must decide if the listing is warranted. Economic impacts cannot be considered in this decision, but it may include an evaluation of the adequacy of local and state protections. Critical habitat for the species may be designated at the time of listing.
- **Section 7: Consultation—**Federal agencies must ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of a listed or proposed species or adversely modify its critical habitat. This includes private and public actions that require a federal permit. Once a final listing is made, non-federal actions are subject to the same review, termed a "consultation." If the listing agency finds that an action will "take" a species, it must propose mitigations or "reasonable and prudent" alternatives to the action; if the proponent rejects these, the action cannot proceed.
- **Section 9: Prohibition of Take—**It is unlawful to "take" an endangered species, including killing or injuring it or modifying its habitat in a way that interferes with essential behavioral patterns, including breeding, feeding or sheltering.
- **Section 10: Permitted Take**—Through voluntary agreements with the federal government that provide protections to an endangered species, a non-federal applicant may commit a take that would otherwise be prohibited as long as it is incidental to an otherwise lawful activity (such as developing land or building a road). These agreements often take the form of a "Habitat Conservation Plan."
- **Section 11: Citizen Lawsuits**—Civil actions initiated by any citizen can require the listing agency to enforce the ESA's prohibition of taking or to meet the requirements of the consultation process.

FEMA hazard mitigation project grant applications require full compliance with applicable federal acts. Any action identified in this plan that falls within the scope of this act will need to meet its requirements.

5.1.3 The Clean Water Act

The federal Clean Water Act (CWA) employs regulatory and non-regulatory tools to reduce direct pollutant discharges into waterways, finance municipal wastewater treatment facilities, and manage polluted runoff. These tools are employed to achieve the broader goal of restoring and maintaining the chemical, physical, and biological integrity of the nation's surface waters so that they can support "the protection and propagation of fish, shellfish, and wildlife and recreation in and on the water."

Evolution of CWA programs over the last decade has included a shift from a program-by-program, source-by-source, pollutant-by-pollutant approach to more holistic watershed-based strategies. Under the watershed approach, equal emphasis is placed on protecting healthy waters and restoring impaired ones. Many issues are addressed, not just those subject to CWA regulatory authority. Involvement of stakeholder groups in the development and implementation of strategies for achieving and maintaining water quality and other environmental goals is a hallmark of this approach.

The CWA is important to hazard mitigation in several ways. There are often permitting requirements for any construction within 200 feet of water of the United States, which may have implications for mitigation projects identified by a local jurisdiction. Additionally, CWA requirements apply to wetlands, which serve important functions related to preserving and protecting the natural and beneficial functions of floodplains and are linked with a community's floodplain management program. Finally, the National Pollutant Discharge Elimination

System is part of the CWA and addresses local stormwater management programs. Stormwater management plays a critical role in hazard mitigation by addressing urban drainage or localized flooding issues within jurisdictions.

FEMA hazard mitigation project grant applications require full compliance with applicable federal acts. Any action identified in this plan that falls within the scope of this act will need to meet its requirements.

5.1.4 National Flood Insurance Program

The National Flood Insurance Program (NFIP) provides federally backed flood insurance in exchange for communities enacting floodplain regulations. Participation and good standing under NFIP are prerequisites to grant funding eligibility under the Robert T. Stafford Act. The County and the City of Emmett participate in the NFIP and have adopted regulations that meet the NFIP requirements. Both participating jurisdictions are in good standing with NFIP requirements as of this plan update.

5.1.5 National Incident Management System

The National Incident Management System is a systematic approach for government and nongovernmental organizations and the private sector to work together to manage incidents involving hazards. The system provides a flexible but standardized set of incident management practices. Incidents typically begin and end locally, and they are managed at the lowest possible geographical, organizational, and jurisdictional level. In some cases, success depends on the involvement of multiple jurisdictions, levels of government, functional agencies, and emergency responder disciplines. These cases necessitate coordination across a spectrum of organizations. Communities using the National Incident Management System follow a comprehensive national approach that improves the effectiveness of emergency management and response personnel across the full spectrum of potential hazards (including natural hazards, terrorist activities, and other human-caused disasters) regardless of size or complexity. Although participation is voluntary, federal departments and agencies are required to make adoption of this system by local and state jurisdictions a condition to receive federal preparedness grants and awards.

5.1.6 Americans with Disabilities Act and Amendments

The Americans with Disabilities Act (ADA) seeks to prevent discrimination against people with disabilities in employment, transportation, public accommodation, communications, and government activities. Title II of the ADA deals with compliance with the Act in emergency management and disaster-related programs, services, and activities. It applies to state and local governments as well as third parties, including religious entities and private nonprofit organizations.

The ADA has implications for sheltering requirements and public notifications. During an emergency alert, officials must use a combination of warning methods to ensure that all residents have all necessary information. Those with hearing impairments may not hear radio, television, sirens, or other audible alerts, while those with visual impairments may not see flashing lights or other visual alerts. Two technical documents for shelter operators address physical accessibility needs of people with disabilities, as well as medical needs and service animals.

The ADA intersects with disaster preparedness programs in regard to transportation, social services, temporary housing, and rebuilding. Persons with disabilities may require additional assistance in evacuation and transit (e.g., vehicles with wheelchair lifts or paratransit buses). Evacuation and other response plans should address the unique needs of residents. Local governments may be interested in implementing a special-needs registry to identify the home addresses, contact information, and needs for residents who may require more assistance.

FEMA hazard mitigation project grant applications require full compliance with applicable federal acts. Any action identified in this plan that falls within the scope of this act will need to meet its requirements.

5.1.7 Civil Rights Act of 1964

The Civil Rights Act of 1964 prohibits discrimination based on race, color, religion, sex or nation origin and requires equal access to public places and employment. The Act is relevant to emergency management and hazard mitigation in that it prohibits local governments from favoring the needs of one population group over another. Local government and emergency response must ensure the continued safety and well-being of all residents equally, to the extent possible. FEMA hazard mitigation project grant applications require full compliance with applicable federal acts. Any action identified in this plan that falls within the scope of this act will need to meet its requirements.

5.1.8 Rural Development Program

The mission of the U.S. Department of Agriculture (USDA) Rural Development Program is to help improve the economy and quality of life in rural America. The program provides project financing and technical assistance to help rural communities provide the infrastructure needed by rural businesses, community facilities, and households. The program addresses rural America's need for basic services, such as clean running water, sewage and waste disposal, electricity, and modern telecommunications and broadband. Loans and competitive grants are offered for various community and economic development projects and programs, such as the development of essential community facilities including fire stations (USDA, 2015b). This program is a potential source of funding for actions identified in this plan.

5.1.9 Community Development Block Grant Disaster Recovery Program

In response to disasters, Congress may appropriate additional funding for the U.S. Department of Housing and Urban Development Community Development Block Grant programs to be distributed as Disaster Recovery grants (CDBG-DR). These grants can be used to rebuild affected areas and provide seed money to start the recovery process. CDBG-DR assistance may fund a broad range of recovery activities, helping communities and neighborhoods that otherwise might not recover due to limited resources. CDBG-DR grants often supplement disaster programs of the Federal Emergency Management Agency, the Small Business Administration, and the U.S. Army Corps of Engineers. Housing and Urban Development generally awards noncompetitive, nonrecurring CDBG-DR grants by a formula that considers disaster recovery needs unmet by other federal disaster assistance programs. To be eligible for CDBG-DR funds, projects must meet the following criteria:

- Address a disaster-related impact (direct or indirect) in a presidentially declared county for the covered disaster
- Be a CDBG-eligible activity (according to regulations and waivers)
- Meet a national objective.

Incorporating preparedness and mitigation into these actions is encouraged, as the goal is to rebuild in ways that are safer and stronger. CDBG-DR funding is a potential source of funding for actions identified in this plan.

5.1.10 Emergency Watershed Program

The USDA Natural Resources Conservation Service (NRCS) administers the Emergency Watershed Protection (EWP) Program, which responds to emergencies created by natural disasters. Eligibility for assistance is not dependent on a national emergency declaration. The program is designed to help people and conserve natural resources by relieving imminent hazards to life and property caused by floods, fires, windstorms, and other natural occurrences. EWP is an emergency recovery program. Financial and technical assistance are available for the following activities (National Resources Conservation Service, 2016):

- Remove debris from stream channels, road culverts, and bridges
- Reshape and protect eroded banks
- Correct damaged drainage facilities
- Establish cover on critically eroding lands
- Repair levees and structures
- Repair conservation practices.

This federal program could be a possible funding source for actions identified in this plan.

5.1.11 Presidential Executive Orders 11988 and 13690

Executive Order 11988 requires federal agencies to avoid to the extent possible the long and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative. It requires federal agencies to provide leadership and act to reduce the risk of flood loss, minimize the impact of floods on human safety, health, and welfare, and restore and preserve the natural and beneficial values of floodplains. The requirements apply to the following activities (FEMA, 2015e):

- Acquiring, managing, and disposing of federal lands and facilities
- Providing federally undertaken, financed, or assisted construction and improvements
- Conducting federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulation, and licensing.

Executive Order 13690 expands Executive Order 11988 and acknowledges that the impacts of flooding are anticipated to increase over time due to the effects of climate change and other threats. It mandates a federal flood risk management standard to increase resilience against flooding and help preserve the natural values of floodplains. This standard expands management of flood issues from the current base flood level to a higher vertical elevation and corresponding horizontal floodplain. The goal is to address current and future flood risk and ensure that projects funded with taxpayer dollars last as long as intended (Office of the Press Secretary, 2015). All actions identified in this plan will seek full compliance with all applicable presidential executive orders.

5.1.12 Presidential Executive Orders 11990

Executive Order 11990 requires federal agencies to provide leadership and act to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands. The requirements apply to the following activities (National Archives, 2016):

- Acquiring, managing, and disposing of federal lands and facilities
- Providing federally undertaken, financed, or assisted construction and improvements
- Conducting federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulation, and licensing.

All actions identified in this plan will seek full compliance with all applicable presidential executive orders.

5.1.13 Emergency Relief for Federally Owned Roads Program

The U.S. Forest Service's Emergency Relief for Federally Owned Roads Program was established to assist federal agencies with repair or reconstruction of tribal transportation facilities, federal lands transportation facilities, and other federally owned roads that are open to public travel and have suffered serious damage by a natural disaster over a wide area or by a catastrophic failure. The program funds both emergency and permanent repairs (Office of Federal Lands Highway, 2016). Eligible activities under this program meet some of the goals and objectives for this plan and the program is a possible funding source for actions identified in this plan.

5.2 STATE

5.2.1 State and Local Building Codes

Idaho's building code largely reflects international codes, with provisions for wind, seismic and snow loading. As of October 1, 2008, the Idaho building code became mandatory for all municipalities in the state. As of January 1, 2015, the building codes include the following:

- 2012 International Building Code
- 2012 International Residential Code Parts I, II, II, IV and IX
- 2012 International Energy Conservation Code
- 2012 International Existing Building Code
- Idaho administrative rules 07.03.01 (Rules of Building Safety), amending the above codes. There are significant changes to the energy conservation provisions for one- and two-family dwellings.

5.2.2 Subdivision Regulations

Subdivision regulations form part of the process utilized by local governments to carry out the requirements of their comprehensive plans and zoning ordinances. In Idaho, local governments have the authority to define the term "subdivision" as they prefer. State enabling authority does not contain standards or requirements that would be considered to exceed those commonly found elsewhere, nor are subdivision regulations mandated. Subdivision regulations are important in hazard prone areas as they can specify requirements for layout and location of infrastructure, lots and other facilities as land is developed.

5.2.3 Comprehensive Plans and Zoning

Title 67, Chapter 65, which is Idaho's local land use enabling authority, includes a stated, specific purpose of local land use regulation "to protect life and property in areas subject to natural hazards and disasters." Tools to do this include comprehensive planning and zoning. Consistent with Idaho law, a comprehensive plan provides the policy basis for a community's zoning ordinance, which contains the specific standards and requirements and processes for making land use and development decisions. In Idaho, a comprehensive plan is required to include a section on hazards (67-6508(g)):

> *The plan with maps, charts, and reports shall be based on the following components as they may apply to land use regulations and actions unless the plan specifies reasons why a particular component is unneeded … Hazardous Areas -- An analysis of known hazards as may result from susceptibility to surface ruptures from faulting, ground shaking, ground failure, landslides or mudslides; avalanche hazards resulting from development in the known or probable path of snow slides and avalanches, and floodplain hazards.*

As part of comprehensive planning, a future land use map is prepared indicating suitable projected land uses for the jurisdiction. The implementation tool to realize the vision in the comprehensive plan is the zoning ordinance. Zoning protects the rights of property owners while promoting the general welfare of the community. By dividing land into categories according to use, and setting regulations for these categories, a zoning ordinance can govern private land use and segregate incompatible uses. The purpose of zoning is to locate particular land uses where they are most appropriate, considering public utilities, road access and the established development pattern.

5.2.4 Floodplain Zoning

Idaho communities are authorized to adopt floodplain zoning to regulate any mapped or unmapped flood hazard area. Additionally, Idaho communities may adopt standards that exceed the minimum standards of the NFIP. In March 2010, the Idaho Legislature passed House Bill 556, which changes Idaho's floodplain zoning enabling authority to exempt operation, maintenance, cleaning or repair of any of any canal ditch, irrigation, drainage or diversion structure from floodplain zoning. Floodplain zoning is important in flood hazard areas to provide for appropriate development standards and enable communities to participate in the NFIP and therefore be eligible for flood insurance and flood mitigation programs. The recent law change would appear to be in conflict with federal minimum regulatory standards for communities participating in the NFIP and could therefore endanger community participation in the program.

5.2.5 Idaho Disaster Preparedness Act of 1975

The Idaho Disaster Preparedness Act of 1975 (Chapter 10, Title 46 of the Idaho Code) created the Bureau of Disaster Services and subsequently the Office of Emergency Management and provided for the creation of local organizations for disaster preparedness. According to the Act, it is the policy of the State of Idaho to plan and prepare for disasters and emergencies resulting from natural or manmade causes, enemy attack, sabotage or other hostile action. State law was put into place to do the following:

- Create an Office of Emergency Management.
- Prevent and reduce damage, injury, and loss of life and property resulting from natural or man-made catastrophes.
- Prepare assistance for prompt and efficient search, rescue and care.
- Provide for rapid restoration and rehabilitation.
- Prescribe the roles of government in prevention, preparation and response to disaster.
- Authorize and encourage cooperation in disaster prevention, preparation and response.
- Provide for coordination of activities.
- Provide a disaster management system.
- Provide for payment of obligations and expenses incurred by the state of Idaho through the Office of Emergency Management.

5.2.6 Idaho Silver Jackets Program

The Silver Jackets Program is the state-level implementation of the Army Corps of Engineers National Flood Risk Management Program. The core member agencies will establish a continuous intergovernmental collaborative team working with other state and federal agencies to do the following:

- Provide assistance in identifying and prioritizing actions to reduce the threat, vulnerability and consequences of flooding in the State of Idaho.
- Facilitate strategic planning and implementation of life-cycle mitigation, response and recovery actions to reduce the threat, vulnerability and consequences of flooding in the State of Idaho.
- Create or supplement a process to collaboratively identify issues and implement or recommend solutions.
- Identify and implement ways to leverage available resources and information between agencies.
- Increase and improve flood risk communication and outreach.
- Promote wise stewardship of the taxpayers' investments.
- Develop more comprehensive state flood risk management policies and strategies.
- Develop advanced hydrologic predictive services to reduce loss of life and property damage from flooding.

5.3 LOCAL PROGRAMS

5.3.1 Plans, Reports and Codes

Plans, reports and other technical information were identified and provided directly by participating jurisdictions and stakeholders or were identified through independent research by the planning team. These documents were reviewed to identify the following:

- Existing jurisdictional capabilities
- Needs and opportunities to develop or enhance capabilities, which may be identified within the local mitigation strategies
- Mitigation-related goals or objectives, considered during the development of the overall goals and objectives
- Proposed, in-progress, or potential mitigation projects, actions and initiatives to be incorporated into the updated jurisdictional mitigation strategies.

The following local regulations, codes, ordinances and plans were reviewed in order to develop complementary and mutually supportive goals, objectives, and mitigation strategies that are consistent across local and regional planning and regulatory mechanisms:

- Gem Community Comprehensive Plan
- Building codes (city and county)
- Zoning and subdivision ordinances (city and county)
- NFIP flood damage prevention ordinances (city and county)
- Stormwater management plans (city and county)
- Emergency management and response plans
- Land use and open space plans
- Community wildfire protection plan.

5.3.2 Capability Assessment

All participating jurisdictions compiled an inventory and analysis of existing authorities and capabilities called a "capability assessment." A capability assessment creates an inventory of a jurisdiction's mission, programs and policies, and evaluates its capacity to carry them out. This assessment identifies potential gaps in the jurisdiction's capabilities. Capability assessments for each planning partner are presented in the jurisdictional annexes in Volume 2. If the capability assessment identified an opportunity to add a missing core capability or expand an existing one, then doing so has been selected as an action in the jurisdiction's action plan, which is also included in the individual annexes in Volume 2. The sections below describe the specific capabilities evaluated.

Legal and Regulatory Capabilities

Jurisdictions have the ability to develop policies and programs and to implement rules and regulations to protect and serve residents. Local policies are typically identified in a variety of community plans, implemented via a local ordinance, and enforced through a governmental body. Jurisdictions regulate land use through the adoption and enforcement of zoning, subdivision and land development ordinances, building codes, building permit ordinances, floodplain, and stormwater management ordinances. When effectively prepared and administered, these regulations can lead to hazard mitigation.

Fiscal Capabilities

Assessing a jurisdiction's fiscal capability provides an understanding of the ability to fulfill the financial needs associated with hazard mitigation projects. This assessment identifies both outside resources, such as grant-funding eligibility, and local jurisdictional authority to generate internal financial capability, such as through impact fees.

Administrative and Technical Capabilities

Legal, regulatory, and fiscal capabilities provide the backbone for successfully developing a mitigation strategy; however, without appropriate personnel, the strategy may not be implemented. Administrative and technical capabilities focus on the availability of personnel resources responsible for implementing all the facets of hazard mitigation. These resources include technical experts, such as engineers and scientists, as well as personnel with capabilities that may be found in multiple departments, such as grant writers.

NFIP Compliance

Flooding is the costliest natural hazard in the United States and, with the promulgation of recent federal regulation, homeowners throughout the country are experiencing increasingly high flood insurance premiums. Community participation in the NFIP opens up opportunity for additional grant funding associated specifically with flooding issues. Assessment of the jurisdiction's current NFIP status and compliance provides planners with a greater understanding of the local flood management program, opportunities for improvement, and available grant funding opportunities.

Public Outreach Capability

Regular engagement with the public on issues regarding hazard mitigation provides an opportunity to directly interface with community members. Assessing this outreach and education capability illustrates the connection between the government and community members, which opens a two-way dialogue that can result in a more resilient community based on education and public engagement.

Participation in Other Programs

Other programs, such as the Community Rating System, StormReady, and Firewise, enhance a jurisdiction's ability to mitigate, prepare for, and respond to natural hazards. These programs indicate a jurisdiction's desire to go beyond minimum requirements set forth by local, state and federal regulations in order to create a more resilient community. These programs complement each other by focusing on communication, mitigation, and community preparedness to save lives and minimize the impact of natural hazards on a community.

Development and Permitting Capability

Identifying previous and future development trends is achieved through a comprehensive review of permitting since completion of the previous plan and in anticipation of future development. Tracking previous and future growth in potential hazard areas provides an overview of increased exposure to a hazard within a community.

Integration Opportunity

The assessment looked for opportunities to integrate this mitigation plan with the legal/regulatory capabilities identified. Capabilities were identified as integration opportunities if they can support or enhance the actions identified in this plan or be supported or enhanced by components of this plan. Planning partners considered actions to implement this integration as described in their jurisdictional annexes.

Adaptability

The Planning Partnership views all core jurisdictional capabilities as fully adaptable to meet a jurisdiction's needs. Every code can be amended, and every plan can be updated. This adaptability is itself an overarching capability.

Part 2. RISK ASSESSMENT

6. IDENTIFIED HAZARDS OF CONCERN; RISK ASSESSMENT METHODOLOGY

Risk assessment is the process of measuring the potential loss of life, personal injury, economic injury, and property damage resulting from identified hazards. It allows emergency management personnel to establish early response priorities by identifying potential hazards and vulnerable assets. The risk assessment for this hazard mitigation plan update evaluates the risk of natural hazards prevalent in the planning area and meets requirements of the Disaster Mitigation Act (44 CFR, Section 201.6(c)(2)). To protect individual privacy and the security of critical facilities, information on properties assessed is presented in aggregate, without details about specific individual personal or public properties.

6.1 IDENTIFIED HAZARDS OF CONCERN

The Steering Committee considered the full range of natural hazards that could affect the planning area and then listed hazards that present the greatest concern. The process incorporated a review of state and local hazard planning documents as well as information on the frequency of, magnitude of, and costs associated with hazards that have struck the planning area or could do so. Anecdotal information regarding natural hazards and the perceived vulnerability of the planning area's assets to them was also used. Based on the review, this plan addresses the following hazards of concern (presented in alphabetical order; the order of listing does not indicate the hazards' relative severity):

- Dam and canal failure
- Drought
- Earthquake
- Flood
- Landslide
- Severe weather
- Wildfire

Additionally, other "non-natural" hazards of interest are qualitatively profiled but not fully assessed. 44 CFR Section 201.6 does not require that local hazards mitigation plans assess non-natural hazards. The Steering Committee determined that these other hazards of interest are important to recognize qualitatively in this plan, in order to support other plans and programs in effect within the planning area. Therefore, Chapter 14 of this section includes profiles of the following hazards:

- Pandemic
- Civil disturbance
- Terrorism
- Cyber
- Oil and gas exploration
- Hazardous materials.

6.2 RISK ASSESSMENT TOOLS

The risk assessments in Chapters 7 through 13 describe the risks associated with each identified hazard of concern. Each chapter describes the hazard, the planning area's vulnerabilities, and probable event scenarios. The following steps were used to define the risk of each hazard:

- **Identify and profile each hazard; use all available information to determine what types of hazards may affect a jurisdiction, how often they can occur, and their potential severity**—The following information is given for each hazard:
  - Geographic areas most affected by the hazard
  - Event frequency estimates
  - Severity estimates
  - Warning time likely to be available for response.
- **Determine exposure to each hazard; estimate the total number of people and properties in the jurisdiction that are likely to experience a hazard event if it occurs**—Exposure was determined by overlaying hazard maps with an inventory of structures, facilities, and systems to determine which of them would be exposed to each hazard. For each identified hazard of concern, the best available existing data delineating a hazard area was selected. Data sets were evaluated based on scale, age and source. Additionally, data available in a GIS-compatible format with coverage of the full extent of the planning area were preferentially selected for use in the analysis.
- **Assess the vulnerability of exposed facilities; assess the impact of hazard events on the people, property, environment, economy and lands of the region, including estimates of the cost of potential damage or cost that can be avoided by mitigation**—Vulnerability of exposed structures and infrastructure was determined by interpreting the probability of occurrence of each event and assessing structures, facilities, and systems that are exposed to each hazard. Tools such as GIS and FEMA's hazard-modeling program called Hazus were used to perform this assessment for the flood, dam failure and earthquake hazards. Outputs similar to those from Hazus were generated for other hazards, using maps generated by the Hazus program.

The risk assessments performed for this plan evaluated risk countywide and for the following specific areas:

- The City of Emmett
- The towns of Letha, Montour, Ola and Sweet
- The remainder of unincorporated county area outside the individually assessed city and towns.

Gem County and City of Emmett risk assessments were based on the corporate boundaries of the county and city. For the unincorporated towns, the assessments used approximate boundaries developed for this plan based on aerial photography and an inventory of building point-locations. Results for the remaining unincorporated county area were calculated by subtracting the results for Emmett and the towns from the countywide results.

6.3 MAPPING

A review of national, state and county databases was performed to locate available spatially based data relevant to this planning effort. Maps were produced using GIS software to show the spatial extent and location of identified hazards when such data was available. These maps are included in the hazard profile chapters of this document. Information regarding the data sources and methodologies employed in these mapping efforts is located in Appendix C.

6.4 DAM FAILURE, EARTHQUAKE AND FLOOD—HAZUS

6.4.1 Overview

In 1997, FEMA developed the standardized Hazards U.S., or Hazus, model to estimate losses caused by earthquakes and identify areas that face the highest risk and potential for loss. Hazus was later expanded into a multi-hazard methodology with new models for estimating potential losses from hurricanes and floods.

Hazus is a GIS-based software program used to support risk assessments, mitigation planning, and emergency planning and response. It provides a wide range of inventory data, such as demographics, building stock, critical facility, transportation and utility lifeline, and multiple models to estimate potential losses from natural disasters. The program maps and displays hazard data and the results of damage and economic loss estimates for buildings and infrastructure. Its advantages include the following:

- Provides a consistent methodology for assessing risk across geographic and political entities.
- Provides a way to save data so that it can readily be updated as population, inventory, and other factors change and as mitigation planning efforts evolve.
- Facilitates the review of mitigation plans because it helps to ensure that FEMA methodologies are incorporated.
- Supports grant applications by calculating benefits using FEMA definitions and terminology.
- Produces hazard data and loss estimates that can be used in communication with local stakeholders.
- Is administered by the local government and can be used to manage and update a hazard mitigation plan throughout its implementation.

6.4.2 Levels of Detail for Evaluation

Hazus provides default data for inventory, vulnerability and hazards; this default data can be supplemented with local data to provide a more refined analysis. The model can carry out three levels of analysis, depending on the format and level of detail of information about the planning area:

- **Level 1**—All of the information needed to produce an estimate of losses is included in the software's default data. This data is derived from national databases and describes in general terms the characteristic parameters of the planning area.
- **Level 2**—More accurate estimates of losses require more detailed information about the planning area. To produce Level 2 estimates of losses, detailed information is required about local geology, hydrology, hydraulics and building inventory, as well as data about utilities and critical facilities. This information is needed in a GIS format.
- **Level 3**—This level of analysis generates the most accurate estimate of losses. It requires detailed engineering and geotechnical information to customize it for the planning area.

6.4.3 Application for This Plan

The following methods were used to assess specific hazards for this plan:

- **Flood**—A Level 2, general building stock and user-defined facility analysis was performed. GIS building and assessor data (replacement cost values and detailed structure information) were loaded into Hazus. An updated inventory was used in place of the Hazus defaults for general building stock, essential facilities, transportation and utilities. Flood depth grids were generated for the model using the flood hazard boundaries and a 10-meter digital elevation model. Two floodplain maps were used to delineate flood hazard areas and estimate potential losses from a 100-year and 500-year flood events:

- ➢ The current FEMA-mapped 100-year and 500-year floodplains
- ➢ A 100-year floodplain generated in HAZUS from data developed for the 2012 Gem County hazard mitigation plan and FEMA Q3 flood data for Gem County was (Q3 flood data is a digital representation of certain features of FEMA's Flood Insurance Rate Maps, intended for use with desktop mapping and geographic information systems).

- **Dam Failure**—Dam failure inundation mapping for the planning area was collected where available. This data was imported into Hazus and a modified Level 2 analysis was run using the flood methodology described above.
- **Earthquake**—A Level 2 analysis was performed to assess earthquake risk and exposure. Hazus pre-loaded earthquake data and probabilistic data prepared by the U.S. Geological Survey (USGS) were used for the analysis of this hazard. An updated general building stock inventory was developed using replacement cost values and detailed structure information from assessor tables. An updated inventory of essential facilities, transportation and utility features was used in place of the Hazus defaults. Two scenario events and two probabilistic events were modeled:

  - ➢ The first scenario event was based on a 2012 USGS scenario of a Magnitude-7.0 event on the Squaw Creek fault.
  - ➢ The second scenario event was based on a 2016 USGS scenario of a Magnitude-6.8 event on the Big Flat/Jakes Creek.
  - ➢ The standard Hazus analysis for the 100- and 500-year probabilistic events was run.

6.5 LANDSLIDE, SEVERE WEATHER, AND WILDFIRE

For most of the hazards evaluated in this risk assessment, historical data was not adequate to model future losses. However, GIS can be used to map hazard areas and calculate exposures if geographic information is available on the locations of the hazards and inventory data. Areas and inventory susceptible to some of the hazards of concern were mapped and exposure was evaluated. For other hazards, a qualitative analysis was conducted using the best available data and professional judgment. County-relevant information was gathered from a variety of sources. Frequency and severity indicators include past events and the expert opinions of geologists, emergency management specialists and others. The primary data source was the Gem County GIS database, augmented with state and federal data sets. Additional data sources for specific hazards were as follows:

- **Landslide**—A dataset of steep slopes was generated using a 1/3-arcsecond digital elevation model. Two slope classifications were created: 15 to 30 percent; and greater than 30 percent.
- **Severe Weather**—Severe weather data was downloaded from the Natural Resources Conservation Service and the National Climatic Data Center.
- **Wildfire**—Information on wildfire hazards areas was provided by rural fire districts, Gem County and the Idaho Bureau of Land Management, or taken from the Gem County Wildland Urban Interface Wildfire Mitigation Plan.

6.6 DROUGHT

The risk assessment methodologies used for this update focus on damage to structures. Because drought does not impact structures, the risk assessment for drought was more limited and qualitative than the assessment for the other hazards of concern.

6.7 LAND USE DATA SOURCE

Data used in the land use analysis was provided by Gem County planning staff. Accuracy is limited to the collective accuracy of the source data on the date of the analysis. The information is believed to be accurate, and reasonable efforts have been made to ensure its accuracy. However, Gem County disclaims responsibility for damage or liability that may arise from use of the data.

6.8 LIMITATIONS

Loss estimates, exposure assessments and hazard-specific vulnerability evaluations rely on the best available data and methodologies. Uncertainties are inherent in any loss estimation methodology and arise in part from incomplete scientific knowledge concerning natural hazards and their effects on the built environment. Uncertainties also result from the following:

- Approximations and simplifications necessary to conduct a study
- Incomplete or outdated inventory, demographic or economic parameter data
- The unique nature, geographic extent and severity of each hazard
- Mitigation measures already employed
- The amount of advance notice residents have to prepare for a specific hazard event.

These factors can affect loss estimates by a factor of two or more. Therefore, potential exposure and loss estimates are approximate and should be used only to understand relative risk. Over the long term, Gem County and its planning partners will collect additional data to assist in estimating potential losses associated with other hazards.

7. DAM/CANAL FAILURE

7.1 GENERAL BACKGROUND

7.1.1 Causes of Dam Failure

Dam failures in the United States typically occur in one of four ways:

- Overtopping of the primary dam structure, which accounts for 34 percent of all dam failures, can occur due to inadequate spillway design, settlement of the dam crest, blockage of spillways, and other factors.
- Foundation defects due to differential settlement, slides, slope instability, uplift pressures, and foundation seepage can also cause dam failure. These account for 30 percent of all dam failures.
- Failure due to piping and seepage accounts for 20 percent of all failures. These are caused by internal erosion due to piping and seepage, erosion along hydraulic structures such as spillways, erosion due to animal burrows, and cracks in the dam structure.
- Failure due to problems with conduits and valves, typically caused by the piping of embankment material into conduits through joints or cracks, constitutes 10 percent of all failures.

The remaining 6 percent of dam failures are due to miscellaneous causes. Many are secondary results of other disasters, such as earthquakes, landslides, storms, snowmelt, equipment malfunction, structural damage, and sabotage. The most likely disaster-related causes of dam failure in Gem County are earthquakes, excessive rainfall and landslides. Poor construction, lack of maintenance and repair, and deficient operational procedures are preventable or correctable through regular inspections. Terrorism and vandalism are concerns that all operators of public facilities plan for; these threats are under continuous review by public safety agencies.

7.1.2 Irrigation Canals

A significant portion of the arid lands of Southwest Idaho was developed through reclamation projects of the early 1900s. These projects included dams to collect water and provide flood control and canals to deliver the water to agricultural areas. Canals often are not recognized as flood hazards despite the fact that a large number of canals crisscross the state. Nonetheless, new community development has encroached on the canals and the areas adjacent to them. In Gem County, a considerable number of housing developments are situated below large-capacity canals. Given the proximity to high-flow, manmade floodways, the risk to life, safety and property is significant. Because of widespread ownership issues (private canals, irrigation districts, etc.) data for canal failure events is not readily obtainable. The Silver Jackets technical advisory group has expressed strong interest in monitoring this issue.

Gem County's surface water delivery system includes over 270 miles of canals. These canals are generally well-maintained by their owners/operators because it is their livelihood. However, these facilities can convey flows as high as 2,500 cubic feet per second (cfs), and they have not been evaluated according to any engineering standards. Therefore, the assessment of risk associated with canals is limited in this plan update. Future updates should continue to seek participation from canal owners/operators to better understand the risk posed by these facilities. These entities were invited to participate in this plan update process, but they chose not to at this time.

7.1.3 Regulatory Oversight

The potential for catastrophic flooding due to dam failures led to passage of the National Dam Safety Act, which requires a periodic engineering analysis of every major dam in the country. The goal of this FEMA-monitored effort is to identify and mitigate the risk of dam failure so as to protect the lives and property of the public.

Idaho Department of Water Resources Dam Safety Program

The Dam Safety Program of Idaho's Department of Water Resources monitors dams at the state level. The program regulates nearly 600 water storage dams and more than 20 mine tailings impoundment structures. The program regulates dams greater than or equal to 10 feet in height or reservoirs greater than or equal to 50 acre-feet in storage capacity. Each dam inspected by IDWR has a classification for size and risk:

- Large—40 feet high or more or with a storage capacity of more than 4,000 acre-feet of water. *104 dams are currently listed as large*.
- Intermediate—More than 20 but less than 40 feet high or with a storage capacity of 100 to 4,000 acre-feet of water. *198 dams are currently listed as intermediate*.
- Small—20 feet high or less and a storage capacity of less than 100 acre-feet of water. *244 dams are currently listed as small*.

All statutory sized dams must be inspected by the IDWR no less than every five years. The frequency between individual dam inspections depends on such items as the project's physical condition, method of construction, maintenance record, age, hazard rating, and size and storage capacity. Inspection reports prepared by the IDWR for non-federal dams are available through the state office in Boise (Idaho Dam Safety Web Site, 2011).

U.S. Army Corps of Engineers Dam Safety Program

The U.S. Army Corps of Engineers is responsible for safety inspections of some federal and non-federal dams in the United States that meet size and storage limitations specified in the National Dam Safety Act. The Corps has inventoried dams; surveyed each state and federal agency's capabilities, practices and regulations regarding design, construction, operation and maintenance of the dams; and developed guidelines for inspection and evaluation of dam safety. The Corps maintains the National Inventory of Dams, which contains information about a dam's location, size, purpose, type, last inspection and regulatory status. (U.S. Army Corps of Engineers, 1997).

Federal Energy Regulatory Commission Dam Safety Program

The Federal Energy Regulatory Commission (FERC) has the largest dam safety program in the United States. The FERC cooperates with federal and state agencies to ensure dam safety and homeland security. There are 3,036 dams that are part of regulated hydroelectric projects are in the FERC program. Two-thirds of these are more than 50 years old. As dams age, concern about their safety and integrity grows, so oversight and regular inspection are important. FERC staff inspects hydroelectric projects on an unscheduled basis to investigate the following:

- Potential dam safety problems
- Complaints about constructing and operating a project
- Safety concerns related to natural disasters
- Issues concerning compliance with the terms and conditions of a license.

Every five years, an independent consulting engineer, approved by the FERC, must inspect and evaluate projects with dams higher than 32.8 feet, or with a total storage capacity of more than 2,000 acre-feet.

FERC staff monitors seismic research in areas where there are concerns about seismic activity. This information is applied in investigating and performing structural analyses of hydroelectric projects in these areas. FERC staff also evaluates the effects of potential and actual large floods on the safety of dams. During and following floods, FERC staff visits dams and licensed projects, determines the extent of damage, if any, and directs any necessary studies or remedial measures the licensee must undertake. The FERC publication *Engineering Guidelines for the Evaluation of Hydropower Projects* guides the FERC engineering staff and licensees in evaluating dam safety. The publication is frequently revised to reflect current information and methodologies.

The FERC requires licensees to prepare emergency action plans and conducts training sessions on how to develop and test these plans. The plans outline an early warning system if there is an actual or potential sudden release of water from a dam due to failure. The plans include operational procedures that may be used, such as reducing reservoir levels and reducing downstream flows, as well as procedures for notifying affected residents and agencies responsible for emergency management. These plans are frequently updated and tested to ensure that everyone knows what to do in emergency situations.

U.S. Bureau of Reclamation

The U.S. Bureau of Reclamation's Dam Safety Program was officially implemented in 1978 with passage of the Reclamation Safety of Dams Act, Public Law 95-578. This act was amended in 1984 under Public Law 98-404, in 2000 under Public Law 106-377, in 2002 under Public Law 107-117, and in 2004 under Public Law 108-439 (Reclamation Safety of Dams Act, as amended). Program Development and administration of dam safety activities is the responsibility of Reclamation's Dam Safety Office located in Denver, Colorado.

Dams must be operated and maintained in a safe manner, ensured through inspections for safety deficiencies, analyses utilizing current technologies and designs, and corrective actions if needed based on current engineering practices. In addition, future evaluations should include assessments of benefits foregone with the loss of a dam. For example, a failed dam can no longer provide needed fish and wildlife benefits.

The primary emphasis of the Safety Evaluation of Existing Dams program is to perform site evaluations and to identify potential safety deficiencies on Reclamation and other Interior bureaus' dams. The basic objective is to quickly identify dams which pose an increased threat to the public, and to quickly complete the related analyses in order to expedite corrective action decisions and safeguard the public and associated resources.

The Safety of Dams program focuses on evaluating and implementing actions to resolve safety concerns at Reclamation dams. Under this program, Reclamation will complete studies and identify and accomplish needed corrective action on Reclamation dams. The selected course of action relies on assessments of risks and liabilities with environmental and public involvement input to the decision-making process.

National Dam Safety Act

Potential for catastrophic flooding due to dam failures led to passage of the National Dam Inspection Act in 1972, creation of the National Dam Safety Program in 1996, and reauthorization of the program through the Dam Safety Act in 2006. National Dam Safety Program, administered by FEMA requires a periodic engineering analysis of the majority of dams in the country; exceptions include the following:

- Dams under jurisdiction of the Bureau of Reclamation, Tennessee Valley Authority, or International Boundary and Water Commission
- Dams constructed pursuant to licenses issued under the Federal Power Act
- Dams that the Secretary of the Army determines do not pose any threat to human life or property.

The goal of this FEMA-monitored effort is to identify and mitigate the risk of dam failure so as to protect lives and property of the public. The National Dam Safety Program is a partnership among the states, federal agencies, and other stakeholders that encourages individual and community responsibility for dam safety. Under FEMA's leadership, state assistance funds have allowed all participating states to improve their programs through increased inspections, emergency action planning, and purchases of needed equipment. FEMA has also expanded existing and initiated new training programs. Grant assistance from FEMA provides support for improvement of dam safety programs that regulate most of the dams in the United States.

7.2 HAZARD PROFILE

7.2.1 Past Events

The 2013 State of Idaho Hazard Mitigation Plan identifies the following dam failures that have occurred in the state, none of which impacted the Gem County planning area:

- **Ridenbaugh Canal Failure, 1973—**On May 26, 1973, a 30-foot wide break in the Ridenbaugh Canal flooded southeast Boise. Waist deep water flooded 15 homes and the Triangle dairy as water flowed from the breach toward the Boise River.
- **Teton Dam Failure, 1976—**On June 5, 1976, Teton Dam in Fremont County failed (see Figure 7-1). An estimated 80 billion gallons of water were released into the Upper Snake River Valley from the reservoir. Devastating flooding occurred in Wilford, Sugar City, Rexburg, and Roberts; additional significant flooding occurred in Idaho Falls and Blackfoot. At the time of its failure, Teton Dam was brand new, stood 305 feet high, with a crest length of 3,100 feet and a base width of 1,700 feet. The dam was a zoned earth-fill structure with a volume of 10 million cubic yards. The floodwaters threatened American Falls Dam downstream on the Snake River. Dam managers opened the outlet works on American Falls to empty the reservoir and to save American Falls Dam and the string of dams farther down the Snake River.

Figure 7-1. Teton Dam Failure, 1976

- **Kirby Dam Failure, 1991—**In the summer of 1990, the old log crib structure of the Kirby Dam near Atlanta became unsound and was in jeopardy of failing. The possibility of failure was of special concern due to the large quantity of mine runoff and tailings that had collected behind the dam over the years. A strategy to stabilize the dam developed by the IDWR and the U.S. Forest Service was unsuccessful. On May 26, 1991, Kirby Dam collapsed, cutting off electrical power and blocking the primary access bridge to Atlanta. Sediments containing arsenic, mercury and cadmium were released into the Middle Fork of the Boise River.

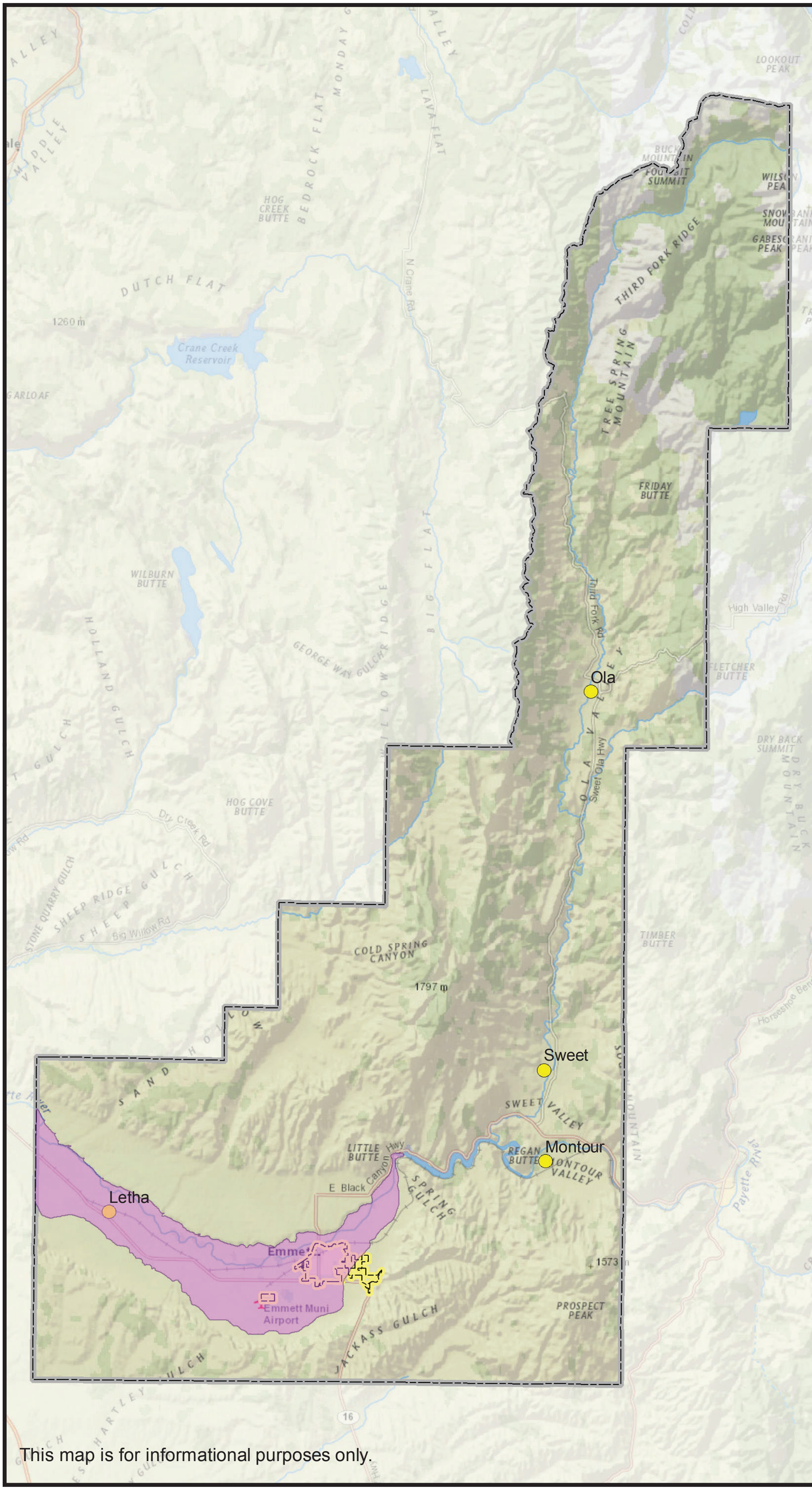
7.2.2 Location

Idaho's Dam Safety Program identifies seven dams in the planning area, as listed in Table 7-1. Three are operated by federal agencies, and the remainder are under the jurisdiction of the state. Dam failure inundation mapping is not available for every dam in the County. The planning team secured inundation mapping from the Bureau of Reclamation for the Black Canyon Dam (Figure 7-2), which is the event most likely to have the largest impact on the planning area. This inundation area is the focus of the risk assessment for the dam/canal failure hazard. It reflects the normal high pool and maximum inundation area associated with dam operations. Figure 7-3 illustrates the Black Canyon Dam inundation area used for the risk assessment.

Table 7-1. Dams in the Planning Area

Name	Nationa l ID #	Tributary	Dam type	Year Built	Dam height (feet)	Hydraulic Height (feet)	Storage Capacity (acre-feet)	Drainage area (sq. mi.)	Hazard Potential
Sage Hen	ID00115	Squaw Creek	Earth	1938	46.4	37.9	5,210	10.5	Significant
Little	ID00248	Bissel Creel	Earth	1963	36.5	33	1,228	1.2	Significant
Gatfield #2	ID00121	Payette River	Earth	1951	20.1	16.6	70	0.3	Significant
Gatfield #1	ID00548	Payette River	Earth	1938	16.2	13.3	14	0.5	Significant
Haw Creek	ID00132	Payette River	Earth	1970	27.1	23.1	100	5.3	Significant
Black Canyon	ID00282	Snake River	Gravity	1924	128.5	111	29,882	2,712	High
Aikman	ID00491	Willow Creek	Earth	1999	76.6	67	2,000	20.3	High

Figure 7-2. Black Canyon Dam



Gem County

Figure 7-3. Dam Inundation - Black Canyon Dam

Dam Failure Inundation Area

Gem County Boundary

City of Emmett

Gem County Planning Communities

Inundation area represents the sudden failure of the Black Canyon Dam as shown on the U.S. Bureau of Reclamation's Black Canyon Dam Inundation Map dated August 2011. Indundation area digitized from the map by Tetra Tech for the 2012 Gem County Hazard Mitigation Plan.

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IDAHO GEM COUNTY

Map Data Sources: National Geographic, Gem County, State of Idaho

7.2.3 Frequency

Dam failure events are infrequent and usually coincide with events that cause them, such as earthquakes, landslides and excessive rainfall and snowmelt. There is a "residual risk" associated with dams. Residual risk is the risk that remains after safeguards have been implemented. For dams, the residual risk is associated with events beyond those that the facility was designed to withstand. However, the probability of any type of dam failure is low in today's regulatory and dam safety oversight environment.

7.2.4 Severity

The Idaho Dam Safety Program classifies dams and reservoirs in a three-tier hazard rating system based on the potential consequences to downstream life and property that would result from a failure of the dam and sudden release of water (Idaho Dam Safety Web Site, 2011):

- **High Hazard**—A high-hazard means that if failure were to occur, the consequences likely would be a direct loss of human life and extensive property damage. All high-hazard dams must be properly designed and at all times responsibly maintained and operated. IDWR considers the inundation of residential structures with floodwater from a dam break to a depth greater than or equal to 2 feet to be a sufficient reason for assigning a high-hazard rating. An up-to-date emergency action plan is a requirement for all owners of high-hazard dams.
- **Significant Hazard**—Significant hazard dams are those whose failure would result in significant damage to developed downstream property and infrastructure or that may result in an indirect loss of human life. An example would be a scenario where a roadway is washed out and people are killed or injured in an automobile crash caused by the damaged pavement.
- **Low Hazard**—Low hazard dams typically are in sparsely populated areas that would be largely unaffected by a dam breach. Although the dam and its works may be totally destroyed, damage to downstream property would be restricted to undeveloped land with minimal impact on infrastructure.

Table 7-2 shows the Corps of Engineers classification system for the hazard potential of dam failures The Idaho and Corps of Engineers hazard rating systems are both based only on the potential consequences of a dam failure; neither system takes into account the probability of such failures.

Table 7-2. Hazard Potential Classification

Hazard Category[a]	Direct Loss of Life[b]	Lifeline Losses[c]	Property Losses[d]	Environmental Losses[e]
Low	None (rural location, no permanent structures for human habitation)	No disruption of services (cosmetic or rapidly repairable damage)	Private agricultural lands, equipment, and isolated buildings	Minimal incremental damage
Significant	Rural location, only transient or day-use facilities	Disruption of essential facilities and access	Major public and private facilities	Major mitigation required
High	Certain (one or more) extensive residential, commercial, or industrial development	Disruption of essential facilities and access	Extensive public and private facilities	Extensive mitigation cost or impossible to mitigate

a. Categories are assigned to overall projects, not individual structures at a project.
b. Loss of life potential based on inundation mapping of area downstream of the project. Analyses of loss of life potential should take into account the population at risk, time of flood wave travel, and warning time.
c. Indirect threats to life caused by the interruption of lifeline services due to project failure or operational disruption; for example, loss of critical medical facilities or access to them.
d. Damage to project facilities and downstream property and indirect impact due to loss of project services, such as impact due to loss of a dam and navigation pool, or impact due to loss of water or power supply.
e. Environmental impact downstream caused by the incremental flood wave produced by the project failure, beyond what would normally be expected for the magnitude flood event under which the failure occurs.

Source: U.S. Army Corps of Engineers, 1995

7.2.5 Warning Time

Warning time for dam failure varies depending on the cause of the failure. In events of extreme precipitation or massive snowmelt, evacuations can be planned with sufficient time. In the event of a structural failure due to earthquake, there may be no warning time. A dam's structural type also affects warning time. Earthen dams do not tend to fail completely or instantaneously. Once a breach is initiated, discharging water erodes the breach until either the reservoir water is depleted or the breach resists further erosion. Concrete gravity dams also tend to have a partial breach as one or more monolith sections are forced apart by escaping water. The time of breach formation ranges from a few minutes to a few hours (U.S. Army Corps of Engineers, 1997).

Gem County and its planning partners have established protocols for flood warning and response to imminent dam failure in the flood warning portion of its adopted emergency operations plan. These protocols are tied to the emergency action plans created by the dam owners.

7.3 SECONDARY HAZARDS

Dam failure can cause severe downstream flooding, depending on the magnitude of the failure. Other potential secondary hazards of dam failure are landslides around the reservoir perimeter, bank erosion on the rivers, and destruction of downstream habitat.

7.4 EXPOSURE

The flood module of Hazus was used for a Level 2 assessment of dam failure. Where possible, the Hazus data was enhanced using GIS data from county, state and federal sources.

7.4.1 Population

All populations in the dam failure inundation zone would be exposed to the risk of a dam failure. The potential for loss of life is affected by the capacity and number of evacuation routes available to populations living in areas of potential inundation. The estimated population living in the mapped inundation area within the planning area is 9,039 or 52.6 percent of the county's population. Table 7-3 summarizes the at-risk population in the planning area by jurisdiction.

Table 7-3. Population at Risk from Dam Failure

	Affected Population	% of Local Population
City of Emmett	5,852	87.1
Letha (General Area)	205	100
Montour (General Area)	0	0.0
Ola (General Area)	0	0.0
Sweet (General Area)	0	0.0
Unincorporated	2,982	32.
Total	**9,039**	**52.6**

7.4.2 Property

Based on assessor parcel data, the Hazus model estimated that there are 7,284 structures in the mapped dam failure inundation area in the planning area. The value of exposed buildings in the planning area was generated using Hazus and is summarized in Table 7-4. This methodology estimated $1.5 billion worth of building-and-contents exposure to dam failure inundation, representing 45.4 percent of the total assessed value of the planning area.

Table 7-4. Value of Property Exposed to Dam Failure

	Number of Buildings Exposed	Value Exposed			% of Total Assessed Value
		Building	Contents	Total	
City of Emmett	2,362	$521,681,601	$371,368,432	$893,050,033	87.5
Letha (General Area)	96	$15,327,092	$12,551,236	$27,878,328	100
Montour (General Area)	0	$0	$0	$0	0.0
Ola (General Area)	0	$0	$0	$0	0.0
Sweet (General Area)	0	$0	$0	$0	0.0
Unincorporated	1,856	$330,217,468	$245,850,256	$576,067,723	28.2
Total	**4,314**	**$867,226,161**	**$629,769,924**	**$1,496,996,084**	**45.4**

7.4.3 Critical Facilities

GIS analysis determined that 69 of the planning area's critical facilities (54 percent) are in the mapped inundation areas, as summarized in Table 7-5 and Table 7-6.

Table 7-5. Critical Facilities in Dam Failure Inundation Areas

Facility Type	Emmett	Letha	Montour	Ola	Sweet	Unincorporated	**Total**
Medical and Health	9	0	0	0	0	0	**9**
Mass Gathering/Government Functions	0	0	0	0	0	0	**0**
Protective Functions	6	0	0	0	0	0	**6**
Schools	5	0	0	0	0	0	**5**
Total	**20**	**0**	**0**	**0**	**0**	**0**	**20**

Table 7-6. Critical Infrastructure in Dam Failure Inundation Areas

Facility Type	Emmett	Letha	Montour	Ola	Sweet	Unincorporated	**Total**
Bridges	10	5	0	0	0	4	**19**
Communication	0	0	0	0	0	0	**0**
Natural Gas	0	0	0	0	0	0	**0**
Power	3	0	0	1	1	0	**5**
Waste Water	12	0	0	0	0	0	**12**
Water	13	0	0	0	0	0	**13**
Total	**38**	**5**	**0**	**1**	**1**	**4**	**49**

7.4.4 Environment

Reservoirs held behind dams affect many ecological aspects of a river. River topography and dynamics depend on a wide range of flows, but rivers below dams often experience long periods of very stable flow conditions or saw-tooth flow patterns caused by releases followed by no releases. Water releases from dams usually contain very little suspended sediment; this can lead to scouring of river beds and banks.

The environment would be exposed to a number of risks in the event of dam failure. The inundation could introduce many foreign elements into local waterways. This could result in destruction of downstream habitat and could have detrimental effects on many species of animals, especially endangered species such as salmon.

7.5 VULNERABILITY

7.5.1 Population

Vulnerable populations are all populations downstream from dam failures that are incapable of escaping the area within the allowable time frame. This population includes the elderly, the young and those who have access and functional needs, who may be unable to get themselves out of the inundation area. The vulnerable population also includes those who would not have adequate warning from a television, cell phone or radio emergency warning system.

7.5.2 Property

Vulnerable properties are those closest to the dam inundation area. These properties would experience the largest, most destructive surge of water. Low-lying areas are also vulnerable since they are where the dam waters would collect. Transportation routes are vulnerable to dam inundation and have the potential to be wiped out, creating isolation issues. This includes all roads, railroads and bridges in the path of the dam inundation. Those that are most vulnerable are those that are already in poor condition and would not be able to withstand a large water surge. Utilities such as overhead power lines, cable and phone lines could also be vulnerable. Loss of these utilities could create additional isolation issues for the inundation areas.

It is estimated that there could be up to $90 million of loss from a dam failure affecting the planning area. This represents 6.02 percent of the total exposure within the inundation area, or 2.7 percent of the total assessed value of the planning area. Table 7-7 summarizes the loss estimates for dam failure.

Table 7-7. Loss Estimates for Dam Failure

	Structures Impacted	Estimated Loss Associated with Dam Failure			% of Total Assessed Value
		Building	Contents	Total	
City of Emmett	607	$8,143,941	$9,825,102	$17,969,043	1.8
Letha (General Area)	96	$4,819,321	$6,172,388	$10,991,709	39.4
Montour (General Area)	0	$0	$0	$0	0.0
Ola (General Area)	0	$0	$0	$0	0.0
Sweet (General Area)	0	$0	$0	$0	0.0
Unincorporated	648	$28,790,901	$32,310,391	$61,101,293	3.0
Total	**1,351**	**$41,754,163**	**$48,307,881**	**$90,062,045**	**2.7**

7.5.3 Critical Facilities and Infrastructure

On average, critical facilities would receive 20.3 percent damage to the structure and 55.7 percent damage to the contents during a dam failure event. The estimated time to restore these facilities to 100 percent of their functionality is 598 days.

7.5.4 Environment

The environment would be vulnerable to a number of risks in the event of dam failure. The inundation could introduce foreign elements into local waterways, resulting in destruction of downstream habitat and detrimental effects on many species of animals, especially endangered species such as coho salmon. The extent of the vulnerability of the environment is the same as the exposure of the environment.

7.6 DEVELOPMENT TRENDS

The value of planning area properties exposed to the dam failure hazard has increased by 39.3 percent ($422 million) since the last hazard mitigation plan update in 2012. This increase in risk exposure can be attributed to the wide extent of the dam failure hazard, a population growth of 6.2 percent in the same period, and property value increases associated with continued economic recovery from the 2008 economic downturn (see Section 4.5.4).

While dam and canal failures are not generally hazards addressed in comprehensive plans, the risk assessment in this plan creates an opportunity for Gem County and its planning partners to consider the inclusion of dam/canal hazards in their comprehensive plans. The municipal planning partners have established comprehensive policies regarding sound land use in identified flood hazard areas. Most of the areas vulnerable to the greatest impacts from dam failure intersect the mapped flood hazard areas. Flood-related policies in the comprehensive plans will help to reduce the risk associated with the dam failure hazard for all future development in the planning area. Future updates to comprehensive plans in the planning area may provide enhancements to floodplain management policies considering the potential impacts from dam or canal failures.

7.7 SCENARIO

An earthquake in the region could lead to liquefaction of soils around a dam. This could occur without warning during any time of the day. A human-caused failure such as a terrorist attack also could trigger a catastrophic failure of a dam.

While the probability of dam failure is very low, the probability of flooding associated with changes to dam operational parameters in response to climate change is higher. Dam designs and operations are developed based on hydrographs from historical records. If these hydrographs experience significant changes over time due to the impacts of climate change, dam design and operations may no longer be valid for the changed condition. This could have significant impacts on dams that provide flood control. Specified release rates and impound thresholds may have to be changed. This would result in increased discharges downstream of these facilities, increasing the probability and severity of flooding.

7.8 ISSUES

Flooding as a result of a dam or canal failure would significantly impact properties and populations in the inundation zones. There is often limited warning time for such failures. These events are frequently associated with other natural hazard events such as earthquakes, landslides or severe weather, which limits their predictability and compounds the hazard. Important issues associated with dam and canal failure hazards include the following:

- The true level of risk associated with canals in the planning area is not known. The lack of regulatory oversight of these facilities results in a void in the level of available information that can be used to assess risk and vulnerability.
- Owners of canals need to be educated on the benefits of participation in hazard mitigation planning. Their lack of participation in these planning efforts creates a gap in the coverage of these plans.
- A buildable-lands analysis that looks at vacant lands and their designated land use would be a valuable tool in helping decision-makers make wise decisions about future development.
- Federally regulated dams have an adequate level of oversight and sophistication in the development of emergency action plans for public notification in the unlikely event of failure. However, the protocol for notification of downstream citizens of imminent failure needs to be tied to local emergency response planning.

- Mapping for federally regulated dams is already required and available; however, mapping for non-federally regulated dams that estimates inundation depths is needed to better assess the risk associated with dam failure from these facilities.
- Most dam failure mapping required at federal levels requires determination of the probable maximum flood. While the probable maximum flood represents a worst-case scenario, it is generally the event with the lowest probability of occurrence. For non-federally regulated dams, mapping of dam failure scenarios that are less extreme than the probable maximum flood but have a higher probability of occurrence can be valuable to emergency managers and community officials downstream of these facilities. This type of mapping can illustrate areas potentially impacted by more frequent events to support emergency response and preparedness.
- The concept of residual risk associated with structural flood control projects should be considered in the design of capital projects and the application of land use regulations.
- Addressing security concerns and the need to inform the public of the risk associated with dam failure is a challenge for public officials.

8. DROUGHT

8.1 GENERAL BACKGROUND

Drought is a normal phase in the climactic cycle of most geographical regions. According to the National Drought Mitigation Center, drought "originates from a deficiency of precipitation over an extended period of time, usually a season or more. This deficiency results in a water shortage for some activity, group, or environmental sector." Drought is the result of a significant decrease in water supply relative to what is "normal" in a given location.

Drought in Idaho is generally associated with a sustained period of low winter snowfall. Such periods result from a temporary change in the large-scale weather patterns in the western U.S. Limited snow packs result in reduced stream flows and groundwater recharge. Idaho's system of reservoirs and natural storage can buffer the effects of minor events over a few years, but a series of dry winters (or an especially pronounced single low snowfall year) will result in a water shortage. Extended periods of above-average temperatures during spring and summer can increase the impacts of low snow packs.

8.1.1 Drought Definitions

There are four generally accepted operational definitions of drought (National Drought Mitigation Center, 2006):

- **Meteorological drought** is an expression of precipitation's departure from normal over some period of time. Meteorological measurements are the first indicators of drought. Definitions are usually region-specific and based on an understanding of regional climatology. A definition of drought developed in one part of the world may not apply to another, given the wide range of meteorological definitions.
- **Agricultural drought** occurs when there is not enough soil moisture to meet the needs of a particular crop at a particular time. Agricultural drought happens after meteorological drought but before hydrological drought. Agriculture is usually the first economic sector to be affected by drought.
- **Hydrological drought** refers to deficiencies in surface and subsurface water supplies. It is measured as stream flow and as lake, reservoir, and groundwater levels. There is a time lag between lack of rain and less water in streams, rivers, lakes and reservoirs, so hydrological measurements are not the earliest indicators of drought. After precipitation has been reduced or deficient over an extended period of time, this shortage is reflected in declining surface and subsurface water levels.
- **Socioeconomic drought** occurs when a physical water shortage starts to affect people, individually and collectively. Most socioeconomic definitions of drought associate it with the supply and demand of an economic good.

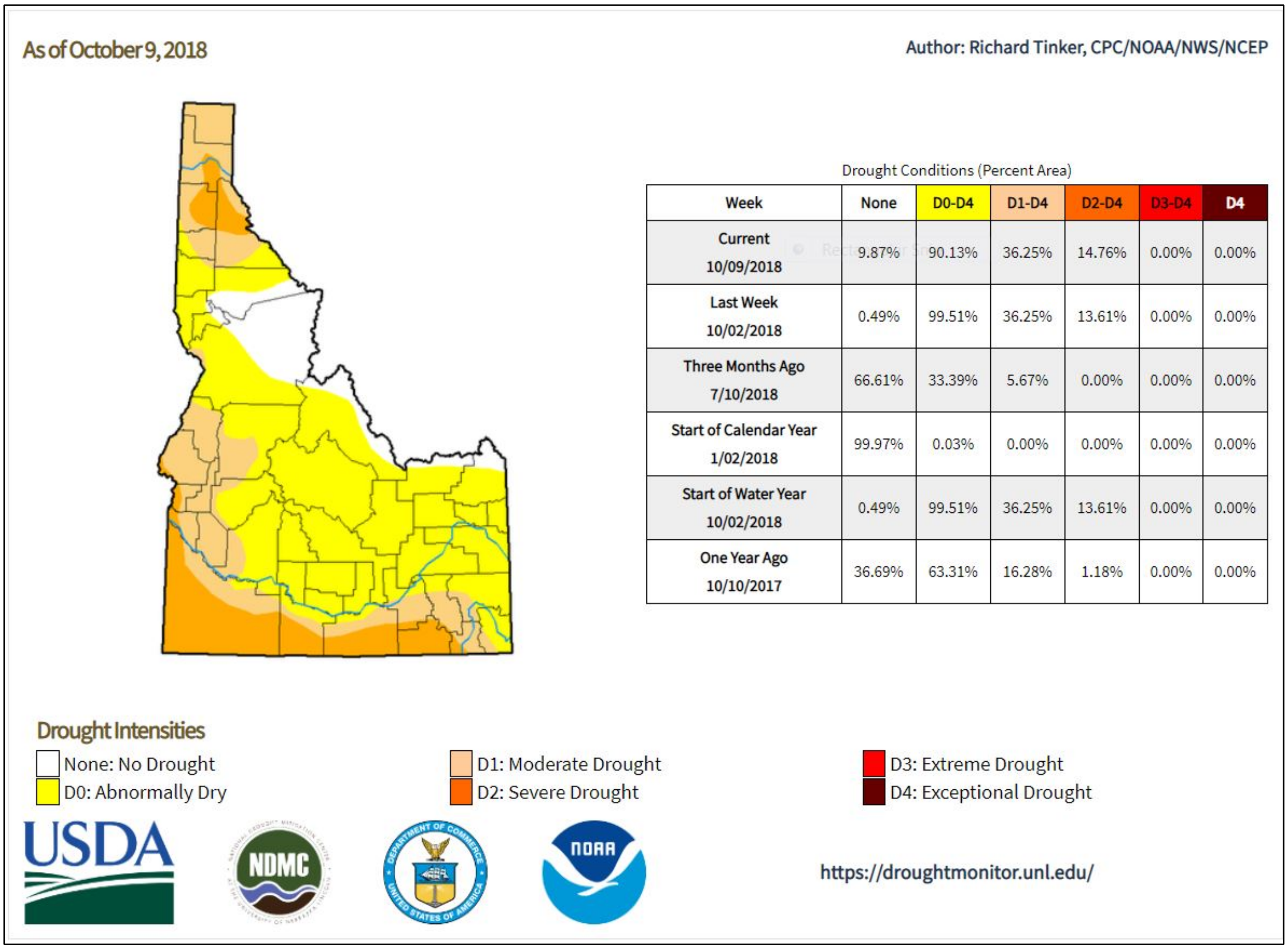
The National Drought Mitigation Center recommends that decision makers adopt an operational definition of drought for their own circumstances, incorporating local data such as grazing conditions or stream flow at a nearby gauge.

8.1.2 Monitoring Drought

Recognizing emerging drought, or knowing whether drought is over, entails understanding what is normal for a given location or season and considering longer time frames. If an area has been in drought for a while, it typically takes more than one or two rains to end it, although one rain may be all that is needed to awaken dormant vegetation or spur crop growth. Recognizing drought before it intensifies can reduce impacts and save money. The U.S. Drought Monitor is a map released weekly that tracks drought conditions with indication of five drought classifications across the U.S.:

- Abnormally dry (D0), indicating areas that may be going into or coming out of drought
- Four levels of current drought:
    - Moderate (D1)
    - Severe (D2)
    - Extreme (D3)
    - Exceptional (D4).

Figure 8-1 shows the drought intensity for the state of Idaho as of October 9, 2009. Figure 8-2 shows the classification of change in drought conditions within the state of Idaho from January 2, 2018 to October 9, 2018.



Week	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current 10/09/2018	9.87%	90.13%	36.25%	14.76%	0.00%	0.00%
Last Week 10/02/2018	0.49%	99.51%	36.25%	13.61%	0.00%	0.00%
Three Months Ago 7/10/2018	66.61%	33.39%	5.67%	0.00%	0.00%	0.00%
Start of Calendar Year 1/02/2018	99.97%	0.03%	0.00%	0.00%	0.00%	0.00%
Start of Water Year 10/02/2018	0.49%	99.51%	36.25%	13.61%	0.00%	0.00%
One Year Ago 10/10/2017	36.69%	63.31%	16.28%	1.18%	0.00%	0.00%

Figure 8-1. Drought Intensity Map for Idaho, as of October 9, 2018

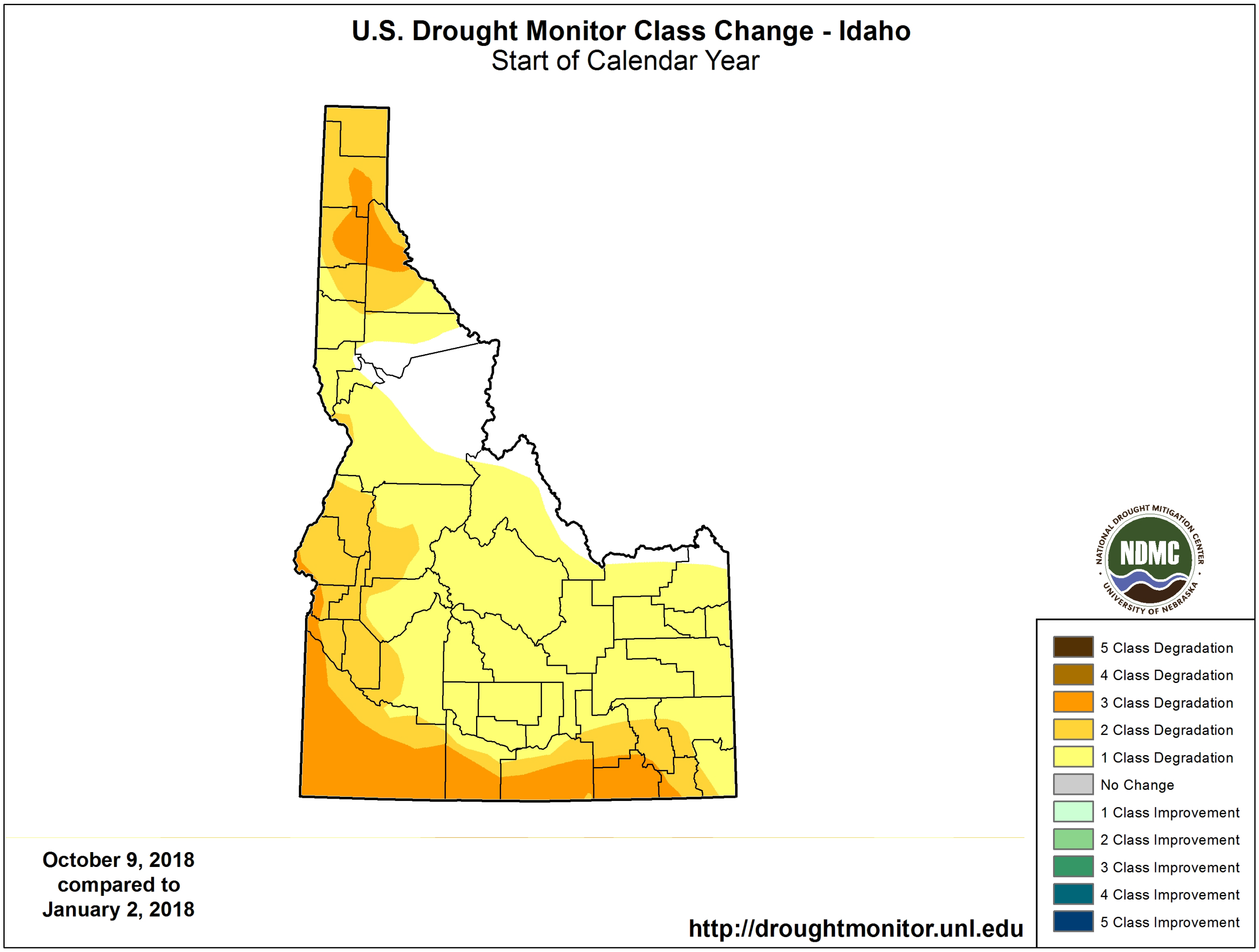


Figure 8-2. Drought Monitor Class Change, January 2, 2018 to October 9, 2018

The U.S. Drought Monitor is produced jointly by the National Drought Mitigation Center, the National Oceanic and Atmospheric Administration, and the U.S. Department of Agriculture. The USDA uses the drought monitor to trigger disaster declarations and eligibility for low-interest loans. The Farm Service Agency uses it to help determine eligibility for its Livestock Forage Program. The Internal Revenue Service uses it for tax deferral on forced livestock sales due to drought. State, local, tribal and basin-level decision makers use it to trigger drought responses, ideally along with other more local drought indicators.

The U.S. Drought Monitor is not a forecast; it is an assessment of current drought conditions, based on how much precipitation fell in the previous week. It is not a statistical model, although it uses many numeric inputs (the Palmer Drought Severity Index, the Standardized Precipitation Index, the Keech-Byram Drought Index, satellite-based assessments of vegetation health, various indicators of soil moisture, and hydrologic data such as the Surface Water Supply Index and snowpack, and other data). It relies on experts to synthesize the best available data from these and other sources and work with local observers to interpret the information. The map incorporates information about how drought is affecting people, via a network of more than 425 observers across the country, including state climatologists, National Weather Service staff, Extension agents, and hydrologists. These local experts report impacts, which helps create the most accurate classifications on the map, particularly in areas with less monitoring capacity, such as Hawaii, Alaska and Puerto Rico.

8.2 HAZARD PROFILE

Droughts originate from a deficiency of precipitation resulting from an unusual weather pattern. If the weather pattern lasts a short time (a few weeks or a couple of months), the drought is considered short-term. If the weather pattern becomes entrenched and the precipitation deficits last for several months or years, the drought is considered to be long-term. It is possible for a region to experience a long-term circulation pattern that produces drought, and to have short-term changes in this long-term pattern that result in short-term wet spells. Likewise, it is possible for a long-term wet circulation pattern to be interrupted by short-term weather spells that result in short-term drought.

8.2.1 Past Events

Drought is never the result of a single cause. It is the result of many causes, often synergistic in nature; these include global weather patterns that produce persistent, upper-level high-pressure systems along the West Coast with warm, dry air resulting in less precipitation. Scientists do not know how to predict drought more than a month in advance for most locations. Predicting drought depends on the ability to forecast precipitation and temperature. Anomalies of precipitation and temperature may last from several months to several decades. How long they last depends on interactions between the atmosphere and the oceans, soil moisture and land surface processes, topography, internal dynamics, and the accumulated influence of weather systems on the global scale.

According to the Idaho State Hazard Mitigation Plan, Gem County has been impacted by drought conditions five times since 1977 (1988, 1991, 1992, 2001 and 2005). The most prolonged drought in Idaho was during the 1930s. For most of the state, this drought lasted for 11 years (1929-41) despite greater than average stream flows in 1932 and 1938.

Of all the statewide drought emergency declarations, only one was also a federal disaster: 1977, the worst single year on record. This event was part of a more widespread water shortage faced by the United States. In Idaho, a lack of winter snowfall resulted in the lowest runoff on record at most gages in the state. Ski resorts were closed for much of the ski season. Irrigation ditches were closed well before the end of the growing season, and crop yields were below normal. Domestic wells in the Big and Little Wood River basins became dry early in April 1977, and many shallow wells in six western Idaho counties became dry in June.

8.2.2 Location

Drought can have the broadest effect of all of Idaho’s hazards, sometimes affecting all regions of the state simultaneously. Idaho’s arid climate predisposes it to periodic drought. Some areas of the state, however, have a greater potential for drought than others. The Idaho Department of Water Resources reports that, based on analyses of historical stream flow records, southeastern Idaho and the upper portions of the Snake River Plain appear to have the highest probability for persistent, severe stream flow deficits.

8.2.3 Severity

Although deaths and injuries are rarely direct results, drought can have significant impacts on the economic, environmental, and social well-being of the state. The severity of a drought depends on the degree of moisture deficiency, the duration, and the size and location of the affected area. The longer the duration of the drought and the larger the area impacted, the more severe the potential impacts. Droughts are not usually associated with direct impacts on people or property, but they can have significant impacts on agriculture, which can impact people indirectly. When measuring the severity of droughts, analysts typically look at economic impacts on a planning area.

A drought directly or indirectly affects all people and all areas of the state. A drought can result in farmers not being able to plant crops or the failure of the planted crops. This results in loss of work for farm workers and those in related food processing jobs. Other water-dependent industries are commonly forced to shut down all or a portion of their facilities, resulting in further layoffs. A drought can spell disaster for recreational companies that use water (e.g., swimming pools, water parks, and river rafting companies) and for landscape and nursery businesses because people will not invest in new plants if water is not available to sustain them. Also, people could pay more for water if utilities increase their rates.

Strains on global water resources are expected to become greater in the future due to the following stresses:

- Growing populations
- Increased competition for available water
- Poor water quality
- Environmental claims
- Uncertain reserved water rights
- Groundwater overdraft
- Aging urban water infrastructure.

8.2.4 Warning Time

Droughts are climatic patterns that occur over long periods of time. Only generalized warning can take place due to the numerous variables that scientists have not pieced together well enough to make accurate and precise predictions.

8.3 SECONDARY HAZARDS

The secondary hazard most commonly associated with drought is wildfire. A prolonged lack of precipitation dries out vegetation, which becomes increasingly susceptible to ignition as the drought continues.

8.4 EXPOSURE

All people, property and environments in the Gem County planning area would be exposed to some degree to the impacts of moderate to extreme drought conditions.

8.5 VULNERABILITY

Drought produces a complex web of impacts that spans many sectors of the economy and reaches well beyond the area experiencing physical drought. This complexity exists because water is integral to the ability to produce goods and provide services. Drought can affect a wide range of economic, environmental and social activities. The vulnerability of an activity to the effects of drought usually depends on its water demand, how the demand is met, and what water supplies are available to meet the demand.

8.5.1 Population

The planning partnership has the ability to minimize any impacts on residents and water consumers in the county should several consecutive dry years occur. This would be accomplished through proactive water conservation and identification and utilization of alternative water supplies. No significant life or health impacts are anticipated as a result of drought within the planning area.

8.5.2 Property

No structures will be directly affected by drought conditions, though some structures may become vulnerable to wildfires, which are more likely following years of drought. Droughts can also have significant impacts on landscapes, which could cause a financial burden to property owners. However, these impacts are not considered critical in planning for impacts from the drought hazard.

8.5.3 Critical Facilities

Critical facilities as defined for this plan will continue to be operational during a drought. The risk to the critical facilities inventory will be largely aesthetic. For example, when water conservation measures are in place, landscaped areas will not be watered and may die. These aesthetic impacts are not considered significant.

8.5.4 Environment

Environmental losses from drought are associated with damage to plants, animals, wildlife habitat, and air and water quality; forest and range fires; degradation of landscape quality; loss of biodiversity; and soil erosion. Some of the effects are short-term and conditions quickly return to normal following the end of the drought. Other environmental effects linger for some time or may even become permanent. Wildlife habitat, for example, may be degraded through the loss of wetlands, lakes and vegetation. However, many species will eventually recover from this temporary condition. The degradation of landscape quality, including increased soil erosion, may lead to a more permanent loss of biological productivity. Although environmental losses are difficult to quantify, growing public awareness and concern for environmental quality has forced public officials to focus greater attention and resources on these effects.

8.5.5 Economic Impact

Economic impact will be largely associated with industries that use water or depend on water for their business. For example, landscaping businesses were affected in the droughts of the past as the demand for service significantly declined because landscaping was not watered. Agricultural industries will be impacted if water usage is restricted for irrigation.

8.6 DEVELOPMENT TRENDS

Because all of the planning area is exposed to the drought hazard, the increase in exposed population and property since the last hazard mitigation plan update is equal to the countywide trends since then: a 2.78-percent increase in population, a 19.6-percent increase in number of general building stock structures, and a 34.2-percent increase in assessed property value (see Section 4.56.3). However, since droughts typically do not kill or injure people or damage structures, there would be no increase in vulnerability to drought from this increased exposure.

Southwestern Idaho has experienced some of the highest growth rates in the nation since the mid- to late 1990s. This growth has forced expansion into areas that are susceptible to the hazards addressed by this plan. Land use in the planning area has been and will continue to be directed by comprehensive plans adopted under Idaho’s land use regulation law.

The principal resource impacted by drought conditions is water. The 2010 Gem Community Comprehensive Plan has established goals and policies to preserve and protect groundwater and surface waters. These goals and policies equip the County to deal with the impacts of future droughts on future development.

8.7 SCENARIO

An extreme multiyear drought more intense than the 1977 drought could impact the region. Combinations of low precipitation and unusually high temperatures could occur over several consecutive years. Intensified by such conditions, extreme wildfires could break out throughout Gem County, increasing the need for water. Surrounding communities, also in drought conditions, could increase their demand for water supplies relied upon by the planning partnership, causing social and political conflicts. If such conditions persisted for several years, the economy of Gem County could experience setbacks, especially in water dependent industries.

8.8 ISSUES

The planning team has identified the following drought-related issues:

- Identification and development of alternative water supplies
- Utilization of groundwater recharge techniques to stabilize the groundwater supply
- The probability of increased drought frequencies and durations due to climate change
- The promotion of active water conservation even during non-drought periods.
- Public education on water conservation.

9. EARTHQUAKE

9.1 GENERAL BACKGROUND

9.1.1 How Earthquakes Happen

An earthquake is the vibration of the earth's surface that follows a release of energy in the earth's crust. This energy can be generated by a sudden dislocation of segments of the crust or by a volcanic eruption. Most destructive quakes are caused by dislocations of the crust. The crust may first bend and then, when the stress exceeds the strength of the rocks, break and snap to a new position. In the process of breaking, vibrations called "seismic waves" are generated. These waves travel outward from the source of the earthquake along the surface and through the earth at varying speeds, depending on the material through which they move.

Faults

Earthquakes tend to occur along faults, which are zones of weakness in the earth's crust. Geologists classify faults by their relative hazards. Active faults, which represent the highest hazard, are those that have ruptured to the ground surface during the Holocene period (about the last 11,000 years). Potentially active faults are those that displaced layers of rock from the Quaternary period (the last 1,800,000 years). Determining if a fault is "active" or "potentially active" depends on geologic evidence, which may not be available for every fault. Although there are probably still some unrecognized active faults, nearly all the movement between the two plates, and therefore the majority of the seismic hazards, are on the well-known active faults.

Faults are more likely to have earthquakes on them if they have more rapid rates of movement, have had recent earthquakes along them, experience greater total displacements, and are aligned so that movement can relieve accumulating tectonic stresses. A direct relationship exists between a fault's length and location and its ability to generate damaging ground motion at a given site. In some areas, smaller, local faults produce lower magnitude quakes, but ground shaking can be strong, and damage can be significant as a result of the fault's proximity to the area. In contrast, large regional faults can generate great magnitudes but, because of their distance and depth, may result in only moderate shaking in the area.

Even if a fault zone has recently experienced an earthquake, there is no guarantee that all the stress has been relieved. Another earthquake could still occur. In fact, relieving stress along one part of a fault may increase stress in another part.

Horizontal Extension

Most earthquakes occur at the boundaries of Earth's tectonic plates. Idaho is not on a plate boundary, but many faults in the state have produced large earthquakes. Tectonic forces in the western part of the North American plate combine with high heat from the underlying mantel to stretch the crust in a northeast-southwest direction. In response to this stretching, the rigid crust breaks and shifts along faults, and the fault movement produces earthquakes. Stretching, or horizontal extension, of the crust produces a type of dipping fault called a "normal" fault (Figure 9-1).

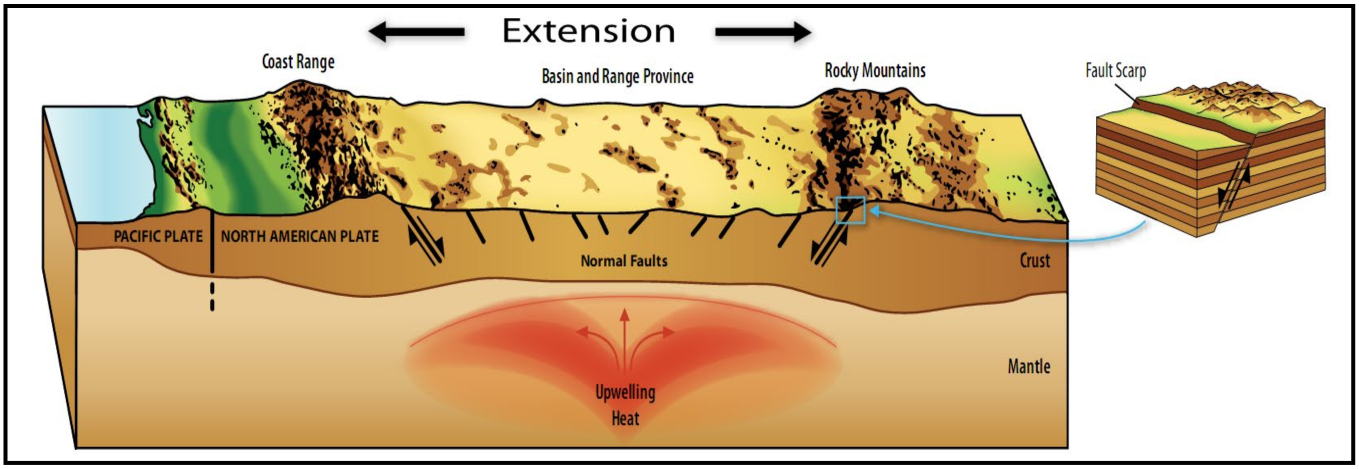


Figure 9-1. Horizontal Extension Creates Normal Faults

The movement of normal faults is characterized by the crust above the fault plane moving down relative to the crust below the fault plane. This up/down movement differs from movement on strike-slip faults like the San Andreas Fault in California, where the crust on one side of the fault slides horizontally past the crust on the other side. Earthquakes in Idaho can be generated by movement on a variety of types of faults, but the faults that are considered capable of generating large surface-faulting earthquakes are mainly normal faults.

9.1.2 Seismic Conditions in Idaho

Most earthquakes in Idaho occur along a belt of seismicity called the Intermountain Seismic Belt that extends from the northwest corner of Montana, along the Idaho-Wyoming border, through Utah, and into southern Nevada. Along most of its length, the Intermountain Seismic Belt straddles the boundary between the Basin and Range Province to the west and more stable parts of North America to the east.

The eastern Snake River Plain formed as the North American continent passed over a “hotspot” of hot rock rising from the earth’s mantle. This plume is called the “Yellowstone hotspot” because it is presently located in the Yellowstone National Park area. Beginning along the Oregon-Nevada-Idaho border about 14.5 million years ago and continuing as recently as 600,000 years ago in Yellowstone, the hotspot melted crustal rocks passing over it, creating huge volumes of magma that erupted to form explosive calderas. These calderas are progressively younger to the northeast because of the continuous movement of the North American continent over the hotspot.

In an area around the eastern Snake River Plain, the Yellowstone hotspot has interacted with the Basin and Range Province to create a pattern of earthquakes and mountain building called the Yellowstone Tectonic Parabola Figure 9-2). A major branch of the Intermountain Seismic Belt extends from the Yellowstone area westward across central Idaho. This zone includes at least eight major active faults and has been the site of numerous earthquake swarms and seismic events, including the two largest historic earthquakes in the Intermountain West.

The pattern of earthquake activity in eastern and central Idaho seems to be related to interactions between the Yellowstone hotspot and the Basin and Range Province to the west. Geologists divide the region into five tectonic belts based on historical earthquake activity and the age and amount of movement on prehistoric faults. Within the Snake River Plain, earthquake activity is very low. Earthquake activity increases and faults become younger away from the Plain, culminating in a band of active faults that forms the tectonic parabola on the east.

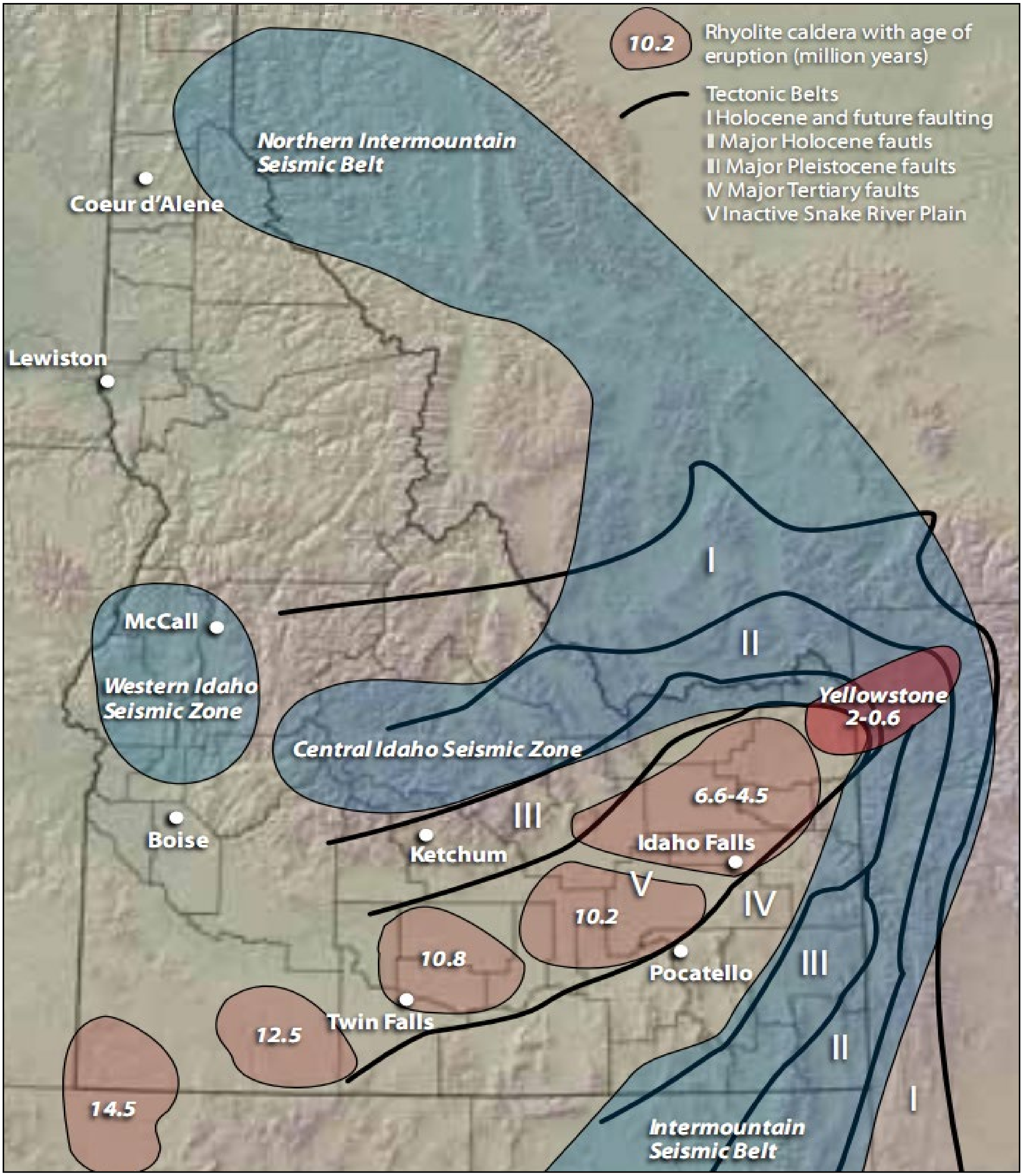


Figure 9-2. Volcanic and Tectonic Features of the Yellowstone-Snake River Plain System

9.1.3 Earthquake Classifications

Earthquakes are typically classified in one of two ways: By the amount of energy released, measured as **magnitude**; or by the impact on people and structures, measured as **intensity**.

Magnitude

Currently the most commonly used magnitude scale is the moment magnitude (M_W) scale, with the follow classifications of magnitude:

- Great—$M_W \geq 8$
- Major—M_W = 7.0 - 7.9
- Strong—M_W = 6.0 - 6.9
- Moderate—M_W = 5.0 - 5.9
- Light—M_W = 4.0 - 4.9
- Minor—M_W = 3.0 - 3.9
- Micro—$M_W < 3$

Estimates of moment magnitude roughly match the local magnitude scale (ML) commonly called the Richter scale. One advantage of the moment magnitude scale is that, unlike other magnitude scales, it does not saturate at the upper end. That is, there is no value beyond which all large earthquakes have about the same magnitude. For this reason, moment magnitude is now the most often used estimate of large earthquake magnitudes.

Intensity

The most commonly used intensity scale is the modified Mercalli scale, defined as follows (USGS, 1989):

- I. Not felt except by a very few under especially favorable conditions
- II. Felt only by a few persons at rest, especially on upper floors of buildings.
- III. Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it is an earthquake. Standing cars may rock slightly. Vibrations similar to the passing of a truck. Duration estimated.
- IV. Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like a heavy truck striking building. Standing cars rocked noticeably.
- V. Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
- VI. Felt by all; many frightened. Some heavy furniture moved; some fallen plaster. Damage slight.
- VII. Damage negligible in well-built buildings; slight in well-built ordinary structures; considerable in poorly built or badly designed structures. Some chimneys broken.
- VIII. Damage slight in specially designed structures; considerable damage in ordinary buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.
- IX. Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
- X. Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.
- XI. Few, if any (masonry) structures remain standing. Bridges destroyed.
- Rails bent greatly.
- XII. Damage total. Lines of sight and level are distorted. Objects thrown into the air.

9.1.4 Ground Motion

Earthquake hazard assessment is also based on expected ground motion. During an earthquake when the ground is shaking, it also experiences acceleration. The peak acceleration is the largest increase in velocity recorded by a particular station during an earthquake. Estimates are developed of the annual probability that certain ground motion accelerations will be exceeded; the annual probabilities can then be summed over a time period of interest.

The most commonly mapped ground motion parameters are horizontal and vertical peak ground accelerations (PGA) for a given soil type. PGA is a measure of how hard the earth shakes, or accelerates, in a given geographic area. Instruments called accelerographs record levels of ground motion due to earthquakes at stations throughout a region. PGA is measured in g (the acceleration due to gravity) or expressed as a percent acceleration force of gravity (%g). These readings are recorded by state and federal agencies that monitor and predict seismic activity.

Maps of PGA values form the basis of seismic zone maps that are included in building codes such as the International Building Code. Building codes that include seismic provisions specify the horizontal force due to lateral acceleration that a building should be able to withstand during an earthquake. PGA values are directly related to these lateral forces that could damage "short period structures" (e.g. single-family dwellings). Longer period response components determine the lateral forces that damage larger structures with longer natural periods (apartment buildings, factories, high-rises, bridges). Table 9-1 lists damage potential and perceived shaking by PGA factors, compared to the Mercalli scale.

Table 9-1. Mercalli Scale and Peak Ground Acceleration Comparison

Modified Mercalli Scale	Perceived Shaking	Potential Structure Damage		Estimated PGA[a] (%g)
		Resistant Buildings	Vulnerable Buildings	
I	Not Felt	None	None	<0.17%
II-III	Weak	None	None	0.17% – 1.4%
IV	Light	None	None	1.4% – 3.9%
V	Moderate	Very Light	Light	3.9% – 9.2%
VI	Strong	Light	Moderate	9.2% – 18%
VII	Very Strong	Moderate	Moderate/Heavy	18% – 34%
VIII	Severe	Moderate/Heavy	Heavy	34% – 65%
IX	Violent	Heavy	Very Heavy	65% – 124%
X – XII	Extreme	Very Heavy	Very Heavy	>124%

a. PGA measured in percent of g, where g is the acceleration of gravity
Sources: USGS, 2008; USGS, 2010

9.1.5 USGS Earthquake Mapping Programs

ShakeMaps

The USGS Earthquake Hazards Program produces maps called ShakeMaps that map ground motion and shaking intensity following significant earthquakes. ShakeMaps focus on the ground shaking caused by the earthquake, rather than on characteristics of the earthquake source, such as magnitude and epicenter. An earthquake has only one magnitude and one epicenter, but it produces a range of ground shaking at sites throughout the region, depending on the distance from the earthquake, the rock and soil conditions at sites, and variations in the propagation of seismic waves from the earthquake due to complexities in the structure of the earth's crust. A ShakeMap shows the extent and variation of ground shaking immediately following significant earthquakes.

Such mapping is derived from peak ground motion amplitudes recorded on seismic sensors, with interpolation where data are lacking based on estimated amplitudes. Color-coded instrumental intensity maps are derived from empirical relations between peak ground motions and Modified Mercalli intensity.

National Seismic Hazard Map

National maps of earthquake shaking hazards have been produced since 1948. They provide information essential to creating and updating seismic design requirements for building codes, insurance rate structures, earthquake loss studies, retrofit priorities and land use planning used in the U.S. Scientists frequently revise these maps to reflect new information and knowledge. Buildings, bridges, highways and utilities built to meet modern seismic design requirements are typically able to withstand earthquakes better, with less damage and disruption. After thorough review of the studies, professional organizations of engineers update the seismic-risk maps and seismic design requirements contained in building codes (Brown et al., 2001).

The USGS updated its National Seismic Hazard Map in 2014, incorporating the best available seismic, geologic, and geodetic information on earthquake rates and associated ground shaking. Figure 9-3 shows the peak ground acceleration with 10 percent probability of exceedance in 50 years. For Gem County, this PGA is in the approximate range of 0.05g to 0.1g.

Source: USGS, 2014a

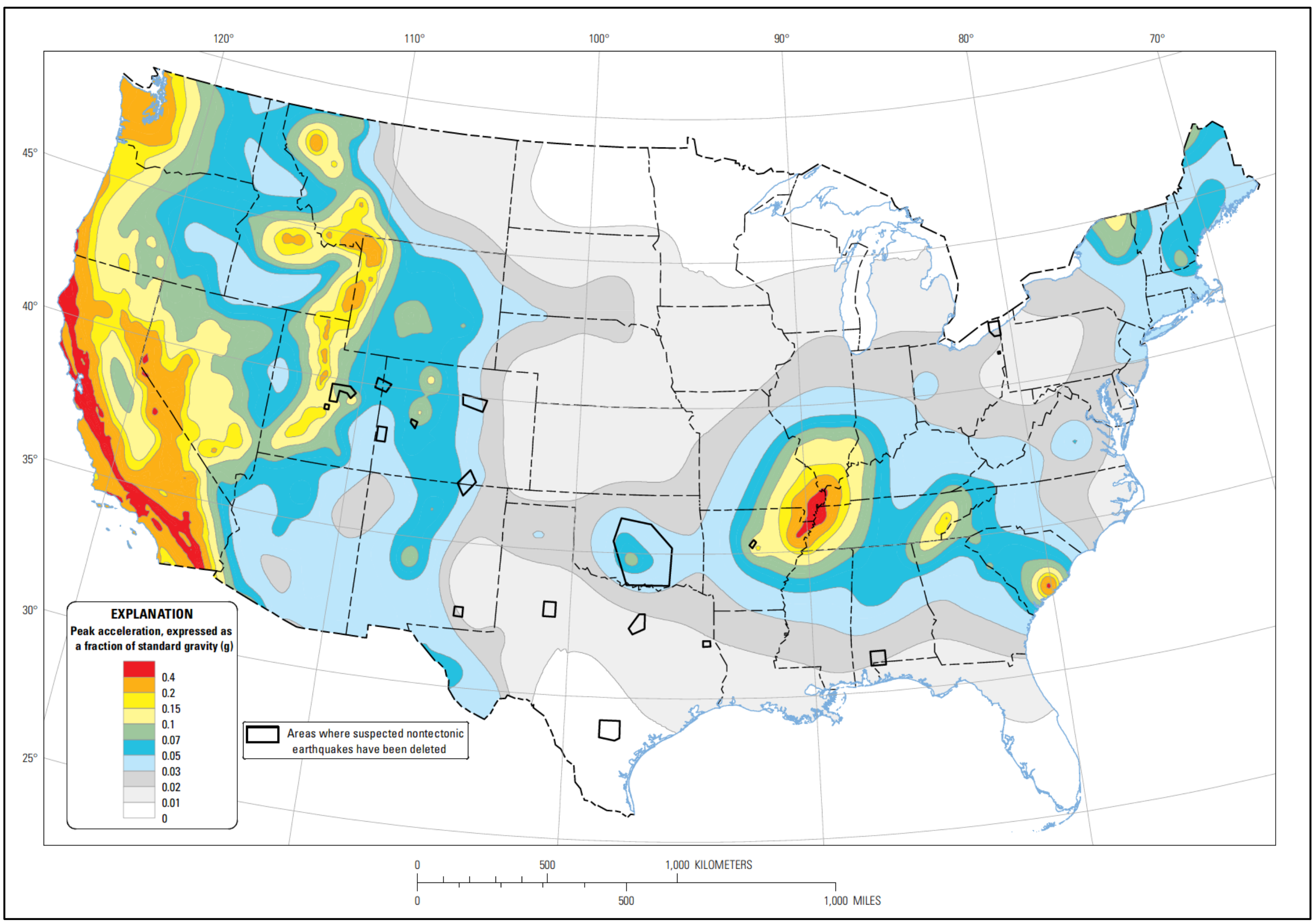


Figure 9-3. Peak Acceleration (%g) with 10% Probability of Exceedance in 50 Years

9.1.6 Effect of Soil Types

The impact of an earthquake on structures and infrastructure is largely a function of ground shaking, distance from the source of the quake, and liquefaction, a secondary effect of an earthquake in which soils lose their shear strength and flow or behave as liquid, thereby damaging structures that derive their support from the soil. When the ground liquefies, sandy or silty materials saturated with water behave like a liquid, causing pipes to leak, roads and airport runways to buckle, and building foundations to be damaged. Liquefaction generally occurs in soft, unconsolidated sedimentary soils.

A program called the National Earthquake Hazard Reduction Program (NEHRP) creates maps based on soil characteristics to help identify locations subject to liquefaction. Table 9-2 summarizes NEHRP soil classifications. NEHRP Soils B and C typically can sustain ground shaking without much effect, dependent on the earthquake magnitude. The areas that are commonly most affected by ground shaking have NEHRP Soils D, E and F. In general, these areas are also most susceptible to liquefaction.

Table 9-2. NEHRP Soil Classification System

NEHRP Soil Type	Description	Mean Shear Velocity to 30 meters (m/s)
A	Hard Rock	1,500
B	Firm to Hard Rock	760-1,500
C	Dense Soil/Soft Rock	360-760
D	Stiff Soil	180-360
E	Soft Clays	< 180
F	Special Study Soils (liquefiable soils, sensitive clays, organic soils, soft clays >36 meters thick)	

Soil liquefaction maps are useful tools to assess potential damage from earthquakes. In general, areas with NEHRP Soils D, E and F are also susceptible to liquefaction. If there is a dry soil crust, excess water will sometimes come to the surface through cracks in the confining layer, bringing liquefied sand with it, creating sand boils. This is a vital need for assessing seismic risk within the planning area. Liquefaction maps are available for the planning area, but they are not countywide. This data tracks with where NEHRP soils data is available.

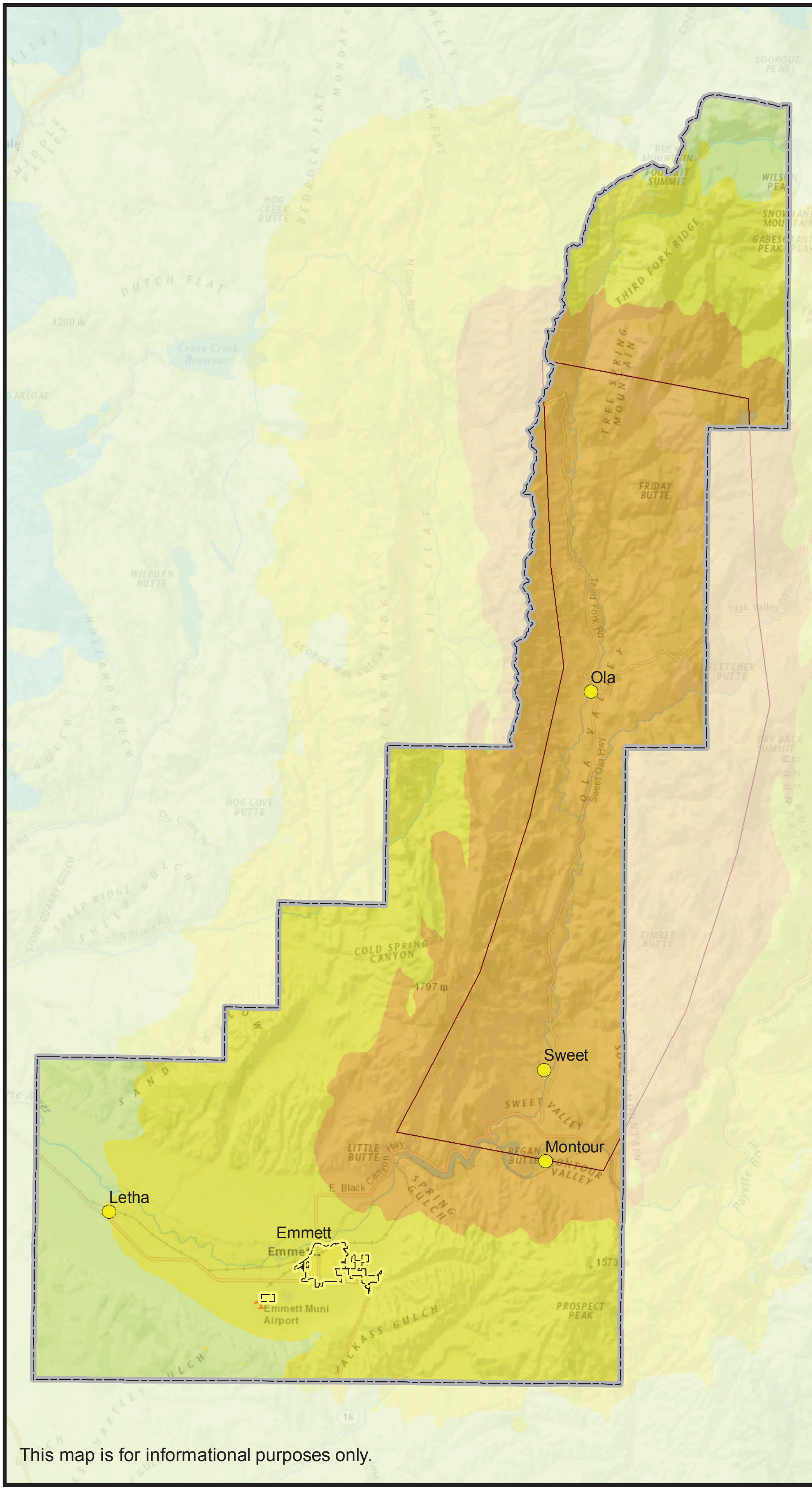
Currently, no NEHRP soil mapping or liquefaction mapping is available for Gem County.

9.2 HAZARD PROFILE

9.2.1 Earthquake Scenarios for Risk Assessment

The USGS Earthquake Hazards Program creates scenarios of potential earthquakes for use in earthquake hazard planning. Hypothetical ShakeMaps of these scenarios depict the expected ground motions and effects of the scenario across the surrounding region. For the Gem County risk assessment, scenario events were modeled using fault data pre-loaded in the Hazus program: a Magnitude-7.1 earthquake on the Squaw Creek fault (see Figure 9-4) and a Magnitude-6.8 earthquake on the Big Flat/Jakes Creek fault (see Figure 9-5).

The USGS also creates probabilistic seismic hazard maps, which show predicted shaking from all possible earthquakes over a 10,000-year period. In a probabilistic map, information from millions of scenario maps are combined to make a forecast for the future. The maps indicate the ground motion at any given point that has a given probability of being exceeded in a given timeframe, such as a 10-percent probability of exceedance in 50 years. The Gem County risk assessment evaluate potential damage based on the 100-year and 500-year probabilistic earthquake for the planning area.



Gem County

Figure 9-4.
Squaw Creek M7.0
Earthquake Scenario

Gem County Boundary

Fault Surface Projection

Peak Ground Acceleration (PGA)

Instrumental Intensity Scale (Potential Damage/Perceived Shaking)

V (Very Light / Moderate)

VI (Light / Strong)

VII (Moderate / Very Strong)

VIII (Moderate / Heavy-Severe)

N
W E
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0 2 4 8
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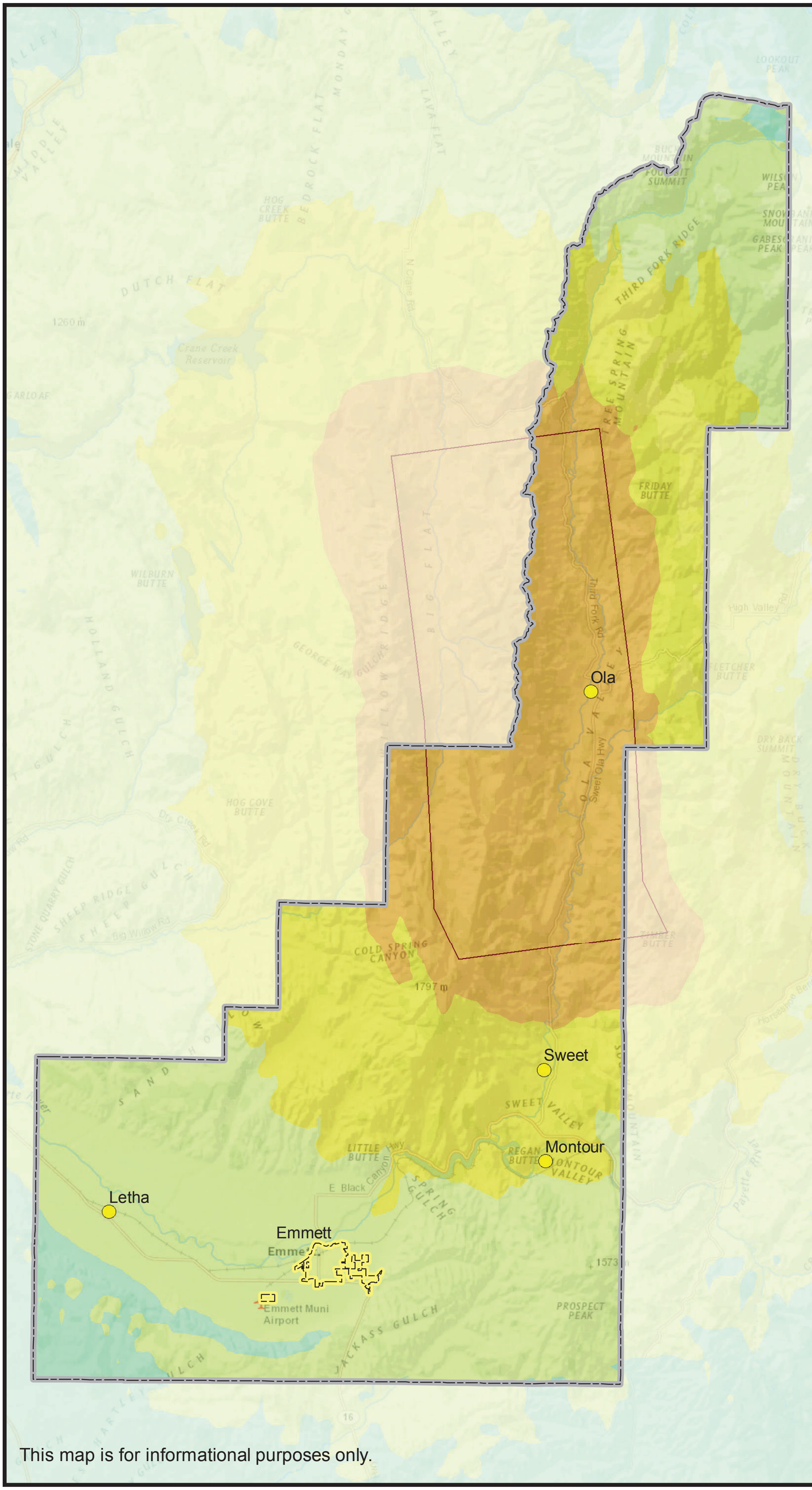
TETRA TECH

IDAHO
GEM COUNTY

Map Data Sources: National Geographic, Gem County, State of Idaho, USGS

Gem County

Figure 9-5.
Big Flat-Jakes Creek M6.8
Earthquake Scenario



Gem County Boundary

Fault Surface Projection

Peak Ground Acceleration (PGA)

Instrumental Intensity Scale (Potential Damage/Perceived Shaking)

V (Very Light / Moderate)

VI (Light / Strong)

VII (Moderate / Very Strong)

VIII (Moderate / Heavy-Severe)

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Map Data Sources: National Geographic, Gem County, State of Idaho, USGS

9.2.2 Past Events

The historical record demonstrates that earthquakes can occur throughout Idaho. Most earthquakes felt by Idaho residents have occurred within the Yellowstone Tectonic Parabola. Notable exceptions include large earthquakes in northern Nevada, eastern Washington and western Montana. The 2008 magnitude-6.0 Wells, Nevada earthquake was felt by thousands in Boise, Twin Falls and Pocatello. Because large earthquakes are felt over hundreds of miles, the locations of some early events not recorded by seismographs are uncertain. Table 9-3 lists past seismic events felt in Idaho.

Table 9-3. Historical Earthquakes Strongly Felt in Idaho

Year	Magnitude	Location	Description
1872	7.4	Lake Chelan, WA	Largest quake in Washington State; felt strongly in north Idaho.
1884	6.0	Bear Lake Valley	The earthquake damaged houses considerably in Paris, Idaho.
1905	6.0	SW Idaho or NE NV	Considerable damage at Shoshone, Idaho.
1913	5.0	Adams County	Broke windows and dishes.
1914	6.0	UT-ID State Line	Intensity VII; between Ogden, Utah and Montpelier, Idaho.
1915	7.75	Pleasant valley, NV	Considerable damage in southwest Idaho a hundred miles from epicenter.
1916	6.0	North of Boise	Boise residents rushed into the street; chimneys fell.
1918	5.0	North Idaho	Widely felt near Sandpoint.
1925	6.6	SW Montana	Felt throughout Idaho.
1926	4.0	North Idaho	Felt at Avery and Wallace.
1927	5.0	Connor Creek	On Idaho-Oregon border west of Cascade.
1934	6.6	Hansel valley, UT	Largest Utah event on record; 20 miles south of Idaho border. 2 fatalities.
1935	6.25	Helena, MT	Extensive damage. Multiple large events throughout Idaho. 4 fatalities.
1936	6.4	Walla Walla, WA	Damaging earthquake; widely felt in Idaho.
1942	5.0	Sandpoint area	Cracked plaster; rock fall onto railroad tracks.
1944	6.0	Central Idaho	Knocked people to ground in Custer County.
1944	4.0	Lewiston area	Widely felt in northern Idaho.
1945	6.0	Central Idaho	Epicenter near Clayton. Slight damage in Idaho City and Weiser.
1947	6.25	Southwest Montana	Epicenter in Gravelly range, 10 miles north of Idaho border.
1947	5.0	Central Idaho	Several large cracks formed in a well-constructed brick building.
1959	7.3	Hebgen Lake, MT	Major event, extensive fault scarps. 20 miles from Idaho. 29 fatalities.
1960	5.0	Soda Springs	Foundations and plaster cracked.
1962	5.7	Cache Valley	Heavily damaged older buildings.
1963	5.0	Clayton	Plaster cracked and windows broken.
1969	5.0	Ketchum	Cement floors cracked.
1975	6.1	NW Yellowstone	Widely felt in Yellowstone region.
1975	6.1	Pocatello Valley	Some 520 homes damaged in Ridgedale and Malad City.
1977	4.5	Cascade	Drywall, foundations cracked. Ceiling beams separated.
1978	4.0	Flathead lake, MT	Felt in northwest Idaho.
1983	6.9	Borah Peak	Major event, 21-mile surface scarp, 11 buildings destroyed, 2 fatalities.
1984	5.0	Challis	Largest of many Borah Peak aftershocks.
1988	4.1	Cooper Pass	Montana border northeast of Mullan.
1994	5.9	Draney Peak	Remote area on Wyoming border. One injury from falling flower pot.
1994	3.5	Avery area	Rare north Idaho event centered near Hoyt Mountain.
1999	5.3	Lima, MT	In Red Rock valley just north of Idaho border.

Year	Magnitude	Location	Description
2001	4.0	Spokane, WA	At least 75 felt events at shallow depth beneath the city.
2005	5.6	Dillon, MT	Felt across Idaho.
2005	4.0	Alpha Swarm	Four Magnitude-4 events, thousands of smaller tremors south of Cascade.
2008	6.0	Wells, NV	Felt strongly throughout southern Idaho.
2015	5.0	Challis, ID	Tremors were felt across Idaho, from McCall to the Treasure Valley.
2017	5.0	Soda Springs, ID	Initial event and aftershocks felt in southeastern Idaho

9.2.3 Location

Gem County is situated near two fault zones: the western Idaho fault system and Owyhee Mountains fault system. The Squaw Creek, Big Flat and Jake Creek faults are active structures near Emmett. The most important of these, the Squaw Creek fault, has geologic evidence for movement as recently as 7,600 years ago. About 57 miles southeast of Boise is the Water Tank fault. Recently discovered in 1997, this fault was active as recently as 3,000 years ago. No other faults in or near Gem County appear to be active.

9.2.4 Frequency

Hundreds of earthquakes have been recorded in Idaho. Table 9-4 summarizes statistics from 2009 to 2018. The 1,754 events in that period represent an average of 195 per year. This average includes the many aftershocks that occur after large earthquakes. For example, there were 22 earthquakes in 1981-82, the year before the 1983 Borah Peak event. Aftershocks raised the yearly total to 87 in 1983-84 and 161 in 1984-85. The number of small earthquakes (magnitude less than 3) is greatly under-reported in Idaho because of limited seismic monitoring.

Table 9-4. Idaho Earthquake Statistics 2009-2018

	Number of events
Magnitude 2-3	1,130
Magnitude 3-4	566
Magnitude 4-5	53
Magnitude 5-6	5
Magnitude 6-7	0
Total	**1,754**

Source: USGS Earthquake Catalog, earthquake.usgs.gov/earthquakes/browse/

Seismologists use a historical distribution of extreme values to estimate the probability of shaking at or above a given intensity over a 50-year year exposure time. Using this methodology, Idaho Geological Survey has estimated the following for Gem County (Boise metropolitan area):

- A >50-percent chance of a midrange intensity event (VI or greater) in any 50-year period.
- A 33-percent chance of intensity VII in any 50-year period.
- An 18-percent chance of intensity VIII in any 50-year period
- A 10-percent chance of intensity IX in any 50-year period

These probabilities are for the maximum shaking on unstable sites within a 300-mile radius of the Boise area. The exact location of unstable sites is not known for the entire planning area due to the lack of countywide NEHRP soils maps.

9.2.5 Severity

The severity of an earthquake can be expressed in terms of intensity or magnitude. Intensity represents the observed effects of ground shaking on people, buildings and natural features. Magnitude is related to the amount of seismic energy released at the hypocenter of an earthquake. It is determined by the amplitude of the earthquake waves recorded on instruments. Whereas intensity varies depending on location with respect to the earthquake epicenter, magnitude is represented by a single, instrumentally determined value for each earthquake event. The severity of an earthquake event can be measured in the following terms:

- How hard did the ground shake?
- How did the ground move? (Horizontally or vertically)
- How stable was the soil?
- What is the fragility of the built environment in the area of impact?

USGS probabilistic mapping is an indication of potential earthquake intensity in an area. Figure 9-6 shows the intensity with a 2-percent exceedance chance in 50 years in the northwestern United States. Southwestern Idaho is a medium-risk area.

The severity of a seismic event is directly correlated to the stability of the ground close to the event's epicenter. The difference in severity between intensity ranges can be immense. A poorly built structure on a stable site is far more likely to survive a large earthquake than a well-built structure on an unstable site. Thorough geotechnical site evaluations should be the rule of thumb for new construction in the planning area until creditable soils mapping becomes available.

Earthquakes can last from a few seconds to over five minutes; they may also occur as a series of tremors over several days. The actual movement of the ground in an earthquake is seldom the direct cause of injury or death. Casualties generally result from falling objects and debris as the shocks shake buildings and other structures. Disruption of communications, electrical power supplies and gas, sewer and water lines should be expected. Earthquakes may trigger fires, dam failures, landslides or releases of hazardous material, compounding their disastrous effects.

9.2.6 Warning Time

There is no current reliable way to predict the day or month that an earthquake will occur at any given location. Research is being done with warning systems that use the low energy waves that precede major earthquakes. These potential warning systems would give approximately 40 seconds notice that a major earthquake is about to occur. The warning time is very short, but it could allow for someone to get under a desk, step away from a hazardous material, or shut down a computer system.

9.3 SECONDARY HAZARDS

Earthquakes can cause large and sometimes disastrous landslides and mudslides. River valleys are vulnerable to slope failure, often as a result of loss of cohesion in clay-rich soils. Soil liquefaction can turn the ground into a pudding-like liquid. Building and road foundations lose load-bearing strength and may sink into what was previously solid ground. Unless properly secured, hazardous materials can be released, causing significant damage to the environment and people. Earthen dams and levees are highly susceptible to seismic events and the impacts of their eventual failures can be considered secondary risks for earthquakes. Additionally, fires can result from gas lines or power lines that are broken or downed during an earthquake. It may be difficult to control a fire, particularly if the water lines feeding fire hydrants are also broken.

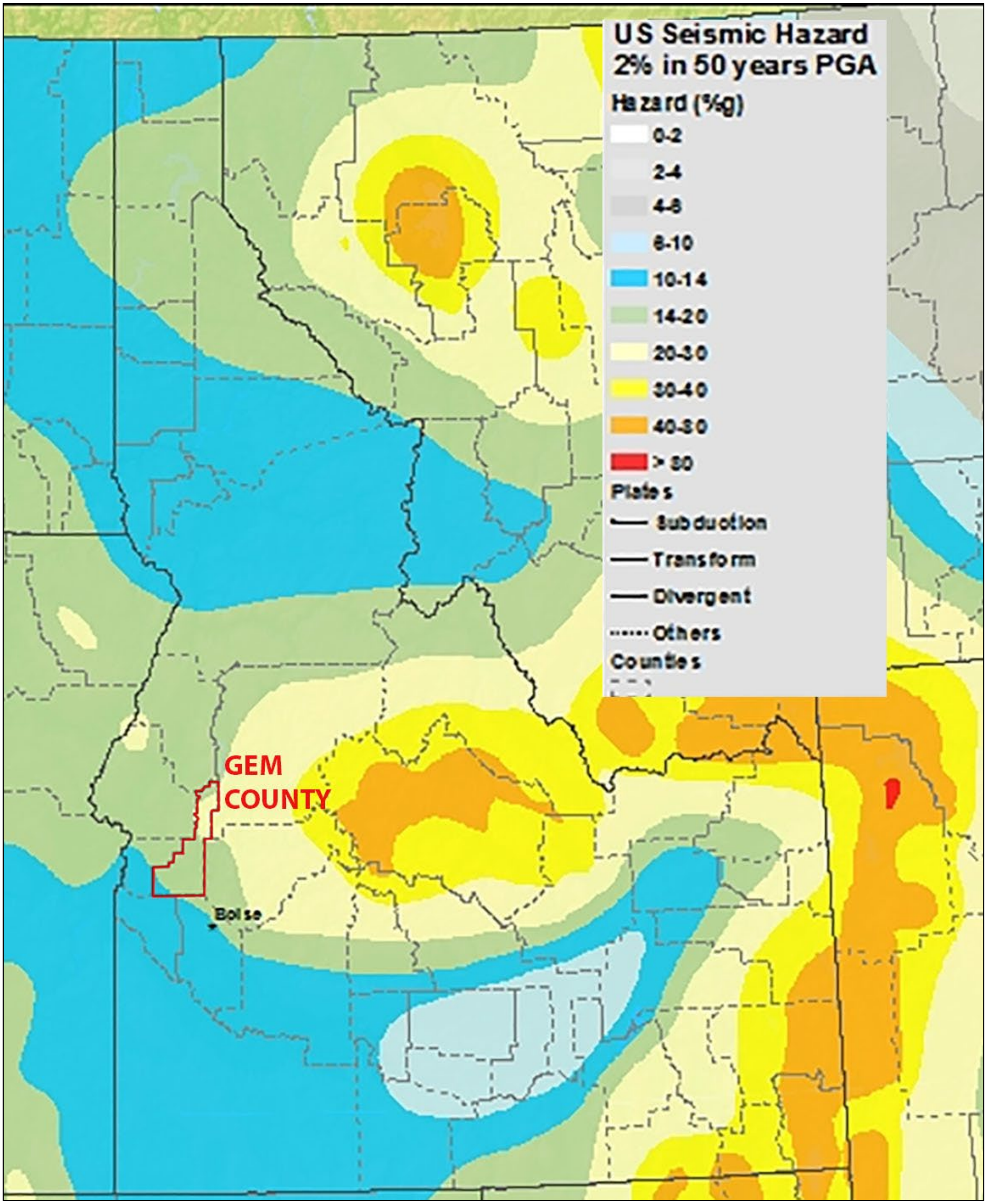


Figure 9-6. PGA with 2-Percent Probability of Exceedance in 50 Years, Northwest Region

9.4 EXPOSURE

9.4.1 Population

The entire population of Gem County is potentially exposed to direct and indirect impacts from earthquakes. The degree of exposure is dependent on many factors, including the age and construction type of the structures people live in, the soil type their homes are constructed on, their proximity to fault location, etc. Whether directly impacted or indirectly impact, the entire population will have to deal with the consequences of earthquakes to some degree. Business interruption could keep people from working, road closures could isolate populations, and loss of functions of utilities could impact populations that suffered no direct damage from an event itself.

9.4.2 Property

The Gem County Assessor estimates that there are 9,058 buildings in the planning area, with a total assessed value of $3.296 billion. Since all structures in the planning area are susceptible to earthquake impacts to varying degrees, this total represents the county-wide property exposure to seismic events. Most of the buildings (87.2 percent) are residential.

9.4.3 Critical Facilities and Infrastructure

All critical facilities in Gem County are exposed to the earthquake hazard. Table 4-3 and Table 4-4 list the number of each type of facility by jurisdiction. Facilities holding hazardous materials are of particular concern because of possible isolation of neighborhoods surrounding them. During an earthquake, structures storing these materials could rupture and leak into the surrounding area or an adjacent waterway, having a disastrous effect on the environment. Transportation corridors can be disrupted during an earthquake, leading to the release of hazardous materials to the surrounding environment.

9.4.4 Environment

Secondary hazards associated with earthquakes will likely have some of the most damaging effects on the environment. Earthquake-induced landslides can significantly impact surrounding habitat. It is also possible for streams to be rerouted after an earthquake. This can change the water quality, possibly damaging habitat and feeding areas. There is a possibility of streams fed by groundwater drying up because of changes in underlying geology.

9.5 VULNERABILITY

Earthquake vulnerability data was generated for the 100-year and 500-year probabilistic earthquakes and the Squaw Creek and Big Flat/Jakes Creek scenario events using a Level 2 Hazus analysis. Once the location and size of a hypothetical earthquake are identified, Hazus estimates the intensity of the ground shaking, the number of buildings damaged, the number of casualties, the damage to transportation systems and utilities, the number of people displaced from their homes, and the estimated cost of repair and clean up.

9.5.1 Population

Vulnerable Groups

Three population groups are particularly vulnerable to earthquake hazards:

- **Linguistically Isolated Populations**——Problems arise when there is an urgent need to inform non-English speaking residents of an earthquake event. They are vulnerable because of difficulties in understanding hazard-related information from predominantly English-speaking media and government agencies.

- **Population Below Poverty Level**—These households may lack the financial resources to improve their homes to prevent or mitigate earthquake damage. Poorer residents are also less likely to have insurance to compensate for losses in earthquakes.
- **Population Over 65 Years Old**—This population group is vulnerable because they are more likely to need special medical attention, which may not be available due to isolation caused by earthquakes. Elderly residents also have more difficulty leaving their homes during earthquake events and could be stranded in dangerous situations.

Estimated Impact on Households and People

Table 9-5 summarizes the estimated impacts of modeled earthquake events on persons and households in the planning area.

Table 9-5. Estimated Earthquake Impact on Person and Households

	Number of Displaced Households	Number of Persons Requiring Short-Term Shelter
100-Year Earthquake	0	0
500-Year Earthquake	0	0
Squaw Creek Scenario	158	116
Big Flat/Jakes Creek	127	132

9.5.2 Property

Building Age

Building codes were not state-mandated in Idaho until 2008. However, the Gem County planning area has had a strong influence of building code enforcement as modern building codes have evolved nationally. Seismic code requirements have principally come from California, due to that state's immense seismic risk. The California State Building Code Council has identified significant milestones in building and seismic code requirements that can be used as a gauge of structural integrity of existing building stock. Using these time periods, the planning team used Hazus to identify the number of structures in the County by date of construction. Table 9-6 shows the results of this analysis.

Table 9-6. Age of Structures in Gem County

Time Period	Number of Current County Structures Built in Period	Significance of Time Frame
Pre-1933	1,137	Before 1933, there were no explicit earthquake requirements in building codes. State law did not require local governments to have building officials or issue building permits.
1933-1940	393	In 1940, the first strong motion recording was made.
1941-1960	786	In 1960, the Structural Engineers Association of California published guidelines on recommended earthquake provisions.
1961-1975	1,092	In 1975, significant improvements were made to lateral force requirements.
1976-1994	1,636	In 1994, the Uniform Building Code was amended to include provisions for seismic safety.
1994—present	**4,014**	Seismic code is currently enforced.
Total	**9,058**	

The analysis of construction dates shows 44.3 percent of the planning area's structures were constructed after the Uniform Building Code was amended in 1994 to include seismic safety provisions; 12.5 percent were built before 1933 when there were no building permits, inspections, or seismic standards.

Loss Potential

Property losses were estimated through the Level 2 Hazus analysis for the 100-year and 500-year probabilistic earthquake events and the Squaw Creek and Big Flat/Jakes Creek scenario events. Table 9-7 shows the results for two types of property loss:

- Structural loss, representing damage to building structures
- Non-structural loss, representing the value of lost contents and inventory, relocation, income loss, rental loss, and wage loss.

Table 9-7. Earthquake Building Loss Potential

	Structural Loss	Non-Structural Loss	Total
100-Year Probabilistic Earthquake			
Emmett	$490,672	$54,519	**$545,191**
Letha (General Area)	$10,621	$1,180	**$11,801**
Montour (General Area)	$25,181	$2,798	**$27,979**
Ola (General Area)	$21,168	$2,352	**$23,520**
Sweet (General Area)	$38,048	$4,228	**$42,276**
Unincorporated County	$571,625	$63,514	**$635,138**
Total Loss	**$1,157,315.00**	**$128,591.00**	**$1,285,905.00**
500-Year Probabilistic Earthquake			
Emmett	$5,545,982	$978,703	**$6,524,685**
Letha (General Area)	$151,354	$26,709	**$178,063**
Montour (General Area)	$392,549	$69,273	**$461,822**
Ola (General Area)	$300,451	$52,844	**$353,295**
Sweet (General Area)	$562,907	$99,336	**$662,243**
Unincorporated County	$9,547,564	$1,684,864	**$11,232,428**
Total Loss	**$16,500,807**	**$2,911,729**	**$19,412,536.00**
Squaw Creek Scenario Earthquake			
Emmett	$56,444,987	$18,814,996	**$75,259,983**
Letha (General Area)	$823,995	$274,665	**$1,098,660**
Montour (General Area)	$6,805,684	$2,268,562	**$9,074,246**
Ola (General Area)	$4,370,263	$1,456,755	**$5,827,018**
Sweet (General Area)	$10,516,704	$3,505,568	**$14,022,272**
Unincorporated County	$78,877,749	$26,292,583	**$105,170,332**
Total Loss	**$157,839,382**	**$52,613,129**	**$210,452,511.00**
Big Flat/Jakes Creek Scenario Earthquake			
Emmett	**$17,370,196**	**$4,074,490**	**$21,444,686**
Letha (General Area)	**$296,908**	**$69,645**	**$366,553**
Montour (General Area)	**$1,792,703**	**$420,510**	**$2,213,213**
Ola (General Area)	**$3,492,961**	**$819,336**	**$4,312,297**
Sweet (General Area)	**$4,432,677**	**$1,039,764**	**$5,472,441**
Total Loss	**$27,385,445.00**	**$6,423,745.00**	**$33,809,190.00**

The total of the two types of losses is also shown in the tables. A summary of the property-related loss results is as follows:

- For a 100-year probabilistic earthquake, the estimated damage potential is $1.285 million, or 0.04 percent of the total assessed value for the planning area.
- For a 500-year probabilistic earthquake, the estimated damage potential is $19.4 million, or 0.6 percent of the total assessed value for the planning area.
- For the Squaw Creek scenario event, the estimated damage potential is $210.5, million or 6.38 percent of the total assessed value for the planning area.
- For the Big Flat/Jakes Creek scenario event, the estimated damage potential is $63.06 million, or 1.91 percent of the total assessed value for the planning area.

The analysis also estimated the amount of earthquake-caused debris, as summarized in Table 9-8.

Table 9-8. Estimated Earthquake-Caused Debris

	Debris to Be Removed
100-Year Earthquake	18 Tons
500-Year Earthquake	2,050 Tons
Squaw Creek Earthquake Scenario	21,990 Tons
Big Flat/Jake Creek Earthquake Scenario	4,780 Tons

9.5.3 Critical Facilities and Infrastructure

Level of Damage

Hazus classifies the vulnerability of critical facilities to earthquake damage in five categories: no damage, slight damage, moderate damage, extensive damage, or complete damage. The model was used to assign a vulnerability category to each critical facility in the planning area except hazmat facilities and “other infrastructure” facilities, for which there are no established damage functions. Table 9-9 and Table 9-10 summarize the results for the Big Flat/Jakes Creek and Squaw Creek scenario events. The 100- and 500-year probabilistic events were also modeled, but neither of these events showed any damage to critical facilities or critical infrastructure.

Table 9-9. Critical Facility Vulnerability to Big Flat/Jakes Creek Fault Scenario Event

	# of Critical Facilities	# of Buildings with Probability ≥ 50% of Achieving Damage Level				
		None	Slight	Moderate	Extensive	Complete
Critical Facilities						
Medical & Health Services	10	10	0	0	0	0
Protective Functions	8	7	1	0	0	0
School Facilities	10	9	1	0	0	0
Mass Gathering/ Government	4	1	2	1	0	0
Critical Infrastructure						
Bridges	53	53	0	0	0	0
Communication	3	1	2	0	0	0
Natural Gas	2	2	0	0	0	0
Power	7	0	7	0	0	0
Wastewater	13	1	12	0	0	0
Water Supply	17	0	14	0	3	0
Total	**127**	**84**	**39**	**1**	**3**	**0**

Table 9-10. Critical Facility Vulnerability to Squaw Creek Fault Scenario

	# of Critical Facilities	# of Buildings with Probability ≥ 50% of Achieving Damage Level				
		None	Slight	Moderate	Extensive	Complete
Critical Facilities						
Medical & Health Services	10	4	6	0	0	0
Protective Functions	8	6	2	0	0	0
School Facilities	10	7	3	0	0	0
Mass Gathering/ Government	4	0	2	2	0	0
Critical Infrastructure						
Bridges	53	45	3	2	3	0
Communication	3	1	0	2	0	0
Natural Gas	2	2	0	0	0	0
Power	7	0	0	1	6	0
Wastewater	13	0	0	6	7	0
Water Supply	17	0	0	1	16	0
Total	**127**	**65**	**16**	**14**	**32**	**0**

Time to Return to Functionality

Hazus estimates the time to restore critical facilities to fully functional use. Results are presented as probability of being functional at specified time increments: 1, 3, 7, 14, 30 and 90 days after the event. For example, Hazus may estimate that a facility has 5 percent chance of being fully functional at Day 3, and a 95-percent chance of being fully functional at Day 90. The analysis of critical facilities was performed for the Big Flat/Jakes Creek Fault and Squaw Creek Fault earthquake events. Table 9-11 and Table 9-12 summarize the results.

Table 9-11. Functionality of Critical Facilities for Big Flat/Jakes Creek Fault Event

Planning Unit	# of Critical Facilities	Probability of Being Fully Functional (%)					
		at Day 1	at Day 3	at Day 7	at Day 14	at Day 30	at Day 90
Medical and Health	10	90.8	91.0	97.8	98.0	99.9	90.8
Protective Functions	8	78.6	79.0	97.8	98.2	99.9	99.9
Schools	10	84.2	84.5	98.7	99.0	99.9	99.9
Mass Gathering/Government	4	34.8	36.8	77.6	77.7	98.5	99.9
Bridges	53	95.0	96.7	97.5	97.6	97.8	98.7
Communications	3	43.5	45.2	78.9	79.0	99.4	99.9
Natural Gas	2	89.5	89.9	97.5	97.5	99.9	99.9
Power	7	39.8	41.2	68.6	68.7	96.5	99.9
Water	13	44.8	46.2	73.1	73.2	97.4	99.9
Waste Water	17	30.6	31.8	55.8	55.8	86.9	98.9
Total/Average	**127**	**63.16**	**81.23**	**84.32**	**84.47**	**97.61**	**98.77**

Table 9-12. Functionality of Critical Facilities for Squaw Creek Fault Event

Planning Unit	# of Critical Facilities	Probability of Being Fully Functional (%)					
		at Day 1	at Day 3	at Day 7	at Day 14	at Day 30	at Day 90
Medical and Health	10	45.1	45.7	73.0	73.7	97.8	98.9
Protective Functions	8	53.6	54.6	93.0	93.9	99.9	99.9
Schools	10	56.0	56.9	94.0	94.8	99.9	99.9
Mass Gathering/Government	4	7.0	8.8	43.5	43.6	91.0	99.4
Bridges	53	84.5	87.6	89.5	89.9	90.3	93.7
Communications	3	26.4	28.0	59.1	59.2	97.1	99.9
Natural Gas	2	61.5	62.6	85.0	85.1	99.1	99.9
Power	7	0.7	1.0	5.1	5.1	40.6	91.9
Water	13	0.4	0.6	3.6	3.6	34.6	87.7
Waste Water	17	1.0	1.2	6.4	6.4	45.9	94.5
Total/Average	**127**	**33.62**	**34.64**	**55.22**	**55.53**	**79.62**	**96.57**

9.5.4 Environment

The environment vulnerable to earthquake hazard is the same as the environment exposed to the hazard.

9.6 DEVELOPMENT TRENDS

Because all of the planning area is exposed to the earthquake hazard, the increase in exposed population and property since the last hazard mitigation plan update is equal to the countywide trends since then: a 2.78-percent increase in population, a 19.6-percent increase in number of general building stock structures, and a 34.2-percent increase in assessed property value (see Section 4.5.4). However, Hazus modeling shows a 4.56-percent decrease in vulnerability for the worst-case-scenario event (Squaw Creek Fault Scenario) since 2011, measured as potential structure damage. The change is attributable to improved analysis techniques, and utilization of USGS shake maps that include soil classifications that are not available to support probabilistic modeling. These data sources allow for more accurate modeling of damage based on differences in earthquake intensity across the planning area. The new results should be considered the baseline for all future analyses seeking to gage changes in earthquake risk for the planning area.

The entire planning area is under the influence of the International Building Code as mandated by the State of Idaho since 2008. This is a significant capability for the planning area in the management of seismic risk in future development. Strict adherence and enforcement of the seismic provisions of the IBC will play a significant role in the management of seismic risk for new development in the future.

Land use in the planning area has been and will continue to be directed by comprehensive plans adopted under Idaho’s land use regulation law. The planning area lacks adequate seismic information to guide land use decisions as they pertain to seismic risk. Information such as NEHRP soils maps and liquefaction maps have not been produced by federal agencies. The Idaho Geologic Survey has taken the lead in trying to create this information. As information becomes available, Gem County and its planning partners will be better equipped to deal with future development as it expands into areas with potential seismic risk.

9.7 SCENARIO

Any seismic activity of 6.0 or greater on faults within the planning area would have significant impacts throughout the county. Potential warning systems could give approximately 40 seconds notice that a major earthquake is about to occur. This would not provide adequate time for preparation. Earthquakes of this magnitude or higher would lead to massive structural failure of property on NEHRP C, D, E, and F soils. Levees and revetments built on these poor soils would likely fail, representing a loss of critical infrastructure. These events could cause secondary hazards, including landslides and mudslides that would further damage structures. River valley hydraulic-fill sediment areas are also vulnerable to slope failure, often as a result of loss of cohesion in clay-rich soils. Soil liquefaction would occur in water-saturated sands, silts or gravelly soils.

Due to the proximity of the Squaw Creek and Big Flat/Jakes Creek faults within the planning area, any seismic activity on this system could impact the planning are. The scenario event on this fault mapped by USGS, could cause significant damage within the planning area as estimated by the Hazus models.

9.8 ISSUES

Important issues associated with an earthquake include but are not limited to the following:

- NEHRP soils mapping is needed to support better seismic risk assessment.
- Liquefaction mapping is needed to support better seismic risk assessment.
- Approximately 37 percent of the planning area’s building stock was built prior to 1975, when seismic provisions became uniformly applied through building codes.
- More information is needed on the fragility of the general building stock and identified critical facilities in the planning area to enhance future risk assessments for earthquake.
- Critical facility owners should be encouraged to create or enhance continuity of operations plans using the information on risk and vulnerability contained in this plan.
- Geotechnical standards should be established that take into account the probable impacts from earthquakes in the design and construction of new or enhanced facilities.
- The County has over 270 miles of canals that were not constructed to engineering standards. The structural integrity of these facilities as it pertains to seismic impacts is not known.
- Earthquakes could trigger other natural hazard events such as dam failures and landslides, which could severely impact the county.
- Dam failure warning and evacuation plans and procedures should be updated to reflect the earthquake risk associated with a large number of earthen dams in the planning area.
- Unreinforced masonry structures in the planning area are particularly vulnerable to the earthquake hazard.
- It is difficult to develop seismic retrofit projects that are cost-effective for FEMA hazard mitigation grant programs, due to the lack of state and federal risk data to support FEMA benefit-cost methodologies.

10. FLOOD

10.1 GENERAL BACKGROUND

A floodplain is the area adjacent to a river, creek or lake that becomes inundated during a flood. Floodplains may be broad, as when a river crosses an extensive flat landscape, or narrow, as when a river is confined in a canyon.

When floodwaters recede after a flood event, they leave behind layers of rock and mud. These gradually build up to create a new floor of the floodplain. Floodplains generally contain unconsolidated sediments (accumulations of sand, gravel, loam, silt, and/or clay), often extending below the bed of the stream. These sediments provide a natural filtering system, with water percolating back into the ground and replenishing groundwater. These are often important aquifers, the water drawn from them being filtered compared to the water in the stream. Fertile, flat reclaimed floodplain lands are commonly used for agriculture, commerce and residential development.

Connections between a river and its floodplain are most apparent during and after major flood events. These areas form a complex physical and biological system that not only supports a variety of natural resources but also provides natural flood and erosion control. When a river is separated from its floodplain with levees and other flood control facilities, natural, built-in benefits can be lost, altered, or significantly reduced.

10.1.1 Measuring Floods and Floodplains

The frequency and severity of flooding are measured using a discharge probability, which is the probability that a certain river discharge (flow) will be equaled or exceeded in a given year. Flood studies use historical records to determine the probability of occurrence for different discharge levels. The flood frequency equals 100 divided by the discharge probability. For example, the 100-year discharge has a 1-percent chance of being equaled or exceeded in any given year. The “annual flood” is the greatest flood event expected to occur in a typical year. These measurements reflect statistical averages only; it is possible for two or more floods with a 100-year or higher recurrence interval to occur in a short time period. The same flood can have different recurrence intervals at different points on a river.

The extent of flooding associated with a 1-percent annual probability of occurrence (the base flood or 100-year flood) is used as the regulatory boundary by many agencies. Also referred to as the special flood hazard area (SFHA), this boundary is a convenient tool for assessing vulnerability and risk in flood-prone communities. Many communities have maps that show the extent and likely depth of flooding for the base flood. Corresponding water-surface elevations describe the elevation of water that will result from a given discharge level, which is one of the most important factors used in estimating flood damage.

10.1.2 Floodplain Ecosystems

Floodplains can support ecosystems that are rich in plant and animal species. A floodplain can contain 100 or even 1,000 times as many species as a river. Wetting of the floodplain soil releases an immediate surge of nutrients: those left over from the last flood, and those that result from the rapid decomposition of organic matter that has accumulated since then. Microscopic organisms thrive, and larger species enter a rapid breeding cycle.

Opportunistic feeders (particularly birds) move in to take advantage. The production of nutrients peaks and falls away quickly, but the surge of new growth endures for some time. This makes floodplains valuable for agriculture. Species growing in floodplains are markedly different from those that grow outside floodplains. For instance, riparian trees (trees that grow in floodplains) tend to be very tolerant of root disturbance and very quick-growing compared to non-riparian trees.

10.1.3 Effects of Human Activities

Because they border water bodies, floodplains have historically been popular sites to establish settlements. Human activities tend to concentrate in floodplains for a number of reasons: water is readily available; land is fertile and suitable for farming; transportation by water is easily accessible; and land is flatter and easier to develop. But human activity in floodplains frequently interferes with the natural function of floodplains. It can affect the distribution and timing of drainage, thereby increasing flood problems. Human development can create local flooding problems by altering or confining drainage channels. This increases flood potential in two ways: it reduces the stream's capacity to contain flows, and it increases flow rates or velocities downstream during all stages of a flood event. Human activities can interface effectively with a floodplain as long as steps are taken to mitigate the activities' adverse impacts on floodplain functions.

10.1.4 Federal Flood Programs

National Flood Insurance Program

The NFIP makes federally backed flood insurance available to homeowners, renters and business owners in participating communities. For most participating communities, FEMA has prepared a detailed Flood Insurance Study. The study presents water surface elevations for floods of various magnitudes, including the 1-percent annual chance flood and the 0.2-percent annual chance flood (the 500-year flood). Base flood elevations and the boundaries of the 100- and 500-year floodplains are shown on Flood Insurance Rate Maps (FIRMs), which are the principal tool for identifying the extent and location of the flood hazard. FIRMs are the most detailed and consistent data source available, and for many communities they represent the minimum area of oversight under their floodplain management program.

Participants in the NFIP must follow NFIP criteria for regulating development in floodplains. Before issuing a permit to build in a floodplain, participating jurisdictions must ensure that three criteria are met:

- New buildings and those undergoing substantial improvements must, at a minimum, be elevated to protect against damage by the 1-percent annual chance flood.
- New floodplain development must not aggravate existing flood problems or increase damage to other properties.
- New floodplain development must exercise a reasonable and prudent effort to reduce its adverse impacts on threatened salmonid species.

Gem County entered the NFIP on April 17, 1978, which is also the effective date for the current countywide FIRM. Structures permitted or built in the County before then are called "pre-FIRM" structures, and structures built afterwards are called "post-FIRM." The insurance rate is different for the two types of structures. The City of Emmett entered the NFIP in 1976.

The County and the City are currently in good standing with the provisions of the NFIP. Compliance is monitored by FEMA regional staff and by the Idaho Department of Water Resources under a contract with FEMA. Maintaining compliance under the NFIP is an important component of flood risk reduction. The County and the City have identified initiatives to maintain their compliance and good standing.

The Community Rating System

The CRS is a voluntary program within the NFIP that encourages floodplain management activities that exceed the minimum NFIP requirements. Flood insurance premiums are discounted to reflect the reduced flood risk resulting from community actions meeting the three goals of the CRS: reduce flood losses; facilitate accurate insurance rating; and promote awareness of flood insurance. CRS activities can help to save lives and reduce property damage.

For participating communities, flood insurance premiums are discounted in increments of 5 percent based on CRS classification: Class 1 communities receive a 45-percent discount, and Class 9 communities receive a 5-percent discount. The classifications are based on 18 activities in the following categories: public information; mapping and regulations; flood damage reduction; and flood preparedness.

Figure 10-1 shows the nationwide number of CRS communities by class as of May 1, 2016, when there were 1,138 communities receiving flood insurance premium discounts under the CRS program. Communities participating in the CRS represent a significant portion of the nation's flood risk; over 66 percent of the NFIP's policy base is located in these communities. Communities receiving premium discounts through the CRS range from small to large and represent a broad mixture of flood risks.

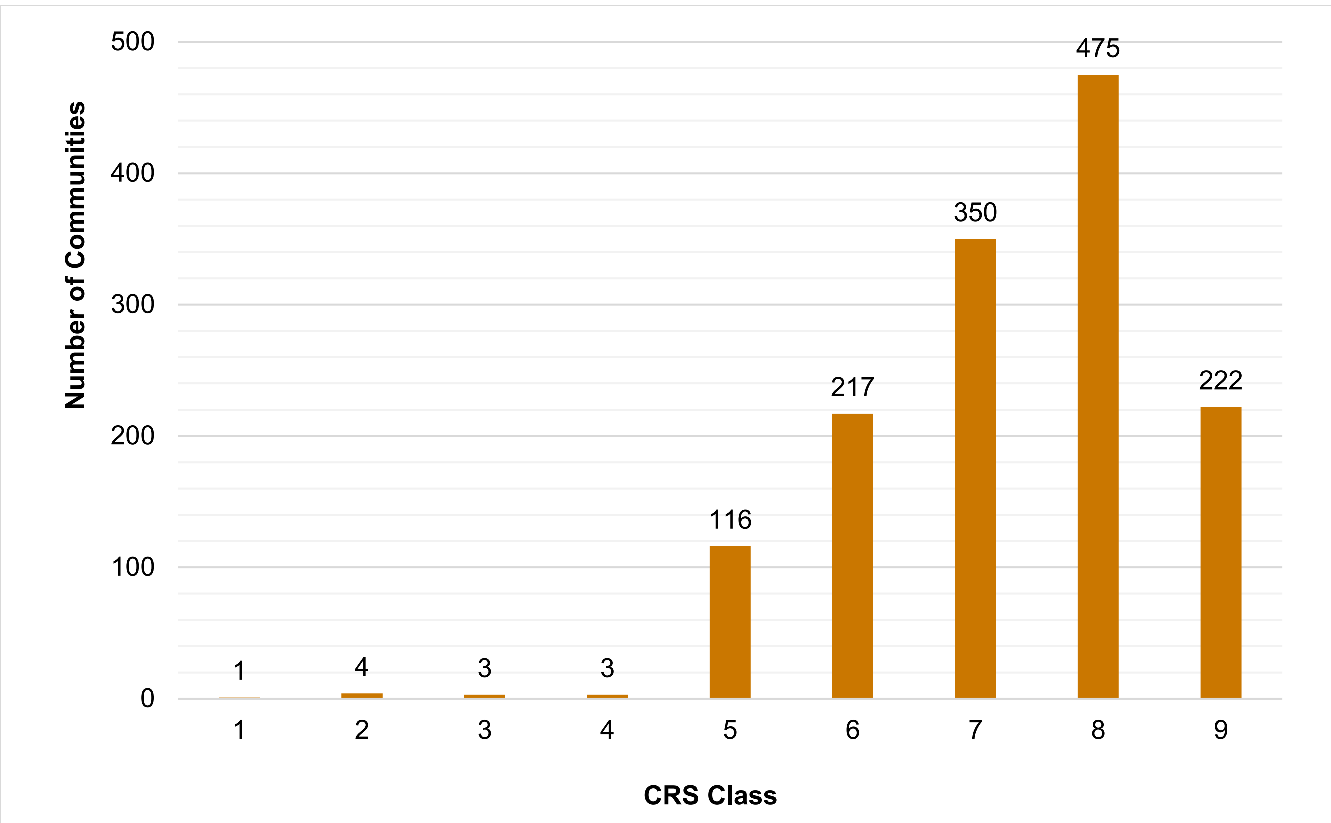


Figure 10-1. CRS Communities by Class Nationwide as of May 1, 2016

Gem County began participating in the CRS program on May 1, 2008 and is currently rated Class 9, allowing a 5-percent discount on flood insurance. The total annual savings on flood insurance premiums in the planning area is $647.85. Many of the mitigation actions identified in Volume 2 of this plan are creditable activities under the CRS program. Therefore, successful implementation of this plan offers the potential for these communities to enhance their CRS classifications and for currently non-participating communities to join the program.

10.2 HAZARD PROFILE

Flooding in the planning area is typically caused by high-intensity, short-duration (1 to 3 hours) storms concentrated on a stream reach with already saturated soil. Two types of flooding are typical:

- Flash floods that occur suddenly after a brief but intense downpour. They move rapidly, end suddenly, and can occur in areas not generally associated with flooding (such as subdivisions not adjacent to a water body and areas serviced by underground drainage systems). Although the duration of these events is usually brief, the damage they cause can be severe. Flash floods cannot be predicted accurately and happen whenever there are heavy storms.
- Riverine floods described in terms of their extent (including the horizontal area affected and the vertical depth of floodwater) and the related probability of occurrence (expressed as the percentage chance that a flood of a specific extent will occur in any given year).

Flooding is predominantly confined within traditional riverine valleys. Locally, some natural or manmade levees separate channels from floodplains and cause independent overland flow paths. Occasionally, railroad, highway or canal embankments form barriers, resulting in ponding or diversion of flows. Some localized flooding not associated with stream overflow can occur where there are no drainage facilities to control flows or when runoff volumes exceed the design capacity of drainage facilities.

10.2.1 Principal Flooding Sources

The flat and mountainous terrain of Gem County creates a flood prone environment. Riverine flooding occurs along the Payette River and its tributaries. Rain-on-snow events occur at almost all elevations across the county. These events often contain enough moisture to cause flooding on the Payette River and most of its major tributaries in the county.

Payette River Basin

The Payette River drains an environmentally diverse 3,320-square-mile watershed. The watershed includes about 4,000 miles of streams. Drainage in the watershed flows primarily from east to west. Its headwaters originate in the Sawtooth and Salmon River Mountains at elevations over 10,000 feet.

Three major branches conveying water from the mountainous headwaters—the North, Middle and South forks—converge near the southwestern edge of the Idaho batholith. The cumulative stream length to the head of the North Fork Payette River is 180 and the cumulative length to the head of the South Fork is 163 miles. The confluence of the South and Middle forks in Garden Valley 81 miles upstream from the mouth forms the Payette River proper. The combined Payette River flows into an agricultural valley and empties into the Snake River. The Payette River near Emmett follows the northern Emmett city limit.

The Payette River channel through Montour and Emmett Valleys is wide but rather shallow. Below Emmett, it is braided or multi-channeled along much of its course to the county line. Bank erosion and sandbar formation take place during floods most years. The average floodplain width is 0.7 miles. The River has a slope of approximately 7 feet per mile in both Montour and Emmett Valleys.

The natural channel bank-full capacity of the Payette in the Montour and Emmett Valleys is generally about 12,000 cubic feet per second (cfs). At higher river stages, the banks overflow and adjacent lands on the floodplain are covered by flood waters 2 to 5 feet deep. A flow of 16,000 cfs is considered to be flood stage; flows of 18,000 cfs or larger are considered to be major floods.

The pattern of flooding in the Emmett Valley is complicated by local variation in floodplain topography and the numerous canals and sloughs used to convey irrigation water for agricultural use.

Tributaries

Payette River tributary drainages with flood potential in the planning area include Squaw Creek, Big Willow Creek, Little Willow Creek and Anderson Creek. FEMA has delineated portions of Squaw Creek as Special Flood Hazard Area (SFHA). Two conditions may cause floods in these drainages:

- A combination of a rainstorm with snowmelt on frozen ground in the winter and early spring; winter storm floods generally occur from January through March.
- High-intensity thunderstorms, which may occur at any time of the year, although they usually happen from March through September.; sandy soil and sparse vegetation combine to foster flash floods when intense thunderstorms hit the area.

Floods from thunderstorms do not occur as frequently as those from general rain and snowmelt but are far more severe. The possibility for injury and death from flash floods is heightened because they are so uncommon that people do not recognize the potential danger.

The onset of flooding in these drainages can be slow or fast. This variability depends on the cause of flooding and other factors such as rainfall intensity, the areas receiving the rain, temperature, and the condition of the soil. Floods that occur quickly are usually caused by thunderstorms, while floods that occur more slowly are often the result of moderate but prolonged rainfall, snowmelt or both. In the case of intense rainfall immediately over developed areas, the onset of flooding may occur in a matter of minutes.

Canals

There is an extensive network of over 270 miles of canals in Gem County. The canals draw water from the Payette River, generally from about the first day of April to the last day of October. This is the time of year when canals present the greatest flood danger. The canals pose several flood threats posed:

- A break or breach in the canal has the potential for significant flooding, especially if the canal is elevated or located on a hillside.
- An obstruction in a canal can cause water to overtop the canal bank.
- Vandalism, piping of water, gopher holes, etc. are potential risks.

Urban Flooding

Like many areas in the western U.S., Gem County has experienced change due to urban development in once rural areas, especially in and around Emmett. Drainage facilities in recently urbanized areas are a series of pipes, roadside ditches and channels. Urban flooding occurs when these conveyance systems lack the capacity to convey rainfall runoff to nearby creeks, streams and rivers. As drainage facilities are overwhelmed, roads and transportation corridors become conveyance facilities. The key factors that contribute to urban flooding are rainfall intensity and rainfall duration. Topography, soil conditions, urbanization and groundcover also play an important role.

Urban floods can be a great disturbance of daily life in urban areas. Roads can be blocked, and people may be unable to go to work or school. Economic damage can be high but the number of casualties is usually limited, because of the nature of the flood. On flat terrain, the flow speed is low and people can still drive through it. The water rises relatively slowly and usually does not reach life endangering depths.

10.2.2 Past Events

Table 10-1 lists significant flood events that have impacted the planning area since 1935.

Table 10-1. History of Flood Events

Date	Declaration #	Type of event	Estimated Damage
5/7/2017	—	Flood	—
The Payette River at Emmett reached minor food stage due to snow melt.			
3/17/2017	—	Flood	—
Flooding occurred along the Payette River around the Emmett, Idaho area and surrounding fields and roads.			
2/8/2017	—	Flood	$1,000
The emergency manager reported high water and debris along Big Willow Creek and water running over Big Willow Road northeast of Dry Creek.			
4/26/2012	—	Flood	—
A National Weather Service employee surveyed the Payette River near Emmett and observed the river was out of bank and flooding areas on the north side of the city.			
6/5/2010	—	Flooding-Payette River	$1,000,000
Tons of debris backed up behind the Black Canyon Dam. The river crested at Emmett at a height of 13.48 feet and a flow of 24,500 cfs. Mountain rains in the Payette Basin sent a torrent of water downstream and prompted officials to increase the release of water from Cascade Dam. A washed-out bridge leading to the Gem Island Sports Complex and minor flooding on the west end of the island park in Emmett prompted officials to close the facility.			
1/4/1997	DR-1154	Severe Storms/Flooding	$643,480
The Payette River at the Black Canyon Dam crested at 39,000 cfs, more than twice flood stage. Highways and bridges were destroyed by mudslides, isolating several communities. Fourteen levees were damaged. Gem County declared a state of emergency along the Payette River January 1, and ordered over 250 people in Emmett to evacuate. 15 people were sheltered by the Red Cross at Emmett High School, and an unknown number at the Mormon Church. A gas line underneath the Payette River broke, leaving 150 people in Emmett without service.			
1/12/1991	—	Urban Flooding	$7,143
12/31/1964	DR-186	Heavy Rains & Flooding	$21,000,000 (statewide)
The Payette River experienced a flow of 31,000 cfs near the Black Canyon Dam. Floodwaters flowed over the dam, breaking out windows in the powerhouse. Roads and bridges throughout the area were washed away, and families were evacuated by boat and helicopter. Hundreds of head of livestock were isolated or swept away.			
2/14/1963	DR-143	Flood-Payette River	$4,685,000
Heavy snowfall followed by heavy rain, combined with large ice jams in several rivers, led to severe flooding in the Clearwater, Boise, Payette, Weiser, Portneuf and Snake River drainages. Statewide highway damage was est. at $800,000; damage to county roads est. at $700,000. Ice jams in the Payette River damaged the Montour Bridge.			
12/18/1956	—	Flooding-Payette River	$1,500,000
Warm rain on snow led to extensive flooding in the Weiser, Payette, Boise and Little Salmon River basins. Payette River peak flow was. 21,900 cfs. The flood damaged roads, farmlands and buildings, and caused loss of livestock. Rising floodwaters from the Payette River washed out bridges, stranding hundreds of head of livestock.			
April/1943	—	Flooding-Payette River	$1,000,000
Snowmelt combined with rain led to flooding along the Boise and Payette Rivers. Over 200 families were evacuated. Of the damage, over $649,000 was agricultural: over 10,000 acres were flooded. Rapid snowmelt and rain raised the Payette River to a peak flow of 21,000 cfs; it remained out of its banks for 13 days. Lowlands along the river from Garden Valley to Payette were flooded.			
5/2/1938	—	Flooding- Payette River	Information not available
Increased runoff and heavy rains led to flooding of farmlands along Payette River. Peak discharge was 23,400 cfs.			

10.2.3 Location

The major floods in the planning area have resulted from intense weather rainstorms between November and March. The flooding that has occurred in portions of the county has been extensively documented by gage records, high water marks, damage surveys and personal accounts. This documentation was the basis for the October 1977 FIRMs generated by FEMA for Gem County, which is one of the sources of data used in this risk assessment to map the extent of the flood hazard. Figure 10-2 show the FEMA flood mapping for the planning area (using FEMA's Q3 digital data). FEMA was in the process of revising the Flood Insurance Rate Maps for Gem County as of this plan update and had released preliminary revised mapping. However, as of this update, FEMA's mapping was under appeal and therefore not considered to be best available data until all appeals are resolved and FEMA has approved an effective map.

Due to the incompleteness of data on the FIRM, the Hazus model also was used to map the extent of the flood hazard, as described in Section 6.4.3. Hazard characterization in the Hazus flood model produces estimated flood depths for riverine flooding. A Level 1 analysis can produce flood depth grids along any river reach. The Hazus-generated floodplain does not take into account flood control facilities such as levees or floodwalls. Therefore, the results represent worst-case scenarios, showing the possible area of inundation should levees breech or fail. The Hazus-generated floodplain is also shown on Figure 10-2.

10.2.4 Frequency

Gem County experiences episodes of river flooding almost every winter. Large floods that can cause property damage typically occur every three to seven years. Urban portions of the county annually experience nuisance flooding related to drainage issues.

10.2.5 Severity

The principal factors affecting flood damage are flood depth and velocity. The deeper and faster flood flows become, the more damage they can cause. Shallow flooding with high velocities can cause as much damage as deep flooding with slow velocity. This is especially true when a channel migrates over a broad floodplain, redirecting high velocity flows and transporting debris and sediment. Flood severity is often evaluated by examining peak discharges; Table 10-2 lists peak flows used by FEMA to map the floodplains of Gem County.

Table 10-2. Summary of Peak Discharges Within Gem County

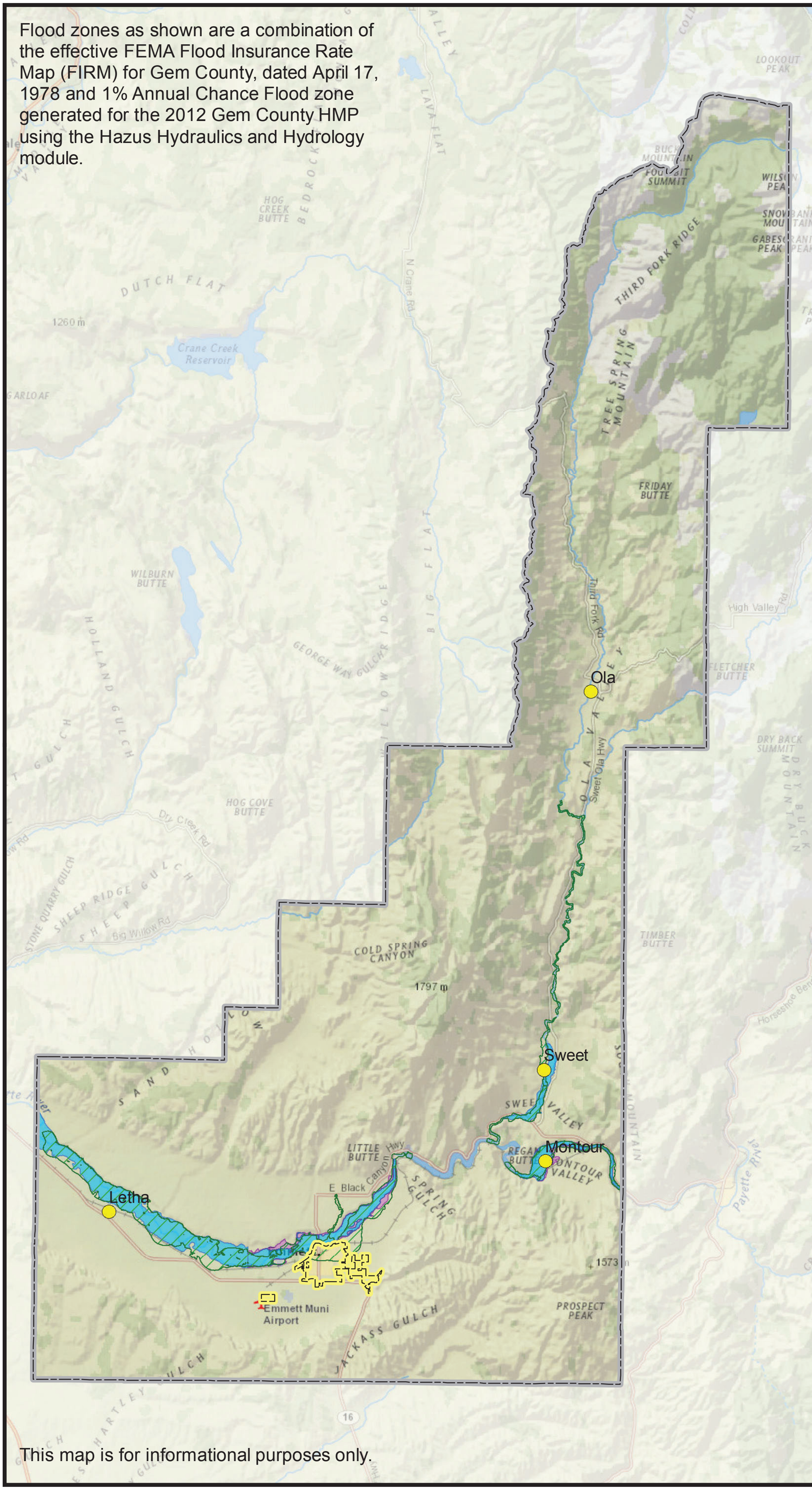
Source/Location	Discharge (cubic feet/second)			
	10-Year	50-Year	100-Year	500-Year
Payette River				
Montour Valley	21,000	26,000	28,000	38,300
Upper Emmett Valley	22,500	28,000	30,500	43,400
Squaw Creek	Observed flows within Squaw Creek range from 200 to 800 cfs. No detailed flood study has been performed on Squaw Creek.			

10.2.6 Warning Time

Due to the sequential pattern of meteorological conditions needed to cause serious flooding, it is unusual for a flood to occur without warning. Warning times for floods can be between 24 and 48 hours. Since flows on the Payette River system are regulated by the U.S. Bureau of Reclamation, warning on this system is tied to water release rates set by the Bureau. Each significant increase in release rates from Black Canyon Dam requires notification to emergency managers by Bureau. These announcements usually occur well in advance of increased release rates (24 to 48 hours).

Gem County

Figure 10-2.
Flood Hazard Area Boundaries



Gem County Boundary

City of Emmett

Gem County Planning Communities

1% Annual Chance Flood (Hazus H&H)

1% Annual Chance Flood (FEMA 100-yr)

0.2% Annual Chance Flood (FEMA 500-yr)

N W E S

0 2 4 8

Miles

TETRA TECH

IDAHO GEM COUNTY

Map Data Sources: National Geographic, Gem County, State of Idaho, FEMA Region X

Flash flooding can be less predictable, but potential hazard areas can be warned in advanced of potential flash flooding danger. The National Weather Service (NWS) uses a two-tiered warning system for flash flooding:

- A Flash Flood Watch covers a large area (a thousand square miles or greater, usually several counties) for up to 12 hours. A Flash Flood Watch is issued when conditions are favorable to produce flash flooding within the next 12 hours.
- A Flash Flood Warning generally covers a very small area (a few square miles to several hundred square miles) for up to 6 hours.

There is no warning system for flooding from canal breaches or failures. Warning for failures of these systems will likely occur well after the event has begun.

Gem County Emergency Management has established flood warning protocols outlining the response to flooding in the planning area. Table 10-3 shows the potential flood impacts at various discharge/stage scenarios on the Payette River upstream of Black Canyon Dam. County emergency managers use these scenarios to help dictate response to flooding.

Table 10-3. Potential Flood Impacts on Payette River

Discharge (cfs)	Stage (feet)	Impact
16,000	10.6	Minor flooding of pasture land and farm fields will occur upstream from Black Canyon Dam near Montour.
18,500	11.5	Some pasture land and farm fields near Montour will be underwater and minor flooding will spread into agricultural areas downstream from Emmett. Squaw Creek will back up and flood agricultural land near intersection of Highway 52 and Ola Road.
20,000	12	Moderate agricultural flooding will occur upstream and downstream from Emmett. Farm fields and pasture land near the river will be underwater near Montour and Letha and livestock should be moved to higher ground. Water will reach the level of Shale Rock Road and the railroad tracks near Montour.
23,000	13	Extensive agricultural flooding will occur upstream and downstream from Emmett. Some county roads will be under water in the vicinity of Emmett, including Shale Rock Road. Railroad tracks between Emmett and Horseshoe Bend will be flooded. Water will begin flowing over Highway 52 between Black Canyon Dam and Montour. Bridge access into the Emmett sports fields near the river will be flooded.
26,000	14	Water about 1/2 foot deep will flow over Highway 52 between Black Canyon Dam and Montour. Water will approach houses along Riverside Street in Emmett. Bridge access into the Emmett sports fields will be flooded. Extensive agricultural flooding will occur near Montour, Emmett and Letha.
30,000	15	Water will approach the top of the levee along Riverside Drive in Emmett. If the levee is breached, a large volume of water will flow down the canal that passes through Emmett, causing significant flooding in portions of Emmett. Water about 1 foot deep will flow across portions of Highway 52 between Emmett and Montour. Extensive agricultural flooding and inundation of county roads near the river will occur.

10.3 SECONDARY HAZARDS

The most problematic secondary hazard for flooding is bank erosion, which in some cases can be more harmful than actual flooding. This is especially true in the upper courses of rivers with steep gradients, where floodwaters may pass quickly and without much damage, but scour the banks, edging properties closer to the floodplain or causing them to fall in. Flooding is also responsible for hazards such as landslides when high flows over-saturate soils on steep slopes, causing them to fail. Hazardous materials spills are a secondary hazard of flooding if storage tanks rupture and spill into streams or storm sewers.

10.4 EXPOSURE

A Level 2 Hazus analysis was used to assess exposure to flooding in the planning area. The model used census data at the block level and FEMA floodplain data, which has a level of accuracy acceptable for planning purposes. Where possible, the Hazus default data was enhanced using local GIS data from county, state and federal sources. The FEMA and Hazus-generated floodplains were both used in the risk assessment. The Hazus-generated floodplain was found to represent the worst case for flooding.

10.4.1 Population

Population counts of those living in the floodplain in the planning area were generated by analyzing census blocks that intersect with the 100-year floodplain identified on FIRMs. Census blocks do not follow the boundaries of the floodplain. Therefore, the methodology used to generate these estimates counted census block groups whose centers are in the floodplain or where the majority of the population most likely lives in or near the floodplain. Hazus estimated the number of buildings within the floodplain in each block, and then estimated the total population by multiplying the number of residential structures by the average Gem County household size of 2.55 persons per household.

Using this approach, it was estimated that the entire county population within the 100-year floodplain is 3,316 (19.3 percent of the total county population). For the unincorporated portions of the county, it is estimated that the population within the 100-year floodplain is 474 (2.92 percent of the total unincorporated county population).

10.4.2 Property

Structures in the Floodplain

Table 10-4 summarizes the total area and number of structures in the Hazus-generated 100-year floodplain, which was determined to be the worst-case scenario for the planning area. The risk assessment determined that there are 77 structures within the FEMA-mapped 100-year floodplain and 1,472 structures within the Hazus-generated 100-year floodplain.

Table 10-4. Area and Number of Structures Within the Hazus-Generated 100-Year Floodplain

	Emmett	Letha	Montour	Ola	Sweet	Unincorporated County	Total
Area in Floodplain (acres)	532	--	--	--	--	8,118	**8,650**
# of Structures in Floodplain							
Residential	992	5	0	0	7	205	1,209
Commercial	143	0	0	0	0	3	146
Industrial	2	0	0	0	0	0	2
Agriculture	24	6	0	0	4	60	94
Religion	12	0	0	0	0	0	12
Government	6	0	0	0	0	0	6
Education	3	0	0	0	0	0	3
Total	**1,182**	**11**	**0**	**0**	**11**	**268**	**1,472**

Exposed Value

Table 10-5 summarizes the estimated value of exposed buildings in the planning area. This analysis estimated $34.1 million worth of building-and-contents exposure to the FEMA 100-year flood, representing 1 percent of the total assessed value of the planning area, and $578.3 million worth of building-and-contents exposure to the Hazus-generated 100-year floodplain, representing 17.5 percent of the total.

Table 10-5. Property Value Exposed to the Flood Hazard

	Emmett	Letha	Montour	Ola	Sweet	Unincorporated County	Total
FEMA 100-Year Floodplain							
Structure Value Exposed	$0	$1,147,886	$0	$0	$2,444,362	$16,153,421	$19,745,669
Content Value Exposed	$0	$930,510	$0	$0	$1,989,933	$11,445,024	$14,365,467
Total Value Exposed	**$0**	**$2,078,396.00**	**$0**	**$0**	**$4,434,296**	**$27,598,445**	**$34,111,137**
% of Total Assessed Value	***0***	***7.5***	***0***	***0***	***4.6***	***1.4***	***1.0***
Hazus-Generated 100-Year Floodplain[a]							
Structure Value Exposed	$284,220,591	$1,943,835	$0	$0	$2,292,866	$47,921,426	$336,378,718
Content Value Exposed	$208,120,910	$1,548,444	$0	$0	$1,623,507	$30,638,202	$241,931,063
Total Value Exposed	**$492,341,501.00**	**$3,492,279.00**	**$0**	**$0**	**$3,916,373.00**	**$78,559,628**	**$578,309,781**
% of Total Assessed Value	***48.2***	***12.5***	***0***	***0***	***4.1***	***3.8***	***17.5***

a. Hazus-generated 100-year floodplain exposure for Emmett assumes no flood protection benefit from Payette River levees in the city.

Land Use in the 100-Year Floodplain

Some land uses, such as single-family homes, are more vulnerable to flooding than others, such as agricultural land or parks. Table 10-6 shows the existing land use of all parcels in the FEMA and Hazus 100-year floodplains, including vacant parcels and those in public/open space uses, broken down for the unincorporated portion of the county. About 96 percent of the parcels in the 100-year floodplain (both FEMA and Hazus-generated) are zoned for agricultural uses. These are favorable, lower-risk uses for the floodplain. The amount of the floodplain that contains vacant, developable land is not known. This would be valuable information for gauging the future development potential of the floodplain.

Table 10-6. Land Use Within the Floodplain (Unincorporated County)

	FEMA 100-Year Floodplain		Hazus-Generated 100-Year Floodplain	
Land Use	Area (acres)	% of total	Area (acres)	% of total
Commercial	9	0.1%	10	0.1%
Heavy Industrial	28	0.4%	42	0.5%
Mixed	103	1.5%	110	1.3%
Prime Agriculture	3,357	49%	4,069	47%
Public	68	1.1%	69	0.9%
Residential Transition	1	0.0%	3	0.0%
Rural Agriculture	1,261	18.5%	1,375	15.8%
Rural Residential	32	0.5%	65	0.8%
Rural Transition Agriculture	1,972	28.9%	2,907	33.6%
Total	6,831	100.00%	8,650	100.00%

10.4.3 Critical Facilities and Infrastructure

Table 10-7 summarizes the critical facilities and infrastructure in the FEMA and Hazus-generated 100-year floodplains of the planning area. Details are provided in the following sections.

Table 10-7. Critical Facilities and Infrastructure Exposed to the Flood Hazard

	Number of Facilities in the FEMA 100-Year Floodplain			Number of Facilities in the Hazus-Generated 100-Year Floodplain		
	City of Emmett	Unincorporated County	Total	City of Emmett	Unincorporated County	Total
Critical Facilities in the Floodplain						
Medical and Health Services	5	0	5	5	0	5
Government Function	1	0	1	1	0	1
Protective	3	0	3	3	0	3
Hazardous Materials	0	0	0	0	0	0
Schools	2	0	2	2	0	2
Other	0	0	0	0	0	0
Total	11	0	11	11	0	11
Critical Infrastructure in the Floodplain						
Bridges	4	5	9	4	5	9
Water Supply	7	2	9	7	2	9
Wastewater	3	1	4	3	1	4
Power	2	0	2	2	0	2
Communications	0	0	0	0	0	0
Other	0	1	1	0	1	1
Total	16	9	25	16	9	25

Roads

Roads or railroads that are blocked or damaged can isolate residents and can prevent access throughout the county, including for emergency service providers needing to get to vulnerable populations or to make repairs. The only major road in the planning area passing through the 100-year floodplain is State Highway 52.

Bridges

Bridges washed out or blocked by floods or debris also can cause isolation. Flooding events can significantly impact road bridges. These are important because often they provide the only ingress and egress to some neighborhoods. An analysis showed that there are two bridges that are in or cross over the FEMA 100-year floodplain and nine bridges in the Hazus-generated 100-year floodplain.

Water and Sewer Infrastructure

Water and sewer systems can be flooded or backed up, causing health problems. Water and sewer systems can be affected by flooding. Floodwaters can back up drainage systems, causing localized flooding. Culverts can be blocked by debris from flood events, also causing localized urban flooding. Floodwaters can get into drinking water supplies, causing contamination. Sewer systems can be backed up, causing wastewater to spill into homes, neighborhoods, rivers and streams.

Canals

There are dozens of canal systems in the planning area, with a combined length of 270 miles. Information on these facilities is very limited. Therefore, the true exposure and vulnerability of these facilities is not known at this time.

10.4.4 Environment

Flooding is a natural event, and floodplains provide many natural and beneficial functions. Nonetheless, with human development factored in, flooding can impact the environment in negative ways. Migrating fish can wash into roads or over dikes into flooded fields, with no possibility of escape. Pollution from roads, such as oil, and hazardous materials can wash into rivers and streams. During floods, these can settle onto normally dry soils, polluting them for agricultural uses. Human development such as bridge abutments and levees, and logjams from timber harvesting can increase stream bank erosion, causing rivers and streams to migrate into non-natural courses.

Many species of mammals, birds, reptiles, amphibians and fish live in Gem County in plant communities that are dependent upon streams, wetlands and floodplains. Changes in hydrologic conditions can result in a change in the plant community. Wildlife and fish are impacted when plant communities are eliminated or fundamentally altered to reduce habitat. Wildlife populations are limited by shelter, space, food and water. Since water supply is a major limiting factor for many animals, riparian communities are of special importance. Riparian areas are the zones along the edge of a river or stream that are influenced by or are an influence upon the water body. Human disturbance to riparian areas can limit wildlife's access to water, remove breeding or nesting sites, and eliminate suitable areas for rearing young. Wildlife relies on riparian areas in the following ways:

- Mammals depend upon a supply of water for their existence. Riparian communities have a greater diversity and structure of vegetation than other upland areas. Beavers and muskrats are now recolonizing streams, wetlands and fallow farm fields, which are converted wetlands. As residences are built in rural areas, there is an increasing concern with beaver dams causing flooding of low-lying areas and abandoned farm ditches being filled in, which can lead to localized flooding.
- A great number of birds are associated with riparian areas. They swim, dive, feed along the shoreline, or snatch food from above. Rivers, lakes and wetlands are important feeding and resting areas for migratory and resident waterfowl. Threatened or endangered species such as the bald eagle or the peregrine falcon eat prey from these riparian areas.
- Amphibians and reptiles are some of the least common forms of wildlife in riparian areas, but species such as the western pond turtle and the spotted frog are known to inhabit the waterways and wetlands.
- Fish habitat throughout the county varies widely based on natural conditions and human influence.

10.5 VULNERABILITY

10.5.1 Population

Vulnerable Groups

A geographic analysis of demographics, using the Hazus model and data from the U.S. Census Bureau and Dun & Bradstreet, identified populations vulnerable to the flood hazard as follows:

- **Economically Disadvantaged Populations**—It is estimated that 7 percent of the people within the FEMA 100-year floodplain are economically disadvantaged, defined as having household incomes of $10,000 or less.
- **Population over 65 Years Old**—It is estimated that 8 percent of the population in the census blocks that intersect the FEMA 100-year floodplain are over 65 years old. Approximately 20 percent of the over-65 population in the floodplain also have incomes considered to be economically disadvantaged and are considered to be extremely vulnerable.
- **Population under 16 Years Old**—It is estimated that 13 percent of the population within census blocks in or near the FEMA 100-year floodplain are under 16 years of age.

Displacement and Shelter Needs

Hazus estimated that a FEMA 100-year flood could displace up to 38 people, with one of those people needing short-term shelter. For a Hazus-generated 100-year flood, it is estimated that up to 2,605 people could be displaced, with 150 needing short-term shelter.

Public Health and Safety

Floods and their aftermath present the following threats to public health and safety:

- **Unsafe food—**Floodwaters contain disease-causing bacteria, dirt, oil, human and animal waste, and farm and industrial chemicals. Their contact with food items, including food crops in agricultural lands, can make that food unsafe to eat. Refrigerated and frozen foods are affected during power outages caused by flooding. Foods in cardboard, plastic bags, jars, bottles, and paper packaging may be unhygienic with mold contamination.
- **Contaminated drinking and washing water and poor sanitation—**Flooding impairs clean water sources with pollutants. The pollutants also saturate into the groundwater. Flooded wastewater treatment plants can be overloaded, resulting in backflows of raw sewage. Private wells can be contaminated by floodwaters. Private sewage disposal systems can become a cause of infection if they or overflow.
- **Mosquitoes and animals—**Floods provide new breeding grounds for mosquitoes in wet areas and stagnant pools. The public should dispose of dead animals that can carry viruses and diseases only in accordance with guidelines issued by local animal control authorities. Leptospirosis—a bacterial disease associated predominantly with rats—often accompanies floods in developing countries, although the risk is low in industrialized regions unless cuts or wounds have direct contact with disease-contaminated floodwaters or animals.
- **Mold and mildew—**Excessive exposure to mold and mildew can cause flood victims—especially those with allergies and asthma—to contract upper respiratory diseases, triggering cold-like symptoms. Molds grow in as short a period as 24 to 48 hours in wet and damp areas of buildings and homes that have not been cleaned after flooding, such as water-infiltrated walls, floors, carpets, toilets and bathrooms. Very small mold spores can be easily inhaled by human bodies and, in large enough quantities, cause allergic reactions, asthma episodes, and other respiratory problems. Infants, children, elderly people and pregnant women are considered most vulnerable to mold-induced health problems.
- **Carbon monoxide poisoning—**In the event of power outages following floods, some people use alternative fuels for heating or cooking in enclosed or partly enclosed spaces, such as small gasoline engines, stoves, generators, lanterns, gas ranges, charcoal or wood. Built-up carbon monoxide from these sources can poison people and animals.
- **Hazards when reentering and cleaning flooded homes and buildings—**Flooded buildings can pose significant health hazards to people entering them. Electrical power systems can become hazardous. Gas leaks can trigger fire and explosion. Flood debris—such as broken bottles, wood, stones and walls—may cause injuries to those cleaning damaged buildings. Containers of hazardous chemicals may be buried under flood debris. Hazardous dust and mold can circulate through a building and be inhaled by those engaged in cleanup and restoration.
- **Mental stress and fatigue—**People who live through a devastating flood can experience long-term psychological impact. The expense and effort required to repair flood-damaged homes places severe financial and psychological burdens on the people affected. Post-flood recovery can cause, anxiety, anger, depression, lethargy, hyperactivity, and sleeplessness. There is also a long-term concern among the affected that their homes can be flooded again in the future.

Current loss estimation models such as Hazus are not equipped to measure public health impacts such as these. The best level of mitigation for these impacts is to be aware that they can occur, educate the public on prevention, and be prepared to deal with them in responding to flood events.

10.5.2 Property

Hazus calculates losses to structures from flooding by looking at depth of flooding and type of structure. Using historical flood insurance claim data, Hazus estimates the percentage of damage to structures and their contents by applying established damage functions to an inventory. For this analysis, local data on facilities was used instead of the default inventory data provided with Hazus.

The analysis is summarized in Table 10-8. It is estimated that there would be up to $5.8 million of flood loss from a FEMA 100-year flood event in the planning area. This represents 17 percent of the total exposed property value and 0.2 percent of the total assessed value for the county. It is estimated that there would be $219.4 million of flood loss from a Hazus-generated 100-year flood event, representing 37.9 percent of the total exposure to that flood event and 6.7 percent of the total assessed value.

Table 10-8. Potential Property Value Loss Due to Flood

	Emmett	Letha	Montour	Ola	Sweet	Unincorporated County	Total
FEMA 100-Year Floodplain							
Structure Value Loss	$0	$71,941	$0	$0	$254,599	$2,699,719	**$3,026,259**
Content Value Loss	$0	$99,951	$0	$0	$308,033	$2,376,476	**$2,784,460**
Total Value Loss	**$0**	**$171,892**	**$0**	**$0**	**$562,632**	**$5,076,195**	**$5,810,719**
% of Total Exposed Value	***0***	***8.27***	***0***	***0***	***12.69***	***18.4***	***17***
Hazus-Generated 100-Year Floodplain[a]							
Structure Value Loss	$83,707,822	$340,039	$0	$0	$403,091	$13,618,073	**$98,069,025**
Content Value Loss	$109,271,484	$565,310	$0	$0	$519,139	$10,998,479	**$121,354,412**
Total Value Loss	**$192,979,306**	**$905,349**	**$0**	**$0**	**$922,230**	**$24,616,552**	**$219,423,437**
% of Total Exposed Value	***39.2***	***25.9***	***0***	***0***	***23.5***	***31.3***	***37.9***

a. Hazus-generated 100-year floodplain losses for Emmett assume no flood protection benefit from Payette River levees in the city.

National Flood Insurance Program

Table 10-9 lists flood insurance statistics that help identify vulnerability in the planning area. The City of Emmett and Gem County both participate in the NFIP, with 30 flood insurance policies providing $8.2 million in insurance coverage. The average premium within the Planning area is $500. According to FEMA statistics, three flood insurance claims were paid between 1978 and 2018, for a total of $13,823, an average of $4,608 per claim.

Table 10-9. Flood Insurance Statistics

	City of Emmett	Unincorporated County	Total
Date of Entry Initial FIRM Effective Date	06/28/1976	04/17/1978	
# of Flood Insurance Policies as of 01/31/2012	8	22	**30**
# of policies within the SFHA	0	6	**6**
# of non-SFHA policies	8	16	**24**
Insurance in Force	$1,650,000	$6,611,300	**$8,261,300**
Total Annual Premium	$2,062	$12,957	**$15,019**
Claims, 1978 to 2012	0	3	**3**
Value of Claims paid, 1978 to 2012	0	$13,823	**$13,823**

The following information from flood insurance statistics is relevant to reducing flood risk:

- The use of flood insurance in the planning area is below the national average. Only 5.7 percent of insurable buildings in the planning area are covered by flood insurance. According to an NFIP study, about 49 percent of single-family homes in special flood hazard areas nationwide are covered by flood insurance nationwide.
- The average claim paid in the planning area represents about 1.26 percent of the 2018 average assessed value of structures in the floodplain.
- Based on information from the NFIP, 21.7 percent of policies in the planning area are on structures within an identified SFHA, and 78.3 percent are for structures outside such areas. Of the three claims paid, all were for properties outside an identified 100-year floodplain. The percentage of policies and claims outside a mapped floodplain suggests that not all of the flood risk in the planning area is reflected in current mapping.

Repetitive Loss

A repetitive loss property is defined by FEMA as an NFIP-insured property that has experienced any of the following since 1978, regardless of any changes in ownership:

- Four or more paid losses in excess of $1,000
- Two paid losses in excess of $1,000 within any rolling 10-year period
- Three or more paid losses that equal or exceed the current value of the insured property.

Repetitive loss properties make up 1 to 2 percent of flood insurance policies in force nationally, yet they account for 40 percent of the nation’s flood insurance claim payments. The government has instituted programs encouraging communities to identify and mitigate the causes of repetitive losses. A recent report on repetitive losses by the National Wildlife Federation found that 20 percent of these properties are outside any mapped 100-year floodplain. The key identifiers for repetitive loss properties are the existence of flood insurance policies and claims paid by the policies.

FEMA-sponsored programs, such as the CRS, require participating communities to identify repetitive loss areas. A repetitive loss area is the portion of a floodplain holding structures that FEMA has identified as meeting the definition of repetitive loss. Identifying repetitive loss areas helps to identify structures that are at risk but are not on FEMA’s list of repetitive loss structures because no flood insurance policy was in force at the time of loss. According to the Idaho Department of Water Resources, the State NFIP Coordination Agency for Idaho, Gem County has no identified repetitive loss properties. Therefore, no repetitive loss area analysis has been performed for this risk assessment.

10.5.3 Critical Facilities and Infrastructure

Hazus was used to estimate the flood loss potential to critical facilities exposed to the flood risk. Using depth/damage function curves to estimate the percent of damage to the building and contents of critical facilities, Hazus correlates these estimates into an estimate of functional down-time (the estimated time it will take to restore a facility to 100 percent of its functionality). This helps to gauge how long the planning area could have limited usage of facilities deemed critical to flood response and recovery. The Hazus critical facility results are as follows:

- **FEMA 100-year flood event**—On average, critical facilities would receive 2 percent damage to the structure and 3 percent damage to the contents during a FEMA 100-year flood event. The estimated time to restore these facilities to 100 percent of their functionality would be 100 days.
- **Hazus-Generated 100-year flood event**—A Hazus-generated 100-year flood event would damage the structures an average of 23 percent and the contents an average 18 percent. The estimated time to restore these facilities to 100 percent of their functionality would be 530 days.

10.5.4 Environment

The environment vulnerable to flood hazard is the same as the environment exposed to the hazard. Loss estimation platforms such as Hazus are not currently equipped to measure environmental impacts of flood hazards. The best gauge of vulnerability of the environment would be a review of damage from past flood events. Loss data that segregates damage to the environment was not available at the time of this plan. Capturing this data from future events could be beneficial in measuring the vulnerability of the environment for future updates.

10.6 DEVELOPMENT TRENDS

The value of planning area properties exposed to the 100-year flood hazard has increased by 17.02 percent ($5.8 million) since the last hazard mitigation plan update in 2012. The value exposed to the Hazus generated 100-year flood hazard has increased by 19.7 percent ($113.8 million). This increase in risk exposure can be attributed to the population growth of 5.8 percent in the same period and property value increases associated with continued economic recovery from the 2008 economic downturn (see Section 4.5.4).

Current comprehensive planning in the planning area appears to be adequately equipped to dictate sound land use practices within the designated floodplain. The key to this will be to identify flood hazard areas that accurately reflect the true flood risk within the planning area. Gem County is in the process of finalizing new flood maps through FEMA's Risk MAP (Risk Mapping, Assessment and Planning) program. The new maps will be based on the abundance of available information on flood risk from creditable agencies such as IDWR and the Corps of Engineers.

All municipal planning partners for this plan are participants in the NFIP and have adopted flood damage prevention ordinances in response to its requirements. With 50 percent of communities in the county participating in the CRS program, there is incentive to adopt consistent, appropriate, higher regulatory standards in communities with the highest degree of flood risk. All municipal planning partners have committed to maintaining their good standing under the NFIP through actions identified in this plan. Communities participating or considering participation in the CRS program will be able to refine this commitment using CRS programs and templates as a guide.

Land use in the planning area has been and will continue to be directed by comprehensive plans adopted under Idaho's land use regulation law. Current comprehensive planning in the planning area appears to be adequately equipped to dictate sound land use practices within the designated floodplain. The key to this will be to identify flood hazard areas that accurately reflect the true flood risk in the planning area. The currently effective Flood Insurance Rate Maps for Gem County are over 36 years old and do not reflect current conditions. A key element to managing the flood risk in the planning area will be the use of best available data and science to implement floodplain management programs. Gem County and the City of Emmett are participants in the NFIP and have adopted flood damage prevention ordinances in response to its requirements. There is incentive to adopt consistent, appropriate, higher regulatory standards in communities with the highest degree of flood risk. The County and the City have committed to maintaining their good standing under the NFIP through initiatives identified in this plan. Gem County is also committed to continuing its participation in FEMA's CRS program and improving its class rating in future years.

10.7 SCENARIO

The primary water courses in the planning area have the potential to flood at irregular intervals, generally in response to a succession of intense winter rainstorms. Storm patterns of warm, moist air usually occur between early November and late March. A series of such weather events can cause severe flooding in the planning area. The worst-case scenario is a series of storms that flood numerous drainage basins in a short time. This could overwhelm the response and floodplain management capability within the planning area. Major roads could be blocked, preventing critical access for many residents and critical functions. High in-channel flows could cause water courses to scour, possibly washing out roads and creating more isolation problems. In the case of multi-basin flooding, the County would not be able to make repairs quickly enough to restore critical facilities and infrastructure.

Additionally, the potential impacts of climate change on the operations of Black Canyon Dam are real. The Payette River as well as the downstream network of ditches and canals could see increased flows in response to a changing hydrograph that dictates dam operations. The regular conveyance of increased flows through these un-engineered facilities could lead to significant flood risk.

10.8 ISSUES

The planning team has identified the following flood-related issues relevant to the planning area:

- The accuracy of the existing flood hazard mapping produced by FEMA in reflecting the true flood risk within the planning area is questionable. Flood maps need to be updated utilizing the best available data, science and technology
- The flood risk for the City of Emmett is highly contingent upon the certification of the levee that protects the city from flooding from the Payette River. If this levee is not certified and accredited in the flood hazard mapping, over 60 percent of the city would be within the regulated floodplain, which could have economic consequences on the city and its citizens.
- The extent of the flood-protection currently provided by flood control facilities (dams, dikes and levees) is not known due to the lack of an established national policy on flood protection standards.
- The risk associated with the flood hazard overlaps the risk associated with other hazards such as earthquake and landslide. This provides an opportunity to seek mitigation alternatives with multiple objectives that can reduce risk for multiple hazards.
- There is no consistency of land-use practices within the planning area or the scope of regulatory floodplain management beyond the minimum requirements of the NFIP.
- Potential climate change could alter flood conditions.
- More information is needed on flood risk to support the concept of risk-based analysis of capital projects.
- There needs to be a sustained effort to gather historical damage data, such as high-water marks on structures and damage reports, to measure the cost-effectiveness of future mitigation projects.
- Ongoing flood hazard mitigation will require funding from multiple sources.
- There needs to be a coordinated hazard mitigation effort between jurisdictions affected by flood hazards in the county.
- Floodplain residents need to continue to be educated about flood preparedness and the resources available during and after floods.
- The concept of residual risk should be considered in the design of future capital flood control projects and should be communicated with residents living in the floodplain.
- The promotion of flood insurance as a means of protecting private property owners from the economic impacts of frequent flood events should continue.
- Existing floodplain-compatible uses such as agricultural and open space need to be maintained. There is constant pressure to convert these existing uses to more intense uses within the planning area during times of moderate to high growth.
- The economy affects a jurisdiction’s ability to manage its floodplains. Budget cuts and personnel losses can strain resources needed to support floodplain management.
- A buildable-lands analysis that looks at vacant lands and their designated land use would be a valuable tool in helping decision-makers make wise decisions about future development.

- The risk associated with flooding due to canal failure is unknown at this time. Data on this risk need to be gathered to better support communities' preparedness and response efforts.
- Additional efforts to coordinate land-use practices across all affected jurisdictions within the planning area are needed to expand floodplain management practices beyond the minimum requirements of the NFIP.

11. LANDSLIDE

11.1 GENERAL BACKGROUND

A landslide is a mass of rock, earth or debris moving down a slope. Landslides may be minor or very large and can move at slow to very high speeds. They can be initiated by storms, earthquakes, fires, volcanic eruptions or human modification of the land.

Mudslides are rivers of rock, earth, organic matter and other soil materials saturated with water. They develop in the soil overlying bedrock on sloping surfaces when water rapidly accumulates in the ground, such as during heavy rainfall or rapid snowmelt. Water pressure in the pore spaces of the material increases to the point that the internal strength of the soil is drastically weakened. The soil's reduced resistance can then easily be overcome by gravity, changing the earth into a flowing river of mud or "slurry." A mudslide can move rapidly down slopes or through channels and can strike with little or no warning at avalanche speeds. The slurry can travel miles from its source, growing as it descends, picking up trees, boulders, cars and anything else in its path. Although these slides behave as fluids, they convey many times the hydraulic force of water due to the mass of material included in them. They can be some of the most destructive events in nature.

All mass movements are caused by a combination of geological and climate conditions, as well as the encroaching influence of urbanization. Vulnerable natural conditions are affected by human residential, agricultural, commercial and industrial development and the infrastructure that supports it. Slides and earth flows can pose serious hazard to property in hillside terrain. When they move—in response to such changes as increased water content, earthquake shaking, addition of load, or removal of downslope support—they deform and tilt the ground surface. The result can be destruction of foundations, offset of roads, breaking of underground pipes, or overriding of downslope property and structures.

11.1.1 Landslide Causes

Landslides are caused by one or a combination of the following factors: change in slope of the terrain, increased load on the land, shocks and vibrations, change in water content, groundwater movement, frost action, weathering of rocks, and removing or changing the type of vegetation covering slopes. In general, landslide hazard areas are where the land has characteristics that contribute to the risk of the downhill movement of material, such as the following:

- A slope greater than 33 percent
- A history of landslide activity or movement during the last 10,000 years
- Stream or wave activity, which has caused erosion, undercut a bank or cut into a bank to cause the surrounding land to be unstable
- The presence or potential for snow avalanches
- The presence of an alluvial fan, indicating vulnerability to the flow of debris or sediments
- The presence of impermeable soils, such as silt or clay, mixed with granular soils, such as sand and gravel.

11.1.2 Landslide Types

Flows and slides are commonly categorized by the form of initial ground failure. Common types of slides are shown in Figure 11-1 through Figure 11-4. The most common is the shallow colluvial slide, occurring particularly in response to intense, short-duration storms. The largest and most destructive are deep-seated slides, although they are less common than other types.

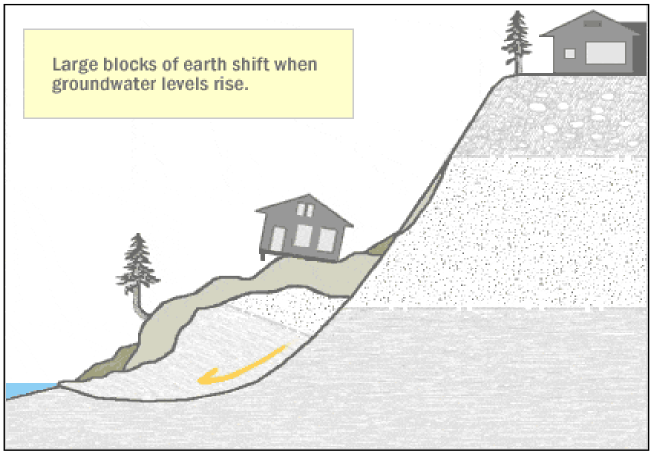


Figure 11-1. Deep Seated Slide

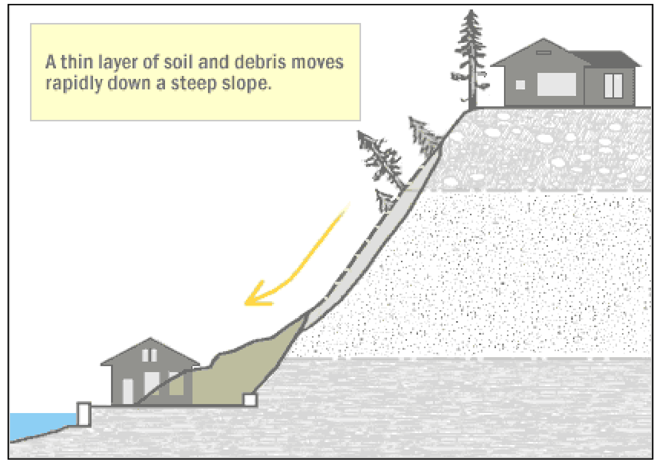


Figure 11-2. Shallow Colluvial Slide

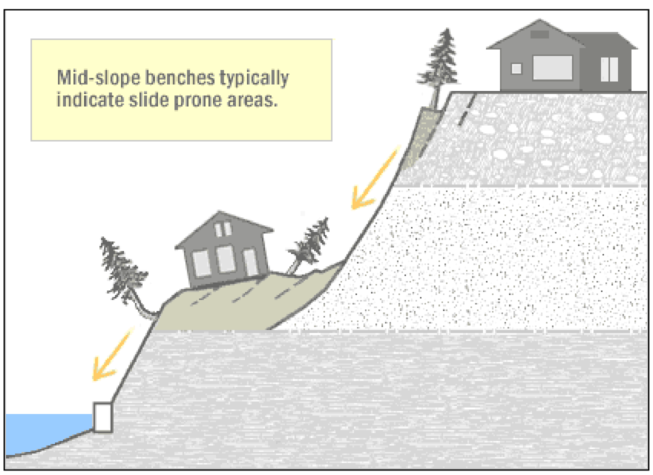


Figure 11-3. Bench Slide

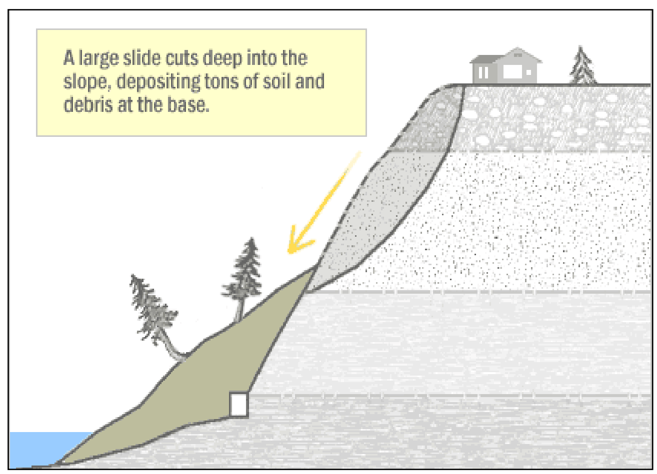


Figure 11-4. Large Slide

11.1.3 Landslides and Geology

Certain combinations of earth materials and steep topography increase the likelihood of slope failure. In Idaho, examples include basalt with sedimentary interbeds, altered volcanic rocks, fractured metamorphic rocks, glacial and lake deposits, and weathered granite. Basalt lava flows exposed in canyons hundreds of feet deep occur throughout the Snake River Plain and Columbia Plateau. Large landslides tend to form where the basalts are underlain by unconsolidated sediments. In some cases, irrigation increases the landslide potential. On steep slopes in Idaho's river canyons, metamorphic rocks fractured by faulting and folding are prone to fail as falls, topples, and translational slides.

11.2 HAZARD PROFILE

Gem County is characterized by rolling basalt plateaus dissected by deep canyons. The plateaus are mantled with deposits of loess that are tens of feet thick in places. The deep canyons associated with all forks of the Payette River cut through the basalt flows that underlie the regions of Gem County. These flows are interbedded with loose, unstable sedimentary layers that are exposed in the deeply incised canyons. The exposure of this unconsolidated sedimentary layer increases landslide potential wherever these deposits are present on steep slopes. Weathering and climatic events lead to landslide activity, with the scale of the event largely dependent on the environmental conditions leading up to the event. Highway 52 and structures along the Payette River system are most likely to be affected by landslide activity.

11.2.1 Past Events

While landslides are known to occur frequently in the planning area, there is little recorded landslide information for the area. According to the 2013 *Idaho State Hazard Mitigation Plan*, there has been one recorded landslide event in the planning area since 1980 causing sufficient damages to trigger a presidential disaster declaration. This was the January 1997 severe storm event that impacted much of the state. The combined estimated damage for this event exceeded $20 million statewide. There are no records in the County of fatalities attributed to mass movement. However, deaths have occurred across the west coast as a result of slides and slope collapses.

11.2.2 Location

The best available predictor of where movement of slides and earth flows might occur is the location of past movements. Past landslides can be recognized by their distinctive topographic shapes, which can remain in place for thousands of years. Most landslides recognizable in this fashion range from a few acres to several square miles. Most show no evidence of recent movement and are not currently active. A small proportion of them may become active in any given year, with movements concentrated within all or part of the landslide masses or around their edges.

The recognition of ancient dormant mass movement sites is important in the identification of areas susceptible to flows and slides because they can be reactivated by earthquakes or by exceptionally wet weather. Also, because they consist of broken materials and frequently involve disruption of groundwater flow, these dormant sites are vulnerable to construction-triggered sliding.

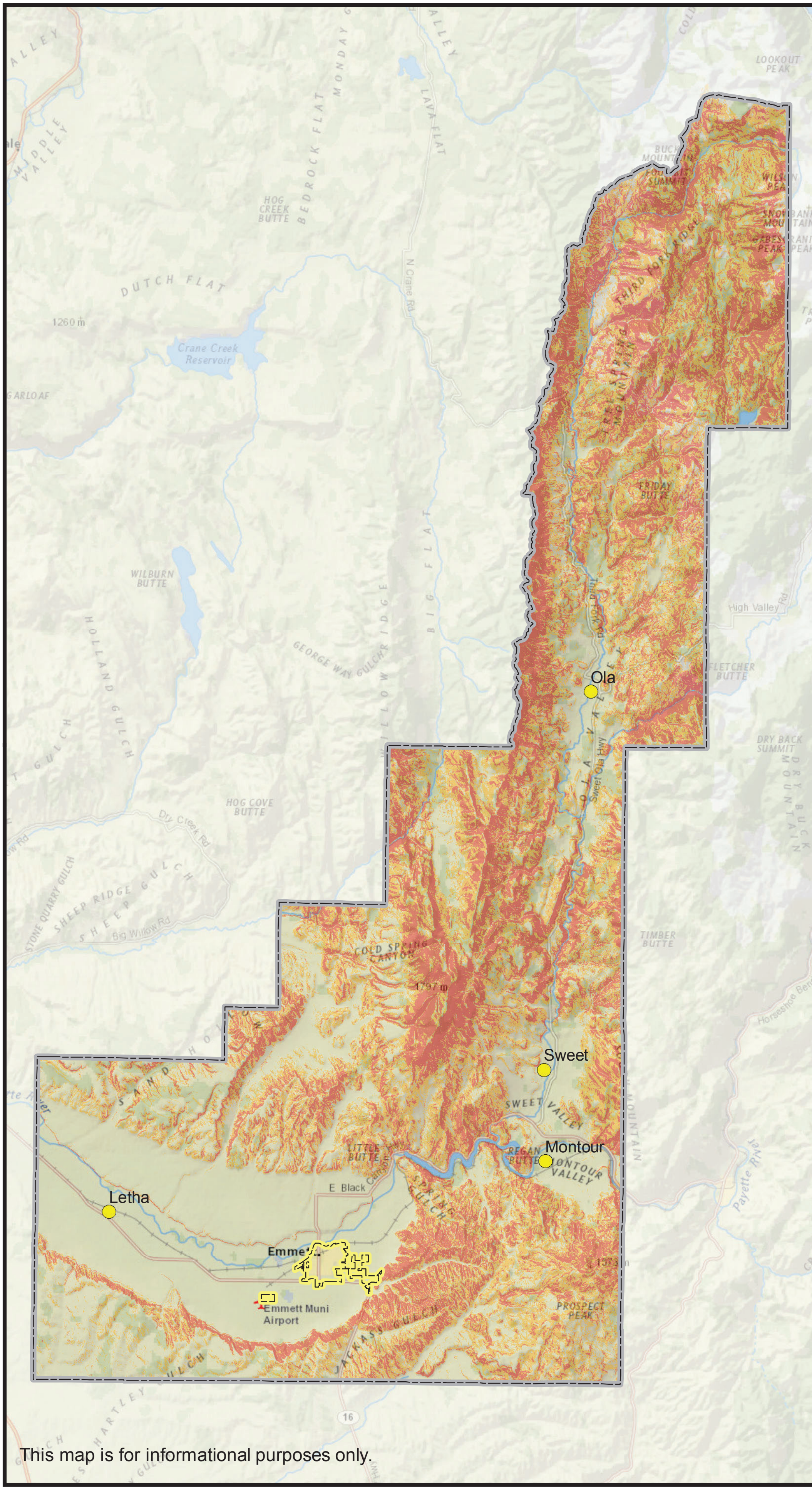
Landslides are typically a function of soil type and steepness of slope. Soil type is a key indicator for landslide potential and is used by geologist and geotechnical engineers to determine soil stability for construction standards. Due to a lack of available soils data for Gem County, the extent and location of the hazard has been estimated for this hazard mitigation plan with an emphasis on steepness of slopes. Figure 11-5 shows the estimated landslide hazard areas in the Gem County planning area, based on slopes. A dataset of steep slopes was generated using a 1/3-arc-second digital elevation model. Two slope classifications were created: 15 to 30 percent; and greater than 30 percent.

11.2.3 Frequency

Landslides are often triggered by other natural hazards such as earthquakes, heavy rain, floods or wildfires, so landslide frequency is often related to the frequency of these other hazards. In Gem County, landslides typically occur during and after major storms, so the landslide potential largely coincides with the potential for sequential severe storms that saturate steep, vulnerable soils. Until better data is generated specifically for landslide hazards, this severe storm frequency is appropriate for the purpose of ranking risk associated with the landslide hazard.

Gem County

Figure 11-5.
Landslide Hazard,
Percent Slope



Slope Greater Than 30 Percent

Slope 15 to 30 Percent

Gem County Boundary

City of Emmett

Gem County Planning Communities

Percent slope calculated using U.S. Geological Survey 10m Digital Elevation Model (DEM) data.

N
W E
S

0 2 4 8

Miles

TETRA TECH

IDAHO GEM COUNTY

Map Data Sources: National Geographic, Gem County, State of Idaho, USGS

Landslides are most likely during periods of higher than average rainfall. The ground must be saturated prior to the onset of a major storm for significant landslides to occur. Most local landslides occur in January after the water table has risen during November and December. Water is involved in nearly all cases; and human influence has been identified in more than 80 percent of reported slides.

11.2.4 Severity

Landslides destroy property and infrastructure and can take the lives of people. Slope failures in the United States result in an average of 25 lives lost per year and an annual cost to society of about $1.5 billion. According to the 2013 *Idaho State Hazard Mitigation Plan*, the 1997 storms caused in excess of $20 million statewide in property damage due to landslides, mudslides and debris flows. This was about half of all damage caused by the storm. The landslides caused by the storm also caused tens of millions of dollars of damage to road infrastructure.

11.2.5 Warning Time

Landslide velocity can range from inches per year to many feet per second, depending on slope angle, material and water content. Some methods used to monitor mass movements can provide an idea of the time prior to failure. It is also possible to determine areas at risk during general time periods. Assessing the geology, vegetation and amount of predicted precipitation for an area can help in these predictions. However, there is no practical warning system for individual landslides. The current procedure is to monitor situations on a case-by-case basis and respond after the event has occurred. Generally accepted warning signs for landslide activity include:

- Springs, seeps, or saturated ground in areas that have not typically been wet before
- New cracks or unusual bulges in the ground, street pavements or sidewalks
- Soil moving away from foundations
- Ancillary structures such as decks and patios tilting and/or moving relative to the main house
- Tilting or cracking of concrete floors and foundations
- Broken water lines and other underground utilities
- Leaning telephone poles, trees, retaining walls or fences
- Offset fence lines
- Sunken or down-dropped road beds
- Rapid increase in creek water levels, possibly accompanied by increased soil content
- Sudden decrease in creek water levels though rain is still falling or recently stopped
- Sticking doors and windows or visible open spaces indicating jambs and frames out of plumb
- A faint rumbling sound that increases in volume as the landslide nears
- Unusual sounds, such as trees cracking or boulders knocking together.

11.3 SECONDARY HAZARDS

Landslides can cause secondary effects such as blocking access to roads, which can isolate residents and businesses and delay transportation. This could result in economic losses for businesses. Other potential problems are power and communication failures. Vegetation or poles on slopes can be knocked over, resulting in possible losses to power and communication lines. Landslides also have the potential of destabilizing the foundation of structures, which may result in monetary loss for residents. They also can damage rivers or streams, potentially harming water quality, fisheries and spawning habitat.

11.4 EXPOSURE

11.4.1 Population

Population could not be examined by landslide hazard area because census block group areas do not coincide with the hazard areas. A population estimate was made using the structure count of buildings within the landslide hazard areas and applying the census value of 2.55 persons per household for Gem County. Using this approach, the estimated population living in landslide risk with slopes of 30 percent or greater is 139, and the population of people living in landslide risk areas with slopes 15 to 30 percent is 385. This totals 524 people potentially exposed to landslide risks, or 3.05 percent of the County's total population

11.4.2 Property

Table 11-1 shows the number and value of structures exposed to the landslide risk. There are 237 structures on parcels in the landslide risk areas (with a slope of 15 to 30 percent), with an estimated value of $95.4 million. There are 73 structures on parcels in the landslide risk areas with a slope of greater than 30 percent, with an estimated value of $33.7 million. Most of the exposed structures are dwellings.

Table 11-1. Property Value Exposed to the Landslide Hazard

	Emmett	Letha	Montour	Ola	Sweet	Unincorporated County	Total
15% to 30% slope areas							
# of Structures Exposed to Hazard	0	0	15	8	18	196	237
Structure Value Exposed to Hazard	$0	$0	$4,803,199	$1,548,794	$4,540,894	$46,897,860	$ 237
Content Value Exposed to Hazard	$0	$0	$2,873,472	$1,042,906	$2,510,718	$31,179,385	$ 474
Total Value Exposed to Hazard	**$0**	**$0**	**$7,676,672**	**$2,591,701**	**7,051,612**	**$78,077,245**	**$ 948**
% of Total Assessed Value	***0***	***0***	***10.58***	***6.81***	***7.39***	***3.82***	***2.89***
30% or greater slope areas							
# of Structures Exposed to Hazard	0	0	3	10	5	55	73
Structure Value Exposed to Hazard	$0	$0	$761,400	$2,576,456	$2,242,280	$15,766,031	$ 73
Content Value Exposed to Hazard	$0	$0	$380,700	$1,448,739	$1,121,140	$9,414,495	$ 146
Total Value Exposed to Hazard	**$0**	**$0**	**$1,142,100**	**$4,025,195**	**$3,363,420**	**$25,180,525**	**$ 292**
% of Total Assessed Value	***0***	***0***	***1.57***	***10.58***	***3.53***	***1.23***	***1.02***

Most parcels exposed to landslides in unincorporated portions of the County are zoned agricultural. Lands zoned for agricultural uses are most prone to landslides because the soils are exposed to influences that can cause earth movements.

11.4.3 Critical Facilities and Infrastructure

Table 11-2 summarizes the critical facilities exposed to the landslide hazard. A significant amount of infrastructure can be exposed to mass movements:

- **Roads**—Access to major roads is crucial to life-safety after a disaster event and to response and recovery operations. Landslides can block egress and ingress on roads, causing isolation for neighborhoods, traffic problems and delays for public and private transportation. This can result in economic losses for businesses.
- **Bridges**—Mass movements can knock out bridge abutments or significantly weaken the soil supporting them, making them hazardous for use.

Table 11-2. Critical Facilities Exposed to Landslide Hazards

	Number of Critical Facilities in Landslide Risk Area
Medical and Health Services	0
Government Function	0
Protective Function	0
Schools	1
Hazmat	0
Other Critical Function	0
Bridges	7
Water	0
Waste Water	1
Communications	2
Total	**11**

- **Power Lines**—Power line towers can be subject to landslides. A landslide could trigger failure of the soil underneath a tower, causing it to collapse and ripping down the lines. Power and communication failures due to landslides can create problems for vulnerable populations and businesses.

11.4.4 Environment

Environmental problems as a result of mass movements can be numerous. Landslides that fall into streams may significantly impact fish and wildlife habitat, as well as affecting water quality. Hillsides that provide wildlife habitat can be lost for prolonged periods of time due to landslides.

11.5 VULNERABILITY

11.5.1 Population

Due to the nature of census block group data, it is difficult to determine demographics of populations vulnerable to mass movements. In general, all of the estimated 524 persons exposed to landslide risk areas are considered to be vulnerable. Increasing population and the fact that many homes are built on view property atop or below bluffs and on steep slopes subject to mass movement, increases the number of lives endangered by this hazard.

11.5.2 Property

Although complete historical documentation of the landslide threat in the planning area is lacking, the landslides of 1997 suggest a significant vulnerability to such hazards. The millions of dollars in damage countywide attributable to mass movement during those storms affected private property and public infrastructure and facilities.

Loss estimations for the landslide hazard are not based on modeling using damage functions, because no such damage functions have been generated. Instead, loss estimates were developed representing 10 percent, 30 percent and 50 percent of the assessed value of exposed structures. This allows emergency managers to select a range of economic impact based on an estimate of the percent of damage to the general building stock. Damage in excess of 50 percent is considered to be substantial by most building codes and typically requires total reconstruction of the structure. Table 11-3 shows the general building stock loss estimates in landslide risk areas.

Table 11-3. Estimated Building Losses in the Steep Slope Areas

	Building Count	Assessed Value	10% Damage	30% Damage	50% Damage
15% to 30% slope areas					
City of Emmett	0	$0	0	0	0
Letha	0	$0	0	0	0
Montour	15	$7,676,672	$767,667	$2,303,001	$3,838,336
Ola	8	$2,591,701	$259,170	$777,510	$1,295,851
Sweet	18	$7,051,612	$705,161	$2,115,484	$3,525,806
Unincorporated	196	$78,077,245	$8,454,241	$25,362,722	$42,271,203
30% or greater slope areas					
City of Emmett	0	$0	$0	$0	$0
Letha	0	$0	$0	$0	$0
Montour	3	$1,142,100	$114,210	$342,630	$$571,050
Ola	10	$4,025,195	$402,520	$1,207,559	$2,012,598
Sweet	05	$3,363,420	$336,342	$1,009,026	$1,681,710
Unincorporated	55	$25,180,525	$2,518,053	$7,554,158	$12,590,263
Total	**73**	**$33,711,240**	**$3,371,125**	**$10,113,373**	**$16,284,571**

11.5.3 Critical Facilities and Infrastructure

There are 11 critical facilities exposed to the landslide hazard to some degree. A more in-depth analysis of the mitigation measures taken by these facilities to prevent damage from mass movements should be done to determine if they could withstand impacts of a mass movement.

Several types of infrastructure are exposed to mass movements, including transportation, water and sewer and power infrastructure. Highly susceptible areas of the county include mountain and coastal roads and transportation infrastructure. At this time, all infrastructure and transportation corridors identified as exposed to the landslide hazard are considered vulnerable until more information becomes available.

11.5.4 Environment

The environment vulnerable to landslide hazard is the same as the environment exposed to the hazard.

11.6 DEVELOPMENT TRENDS

The value of planning area properties exposed to the landslide hazard has increased by 54.16 percent ($69.9 million) since the last hazard mitigation plan update in 2012. This increase in risk exposure can be attributed to the expansion of the risk assessment to include properties on slopes of 30 percent or greater, a population growth of 5.8 percent in the same period, and property value increases associated with continued economic recovery from the 2008 economic downturn (see Section 4.5.3).

While landslides are not generally hazards addressed in comprehensive plans, the risk assessment in this plan creates an opportunity for Gem County and its planning partners to consider the inclusion of landslide hazards in their comprehensive plans. A key component to support this action would be the availability of good sub-surface soil mapping using the best available data, science and technology. It is anticipated that this data will be available in the near future. In the meantime, Gem County and its planning partners are equipped to deal with new development on a case-by-case basis through enforcement of the International Building Code (IBC). The IBC includes provisions for geotechnical analyses in steep slope areas that have soil types susceptible to landslides. These provisions ensure that new construction is built to standards that reduce the vulnerability to landslides.

11.7 SCENARIO

Major landslides in Gem County occur as a result of soil conditions that have been affected by severe storms, groundwater or human development. The worst-case scenario for landslide hazards in the planning area would generally correspond to a severe storm that had heavy rain and caused flooding. Landslides are most likely during late winter when the water table is high. After heavy rains from November to December, soils become saturated with water. As water seeps downward through upper soils that may consist of permeable sands and gravels and accumulates on impermeable silt, it will cause weakness and destabilization in the slope. A short intense storm could cause saturated soil to move, resulting in landslides. As rains continue, the groundwater table rises, adding to the weakening of the slope. Gravity, poor drainage, a rising groundwater table and poor soil exacerbate hazardous conditions.

Mass movements are becoming more of a concern as development moves outside of city centers and into areas less developed in terms of infrastructure. Most mass movements would be isolated events affecting specific areas. It is probable that private and public property, including infrastructure, will be affected. Mass movements could affect bridges that pass over landslide prone ravines and knock out rail service through the county. Road obstructions caused by mass movements would create isolation problems for residents and businesses in sparsely developed areas. Property owners exposed to steep slopes may suffer damage to property or structures. Landslides carrying vegetation such as shrubs and trees may cause a break in utility lines, cutting off power and communication access to residents.

Continued heavy rains and flooding will complicate the problem further. As emergency response resources are applied to problems with flooding, it is possible they will be unavailable to assist with landslides occurring all over Gem County.

11.8 ISSUES

Important issues associated with landslides in Gem County include the following:

- Sub-surface soils mapping is needed to better understand the landslide risk potential within the planning area.
- There are existing homes in landslide risk areas throughout the county. The degree of vulnerability of these structures depends on the codes and standards the structures were constructed to. Information to this level of detail is not currently available.
- Future development could lead to more homes in landslide risk areas, especially as development moves upland for increased view potential of the Emmett Valley.
- Mapping and assessment of landslide hazards are constantly evolving. As new data and science become available, assessments of landslide risk should be reevaluated.
- The impact of climate change on landslides is uncertain. If climate change impacts atmospheric conditions, then exposure to landslide risks is likely to increase.
- Landslides may cause negative environmental consequences, including water quality degradation.
- The risk associated with the landslide hazard overlaps the risk associated with other hazards such as earthquake, flood and wildfire. This provides an opportunity to seek mitigation alternatives with multiple objectives that can reduce risk for multiple hazards.
- A buildable-lands analysis that looks at vacant lands and their designated land use would be a valuable tool in helping decision-makers make wise decisions about future development.

12. SEVERE WEATHER

12.1 GENERAL BACKGROUND

Severe weather refers to any dangerous meteorological phenomena with the potential to cause damage, serious social disruption, or loss of human life. It includes thunderstorms, hail storms, damaging winds, tornadoes, excessive heat, snowstorms, ice storms, blizzards, and extreme cold

Severe weather can be categorized into two groups: systems that form over wide geographic areas are classified as general severe weather; those with a more limited geographic area are classified as localized severe weather. Severe weather, technically, is not the same as extreme weather, which refers to unusual weather events at the extremes of the historical distribution for a given area.

Five types of severe weather events typically impact Gem County: thunderstorms, damaging winds, hail storms, severe winter weather, and flash flooding. Flooding issues are discussed in Chapter 10. The other four types of severe weather common to Gem County are described in the following sections.

12.1.1 Thunderstorms

A thunderstorm is a rain event that includes thunder and lightning. A thunderstorm is classified as "severe" when it contains one or more of the following: hail with a diameter of three-quarter inch or greater, winds gusting in excess of 50 knots (57.5 mph), or tornado. Approximately 10 percent of the 100,000 thunderstorm that occur nationally every year are classified as severe (NOAA, 2014).

Storm Development

Three factors cause thunderstorms to form: moisture, rising unstable air (air that keeps rising when disturbed), and a lifting mechanism to provide the disturbance. The sun heats the surface of the earth, which warms the air above it. If this warm surface air is forced to rise (hills or mountains can cause rising motion, as can the interaction of warm air and cold air or wet air and dry air) it will continue to rise as long as it weighs less and stays warmer than the air around it. As the air rises, it transfers heat from the surface of the earth to the upper levels of the atmosphere (the process of convection). The water vapor it contains begins to cool and it condenses into a cloud.

The cloud eventually grows upward into areas where the temperature is below freezing. Some of the water vapor turns to ice and some of it turns into water droplets. Both have electrical charges. Ice particles usually have positive charges, and rain droplets usually have negative charges. When the charges build up enough, they are discharged in a bolt of lightning, which causes the sound waves we hear as thunder. Thunderstorms have three stages (see Figure 12-1):

- The *developing stage* of a thunderstorm is marked by a cumulus cloud being pushed upward by a rising column of air (updraft). The cumulus cloud soon looks like a tower. There is little to no rain during this stage but occasional lightning. The developing stage lasts about 10 minutes.

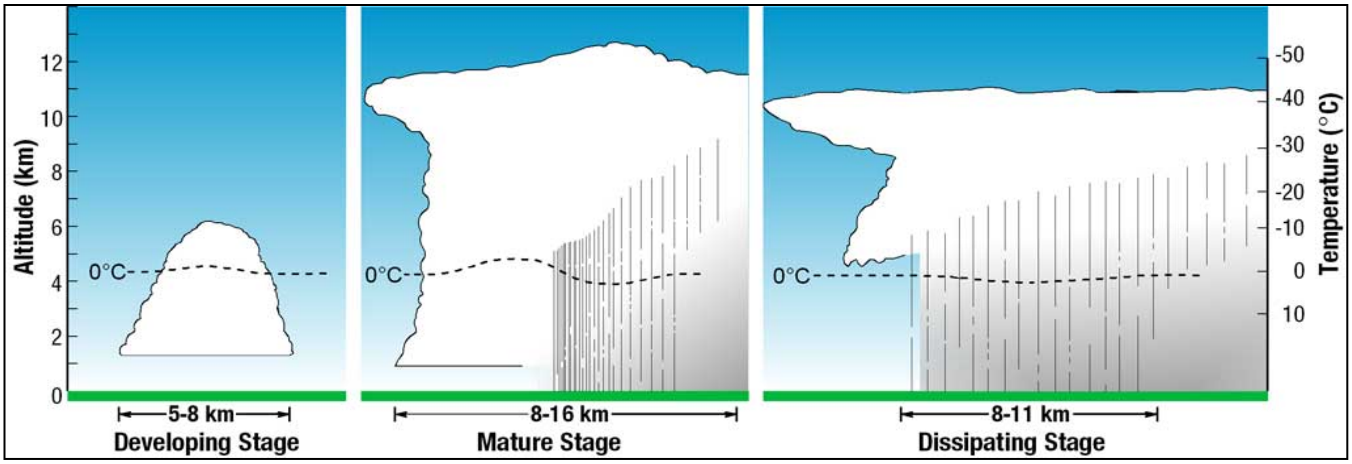


Figure 12-1. The Thunderstorm Life Cycle

- As the updraft continues, the thunderstorm enters the *mature stage* when precipitation begins to fall, and a downdraft begins (a column of air pushing downward). When the downdraft and rain-cooled air spread out along the ground, they form a gust front, or a line of gusty winds. The mature stage is the most likely time for hail, heavy rain, frequent lightning, strong winds, and tornadoes. The storm occasionally has a black or dark green appearance.
- Eventually, a large amount of precipitation is produced, and the updraft is overcome by the downdraft beginning the *dissipating stage*. At the ground, the gust front moves out a long distance from the storm and cuts off the warm moist air that was feeding the thunderstorm. Rainfall decreases in intensity, but lightning remains a danger.

Storm Types

There are four types of thunderstorms:

- **Single-Cell Thunderstorms—**Single-cell thunderstorms usually last 20 to 30 minutes. A true single-cell storm is rare, because the gust front of one cell often triggers the growth of another. Most single-cell storms are not usually severe, but a single-cell storm can produce a brief severe weather event. When this happens, it is called a pulse severe storm.
- **Multi-Cell Cluster Storm—**A multi-cell cluster is the most common type of thunderstorm. The multi-cell cluster consists of a group of cells, moving as one unit, with each cell in a different phase of the thunderstorm life cycle. Mature cells are usually found at the center of the cluster and dissipating cells at the downwind edge. Multi-cell cluster storms can produce moderate-size hail, flash floods and weak tornadoes. Each cell in a multi-cell cluster lasts only about 20 minutes; the multi-cell cluster itself may persist for several hours. This type of storm is usually more intense than a single cell storm.
- **Multi-Cell Squall Line—**A multi-cell line storm, or squall line, consists of a long line of storms with a continuous well-developed gust front at the leading edge. The line of storms can be solid, or there can be gaps and breaks in the line. Squall lines can produce hail up to golf-ball size, heavy rainfall, and weak tornadoes, in addition to strong downdrafts. Occasionally, a strong downburst will accelerate a portion of the squall line ahead of the rest of the line to produce a bow echo. Bow echoes can develop with isolated cells as well as squall lines. Bow echoes are easily detected on radar but are difficult to observe visually.
- **Super-Cell Storm—**A super-cell is similar to a single-cell storm in that it has one main updraft, but the updraft is extremely strong, reaching speeds of 150 to 175 miles per hour. Super-cells are rare. The main characteristic that sets them apart from other thunderstorms is the presence of rotation. The rotating updraft of a super-cell (called a mesocyclone when visible on radar) helps the super-cell to produce

extreme weather events, such as giant hail (more than 2 inches in diameter), strong downbursts of 80 miles an hour or more, and strong to violent tornadoes.

Lightning

Lightning is an electrical discharge between positive and negative regions of a thunderstorm. A lightning flash is composed of a series of strokes, with an average of about four. The average duration of each stroke is about 30 microseconds. Lightning occurs in all thunderstorms. There are two main types of lightning: intra-cloud lightning and cloud-to-ground lightning (NWS, 2014).

Lightning is one of the more dangerous weather hazards in the United States. Each year, lightning is responsible for deaths, injuries, and millions of dollars in property damage, including damage to buildings, communications systems, power lines, and electrical systems. Lightning also causes forest and brush fires and deaths and injuries to livestock and other animals. According to the National Lightning Safety Institute, property damage, increased operating costs, production delays, and lost revenue from lightning and secondary effects exceed $6 billion per year (NLSI, 2008). Impacts can be direct or indirect. People or objects can be directly struck, or damage can occur indirectly when the current passes through or near it.

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

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

The ratio of cloud-to-ground and intra-cloud lightning can vary significantly from storm to storm. Depending upon cloud height above ground and changes in electric field strength between cloud and earth, the discharge stays within the cloud or makes direct contact with the earth. If the field strength is highest in the lower regions of the cloud, a downward flash may occur from cloud to earth. Using a network of lightning detection systems, the United States monitors an average of 25 million strokes of lightning from the cloud-to-ground every year.

U.S. lightning statistics compiled by the National Oceanic and Atmospheric Administration between 1959 and 1994 indicate that most lightning incidents occur in June, July and August and during the afternoon hours from between 2 and 6 p.m.

12.1.2 Damaging Winds

Damaging winds are classified as those exceeding 60 mph. Damage from such winds accounts for half of all severe weather reports in the lower 48 states. Wind speeds can reach up to 100 mph and can produce a damage path extending for hundreds of miles. Isolated wind events in mountainous regions have more localized effects. Windstorms in Idaho typically occur from October through March (Idaho State Hazard Mitigation Plan, 2013). There are seven types of damaging winds:

- **Straight-line winds—**Any thunderstorm wind that is not associated with rotation; this term is used mainly to differentiate from tornado winds. Most thunderstorms produce some straight-line winds as a result of outflow generated by the thunderstorm downdraft.
- **Downdrafts—**A small-scale column of air that rapidly sinks toward the ground.
- **Downbursts—**A strong downdraft with horizontal dimensions larger than 2.5 miles resulting in an outward burst or damaging winds on or near the ground. Downburst winds may begin as a microburst and spread out over a wider area, sometimes producing damage similar to a strong tornado. Although usually associated with thunderstorms, downbursts can occur with showers too weak to produce thunder.
- **Microbursts—**A small concentrated downburst that produces an outward burst of damaging winds at the surface. Microbursts are generally less than 2.5 miles across and short-lived, lasting only 5 to 10 minutes, with maximum wind speeds up to 168 mph. There are two kinds of microbursts: wet and dry. A wet microburst is accompanied by heavy precipitation at the surface. Dry microbursts, common in places like the high plains and the intermountain west, occur with little or no precipitation reaching the ground.
- **Gust front—**A gust front is the leading edge of rain-cooled air that clashes with warmer thunderstorm inflow. Gust fronts are characterized by a wind shift, temperature drop, and gusty winds out ahead of a thunderstorm. Sometimes the winds push up air above them, forming a shelf cloud or detached roll cloud.
- **Derecho—**A derecho is a widespread thunderstorm wind caused when new thunderstorms form along the leading edge of an outflow boundary (the boundary formed by horizontal spreading of thunderstorm-cooled air). The word “derecho” is of Spanish origin and means “straight ahead.” Thunderstorms feed on the boundary and continue to reproduce. Derechos typically occur in summer when complexes of thunderstorms form over plains, producing heavy rain and severe wind. The damaging winds can last a long time and cover a large area.
- **Bow Echo—**A bow echo is a linear wind front bent outward in a bow shape. Damaging straight-line winds often occur near the center of a bow echo. Bow echoes can be 200 miles long, last for several hours, and produce extensive wind damage at the ground.

Windstorms can result in collapsed or damaged buildings, damaged or blocked roads and bridges, damaged traffic signals, streetlights and parks, and other damage. They can also cause direct losses to buildings, people, and vital equipment. There are direct consequences to the local economy resulting from windstorms related to both physical damage and interrupted services.

Wind pressure can create a direct and frontal assault on a structure, pushing walls, doors, and windows inward. Conversely, passing currents can create lift and suction forces that act to pull building components and surfaces outward. As positive and negative forces impact a building’s doors, windows and walls, the result can be roof or building component failures and considerable structural damage. The effects of winds are magnified in the upper levels of multi-story structures.

Debris carried along by extreme winds can contribute directly to loss of life and indirectly to the failure of protective building envelopes. Falling trees and branches can damage buildings, power lines, and other property and infrastructure. Tree limbs breaking in winds of only 45 mph can be thrown over 75 feet, so overhead power lines can be damaged even in relatively minor windstorm events. During wet winters, saturated soils cause trees to become less stable and more vulnerable to uprooting from high winds. Utility lines brought down by summer thunderstorms have also been known to cause fires, which start in dry roadside vegetation. Electric power lines falling down to the pavement create the possibility of lethal electric shock.

Downed trees and power lines, and damaged property also can be major hindrances to emergency response and disaster recovery. Emergency response operations can be complicated when roads are blocked or when power supplies are interrupted. Industry and commerce can suffer losses from interruptions in electric service and from extended road closures.

12.1.3 Hail

Hail occurs when updrafts in thunderstorms carry raindrops upward into extremely cold areas of the atmosphere where they freeze into ice. Super-cooled water may accumulate on frozen particles near the back-side of a storm as they are pushed forward across and above the updraft by the prevailing winds near the top of the storm. Eventually, the hailstones encounter downdraft air and fall to the ground.

Hailstones grow two ways: by wet growth or dry growth. In wet growth, a tiny piece of ice is in an area where the air temperature is below freezing, but not super cold. When the tiny piece of ice collides with a super-cooled drop, the water does not freeze on the ice immediately. Instead, liquid water spreads across tumbling hailstones and slowly freezes. Since the process is slow, air bubbles can escape, resulting in a layer of clear ice. Dry growth hailstones grow when the air temperature is well below freezing and the water droplet freezes immediately as it collides with the ice particle. The air bubbles are “frozen” in place, leaving cloudy ice.

Hailstones can have layers like an onion if they travel up and down in an updraft, or they can have few or no layers if they are “balanced” in an updraft. Hailstones can begin to melt and then re-freeze together, forming large and very irregularly shaped hail.

12.1.4 Severe Winter Weather

The National Weather Service defines a winter storm as having significant snowfall, ice and/or freezing rain; the quantity of precipitation varies by elevation. Heavy snowfall is 4 inches or more in a 12-hour period, or 6 inches or more in a 24-hour period in non-mountainous areas; and 12 inches or more in a 12-hour period or 18 inches or more in a 24-hour period in mountainous areas. There are three key ingredients to a severe winter storm:

- **Cold Air**—Below-freezing temperatures in the clouds and near the ground are necessary to make snow and/or ice.
- **Moisture**—Moisture is required in order to form clouds and precipitation. Air blowing across a body of water, such as a large lake or the ocean, is a typical source of moisture.
- **Lift**—Lift is required in order to raise the moist air to form the clouds and cause precipitation. An example of lift is warm air colliding with cold air and being forced to rise over the cold dome. The boundary between the warm and cold air masses is called a front. Another example of lift is air flowing up a mountain side.

Areas most vulnerable to winter storms are those affected by convergence of dry, cold air from the interior of the North American continent and warm, moist air off the Pacific Ocean. When strong storms crossing the Pacific arrive at the coast, if the air is cold enough, snow falls. As the moisture rises into the mountains, heavy snow closes mountain passes and can cause avalanches. Cold air from the north has to filter through mountain canyons into basins and valleys to the south. If the cold air is deep enough, it can spill over a mountain ridge. As the air funnels through canyons and over ridges, wind speeds can reach 100 mph. High winds with snow results in a blizzard.

12.2 HAZARD PROFILE

12.2.1 Past Events

Table 12-1 summarizes severe weather events in Gem County since 2000 that caused property damage, as recorded by the National Oceanic and Atmospheric Administration (NOAA).

Table 12-1. Severe Weather Events Impacting Planning Area Since 2000

Date	Type	Deaths or Injuries	Property Damage
12/24/2017	Heavy Snow	None	None reported
Description: *A warm front moving through the Northern Great Basin spread areas of heavy snow across parts of Southwest Idaho. Numerous reports of three to four inches of new snow were received.*			
2/8/2017	Heavy Rain	None	$1,000
Description: *Heavy rain across most of the intermountain west. Flooding occurred in most of South Central Idaho. An emergency manager reported high water and debris along Big Willow Creek and water running over Big Willow Road northeast of Dry Creek.*			
8/7/2016	Hail	None	None reported
Description: *Strong to severe convection occurred across parts of Southwest Idaho. A follower on social media posted a picture of observed three quarter of an inch hail that dropped out of a thunderstorm near Emmett, Idaho.*			
6/29/2010	Hail	None	None reported
Description: *A moist, southerly flow continued across the Intermountain West on the 29th with severe thunderstorms developing over parts of Gem County. A trained spotter near Ola reported 1-inch hail.*			
6/28/2010	Thunderstorm Wind	None	None reported
Description: *A southerly flow of moisture into the Intermountain West along with daytime temperatures near 100 degrees for many locations provided the needed energy for strong to severe thunderstorm development across parts of Southwest Idaho. A trained spotter near Ola reported a wind gust of 66 mph.*			
8/25/2004	Tornado	None	None reported
Description: *An F0 tornado was spotted near Sand Hollow, Payette, Gem County line. No damaged reported.*			
6/19/2003	Thunderstorm Wind	None	None reported
Description*: A very moist upper level trough moving eastward across southern Idaho produced wide spread thunderstorms over the region. Several severe thunderstorms occurred, with winds in excess of 60 mph. Hail to three quarters of an inch was reported 3 miles south of Reynolds Creek in Owyhee County.*			
9/29/2002	Tornado	None	None reported
Description: *A tornado touched down at Tom's Cabin Road, west of Emmett, in Gem County. It tracked eastward on the ground for a mile, ripping limbs off trees, destroying an outbuilding, and damaging houses and a vehicle.*			
2/25/2002	Thunderstorm Wind	None	None reported
Description: *Thunderstorm winds brought down trees and power lines and left over 5,000 homes and businesses without power. Winds also kicked up dust, which reduced visibility to near zero on Interstate 84 near Blacks Creek Road. This resulted in a 12-car pileup in which four persons were injured. Wind gusts were measured at 62 mph at KTVB TV in Meridian and at 69 mph at Dead Indian Remote Automatic Weather Station in western Washington County.*			
7/15/2002	Funnel Cloud	None	None reported
Description: *A funnel cloud was spotted in Gem County near the Canyon County line.*			
7/13/2002	Thunderstorm Wind	None	None reported
Description: *Thunderstorm winds along a gust front toppled a stack of speakers from the stage of the Idaho Center Amphitheater and into the audience. Four persons were treated for injuries at a local medical center. Outflow winds continued across Canyon County and into Payette, Gem and Ada counties, bringing numerous trees and power lines down.*			
2/7/2002	Thunderstorm Wind	None	None Reported
Description: *Thunderstorms in Gem County produced wind gusting to 61 mph and dropped hail up to 1.0 inches in diameter along a path from 2 miles northwest of Emmett to 2 miles east of Emmett. Numerous trees and power lines were brought down by the storm.*			

a. Loss data obtained from NOAA Storm Events Database (https://www.ncdc.noaa.gov/stormevents/choosedates.jsp?statefips=16%2CIDAHO)

12.2.2 Location

Severe weather events have the potential to happen anywhere in the planning area. Communities in low-lying areas next to streams or lakes are more susceptible to flooding. Wind events are most damaging to areas that are heavily wooded.

12.2.3 Frequency

The severe weather events for Gem County shown in Table 12-1 are often related to high winds associated with winter storms and thunderstorms. The planning area can expect to experience exposure to some type of severe weather event at least annually. According to the Idaho State Hazard Mitigation Plan, Gem County has a high probability for severe winter storms, due to its winter storm patterns, severity and duration of storms, and proximity to higher elevations.

12.2.4 Severity

The most common problems associated with severe storms are immobility and loss of utilities. Fatalities are uncommon but can occur. Roads may become impassable due to flooding, downed trees or a landslide. Power lines may be downed due to high winds or ice accumulation, and services such as water or phone may not be able to operate without power. Lightning can cause severe damage and injury. Physical damage to homes and facilities can be caused by wind or accumulation of snow or ice.

Windstorms can be a frequent problem in the planning area and have been known to cause damage to utilities. The predicted wind speed given in wind warnings issued by the National Weather Service is for a one-minute average; gusts may be 25 to 30 percent higher. According to FEMA, Gem County is located in Wind Zone I, where wind speeds can reach up to 130 mph. Figure 12-2 indicates the typical maximum strength of windstorms across the United States, based on 40 years of tornado data and 100 years of hurricane data collected by FEMA.

Source: FEMA 2010

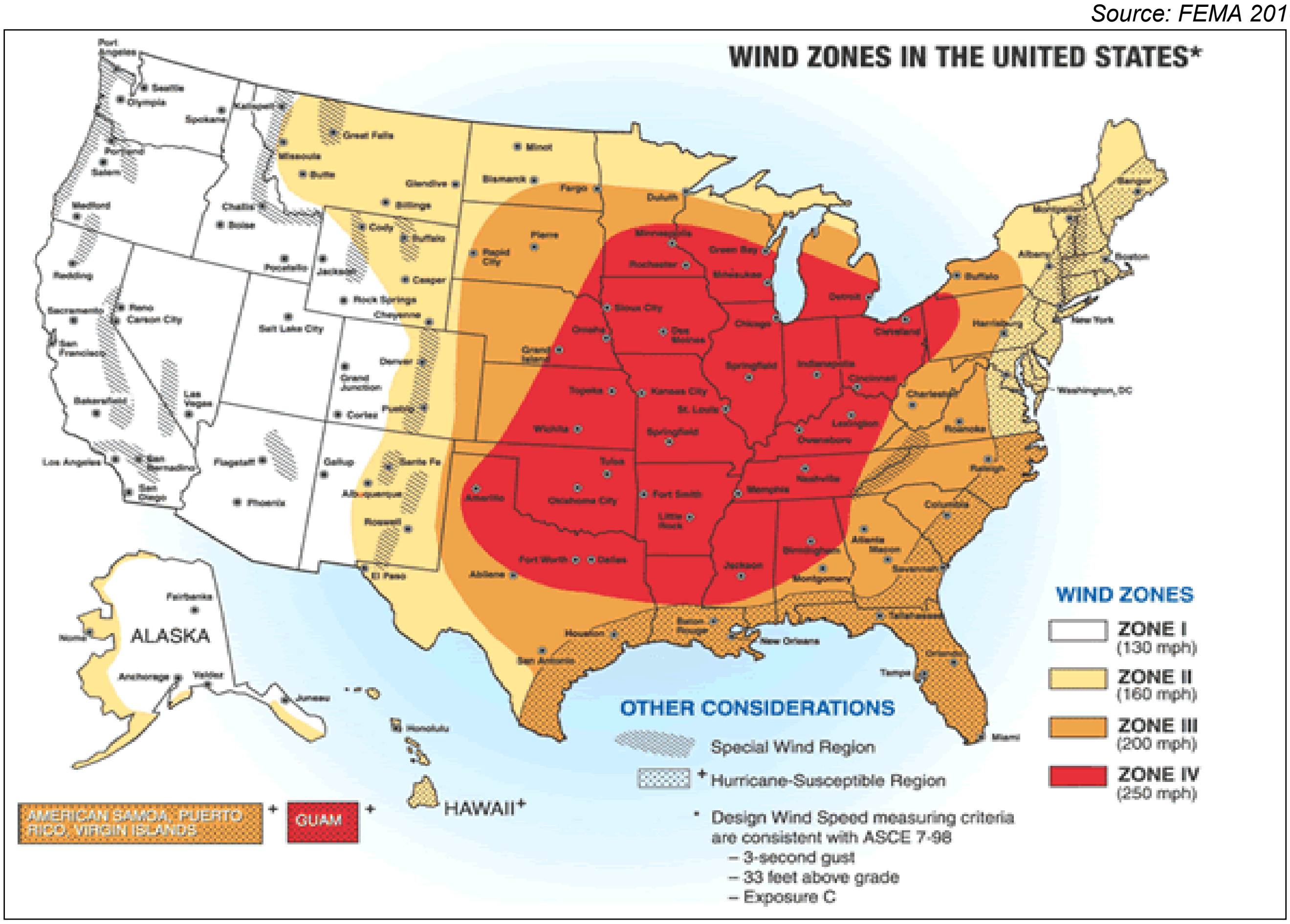


Figure 12-2. Wind Zones in the United States

Ice storms accompanied by high winds can have especially destructive impacts, especially on trees, power lines, and utility services. While sleet and hail can create hazards for motorists when they accumulate, freezing rain can cause the most dangerous conditions in the planning area. Ice buildup can bring down trees, communication towers and wires, creating hazards for property owners, motorists and pedestrians. Rain can fall on frozen streets, cars, and other sub-freezing surfaces, creating dangerous conditions.

Lightning severity is typically assessed based on property damage and life safety (injuries and fatalities). The number of reported injuries from lightning is likely to be low. County infrastructure losses can be up to thousands of dollars each year.

12.2.5 Warning Time

Meteorologists can often predict the likelihood of a severe storm. This can give several days of warning time. However, meteorologists cannot predict the exact time of onset or severity of the storm. Some storms may come on more quickly and have only a few hours of warning time.

12.3 SECONDARY HAZARDS

The most significant secondary hazards associated with severe local storms are floods, falling and downed trees, landslides and downed power lines. Rapidly melting snow combined with heavy rain can overwhelm both natural and man-made drainage systems, causing overflow and property destruction. Landslides occur when the soil on slopes becomes oversaturated and fails.

12.4 EXPOSURE

12.4.1 Population

A lack of data separating severe weather damage from flooding and landslide damage prevented a detailed analysis for exposure and vulnerability. However, it can be assumed that the entire planning area is exposed to some extent to severe weather events. Certain areas are more exposed due to geographic location and local weather patterns. Populations living at higher elevations with large stands of trees or power lines may be more susceptible to wind damage and black out, while populations in low-lying areas are at risk for possible flooding.

12.4.2 Property

According to the Gem County Assessor, there are 9,058 structures in the census tracts that define the planning area. Most of these buildings are residential. It is estimated that 28 percent of the residential structures were built without the influence of a structure building code with provisions for wind loads. All of these buildings are considered to be exposed to the severe weather hazard, but structures in poor condition or in particularly vulnerable locations (located on hilltops or exposed open areas) may risk the most damage. The frequency and degree of damage will depend on specific locations.

12.4.3 Critical Facilities and Infrastructure

All critical facilities exposed to flooding (Chapter 10) are also likely exposed to severe weather. Additional facilities on higher ground may also be exposed to wind damage or damage from falling trees. The most common problems associated with severe weather are loss of utilities. Downed power lines can cause blackouts, leaving large areas isolated. Phone, water and sewer systems may not function. Roads may become impassable due to ice or snow or from secondary hazards such as landslides.

12.4.4 Environment

The environment is highly exposed to severe weather. Natural habitats such as streams and trees are exposed to the elements during a severe storm and risk major damage and destruction. Prolonged rains can saturate soils and lead to slope failure. Flooding events caused by severe weather or snowmelt can produce river channel migration or damage riparian habitat.

12.5 VULNERABILITY

12.5.1 Population

Populations vulnerable to severe weather hazards tend to be the elderly, low income or linguistically isolated populations, people with life-threatening illnesses, residents living in areas that are isolated from major roads, and residents who lack proper shelter. Power outages can be life threatening to those dependent on electricity for life support. Isolation of these populations is a significant concern. These populations face isolation and exposure during severe weather events and could suffer more secondary effects of the hazard.

12.5.2 Property

All property is vulnerable during severe weather events, but properties in poor condition or in particularly vulnerable locations may risk the most damage. Those in higher elevations and on ridges may be more prone to wind damage. Those that are located under or near overhead lines or near large trees may be vulnerable to falling ice or may be damaged in the event of a collapse.

Loss estimations for the severe weather hazard are not based on damage functions, because no such damage functions have been generated. Instead, loss estimates were developed representing 10 percent, 30 percent and 50 percent of the assessed value of exposed structures. This allows emergency managers to select a range of potential economic impact based on an estimate of the percent of damage to the general building stock. Damage in excess of 50 percent is considered to be substantial by most building codes and typically requires total reconstruction of the structure. Table 12-2 lists the loss estimates to the general building stock.

Table 12-2. Potential Damage to Buildings from Severe Weather Hazard

City	Assessed Value	10% Damage	30% Damage	50% Damage
City of Emmett	$1,021,203,116	$102,120,312	$306,360,935	$510,601,558
Letha	$27,878,328	$2,787,833	$8,363,499	$13,939,164
Montour	$72,588,086	$7,258,809	$21,776,426	$36,294,043
Ola	$38,032,891	$3,803,289	$11,409,867	$19,016,445
Sweet	$95,375,929	$9,537,593	$28,612,779	$47,687,965
Unincorporated	$2,041,521,032	$204,152,103	$612,456,310	$1,020,760,516
Total	**$3,296,599,382**	**$329,659,939**	**$988,979,816**	**$1,648,299,691**

12.5.3 Critical Facilities and Infrastructure

Incapacity and loss of roads are the primary transportation failures resulting from severe weather, mostly associated with secondary hazards. Landslides caused by heavy prolonged rains can block roads. High winds can cause significant damage to trees and power lines, blocking roads with debris, incapacitating transportation, isolating population, and disrupting ingress and egress. Snowstorms in higher elevations can significantly impact the transportation system and the availability of public safety services. Of particular concern are roads providing access to isolated areas and to the elderly.

Prolonged obstruction of major routes due to landslides, snow, debris or floodwaters can disrupt the shipment of goods and other commerce. Large, prolonged storms can have negative economic impacts for an entire region. Severe windstorms, downed trees, and ice can create serious impacts on power and above-ground communication lines. Freezing of power and communication lines can cause them to break, disrupting electricity and communication. Loss of electricity and phone connection would leave certain populations isolated because residents would be unable to call for assistance.

12.5.4 Environment

The vulnerability of the environment to severe weather is the same as the exposure.

12.6 DEVELOPMENT TRENDS

Because all of the planning area is exposed to the severe weather hazard, the increase in exposed population and property since the last hazard mitigation plan update is equal to the countywide trends since then: a 2.78-percent increase in population, a 19.6-percent increase in number of general building stock structures, and a 34.2-percent increase in assessed property value (see Section 4.5.4) However, since the majority of this growth was new development, the increase in vulnerability to severe weather is considered to be minimal due to the influence of strong codes and code enforcement within the planning area.

All future development will be affected by severe storms. The ability to withstand impacts lies in sound land use practices and consistent enforcement of codes and regulations for new construction. All planning partners that have permit authority have adopted the International Building Code. This code is equipped to deal with the impacts of severe weather events. Land use policies identified in comprehensive plans within the planning area also address many of the secondary impacts (flood and landslide) of the severe weather hazard. With these tools, the planning partnership is well equipped to deal with future growth and the associated impacts of severe weather.

12.7 SCENARIO

Severe local storms can occur frequently, and impacts can be significant, particularly when secondary hazards of flood and landslide occur. A worst-case event would involve prolonged high winds during a winter storm accompanied by thunderstorms. Such an event would have both short-term and longer-term effects. Initially, schools and roads would be closed due to power outages caused by high winds and downed tree obstructions. In more rural areas, some subdivisions could experience limited ingress and egress. Prolonged rain could produce flooding, overtopped culverts with ponded water on roads, and landslides on steep slopes. Flooding and landslides could further obstruct roads and bridges, further isolating residents.

12.8 ISSUES

Important issues associated with a severe weather in the Gem County planning area include the following:

- Older building stock in the planning area is built to low code standards or none at all. These structures could be highly vulnerable to severe weather events such as windstorms.
- Redundancy of power supply throughout the planning area must be evaluated to better understand what areas may be vulnerable.
- Above-ground power supply lines and telephone lines are susceptible.
- The capacity for backup power generation is limited.
- Some population centers are isolated.
- Public education on dealing with the impacts of severe weather needs to continue so that residents can be better informed and prepared for severe weather events.

- Debris management (downed trees, etc.) must be addressed, because debris can impact the severity of severe weather events, requires coordination efforts, and may require additional funding.
- Priority snow removal routes should continue to be cleared first to ensure navigable routes through and between jurisdictions.

13. WILDFIRE

13.1 GENERAL BACKGROUND

A wildfire is defined as an uncontrolled fire on undeveloped or developed land that in most cases, but not all, requires fire suppression. Wildfires can be ignited by lightning or by human activity such as smoking, campfires, equipment use and arson. Wildfires occur when all of the necessary elements of a fire come together in a wooded or grassy area: an ignition source is brought into contact with a combustible material such as vegetation that is subjected to sufficient heat and has an adequate supply of oxygen from the ambient air.

A wildfire front is the portion of a wildfire sustaining continuous flaming combustion, where unburned material meets active flames. As the front approaches, the fire heats both the surrounding air and vegetative material through convection and thermal radiation. First, vegetative material is dried as water in it is vaporized at a temperature of 212ºF. Next, the wood releases flammable gases at 450ºF. Finally, wood can smolder at 720ºF, and ignite at 1,000ºF. Before the flames of a wildfire arrive at a particular location, heat transfer from the wildfire front can warm the air to 1,470ºF, which pre-heats and dries flammable materials, causing them to ignite faster and allowing the fire to spread faster. High temperature and long-duration surface wildfires may encourage flashover or torching: the drying of tree canopies and their subsequent ignition from below.

Large wildfires may affect air currents by the stack effect: air rises as it is heated, so large wildfires create powerful updrafts that draw in new, cooler air from surrounding areas in thermal columns. Great vertical differences in temperature and humidity encourage fire-created clouds, strong winds, and fire whirls with the force of tornadoes at speeds of more than 50 mph. Rapid rates of spread, prolific crown fires, the presence of fire whirls, and strong convection columns signify extreme conditions.

13.1.1 Factors Affecting Wildfire Risk

Topography

Topography can have a powerful influence on wildfire behavior. The movement of air over the terrain tends to direct a fire's course. Gulches and canyons can funnel air and act as a chimney, intensifying fire behavior and inducing faster rates of spread. Saddles on ridge tops offer lower resistance to the passage of air and will draw fires. Solar heating of drier, south-facing slopes produces upslope thermal winds that can complicate behavior.

Slope is an important factor. If the percentage of uphill slope doubles, the rate of spread of wildfire will likely double. On steep slopes, fuels on the uphill side of the fire are closer physically to the source of heat. Radiation preheats and dries the fuel, thus intensifying fire behavior. Fire travels downslope much more slowly than it does upslope, and ridge tops often mark the end of wildfire's rapid spread.

Fuels

Fuels are classified by weight or volume (fuel loading) and by type. Fuel loading, often expressed in tons per acre, can be used to describe the amount of vegetative material available. If fuel loading doubles, the energy released also can be expected to double. Each fuel type is given a burn index, which is an estimate of the amount of potential energy that may be released, the effort required to contain a fire in a given fuel, and the expected flame length. Different fuels have different burn qualities. Some fuels burn more easily or release more energy than others. Grass, for instance, releases relatively little energy, but can sustain very high rates of spread. Continuity of fuels is expressed in terms of horizontal and vertical dimensions. Horizontal continuity is what can be seen from an aerial photograph and represents the distribution of fuels over the landscape. Vertical continuity links fuels at the ground surface with tree crowns via ladder fuels.

Another essential factor is fuel moisture. Fuel moisture is expressed as a percentage of total saturation and varies with antecedent weather. Low fuel moistures indicate the probability of severe fires. Given the same weather conditions, moisture in fuels of different diameters changes at different rates. A 1,000-hour fuel, which has a 3- to 8-inch diameter, changes more slowly than a 1- or 10-hour fuel.

Weather

Of all the factors influencing wildfire behavior, weather is the most variable. Extreme weather leads to extreme events, and it is often a moderation of the weather that marks the end of a wildfire's growth and the beginning of successful containment. High temperatures and low humidity can produce vigorous fire activity. The cooling and higher humidity brought by sunset can dramatically quiet fire behavior.

Fronts and thunderstorms can produce winds capable of sudden changes in speed and direction, causing changes in fire activity. The rate of spread of a fire varies directly with wind velocity. Winds may play a dominant role in directing the course of a fire. The most damaging firestorms are usually marked by high winds. The radical and devastating effect that wind can have on fire behavior is a primary safety concern for firefighters. In a 1994 fire in Colorado, a sudden change in wind speed and direction led to a blowup that claimed the lives of 14 firefighters.

13.1.2 Wildfire Types

Fire types can be generally characterized by their fuels as follows:

- **Ground fires** are fed by roots and other buried organic matter. Ground fires typically burn by smoldering and can burn slowly for days to months.
- **Crawling or surface fires** are fueled by low-lying vegetation such as tree litter, grass, and low shrubbery.
- **Ladder fires** consume material between low-level vegetation and tree canopies, such as small trees, downed logs and vines. Invasive plants that scale trees may encourage ladder fires.
- **Crown, canopy or aerial fires** burn suspended material at the canopy level, such as tall trees, vines and mosses. The ignition of a crown fire, depends on the density of the suspended material, canopy height, canopy continuity, and the presence of surface and ladder fires to reach the tree crowns.

13.1.3 Historical Fire Regime and Current Condition Classification

Land managers need to understand historical fire regimes (that is, fire frequency and fire severity prior to significant human settlement) to be able to define ecologically appropriate goals and objectives for an area. This understanding must include knowledge of how historical fire regimes vary across the landscape. Five historical fire regimes are classified based on average number of years between fires (fire frequency) and the severity of the fire (amount of replacement) on the dominant overstory vegetation:

I. 0- to 35-year frequency and low (surface fires most common) to mixed severity (less than 75 percent of the dominant overstory vegetation replaced)
II. 0- to 35-year frequency and high (stand replacement) severity (greater than 75 percent of the dominant overstory vegetation replaced)
III. 35- to 100-year frequency and mixed severity (less than 75 percent of the dominant overstory vegetation replaced)

IV. 35- to 100-year frequency and high (stand replacement) severity (greater than 75 percent of the dominant overstory vegetation replaced)
V. >200-year frequency and high (stand replacement) severity.

Understanding ecosystem departures—how ecosystem processes and functions have changed—provides a context for managing sustainable ecosystems. The fire regime condition class (FRCC) is a classification of the amount of departure from the historical fire regime. There are three condition classes for each historical fire regime. All wildland vegetation and fuel conditions fit within one of the three classes. The classification is based on a relative measure describing the degree of departure from the historical fire regime. This departure results in changes to one or more of the following ecological components:

- Vegetation characteristics (species composition, structural stages, stand age, canopy pattern)
- Fuel composition
- Fire frequency, severity, and pattern
- Associated disturbances (e.g. insect and disease mortality, grazing, and drought).

The three classes indicate low (FRCC 1), moderate (FRCC 2) and high (FRCC 3) departure from the historical fire regime. Low departure is considered to be within the historical range of variability, while moderate and high departures are outside.

Characteristic vegetation and fuel conditions are those that occurred within the historical fire regime. Uncharacteristic conditions are those that did not occur within the historical fire regime, such as invasive species (e.g. weeds, insects, and diseases), "high graded" forest composition and structure (e.g. large trees removed in a frequent surface fire regime), or repeated annual grazing that reduces grassy fuels across relatively large areas to levels that will not carry a surface fire.

Determination of the amount of departure is based on comparison of a composite measure of fire regime attributes to the central tendency of the historical fire regime. The amount of departure is then classified to determine the fire regime condition class. Table 13-1 presents a simplified description of the fire regime condition classes and associated potential risks.

Table 13-1. Fire Regime Condition Class Definitions

Description	Potential Risks
Fire Regime Condition Class 1	
Within the historical range of variability.	• Fire behavior, effects, and other associated disturbances are similar to those that occurred prior to fire exclusion (suppression) and other types of management that do not mimic the natural fire regime and associated vegetation and fuel characteristics. • Composition and structure of vegetation and fuels are similar to the natural (historical) regime. • Risk of loss of key ecosystem components (e.g. native species, large trees and soil) is low.
Fire Regime Condition Class 2	
Moderate departure from the historical regime of variability.	• Fire behavior, effects, and other associated disturbances are moderately departed (more or less severe). • Composition and structure of vegetation and fuel are moderately altered. • Uncharacteristic conditions range from low to moderate. • Risk of loss of key ecosystem components is moderate.
Fire Regime Condition Class 3	
High departure from the historical regime of variability.	• Fire behavior, effects, and other associated disturbances are highly departed (more or less severe). • Composition and structure of vegetation and fuel are highly altered. • Uncharacteristic conditions range from moderate to high. • Risk of loss of key ecosystem components is high.

13.2 HAZARD PROFILE

Wildfire presents a considerable risk to vegetation and wildlife. Short-term loss caused by a wildfire can include the destruction of timber, wildlife habitat, scenic vistas, and watersheds. Long-term effects include smaller timber harvests, reduced access to affected recreational areas, destruction of cultural and economic resources, and potential impacts on water supply and community infrastructure. Vulnerability to flooding increases due to the destruction of watersheds. The potential for significant damage to life and property exists in areas designated as wildland urban interface (WUI) areas, where development is adjacent to densely vegetated areas.

13.2.1 Past Events

In the fire-adapted ecosystems of Idaho, fire is the dominant process constraining terrestrial vegetation patterns, habitat, and species composition. Fire was once an integral function of the majority of ecosystems in Idaho. The seasonal cycling of fire across the landscape was as regular as the July, August and September lightning storms across the canyons and mountains. Depending on the plant community composition, structural configuration, and buildup of plant biomass, fire resulted from ignitions with varying intensities and extent across the landscape. Shorter return intervals between fire events often resulted in less dramatic changes in plant composition. The fires burned with a varied return interval, but much of the county burned through a stand-replacing fire that occurred on a moderate return interval of 20 to 80 years.

Native plant communities in this region developed under the influence of fire, and adaptations to fire are evident at the species, community and ecosystem levels. Fire history data (from fire scars and charcoal deposits) suggest fire has played a role in shaping the vegetation in the region for thousands of years.

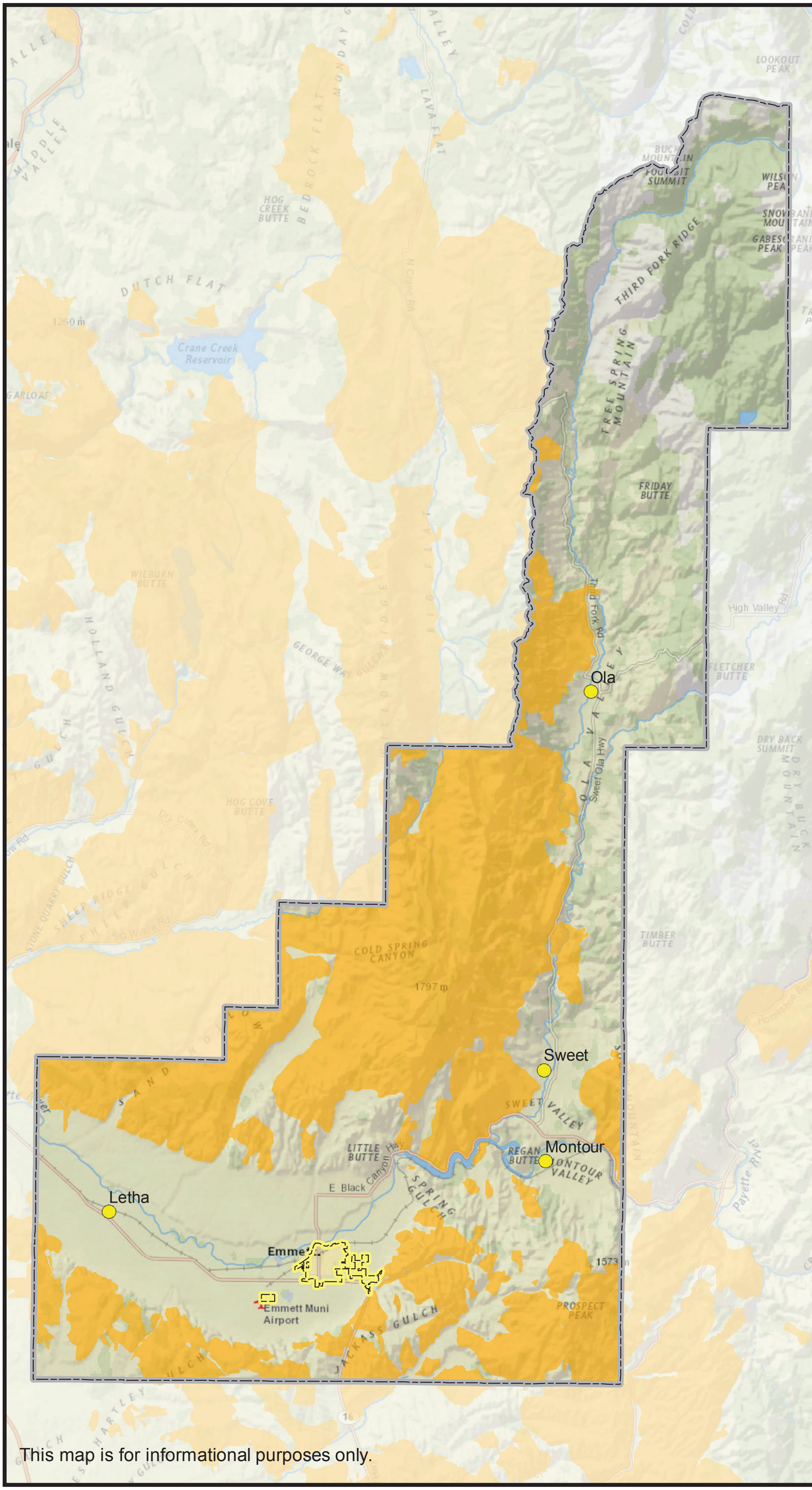
The Gem County planning area is within the Idaho Department of Lands Southwest Idaho Fire Protection District. The Department of Lands maintains detailed records of fire starts. Table 13-2 is a summary of fire causes and area burned in the Southwest Idaho Fire Protection District for 2010 through 2016. Figure 13-1 shows the location of all major historical fires recorded in Gem County through 2012, the last year for which these data are available. The fire perimeters for each year over the past 10 years is shown on Figure 13-2.

Table 13-2. Fires by Cause—Southwest Idaho Fire Protection District, 2010-2017

	2010	2011	2012	2013	2014	2015	2016	Total
Number of Fires, by Cause								
Lightning	20	13	6	38	16	16	2	111
Miscellaneous	0	0	4	1	7	3	4	19
Camp Fire	0	2	1	3	2	2	5	15
Debris Burning	1	3	2	5	2	2	0	15
Equipment Use	2	1	2	1	1	2	3	12
Arson	1	1	3	0	0	1	3	9
Smoking	1	2	1	0	0	0	0	4
Total	**25**	**22**	**18**	**48**	**28**	**26**	**17**	**185**
Total Area Burned								
Burned Area (acres)	22	754	1,880	287	4,578	32,042	0	

13.2.2 Location

The Idaho State Fire Plan Working Group produced the *Relative Risk to Communities from Wildland Fire* mapping. These maps characterize relative wildfire risk by integrating relative risk, relative hazard, and wildland urban interface. Figure 13-3 shows this mapping for Gem County. This data set and the modeling it was based on are the best data available to assess the wildfire risk for this plan.



Gem County

Figure 13-1.
Historical Fire Perimeters
(1878-2012)

Historical Fire Perimeters

Gem County Boundary

City of Emmett

Gem County Planning Communities

N
W E
S

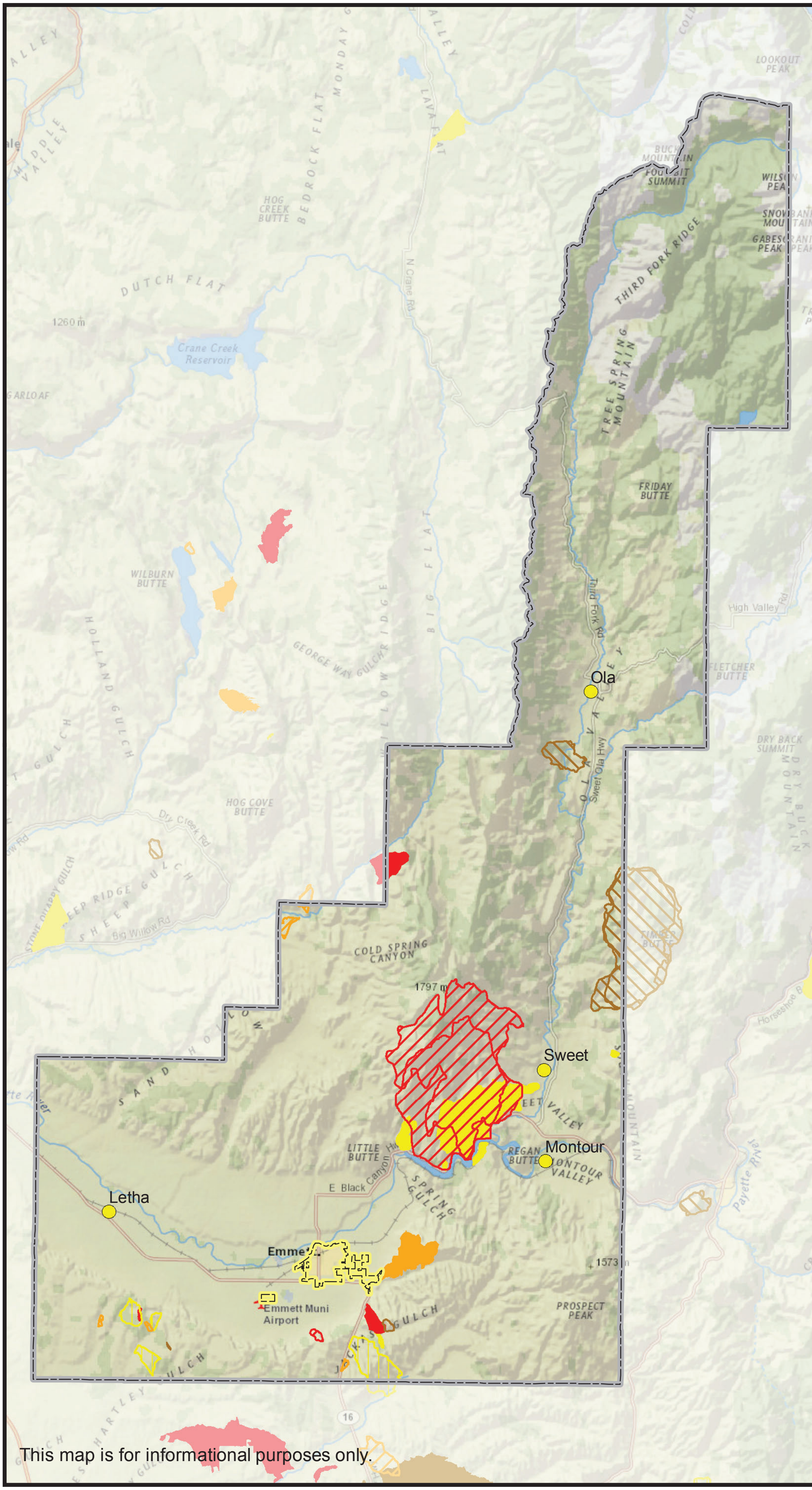
0 2 4 8
Miles

TETRA TECH

Map Data Sources: National Geographic, Gem County, State of Idaho, USBLM

Gem County

Figure 13-2.
Historical Wildfires by Area and Year (2007 - 2017)



Gem County Boundary

City of Emmett

Gem County Planning Communities

Fire Year

2015
2014
2013
2012
2011
2010
2009
2007

N
W E
S

0 2 4 8
Miles

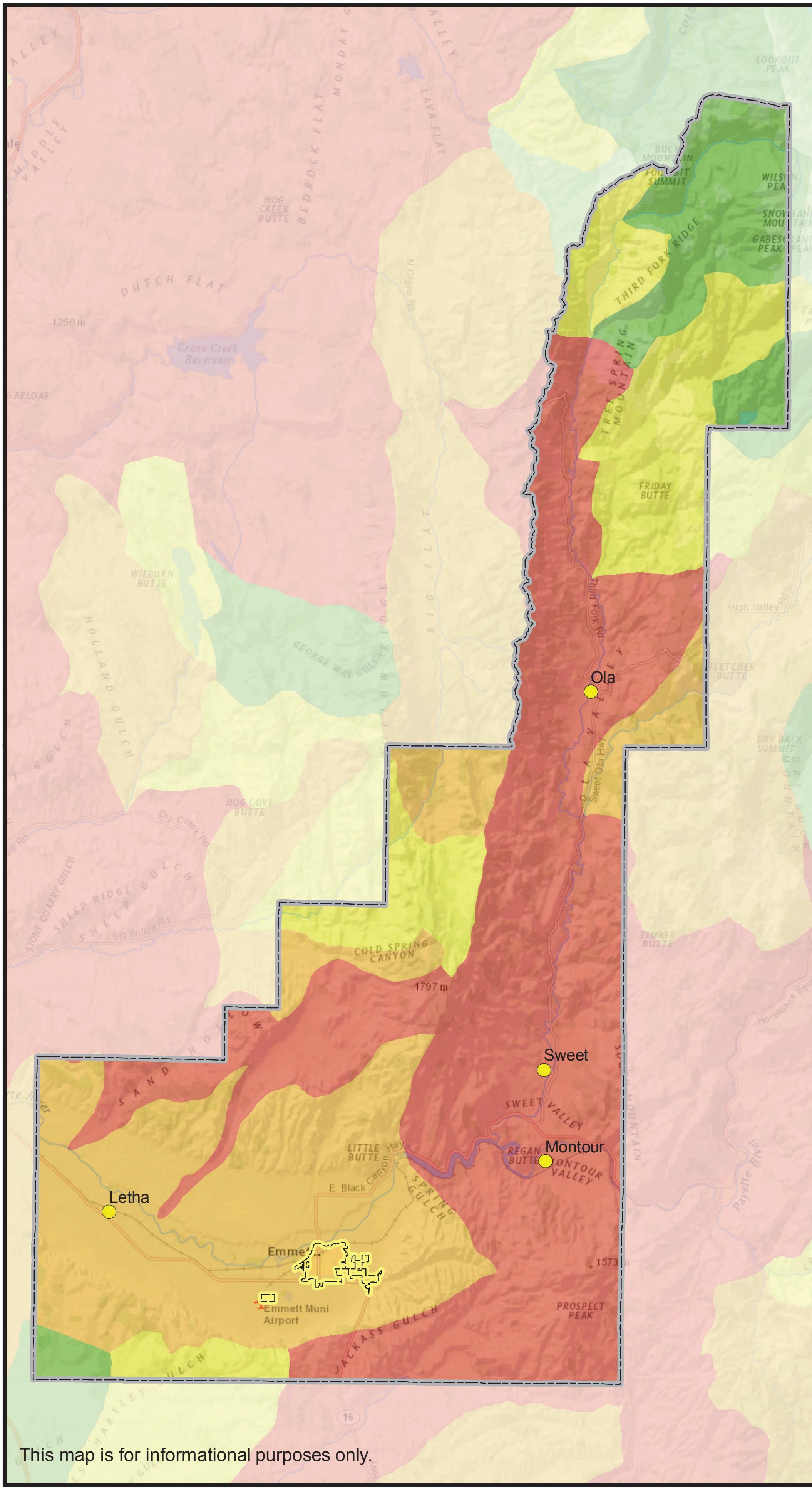
TETRA TECH

IDAHO GEM COUNTY

Map Data Sources: National Geographic, Gem County, State of Idaho, GEOMAC, USBLM

Gem County

Figure 13-3.
Wildfire Risk Areas



Gem County Boundary

City of Emmett

Gem County Planning Communities

Risk Category

Low

Low-Moderate

Moderate

Moderate-High

High

N
W E
S

0 2 4 8
Miles

TETRA TECH

IDAHO
GEM COUNTY

Map Data Sources: National Geographic, Gem County, State of Idaho, USBLM

13.2.3 Frequency

Fire ecologists use natural fire rotation to establish recurrence intervals for a planning area. Fire rotation is a measure of relative expected intervals between fires at regional scales, where site-specific fire frequency estimates are not available. Natural fire rotation is defined as the number of years necessary for fires to burn over an area equal to that of the study area (Heinselman, 1981). It is calculated for large areas using past fire size records by dividing the length of the record period in years by the percentage of total area burned during that period. Modern-era fire rotation analysis summarizes areas into the following classes of expected fire frequency:

- High (fire rotation less than 100 years)
- Medium (fire rotation more than 100 years and less than 300 years)
- Low (fire rotation more than 300 years).

From 2010 to 2016, the Idaho Department of Lands Southwest Idaho Fire Protection District experienced an average of 26 fires per year, burning 2,756 acres per year on state-monitored lands. This yields a natural fire rotation of approximately 108.3 years, a medium rating, almost a high rating.

13.2.4 Severity

Potential losses from wildfire include human life, structures and other improvements, and natural resources. Although fire suppression capabilities in the WUI areas are substantial, the volatile nature of wildfire characteristics makes fighting wildfires a challenge. First responders are exposed to the dangers from the initial incident and after-effects from smoke inhalation and heat stroke. Smoke and air pollution from wildfires can be a health hazard, especially for sensitive populations including children, the elderly and those with respiratory and cardiovascular diseases. In addition, wildfire can lead to ancillary impacts such as landslides in steep ravine areas and flooding due to the impacts of silt in local watersheds.

13.2.5 Warning Time

Wildfires are often caused by humans, intentionally or accidentally. There is no way to predict when one might break out. The weather can provide an element of warning for local governments in that nicer weather heightens public activity in interface areas. Within the planning area, there is always a heightened state of readiness by fire response personnel during the spring, summer and fall as weather and the increased recreational uses within the WUI can trigger events.

Dry seasons and droughts are factors that greatly increase fire likelihood. Dry lightning may trigger wildfires. Severe weather can be predicted, so special attention can be paid during weather events that may include lightning. Reliable National Weather Service lightning warnings are available on average 24 to 48 hours prior to a significant electrical storm.

If a fire does break out and spread rapidly, residents may need to evacuate within days or hours. A fire's peak burning period generally is between 1 p.m. and 6 p.m. Once a fire has started, fire alerting is reasonably rapid in most cases. The spread of cellular and two-way radio communications in recent years has contributed to a significant improvement in warning time.

13.3 SECONDARY HAZARDS

Wildfires can generate a range of secondary effects, which in some cases may cause more widespread and prolonged damage than the fire itself. Fires can cause direct economic losses in the reduction of harvestable timber and indirect economic losses in reduced tourism. Wildfires cause the contamination of reservoirs, destroy transmission lines and contribute to flooding. They strip slopes of vegetation, exposing them to greater amounts of runoff. This in turn can weaken soils and cause failures on slopes. Major landslides can occur several years after a wildfire. Most wildfires burn hot and for long durations that can bake soils, especially those high in clay content, thus increasing the imperviousness of the ground. This increases the runoff generated by storm events, thus increasing the chance of flooding.

13.4 EXPOSURE

13.4.1 Population

The population living in individual wildfire risk areas was estimated by calculating the percentage of total planning area residential structures in each wildfire risk area and applying that percentage to the total planning area population. The results are shown in Table 13-3 for all but the low-risk area, which has a negligible population.

Table 13-3. Population Estimates Within Fire Hazard Risk Zones

	High Risk Zone		Moderate/High Risk Zone	
	Population	% of Total	Population	% of total
City of Emmett	0	0.00	6,717	100
Letha	0	0.00	205	100
Montour	322	100	0	0.00
Ola	133	94.34	8	5.66
Sweet	466	100	0	0.00
Unincorporated	1,348	14.44	8,549	91.60
Total[a]	**2,269**	**13.2**	**8,500**	**90.08**

a. Total percentages do not add to 100% because the estimating approach using average household size does not result in population exactly equal to current county population estimate.

13.4.2 Property

The number of homes in the various wildfire risk zones within the planning area and their values are listed in Table 13-4. Exposure in the low risk zone is negligible and therefore is not shown. Table 13-5 shows the general land use of parcels exposed to the identified wildfire risk zones in the unincorporated portions of the County.

13.4.3 Critical Facilities and Infrastructure

Table 13-6 summarizes critical facilities and infrastructure exposed to the wildfire hazard in the planning area. In the event of wildfire, there would likely be little damage to the majority of infrastructure. Most roads and railroads would be without damage except in the worst scenarios. Power lines are the most at risk to wildfire because most are supported on poles made of wood and susceptible to burning. In the event of a wildfire, pipelines could provide a source of fuel and lead to a catastrophic explosion.

During a wildfire event, hazardous material containers at Tier II material containment sites could rupture due to excessive heat and act as fuel for the fire, causing rapid spreading and escalating the fire to unmanageable levels. In addition, they could leak into surrounding areas, saturating soils and seeping into surface waters, and have a disastrous effect on the environment.

Table 13-4. Planning Area Structures Exposed to Wildfire Hazards

Jurisdiction	Buildings Exposed	Assessed Value			% of Total Assessed Value
		Structure	Contents	Total	
High Wildfire Hazard					
City of Emmett	0	$0	$0	$0	0.00
Letha	0	$0	$0	$0	0.00
Montour	185	$42,905,907	$29,682,179	$72,588,086	100
Ola	88	$18,620,392	$15,079,120	$33,699,512	88.61
Sweet	255	$56,100,090	$39,275,839	$95,375,929	100
Unincorporated	316	$66,854,235	$47,876,628	$114,730,863	5.62
Total	**844**	**$184,480,624**	**$131,913,766**	**$316,394,390**	**9.60**
Moderate/High Wildfire Hazard					
City of Emmett	2,679	600,400,866	420,802,250	1,021,203,116	100
Letha	96	15,327,092	12,551,236	27,878,328	100
Montour	0	0	0	0	0.00
Ola	5	2,616,942	1,716,436	4,333,379	11.39
Sweet	0	0	0	0	0.00
Unincorporated	5,216	1,095,423,236	758,678,659	1,854,101,895	90.82
Total	**7,996**	**1,713,768,136**	**1,193,748,581**	**2,907,516,718**	**88.20**
Total	**8840**	**$1,898,248,760**	**$1,325,662,347**	**$3,223,911,108**	**97.8**

Table 13-5. Land Use Within the Wildfire Risk Areas in Unincorporated County

Land Use	Low/Moderate		Moderate		Moderate/High		High	
	Area (acres)	% of total	Area (acres)	% of total	Area (acres)	% of total	Area (acres)	% of total
Commercial 1	0	0.0%	0	0.0%	104	0.1%	0	0.0%
Commercial 2	0	0.0%	0	0.0%	46	0.0%	0	0.0%
Heavy Industrial	0	0.0%	0	0.0%	685	0.6%	0	0.0%
Light Industrial	0	0.0%	0	0.0%	326	0.3%	0	0.0%
Mixed Use	0	0.0%	0	0.0%	814	0.8%	405	0.2%
Multi-Family Residential	0	0.0%	0	0.0%	3	0.0%	0	0.0%
Planned Community	0	0.0%	0	0.0%	398	0.4%	2,653	1.6%
Prime Agriculture	193	100.0%	40,138	69.6%	60,797	56.1%	59,000	36.4%
Public	0	0.0%	0	0.0%	120	0.1%	0	0.0%
Residential Transition	0	0.0%	0	0.0%	1,966	1.8%	0	0.0%
Rural Agriculture	0	0.0%	17,492	30.4%	16,787	15.5%	99,964	61.7%
Rural Residential	0	0.0%	0	0.0%	311	0.3%	30	0.0%
Rural Transition Agriculture	0	0.0%	0	0.0%	26,054	24.0%	0	0.0%
Total	**193**	**100%**	**57,631**	**100%**	**108,411**	**100%**	**162,052**	**100%**

Table 13-6. Critical Facilities Exposed to Wildfire Hazards

	Number of Critical Facilities in Risk Zone	
	Moderate/High Risk Zone	High Risk Zone
Medical and Health Services	10	0
Government Function	1	1
Protective Function	6	2
Schools	8	2
Bridges	40	9
Water	13	3
Wastewater	14	0
Power	7	0
Natural Gas	0	0
Communications	0	3
Total	**99**	**20**

13.4.4 Environment

Many ecosystems are adapted to historical fire regimes. Ecosystem stability is threatened when any of the attributes for a given fire regime diverge from its range of natural variability. In such cases, wildfires can cause severe environmental impacts:

- **Damaged Fisheries**—Critical fisheries can suffer from increased water temperatures, sedimentation, and changes in water quality.
- **Soil Erosion**—The protective covering provided by foliage and dead organic matter is removed, leaving the soil fully exposed to wind and water erosion. Accelerated soil erosion occurs, causing landslides and threatening aquatic habitats.
- **Spread of Invasive Plant Species—**Non-native woody plant species frequently invade burned areas. When weeds become established, they can dominate the plant cover over broad landscapes, and become difficult and costly to control.
- **Disease and Insect Infestations**—Unless diseased or insect-infested trees are swiftly removed, infestations and disease can spread to healthy forests and private lands. Timely active management actions are needed to remove diseased or infested trees.
- **Destroyed Endangered Species Habitat**—Catastrophic fires can devastate endangered species.
- **Soil Sterilization**—Topsoil exposed to extreme heat can become water repellant, and soil nutrients may be lost. It can take decades or even centuries for ecosystems to recover from a fire. Some fires burn so hot that they can sterilize the soil.

13.5 VULNERABILITY

There are currently no recognized models that estimate the vulnerability of people, property or infrastructure in for wildfire. There are too many variables with wildfire behavior to establish damage curves for the various wildfire severity zones. The vulnerabilities to wildfires are many. This section quantifies vulnerabilities in a fashion consistent with FEMA-suggested best management practices for risk assessment for hazard mitigation planning. For vulnerabilities that are not quantifiable, a qualitative assessment is provided. Except as discussed in this section, vulnerable populations, property, infrastructure and environment are assumed to be the same as described in the section on exposure.

13.5.1 Population

There are no recorded incidents of loss of life from wildfires within the planning area. Given the immediate response times to reported fires, the likelihood of injuries and casualties is minimal; therefore, injuries and casualties were not estimated for the wildfire hazard.

Smoke and air pollution from wildfires can be a severe health hazard, especially for sensitive populations, including children, the elderly and those with respiratory and cardiovascular diseases. Smoke generated by wildfire consists of emissions that contain particulate matter (soot, tar, water vapor, and minerals), gases (carbon monoxide, carbon dioxide, nitrogen oxides), and toxics (formaldehyde, benzene). Public health impacts associated with wildfire include difficulty in breathing, odor, and reduction in visibility. Wildfire may also threaten the health and safety of those fighting the fires.

13.5.2 Property

Loss estimations for this assessment were developed representing 10 percent, 30 percent and 50 percent of the assessed value of exposed structures. This allows emergency managers to select a range of economic impact based on an estimate of the percent of damage to the general building stock. Damage in excess of 50 percent is considered to be substantial by most building codes and typically requires total reconstruction of the structure. Table 13-7 lists the loss estimates for the general building stock for jurisdictions that have an exposure to a fire hazard severity zone.

Table 13-7. Potential Building Losses Due to Wildfire Hazard

	Building Count	Assessed Value	10% Damage	30% Damage	50% Damage
High Wildfire Hazard					
City of Emmett	0	$0	$0	$0	$0
Letha	0	$0	$0	$0	
Montour	185	$72,588,086	$7,258,809	$21,776,426	$36,294,043
Ola	88	$33,699,512	$3,369,951	$10,109,854	$16,849,756
Sweet	255	$95,375,929	$9,537,593	$28,612,779	$47,687,965
Unincorporated	316	$114,730,863	$11,473,086	$34,419,259	$57,365,432
Total	**844**	**$316,394,390**	**$31,639,439**	**$94,918,318**	**$158,197,196**
Moderate/High Wildfire Hazard					
City of Emmett	2,679	$1,021,203,116	$102,120,312	$306,360,935	$510,601,558
Letha	96	$27,878,328	$2,787,833	$8,363,498	$13,839,164
Montour	0	$0	$0	$0	$0
Ola	5	$4,333,379	$433,338	$1,300,014	$2,166,690
Sweet	0	$0	$0	$0	$0
Unincorporated	5,216	$1,854,101,895	$185,410,190	$556,230,569	$927,050,948
Total	**7,996**	**$2,907,516,718**	**$290,751,673**	**$872,255,016**	**$1,453,658,360**

13.5.3 Critical Facilities and Infrastructure

Critical facilities of wood frame construction are especially vulnerable during wildfire events. In the event of wildfire, there would likely be little damage to most infrastructure. Most roads and railroads would be without damage except in the worst scenarios. Power lines are the most at risk from wildfire because most poles are made of wood and susceptible to burning. Fires can create conditions that block or prevent access and can isolate residents and emergency service providers. Wildfire typically does not have a major direct impact on bridges, but it can create conditions in which bridges are obstructed. Many bridges in areas of high to moderate fire risk are important because they provide the only ingress and egress to large areas and in some cases to isolated neighborhoods.

Transportation infrastructure increases the wildfire vulnerability of adjacent lands because it provides access to the high-risk areas. For example, a car towing a trailer through an area of high wildfire risk with a safety chain dragging on the ground that cause sparks can start a wildfire. Any access to a wildfire hazard area increases the vulnerability of that area. Figure 13-1 shows that a large percentage of fire starts and perimeters are adjacent to transportation corridors.

13.5.4 Ecosystem Impacts

Wildfire is a part of nature. It plays a key role in shaping ecosystems by serving as an agent of renewal and change. But fire can be deadly, destroying homes, wildlife habitat and timber, and polluting the air with emissions harmful to human health. Fire also releases carbon dioxide—a key greenhouse gas—into the atmosphere. Fire's effect on the landscape may be long-lasting. Fire effects are influenced by forest conditions before the fire and management action taken or not taken after the fire. Fire can shape ecosystem composition, structure and functions in multiple ways:

- By selecting fire-adapted species and removing other, susceptible species
- By releasing nutrients from the biomass and improving nutrient cycling
- By affecting soil properties through changing soil microbial activities and water relations
- By creating heterogeneous mosaics, which in turn, can further influence fire behavior and ecological processes
- By damaging watersheds that serve as water supplies for urban areas
- By eliminating natural grazing areas.

Fire as a destructive force can rapidly consume large amount of biomass and cause negative impacts such as post-fire soil erosion and water runoff, and air pollution; however, as a constructive force, fire is also responsible for maintaining the health and perpetuity of fire-dependent ecosystems. Considering the unique ecological roles of fire in mediating and regulating ecosystems, fire should be incorporated as an integral component of ecosystems and management.

13.6 DEVELOPMENT TRENDS

The planning area appears to be well equipped to deal with the wildfire hazard to future development. The key will be the availability of good hazard identification mapping that accurately reflects risks. As new science, data and technology become available, wildfire mapping should be updated.

Another key element to dealing with future development trends will be the ability of fire districts to maintain their levels of service. Maintaining and or improving service will be a key element to dealing with future growth in the WUI.

County-wide adoption of stricter building codes for structures in the WUI is the first step to reducing risk in new construction. Increased public outreach will be the tool used to educate and assist property owners already in the WUI on how to comply with new codes and reduce the risk to their property. This combination of public education and code enforcement will be critical to reducing the risk of wildfire countywide.

13.7 SCENARIO

A major conflagration in the planning area might begin with a wet spring, adding to fuels already present on the forest floor. Flashy fuels would build throughout the spring. The summer could see the onset of insect infestation.

A dry summer could follow the wet spring, exacerbated by dry hot winds. Carelessness with combustible materials or a tossed lit cigarette, or a sudden lighting storm could trigger a multitude of small isolated fires.

The embers from these smaller fires could be carried miles by hot, dry winds. The deposition zone for these embers would be deep in the forests and interface zones. Fires that start in flat areas move slower, but wind still pushes them. It is not unusual for a wildfire pushed by wind to burn the ground fuel and later climb into the crown and reverse its track. This is one of many ways that fires can escape containment, typically during periods when response capabilities are overwhelmed. These new small fires would most likely merge. Suppression resources would be redirected from protecting the natural resources to saving more remote subdivisions.

The worst-case scenario would include an active fire season throughout the American west, spreading resources thin. Firefighting teams would be exhausted or unavailable. Many federal assets would be responding to other fires that started earlier in the season. While local fire districts would be useful in the WUI areas, they have limited wildfire response capabilities and would have a difficult time responding to the ignition zones due to topography and other access limitations. Even though the existence and spread of the fire is known, it may not be possible to respond to it adequately. An initially manageable fire can become out of control before resources can reach the area.

Heavy rains could follow, causing flooding and landslides and releasing sediment into rivers, permanently changing floodplains and damaging sensitive habitat. With the forests removed from the watershed, stream flows could easily double. High-magnitude floods could increase in frequency.

13.8 ISSUES

The major issues for wildfire are the following:

- Public education and outreach to people living in or near the fire hazard zones should include information about and assistance with mitigation activities such as defensible space and advance identification of evacuation routes and safe zones.
- Wildfires could cause landslides as a secondary natural hazard.
- Climate change could affect the wildfire hazard.
- Future growth into interface areas should continue to be managed.
- Area fire districts need to continue to train on wildland-urban interface events.
- Vegetation management activities would include enhancement through expansion of the target areas as well as additional resources.
- Regional consistency is needed for higher building code standards such as residential sprinkler requirements and prohibitive combustible roof standards.
- Additional fire department water supply is needed in high risk wildfire areas.
- Expand certifications and qualifications for fire department personnel. Ensure that all firefighters are trained in basic wildfire behavior, basic fire weather, and that all company officers and chief level officers are trained in the wildland command and strike team leader level.
- A buildable-lands analysis that looks at vacant lands and their designated land use would be a valuable tool in helping decision-makers make wise decisions about future development.

14. PLANNING AREA RISK RANKING

A risk ranking was performed for the hazards of concern described in this plan. This risk ranking assesses the probability of each hazard's occurrence as well as its likely impact on the people, property, and economy of the planning area. The risk ranking was conducted via facilitated brainstorming sessions with the Steering Committee. Estimates of risk were generated with data from Hazus using methodologies promoted by FEMA. The results are used in establishing mitigation priorities.

14.1 PROBABILITY OF OCCURRENCE

The probability of occurrence of a hazard is indicated by a probability factor based on likelihood of annual occurrence:

- High—Hazard event is likely to occur within 25 years (Probability Factor = 3)
- Medium—Hazard event is likely to occur within 100 years (Probability Factor =2)
- Low—Hazard event is not likely to occur within 100 years (Probability Factor =1)
- No exposure—There is no probability of occurrence (Probability Factor = 0)

The assessment of hazard frequency is generally based on past hazard events in the area. Table 14-1 summarizes the probability assessment for each hazard of concern for this plan.

Table 14-1. Probability of Hazards

Hazard Event	Probability (high, medium, low)	Probability Factor
Dam/Canal Failure	Low	1
Drought	High	3
Earthquake	Medium	2
Flood	High	3
Landslide	High	3
Severe Weather	High	3
Wildfire	High	3

14.2 IMPACT

Hazard impacts were assessed in three categories: impacts on people, impacts on property and impacts on the local economy. Numerical impact factors were assigned as follows:

- **People**—Values were assigned based on the percentage of the total ***population exposed*** to the hazard event. The degree of impact on individuals will vary and is not measurable, so the calculation assumes for simplicity and consistency that all people exposed to a hazard because they live in a hazard zone will be equally impacted when a hazard event occurs. It should be noted that planners can use an element of subjectivity when assigning values for impacts on people. Impact factors were assigned as follows:
  - ➢ High—50 percent or more of the population is exposed to a hazard (Impact Factor = 3)
  - ➢ Medium—25 percent to 49 percent of the population is exposed to a hazard (Impact Factor = 2)
  - ➢ Low—25 percent or less of the population is exposed to the hazard (Impact Factor = 1)

  - No impact—None of the population is exposed to a hazard (Impact Factor = 0)

- **Property**—Values were assigned based on the percentage of the total ***property value exposed*** to the hazard event:
  - High—30 percent or more of the total assessed property value is exposed to a hazard (Impact Factor = 3)
  - Medium—15 percent to 29 percent of the total assessed property value is exposed to a hazard (Impact Factor = 2)
  - Low—14 percent or less of the total assessed property value is exposed to the hazard (Impact Factor = 1)
  - No impact—None of the total assessed property value is exposed to a hazard (Impact Factor = 0)

- **Economy**—Values were assigned based on the percentage of the total ***property value vulnerable*** to the hazard event. Values represent estimates of the loss from a major event of each hazard in comparison to the total assessed value of the property exposed to the hazard. For some hazards, such as wildfire, landslide and severe weather, vulnerability was considered to be the same as exposure due to the lack of loss estimation tools specific to those hazards. Loss estimates separate from the exposure estimates were generated for the earthquake and flood hazards using Hazus.
  - High—Estimated loss from the hazard is 20 percent or more of the total assessed property value (Impact Factor = 3)
  - Medium—Estimated loss from the hazard is 10 percent to 19 percent of the total assessed property value (Impact Factor = 2)
  - Low—Estimated loss from the hazard is 9 percent or less of the total assessed property value (Impact Factor = 1)
  - No impact—No loss is estimated from the hazard (Impact Factor = 0)

The impacts of each hazard category were assigned a weighting factor to reflect the significance of the impact. These weighting factors are consistent with those typically used for measuring the benefits of hazard mitigation actions: impact on people was given a weighting factor of 3; impact on property was given a weighting factor of 2; and impact on the operations was given a weighting factor of 1.

Table 14-2, Table 14-3 and Table 14-4 summarize the impacts for each hazard.

14.3 RISK RATING AND RANKING

The risk rating for each hazard was determined by multiplying the probability factor by the sum of the weighted impact factors for people, property and operations, as summarized in Table 14-5.

Based on these ratings, a priority of high, medium or low was assigned to each hazard. The hazards ranked as being of highest concern are earthquake and severe weather. Hazards ranked as being of medium concern are landslide, flood and wildfire. The hazards ranked as being of lowest concern are drought and dam failure. Table 14-6 shows the hazard risk ranking.

Table 14-2. Impact on People from Hazards

Hazard Event	Impact (high, medium, low)	Impact Factor	Multiplied by Weighting Factor (3)
Dam/Canal Failure	High	3	(3x3) = 9
Drought	None	0	(3x0) = 0
Earthquake	High	3	(3x3) = 9
Flooding	Medium	2	(3x2) = 6
Landslide	Low	1	(3x1) = 3
Severe Weather	High	3	(3x3) = 9
Wildfire	High	3	(3x3) = 9

Table 14-3. Impact on Property from Hazards

Hazard Event	Impact (high, medium, low)	Impact Factor	Multiplied by Weighting Factor (2)
Dam/Canal Failure	High	3	(2x3) = 6
Drought	None	0	(2x0) = 0
Earthquake	High	3	(2x3) = 6
Flooding	Medium	2	(2x2) = 4
Landslide	Low	1	(2x1) = 2
Severe Weather	High	3	(2x6) = 6
Wildfire	High	3	(2x3) = 6

Table 14-4. Impact on Economy from Hazards

Hazard Event	Impact (high, medium, low)	Impact Factor	Multiplied by Weighting Factor (1)
Dam/Canal Failure	Low	1	(1x1) = 1
Drought	High	3	(1x3) = 3
Earthquake	Medium	2	(1x2) = 2
Flooding	Medium	2	(1x2) = 2
Landslide	Low	1	(1x1) = 1
Severe Weather	Medium	2	(1x2) = 2
Wildfire	Medium	2	(1x2) = 2

Table 14-5. Hazard Risk Rating

Hazard Event	Probability Factor	Sum of Weighted Impact Factors	Total (Probability x Impact)
Dam/Canal Failure	1	(9+6+1) = 16	16
Drought	3	(0+0+3) = 3	9
Earthquake	2	(9+6+2) = 17	34
Flooding	3	(6+4+2) = 12	36
Landslide	3	(3+2+1) = 6	18
Severe Weather	3	(9+6+2) = 17	51
Wildfire	3	(9+6+2) = 17	51

Table 14-6. Hazard Risk Ranking

Hazard Ranking	Hazard Event	Category
1	Wildfire	High
1	Severe Weather	High
2	Flood	Medium
3	Earthquake	Medium
4	Dam Failure	Medium
5	Landslide	Low
6	Drought	Low

15. CLIMATE CHANGE CONSIDERATIONS

15.1 WHAT IS CLIMATE CHANGE?

Climate, consisting of patterns of temperature, precipitation, humidity, wind and seasons, plays a fundamental role in shaping natural ecosystems and the human economies and cultures that depend on them. "Climate change" refers to changes over a long period of time. Worldwide, average temperatures have increased 1.8ºF since 1880 (NASA, 2018). Although this change may seem small, it can lead to large changes in climate and weather.

The warming trend and its related impacts are caused by increasing concentrations of carbon dioxide and other greenhouse gases in the earth's atmosphere. Greenhouse gases are gases that trap heat in the atmosphere, resulting in a warming effect. Carbon dioxide is the most commonly known greenhouse gas; however, methane, nitrous oxide and fluorinated gases also contribute to warming. Emissions of these gases come from a variety of sources, such as the combustion of fossil fuels, agricultural production, changes in land use and volcanic eruptions. Carbon dioxide concentrations measured about 280 parts per million before the industrial era began in the late 1700s and are now recorded at more than 407 parts per million (EPA, 2016 and NASA, 2018) (see Figure 15-1).

Source: EPA, 2016

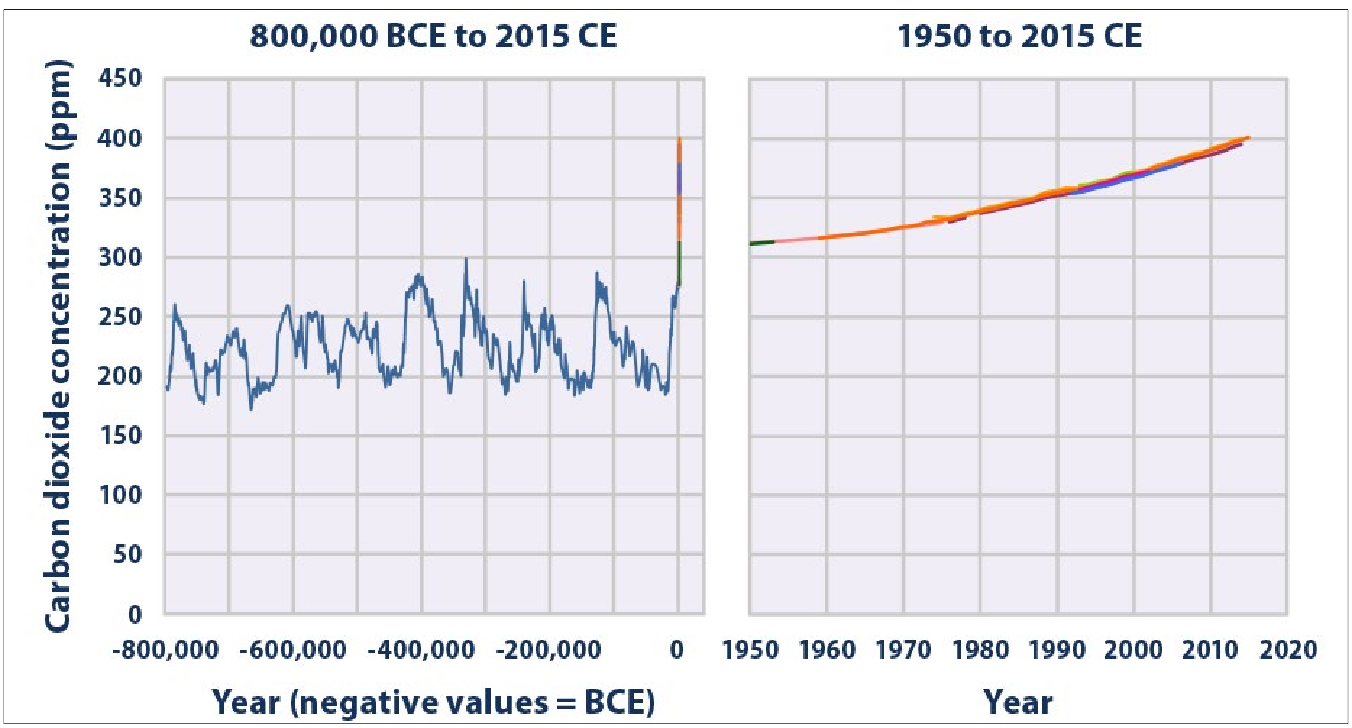


Figure 15-1. Global Carbon Dioxide Concentrations Over Time

Climate change will affect the people, property, economy and ecosystems of Gem County in a variety of ways. Climate change impacts are most frequently associated with negative consequences, such as increased flood vulnerability or increased heat-related illnesses/public health concerns; however, other changes may present opportunities. The most important effect for the development of this plan is that climate change will have a measurable impact on the occurrence and severity of natural hazards.

15.2 HOW CLIMATE CHANGE AFFECTS HAZARD MITIGATION

An essential aspect of hazard mitigation is predicting the likelihood of hazard events in a planning area. Typically, predictions are based on statistical projections from records of past events. This approach assumes that the likelihood of hazard events remains essentially unchanged over time. Thus, averages based on the past frequencies of, for example, floods are used to estimate future frequencies: if a river has flooded an average of once every 5 years for the past 100 years, then it can be expected to continue to flood an average of once every 5 years.

For hazards that are affected by climate conditions, the assumption that future behavior will be equivalent to past behavior is not valid if climate conditions are changing. As flooding is generally associated with precipitation frequency and quantity, for example, the frequency of flooding will not remain constant if broad precipitation patterns change over time. Floods currently considered to be 1-percent-annual-chance events might strike more often, leaving many communities at greater risk. The risks of landslide, severe storms, extreme heat and wildfire are all affected by climate patterns as well. For this reason, an understanding of climate change is pertinent to efforts to mitigate natural hazards. Information about how climate patterns are changing provides insight on the reliability of future hazard projections used in mitigation analysis. This chapter summarizes current understandings about climate change in order to provide a context for the recommendation and implementation of hazard mitigation measures.

15.3 CURRENT INDICATIONS OF CLIMATE CHANGE

The major scientific agencies of the United States and the world—including NASA, NOAA and the Intergovernmental Panel on Climate Change (IPCC)—agree that climate change is occurring. Multiple temperature records from all over the world have shown a warming trend. The IPCC has stated that the warming of the climate system is unequivocal (IPCC, 2014). Seventeen of the 18 warmest years on record occurred since 2001, and 2016 was the warmest year on record (NASA, 2017).

Rising global temperatures have been accompanied by other changes in weather and climate. Many places have experienced changes in rainfall resulting in more intense rain, as well as more frequent and severe heat waves (IPCC, 2014a). The planet's oceans and glaciers have also experienced changes: oceans are warming and becoming more acidic, ice caps are melting, and sea levels are rising. Global sea level has risen approximately 6.7 inches, on average, in the last 100 years (NASA, 2018). This has already put some coastal homes, beaches, roads, bridges, and wildlife at risk (USGCRP, 2009). At the time of the development of this plan, NASA reports the following trends (NASA, 2017):

- Carbon Dioxide—Increasing trend, currently at 407.61 parts per million
- Global Temperature—Increasing trend, increase of 1.8ºF since 1880
- Arctic Ice Minimum—Decreasing trend, 13.2 percent per decade
- Land Ice—Decreasing trend, 286.0 gigatonnes per year
- Sea Level—Increasing trend, 3.2 millimeters (0.13 inches) per year.

15.4 PROJECTED FUTURE IMPACTS

The Third National Climate Assessment Report for the United States indicates that impacts resulting from climate change will continue through the 21st century and beyond. Although not all changes are understood at this time, the following impacts are expected in the United States (NASA, 2016):

- Temperatures will continue to rise.
- Growing seasons will lengthen.
- Precipitation patterns will change.
- Droughts and heat waves will increase.
- Hurricanes will become stronger and more intense.
- Sea level will rise 1 to 4 feet by 2100.
- The Arctic may become ice free.

A research project at the University of Idaho (http://idahoclimatescience.weebly.com/streamflow.html) sought to identify and develop indicators of climate change in the State of Idaho. Indicators provide useful information about what is occurring in complex systems. The following information is extracted and summarized from the website providing information on their findings:

- **Temperature and Growing Season**—Through the analysis of climate data throughout Idaho, scientists have found that the growing season in Idaho has increased by an average of 13 days since early in the 20th century. On average, the last spring frost occurs eight days earlier and the first fall frost is five days later.
- **Rainfall**—Rainfall intensity is believed to be related to climate change due to the increased capacity of warmer temperatures to hold water, potentially leading to heavier rainfall events. Scientists analyzed extreme rainfall events—the largest daily precipitation accumulation during March 15 through May 15—at 28 climate stations across Idaho. The results suggest that the intensity of big rainfall events has increased. Most large events have occurred since 1990.
- **Snowpack**—Scientists in Idaho have been measuring snowpack levels in the state since 1937. These annual measurements provide clear evidence that snowpack has been declining in the state over the past 50 years.
- **Streamflow**—Measurements of stream flow across the state indicate that spring runoff is occurring earlier and that the total annual volume of flow has decreased. These observations are based on records from 1950 to 2005.
- **Stream Temperature**—Average stream temperatures in the state may be increasing. Annual average temperatures in the North Clearwater River have increased by just over 1ºF over a 36-year period.
- **Wildfire**—In the western United States there have been four times as many major wildfires and six times as much area of forest burned when comparing totals from 1970 to 1986 and 1986 to the present. Scientists are monitoring the severity of fire burns to see if any trends are able to be established.
- **Plants and Forests**—Through observations of plant life cycle events and temperature data, scientists have determined that indicator plant species are blooming earlier on average.
- **Salmon Migration**—Sockeye salmon migration has been occurring earlier in the spring. Thirty years' worth of data suggests that salmon are returning to freshwater streams about one day earlier per decade.
- **Wildlife**—Changes in temperature impact plant and animal life cycle events. Tracking by citizen scientists has provided data that indicates that Mountain Bluebirds in Idaho lay eggs earlier when spring temperatures are warmer.

15.5 RESPONSES TO CLIMATE CHANGE

Communities and governments worldwide are working to address, evaluate and prepare for climate changes that are likely to impact communities in coming decades. Adaptation is defined by the IPCC as the process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities. In some natural systems, human intervention may facilitate adjustment to expected climate and its effects (IPCC, 2014 http://www.ipcc.ch/report/ar5/wg2/).

Societies across the world are facing the need to adapt to changing conditions associated with natural disasters and climate change such as those indicated above. Farmers are altering crops and agricultural methods to deal with changing rainfall and rising temperature; architects and engineers are redesigning buildings; planners are looking at managing water supplies to deal with droughts or flooding.

Most ecosystems show a remarkable ability to adapt to change and to buffer surrounding areas from the impacts of change. Forests can bind soils and hold large volumes of water during times of plenty, releasing it through the year; floodplains can absorb vast volumes of water during peak flows; coastal ecosystems can hold out against storms, attenuating waves and reducing erosion. Other ecosystem services—such as food provision, timber, materials, medicines and recreation—can provide a buffer to societies in the face of changing conditions.

Ecosystem-based adaptation is the use of biodiversity and ecosystem services as part of an overall strategy to help people adapt to the adverse effects of climate change. This includes the sustainable management, conservation and restoration of specific ecosystems that provide key services.

15.6 CLIMATE CHANGE IMPACTS ON HAZARDS

The following sections provide information on how each identified hazard of concern for this planning process may be impacted by climate change and how these impacts may alter current exposure and vulnerability for the people, property, critical facilities and the environment in Gem County to these hazards.

15.7 DAM FAILURE

15.7.1 Impacts on the Hazard

Small changes in rainfall, runoff, and snowpack conditions may have significant impacts for water resource systems, including dams. Dams are designed partly based on assumptions about a river's flow behavior, expressed as hydrographs. Changes in weather patterns can have significant effects on the hydrograph used for the design of a dam. If the hygrograph changes, it is conceivable that the dam can lose some or all of its designed margin of safety, also known as freeboard. If freeboard is reduced, dam operators may be forced to release increased volumes earlier in a storm cycle in order to maintain the required margins of safety. Such early releases of increased volumes can increase flood potential downstream.

Dams are constructed with safety features known as "spillways." Spillways are put in place on dams as a safety measure in the event of the reservoir filling too quickly. Spillway overflow events, often referred to as "design failures," result in increased discharges downstream and increased flooding potential. Although climate change will not increase the probability of catastrophic dam failure, it may increase the probability of design failures.

15.7.2 Population

Population exposure and vulnerability to the dam failure hazard are unlikely to change as a result of climate change.

15.7.3 Property

Property exposure and vulnerability to the dam failure hazard are unlikely to change as a result of climate change.

15.7.4 Critical Facilities

The exposure and vulnerability of critical facilities are unlikely to change as result of climate change. Dam owners and operators may need to alter maintenance and operations to account for changes in the hydrograph and increased sedimentation.

15.7.5 Environment

The exposure and vulnerability of the environment to dam failure are unlikely to change as a result of climate change. Ecosystem services may be used to mitigate some of the factors that may increase the risk of design failures, such as increasing the natural water storage capacity in watersheds above dams.

15.8 DROUGHT

15.8.1 Impacts on the Hazard

The long-term effects of climate change on regional water resources are unknown, but global water resources are already experiencing the following stresses without climate change:

- Growing populations
- Increased competition for available water
- Poor water quality
- Environmental claims
- Uncertain reserved water rights
- Groundwater overdraft
- Aging urban water infrastructure.

With a warmer climate, droughts could become more frequent, more severe, and longer-lasting. According to the National Climate Assessment, “higher surface temperatures brought about by global warming increase the potential for drought. Evaporation and the higher rate at which plants lose moisture through their leaves both increase with temperature. Unless higher evapotranspiration rates are matched by increases in precipitation, environments will tend to dry, promoting drought conditions” (Globalchange.gov, 2014). Because expected changes in precipitation patterns are still uncertain, the potential impacts and likelihood of drought are uncertain.

By addressing current stresses on water supplies and by building a flexible, robust program, Gem County will be able to more adeptly respond to changing conditions and to survive dry years.

15.8.2 Population

Population exposure and vulnerability to drought are unlikely to increase as a result of climate change. While greater numbers of people may need to engage in behavior change, such as water saving efforts, significant life or health impacts are unlikely.

15.8.3 Property

Property exposure and vulnerability may increase as a result of increased drought resulting from climate change, although this would most likely occur in non-structural property such as crops and landscaping. It is unlikely that structure exposure and vulnerability would increase as a direct result of drought, although secondary impacts of drought, such as wildfire, may increase and threaten structures.

15.8.4 Critical Facilities

Critical facility exposure and vulnerability are unlikely to increase as a result of increased drought resulting from climate change; however, critical facility operators may need to alter standard management practices and actively manage resources, particularly in water-related service sectors.

15.8.5 Environment

The vulnerability of the environment may increase as a result of increased drought resulting from climate change. The ecosystems and biodiversity in Gem County are already under stress from development and water diversion activities. Prolonged or more frequent drought resulting from climate change may further stress the ecosystems in the region.

15.9 EARTHQUAKE

15.9.1 Impacts on the Hazard

The impacts of global climate change on earthquake probability are unknown. Some scientists say that melting glaciers could induce tectonic activity. As ice melts and water runs off, tremendous amounts of weight are shifted on the earth's crust. As newly freed crust returns to its original, pre-glacier shape, it could cause seismic plates to slip and stimulate volcanic activity, according to research into prehistoric earthquakes and volcanic activity. NASA and USGS scientists found that retreating glaciers in southern Alaska may be opening the way for future earthquakes (NASA, 2004).

Secondary impacts of earthquakes could be magnified by climate change. Soils saturated by repetitive storms or heavy precipitation could experience liquefaction or an increased propensity for slides during seismic activity due to the increased saturation. Dams storing increased volumes of water due to changes in the hydrograph could fail during seismic events.

15.9.2 Population, Property, Critical Facilities and the Environment

Because impacts on the earthquake hazard are not well understood, increases in exposure and vulnerability of the local resources are not able to be determined.

15.10 FLOOD

15.10.1 Impacts on the Hazard

Use of historical hydrologic data has long been the standard of practice for designing and operating water supply and flood protection projects. For example, historical data are used for flood forecasting models and to forecast snowmelt runoff for water supply. This method of forecasting assumes that the climate of the future will be similar to that of the period of historical record. However, the hydrologic record cannot be used to predict changes in frequency and severity of extreme climate events such as floods. Going forward, model calibration or statistical relation development must happen more frequently, new forecast-based tools must be developed, and a standard of practice that explicitly considers climate change must be adopted. Climate change is already impacting water resources, and resource managers have observed the following:

- Historical hydrologic patterns can no longer be solely relied upon to forecast the water future.
- Precipitation and runoff patterns are changing, increasing the uncertainty for water supply and quality, flood management and ecosystem functions.
- Extreme climatic events will become more frequent, necessitating improvement in flood protection, drought preparedness and emergency response.

The amount of snow is critical for water supply and environmental needs, but so is the timing of snowmelt runoff into rivers and streams. Rising snowlines caused by climate change will allow more mountain areas to contribute to peak storm runoff. High frequency flood events (e.g. 10-year floods) in particular will likely increase with a changing climate. Along with reductions in the amount of the snowpack and accelerated snowmelt, scientists project greater storm intensity, resulting in more direct runoff and flooding. Changes in watershed vegetation and soil moisture conditions will likewise change runoff and recharge patterns. As stream flows and velocities change, erosion patterns will also change, altering channel shapes and depths, possibly increasing sedimentation behind dams, and affecting habitat and water quality. With potential increases in the frequency and intensity of wildfires due to climate change, there is potential for more floods following fire, which increase sediment loads and water quality impacts.

As hydrology changes, what is currently considered a 1-percent-annual-chance (100-year flood) may strike more often, leaving many communities at greater risk. Planners will need to factor a new level of safety into the design, operation, and regulation of flood protection facilities such as dams, bypass channels and levees, as well as the design of local sewers and storm drains.

15.10.2 Population and Property

Population and property exposure and vulnerability may increase as a result of climate change impacts on the flood hazard. Runoff patterns may change resulting in flooding in areas where it has not previously occurred.

15.10.3 Critical Facilities

Critical facility exposure and vulnerability may increase as a result of climate change impacts on the flood hazard. Runoff patterns may change resulting in risk to facilities that have not historically been at risk from flooding. Additionally, changes in the management and design of flood protection critical facilities may be needed as additional stress is placed on these systems.

15.10.4 Environment

The exposure and vulnerability of the environment may increase as a result of climate change impacts on the flood hazard. Changes in the timing and frequency of flood events may have broader ecosystem impacts that alter the ability of already stressed species to survive.

15.11 LANDSLIDE

15.11.1 Impacts on the Hazard

Climate change may impact storm patterns, increasing the probability of more frequent, intense storms with varying duration. Increase in global temperature is likely to affect the snowpack and its ability to hold and store water. Warming temperatures also could increase the occurrence and duration of droughts, which would increase the probability of wildfire, reducing the vegetation that helps to support steep slopes. All of these factors would increase the probability for landslide occurrences.

15.11.2 Population and Property

Population and property exposure and vulnerability would be unlikely to increase as a result of climate change impacts on the landslide hazard. Landslide events may occur more frequently, but the extent and location should be contained within mapped hazard areas and recently burned areas.

15.11.3 Critical Facilities

Critical facility exposure and vulnerability would be unlikely to increase as a result of climate change impacts on the landslide hazard; however, critical facility owners and operators may experience more frequent disruption to service provision as a result of landslide hazards. For example, transportation systems may experience more frequent delays if slides blocking these systems occur more frequently.

15.11.4 Environment

Exposure and vulnerability of the environment would be unlikely to increase as a result of climate change, but more frequent slides in riverine systems may impact water quality and have negative impacts on already stressed species.

15.12 SEVERE WEATHER

15.12.1 Impacts on the Hazard

Climate change presents a challenge for risk management associated with severe weather. The frequency of severe weather events has increased steadily over the last century. The number of weather-related disasters during the 1990s was four times that of the 1950s, and cost 14 times as much in economic losses. Historical data shows that the probability for severe weather events increases in a warmer climate.

This increase in average surface temperatures can also lead to more intense heat waves that can be exacerbated in urbanized areas by what is known as urban heat island effect. The evidence suggests that heat waves are already increasing, especially in western states.

15.12.2 Population and Property

Population and property exposure and vulnerability would be unlikely to increase as a direct result of climate change impacts on the severe weather hazard. Severe weather events may occur more frequently, but exposure and vulnerability will remain the same. Secondary impacts, such as the extent of localized flooding, may increase, thus impacting greater numbers of people and structures.

15.12.3 Critical Facilities

Critical facility exposure and vulnerability would be unlikely to increase as a result of climate change impacts on the severe weather hazard; however, critical facility owners and operators may experience more frequent disruptions. For example, more frequent and intense storms may cause more frequent disruptions in power service.

15.12.4 Environment

Exposure and vulnerability of the environment would be unlikely to increase; however, more frequent storms and heat events and more intense rainfall may place additional stressors on already stressed systems.

15.13 WILDFIRE

15.13.1 Impacts on the Hazard

Wildfire is determined by climate variability, local topography, and human intervention. Climate change has the potential to affect multiple elements of the wildfire system: fire behavior, ignitions, fire management, and vegetation fuels. Hot dry spells create the highest fire risk. Increased temperatures may intensify wildfire danger by warming and drying out vegetation. Additionally, changes in climate patterns may impact the distribution and perseverance of insect outbreaks that create dead trees (increase fuel). When climate alters fuel loads and fuel moisture, forest susceptibility to wildfires changes. Climate change also may increase winds that spread fires. Faster fires are harder to contain, and thus are more likely to expand into residential neighborhoods.

15.13.2 Population, Property and Critical Facilities

Larger, more severe, and more frequent fires may impact the people, property and critical facilities by increasing the risk of ignition from nearby fire sources. Additionally, secondary impacts such as air quality issues may increase.

15.13.3 Environment

It is possible that the exposure and vulnerability of the environment will be impacted by impacts on wildfire risk from climate change, as natural fire regimes may change, resulting in more frequent or higher intensity burns. These impacts may alter the composition of the ecosystems in the areas in and surrounding Gem County.

16. NON-NATURAL HAZARDS OF CONCERN

Hazard mitigation plans are required to include a risk assessment of natural hazards that can or have impacted a planning area (Section 201.6(c)(2)(i) 44 CFR). Plans have the option, but are not required, to include an assessment on non-natural hazards as well. The Steering Committee decided that for this update, the *Gem County Hazard Mitigation Plan* would include a profile of potential non-natural hazards that could impact the planning area. This creates an opportunity for plan integration and linkage between planning processes.

The non-natural hazards addressed in this chapter are profiled but not fully assessed like the natural hazards addressed elsewhere in this plan. These hazards are not included in the risk ranking. Planning partners have the option of identifying mitigation actions for the non-natural hazards of concern, as long as they have fully addressed their natural hazard risk as required under Section 201.6 44 CFR. The following profiles are consistent with the non-natural hazards addressed in the 2013 Idaho State Hazard Mitigation Plan.

16.1 HAZARDOUS MATERIALS

Hazardous materials are substances that are considered severely harmful to human health and the environment, as defined by the U.S. EPA's Comprehensive Environmental Response, Compensation, and Liability Act (commonly known as Superfund). Many hazardous materials are commonly used substances that are harmless in their normal uses but dangerous if released. The EPA designates more than 800 substances as hazardous and identifies many more as potentially hazardous due to their characteristics and the circumstances of their release (EPA, 2013). If released or misused, hazardous substances can cause death, serious injury, long-lasting health effects, and damage to structures, other properties, and the environment. Many products containing hazardous substances are used and stored in homes and these products are shipped daily on highways, railroads, waterways, and pipelines. The following are the most common types of hazardous material incidents:

- **Fixed-Facility Hazardous Materials Incident**—This is the uncontrolled release of materials from a fixed site capable of posing a risk to health, safety, and property as determined by the Resource and Conservation and Recovery Act. It is possible to identify and prepare for a fixed-facility incident because federal and state laws require those facilities to notify state and local authorities about what is being used or produced at the site.
- **Hazardous Materials Transportation Incident**—A hazardous materials transportation incident is any event resulting in uncontrolled release of materials during transport that can pose a risk to health, safety, and property as defined by Department of Transportation Materials Transport regulations. Transportation incidents are difficult to prepare for because there is little if any notice about what materials could be involved should an accident happen. Hazardous materials transportation incidents can occur at any place within the country, although most occur on the interstate highways or major federal or state highways, or on major rail lines.

16.1.1 Location, Extent and Magnitude

Because hazardous materials are so widely used, stored and transported, a hazardous material event could take place almost anywhere. Moreover, many hazardous materials are used, stored and transported in very large quantities, so the impacts of an event may be widespread and powerful. Hazardous material incidents usually occur on major highways and railways. There is no magnitude rating for hazardous material incidents at present.

16.1.2 Planning Capability for Hazardous Materials

Gem County Emergency Management maintains National Incident Management System and emergency operations/response plans for the entire Gem County area (in compliance with FEMA's Civil Planning Guidance #101).

16.2 CIVIL DISTURBANCES

(The following are excerpts from the 2013 Idaho State Hazard Mitigation Plan)

Civil unrest spans a variety of actions including labor unrest, strikes, civil disobedience, demonstrations, riots, and rebellion. Civil disturbances arise from acts of civil disobedience, often spontaneous, involving large numbers of persons, generally caused by political grievances and urban economic conflicts or a decrease in the supply of essential goods and services. Civil disturbance is often a form of protest, arising from highly emotional social and economic issues.

Civil disturbance severity depends on the nature of the disturbance. The high-profile World Trade Organization conference in Seattle in 2000 resulted in mass arrests, civilian curfews, and over $20 million in property damage. The Rodney King beating unleashed seven days of violence and $1 billion in property damage and left 50 people dead. It is not possible to predict the potential severity of civil disturbance; however, it is necessary to think about the potential of such a disturbance. Incidents like these are less likely to occur in a smaller city, due to the noncontiguous nature of suburban development patterns.

Mob violence is segregated into three forms: riots, lynching, and vigilante groups. Mobs are typically associated with disorder and lack of respect for the law. Uncontrolled, unorganized, angry, and emotional, these commons masses, otherwise known as mobs, share a common purpose.

There is a low, medium, and high range that can be associated with the severity of the hazard of civil disturbance. Such disturbances may originate from a political rally or university football game celebration getting out of control or demonstrations by environmental protestors. Dispatching police to control traffic corridors or intrusion on private property is considered a low severity civil disturbance. Disruption of businesses and potential property damage are assessed as a moderate civil disturbance. In these cases, police intervention would be required to restore order without employing chemical agents or physical force. A severe civil disturbance would involve rioting, arson, looting, and assault, where aggressive police action (tear gas, curfews, and mass arrests) may be required.

In general, a high hazard severity rating is assigned to an event where emotionally charged and highly contentious business or police action engender the outrage of a segment of the population. While the hazard severity would be high, there would be a moderate vulnerability in such an event and low probability, and as such, a low risk rating is assigned to a high severity civil disturbance. A moderate hazard severity rating would be assigned to a localized event that resulted in damage to property, police action, or some physical harm to the people involved, either protesters or police. In that the vulnerability to such an event is moderate, the severity is moderate, and the probability is moderate, a moderate risk rating is assigned to the potential moderate civil disturbance event.

A low hazard rating would be assigned to a localized event that resulted in minimal to no property damage, no police action (though potential police presence), and no physical harm to the participants, bystanders, or police. As such, while there may a high probability rating for such forms of low severity civil disturbance, and while the vulnerability rating may be moderate, a low severity hazard would be given a low hazard rating.

16.2.1 Location, Extent and Magnitude

Because of their often spontaneous nature, it is difficult to identify specifics; however, information gathered in advance may warn officials and provide locations of future civil disturbances.

16.2.2 Planning Capability for Civil Disturbances

Gem County Emergency Management maintains the following planning capabilities for civil disturbances:

- National Incident Management System and emergency operations/response plans for the entire Gem County area (in compliance with FEMA's Civil Planning Guidance #101)
- A terrorism and civil unrest annex to the 2004 Gem County Hazard Mitigation Plan, prepared for Gem County Emergency Management by Northwest Management, Inc. in December of 2004. Gem County Emergency Management still views this as a viable plan to guide the county's response to a civil disturbance event within Gem County.

16.3 PANDEMIC

An outbreak is defined by the U.S. Centers for Disease Control and Prevention (CDC) as the occurrence of more cases of disease than normally expected within a specific place or group of people over a given period of time. State and local regulations require immediate reporting of any known or suspected outbreaks by health care providers, health care facilities, laboratories, veterinarians, schools, child day care facilities, and food service establishments. An epidemic is a localized outbreak that spreads rapidly and affects a large number of people or animals in a community. A pandemic is an epidemic that occurs worldwide or over a very large area and affects a large number of people or animals.

The Idaho Office of Emergency Management has identified the following as human diseases that could contribute to a serious epidemic in the area:

- **Cholera**—A bacterial infection in the small intestine that may cause diarrhea, dehydration, and death. It spreads by ingesting food or water contaminated with feces from infected persons. Cholera outbreaks no longer exist in the United States due to water treatment and sanitation systems.
- **Diphtheria**—A contagious infection caused by bacteria affecting the upper respiratory tract and less often the skin. Coughing, sneezing, or even laughing easily transmits the disease. Complications are breathing problems, heart failure, and nervous system damage. Diphtheria is rare in the United States due to immunizations.
- **HIV/AIDS**—An abbreviation for human immunodeficiency virus /acquired immunodeficiency syndrome. A viral infection transmitted by sexual intercourse, contaminated blood transfusions, or from infected mother to child during pregnancy or breastfeeding compromises the immune system. This disease is recent compared to other pandemics, first recognized by the CDC in 1981. No current cure exists although breakthroughs in research are promising.
- **Influenza**—An infectious viral disease of birds and mammals commonly transmitted through airborne aerosols such as coughing or sneezing. Symptoms are chills, headache, fever, nausea, muscle pain and occasionally pneumonia. New flu strains caused pandemics in the late 19th and 20th centuries: Russian flu, 1918 Spanish flu, Asian flu, Hong Kong flu, and A/H1N1 or the swine flu. According to the CDC, avian influenza occurs naturally among wild aquatic birds worldwide and can infect domestic poultry and other bird and animal species. Avian flu viruses do not normally infect humans. The recent avian flu strains H5N1 and H7N9 have caused human deaths but have not escalated to pandemic proportions.
- **Measles**—A serious respiratory disease caused by a virus. It spreads easily through coughing and sneezing. In rare cases, it can be deadly. The measles, mumps, rubella vaccine protects against measles.

- **Pertussis (also known as whooping cough)—**A serious respiratory (in the lungs and breathing tubes) infection caused by the pertussis bacteria. It causes violent persistent coughing. Whooping cough is most harmful for young babies and can be deadly. The DTaP vaccine protects against whooping cough.
- **Plague**—A disease that affects humans and other mammals, caused by the bacterium *Yersinia pestis*. Humans usually get plague after rodent fleabite carrying the bacterium or by handling an infected animal. Plague killed millions of people in Europe during the middle ages. Today, modern antibiotics are effective in treating plague. Without prompt treatment, the disease can cause serious illness or death. Human plague infections continue to occur in the western United States, but significantly more cases occur in parts of Africa and Asia
- **Polio (or poliomyelitis)—**A disease caused by poliovirus. It can cause lifelong paralysis and can be deadly. The polio vaccine can protect against polio.
- **Q-fever**—A worldwide disease with acute and chronic stages caused by the bacterium *Coxiella burnetii*. Cattle, sheep, and goats are the primary reservoirs although a variety of species may be infected. During birthing, the organisms are shed in high numbers within amniotic fluids and the placenta. The organism is extremely hardy and resistant to heat, drying, and many common disinfectants. Infection of humans usually occurs by inhalation of these organisms from air that contains barnyard dust contaminated by dried placental material, birth fluids, and excreta of infected animals. Other modes of transmission to humans, including tick bites, ingestion of unpasteurized milk or dairy products, and human-to-human transmission, are rare. Humans are often very susceptible to the disease, and very few organisms may be required to cause infection.
- **Severe acute respiratory syndrome (SARS)**—A viral respiratory illness caused by a coronavirus, called SARS-associated coronavirus (SARS-CoV). SARS was first reported in Asia in 2003. The illness spread to more than two dozen countries in North America, South America, Europe, and Asia before the global outbreak was contained.
- **Small Pox**—A serious, contagious, and sometimes fatal infectious disease. There is no specific treatment for smallpox disease, and the only prevention is vaccination. Smallpox outbreaks occurred from time to time for thousands of years, but the disease is now eradicated after a successful worldwide vaccination program. The last case of smallpox in the United States was in 1949. The last naturally occurring case in the world was in Somalia in 1977. After the disease was eliminated from the world, routine vaccination against smallpox among the public was stopped because it was no longer necessary for prevention.
- **Tuberculosis (TB)**—A disease caused by a bacterium called *Mycobacterium tuberculosis*. The bacteria usually attack the lungs but can attack any part of the body such as the kidney, spine, and brain. If not treated properly, TB can be fatal. TB is spread through the air from one person to another. The bacteria are put into the air when a person with TB coughs, sneezes, speaks, or sings.
- **Typhoid**—A bacterial infection of the intestinal tract and bloodstream. Most of the cases are acquired during foreign travel to underdeveloped countries. The germ that causes typhoid is a unique human strain of salmonella called *salmonella typhi*.
- **West Nile virus**—A potentially serious illness established as a seasonal epidemic in North America that flares up in the summer and continues into the fall.

According to the 2013 Idaho State's Hazard Mitigation Plan, factors in Idaho that heighten the probability of occurrences of such events include large numbers of travelers arriving via the region's air and sea ports, the transportation of infected animals into the area, contaminated garbage or other waste washing ashore, or disease transmission through individuals transporting or coming into contact with hospitalized or nursing-home-bound patients (IOEM, 2013).

16.3.1 Location, Extent and Magnitude

Health hazards that affect the residents of Gem County may arise in a variety of situations, such as during a communicable disease outbreak, after a natural disaster, or as the result of a bioterrorism incident. All populations in Gem County are susceptible to bioterrorism or pandemic events. Populations who are young or elderly or have compromised immune systems are likely to be more vulnerable. The relative ease of world-wide travel in addition to the world's expanding global food industry ensures that all countries are vulnerable to pandemic events at any time.

16.3.2 Planning Capability for Pandemic

The Southwest District Health Department has developed and maintains a regional preparedness and response plan for pandemic that covers the Gem County planning area.

16.4 TERRORISM

16.4.1 Overview

FEMA defines terrorism as the use of weapons of mass destruction, including biological, chemical, nuclear and radiological weapons; arson, incendiary, explosive and armed attacks; industrial sabotage and intentional hazardous materials releases; agro-terrorism; and cyber-terrorism (FEMA 2003a). The three key elements to defining a terrorist event are as follows:

- Activities involve the use of illegal force.
- Actions are intended to intimidate or coerce.
- Actions are committed in support of political or social objectives.

Types of Terrorism

The Federal Bureau of Investigation (FBI) categorizes two types of terrorism in the United States:

- Domestic terrorism involves groups or individuals inspired by or associated with primarily U.S.-based movements that espouse extremist ideologies of a political, religious, social, racial, or environmental nature.
- International terrorism involves groups or individuals inspired by or associated with designated foreign terrorist organizations or nations (state-sponsored).

Terrorism Methods and Impacts

The effects of terrorism can include injuries, loss of life, property damage, or disruption of services such as electricity, water supplies, transportation, or communications. Effects may be immediate or delayed. Terrorists often choose targets that offer limited danger to themselves and areas with relatively easy public access. Foreign terrorists look for visible targets where they can avoid detection before and after an attack, such as international airports, large cities, major special events, and high-profile landmarks. Table 16-1 provides a hazard profile summary of common terrorism methods. Most terrorist events in the United States have been bombing attacks, involving detonated and undetonated explosive devices, tear gas, pipe bombs, and firebombs.

Terrorism Preparation and Response

To prepare for terrorism, the unpredictability of human beings must be considered. People with a desire to perform such acts may seek out targets of opportunity that may not fall into established lists of critical areas or facilities. While education, heightened awareness, and early warning of unusual circumstances may deter terrorism, intentional acts that harm people and property are possible at any time. Public safety entities must react to the threat, locating, isolating, and neutralizing further damage and investigating potential scenes and suspects to bring criminals to justice.

Table 16-1. Event Profiles for Terrorism

Hazard	Application Mode[a]	Hazard Duration[b]	Static/Dynamic Characteristics[c]	Mitigating and Exacerbating Conditions[d]
Conventional Bomb	Detonation of explosive device on or near target; delivery via person, vehicle, or projectile.	Instantaneous; additional secondary devices, or diversionary activities may be used, lengthening the duration of the hazard until the attack site is determined to be clear.	Extent of damage is determined by type and quantity of explosive. Effects generally static other than cascading consequences, incremental structural failure, etc.	Overpressure at a given standoff is inversely proportional to the cube of the distance from the blast; thus, each additional increment of standoff provides progressively more protection. Terrain, forestation, structures, etc. can provide shielding by absorbing and/or deflecting energy and debris. Exacerbating conditions include ease of access to target; lack of barriers and shielding; poor construction; and ease of concealment of device.
Chemical Agent	Liquid/aerosol contaminants dispersed using sprayers or other aerosol generators; liquids vaporizing from puddles/ containers; or munitions.	Hours to weeks, depending on the agent and the conditions in which it exists.	Contamination can be carried out of the initial target area by persons, vehicles, water, and wind. Chemicals may be corrosive or otherwise damaging over time if not remediated.	Air temperature can affect evaporation of aerosols. Ground temperature affects evaporation of liquids. Humidity can enlarge aerosol particles, reducing inhalation hazard. Precipitation can dilute and disperse agents but can spread contamination. Wind can disperse vapors but also cause target area to be dynamic. The micro-meteorological effects of buildings and terrain can alter travel and duration of agents. Shielding in the form of sheltering in place can protect people and property from harmful effects.
Arson/ Incendiary Attack	Initiation of fire or explosion on or near target via direct contact or remotely via projectile.	Generally minutes to hours.	Extent of damage is determined by type and quantity of device, accelerant, and materials present at or near target. Effects generally static other than cascading consequences, incremental structural failure, etc.	Mitigation factors include built-in fire detection and protection systems and fire-resistive construction techniques. Inadequate security can allow easy access to target, easy concealment of an incendiary device, and undetected initiation of a fire. Non-compliance with fire and building codes, as well as failure to maintain existing fire protection systems, can substantially increase the effectiveness of a fire weapon.
Armed Attack	Tactical assault or sniping from remote location, or random attack based on fear, emotion, or mental instability.	Generally minutes to days.	Varies based on the perpetrators' intent and capabilities.	Inadequate security can allow easy access to target, easy concealment of weapons, and undetected initiation of an attack.
Biological Agent	Liquid or solid contaminants dispersed using sprayers/ aerosol generators or by point or line sources such as munitions, covert deposits, and moving sprayers.	Hours to years, depending on the agent and the conditions in which it exists.	Depending on the agent used and the effectiveness with which it is deployed, contamination can be spread via wind and water. Infection can spread via humans or animals.	Altitude of release above ground can affect dispersion; sunlight is destructive to many bacteria and viruses; light to moderate wind will disperse agents but higher winds can break up aerosol clouds; the micro-meteorological effects of buildings and terrain can influence aerosolization and travel of agents.

Hazard	Application Mode[a]	Hazard Duration[b]	Static/Dynamic Characteristics[c]	Mitigating and Exacerbating Conditions[d]
Agro-terrorism	Direct, generally covert contamination of food supplies or introduction of pests and/or disease agents to crops and livestock.	Days to months.	Varies by type of incident. Food contamination events may be limited to specific distribution sites, whereas pests and diseases may spread widely. Generally no effects on built environment.	Inadequate security can facilitate adulteration of food and introduction of pests and disease agents to crops and livestock.
Radiological Agent	Radioactive contaminants dispersed using sprayers/ aerosol generators, or by point or line sources such as munitions.	Seconds to years, depending on material used.	Initial effects will be localized to site of attack; depending on meteorological conditions, subsequent behavior of radioactive contaminants may be dynamic.	Duration of exposure, distance from source of radiation, and the amount of shielding between source and target determine exposure to radiation.
Nuclear Bomb	Detonation of nuclear device underground, at the surface, in the air, or at high altitude.	Light/heat flash and blast/shock wave last for seconds; nuclear radiation and fallout hazards can persist for years. Electromagnetic pulse from a high-altitude detonation lasts for seconds and affects only unprotected electronic systems.	Initial light, heat, and blast effects of a subsurface, ground or air burst are static and determined by the device's characteristics and employment; fallout of radioactive contaminants may be dynamic, depending on meteorological conditions.	Harmful effects of radiation can be reduced by minimizing the time of exposure. Light, heat, and blast energy decrease logarithmically as a function of distance from seat of blast. Terrain, forestation, structures, etc. can provide shielding by absorbing and/or deflecting radiation and radioactive contaminants.
Intentional Hazardous Material Release (fixed facility or transportation)	Solid, liquid, and/or gaseous contaminants released from fixed or mobile containers	Hours to days.	Chemicals may be corrosive or otherwise damaging over time. Explosion and/or fire may be subsequent. Contamination may be carried out of the incident area by persons, vehicles, water and wind.	Weather conditions directly affect how the hazard develops. The micro-meteorological effects of buildings and terrain can alter travel and duration of agents. Shielding in the form of sheltering in place can protect people and property from harmful effects. Non-compliance with fire and building codes, as well as failure to maintain existing fire protection and containment features, can substantially increase the damage from a hazardous materials release.

a. **Application Mode**—Application mode describes the human acts or unintended events necessary to cause the hazard event to occur.
b. **Duration**—Duration is the length of time the hazard is present. For example, a chemical warfare agent such as mustard gas, if un-remediated, can persist for hours or weeks under the right conditions.
c. **Dynamic or Static Characteristics**—These characteristics of a hazard describe its tendency, or that of its effects, to either expand, contract, or remain confined in time, magnitude, and space. For example, the physical destruction caused by an earthquake is generally confined to the place in which it occurs, and it does not usually get worse unless aftershocks or other cascading failures occur; in contrast, a cloud of chlorine gas leaking from a storage tank can change location by drifting with the wind and can diminish in danger by dissipating over time.
d. **Mitigation and Exacerbating Conditions**—Mitigating conditions are characteristics of the target and its physical environment that can reduce the effects of a hazard. For example, earthen berms can provide protection from bombs; exposure to sunlight can render some biological agents ineffective; and effective perimeter lighting and surveillance can minimize the likelihood of someone approaching a target unseen. In contrast, exacerbating conditions are characteristics that can enhance or magnify the effects of a hazard. For example, depressions or low areas in terrain can trap heavy vapors, and a proliferation of street furniture (trash receptacles, newspaper vending machines, mail boxes, etc.) can provide hiding places for explosive devices.

Source: FEMA 386-7

Those involved with terrorism response, including public health and public information staff, are trained to deal with the public's emotional reaction swiftly as response to the event occurs. The area of the event must be clearly identified in all emergency alert messages to prevent those not affected by the incident from overwhelming local emergency rooms and response resources, which can reduce service to those actually affected. The public needs to be informed clearly and frequently about what government agencies are doing to mitigate the impacts of the event. The public also needs clear direction on how to protect the health of individuals and families.

16.4.2 Location, Extent and Magnitude

Terrorist threats are difficult to predict. Many different groups use terrorist attacks for various reasons. The most often used weapons of terrorists are incendiary bombs, and the greatest potential for loss is from active shooters or weapons of mass destruction. Additional concerns include the use of chemical and biological weapons.

According to the 2004 Terrorism and Civil Unrest Annex to the 2004 Gem County Hazard Mitigation Plan, Gem County's Phase I Hazard Profile assessed the hazard profile for terrorism and civil unrest. The assessment concluded that this hazard has historically been of little to no concern in Gem County. This is partially due to the extremely low population of the region, the remoteness of the county in a rural state, and the presence of other, more visible targets in the region but out of Gem County (e.g., Boise to the south). However, many high-use highways across the county provide a would-be terrorist with an easy and anonymous transportation route.

16.4.3 Planning Capability for Terrorism

Gem County Emergency Management maintains the following planning capabilities for civil disturbances:

- A National Incident Management System and emergency operations/response plans for the entire Gem County area (in compliance with FEMA's Civil Planning Guidance #101)
- The Terrorism and Civil Unrest Annex to the 2004 Gem County Hazard Mitigation Plan. Gem County Emergency Management still views this as a viable plan to guide the County's response to a terrorism event in Gem County.

16.5 CYBER DISRUPTION

(The following are excerpts from the 2018 Idaho State Hazard Mitigation Plan)

16.5.1 Overview

Cyber disruption is a hazard that touches many aspects of communities: industry, government, health, business, and private. As information technology continues to flourish and grow in capability and interconnectivity, cyber disruptions become increasingly frequent and destructive. They are a fast-growing area of crime and more criminals are using the internet to commit a diverse range of criminal activities. These types of crimes can cause serious harm and pose a real threat to victims worldwide.

Cyber disruptions may be driven by criminal motives for profit, extortion, or theft, or as attacks to destroy, damage, or interfere with infrastructure systems. The likelihood of an event involving this tactic is moderate, based on a review of threats and trends related to this type of attack nationally and at the state level. Intelligence also indicates that this methodology has been used in limited attacks and attempted attacks both overseas and within the United States with some level of success. In 2016, the State of Idaho ranked 40th in the United States for the number of cybercrime victims reported to the Internet Crime Complaint Center and 37th for losses per victim.

Cyber security has shifted its focus from preventing entry to limiting damage once a system has been penetrated by identifying breaches and isolating the malware to stop it from spreading. A state cyber-security group is working to address risk to state agencies' systems. Centralized control systems are used to control infrastructure such as communications, utilities, transportation, medical facilities, law enforcement, business, financial systems, and personally identifiable information, all of which may be compromised by cyber disruptions.

The sections below describe specific types of cyber disruption identified as having the potential to occur in Idaho.

Cybercrime

Computer systems on the county, local, and individual level are likely to experience a variety of cybercrime, from malware to targeted attacks on system capabilities. These cybercrime attacks specifically seek to breach information technology security measures designed to protect individuals or organizations. The initial attack is followed by further, more severe attacks for the purpose of causing harm or stealing data. Organizations are prone to a multitude of different types of attacks. Table 16-2 describes the most common types of cyber-attacks seen today.

Table 16-2. Event Profiles for Cyber Attacks

Type	Description
Socially Engineered Trojans	Programs designed to mimic legitimate processes (e.g. updating software, running fake antivirus software) with the end goal of human-interaction caused infection. When the victim runs the fake process, the Trojan is installed on the system.
Unpatched Software	Nearly all software has weak points that may be exploited by malware. Most common software exploitations occur with Java, Adobe Reader, and Adobe Flash. These vulnerabilities are often exploited as small amounts of malicious code are often downloaded via drive-by download.
Phishing	Malicious email messages that ask users to click a link or download a program. Phishing attacks may appear as legitimate emails from trusted third parties.
Password Attacks	Third party attempts to crack a user's password and subsequently gain access to a system. Password attacks do not typically require malware, but rather stem from software applications on the attacker's system. These applications may use a variety of methods to gain access, including generating large numbers of generated guesses, or dictionary attacks, in which passwords are systematically tested against all of the words in a dictionary.
Drive-by Downloads	Malware is downloaded unknowingly by the victims when they visit an infected site.
Denial of Service Attacks	Attacks that focus on disrupting service to a network in which attackers send high volumes of data until the network becomes overloaded and can no longer function.
Man in the Middle	Man-in-the-middle attacks mirror victims and endpoints for online information exchange. In this type of attack, the man in the middle communicates with the victim, who believes he or she is interacting with a legitimate endpoint website. The man in the middle is also communicating with the actual endpoint website by impersonating the victim. As the process goes through, the man in the middle obtains entered and received information from both the victim and the endpoint.
Malvertising	Malware downloaded to a system when the victim clicks on an affected ad.
Advanced Persistent Threat	An attack in which the attacker gains access to a network and remains undetected. Advanced persistent threat attacks are designed to steal data instead of cause damage.
Ransomware	Malware that locks a person's keyboard or computer to prevent them from accessing data until you pay a ransom, usually in Bitcoin. A popular variation of this corrupts files using a private key that only the attacker possesses.

Cyber Terrorism

The FBI defines cyber terrorism as a premeditated, politically motivated attack against information, computer systems, computer programs, and data, resulting in violence against non-combatant targets. It is a deliberate act of computer-to-computer attack that undermines the confidentiality, integrity, or availability of a computer or computer system or information. Such disruptions can be motivated by religious, political, or other objectives. Similar to traditional terrorism tactics, cyberterrorism's purpose is to evoke very strong emotional reactions, such as anxiety, fear, anger, despair, depression, or even sympathy as a recruitment tool for an organization. The mechanisms for achieving these goals are not necessarily a tangible violent or physically disruptive action.

Cyberterrorism can be categorized based on three main objectives:

- As an **organizational** objective, cyberterrorism includes specific functions outside of or in addition to a typical cyberattack. Terrorist groups today use the internet on a daily basis. This may include recruitment, training, fundraising, communication, or planning. Organizational cyberterrorism can use platforms such as social media as a tool to spread a message beyond country borders and instigate physical forms of terrorism. Additionally, organizational goals may use systematic attacks as a tool for training new members of a faction in cyber warfare.
- **Undermining** as an objective seeks to achieve the hindrance of normal functioning computer systems, services, or websites. Such methods include defacing, denying, and exposing information. While undermining tactics are typically used due to high dependence on online structures to support vital operational functions, they typically do not result in grave consequences unless undertaken as part of a larger attack. Three kinds of undermining attacks can be conducted on computers:
  - Directing conventional kinetic weapons against computer equipment, a computer facility, or transmission lines to create a **physical attack** that disrupts the reliability of equipment.
  - The power of electromagnetic energy, most commonly in the form of an electromagnetic pulse, can be used to create an **electronic attack** directed against computer equipment or data transmissions. By overheating circuitry or jamming communications, an electronic attack disrupts the reliability of equipment and the integrity of data.
  - Malicious code can be used to create a cyberattack, or **computer network attack**, directed against computer processing code, instruction logic, or data. The code can generate a stream of malicious network packets that disrupt data or logic through exploiting vulnerability in computer software, or a weakness in the computer security practices of an organization. This type of cyberattack can disrupt the reliability of equipment, the integrity of data, and the confidentiality of communications.
- The **destructive** objective for cyberterrorism is what organizations fear most. Through the use of computer technology and the internet, terrorists seek to inflict destruction or damage on tangible property or assets, and even death or injury to individuals.

Space Weather

Space weather refers to the variable conditions on the sun and in space that can influence the performance of technology used on earth. Extreme space weather can cause damage to critical infrastructure, especially the electric grid. Space weather can produce electromagnetic fields that induce extreme currents in wires, disrupting power lines, and even causing wide-spread blackouts. Severe space weather also produces solar energetic particles, which can damage satellites used for commercial communications, global positioning, intelligence gathering, and weather forecasting.

Different types of space weather can affect different technologies at earth. Solar flares can produce strong x-rays that degrade or block high-frequency radio waves used for radio communication during events known as radio blackout storms. Solar energetic particles (energetic protons) can penetrate satellite electronics and cause electrical failure. These energetic particles also block radio communications at high latitudes during solar radiation storms. Geomagnetic storms can modify the signal from radio navigation systems such as GPS, causing degraded accuracy.

Figure 16-1 shows regions susceptible to a power grid collapse during a 4,800-nanotesla-per-minute geomagnetic field disturbance at 50° geomagnetic latitude, where the densest part of the United States power grid lies. The affected regions are outlined in black. Widespread blackouts could occur, impacting more than 130 million people. The entire State of Idaho is shown as being affected in the event of a power outage as a result of this disturbance. A disturbance of such magnitude, although rare, is not unprecedented: analysis of the May 1921 storm shows that disturbance levels of about 5000 nanoteslas per minute were reached during that storm.

Source: National Research Council 2008

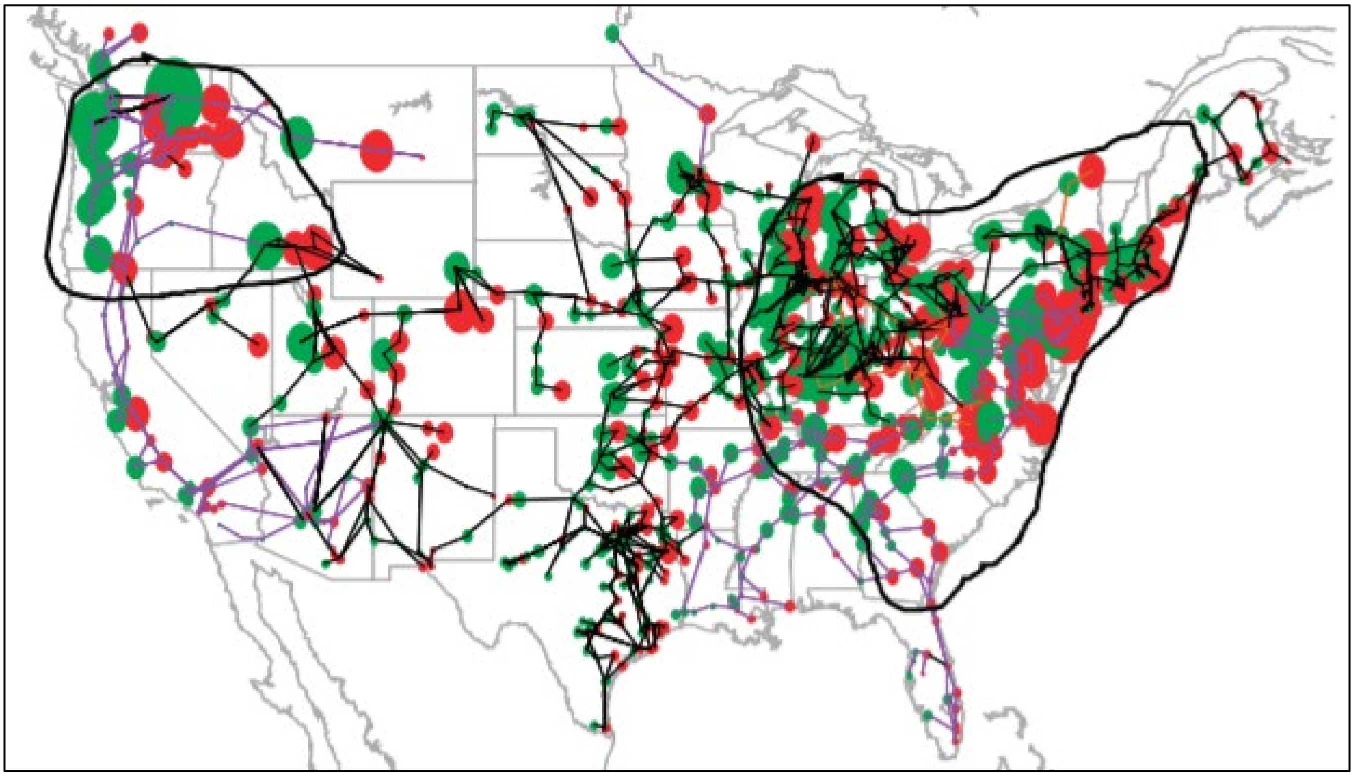


Figure 16-1. Regions Susceptible to Power Grid Collapse from a Geomagnetic Storm

16.5.2 Location, Extent and Magnitude

Cyber disruptions are not geography-based; they can occur anywhere across Idaho where technological systems exist or are utilized. They can originate from any computer to affect any other computer. If a system is connected to the internet or operating on a wireless frequency, it is susceptible. Targets of cyber disruptions can be individual computers, networks, organizations, business sectors, or governments. The most affected sectors are finance, energy and utilities, and defense and aerospace, as well as communication, retail, and health care. Both public and private operations in Idaho are threatened on a near-daily basis by millions of cyberattacks.

There is no associated magnitude ranking for cybercrimes or cyber terrorism at present. The magnitude of extent of an incident will vary greatly based on the extent and duration of the impact. Additionally, the extent will vary based on which specific system is affected, the warning time, and ability to preempt an attack. As for space weather, NOAA has developed a way to show the possible effects on people and systems from such incidents.

16.5.3 Planning Capability for Cyber Disruption

Gem County currently has prepared no plans or programs that addresses cyber disruption.

Part 3. MITIGATION PLAN

17. GUIDING PRINCIPLE, GOALS AND OBJECTIVES

Hazard mitigation plans must identify goals for reducing long-term vulnerabilities to identified hazards (44 CFR Section 201.6.c(3i)). The Steering Committee established a mission statement, a set of goals and measurable objectives for this update, based on data from the preliminary risk assessment and the results of the public involvement strategy. The mission statement, goals, objectives and actions in this plan all support each other. Goals were selected to support the mission statement. Objectives were selected that met multiple goals. Actions were prioritized based on the action meeting multiple objectives.

17.1 MISSION STATEMENT

A guiding principle focuses the range of objectives and actions to be considered. This is not a goal because it does not describe a hazard mitigation outcome, and it is broader than a hazard-specific objective. The guiding principle for the Gem County Hazard Mitigation Plan Update is as follows:

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

17.2 GOALS

The following are the mitigation goals for this plan update:

1. Prevent loss of life and reduce personal injury from future hazards and conditions.
2. Minimize loss and damage to private and public property.
3. Increase public awareness of Gem County hazards and promote opportunities to reduce exposure to risk.
4. Increase and enhance the resilience of Gem County's critical infrastructure, economic base and unique/changing environments.
5. Ensure high level of communication and cooperation among local, state and federal government to avoid significant disruption of services during a disaster.

Achievement of these goals defines the effectiveness of a mitigation strategy.

17.3 OBJECTIVES

Each selected objective meets multiple goals, serving as a stand-alone measurement of the effectiveness of a mitigation action, rather than as a subset of a goal. The objectives also are used to help establish priorities. The objectives are as follows:

1. Reduce hazard-related risks and vulnerability to potentially isolated populations within the planning area.
2. Maintain/enhance the understanding of hazards and the risk they pose using the best available data and science.

3. Retrofit, purchase or relocate structures and critical facilities based on one or more of the following criteria: level of exposure, repetitive loss history or previous damage from hazards.
4. Seek mitigation projects that provide the highest degree of hazard protection at the least cost.
5. Minimize disruption of local government, commerce and public operations caused by hazard events.
6. Strengthen codes and code enforcement to ensure that new construction of property and infrastructure can withstand the impacts of all hazards that impact the Gem County planning area.
7. Educate the public on the risk exposure to hazards and ways to increase the public's ability to prepare, respond, recover and mitigate the impacts of these events.
8. Utilize the best available data and science on the impacts of hazards to inform future land uses in the planning area.
9. Increase resilience and the continuity of operations of identified critical facilities and infrastructure within the planning area.
10. Establish partnerships with stakeholders to improve capabilities and implement methods to protect the people, property and environment of Gem County.
11. Seek ways to enhance emergency management capability within the planning area.
12. Use incentive-based programs, such as the Community Rating System, Firewise and Storm/Ready, to promote proactive risk reduction at both the public and private scale.

18. MITIGATION BEST PRACTICES

Catalogs of hazard mitigation best practices were developed that present a broad range of alternatives to be considered for use in the planning area, in compliance with 44 CFR (Section 201.6.c.3.ii). These catalogs were developed through a facilitated session with the Steering Committee looking at strengths, weaknesses, obstacles and opportunities within the planning area for each identified hazard of concern. The planning team augmented the catalogs with best practices from state and federal publications as well as experience from past planning efforts. One catalog was developed for each natural hazard of concern evaluated in this plan. The catalogs, listed in Table 18-1 through Table 18-7, present best practices categorized in two ways:

- By what it would do:
  - Manipulate a hazard
  - Reduce exposure to a hazard
  - Reduce vulnerability to a hazard
  - Increase the ability to respond to or be prepared for a hazard
- By who would have responsibility for implementation:
  - Individuals
  - Businesses
  - Government.

Hazard mitigation actions recommended in this plan were selected from among the best practices presented in the catalogs or inspired by a review of the catalogs. The catalogs provide a baseline of mitigation best practices that are backed by a planning process, are consistent with the planning partners' goals and objectives, and are within the capabilities of the partners to implement. Some of these best practices may not be feasible based on the selection criteria identified for this plan. The purpose of the catalog was to equip the planning partners with a list of what could be considered to reduce risk from natural hazards within the planning area. Best practices in the catalog that are not included for the final action plan were not selected for one or more of the following reasons:

- The action is not feasible.
- The action is already being implemented.
- There is an apparently more cost-effective alternative.
- The action does not have public or political support.

Table 18-1. Catalog of Mitigation Alternatives—Dam/Canal Failure

Personal Scale	Corporate Scale	Government Scale
Manipulate Hazard		
• None	1. Remove dams 2. Remove levees 3. Harden dams	1. Remove dams 2. Remove flood control impounding facilities 3. Harden dams
Reduce Exposure		
• Relocate out of dam failure inundation areas.	• Replace earthen dams with hardened structures	1. Replace earthen dams with hardened structures 2. Relocate critical facilities out of dam failure inundation areas. 3. Consider open space land use in designated dam failure inundation areas. 4. Develop effective underground water storage as an alternative to dams and reservoir storage.
Reduce Vulnerability		
• Elevate home to appropriate levels.	• Flood-proof facilities within dam failure inundation areas	1. Adopt higher regulatory floodplain standards in mapped dam failure inundation areas. 2. Retrofit critical facilities within dam failure inundation areas.
Increase Preparation or Response Capability		
1. Learn about risk reduction for the dam failure hazard. 2. Learn the evacuation routes for a dam failure event. 3. Educate yourself on early warning systems and the dissemination of warnings.	1. Educate employees on the probable impacts of a dam failure. 2. Develop a Continuity of Operations Plan.	1. Map dam failure inundation areas. 2. Enhance emergency operations plan to include a dam failure component. 3. Institute monthly communications checks with dam operators. 4. Inform the public on risk reduction techniques 5. Adopt real-estate disclosure requirements for the re-sale of property located within dam failure inundation areas. 6. Consider the probable impacts of climate in assessing the risk associated with the dam failure hazard. 7. Establish early warning capability downstream of listed high hazard dams. 8. Consider the residual risk associated with protection provided by dams in future land use decisions. 9. Analyze and include elements of conservation and recreation benefits into any mitigation project.

Table 18-2. Catalog of Mitigation Alternatives—Drought

Personal Scale	Corporate Scale	Government Scale
Manipulate Hazard		
• None	• None	• Groundwater recharge through stormwater management
Reduce Exposure		
• None	• None	• Identify and create groundwater backup sources
Reduce Vulnerability		
1. Drought-resistant landscapes 2. Reduce water system losses 3. Modify plumbing systems (through water saving kits)	1. Drought-resistant landscapes 2. Reduce private water system losses	1. Water use conflict regulations 2. Reduce water system losses 3. Distribute water saving kits
Increase Preparation or Response Capability		
• Practice active water conservation	• Practice active water conservation	1. Public education on drought resistance 2. Identify alternative water supplies for times of drought; mutual aid agreements with alternative suppliers 3. Develop drought contingency plan 4. Develop criteria "triggers" for drought-related actions 5. Improve accuracy of water supply forecasts 6. Modify rate structure to influence active water conservation techniques 7. Consider the potential of issuing grants to municipalities and non-governmental organizations in implementation

Table 18-3. Catalog of Mitigation Alternatives—Earthquake

Personal Scale	Corporate Scale	Government Scale
Manipulate Hazard		
• None	• None	• None
Reduce Exposure		
• Locate outside of hazard area (off soft soils)	• Locate or relocate mission-critical functions outside hazard area where possible	• Locate critical facilities or functions outside hazard area where possible
Reduce Vulnerability		
1. Retrofit structure (anchor house structure to foundation) 2. Secure household items that can cause injury or damage (such as water heaters, bookcases, and other appliances) 3. Build to higher design	1. Build redundancy for critical functions and facilities 2. Retrofit critical buildings and areas housing mission-critical functions	1. Harden infrastructure 2. Provide redundancy for critical functions 3. Adopt higher regulatory standards
Increase Preparation or Response Capability		
1. Practice "drop, cover, and hold" 2. Develop household mitigation plan, such as creating a retrofit savings account, communication capability with outside, 72-hour self-sufficiency during an event 3. Keep cash reserves for reconstruction 4. Become informed on the hazard and risk reduction alternatives available. 5. Develop a post-disaster action plan for your household	1. Adopt higher standard for new construction; consider "performance-based design" when building new structures 2. Keep cash reserves for reconstruction 3. Inform your employees on the possible impacts of earthquake and how to deal with them at your work facility. 4. Develop a Continuity of Operations Plan	1. Provide better hazard maps 2. Provide technical information and guidance 3. Enact tools to help manage development in hazard areas (e.g., tax incentives, information) 4. Include retrofitting and replacement of critical system elements in capital improvement plan 5. Develop strategy to take advantage of post-disaster opportunities 6. Warehouse critical infrastructure components such as pipe, power line, and road repair materials 7. Develop and adopt a Continuity of Operations Plan 8. Initiate triggers guiding improvements (such as <50% substantial damage or improvements) 9. Further enhance seismic risk assessment to target high hazard buildings for mitigation opportunities 10. Develop a post-disaster action plan that includes grant funding and debris removal components 11. Consider the potential of issuing grants to municipalities and non-governmental organizations in implementation

Table 18-4. Catalog of Mitigation Alternatives—Flood

Personal Scale	Corporate Scale	Government Scale
Manipulate Hazard		
1. Clear stormwater drains and culverts 2. Institute low-impact development techniques on property	1. Clear stormwater drains and culverts 2. Institute low-impact development techniques on property	1. Maintain drainage system 2. Institute low-impact development techniques on property 3. Dredging, levee construction, and providing regional retention areas 4. Structural flood control, levees, channelization, or revetments. 5. Stormwater management regulations and master planning 6. Acquire vacant land or promote open space uses in developing watersheds to control increases in runoff
Reduce Exposure		
1. Locate outside of hazard area 2. Elevate utilities above base flood elevation 3. Institute low impact development techniques on property	1. Locate business critical facilities or functions outside hazard area 2. Institute low impact development techniques on property	1. Locate or relocate critical facilities outside of hazard area 2. Acquire or relocate identified repetitive loss properties 3. Promote open space uses in identified high hazard areas via techniques such as: planned unit developments, easements, setbacks, greenways, sensitive area tracks. 4. Adopt land development criteria such as planned unit developments, density transfers, clustering 5. Institute low impact development techniques on property 6. Acquire vacant land or promote open space uses in developing watersheds to control increases in runoff 7. Encourage the creation of a floodplain acquisition fund to acquire land or easements that benefit flood hazard mitigation
Reduce Vulnerability		
1. Retrofit structures (elevate structures above base flood elevation) 2. Elevate items within house above base flood elevation 3. Build new homes above base flood elevation 4. Flood-proof existing structures	1. Build redundancy for critical functions or retrofit critical buildings 2. Provide flood-proofing measures when new critical infrastructure must be located in floodplains	1. Harden infrastructure, bridge replacement program 2. Provide redundancy for critical functions and infrastructure 3 Adopt appropriate regulatory standards, such as: increased freeboard standards, cumulative substantial improvement or damage, lower substantial damage threshold; compensatory storage, non-conversion deed restrictions 4. Stormwater management regulations and master planning 5. Adopt “no-adverse impact” floodplain management policies that strive to not increase the flood risk on downstream communities

Personal Scale	Corporate Scale	Government Scale
Increase Preparation or Response Capability		
1. Buy flood insurance 2. Develop household mitigation plan, such as retrofit savings, communication capability with outside, 72-hour self-sufficiency during and after an event	1. Keep cash reserves for reconstruction 2. Support and implement hazard disclosure for the sale/re-sale of property in identified risk areas. 3. Solicit cost-sharing through partnerships with other stakeholders on projects with multiple benefits.	1. Produce better hazard maps 2. Provide technical information and guidance 3. Enact tools to help manage development in hazard areas (stronger controls, tax incentives, and information) 4. Incorporate retrofitting or replacement of critical system elements in capital improvement plan 5. Develop strategy to take advantage of post-disaster opportunities 6. Warehouse critical infrastructure components 7. Develop and adopt a Continuity of Operations Plan 8. Consider participation in the Community Rating System 9. Maintain existing data and gather new data needed to define risks and vulnerability 10. Train emergency responders 11. Create a building and elevation inventory of structures in the floodplain 12. Develop and implement a public information strategy 13. Charge a hazard mitigation fee 14. Integrate floodplain management policies into other planning mechanisms within the planning area. 15. Consider the probable impacts of climate change on the risk associated with the flood hazard 16. Consider the residual risk associated with structural flood control in future land use decisions 17. Enforce National Flood Insurance Program 18. Adopt a stormwater management master plan 19. Consider the potential of issuing grants to municipalities and non-governmental organizations in implementation 20. Analyze and include elements of conservation and recreation benefits into any mitigation project

Table 18-5. Catalog of Mitigation Alternatives—Landslide

Personal Scale	Corporate Scale	Government Scale
Manipulate Hazard		
1. Stabilize slope (dewater, armor toe) 2. Reduce weight on top of slope 3. Minimize vegetation removal and the addition of impervious surfaces.	1. Stabilize slope (dewater, armor toe) 2. Reduce weight on top of slope	1. Stabilize slope (dewater, armor toe) 2. Reduce weight on top of slope
Reduce Exposure		
• Locate structures outside of hazard area (off unstable land and away from slide-run out area)	• Locate structures outside of hazard area (off unstable land and away from slide-run out area)	1. Acquire properties in high-risk landslide areas. 2. Adopt land use policies that prohibit the placement of habitable structures in high-risk landslide areas.
Reduce Vulnerability		
• Retrofit home.	• Retrofit at-risk facilities.	1. Adopt higher regulatory standards for new development within unstable slope areas. 2. Armor/retrofit critical infrastructure against the impact of landslides.
Increase Preparation or Response Capability		
1. Institute warning system, and develop evacuation plan 2. Keep cash reserves for reconstruction 3. Educate yourself on risk reduction techniques for landslide hazards.	1. Institute warning system, and develop evacuation plan 2. Keep cash reserves for reconstruction 3. Develop a Continuity of Operations Plan 4. Educate employees on the potential exposure to landslide hazards and emergency response protocol.	1. Produce better hazard maps 2. Provide technical information and guidance 3. Enact tools to help manage development in hazard areas: better land controls, tax incentives, information 4. Develop strategy to take advantage of post-disaster opportunities 5. Warehouse critical infrastructure components 6. Develop and adopt a continuity of operations plan 7. Educate the public on the landslide hazard and appropriate risk reduction alternatives 8. Consider the potential of issuing grants to municipalities and non-governmental organizations in implementation

Table 18-6. Catalog of Mitigation Alternatives—Severe Weather

Personal Scale	Corporate Scale	Government Scale
Manipulate Hazard		
• None	• None	• None
Reduce Exposure		
• None	• None	• None
Reduce Vulnerability		
1. Insulate house 2. Provide redundant heat and power 3. Insulate structure 4. Plant appropriate trees near home and power lines ("Right tree, right place" National Arbor Day Foundation Program)	1. Relocate critical infrastructure (such as power lines) underground 2. Reinforce or relocate critical infrastructure such as power lines to meet performance expectations 3. Install tree wire	1. Harden infrastructure such as locating utilities underground 2. Trim trees back from power lines 3. Designate snow routes and strengthen critical road sections and bridges
Increase Preparation or Response Capability		
1. Trim or remove trees that could affect power lines 2. Promote 72-hour self-sufficiency 3. Obtain a NOAA weather radio. 4. Obtain an emergency generator.	1. Trim or remove trees that could affect power lines 2. Create redundancy 3. Equip facilities with a NOAA weather radio 4. Equip vital facilities with emergency power sources.	1. Support programs such as "Tree Watch" that proactively manage problem areas through use of selective removal of hazardous trees, tree replacement, etc. 2. Establish and enforce building codes that require all roofs to withstand snow loads 3. Increase communication alternatives 4. Modify land use and environmental regulations to support vegetation management activities that improve reliability in utility corridors. 5. Modify landscape and other ordinances to encourage appropriate planting near overhead power, cable, and phone lines 6. Provide NOAA weather radios to the public 7. Consider the potential of issuing grants to municipalities and non-governmental organizations in implementation

Table 18-7. Catalog of Mitigation Alternatives—Wildfire

Personal Scale	Corporate Scale	Government Scale
Manipulate Hazard		
• Clear potential fuels on property such as dry overgrown underbrush and diseased trees	• Clear potential fuels on property such as dry underbrush and diseased trees	1. Clear potential fuels on property such as dry underbrush and diseased trees 2. Implement best management practices on public lands.
Reduce Exposure		
1. Create and maintain defensible space around structures 2. Locate outside of hazard area 3. Mow regularly	1. Create and maintain defensible space around structures and infrastructure 2. Locate outside of hazard area	1. Create and maintain defensible space around structures and infrastructure 2. Locate outside of hazard area 3. Enhance building code to include use of fire resistant materials in high hazard area.
Reduce Vulnerability		
1. Create and maintain defensible space around structures and provide water on site 2. Use fire-retardant building materials 3. Create defensible spaces around home	1. Create and maintain defensible space around structures and infrastructure and provide water on site 2. Use fire-retardant building materials 3. Use fire-resistant plantings in buffer areas of high wildfire threat.	1. Create and maintain defensible space around structures and infrastructure 2. Use fire-retardant building materials 3. Use fire-resistant plantings in buffer areas of high wildfire threat. 4. Consider higher regulatory standards (such as Class A roofing) 5. Establish biomass reclamation initiatives
Increase Preparation or Response Capability		
1. Employ techniques from the National Fire Protection Association's Firewise Communities program to safeguard home 2. Identify alternative water supplies for fire fighting 3. Install/replace roofing material with non-combustible roofing materials.	1. Support Firewise community initiatives. 2. Create /establish stored water supplies to be utilized for firefighting.	1. More public outreach and education efforts, including an active Firewise program 2. Possible weapons of mass destruction funds available to enhance fire capability in high-risk areas 3. Identify fire response and alternative evacuation routes 4. Seek alternative water supplies 5. Become a Firewise community 6. Use academia to study impacts/solutions to wildfire risk 7. Establish/maintain mutual aid agreements between fire service agencies. 8. Create/implement fire plans 9. Consider the probable impacts of climate change on the risk associated with the wildfire hazard in future land use decisions 10. Consider the potential of issuing grants to municipalities and non-governmental organizations in implementation

19. MITIGATION ACTIONS AND IMPLEMENTATION

19.1 SELECTED COUNTYWIDE MITIGATION ACTIONS

The planning partners and the Steering Committee determined that some actions from the mitigation catalogs could be implemented to provide hazard mitigation benefits countywide. Table 19-1 lists the recommended countywide actions, the lead agency for each, and the proposed timeline.

Table 19-1. Action Plan—Countywide Mitigation Actions

Hazards Addressed	Lead Agency	Possible Funding Sources	Time Line	Objectives
CW-1—Continue outreach to irrigation districts to encourage their participation as planning partners in the hazard mitigation plan.				
Flood, Severe Weather, Earthquake, Dam/Canal Failure	Emergency Management	Local Funding	Short term	2, 7, 10
CW-2—Continue to maintain a countywide hazard mitigation plan web link on the County website to house the plan and plan updates, in order to provide the public an opportunity to monitor plan implementation and progress. Each planning partner may support the initiative by including an initiative in its action plan and creating a web link to the website.				
All Hazards	Gem County Emergency Management	General Fund	Short term/ ongoing	2, 7, 10
CW-3—Coordinate all mitigation planning and project efforts, including grant application support, to maximize all resources available to the planning partnership.				
All Hazards	Gem County Emergency Management/ All Planning Partners	General Fund, FEMA mitigation grants	Short term/ ongoing	1, 4, 10
CW-4—Provide coordination and technical assistance in grant application preparation that includes assistance in cost-benefit analysis for grant-eligible projects.				
All Hazards	Gem County Emergency Management	General Fund, FEMA mitigation grants	Short term/ ongoing	2, 7, 10
CW-5—Where appropriate, support retrofitting, purchase, or relocation of structures or infrastructure located in hazard-prone areas to protect structures/infrastructure from future damage, with repetitive loss and severe repetitive loss properties as priority when applicable.				
All Hazards	Al Planning Partners	FEMA mitigation grants	Long term	7, 8, 9, 10

The parameters for the timeline are as follows:

- Short Term = to be completed in 1 to 5 years
- Long Term = to be completed in greater than 5 years
- Ongoing = currently being funded and implemented under existing programs.

19.2 BENEFIT/COST REVIEW

44 CFR requires the prioritization of the action plan according to a benefit/cost analysis of the actions and their associated costs (Section 201.6.c.3iii). The benefit/cost analysis for this plan was not of the detailed variety required for eligibility under FEMA's Hazard Mitigation Grant Program (HMGP) or Pre-Disaster Mitigation (PDM) grant program. A less formal approach was used because some projects may not be implemented for up to 10 years, by which time associated costs and benefits could change dramatically. Parameters were established for assigning subjective ratings (high, medium and low) to the costs and benefits of these projects.

Cost ratings were defined as follows:

- **High**—Existing funding will not cover the cost of the project; implementation would require new revenue through an alternative source (for example, bonds, grants and fee increases).
- **Medium**—The project could be implemented with existing funding but would require a re-apportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.
- **Low**—The project could be funded under the existing budget. The project is part of or can be part of an ongoing existing program.

Benefit ratings were defined as follows:

- **High—**Project will provide an immediate reduction of risk exposure for life and property.
- **Medium—**Project will have a long-term impact on the reduction of risk exposure for life and property, or project will provide an immediate reduction in the risk exposure for property.
- **Low—**Long-term benefits of the project are difficult to quantify in the short term.

Using this approach, projects with positive benefit versus cost ratios (such as high over high, high over medium, medium over low, etc.) are considered cost-beneficial and are prioritized accordingly.

For many of the strategies identified in this action plan, the partners may seek financial assistance under the HMGP or PDM programs, both of which require detailed benefit/cost analyses. These analyses will be performed on projects at the time of application using the FEMA benefit-cost model. For projects not seeking financial assistance from grant programs that require detailed analysis, the partners reserve the right to define "benefits" according to parameters that meet the goals and objectives of this plan.

19.3 COUNTYWIDE ACTION PLAN PRIORITIZATION

Table 19-2 lists the priority of each countywide action, using the same parameters used by each of the planning partners in selecting their actions. A qualitative benefit-cost review was performed for each of these actions.

Table 19-2. Prioritization of Countywide Mitigation Actions

Action #	# of Objectives Met	Benefits	Costs	Do benefits equal or exceed costs?	Is project grant eligible?	Can project be funded under existing programs/ budgets?	Priority (High, Medium, Low)
CW-1	3	High	Low	Yes	No	Yes	High
CW-2	3	Medium	Low	Yes	No	Yes	High
CW-3	3	Medium	Low	Yes	No	Yes	High
CW-4	3	Medium	Low	Yes	No	Yes	High
CW-5	4	High	High	Yes	Yes	No	Medium

The priorities are defined as follows:

- **High Priority**—A project that meets multiple objectives (i.e., multiple hazards), has benefits that exceed cost, has funding secured or is an ongoing project and meets eligibility requirements for the HMGP or PDM grant program. High priority projects can be completed in the short term (1 to 5 years).
- **Medium Priority**—A project that meets goals and objectives, that has benefits that exceed costs, and for which funding has not been secured but that is grant eligible under HMGP, PDM or other grant programs. Project can be completed in the short term once funding is secured. Medium priority projects will become high priority projects once funding is secured.

- **Low Priority**—A project that will mitigate the risk of a hazard, that has benefits that do not exceed the costs or are difficult to quantify, for which funding has not been secured, that is not eligible for HMGP or PDM grant funding, and for which the time line for completion is long term (1 to 10 years). Low priority projects may be eligible for other sources of grant funding from other programs.

19.4 PLAN ADOPTION

A hazard mitigation plan must document formal adoption by the governing body of the jurisdiction requesting federal approval of the plan (44 CFR, Section 201.6.c.5). For multi-jurisdictional plans, each jurisdiction requesting approval must document that is has been formally adopted. This plan will be submitted for a pre-adoption review to the Idaho Office of Emergency Management and the Insurance Services Office (FEMA's CRS contractor) prior to adoption. Once pre-adoption approval has been provided, all planning partners will formally adopt the plan update. FEMA Region X granted final approval of the plan to Gem County and its eligible planning partners on ____________. All partners understand that DMA compliance and its benefits cannot be achieved until the plan is adopted. Copies of the resolutions adopting this plan for all planning partners and the final approval letter from FEMA can be found in Appendix D of this volume.

19.5 PLAN MAINTENANCE STRATEGY

A hazard mitigation plan must present a plan maintenance process that includes the following (44 CFR Section 201.6.c.4):

- A section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan over a 5-year cycle
- A process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate
- A discussion on how the community will continue public participation in the plan maintenance process.

This section details the formal process that will ensure that the 2018 Gem County Hazard Mitigation Plan remains an active and relevant document and that the planning partners maintain their eligibility for applicable funding sources. The plan maintenance process includes a schedule for monitoring and evaluating the plan annually and producing an updated plan every five years. This section also describes how public participation will be integrated throughout the plan maintenance and implementation process. It explains how the mitigation strategies outlined in this Plan will be incorporated into existing planning mechanisms and programs, such as comprehensive land-use planning processes, capital improvement planning, and building code enforcement and implementation. The Plan's format allows sections to be reviewed and updated when new data become available, resulting in a plan that will remain current.

19.6 PLAN MONITORING AND IMPLEMENTATION

The effectiveness of the hazard mitigation plan depends on monitoring, implementation, and incorporation of its action items into partner jurisdictions' existing plans, policies and programs. Together, the action items in the plan provide a framework for activities that the Planning Partnership can implement over the next 5 years. The planning team and the Steering Committee have established goals and objectives and have prioritized mitigation actions that will be implemented through existing plans, policies, and programs. The planning partners will have individual responsibility for overseeing the plan monitoring and implementation strategy, with primary responsibility identified in each jurisdictional annex plans (see planning partner annexes in Volume 2) and summarized in Table 19-3. At a minimum, the planning partners will track and report the status of the jurisdiction-specific mitigation actions for inclusion into the annual progress report, described in Section 19.8.

Table 19-3. Plan Maintenance Matrix

<table>
<tr><th>Task</th><th>Approach</th><th>Timeline</th><th colspan="2">Lead Responsibility[a]</th><th>Support Responsibility</th></tr>
<tr><td rowspan="5">Monitoring</td><td rowspan="5">Preparation of status updates and action implementation tracking as part of submission for Annual Progress Report.</td><td rowspan="5">Annually after the adoption and final approval of the plan by FEMA. Actual reporting period TBD</td><td>Gem County</td><td>Emergency Manager</td><td rowspan="5">Jurisdictional points of contact identified in Volume 2 annexes</td></tr>
<tr><td>Emmett</td><td>Director of Public Works</td></tr>
<tr><td>GCFD#1</td><td>Fire Chief</td></tr>
<tr><td>GCFD#2</td><td>Board of Commissioners</td></tr>
<tr><td>ESD#221</td><td>Board</td></tr>
<tr><td>Evaluation</td><td>Review the status of previous actions as submitted by the monitoring task lead and support the assessment of the effectiveness of the plan; compile the Annual Progress Report; assess appropriate action for preparing next hazard mitigation plan update.</td><td>Annually after final plan approval by FEMA, or upon comprehensive update to General Plan or major disaster</td><td colspan="2">Gem County
City of Emmett
Gem County Fire District #1
Gem County Fire District #2
Emmett School District #221</td><td>Jurisdictional points of contact identified in Volume 2 annexes</td></tr>
<tr><td>Update</td><td>The Gem County partnership will reconvene the planning partners, at a minimum, every 5 years to guide a comprehensive update to review and revise the plan.</td><td>Every 5 years or upon comprehensive update to General Plan or major disaster</td><td colspan="2">The governing body for all planning partners covered by this plan</td><td>Jurisdictional points of contact identified in Volume 2 annexes</td></tr>
<tr><td>Grant Monitoring and Coordination</td><td>As grant opportunities present themselves, the Gem County planning partners will consider options to pursue grants to fund actions identified in this plan</td><td>As grants become available</td><td colspan="2">Gem County Emergency Management through its LEPC</td><td>Jurisdictional points of contact identified in Volume 2 annexes</td></tr>
<tr><td>Continuing Public Involvement</td><td>The principle means for providing the public access to the implementation of this plan will be the Gem County hazard mitigation website: https://www.gemcounty.org/disaster-services/ahmp/</td><td>Annually</td><td colspan="2">Gem County Emergency Management</td><td>All planning partners will provide a link to hazard mitigation website on their jurisdictional websites</td></tr>
<tr><td>Plan Integration</td><td>Integrate relevant information from hazard mitigation plan into other plans and programs where viable and opportunities arise</td><td>Ongoing</td><td colspan="2">The governing body for all planning partners covered by this plan</td><td>Jurisdictional points of contact identified in Volume 2 annexes</td></tr>
</table>

19.7 STEERING COMMITTEE

The Steering Committee is a volunteer body that oversaw the development of the Plan and made recommendations on key elements of the plan, including the maintenance strategy. It was the Steering Committee's position that an oversight committee with representation similar to the initial Steering Committee should have an active role in the Plan maintenance strategy. Therefore, it is recommended that a steering committee remain a viable body involved in key elements of the Plan maintenance strategy. The new steering committee should strive to include representation from the planning partners, as well as other stakeholders in the planning area.

The principal role of the new steering committee in this plan maintenance strategy will be to review the annual progress report and provide input to Gem County on possible enhancements to be considered at the next update. Future plan updates will be overseen by a steering committee similar to the one that participated in this update process, so keeping an interim steering committee intact will provide a head start on future updates. Completion of the progress report is the responsibility of each planning partner, not the responsibility of the steering committee. The steering committee's role will be to review the progress report in an effort to identify issues needing to be addressed by future plan updates.

19.8 ANNUAL PROGRESS REPORT

The minimum task of each planning partner will be the evaluation of the progress of its individual action plan during a 12-month performance period. This review will include the following:

- Summary of any hazard events that occurred during the performance period and the impact these events had on the planning area
- Review of mitigation success stories
- Review of continuing public involvement
- Brief discussion about why targeted strategies were not completed
- Re-evaluation of the action plan to determine if the timeline for identified projects needs to be amended (such as changing a long-term project to a short-term one because of new funding)
- Recommendations for new projects
- Changes in or potential for new funding options (grant opportunities)
- Impact of any other planning programs or initiatives that involve hazard mitigation.

The planning team has created a template to guide the planning partners in preparing a progress report (see Appendix E). The plan maintenance steering committee will provide feedback to the planning team on items included in the template. It is the intent of the planning team to prepare an annual report on the progress of the plan. This report should be used as follows:

- Posted on the Gem County website page dedicated to the hazard mitigation plan
- Presented to planning partner governing bodies to inform them of the progress of actions implemented during the reporting period
- For Gem County, the report can be provided as part of the CRS annual re-certification package. The CRS requires an annual recertification to be submitted by October 1 of every calendar year for which the community has not received a formal audit. To meet this recertification timeline, the planning team will strive to complete progress reports between June and September each year.

Uses of the progress report will be at the discretion of each planning partner. Annual progress reporting is not a requirement specified under 44 CFR. However, it may enhance the planning partnership's opportunities for funding. While failure to implement this component of the plan maintenance strategy will not jeopardize a planning partner's compliance under the DMA, it may jeopardize its opportunity to partner and leverage funding opportunities with the other partners. Each planning partner was informed of these protocols at the beginning of this planning process, and each partner acknowledged these expectations with submittal of a letter of intent to participate in this process.

19.9 PLAN UPDATE

Local hazard mitigation plans must be reviewed, revised if appropriate, and resubmitted for approval in order to remain eligible for benefits under the DMA (44 CFR, Section 201.6.d.3). The Gem County partnership intends to update the hazard mitigation plan on a 5-year cycle from the date of initial plan adoption. This cycle may be accelerated to less than 5 years based on the following triggers:

- A Presidential Disaster Declaration that impacts the planning area

- A hazard event that causes loss of life
- An update of the County or participating city's comprehensive plan

It will not be the intent of future updates to develop a complete new hazard mitigation plan for the planning area. The update will, at a minimum, include the following elements:

- The update process will be convened through a steering committee.
- The hazard risk assessment will be reviewed and, if necessary, updated using best available information and technologies.
- The action plans will be reviewed and revised to account for any actions completed, dropped, or changed and to account for changes in the risk assessment or new partnership policies identified under other planning mechanisms (such as the comprehensive plan).
- The draft update will be sent to appropriate agencies and organizations for comment.
- The public will be given an opportunity to comment on the update prior to adoption.
- The partnership governing bodies will adopt their respective portions of the updated plan.

19.10 CONTINUING PUBLIC INVOLVEMENT

The public will continue to be apprised of the plan's progress through the Gem County website, including providing copies of annual progress reports on the website. Each planning partner has agreed to provide links to the County hazard mitigation plan website on their individual jurisdictional websites to increase avenues of public access to the plan. Gem County has agreed to maintain the hazard mitigation plan website. This site will not only house the final plan, it will become the one-stop shop for information regarding the plan, the partnership and plan implementation. Upon initiation of future update processes, a new public involvement strategy will be initiated based on guidance from a new steering committee. This strategy will be based on the needs and capabilities of the planning partnership at the time of the update. At a minimum, this strategy will include the use of local media outlets within the planning area.

19.11 INCORPORATION INTO OTHER PLANNING MECHANISMS

The information on hazard, risk, vulnerability and mitigation contained in this plan is based on the best science and technology available at the time this update was prepared. The Gem County Comprehensive Plan and the comprehensive plans of the partner cities are considered to be integral parts of this plan. The County and partner cities, through adoption of comprehensive plans and zoning ordinances, have planned for the impact of natural hazards. The Plan update process provided the County and the cities with the opportunity to review and expand on policies contained within these planning mechanisms. The planning partners used their comprehensive plans and the hazard mitigation plan as complementary documents that work together to achieve the goal of reducing risk exposure to the citizens of the Gem County. An update to a comprehensive plan may trigger an update to the hazard mitigation plan.

All municipal planning partners support the creation of a linkage between the hazard mitigation plan and their individual comprehensive plans by identifying a mitigation action as such and giving that action a high priority. Other planning processes and programs to be coordinated with the recommendations of the hazard mitigation plan may include the following:

- Partners' emergency response plans
- Capital improvement programs
- Municipal codes
- Community design guidelines
- Water-efficient landscape design guidelines

- Stormwater management programs
- Water system vulnerability assessments
- Master fire protection plans.

Some action items do not need to be implemented through regulation. Instead, they can be implemented through the creation of new educational programs, continued interagency coordination, or improved public participation. As information becomes available from other planning mechanisms that can enhance this plan, that information will be incorporated via the update process.

REFERENCES

American Planning Association (APA). 2014. Hazard Mitigation Policy Guide. July 2014

Association of State Dam Safety Officials. 2015. "Dam Failures, Dam Incidents (Near Failures). Available online at http://www.damsafety.org/media/Documents/PDF/USA_FailuresIncidents.pdf

Association of State Dam Safety Officials. 2018. "Dam Failures and Incidents." Association of State Dam Safety Officials website, accessed January 2018 at http://www.damsafety.org/news/?p=412f29c8-3fd8-4529-b5c9-8d47364c1f3e

Boise Interagency Dispatch Center. 2018. http://www.idahofireinfo.blm.gov/southwest/incident_information.htm website accessed 2018

Centers for Disease Control and Prevention (CDC). 2009. Climate and Health: Heat Waves. The website of the CDC, last updated December 14, 2009, http://www.cdc.gov/climateandhealth/effects/heat.htm.

Centers for Disease Control and Prevention (CDC). 2013. Emergency Preparedness and Response: Lightning: Victim Data. The website of the CDC, last reviewed December 23, 2013. http://www.bt.cdc.gov/disasters/lightning/victimdata.asp

Centers for Disease Control and Prevention (CDC). 2014a. Extreme Cold: A Prevention Guide to Promote Your Personal Health and Safety. Accessed March 2018 at http://www.bt.cdc.gov/disasters/winter/pdf/extreme-cold-guide.pdf

Centers for Disease Control and Prevention (CDC). 2014b. Climate Change: Extreme Heat. The website of the CDC, last updated July 1, 2014, http://ephtracking.cdc.gov/showClimateChangeExtremeHeat.action

Dalton, M.M., P.W. Mote, and A.K. Snover [Eds.]. 2013. Climate Change in the Northwest: Implications for Our Landscapes, Waters, and Communities. Washington, DC: Island Press.

Federal Emergency Management Agency (FEMA). 1978. National Flood Insurance Program. "Flood Insurance Study for Gem County"

Federal Emergency Management Agency (FEMA). 1989. "Landslide Loss reduction: A guide for State and Local Government Planning". FEMA 182. August 1989

Federal Emergency Management Agency (FEMA). 2001. Understanding Your Risks; Identifying Hazards and Determining your Risks. FEMA (386-2). August 2001

Federal Emergency Management Agency (FEMA). 2002. Getting Started; Building support for Mitigation Planning; FEMA (386-1). September 2002

Federal Emergency Management Agency (FEMA). 2003. Developing the Mitigation Plan; Identifying Mitigation Actions and Implementing Strategies. FEMA (386-3). April 2003

Federal Emergency Management Agency (FEMA). 2004. Using Hazus-MH for Risk Assessment, How to Guide, FEMA (433). August 2004

Federal Emergency Management Agency (FEMA). 2007. "Selecting Appropriate Mitigation Measures for Flood Prone Structures". FEMA 551. March 2007

Federal Emergency Management Agency (FEMA). 2011. "Local Mitigation Plan Review Guide." October 2011

Federal Emergency Management Agency (FEMA). 2013. "Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards". January 2013

Federal Emergency Management Agency (FEMA). 2013. Integrating the Local Natural Hazard Mitigation Plan into a Community's Comprehensive Plan. May 2013

Federal Emergency Management Agency (FEMA). 2013. Local Mitigation Planning Handbook. March 2013

Federal Emergency Management Agency (FEMA). 2013. What is Mitigation? Last updated September 2013, http://www.fema.gov/what-mitigation.

Federal Emergency Management Agency (FEMA). 2016. Executive Order 11988: Floodplain Management. The website of FEMA. Last updated April 23, 2015. Available online at http://www.fema.gov/disaster/4253

Federal Emergency Management Agency (FEMA). 2016. Website accessed 2015-2016 http://www.fema.gov.

Federal Emergency Management Agency (FEMA). 2017. FEMA, National Flood Insurance Program, Community Rating System; CRS Coordinator's Manual FIA-15/2017 OMB No. 1660-0022

Federal Energy Regulatory Commission (FERC). 2015. "Dam Safety Performance Monitoring Program." January 1, 2005. Accessed January 2018. http://ferc.gov/industries/hydropower/safety/guidelines/eng-guide/chap14.pdf.

Gem County Development Services. 2014. "2014 Gem Community Joint Comprehensive Plan". February 2014

Gem County Emergency Management. 2018. Website. https://www.gemcounty.org/disaster-services/. Website Accessed 2017-2018

Gem County. 2004. Gem County Hazard Mitigation Plan, Terrorism and Civil Unrest Annex. Prepared for Gem City-County Emergency Management by Northwest Management, Inc. December 2004.

Gem County. 2011. Gem County Hazard Mitigation Plan Update. Prepared for Gem City-County Emergency Management by Tetra Tech, Eagle, ID. July 2011.

Gillis, Stephen, Brent Knapp, Jacob Wolf, Jeffery Izo, Kristin McElligott, Jeffery Reader, Alexander Peterson, Donovan VanSant, and Nathan Wheeler. 2011. Indicators of Climate Change in Idaho: Understanding climate change and its impacts through indicators. Available online at http://webpages.uidaho.edu/jabatzoglou/PDF/IndicatorsofClimateChangeIdaho.pdf.

GlobalChange.gov. 2014. National Climate Assessment. The website of the U.S. Global change Research program. Last accessed July 2018. Accessed online at: http://www.globalchange.gov/

Hardy, C.C. 2005. "Wildland fire hazard and risk: Problems, definitions, and context." Forest Ecology and Management 211 (2005) 73–82

Heinselman, M.L. 1981. Fire intensity and frequency as factors in the distribution and structure of northern ecosystems. In Fire Regimes and Ecosystem Properties. U.S. For. Serv. Gen. Tech. Rep. WO-26. p. 7-57.

Humphreys, M.K. "The Boise Foothills Fires: A History of Devastating Loss and Remarkable Discovery." July 2018. Accessed via Boise State University website https://sps.boisestate.edu/idaho/exhibitions-tours/historian/timelines/the-boise-foothills-fires/

Idaho Dam Safety Web Site. 2011. Accessed April, 2018. http://www.idwr.idaho.gov/WaterManagement/StreamsDams/DamSafety/dams.htm

Idaho Department of Labor. 2015. Census data page of Idaho Department of Labor website. Accessed August 2018 at http://lmi.idaho.gov/census

Idaho Department of Water Resources. 2018. Website accessed 2018. http://www.idwr.idaho.gov/

Idaho Fire. 2016. Boise Interagency Dispatch Center web page. Accessed online at http://www.idahofireinfo.blm.gov/southwest/incident_information.htm

Idaho Office of Emergency Management (IOEM). 2013. Idaho State Hazard Mitigation Plan. Available online at http://www.bhs.idaho.gov/Pages/Plans/Mitigation/SHMP.aspx

Intergovernmental Panel on Climate Change (IPCC). 2007. Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Pachauri, R.K. and A. Reisinger (eds.)]. Geneva, Switzerland.

Intergovernmental Panel on Climate Change (IPCC). 2014. Climate Change 2014: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Parts A, B and Annexes. Accessed online at: http://www.ipcc.ch/report/ar5/wg2/

International Strategy for Disaster Reduction. 2008. "Disaster Risk Reduction Strategies and Risk Management Practices: Critical Elements for Adaptation to Climate Change" 11/11/2008.

Keeley, Jon. E. 2009. "Fire intensity, fire severity and burn severity: a brief review and suggested usage." International Journal of Wildland Fire. 10.1071/WF07049

National Aeronautics and Space Administration (NASA). 2004. NASA News, Release: 04-252 Retreating Glaciers Spur Alaskan Earthquakes. The website of NASA. Released August 2, 2004. Accessed online at: http://earthobservatory.nasa.gov/Newsroom/view.php?id=25145

National Aeronautics and Space Administration (NASA). 2016a. Global Climate Change: Vital Signs of the Planet. The website of NASA. Last updated April 22, 2016. Accessed online at: http://climate.nasa.gov/vital-signs/carbon-dioxide/

National Aeronautics and Space Administration (NASA). 2016b. Graphic: Global warming from 1880 to 2013. The website of NASA. Last updated March 10, 2016. Accessed online at: http://climate.nasa.gov/climate_resources/28/

National Drought Mitigation Center. 2006. Types of Drought. Website of the National Drought Mitigation Center. Last accessed 2016. Available online at http://drought.unl.edu/DroughtBasics/TypesofDrought.aspx

National Lightning Safety Institute (NLSI). 2008. Lightning Costs and Losses from Attributed Sources. The website of the NLSI. Last updated June 11, 2016. Available online at http://lightningsafety.com/nlsi_lls/nlsi_annual_usa_losses.htm

National Oceanic and Atmospheric Administration (NOAA). 2011. National Oceanic and Atmospheric Administration Web Site. 2010 Tied for Warmest Year on Record. Accessed 3/16/2012.

National Oceanic and Atmospheric Administration (NOAA). 2015. National Centers for Environmental Information Climate Data Online website, accessed December 31, 2017: http://www.ncdc.noaa.gov/cdo-web/datatools/findstation

National Oceanic and Atmospheric Administration (NOAA). 2016. Billion-Dollar Weather and Climate Disasters: Mapping." Website of the National Oceanic and Atmospheric Administration. Accessed March 2018, http://www.ncdc.noaa.gov/billions/mapping

National Oceanic and Atmospheric Administration (NOAA). 2016. NOAA Severe Weather website. Accessed 2018 at http://www.noaawatch.gov/themes/severe.php

National Oceanic and Atmospheric Administration (NOAA). 2018. NOAA National Climatic Data Center website. Accessed 2018 at http://www.ncdc.noaa.gov/climate-information/extreme-events/us-tornado-climatology.

National Research Council (NRC). 2010. Advancing the Science of Climate Change. National Research Council. The National Academies Press, Washington, DC, USA.

National Research Council (NRC). 2011a. America's Climate Choices: Final Report. National Research Council. The National Academies Press, Washington, DC, USA

National Research Council (NRC). 2011b. Climate Stabilization Targets: Emissions, Concentrations, and Impacts over Decades to Millennia. Exit EPA Disclaimer National Research Council. The National Academies Press, Washington, DC, USA.

National Resources Conservation Service. 2018. Emergency Watershed Protection Program. The website of the USDA. Last accessed 2018. Available online at http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/landscape/ewpp/

National Wildlife Federation. 2006. The Evaluation of the National Flood Insurance Report. Available online at http://www.fema.gov/media-library-data/20130726-1602-20490-1463/nfip_eval_final_report.pdf

NOAA. 2016. National Centers for Environmental Information. Storm Events Data Base. http://www.ncdc.noaa.gov/stormevents/choosedates.jsp?statefips=-999%2CALL . website, accessed 2018

Office of the Press Secretary. 2015. Executive Order – Establishing a Federal Flood Risk Management Standard and a Process for Further Soliciting and Considering Stakeholder Input. The website of the White House. Posted online January 30, 2015. Available online at: https://www.whitehouse.gov/the-press-office/2015/01/30/executive-order-establishing-federal-flood-risk-management-standard-and-

OTA (Congressional Office of Technology Assessment). 1993. Preparing for an Uncertain Climate, Vol. I. OTA–O–567. U.S. Government Printing Office, Washington, D.C.

RS Means. 2017. RS Means Square Foot Costs. RS Means Company.

Stacy, Susan M. 1993. When the River Rises; Flood Control on the Boise River 1943-1985. Program on Environment and Behavior, Special Publication #27. Published jointly; Natural Hazards Research and Application Information Center, University of Colorado and College of Social Sciences and Public Affairs, Boise State University.

U.S. Census Bureau. 2018. American Community Survey 2015 5-Year Estimates from United States Census Bureau American Fact Finder website:

http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_13_5YR_S0101&prodType=tablehttp://factfinder2.census.gov/faces/nav/jsf/pages/searchresults.xhtml?refresh=t

U.S. Census. 2010. Data from 2010 U.S. Census. U.S. Census Bureau. http://factfinder.census.gov/servlet/ACSSAFFFacts?_event=Search&geo_id=01000US&_geoContext=01000US%7C04000US06%7C16000US0662938&_street=&_county=Gem+County&_cityTown=Gem+County&_state=04000US16&_zip=&_lang=en&_sse=on&ActiveGeoDiv=geoSelect&_useEV=&pctxt=fp

U.S. Department of Agriculture (USDA). 2015. "Disaster Designation Information." Website of the United States Department of Agriculture. Accessed February 2018, http://www.fsa.usda.gov/programs-and-services/disaster-assistance-program/disaster-designation-information/index

U.S. Environmental Protection Agency (EPA). 2013a. Climate Change Facts: Answers to Common Questions. U.S. EPA Website. Accessed April 14, 2018 at: http://epa.gov/climatechange/facts.html

U.S. Environmental Protection Agency (EPA). 2013b. Climate Change Indicators in the United States: U.S. and Global Temperatures. www.epa.gov/climatechange/indicators.

U.S. Environmental Protection Agency (EPA). 2013c. Climate Change Indicators in the United States: Heavy Precipitation. www.epa.gov/climatechange/indicators.

U.S. Environmental Protection Agency (EPA). 2013d. Climate Change Indicators in the United States: Snowfall. http://www.epa.gov/climatechange/science/indicators/snow-ice/snowfall.html.

U.S. Environmental Protection Agency (EPA). 2013e. Climate Change Indicators in the United States: Atmospheric Concentrations of Greenhouse Gases. http://www.epa.gov/climatechange/pdfs/print_sea-level-2013.pdf.

U.S. Environmental Protection Agency (EPA). 2013f. Glossary of Climate Change Terms. Accessed in June 2014, http://www.epa.gov/climatechange/glossary.html#M.

U.S. Environmental Protection Agency (EPA). 2015. Climate Change Indicators in the United States. U.S. Environmental Protection Agency, Washington, DC, USA

U.S. Environmental Protection Agency (EPA). 2018. Endangerment and Cause or Contribute Findings for Greenhouse Gases under Section 202(a) of the Clean Air Act, EPA Response to Public Comments. U.S. Environmental Protection Agency. Accessed 2018.

U.S. Geological Survey (USGS). 2009. U.S. Geological Survey accessed in 2009. http://wrgis.wr.usgs.gov/docs/wgmt/pacnw/lifeline/eqhazards.html

U.S. Geological Survey (USGS). 2012a. 'Earthquake Hazards Program: Pacific Northwest." Last modified July 18, 2012. Available on-line at http://earthquake.usgs.gov/regional/pacnw/.

U.S. Geological Survey (USGS). 2013. Why Study Cascade Volcanoes? The website of the USGS Volcano Hazards Program. Last updated August 28, 2013. Available online at https://volcanoes.usgs.gov/observatories/cvo/cascade_volcanoes.html

U.S. Geological Survey (USGS). 2015. Volcanic Ash and Mitigation Impacts. The website of the USGS. Last modified December 14, 2015. Available online at https://volcanoes.usgs.gov/volcanic_ash/

U.S. Geological Survey (USGS). 2016. Volcanic alert-levels characterize conditions at U.S. volcanoes. The website of the USGS volcano hazard program. Last updated January 7, 2016. Available online at https://volcanoes.usgs.gov/vhp/about_alerts.html

U.S. Geological Survey (USGS). 2018. 2018 National Seismic Hazard Maps – Source Parameters. The website of the USGS. Last accessed January 2018. Available online at http://geohazards.usgs.gov/cfusion/hazfaults_2014_search/view_fault.cfm?cfault_id=880

U.S. Global Change Research Program (USGCRP). 2009. Global Climate Change Impacts in the United States. Thomas R. Karl, Jerry M. Melillo, and Thomas C. Peterson (eds.). United States Global Change Research Program. Cambridge University Press, New York, NY, USA.

GLOSSARY

ACRONYMS

BLM—Bureau of Land Management

BREN— Boise River Enhancement Network

CDBG-DR—Community Development Block Grant Disaster Recovery grants

CFR—Code of Federal Regulations

cfs—cubic feet per second

CIP—Capital Improvement Plan

CRS—Community Rating System

DHS—Department of Homeland Security

DMA —Disaster Mitigation Act

EPA—U.S. Environmental Protection Agency

ESA—Endangered Species Act

FEMA—Federal Emergency Management Agency

FERC—Federal Energy Regulatory Commission

FIRM—Flood Insurance Rate Map

FRCC—Fire Regime Condition Class

GIS—Geographic Information System

Hazus—Hazards, United States

HMGP—Hazard Mitigation Grant Program

IBC—International Building Code

IDWR—Idaho Department of Water Resources

IOEM—Idaho Office of Emergency Management

IRC—International Residential Code

LEPC—Local emergency planning committee

MM—Modified Mercalli Scale

NEHRP—National Earthquake Hazards Reduction Program

NFIP—National Flood Insurance Program

NLSI—National Lightning Safety Institute

NOAA—National Oceanic and Atmospheric Administration

NWS—National Weather Service

PDM—Pre-Disaster Mitigation Grant Program

PGA—Peak Ground Acceleration

SFHA—Special Flood Hazard Area

SPI—Standardized Precipitation Index

TOD—Transit-Oriented Development

USDA—U.S. Department of Agriculture

USGCRP—U.S. Global Change Research Program

USGS—U.S. Geological Survey

WUI—Wildland Urban Interface

DEFINITIONS

100-Year Flood: The term "100-year flood" can be misleading. The 100-year flood does not necessarily occur once every 100 years. Rather, it is the flood that has a 1 percent chance of being equaled or exceeded in any given year. Thus, the 100-year flood could occur more than once in a relatively short period of time. The Federal Emergency Management Agency (FEMA) defines it as the 1 percent annual chance flood, which is now the standard definition used by most federal and state agencies and by the National Flood Insurance Program (NFIP).

Acre-Foot: An acre-foot is the amount of water it takes to cover 1 acre to a depth of 1 foot. This measure is used to describe the quantity of storage in a water reservoir. An acre-foot is a unit of volume. One acre-foot equals 7,758 barrels; 325,829 gallons; or 43,560 cubic feet. An average household of four will use approximately 1 acre-foot of water per year.

Asset: An asset is any man-made or natural feature that has value, including, but not limited to, people; buildings; infrastructure, such as bridges, roads, sewers, and water systems; lifelines, such as electricity and communication resources; and environmental, cultural, or recreational features such as parks, wetlands, and landmarks.

Base Flood: The flood having a 1% chance of being equaled or exceeded in any given year, also known as the "100-year" or "1% chance" flood. The base flood is a statistical concept used to ensure that all properties subject to the National Flood Insurance Program (NFIP) are protected to the same degree against flooding.

Basin: A basin is the area within which all surface water—whether from rainfall, snowmelt, springs, or other sources—flows to a single water body or watercourse. The boundary of a river basin is defined by natural topography, such as hills, mountains and ridges. Basins are also referred to as "watersheds" and "drainage basins."

Benefit: A benefit is a net project outcome and is usually defined in monetary terms. Benefits may include direct and indirect effects. For the purposes of benefit-cost analysis of proposed mitigation measures, benefits are limited to specific, measurable, risk reduction factors, including reduction in expected property losses (buildings, contents and functions) and protection of human life.

Benefit/Cost Analysis: A benefit/cost analysis is a systematic, quantitative method of comparing projected benefits to projected costs of a project or policy. It is used as a measure of cost effectiveness.

Building: A building is defined as a structure that is walled and roofed, principally aboveground, and permanently fixed to a site. The term includes manufactured homes on permanent foundations on which the wheels and axles carry no weight.

Capability Assessment: A capability assessment provides a description and analysis of a community's current capacity to address threats associated with hazards. The assessment includes two components: an inventory of an agency's mission, programs and policies, and an analysis of its capacity to carry them out. A capability assessment is an integral part of the planning process in which a community's actions to reduce losses are identified, reviewed, and analyzed, and the framework for implementation is identified. The following capabilities were reviewed under this assessment:

- Legal and regulatory capability
- Administrative and technical capability
- Fiscal capability

Community Rating System (CRS): The CRS is a voluntary program under the NFIP that rewards participating communities (provides incentives) for exceeding the minimum requirements of the NFIP and completing activities that reduce flood hazard risk by providing flood insurance premium discounts.

Critical Area: An area defined by state or local regulations as deserving special protection because of unique natural features or its value as habitat for a wide range of species of flora and fauna. A sensitive/critical area is usually subject to more restrictive development regulations.

Critical Facility: A critical facility is one that is deemed vital to the Gem County planning area's ability to provide essential services while protecting life and property. A critical facility may be a system or an asset, either physical or virtual, the loss of which would have a profound impact on the security, economy, public health or safety, environment, or any combination of thereof, across the planning area. For the *Gem County Hazard Mitigation Plan*, the following are defined as critical facilities:

- Police stations, fire stations, paramedic stations, emergency vehicle and equipment storage facility-ties, and emergency operations and communications centers needed for disaster response before, during, and after hazard events.
- Public and private utilities and infrastructure vital to maintaining or restoring normal services to areas damaged by hazard events. These include but are not limited to water (potable, wastewater, stormwater facilities), impoundments (dams and irrigation conveyance facilities), utilities (transmission and distribution facilities for natural gas, power, geothermal) and communications (land-based telephone, cell phone, the internet emergency broadcast facilities and emergency radios).
- Public gathering places that could be utilized as evacuation centers during large-scale disasters.
- Hospitals, extended care facilities, urgent care facilities and housing that may contain occupants not sufficiently mobile to avoid death or injury during a hazard event
- Transportation systems that convey vital supplies and services to and throughout the community. These include roads, bridges, railways, airports and pipelines
- Government and educational facilities central to governance and quality of life along with response and recovery actions taken as a result of a hazard event
- Structures or facilities that produce, use, or store highly volatile, flammable, explosive, toxic, and/or water-reactive materials.
- Infrastructure designed to help safely convey high-water events from the event source to the perimeter of the planning area.

Cubic Feet per Second (cfs): Discharge or river flow is commonly measured in cfs. One cubic foot is about 7.5 gallons of liquid.

Dam: Any artificial barrier or controlling mechanism that can or does impound 10 acre-feet or more of water.

Dam Failure: Dam failure refers to a partial or complete breach in a dam (or levee) that impacts its integrity. Dam failures occur for a number of reasons, such as flash flooding, inadequate spillway size, mechanical failure of valves or other equipment, freezing and thawing cycles, earthquakes, and intentional destruction.

Debris Avalanche: Volcanoes are prone to debris and mountain rock avalanches that can approach speeds of 100 mph.

Debris Flow: Dense mixtures of water-saturated debris that move down-valley; looking and behaving much like flowing concrete. They form when loose masses of unconsolidated material are saturated, become unstable, and move down slope. The source of water varies but includes rainfall, melting snow or ice, and glacial outburst floods.

Debris Slide: Debris slides consist of unconsolidated rock or soil that has moved rapidly down slope. They occur on slopes greater than 65 percent.

Disaster Mitigation Act of 2000 (DMA); The DMA is Public Law 106-390 and is the latest federal legislation enacted to encourage and promote proactive, pre-disaster planning as a condition of receiving financial assistance under the Robert T. Stafford Act. The DMA emphasizes planning for disasters before they occur. Under the DMA, a pre-disaster hazard mitigation program and new requirements for the national post-disaster hazard mitigation grant program (HMGP) were established.

Drainage Basin: A basin is the area within which all surface water- whether from rainfall, snowmelt, springs or other sources- flows to a single water body or watercourse. The boundary of a river basin is defined by natural topography, such as hills, mountains and ridges. Drainage basins are also referred to as **watersheds** or **basins**.

Drought: Drought is a period of time without substantial rainfall or snowfall from one year to the next. Drought can also be defined as the cumulative impacts of several dry years or a deficiency of precipitation over an extended period of time, which in turn results in water shortages for some activity, group, or environmental function. A hydrological drought is caused by deficiencies in surface and subsurface water supplies. A socioeconomic drought impacts the health, well-being, and quality of life or starts to have an adverse impact on a region. Drought is a normal, recurrent feature of climate and occurs almost everywhere.

Earthquake: An earthquake is defined as a sudden slip on a fault, volcanic or magmatic activity, and sudden stress changes in the earth that result in ground shaking and radiated seismic energy. Earthquakes can last from a few seconds to over 5 minutes and have been known to occur as a series of tremors over a period of several days. The actual movement of the ground in an earthquake is seldom the direct cause of injury or death. Casualties may result from falling objects and debris as shocks shake, damage, or demolish buildings and other structures.

Exposure: Exposure is defined as the number and dollar value of assets considered to be at risk during the occurrence of a specific hazard.

Extent: The extent is the size of an area affected by a hazard.

Fire Behavior: Fire behavior refers to the physical characteristics of a fire and is a function of the interaction between the fuel characteristics (such as type of vegetation and structures that could burn), topography, and weather. Variables that affect fire behavior include the rate of spread, intensity, fuel consumption, and fire type (such as underbrush versus crown fire).

Fire Frequency: Fire frequency is the broad measure of the rate of fire occurrence in a particular area. An estimate of the areas most likely to burn is based on past fire history or fire rotation in the area, fuel conditions, weather, ignition sources (such as human or lightning), fire suppression response, and other factors.

Firewise: National Fire Protection Association program encouraging local solutions for wildfire safety by involving homeowners, community leaders, planners, developers, firefighters and others in the effort to protect people and property from the risk of wildfire. The program is co-sponsored by the U.S. Forest Service, the U.S. Department of the Interior, and the National Association of State Foresters.

Flash Flood: A flash flood occurs with little or no warning when water levels rise at an extremely fast rate

Flood Insurance Rate Map (FIRM): FIRMs are the official maps on which the Federal Emergency Management Agency (FEMA) has delineated the Special Flood Hazard Area (SFHA).

Flood Insurance Study: A report published by the Federal Insurance and Mitigation Administration for a community in conjunction with the community's Flood Insurance Rate Map. The study contains such background data as the base flood discharges and water surface elevations that were used to prepare the FIRM. In most cases, a community FIRM with detailed mapping will have a corresponding flood insurance study.

Floodplain: Any land area susceptible to being inundated by flood waters from any source. A flood insurance rate map identifies most, but not necessarily all, of a community's floodplain as the Special Flood Hazard Area (SFHA).

Floodway: Floodways are areas within a floodplain that are reserved for the purpose of conveying flood discharge without increasing the base flood elevation more than 1 foot. Generally speaking, no development is allowed in floodways, as any structures located there would block the flow of floodwaters.

Floodway Fringe: Floodway fringe areas are located in the floodplain but outside of the floodway. Some development is generally allowed in these areas, with a variety of restrictions. On maps that have identified and delineated a floodway, this would be the area beyond the floodway boundary that can be subject to different regulations.

Freeboard: Freeboard is the margin of safety added to the base flood elevation.

Frequency: For the purposes of this plan, frequency refers to how often a hazard of specific magnitude, duration, and/or extent is expected to occur on average. Statistically, a hazard with a 100-year frequency is expected to occur about once every 100 years on average and has a 1 percent chance of occurring any given year. Frequency reliability varies depending on the type of hazard considered.

Fujita Scale of Tornado Intensity: Tornado wind speeds are sometimes estimated on the basis of wind speed and damage sustained using the Fujita Scale. The scale rates the intensity or severity of tornado events using numeric values from F0 to F5 based on tornado wind speed and damage. An F0 tornado (wind speed less than 73 miles per hour (mph)) indicates minimal damage (such as broken tree limbs), and an F5 tornado (wind speeds of 261 to 318 mph) indicates severe damage.

Goal: A goal is a general guideline that explains what is to be achieved. Goals are usually broad-based, long-term, policy-type statements and represent global visions. Goals help define the benefits that a plan is trying to achieve. The success of a hazard mitigation plan is measured by the degree to which its goals have been met (that is, by the actual benefits in terms of actual hazard mitigation).

Geographic Information System (GIS): GIS is a computer software application that relates data regarding physical and other features on the earth to a database for mapping and analysis.

Hazard: A hazard is a source of potential danger or adverse condition that could harm people and/or cause property damage.

Hazard Mitigation Grant Program (HMGP): Authorized under Section 202 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, the HMGP is administered by FEMA and provides grants to states, tribes and local governments to implement hazard mitigation actions after a major disaster declaration. The purpose of the program is to reduce the loss of life and property due to disasters and to enable mitigation activities to be implemented as a community recovers from a disaster

Hazards United States Loss Estimation Program: Hazus is a GIS-based program used to support the development of risk assessments as required under the DMA. The Hazus software program assesses risk in a quantitative manner to estimate damages and losses associated with natural hazards. Hazus is FEMA's nationally applicable, standardized methodology and software program and contains modules for estimating potential losses from earthquakes, floods and wind hazards. Hazus has also been used to assess vulnerability (exposure) for other hazards.

Hydraulics: Hydraulics is the branch of science or engineering that addresses fluids (especially water) in motion in rivers or canals, works and machinery for conducting or raising water, the use of water as a prime mover, and other fluid-related areas.

Hydrology: Hydrology is the analysis of waters of the earth. For example, a flood discharge estimate is developed by conducting a hydrologic study.

Intensity: For the purposes of this plan, intensity refers to the measure of the effects of a hazard.

Inventory: The assets identified in a study region comprise an inventory. Inventories include assets that could be lost when a disaster occurs and community resources are at risk. Assets include people, buildings, transportation, and other valued community resources.

Landslide: Landslides can be described as the sliding movement of masses of loosened rock and soil down a hillside or slope. Fundamentally, slope failures occur when the strength of the soils forming the slope exceeds the pressure, such as weight or saturation, acting upon them.

Lightning: Lightning is an electrical discharge resulting from the buildup of positive and negative charges within a thunderstorm. When the buildup becomes strong enough, lightning appears as a "bolt," usually within or between clouds and the ground. A bolt of lightning instantaneously reaches temperatures approaching 50,000ºF. The rapid heating and cooling of air near lightning causes thunder. Lightning is a major threat during thunderstorms. In the United States, 75 to 100 Americans are struck and killed by lightning each year (see http://www.fema.gov/hazard/thunderstorms/thunder.shtm).

Liquefaction: Liquefaction is the complete failure of soils, occurring when soils lose shear strength and flow horizontally. It is most likely to occur in fine grain sands and silts, which behave like viscous fluids when liquefaction occurs. This situation is extremely hazardous to development on the soils that liquefy, and generally results in extreme property damage and threats to life and safety.

Local Government: Any county, municipality, city, town, township, public authority, school district, special district, intrastate district, council of governments (regardless of whether the council of governments is incorporated as a nonprofit corporation under State law), regional or interstate government entity, or agency or instrumentality of a local government; any Indian tribe or authorized tribal organization, or Alaska Native village or organization; and any rural community, unincorporated town or village, or other public entity.

Magnitude: Magnitude is the measure of the strength of an earthquake and is typically measured by the Richter scale. As an estimate of energy, each whole number step in the magnitude scale corresponds to the release of about 31 times more energy than the amount associated with the preceding whole number value.

Mass movement: A collective term for landslides, mudflows, debris flows, sinkholes and lahars.

Mitigation: A preventive action that can be taken in advance of an event that will reduce or eliminate the risk to life or property.

Mitigation Actions: Mitigation actions are specific actions to achieve goals and objectives that minimize the effects from a disaster and reduce the loss of life and property.

Objective: For the purposes of this plan, an objective is defined as a short-term aim that, when combined with other objectives, forms a strategy or course of action to meet a goal. Unlike goals, objectives are specific and measurable.

Peak Ground Acceleration: Peak Ground Acceleration (PGA) is a measure of the highest amplitude of ground shaking that accompanies an earthquake, based on a percentage of the force of gravity.

Preparedness: Preparedness refers to actions that strengthen the capability of government, citizens and communities to respond to disasters.

Presidential Disaster Declaration: These declarations are typically made for events that cause more damage than state and local governments and resources can handle without federal government assistance. Generally, no specific dollar loss threshold has been established for such declarations. A Presidential Disaster Declaration puts into motion long-term federal recovery programs, some of which are matched by state programs, designed to help disaster victims, businesses and public entities.

Probability of Occurrence: The probability of occurrence is a statistical measure or estimate of the likelihood that a hazard will occur. This probability is generally based on past hazard events in the area and a forecast of events that could occur in the future. A probability factor based on yearly values of occurrence is used to estimate probability of occurrence.

Repetitive Loss Property: Any NFIP-insured property that, since 1978 and regardless of any changes of ownership during that period, has experienced:

- Four or more paid flood losses in excess of $1000; or
- Two paid flood losses in excess of $1000 within any 10-year period since 1978 or
- Three or more paid losses that equal or exceed the current value of the insured property.

Return Period (or Mean Return Period): This term refers to the average period of time in years between occurrences of a particular hazard (equal to the inverse of the annual frequency of occurrence).

Riverine: Of or produced by a river. Riverine floodplains have readily identifiable channels. Floodway maps can only be prepared for riverine floodplains.

Risk: Risk is the estimated impact that a hazard would have on people, services, facilities and structures in a community. Risk measures the likelihood of a hazard occurring and resulting in an adverse condition that causes injury or damage. Risk is often expressed in relative terms such as a high, moderate or low likelihood of sustaining damage above a particular threshold due to occurrence of a specific type of hazard. Risk also can be expressed in terms of potential monetary losses associated with the intensity of the hazard.

Risk Assessment: Risk assessment is the process of measuring potential loss of life, personal injury, economic injury, and property damage resulting from hazards. This process assesses the vulnerability of people, buildings and infrastructure to hazards and focuses on (1) hazard identification; (2) impacts of hazards on physical, social and economic assets; (3) vulnerability identification; and (4) estimates of the cost of damage or costs that could be avoided through mitigation.

Risk Ranking: This ranking serves two purposes, first to describe the probability that a hazard will occur, and second to describe the impact a hazard will have on people, property and the economy. Risk estimates for the City are based on the methodology that the City used to prepare the risk assessment for this plan. The following equation shows the risk ranking calculation:

Risk Ranking = Probability + Impact (people + property + economy)

Robert T. Stafford Act: The Robert T. Stafford Disaster Relief and Emergency Assistance Act, Public Law 100-107, was signed into law on November 23, 1988. This law amended the Disaster Relief Act of 1974, Public Law 93-288. The Stafford Act is the statutory authority for most federal disaster response activities, especially as they pertain to FEMA and its programs.

Sinkhole: A collapse depression in the ground with no visible outlet. Its drainage is subterranean. It is commonly vertical-sided or funnel-shaped.

Special Flood Hazard Area: The base floodplain delineated on a Flood Insurance Rate Map. The SFHA is mapped as a Zone A in riverine situations and zone V in coastal situations. The SFHA may or may not encompass all of a community's flood problems

Stakeholder: Business leaders, civic groups, academia, non-profit organizations, major employers, managers of critical facilities, farmers, developers, special purpose districts, and others whose actions could impact hazard mitigation.

Stream Bank Erosion: Stream bank erosion is common along rivers, streams and drains where banks have been eroded, sloughed or undercut. However, it is important to remember that a stream is a dynamic and constantly changing system. It is natural for a stream to want to meander, so not all eroding banks are "bad" and in need of repair. Generally, stream bank erosion becomes a problem where development has limited the meandering nature of streams, where streams have been channelized, or where stream bank structures (like bridges, culverts, etc.) are located in places where they can actually cause damage to downstream areas. Stabilizing these areas can help protect watercourses from continued sedimentation, damage to adjacent land uses, control unwanted meander, and improvement of habitat for fish and wildlife.

Steep Slope: Different communities and agencies define it differently, depending on what it is being applied to, but generally a steep slope is a slope in which the percent slope equals or exceeds 25%. For this study, steep slope is defined as slopes greater than 33%.

Sustainable Hazard Mitigation: This concept includes the sound management of natural resources, local economic and social resiliency, and the recognition that hazards and mitigation must be understood in the largest possible social and economic context.

Thunderstorm: A thunderstorm is a storm with lightning and thunder produced by cumulonimbus clouds. Thunderstorms usually produce gusty winds, heavy rains, and sometimes hail. Thunderstorms are usually short in duration (seldom more than 2 hours). Heavy rains associated with thunderstorms can lead to flash flooding during the wet or dry seasons.

Tornado: A tornado is a violently rotating column of air extending between and in contact with a cloud and the surface of the earth. Tornadoes are often (but not always) visible as funnel clouds. On a local scale, tornadoes are the most intense of all atmospheric circulations, and winds can reach destructive speeds of more than 300 mph. A tornado's vortex is typically several hundred feet in diameter, and damage paths can be up to 1 mile wide and 50 miles long.

Vulnerability: Vulnerability describes how exposed or susceptible an asset is to damage. Vulnerability depends on an asset's construction and contents, and the economic value of its functions. Like indirect damages, the vulnerability of one element of the community is often related to the vulnerability of another. For example, many businesses depend on uninterrupted electrical power. Flooding of an electric substation would affect not only the substation itself but businesses as well. Often, indirect effects can be much more widespread and damaging than direct effects.

Watershed: A watershed is an area that drains downgradient from areas of higher land to areas of lower land to the lowest point, a common drainage basin.

Wildfire: These terms refer to any uncontrolled fire occurring on undeveloped land that requires fire suppression. The potential for wildfire is influenced by three factors: the presence of fuel, topography and air mass. Fuel can include living and dead vegetation on the ground, along the surface as brush and small trees, and in the air such as tree canopies. Topography includes both slope and elevation. Air mass includes temperature, relative humidity, wind speed and direction, cloud cover, precipitation amount, duration, and the stability of the atmosphere at the time of the fire. Wildfires can be ignited by lightning and, most frequently, by human activity including smoking, campfires, equipment use and arson.

Wildland-Urban Interface Area: The geographical area where structures and other human development meet or intermingle with wildland or vegetative fuels.

Windstorm: Windstorms are generally short-duration events involving straight-line winds or gusts exceeding 50 mph. These gusts can produce winds of sufficient strength to cause property damage. Windstorms are especially dangerous in areas with significant tree stands, exposed property, poorly constructed buildings, mobile homes (manufactured housing units), major infrastructure, and aboveground utility lines. A windstorm can topple trees and power lines; cause damage to residential, commercial, critical facilities; and leave tons of debris in its wake.

Zoning Ordinance: The zoning ordinance designates allowable land use and intensities for a local jurisdiction. Zoning ordinances consist of two components: a zoning text and a zoning map.

Gem County Hazard Mitigation Plan—Volume 1: Countywide Elements

Appendix A. Steering Committee Ground Rules

A. STEERING COMMITTEE GROUND RULES

PURPOSE

The role of the Steering Committee (SC) is to guide the Planning Team through the plan update process that will result in a plan that can be embraced both politically and by the constituency within Gem County. The SC will provide guidance and leadership, oversee the planning process, and act as the point of contact for all stakeholders and various interest groups in the planning area. The makeup of this committee was selected to provide the best possible cross section of views to enhance the planning effort and to help build support for hazard mitigation.

LEADERSHIP

The Steering Committee selected **Bruce Evans** to be the chairperson. The role of a chair is to: 1) lead meetings so that agendas are followed and meetings adjourn on-time, 2) allow all members to be heard during discussions, 3) moderate discussions between members with differing points of view, and 4) be a sounding board for staff in the preparation of agendas and how to best involve the full Committee in work plan tasks. **Sheriff Chuck Rolland** was selected as vice chairperson to take the chair's role when the chair is not available. The Committee chose to adopt a rule that requires either the chair or the vice chair to be present at any given meeting.

ATTENDANCE

Participation of all Committee members in meetings is important and members should make every effort to attend each meeting. If Committee members cannot attend, they should inform staff before the meeting is conducted. If a member misses two consecutive meetings without an explanation, the Chairperson will contact the member to determine their interest in continued support of this process. Replacing any member on the committee due to lack of attendance will be the discretion of the chair.

QUORUM

A minimum attendance at each meeting often is needed to ensure that the different viewpoints of Committee members are adequately represented. A quorum for this committee will be 8 members in attendance. This quorum can be met with an attendance augmented by designated alternates.

ALTERNATES

It was the decision of the SC to designate alternates for those SC members that felt that they may not be able to attend each meeting. All designated alternates will have full voting authority on any action at any meeting they attend in place of the primary SC member. They will receive copies of all meeting materials as well as meeting agendas and minutes. Alternates are welcome to attend any and all scheduled meetings. Alternates will not have a vote on this committee when the primary SC member is also in attendance. Alternates will only have a vote when they are attending in the place of the primary SC member. Coordination of who attends scheduled SC meetings is the sole responsibility of the primary member and their designated alternate. Those SC members that chose to designate alternates shall notify the planning team no later that one week prior to the next scheduled SC meeting.

DECISION-MAKING

As the Committee provides advice and guidance on the Plan, it will reach its recommendations through 1) consensus, or 2) voting. Consensus is defined as a recommendation that may not be ideal for each Committee member, but every member can live with it (using the consensus continuum as a gage). Voting is defined as "majority rules". The Committee decided that consensus will be their preferred method of decision making. However, if consensus cannot be reached on a given issue, then voting will be used to reach a ruling. In either case, minority dissent will be recorded in the meeting summaries and the Committee chose to note such opinions in their final recommendations. On action items where decisions will need to be made by the committee, a vote will be taken to determine consensus or the majority stance of the committee. Only seated steering committee members or their designated alternates, that are attending the meeting as the principal representative will have a vote. Members of the public, planning team members, or alternates that are attending a meeting in conjunction with their principal representative will not have a vote.

RECOMMENDATIONS

The Committee's recommendations will be recorded in the meeting summaries and reflected in the plan as appropriate. The Committee may assist in presenting the plan to the elected bodies of participating organizations.

SPOKESPERSONS

It was the decision of the SC to designate a spokesperson for this plan update process to act as the primary point of contact for the SC with the Public and the Media. The designated spokesperson for this process will be **Ms. Laurie Boston**, **Gem County Emergency Manager**. Ideally the Steering Committee will present a united recommendation after considering the different viewpoints of its members, recognizing that each member might have made a somewhat different recommendation as an individual. To consistently represent the Committee's united recommendations to participating organizations, the public, and the media; is the principle responsibility of the spokesperson.

Each member should have a responsibility to represent the Committee's recommendation when speaking on Plan-related issues as a Committee member. Any differing personal or organizational viewpoints should be clearly distinguished from the Committee's work. Finally, Committee members will need to help with presentations given to governing bodies of regulatory agencies, stakeholders as well as during public meetings or presentations.

STAFFING

The Planning Team for this project includes Laurie Boston, Gem County Emergency Manager, and personnel from the contract consultant assistance provided by Tetra Tech, Inc. The Planning Team will schedule meetings, distribute agendas, prepare information/presentations for Committee meetings, write meeting summaries, and generally seek to facilitate the Committee's activities.

PUBLIC INVOLVEMENT

As they conduct Committee work, members will seek to keep the public and the groups to which they are affiliated informed about the Plan. Committee meetings will be open to the public and agendas and minutes will be posted on a project web-page sponsored by Gem County. Opportunities for public comment during Steering Committee meetings will be at the discretion of the Chair. If the Chair has determined that public comment will be taken, comments will be limited to a time duration specified by the Chair (ie: 3 minutes per subject, limited to an aggregate total not to exceed 30 minutes per meeting per individual. Other acceptable methods of public input will include written or emailed documents to staff or Committee members and there will be no public comment during meetings, unless authorized by the Chair. Development of a public involvement strategy will be one of the first tasks undertaken by the Committee.

COURTESY

Committee members should treat each other with respect, listen to each other, work cooperatively, and allow all members to voice their opinions.

MEETINGS

Meetings generally will be conducted on the third Tuesday of each month from 10:00 AM to noon at the Gem County EMS Building, unless otherwise notified by the planning team. Committee members will be notified in advanced as to where the meeting will be held if different than the EMS Building.

STEERING COMMITTEE MAKEUP

GEM County Hazard Mitigation Plan Update—STEERING COMMITTEE			
Name	**Representing**	**E-Mail**	**Phone**
Bruce Evans (Chair)	Emmett City Public Works	bevans@cityofemmett.org	208.941.7365 c) 208.365.9569 o)
Chuck Rolland	Gem County Sheriff	sheriff@co.gem.id.us	
Rick Sego	Bureau of Reclamation	RSego@usbr.gov	208.383.2262 w) 208.859.4718 c)
Rick Johnston	Gem County Assessor	rjohnston@co.gem.id.us	208.365.2982 w)
Neal Capps	Gem County Road & Bridge	ncapps@co.gem.id.us	208.477.8641 c)
Bill Butticci	Gem County Commissioner	commissioners@co.gem.id.us	
Bryan Elliott	G.C. Commissioner/ SWDH Board	commissioners@co.gem.id.us	
Mark Rekow	G. C. Commissioner	commissioners@co.gem.id.us	
Shelly Tilton	Gem County Clerk	stilton@co.gem.id.us	208.365.4561 w)
Jay Hummel	School District	jhummel@isd221.net	
Bev Martin	Ola Rep/Sheriff Posse	bearcreekranches@juno.com	208.584.3494 h)
Dennis Weaver	Ola Representative	imperial@wildblue.net	
Jennifer Kharrl	Planning & Zoning	jkharrl@co.gem.id.us	208.365.5144 w)
Ken Sheldon	EMS	ksheldon@co.gem.id.us	208.559.6976 c)
Curt Christensen	City Fire	cchristensen@cityofemmett.org	208.941.7367 c)
Rick Welch	County Fire	gcfdistrict1@gmail.com	208.859.4775 c)
Michele Chadwick	Former S.C. Member/ GCMAD Board	idahomom@q.com	208.861.4424 c)
Myra Church	Sweet Representative	Churchent1@gmail.com	208.584.3703 h)
Chris Davidson	Idaho Power Phys. Sec. & Bus Cont. Mgr.	CDavidson@idahopower.com	208.388.6401 w) 858.232.0398 c)
Terry Wilson	SWDH, Planner	Terry.Wilson@phd3.idaho.gov	208.455.5326 w) 208.590.2524 c)
Dale Nalder	SW Area Field Officer IOEM	dnalder@imd.idaho.gov	208.258.6512 w) 208.830.8059 c)
Lorrie Pahl	Mitigation Planner, IOEM	lpahl@imd.idaho.gov	208.258.6508 w)

GEM County Hazard Mitigation Plan Update—STEERING COMMITTEE ALTERNATES			
Name	**Alternate for**	**E-mail**	**Phone**
Greg Bradley	Rick Sego	gbradley@usbr.gov	208.378.5207 w)
Hollie Ann Strang	Rick Johnston	hstrang@co.gem.id.us	208.477.2010 w)
Clint Seamons	Bruce Evans	cseamons@cityofemmett.org	208-941-1251 c)
Donnie Wunder	Chuck Rowland	dwunder@co.gem.id.us	
Jason Brown	Neil Capps	dwunder@co.gem.id.us	
Wayne Rush	Jay Hummel	wrush@isd221.net	208.365.6301 w)
Michelle Barron	Jennifer Kharrl	mbarron@co.gem.id.us	208.365.5144 w)
Mike Giery	Curt Christensen		
Heath Schab	Chris Davidson	HSchab@idahopoer.com	
Marci Anderson	Chris Davidson	MAnderson2@idahopower.com	
Heidi Novich (ALT)	Dale Nalder	hnovich@imd.idaho.gov	208.258.6523 w) 208.954.2932 c)

GEM County Hazard Mitigation Plan Update—PLANNING TEAM			
Name	**Representing**	**E-Mail**	**Phone**
Laurie Boston	Gem County Emergency Management	lboston@co.gem.id.us	208.284.0772 c)
Bonnie LaBonte	Gem Co. Emergency Mgmt.	blabonte@co.gem.id.us	
Tahja Jensen	G.C. Pros. Attorney	tjensen@co.gem.is.us	
Rob Flaner	Tetra Tech, Inc. –Project Manager	Rob.flaner@tetratech.com	208.939.4391
Carol Bauman	Tetra Tech, Inc.- Risk Assessment Lead	Carol.bauman@tetratech.com	503.223.5388 (ext. 111)
Stephen Veith	Tetra Tech, Inca-Planner	Stephen.veith@tetratech.com	503.223.5388 (ext.115)

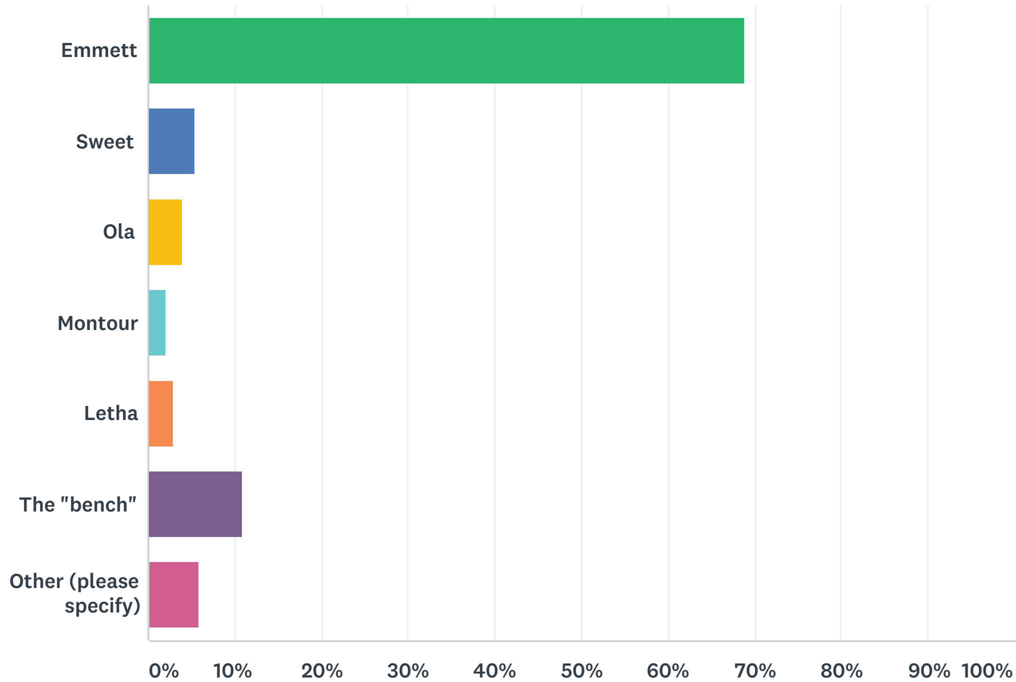
Gem County Hazard Mitigation Plan—Volume 1: Countywide Elements

Appendix B. Public Outreach

HAZARD MITIGATION SURVEY
SUMMARY OF RESULTS

Q1 Where in Gem County do you live?

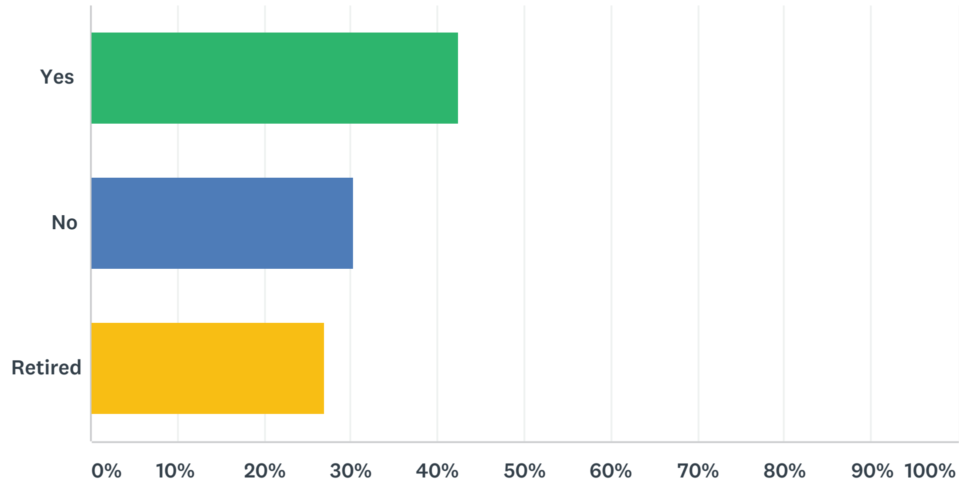
Answered: 423 Skipped: 0



ANSWER CHOICES	RESPONSES	
Emmett	68.79%	291
Sweet	5.44%	23
Ola	4.02%	17
Montour	2.13%	9
Letha	2.84%	12
The "bench"	10.87%	46
Other (please specify)	5.91%	25
TOTAL		423

Q2 Do you work in Gem County?

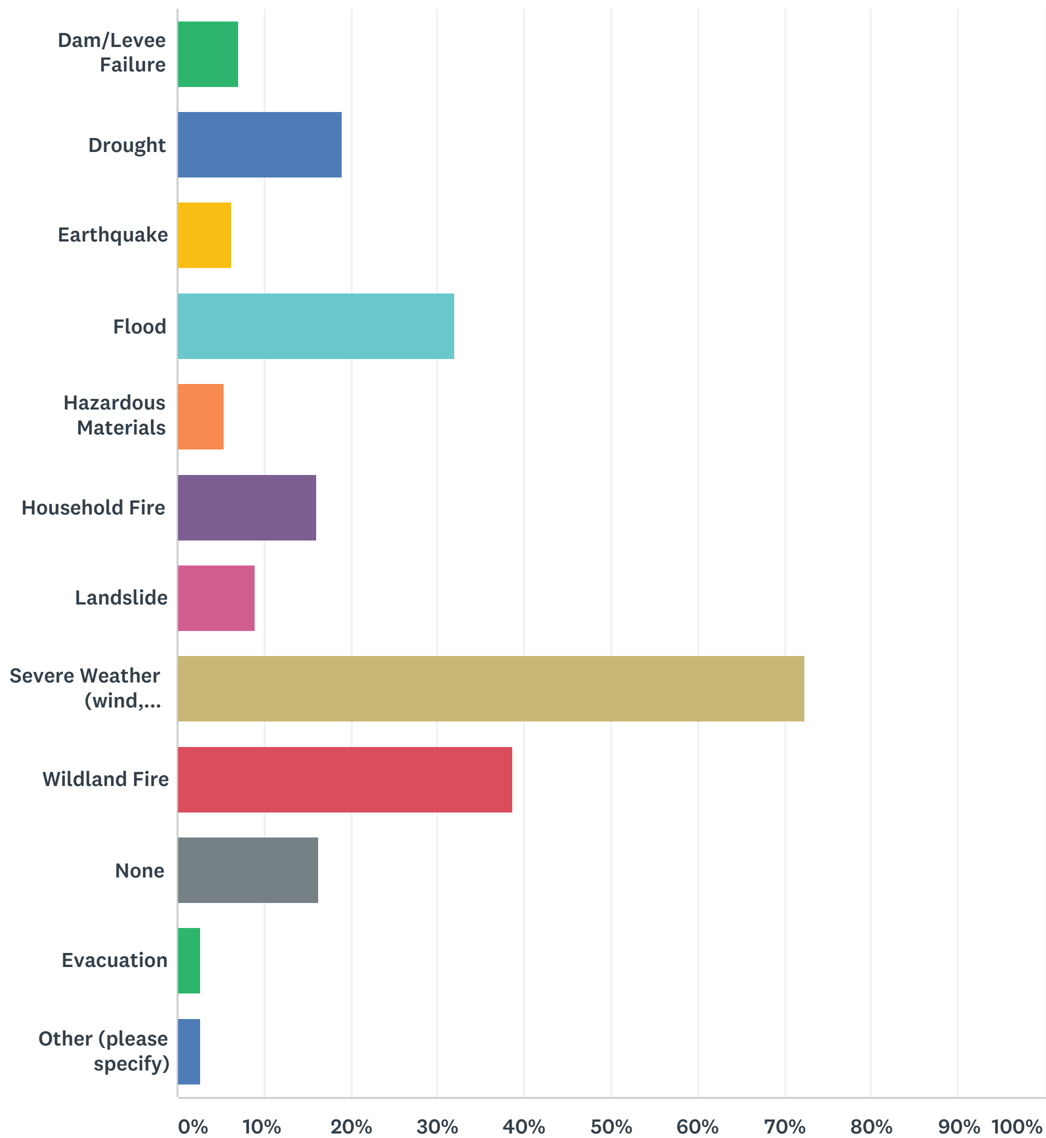
Answered: 421   Skipped: 2



ANSWER CHOICES	RESPONSES	
Yes	42.52%	179
No	30.40%	128
Retired	27.08%	114
TOTAL		421

Q3 Which of the following natural hazard events have you or has anyone in your household observed and/or experienced in the past 20 years within Gem County? (Check all that apply)

Answered: 416 Skipped: 7

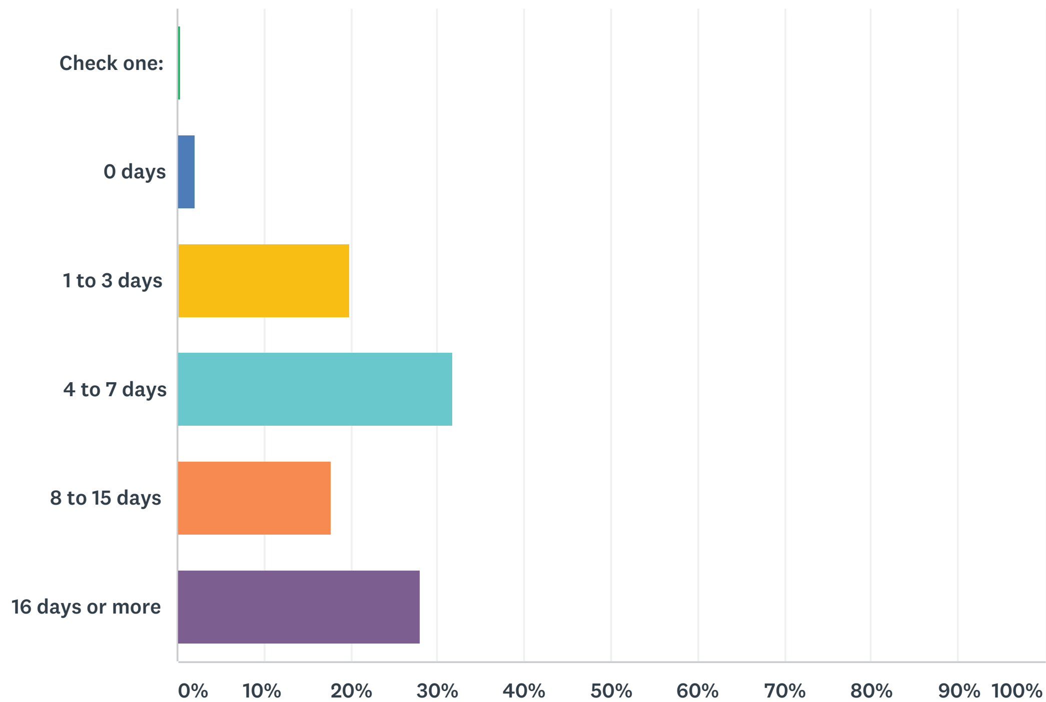


ANSWER CHOICES	RESPONSES	
Dam/Levee Failure	7.21%	30
Drought	18.99%	79
Earthquake	6.25%	26
Flood	31.97%	133
Hazardous Materials	5.53%	23
Household Fire	16.11%	67

Landslide	8.89%	37
Severe Weather (wind, lightning, snow accumulation, etc.)	72.36%	301
Wildland Fire	38.70%	161
None	16.35%	68
Evacuation	2.64%	11
Other (please specify)	2.64%	11
Total Respondents: 416		

Q4 If your household were impacted/isolated due to a natural hazard event, how many days could your household survive due to your preparedness?

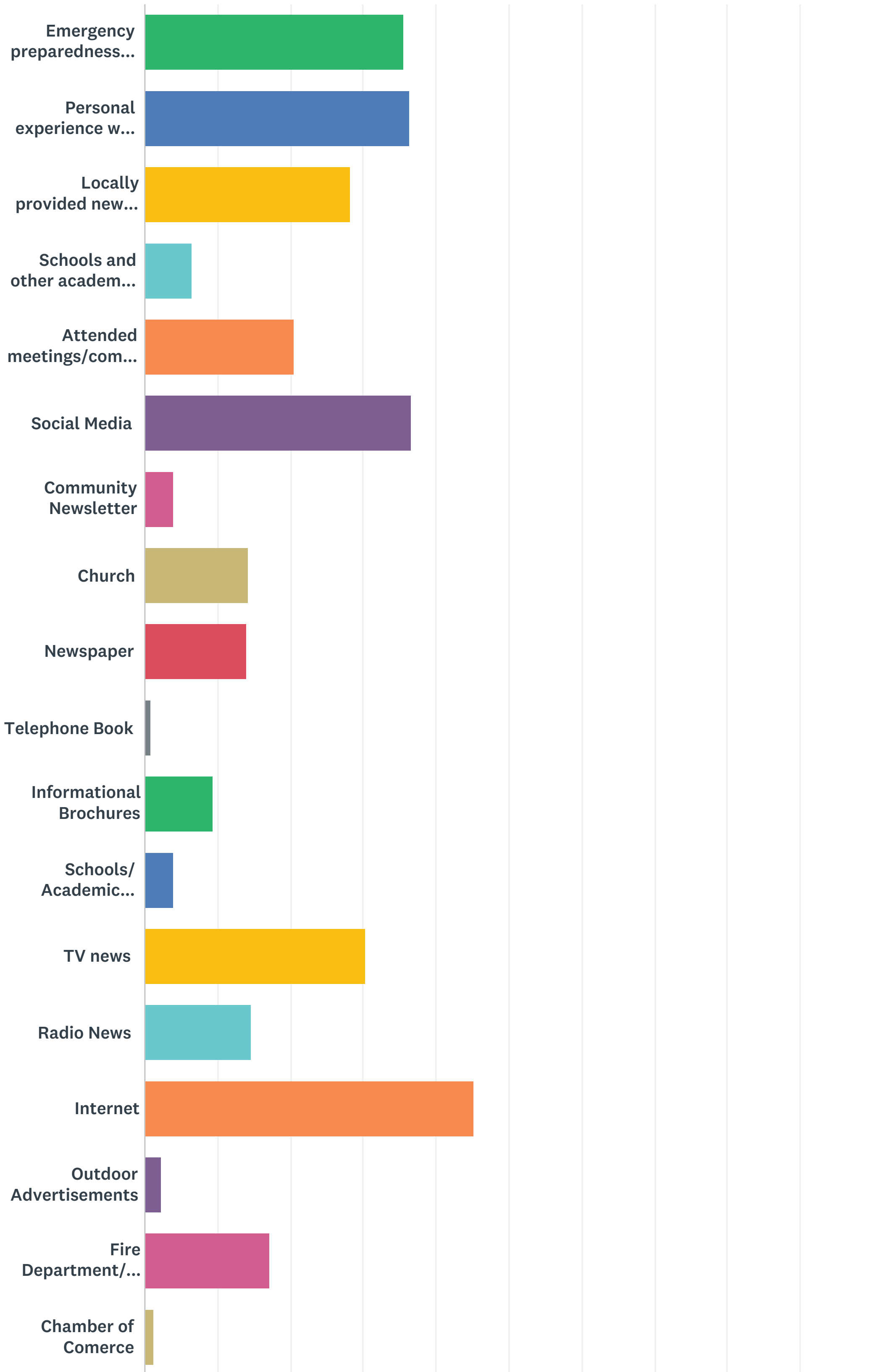
Answered: 383 Skipped: 40

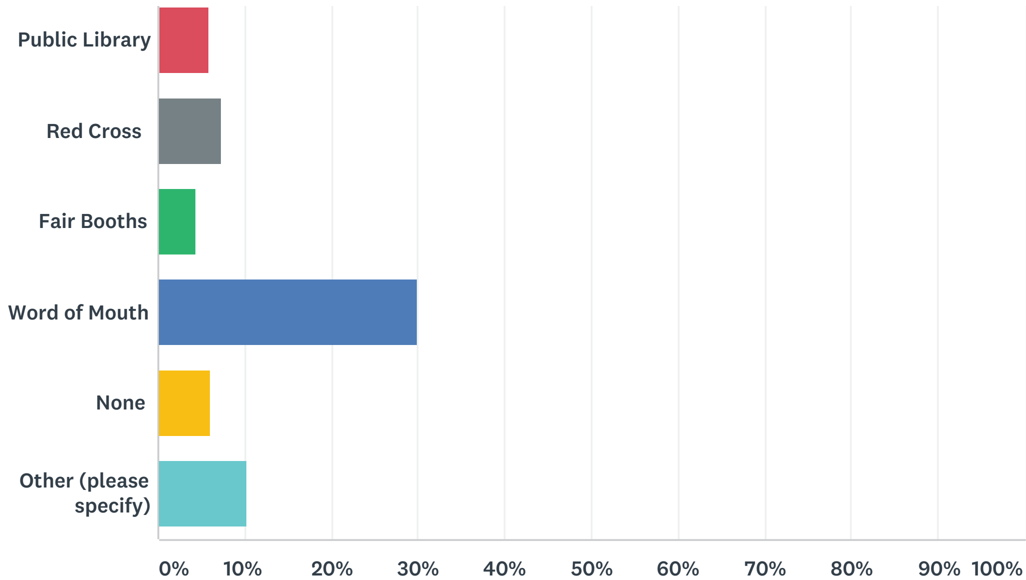


ANSWER CHOICES	RESPONSES	
Check one:	0.52%	2
0 days	2.09%	8
1 to 3 days	19.84%	76
4 to 7 days	31.85%	122
8 to 15 days	17.75%	68
16 days or more	27.94%	107
TOTAL		383

Q5 Which of the following have provided you with useful information to help you be prepared for a natural hazard event? (Check all that apply)

Answered: 380 Skipped: 43



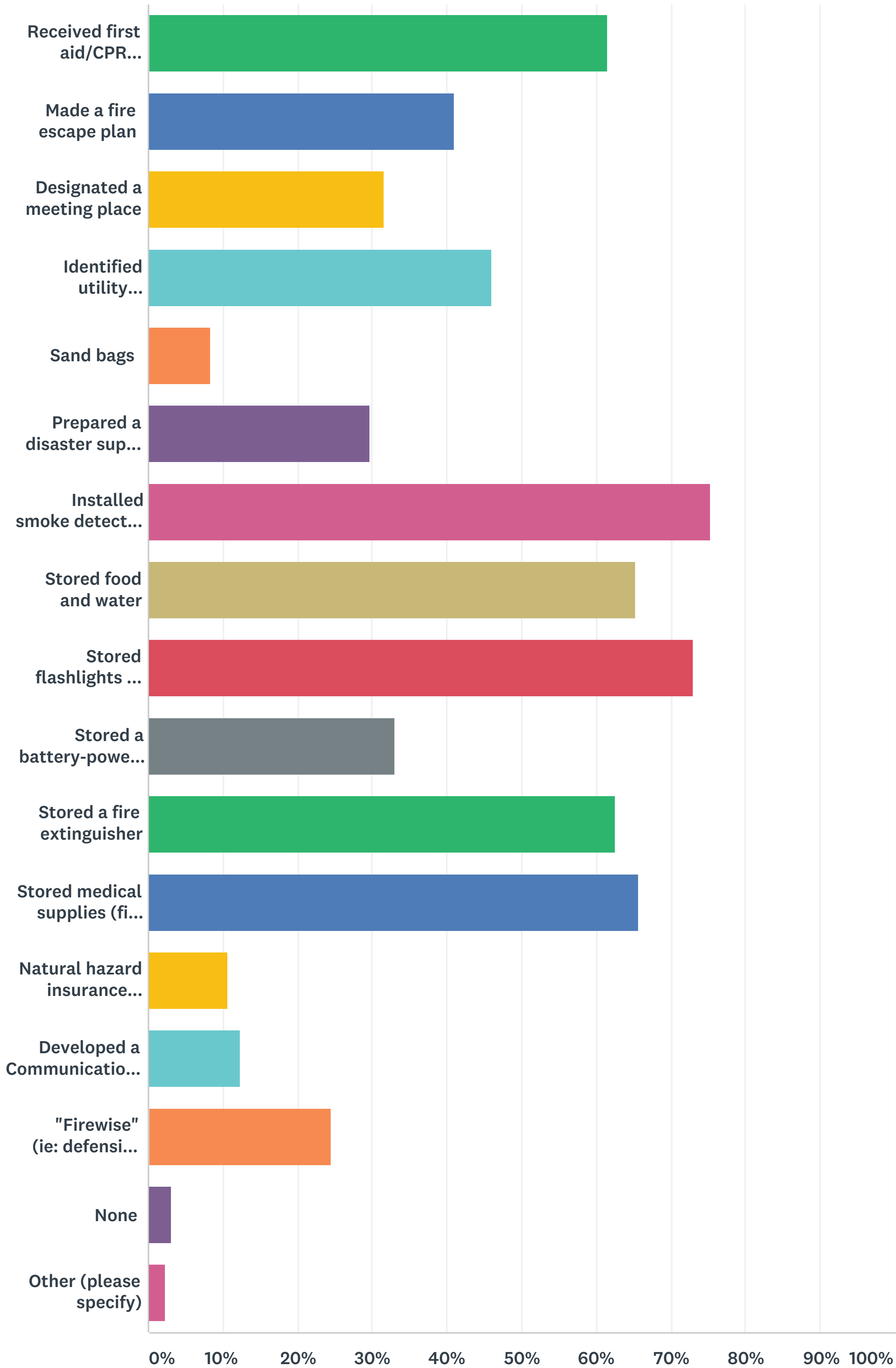


ANSWER CHOICES	RESPONSES	
Emergency preparedness information from a government source (e.g., federal, state, or local emergency management)	35.53%	135
Personal experience with one or more natural hazards/disasters	36.32%	138
Locally provided news or other media information	28.16%	107
Schools and other academic institutions	6.58%	25
Attended meetings/community events or workshops that have dealt with disaster preparedness	20.53%	78
Social Media	36.58%	139
Community Newsletter	3.95%	15
Church	14.21%	54
Newspaper	13.95%	53
Telephone Book	0.79%	3
Informational Brochures	9.47%	36
Schools/ Academic Institutions	3.95%	15
TV news	30.26%	115
Radio News	14.74%	56
Internet	45.26%	172
Outdoor Advertisements	2.37%	9
Fire Department/ Rescue	17.11%	65
Chamber of Comerce	1.32%	5
Public Library	5.79%	22
Red Cross	7.37%	28
Fair Booths	4.47%	17
Word of Mouth	30.00%	114

None	6.05%	23
Other (please specify)	10.26%	39
Total Respondents: 380		

Q6 Which of the following steps has your household taken to prepare for a natural hazard event? (Check all that apply)

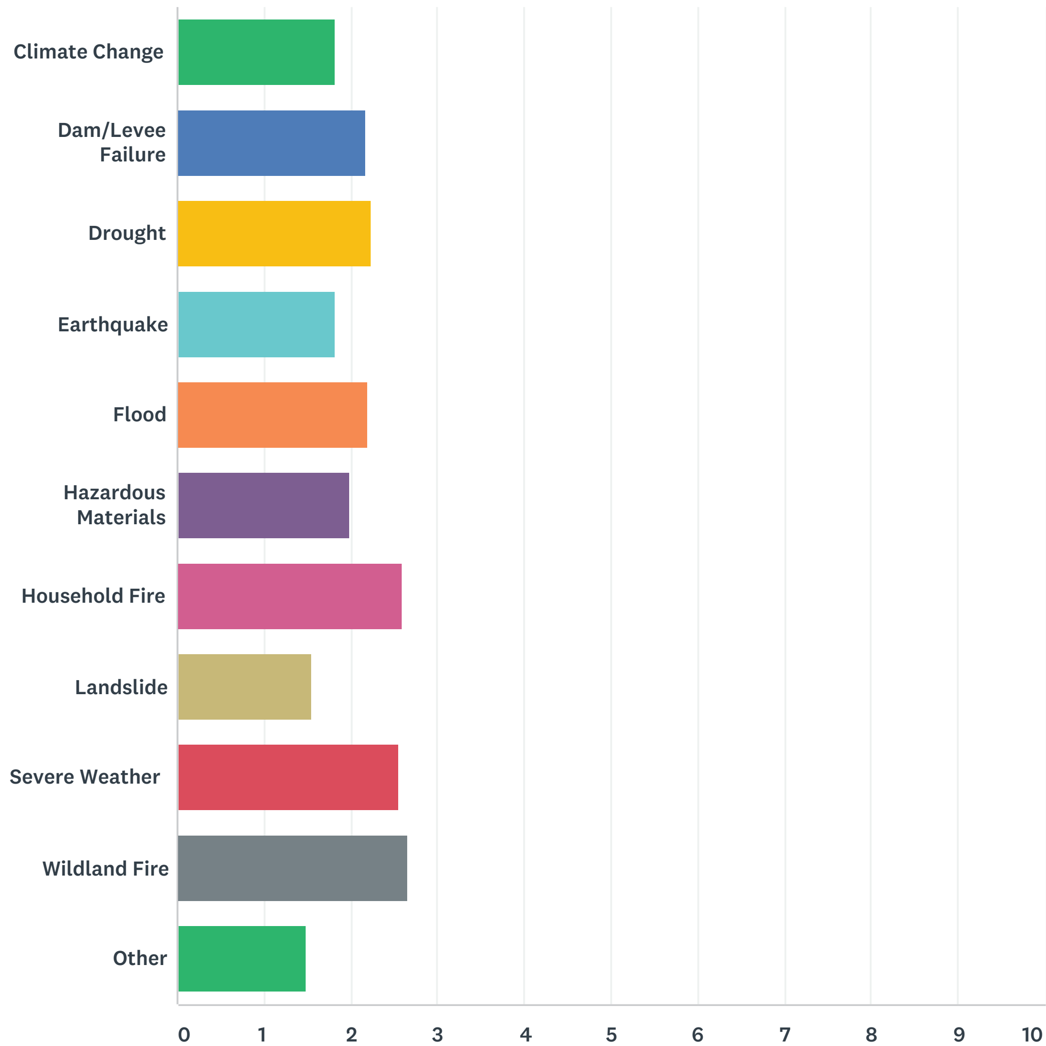
Answered: 381 Skipped: 42



ANSWER CHOICES	RESPONSES	
Received first aid/CPR training	61.42%	234
Made a fire escape plan	40.94%	156
Designated a meeting place	31.50%	120
Identified utility shutoffs	45.93%	175
Sand bags	8.40%	32
Prepared a disaster supply kit	29.66%	113
Installed smoke detectors on each level of the house	75.33%	287
Stored food and water	65.35%	249
Stored flashlights and batteries	72.97%	278
Stored a battery-powered radio	33.07%	126
Stored a fire extinguisher	62.47%	238
Stored medical supplies (first aid kit, medications)	65.62%	250
Natural hazard insurance (Flood, Earthquake, Wildfire)	10.76%	41
Developed a Communication Plan	12.34%	47
"Firewise" (ie: defensible space, fire resistant landscapes, alternative Water sources) https://www.nfpa.org/Public-Education/By-topic/Wildfire/Firewise-USA	24.41%	93
None	3.15%	12
Other (please specify)	2.36%	9
Total Respondents: 381		

Q7 How concerned are you about the following natural hazards in Gem County? (Check one response for each hazard)

Answered: 383   Skipped: 40

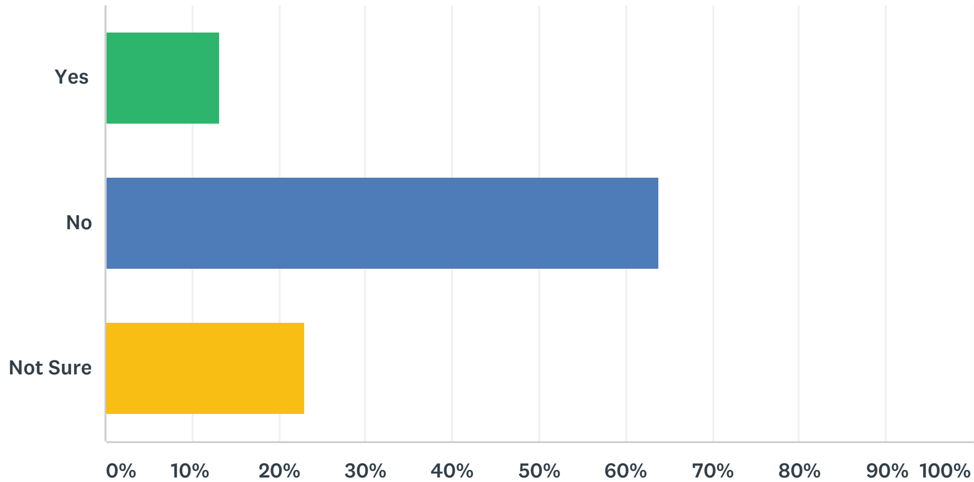


	NOT CONCERNED	SOMEWHAT CONCERNED	CONCERNED	VERY CONCERNED	EXTREMELY CONCERNED	TOTAL	WEIGHTED AVERAGE
Climate Change	49.47% 188	29.74% 113	12.89% 49	5.53% 21	2.37% 9	380	1.82
Dam/Levee Failure	27.78% 105	40.74% 154	20.11% 76	8.20% 31	3.17% 12	378	2.18
Drought	25.79% 98	38.95% 148	23.42% 89	9.47% 36	2.37% 9	380	2.24
Earthquake	45.50% 172	33.33% 126	15.34% 58	4.76% 18	1.06% 4	378	1.83
Flood	25.99% 98	40.32% 152	23.87% 90	7.69% 29	2.12% 8	377	2.20
Hazardous Materials	39.62% 147	35.31% 131	14.29% 53	8.89% 33	1.89% 7	371	1.98

Household Fire	11.14% 42	38.46% 145	34.48% 130	12.47% 47	3.45% 13	377	2.59
Landslide	63.00% 235	24.40% 91	9.12% 34	2.95% 11	0.54% 2	373	1.54
Severe Weather	11.90% 45	40.74% 154	30.95% 117	11.90% 45	4.50% 17	378	2.56
Wildland Fire	17.41% 66	32.98% 125	25.59% 97	14.25% 54	9.76% 37	379	2.66
Other	73.55% 89	13.22% 16	9.09% 11	0.00% 0	4.13% 5	121	1.48

Q8 Is your property located in or near a designated floodplain?

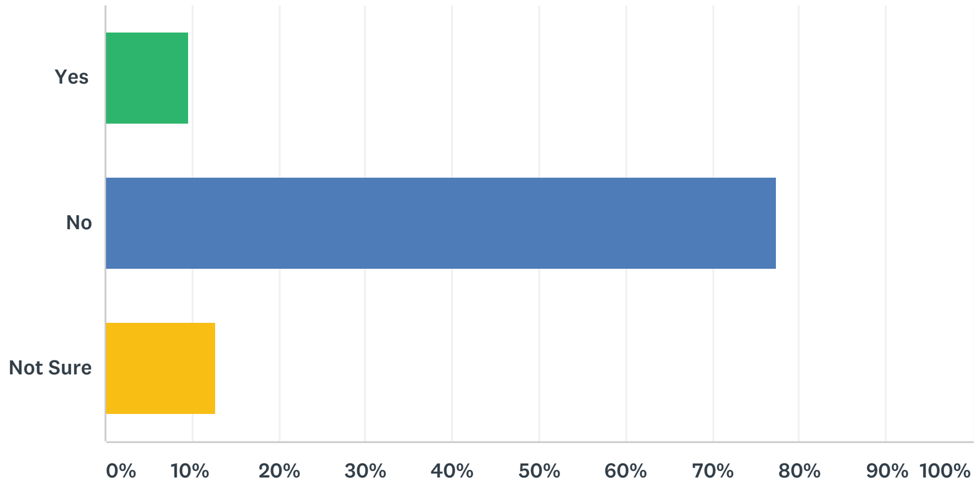
Answered: 381 Skipped: 42



ANSWER CHOICES	RESPONSES	
Yes	13.12%	50
No	63.78%	243
Not Sure	23.10%	88
TOTAL		381

Q9 Do you have flood insurance?

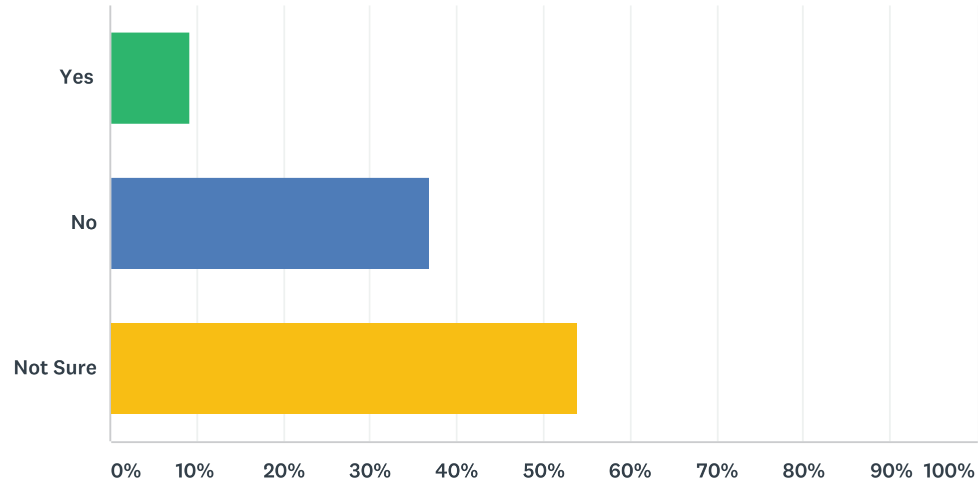
Answered: 382 Skipped: 41



ANSWER CHOICES	RESPONSES	
Yes	9.69%	37
No	77.49%	296
Not Sure	12.83%	49
TOTAL		382

Q10 Is your property located near an earthquake fault?

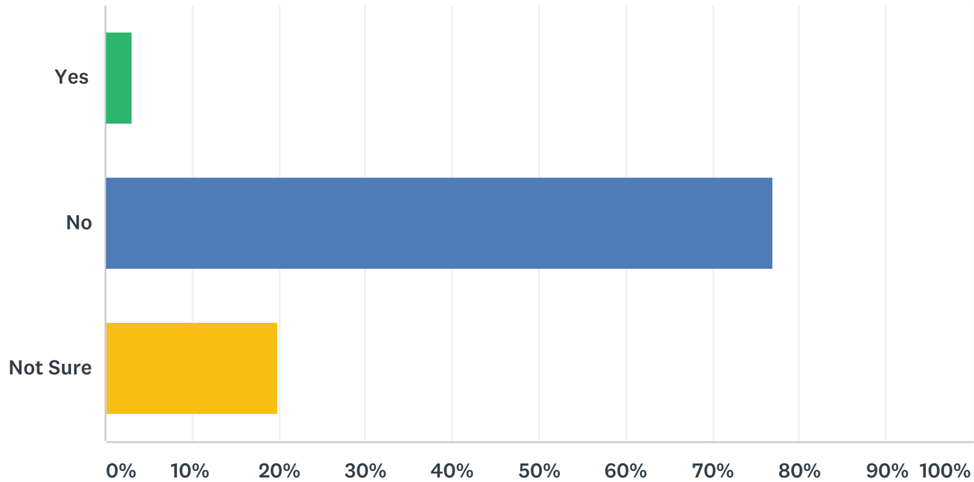
Answered: 383 Skipped: 40



ANSWER CHOICES	RESPONSES	
Yes	9.14%	35
No	36.81%	141
Not Sure	54.05%	207
TOTAL		383

Q11 Do you have earthquake insurance?

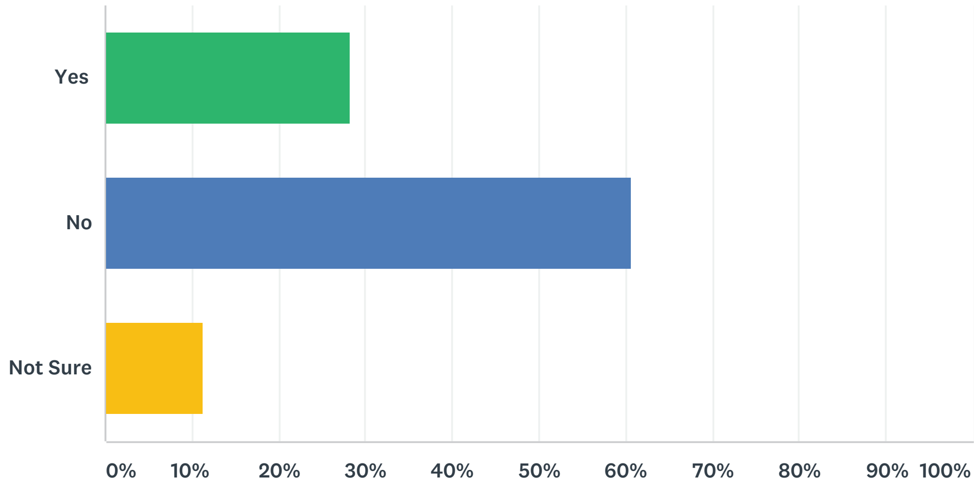
Answered: 382 Skipped: 41



ANSWER CHOICES	RESPONSES	
Yes	3.14%	12
No	76.96%	294
Not Sure	19.90%	76
TOTAL		382

Q12 Is your property located in an area at risk for wild fires?

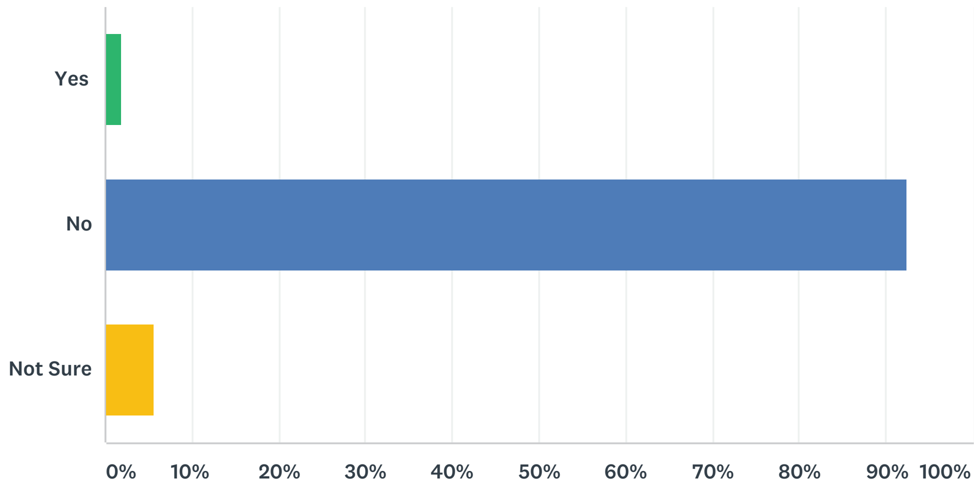
Answered: 383   Skipped: 40



ANSWER CHOICES	RESPONSES	
Yes	28.20%	108
No	60.57%	232
Not Sure	11.23%	43
TOTAL		383

Q13 Have you ever had problems getting homeowners or renters insurance due to risks from natural hazards?

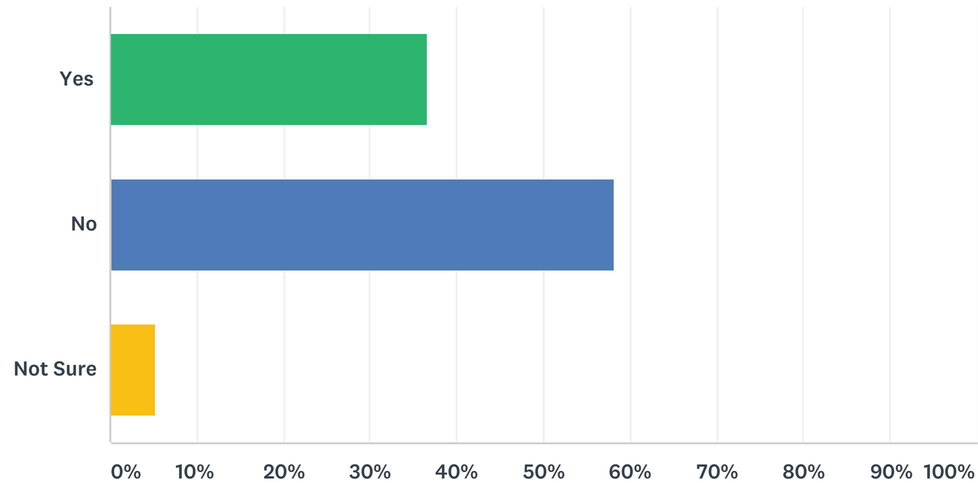
Answered: 383 Skipped: 40



ANSWER CHOICES	RESPONSES	
Yes	1.83%	7
No	92.43%	354
Not Sure	5.74%	22
TOTAL		383

Q14 When you moved into your home, did you consider the impact a natural disaster could have on your home?

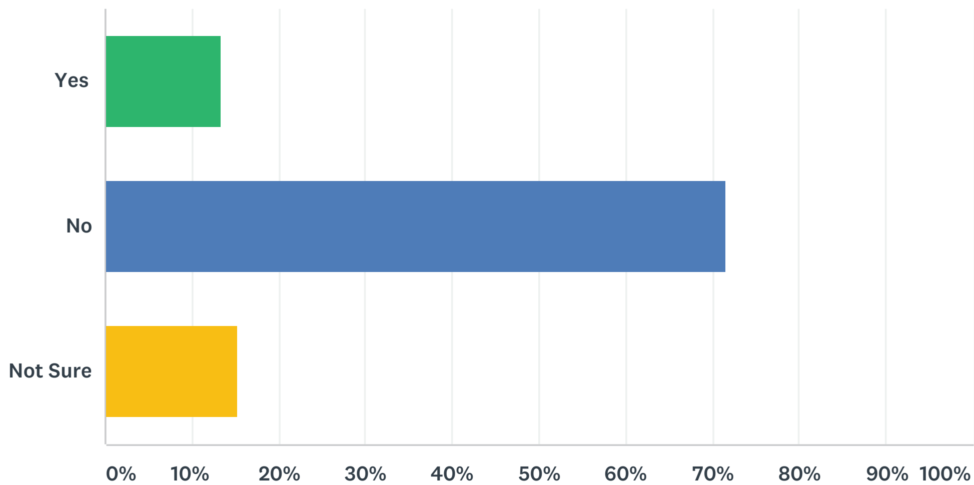
Answered: 368 Skipped: 55



ANSWER CHOICES	RESPONSES	
Yes	36.68%	135
No	58.15%	214
Not Sure	5.16%	19
TOTAL		368

Q15 Was the presence of a natural hazard risk zone (e.g., dam failure zone, flood zone, landslide hazard area, high fire risk area) disclosed to you by a real estate agent, seller, or landlord before you purchased or moved into your home?

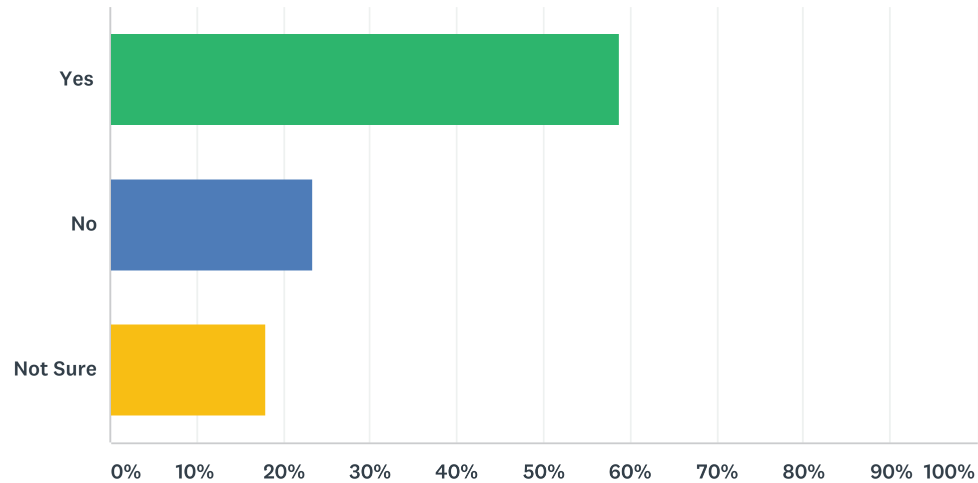
Answered: 368 Skipped: 55



ANSWER CHOICES	RESPONSES	
Yes	13.32%	49
No	71.47%	263
Not Sure	15.22%	56
TOTAL		368

Q16 Would the disclosure of this type of natural hazard risk information influence your decision to buy or rent a home?

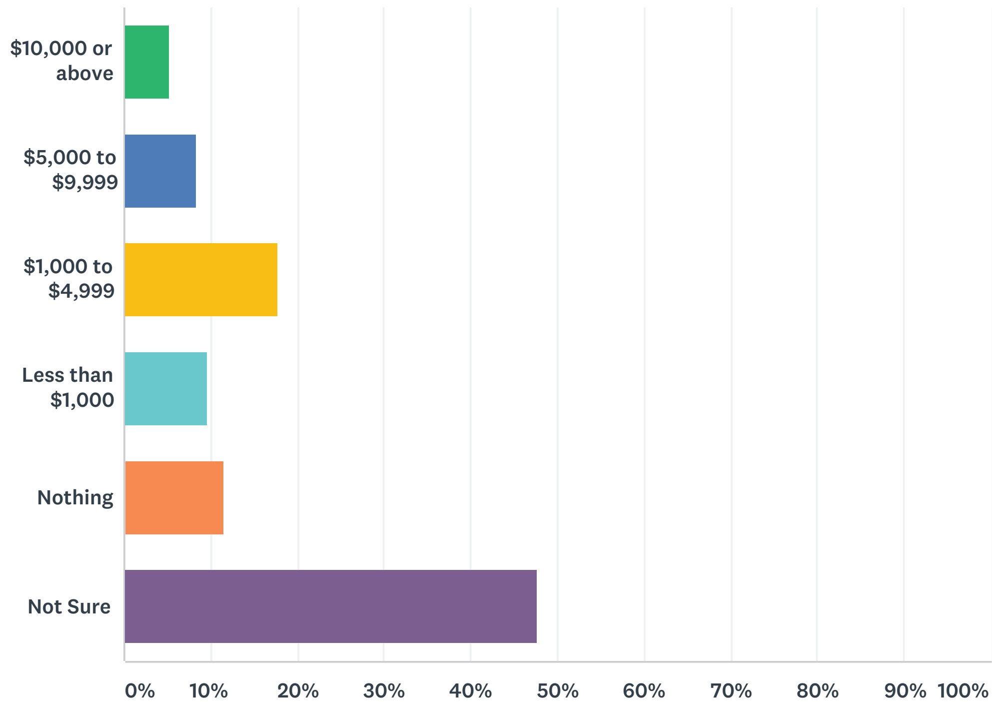
Answered: 368 Skipped: 55



ANSWER CHOICES	RESPONSES	
Yes	58.70%	216
No	23.37%	86
Not Sure	17.93%	66
TOTAL		368

Q17 If you were eligible for funding assistance that required a local contribution, how much money would you be willing to spend to retrofit your home to reduce risks associated with natural disasters? (for example, by elevating a home above the flood level, performing seismic upgrades, or replacing a combustible roof with non-combustible roofing)

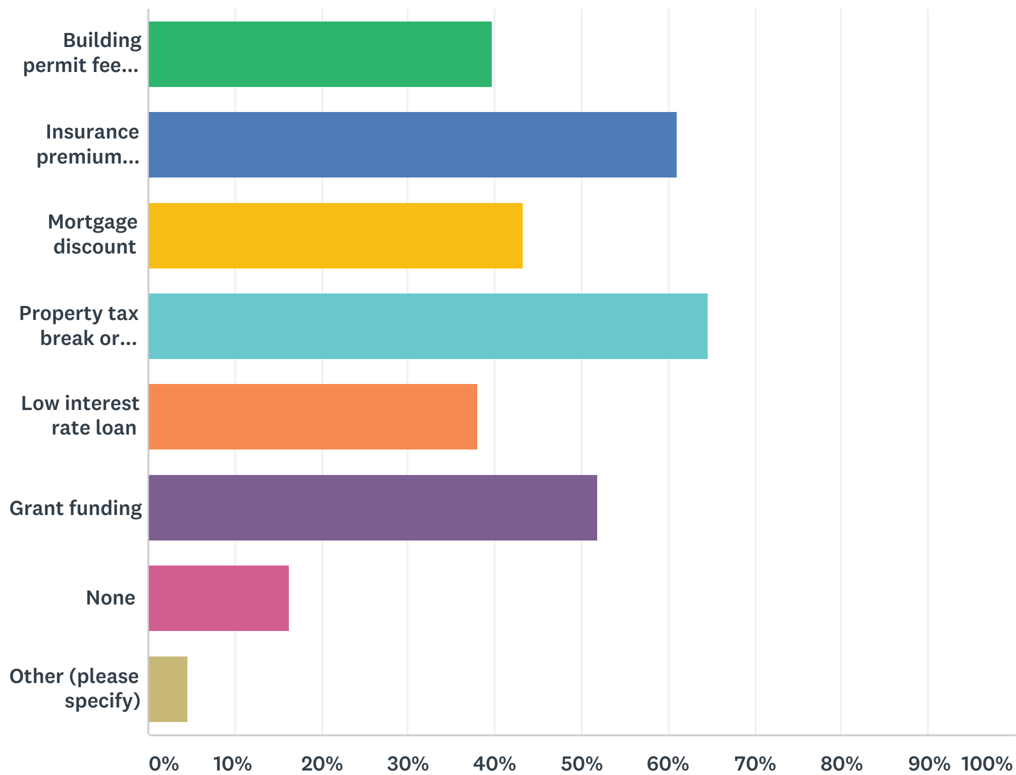
Answered: 367 Skipped: 56



ANSWER CHOICES	RESPONSES	
$10,000 or above	5.18%	19
$5,000 to $9,999	8.45%	31
$1,000 to $4,999	17.71%	65
Less than $1,000	9.54%	35
Nothing	11.44%	42
Not Sure	47.68%	175
TOTAL		367

Q18 Which of the following incentives would encourage you to spend money to retrofit your home to protect against natural disasters? (Check all that apply). Please note that you answers to this question does not obligate any of the planning partners to implement the incentives.

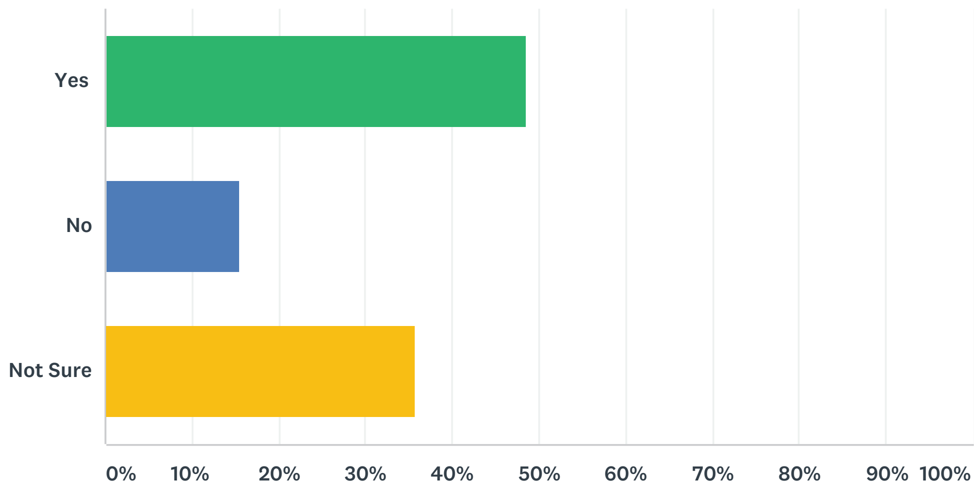
Answered: 362 Skipped: 61



ANSWER CHOICES	RESPONSES	
Building permit fee waiver	39.78%	144
Insurance premium discount	61.05%	221
Mortgage discount	43.37%	157
Property tax break or incentive	64.64%	234
Low interest rate loan	38.12%	138
Grant funding	51.93%	188
None	16.30%	59
Other (please specify)	4.70%	17
Total Respondents: 362		

Q19 If your property were located in a designated “high hazard” area or had received repetitive damages from a natural hazard event, would you consider a ”buyout” offered by a public agency?

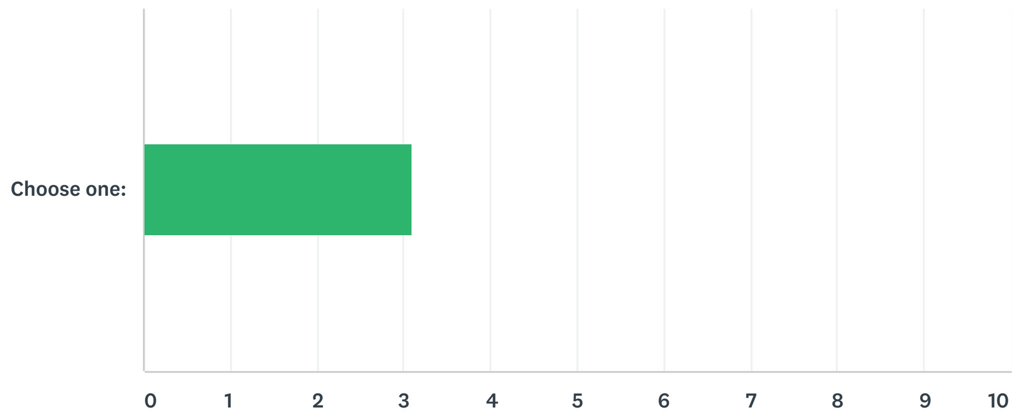
Answered: 366 Skipped: 57



ANSWER CHOICES	RESPONSES	
Yes	48.63%	178
No	15.57%	57
Not Sure	35.79%	131
TOTAL		366

Q20 Please indicate how you feel about the following statement:Information about the risks associated with natural hazards is readily available and easy to locate.

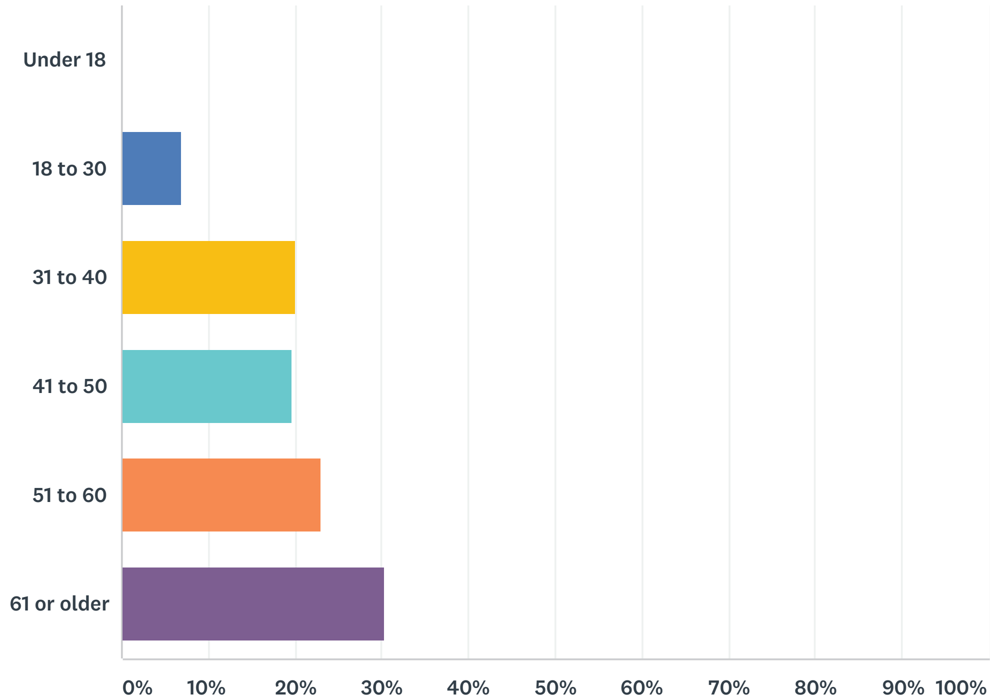
Answered: 368 Skipped: 55



	STRONGLY DISAGREE	SOMEWHAT DISAGREE	NEITHER AGREE NOR DISAGREE	SOMEWHAT AGREE	STRONGLY AGREE	TOTAL	WEIGHTED AVERAGE
Choose one:	8.42% 31	20.38% 75	35.05% 129	26.36% 97	9.78% 36	368	3.09

Q21 Please indicate your age range:

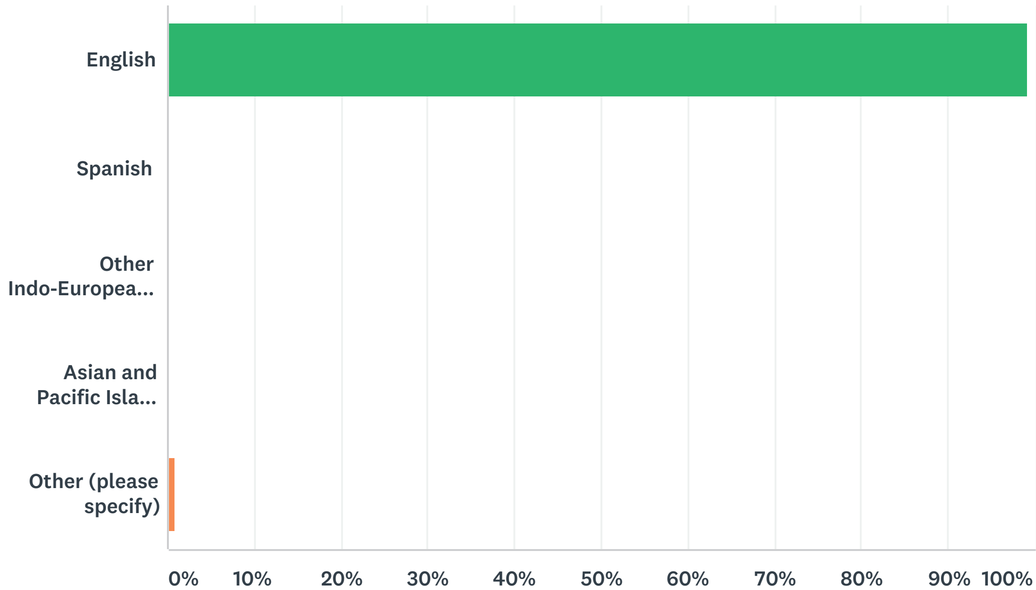
Answered: 362 Skipped: 61



ANSWER CHOICES	RESPONSES	
Under 18	0.00%	0
18 to 30	6.91%	25
31 to 40	20.17%	73
41 to 50	19.61%	71
51 to 60	22.93%	83
61 or older	30.39%	110
TOTAL		362

Q22 Please indicate the primary language spoken in your household.

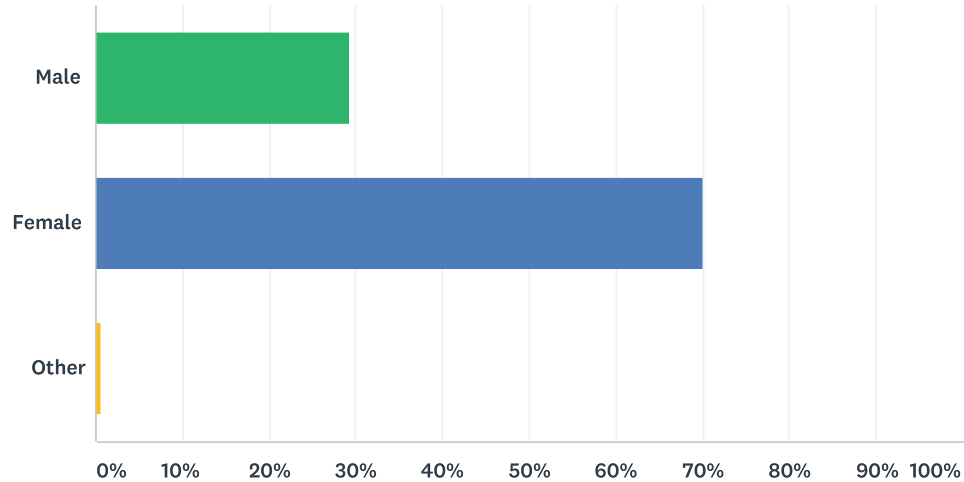
Answered: 363 Skipped: 60



ANSWER CHOICES	RESPONSES	
English	99.17%	360
Spanish	0.00%	0
Other Indo-European Languages	0.00%	0
Asian and Pacific Island Languages	0.00%	0
Other (please specify)	0.83%	3
TOTAL		363

Q23 Please indicate your gender:

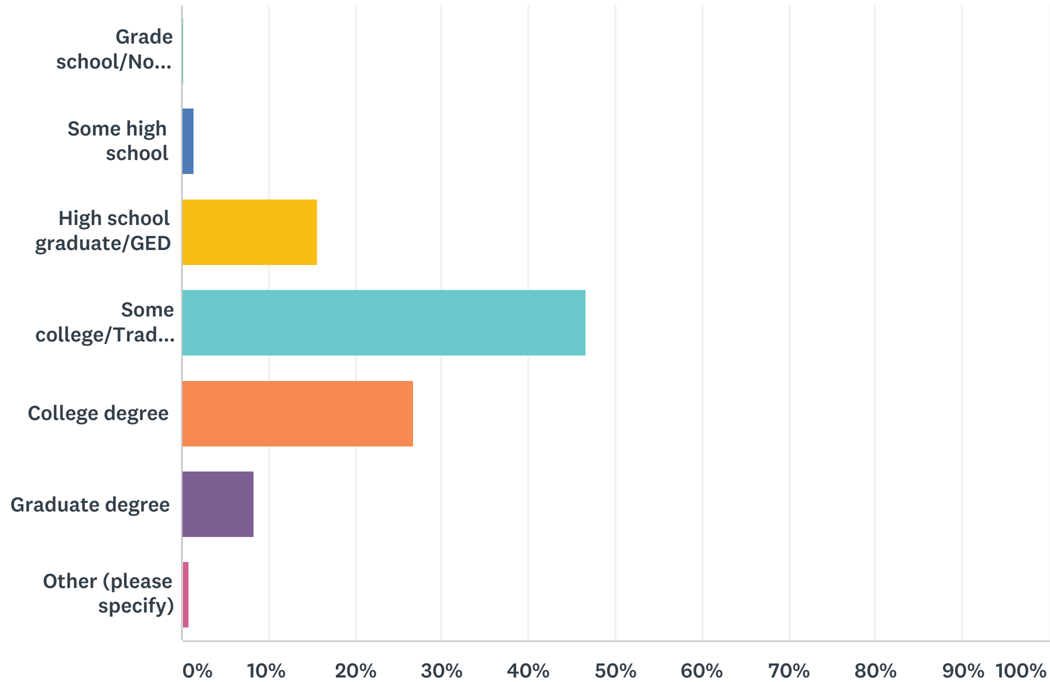
Answered: 362 Skipped: 61



ANSWER CHOICES	RESPONSES	
Male	29.28%	106
Female	70.17%	254
Other	0.55%	2
TOTAL		362

Q24 Please indicate your highest level of education.

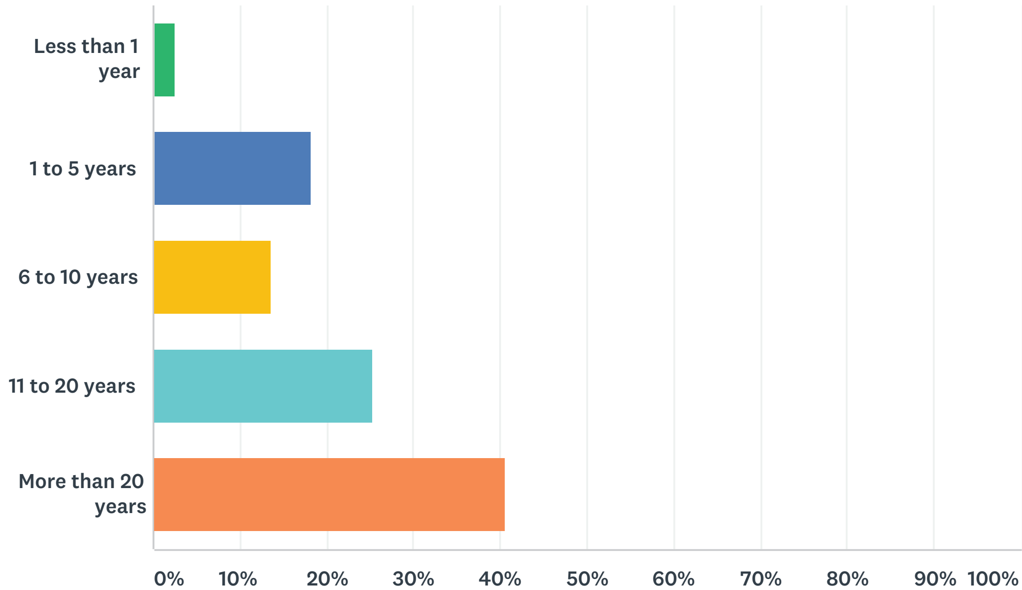
Answered: 362   Skipped: 61



ANSWER CHOICES	RESPONSES	
Grade school/No schooling	0.28%	1
Some high school	1.38%	5
High school graduate/GED	15.75%	57
Some college/Trade school	46.69%	169
College degree	26.80%	97
Graduate degree	8.29%	30
Other (please specify)	0.83%	3
TOTAL		362

Q25 How long have you lived in Gem County?

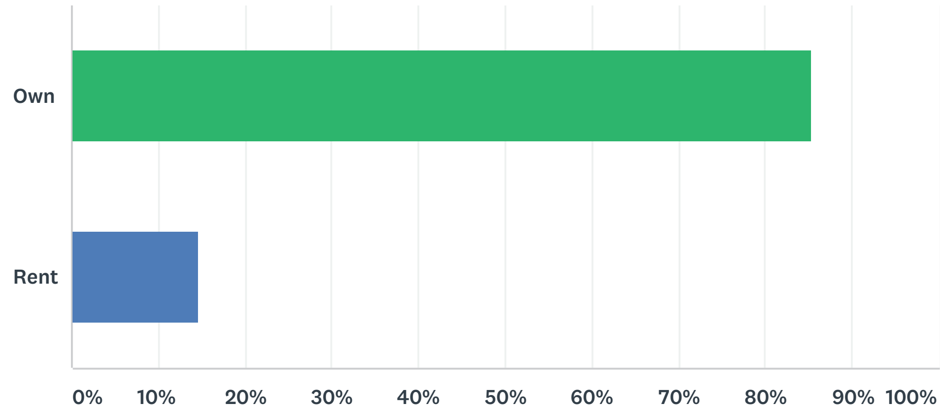
Answered: 363 Skipped: 60



ANSWER CHOICES	RESPONSES	
Less than 1 year	2.48%	9
1 to 5 years	18.18%	66
6 to 10 years	13.50%	49
11 to 20 years	25.34%	92
More than 20 years	40.50%	147
TOTAL		363

Q26 Do you own or rent your place of residence?

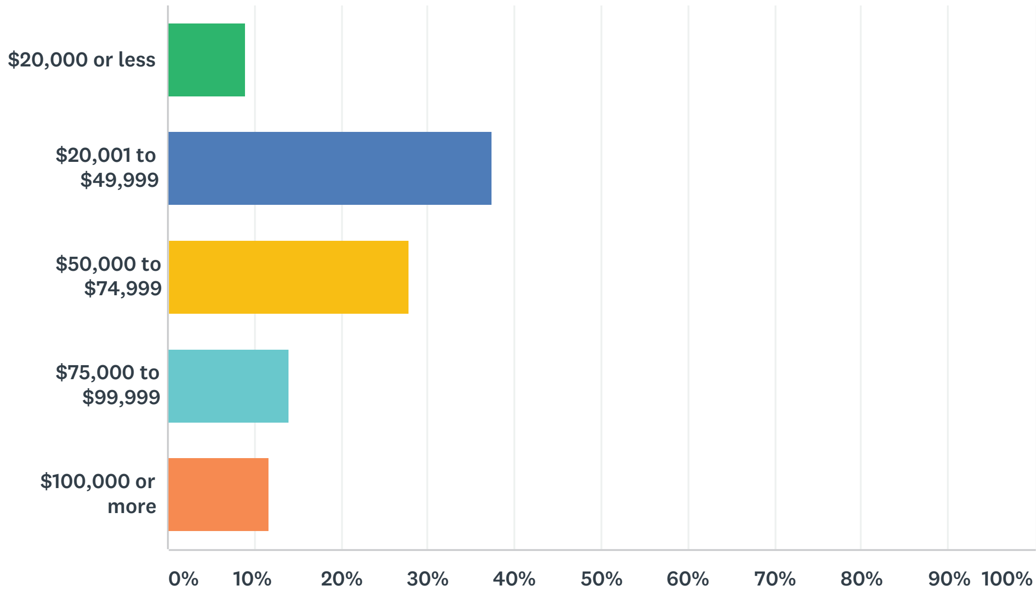
Answered: 360 Skipped: 63



ANSWER CHOICES	RESPONSES	
Own	85.28%	307
Rent	14.72%	53
TOTAL		360

Q27 How much is your gross household income?

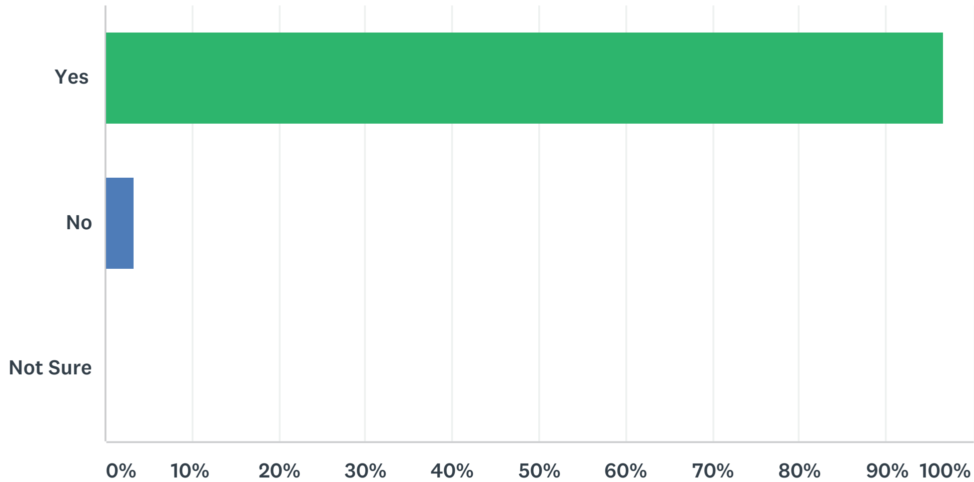
Answered: 342 Skipped: 81



ANSWER CHOICES	RESPONSES	
$20,000 or less	9.06%	31
$20,001 to $49,999	37.43%	128
$50,000 to $74,999	27.78%	95
$75,000 to $99,999	14.04%	48
$100,000 or more	11.70%	40
TOTAL		342

Q28 Do you have regular access to the Internet?

Answered: 363 Skipped: 60



ANSWER CHOICES	RESPONSES	
Yes	96.69%	351
No	3.31%	12
Not Sure	0.00%	0
TOTAL		363

STEERING COMMITTEE
MEETING SUMMARIES

MEETING SUMMARY

Date/Time of Meeting:	Wednesday – November 29, 2017; 10:00am to Noon
Location:	Emergency Operations Center, 415 East Main Street Emmett, Idaho 83617
Subject:	Steering Committee No.1
Project Name:	Gem County Hazard Mitigation Plan-Update
In Attendance (See Attachment):	**Attendees:** Greg Bradley, Rick Johnston, Bruce Evans, Chuck Rolland, Neil Capps, Bill Butticci, Wayne Rush, Jay Hummel, Bev Martin, Dennis Weaver, Jennifer Kharri, Curt Christensen, Michelle Chadwick, Myra Church, Dale Nalder, Tahja Jensen Phoned in: None **Planning Team:** Rob Flaner, Laurie Boston, Bonnie Labonte
Not Present:	N/A
Summary Prepared by:	Rob Flaner (12/11/2017)
Quorum – Yes or No	N/A – Steering Committee not finalized

Item	Action

Welcome and Introductions, Review Agenda

- Ms. Laurie Boston open the meeting and facilitated group introductions.
- Mr. Rob Flaner, Hazard Mitigation Program Manager from Tetra Tech facilitated the balance of the meeting. Tetra Tech is the contractor hired by Gem County to facilitate the plan update.
- Distributed handouts included: Agenda; Draft Steering Committee Charter; Hazards of concern for Gem County, Guiding Principle, Goals and Objectives
- The agenda was reviewed and no modifications were made.

Project Overview

Mr. Flaner provided the committee and overview of the scope of work and timeline for the project. This is an update to the Gem County Hazard Mitigation Plan that was last updated in 2012. This process will represent the second comprehensive update and 3rd overall hazard mitigation planning effort for Gem County. Hazard Mitigation plans are required for eligibility for FEMA grant funding pursuant to the Disaster Mitigation Act of 2000 (DMA) (Public Law 106-190). The law requires

Item	Action
that local hazard mitigation plans be updated every 5 years. The County's 1st planning effort was conducted in 2005, that plan was updated in 2012 will expire on 12/18/2017. The work plan for this plan update will follow the same script that was used for the last plan update. The plan update process will be facilitated through a stakeholder Steering Committee (SC) that will be an offshoot of the LEPC. The plan update process will be centered upon a comprehensive risk assessment that looks at the natural hazards of concern that impact the Gem County Operational area. This will be a multijurisdictional planning effort that will provide DMA compliance any eligible "local government" within the OA that fully participates in the plan update process. The last plan provided coverage to: Gem County, the City of Emmett, Emmett Independent Scholl District #221, gem County Mosquito Abatement District, Gem County Fire District #1 and Gem County Fire District #2. A key outcome from this plan update process will be a review of prior actions and the identification and prioritization of new actions for the next 5-year performance period of the plan. The time line for this plan update process in 6 to 8 months depending upon the direction from the SC. **<u>Planning Partnership</u>** Under the next segment of the agenda, Mr. Flaner discussed the planning partnership to be covered by this plan update. As stated above, the last plan covered 6 planning partners. Mr. Flaner explained that there are other eligible "local governments" within the OA that may want to participate in this plan update process. The DMA has defined a "local government" as: a City, County, Tribe, State or Special Purpose District that has junior taxing authority. Based on that definition, what no-participating local governments within the OA should be considered for this plan update process?	
Mr. Flaner explained that any planning partner would need to submit a letter of intent to participate in the plan update process and agree to meet the panning partner expectations that will be confirmed by the SC at the next scheduled meeting. Districts recommended by the SC included: the Ditch/Irrigation Districts, Letha Sewer District and Middleton Fire District. Laurie Boston will reach out to these districts to see if they are interested in participating in the plan update process.	Laurie Boston to reach out to the Ditch/Irrigation Districts, Letha Sewer District and Middleton Fire District to see if they are interested in joining the planning partnership.
<u>Steering Committee Ground Rules</u> Mr. Flaner turned attention to establishing the ground rules for the Steering Committee. He provided the group with a copy of the SC	

Item	Action
ground rules from the last plan update. Mr. Flaner requested that the group discuss the specific composition and rules of the HMP SC. He began by discussing who should be the Chair and Vice Chair. Mr. Bruce Evans from the City of Emmett volunteered to be the Chair and Mr. Chuck Rolland, the Gem County Sherriff, volunteered as Vice-chair. Other key components of the Charter approved by the SC include: • Laurie Boston will act as the spokesperson for the process • The quorum was established as 8 members. • Alternates will be designated for each seat and will have full voting authority for those meetings they attend in place of the primary representative • Decision Making- the SC will strive for consensus. If consensus cannon be reached, the decision will be decided by a majority vote • The reoccurring meeting date will be the 3rd Tuesday of every month following the LEPC meeting from 10:00 AM to Noon • The meeting Location will be the Gem County EOC at: 415 East Main Street, Emmett, Idaho 83617. • A public comment protocol will be followed that will allow members of the public to address the SC on any topic related to the Hazard Mitigation Plan. The comment period will be limited to 3 minutes per person, with the aggregate comment period not to exceed 30 minutes. Time cannot be deferred to another speaker.	
Mr. Flaner will finalize the Charter and will make available for public review via the website discussed below. The SC will formally approve the Charter at their next meeting.	Rob Flaner will finalize the charter and the SC will formally approve at the Next SC meeting.
<u>Plan Review</u> Under this segment, Mr. Flaner advised the SC on elements of the last plan that will need to be reviewed by the SC to provide guidance to the planning team for this plan update. First was the confirmation of the Hazards of Concern for the plan. A handout was provided to the SC illustrated the hazards of concern addressed by the last plan, and included the table of contents from that plan to show the level of detail profiled for each hazard. The SC was asked the following questions: • Do we want to delete any of these hazards?	

Item	Action

• Do we want to add any additional Hazards?
• What about non-natural of human caused hazards?
• How should this plan update address climate change?
• Any changes to the hazard profile elements?
 	
A summary of the direction provided by the SC in response to these questions are as follows:
 	
• None of the hazards of concern addressed by the last plan should be deleted.
• No new natural hazards will be added to the risk assessment with one exception. A profile of the “space weather” hazard will be added to the severe weather chapter.
• The SC would like the risk assessment to be expanded to include a profile of non-natural hazards. These hazards will be profiled, but not fully assessed or ranked to the detail of the natural hazards. These hazards shall be grouped under the category of “Other Hazards of Interest and shall include:
    o Pandemic
    o Civil Disturbance
    o Terrorism
    o Cyber
    o Oil/Gas-exploration
    o HAZMAT
• The plan will address climate change under a stand-alone chapter titles “Future Conditions”
 	
Guiding Principle, Goals and Objectives- This task was tabled until the next SC meeting due to the lack of sufficient time to adequately address this topic.	

Homework: The SC was assigned homework prior to their next scheduled meeting. The home work involves review of the prior Gem County plan and the Idaho State Hazard mitigation Plan. The review elements were defined as follows: ID SHMP: https://ioem.idaho.gov/Pages/Plans/Mitigation/SHMP.aspx . The SC should do a cursory review of the State Hazard Mitigation Plan to see what the goals and objectives were identified, the types of actions	Homework was assigned to the SC. This involved review of the ID State Hazard Mitigation Plan and the 2012 Gem County Hazard mitigation Plan as described.

Item	Action
included in the state plan, and overall impressions of plan content and layout.	
Gem County Hazard Mitigation Plan: (Laurie to provide a digital copy to all SC members). The SC should review the prior Gem County plan and ask themselves with regards to plan content and layout; • What do you like about the plan? • What do you not like about the plan? • What would you like to see changed in the plan update?	Laurie Boston to provide a digital copy of the 2012 Gem County hazard Mitigation plan to all SC members.

Bothe of these reviews are considered to be cursory and not detailed reviews. SC should be prepared to discuss their observations at the next meeting.

Public Involvement Strategy

Mr. Flaner expanded on earlier discussion regarding the requirement for public engagement throughout the entire planning process. This will be accomplished for this effort by the identification of a comprehensive public engagement strategy that will utilize multiple media within the existing capabilities of the assembled planning partnership. This strategy will be identified and approved by the SC via the panning process. The cornerstone of this strategy will be the development of a website that will house the plan and its support document. The website will be the "one-stop-shop" for all things hazard mitigation within the Gem County planning area. This website will be hosted on the Gem County Emergency Management Website.

Action Items for Next Meeting

Action items identified for the next meeting include the following:

- Document and data request
- Confirm guiding principle, goals and objectives
- Define critical facilities
- Risk Assessment update

The next meeting will be Tuesday, December19, 2017, at the Gem County EOC, 415 East Main Street, Emmett, Idaho 83617; from 10:00 AM to noon.

MEETING SUMMARY

Attachment: Sign-in Sheet

Gem County All Hazard Mitigation Plan Update
Steering Committee Meeting
November 29, 2017 10:00 a.m. – Noon

NAME	AGENCY	EMAIL	PHONE	SIGNATURE
Rick Sego	Bureau of Rec	RSego@usbr.gov	208.383.2262 w) 208.859.4718 c)	
Greg Bradley	Bureau of Rec	gbradley@usbr.gov	208.378.5207 w)	
Rick Johnston	Gem County Assessor	rjohnston@co.gem.id.us	208.365.2982 w)	RJ
Bruce Evans	Emmett City Public Works	bevans@cityofemmett.org	208.941.7365 c) 208.365.9569 o)	Bruce Evans
Clint Seamons	Emmett City Public Works	cseamons@cityofemmett.org	208-941-1251 c)	
Chuck Rolland	Gem County Sheriff	sheriff@co.gem.id.us		Chuck Rolland
Donnie Wunder	Gem County Chief Deputy	dwunder@co.gem.id.us		
Neal Capps	Gem County Road & Bridge	ncapps@co.gem.id.us	208.477.8641 c)	
Bill Butticci	Gem County Commissioner	commissioners@co.gem.id.us		
Bryan Elliott	Gem County Commissioner	commissioners@co.gem.id.us		Bryan Elliott
Mark Rekow	Gem County Commissioner	commissioners@co.gem.id.us		
Shelly Tilton	Gem County Clerk	stilton@co.gem.id.us	208.365.4561 w)	
Wayne Rush	School District	wrush@isd221.net	208.365.6301 w)	WR
Jay Hummel	School District	jhummel@isd221.net		
Bev Martin	Ola Rep/Sheriff Posse	bearcreekranches@juno.com	208.584.3494 h)	Bev Martin
Dennis Weaver	Ola Representative	imperial@wildblue.net		DENNIS WEAVER
Jennifer Kharrl	Planning & Zoning	jkharrl@co.gem.id.us	208.365.5144 w)	Jennifer Kharrl
Ken Sheldon	EMS	ksheldon@co.gem.id.us	208.559.6976 c)	
Curt Christensen	City Fire	cchristensen@cityofemmett.org	208.941.7367 c)	
Rick Welch	County Fire	gcfdistrict1@gmail.com	208.859.4775 c)	
Michele Chadwick	Former S.C. Member	idahomom@q.com	208.861.4424 c)	M Chadwick
Myra Church	Sweet Representative	churchent1@gmail.com	208.584.3703 h)	Myra Church
Lorrie Pahl	Mitigation Planner, IOEM	lpahl@imd.idaho.gov	208.258.6508 w)	
Dale Nalder	SW Area Field Officer IOEM	dnalder@imd.idaho.gov	208.258.6512 w) 208.830.8059 c)	
Heidi Novich	SW/SC Area Field Officer IOEM	hnovich@imd.idaho.gov	208.258.6523 w) 208.954.2932 c)	
Rob Flaner	Tetra Tech Consultant	rob.flaner@tetratech.com	208.939.4391 w) 208.830.3844 c)	
Laurie Boston	Gem Cty. Emergency Mgr.	lboston@co.gem.id.us	208.284.0772 c)	Laurie Boston
Bonnie LaBonte	Gem Cty. Emergency Mgmt.	blabonte@co.gem.id.us		Bonnie LaBonte
Tahja	GC Pros Attorney	tjensen@co.gem.id.us		← signature

not voting members

not participant of committee will attend meetings)

MEETING SUMMARY

Date/Time of Meeting:	Wednesday – December 19, 2017; 10:00am to Noon
Location:	Emergency Operations Center, 415 East Main Street Emmett, Idaho 83617
Subject:	Steering Committee No.2
Project Name:	Gem County Hazard Mitigation Plan-Update
In Attendance (See Attachment):	**Attendees:** Rick Sego, Rick Johnston, Hollie Ann Strang, Bruce Evans, Chuck Rolland, Bill Butticci, Jay Hummel, Bev Martin, Dennis Weaver, Jennifer Kharrl, Ken Sheldon, Curt Christensen, Michelle Chadwick, Heath Schab, Tahja Jensen, Lorie Pahl, Jeff Cape, Molly Smith Phoned in: None **Planning Team:** Rob Flaner, Laurie Boston, Bonnie Labonte
Not Present:	N/A
Summary Prepared by:	Rob Flaner (1/8/2018)
Quorum – Yes or No	Yes

Item	Action

Welcome and Introductions, Review Agenda

- Chairman, Mr. Bruce Evans open the meeting and facilitated group introductions.
- Distributed handouts included: Agenda; SC Meeting # 1 meeting summary, Final SC ground Rules, Planning partner expectation document, Data needs worksheet, Guiding Principle, Goals and Objectives from the last plan, Critical facility definition from last plan, and the mazzard mitigation survey from the last plan.
- The agenda was reviewed and no modifications were made.

Planning Process

- The meeting summary for SC meeting #1 was reviewed and approved.
- The final Charter for the Steering Committee was reviewed. Changes in contact information was requested. The Charter was approved as amended.
- No members of the public were present and no public comment was received by the SC.

Item	Action
• Planning Partner Status- Lead project Planner, Rob Flaner from Tetra Tech, informed the SC of the planning partnership status. The planning partnership currently stands at5 planning partners covered under the 2012 plan (Gem County, City of Emmett, Gem County Fire District #1, Gem County Fire District # 2, and Gem County Mosquito Abatement District. At the last meeting, the SC had discussed possible expansion of this partnership to include other eligible districts with the Gem County planning area. Rob explained to the Committee that Letters of Intent to participate (LOI) would be needed from all planning partners participating in this update, including those that participate last time. The SC reviewed the planning partner expectation handout that includes a draft LOI form letter. Rob asked that the LOI deadline be established of 30 days for the date of this SC meeting (1/17/2018). All LOI's should be submitted to Laurie Boston.	All planning partners to provide an LOI to Laurie Boston by 1/17/2018
• Data Needs Worksheet- Rob went over the data needs worksheet that was provided as a handout. This worksheet is a "data wish list" for all data that could be used to support the development of the risk assessment for the plan. Rob explained to the SC that it is not expected that all information on the list will be available. But the goal is to get as much of the data that is available for the Gem County planning area. Rob stated that the risk assessment will only be as good as the quality of the data used to construct the assessment. It is anticipated that the Majority of the data will be provided by Gem County Planning Department and the Gem County Assessor. Rob introduced Carol Bauman, who is the Tetra Tech Risk Assessment lead, who will reach out to both Planning and the Assessor to begin the mining of data.	Risk Assessment lead, Carol Bauman to reach out to Gem County Planning and the Gem County Assessor to begin mining of data for the Risk Assessment.
<u>Homework Review</u> At the last SC meeting, the Committee was given a homework assignment to review the 2012 Gem County Plan, and the current version of the Idaho State Hazard Mitigation Plan. This segment was provided for the SC to provide comments based on this Review. Mr. Bruce Evans had provided written comments to the planning team prior to the meeting, and he took this opportunity to share his comments with the SC. Most of Bruce's comments focused on what data to use in the plan, namely the new flood mapping getting ready to be released by FEMA. Bruce explained that this information was very controversial in the City of Emmett and expressed concern over the public's support of a plan that included this information. The general consensus of this discussion was to table the discussion for another SC meeting that could be focused on a resolution by the SC.	Schedule further discussion on what Floodplain data to use in the risk assessment.

Item	Action

Guiding Principle, Goals and Objectives

Under this segment of the agenda, the SC reviewed the Guiding Principle, Goals and Objectives that were developed for the 2012 gem County Hazard Mitigation Plan. Rob explained to the SC that these plan components were developed through a facilitated process during the last plan update, and were complete revisions from the Goals and objectives of the initial, 2005 Gem County Plan. Rob explained to the SC that these are "linear" in that no component is a subset of another. Each planning component directly supports the other. Goals were identified to support the Guiding principle, objectives were selected that met multiple goals, and the objectives were used to prioritize the actions.

There was a lot of really good discussion during this segment. Each of the planning components were reviewed, edited then approved by the SC. The Final approved components were as follows:

Guiding Principle: no changes were made to the Guiding Principle which was approved as follows:

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

Goals: Minor amendments were made to the 5 goals for the plan which were approved as follows:

1. ***Prevent loss of life and reduce personal injury from future hazards and conditions.***
2. ***Minimize loss and damage to private and public property.***
3. ***Increase public awareness of Gem County hazards and promote opportunities to reduce exposure to risk.***
4. ***Increase and enhance the resilience of Gem County's critical infrastructure, economic base and unique/changing environments.***
5. ***Ensure high level of communication and cooperation among local, state and federal government to avoid significant disruption of services during a disaster.***

Objectives: Minor amendments were made to the 12 objectives for the plan which were approved as follows:

1. ***Reduce hazard-related risks and vulnerability to potentially isolated populations within the planning area.***
2. ***Maintain/enhance the understanding of hazards and the risk they pose using the best available data and science.***
3. ***Retrofit, purchase or relocate structures and critical facilities based on one or more of the following criteria: level of***

Action: Rob Flaner will finalize the charter and the SC will formally approve at the Next SC meeting.

Item	Action
exposure, repetitive loss history or previous damage from hazards. 4. ***Seek mitigation projects that provide the highest degree of hazard protection at the least cost.*** 5. ***Minimize disruption of local government, commerce and public operations caused by hazard events.*** 6. ***Strengthen codes and code enforcement to ensure that new construction of property and infrastructure can withstand the impacts of all hazards that impact the Gem County planning area.*** 7. ***Educate the public on the risk exposure to hazards and ways to increase the public's ability to prepare, respond, recover and mitigate the impacts of these events.*** 8. ***Utilize the best available data and science on the impacts of hazards to inform future land uses in the planning area.*** 9. ***Increase resilience and the continuity of operations of identified critical facilities and infrastructure within the planning area.*** 10. ***Establish partnerships with stakeholders to improve capabilities and implement methods to protect the people, property and environment of Gem County.*** 11. ***Seek ways to enhance emergency management capability within the planning area.*** 12. ***Use incentive based programs, such as the Community Rating System, Firewise and Storm/Ready, to promote proactive risk reduction at both the public and private scale.***	Laurie Boston will reach out to Idaho Power and SW District Health about participating on the SC prior to next meeting.
It is important to note that there was good discussion by the SC on the possibility of adding a 13th objective. The premise of the additional objective would be to enhance and expand interagency coordination within the planning area. The SC felt that while there were currently objectives that spoke to the premise (Objective # 10), that this initiative would be better served as a County-wide action which the plan will include. So it was decided to not add a 13th objective, but consider this initiative as a County-wide action when the SC confirms that component of the plan update.	SC to consider the addition of a County-wide action that stresses interagency coordination within the planning area when it comes time to confirm these action for the plan update.
<u>Define Critical Facilities</u> Due to the extended discussion on the Guiding principle, goals and objectives, this discussion topic was tabled until the next SC meeting.	Table discussion until next meeting
<u>Public Involvement Strategy</u> Due to the extended discussion on the Guiding principle, goals and objectives, this discussion topic was tabled until the next SC meeting.	Table discussion until next meeting

Item	Action
Meeting was adjourned at 12:07 PM	
The next meeting will be Tuesday, January 17, 2018, at the Gem County EOC, 415 East Main Street, Emmett, Idaho 83617; from 10:00 AM to noon.	

Attachment: Sign-in Sheet

Gem County All Hazard Mitigation Plan Update
Steering Committee Meeting #2
December 19, 2017 10:00 a.m. - Noon

NAME	AGENCY	EMAIL	PHONE	NON-MTG. HRS	SIGNATURE
Rick Sego	Bureau of Rec	RSego@usbr.gov	208.383.2262 w) 208.859.4718 c)		[illegible]
Greg Bradley (ALT)	Bureau of Rec	gbradley@usbr.gov	208.378.5207 w)		
Rick Johnston	Gem County Assessor	rjohnston@co.gem.id.us	208.365.2982 w)		Rick
Hollie Ann Strang (ALT)	G.C. Assessor's Ofc.	hstrang@co.gem.id.us	208.477.2010 w)		HAS left @ 11:00
Bruce Evans	Emmett City Public Works	bevans@cityofemmett.org	208.941.7365 c) 208.365.9569 o)	3.5	BE
Clint Seamons (ALT)	Public Works	cseamons@cityofemmett.org	208-941-1251 c)		
Chuck Rolland	Gem County Sheriff	sheriff@co.gem.id.us			CR
Donnie Wunder (ALT)	Gem County Chief Deputy	dwunder@co.gem.id.us			
Neal Capps	Gem County Road & Bridge	ncapps@co.gem.id.us	208.477.8641 c)		
Jason Brown (ALT)	G.C. Road & Bridge	gcrb@co.gem.id.us	208.365.3305 w)		
Bill Butticci	Gem County Commissioner	commissioners@co.gem.id.us			[illegible]
Bryan Elliott	G.C. Commissioner/ SWDH Board	commissioners@co.gem.id.us			
Mark Rekow	G. C. Commissioner	commissioners@co.gem.id.us			
Shelly Tilton	Gem County Clerk	stilton@co.gem.id.us	208.365.4561 w)		
Wayne Rush (ALT)	School District	wrush@isd221.net	208.365.6301 w)		
Jay Hummel	School District	jhummel@isd221.net		2.5	[illegible]
Bev Martin	Ola Rep/Sheriff Posse	bearcreekranches@juno.com	208.584.3494 h)	1 hr.	Bev Martin
Dennis Weaver	Ola Representative	imperial@wildblue.net		1 hr	Dennis Weaver
Jennifer Kharrl	Planning & Zoning	jkharrl@co.gem.id.us	208.365.5144 w)	1.5	Jennifer Kharrl
Michelle Barron (ALT)	Planning & Zoning	mbarron@co.gem.id.us	208.365.5144 w)		
Ken Sheldon	EMS	ksheldon@~~co.gem.id.us~~ gemfiregems.org	208.559.6976 c)		K Sheldon
Curt Christensen	City Fire	cchristensen@cityofemmett.org	208.941.7367 c)	1 HR	[illegible]
Mike Giery (ALT)	City Fire				
Rick Welch	County Fire	gcfdistrict1@gmail.com	208.859.4775 c)		
Michele Chadwick	Former S.C. Member/ GCMAD Board	idahomom@q.com	208.861.4424 c)	1 hr	mchadwick
Myra Church	Sweet Representative	Churchent1@gmail.com	208.584.3703 h)		

Chris Davidson	Idaho Power Phys. Sec. & Bus Cont. Mgr.	CDavidson@idahopower.com	208.388.6401 w) 858.232.0398 c)		
Heath Schab **(ALT)**	Idaho Power	HSchab@idahopoer.com		1 HQ	[illegible]
Marci Anderson **(ALT)**	Idaho Power	MAnderson2@idahopower.com			
Terry Wilson	SWDH, Planner	Terry.Wilson@phd3.idaho.gov	208.455.5326 w) 208.590.2524 c)		
Ricky Bowman	SWDH, PHP Mgr.	Ricky.Bowman@phd3.idaho.gov	208.455.5311 w)		
Tahja Jensen	G.C. Pros. Attorney	tjensen@co.gem.is.us			[illegible]
Lorrie Pahl	Mitigation Planner, IOEM	lpahl@imd.idaho.gov	208.258.6508 w)	**N/A**	Lorrie Pahl
Dale Nalder	SW Area Field Officer IOEM	dnalder@imd.idaho.gov	208.258.6512 w) 208.830.8059 c)	**N/A**	
Heidi Novich **(ALT)**	SW/SC Area Field Officer IOEM	hnovich@imd.idaho.gov	208.258.6523 w) 208.954.2932 c)	**N/A**	
Rob Flaner	Tetra Tech Consultant	rob.flaner@tetratech.com	208.939.4391 w) 208.830.3844 c)	**N/A**	
Laurie Boston	Gem Cty. Emergency Mgr.	lboston@co.gem.id.us	208.284.0772 c)	**N/A**	Laurie Boston
Bonnie LaBonte	Gem Cty. Emergency Mgmt.	blabonte@co.gem.id.us		**N/A**	Bonnie LaBonte
Jeff Cappe	SWDH	jeff.cappe@phd3.idaho.gov	208 899-1271		Jeff Cappe
Molly Smith	SWDH, Health Educator	molly.smith@phd3.idaho.gov	208-455-5372		Molly Smith

RSego@usbr.gov; gbradley@usbr.gov; rjohnston@co.gem.id.us; hstrang@co.gem.id.us; bevans@cityofemmett.org; cseamons@cityofemmett.org; sheriff@co.gem.id.us; dwunder@co.gem.id.us; ncapps@co.gem.id.us; gcrb@co.gem.id.us; commissioners@co.gem.id.us; stilton@co.gem.id.us; jhummel@isd221.net; wrush@isd221.net; bearcreekranches@juno.com; imperial@wildblue.net; jkharrl@co.gem.id.us; mbarron@co.gem.id.us; ksheldon@co.gem.id.us; cchristensen@cityofemmett.org; gcfdistrict1@gmail.com; idahomom@q.com; Churchent1@gmail.com; CDavidson@idahopower.com; HSchab@idahopoer.com; MAnderson2@idahopower.com; Terry.Wilson@phd3.idaho.gov; Ricky.Bowman@phd3.idaho.gov; tjensen@co.gem.is.us; lpahl@imd.idaho.gov; dnalder@imd.idaho.gov; hnovich@imd.idaho.gov; rob.flaner@tetratech.com; lboston@co.gem.id.us; blabonte@co.gem.id.us

Please add Jason Kinley as Michele's backup for the GCMAD

MEETING SUMMARY

Date/Time of Meeting:	Tuesday – January 16, 2018; 10:00am to Noon
Location:	Emergency Operations Center, 415 East Main Street Emmett, Idaho 83617
Subject:	Steering Committee No.3
Project Name:	Gem County Hazard Mitigation Plan-Update
In Attendance (See Attachment):	**Attendees:** Rick Sego, Rick Johnston, Bruce Evans, Donnie Wunder, Bryan Elliott, Jay Hummel, Bev Martin, Dennis Weaver, Jennifer Kharrl, Ken Sheldon, Curt Christensen, Chris Davidson, Marci Anderson, Terriy Wilson, Tahja Jensen, Lorie Pahl, Molly Smith Phoned in: None **Planning Team:** Rob Flaner, Laurie Boston
Not Present:	N/A
Summary Prepared by:	Rob Flaner (2/15/2018)
Quorum – Yes or No	Yes

Item	Action

Welcome and Introductions, Review Agenda

- Chairman, Mr. Bruce Evans open the meeting and facilitated group introductions.
- Distributed handouts included: Agenda; SC Meeting # 2 meeting summary, Final Guiding Principle, Goals and Objectives, Critical facility definition from last plan, and the Hazard mitigation survey from the last plan.
- The agenda was reviewed and no modifications were made.

Planning Process

- No members of the public were present and no public comment was received by the SC.
- The meeting summary for SC meeting #2 was reviewed and approved.
- The final Guiding Principle, Goals and Objectives were reviewed and approved as presented by the SC.
- Planning Partner Status- Laurie Boston informed the SC that no new LOI's had been received to date. Gem County Drainage District had been reached out to, but has not provided any

Item	Action
formal confirmation to participate in this plan update process. A hard deadline of 2/20/2018 was established for receipt of any new LOI's for this plan update. No LOI's from new planning partners will be accepted after this date.	

Define Critical Facilities

The SC was provided a copy of the Critical Facility/Infrastructure from the prior plan. Rob explained to the group that defining "critical facilities" is an important part of the planning process. It is a requirement for the planning process to define what are "critical facilities" within a planning area, and then to assess the risk and vulnerability of those facilities as part of the planning process. The group reviewed the prior definition, and made some amendments to it. The definition for critical facilities/infrastructure for the 2018 plan update will be as follows:

A critical facility is one that is deemed vital to the Gem County planning area's ability to provide essential services while protecting life and property. A critical facility may be a system or an asset, either physical or virtual, the loss of which would have a profound impact on security, economy, public health or safety, environment, or any combination of thereof, across the planning area. For this hazard mitigation plan defined critical facilities will include but are not limited to:

Action: Schedule further discussion on what Floodplain data to use in the risk assessment.

- *Police stations, fire stations, paramedic stations, emergency vehicle and equipment storage facilities, and emergency operations and communications centers needed for disaster response before, during and after hazard events.*
- *Public and private utilities and infrastructure vital to maintaining or restoring normal services to areas damaged by hazard events. These include water (potable, wastewater, stormwater, drainage and irrigation), utilities (transmission and distribution facilities for natural gas, power, geothermal) and communications that support interoperability within the planning area (land-based telephone, cell phone, the internet, emergency broadcast facilities and emergency radios).*
- *Public gathering places that could be used as evacuation centers during large-scale disasters. These facilities include but are not limited to: churches, recreation centers and fairgrounds)*
- *Hospitals, extended care facilities, urgent care facilities and housing that may contain occupants not sufficiently mobile to avoid death or injury during a hazard event.*

Item	Action
– *Transportation systems that convey vital supplies and services to and throughout the community. These include roads, bridges, railways, airports and pipelines.* – *Government and educational facilities central to governance and quality of life along with response and recovery actions taken because of a hazard event (such as: fairgrounds, Armory and Libraries, etc.).* – *Structures or facilities that produce, use or store highly volatile, flammable, explosive, toxic and/or water-reactive materials.* – *Infrastructure designed to help safely convey high-water events from the event source to the perimeter of the planning area.* – *Impoundments (dams) and irrigation conveyance facilities (diversion structures, head gates and canals).* – *Facilities that may be utilized for post-disaster debris management*	SC to approve final amended Critical Facility definition as a committee action at next SC meeting
Public Involvement Strategy	
• Rob informed the SC that the website was up and running and can be accessed through the County Home page at: http://www.gemcounty.org/disaster-services/ahmp/	
• Now that the website is up, Rob will prepare a press release that announces the plan update process and informs the public about the website as the "one-stop-shop" for information about the plan and the update process. This will be provided to Laurie for dissemination.	Ro to prepare press release and provide to Laurie prior to the next SC meeting
• Rob explained to the SC that the public outreach strategy would be deployed in 2 phase 1 would be early in the process with a goal of gaging the public's perception of risk within Gem County. Phase 2 would be towards the end of the planning process with the objective of providing the public the opportunity to comment on the draft plan.	
• Rob asked the SC to provide input of timing and location for the phase 1 public meetings. Rob explained what was done for the last planning effort. During the last effort, one meeting was done in the Sweet/Ola area for phase 1. And One meeting was done in Emmett for the phase 2 meeting. Laurie Boston stated that she would like for the public meetings to possibly reach some areas of the County that were missed in the last effort, namely the Letha area. Rob explained to the SC that the canvas of the County could be split between phase 1 and phase 2.	
• The direction from the SC for the phase 1 meetings was to do something in the Sweet/Ola vicinity. Dennis Weaver was asked to	

Item	Action
check on availability of facilities in Ola, looking at some time, preferably a Thursday, in the 1st 2 weeks of March.	Dennis Weaver to check on meeting space availability in Ola in the 1st 2 weeks of March
• Rob asked the SC about social media outlets available for use within the County. Laurie stated that the County had a Facebook account and was looking in to “NextDoor”. Rob stated that social media should/ could be utilized to advertise public meetings, survey’s and public comment periods.	
• Hazard Mitigation Survey- Rob explained to the SC that a hazard mitigation survey was utilized during the last planning effort. Rob explained that the survey was valuable in providing input on the Public’s perception on risk to the SC to inform their decision-making process. Rob asked the SC if they wanted to do a survey again for this update. It was the general consensus of the group that they did want to do a survey. At this point, the SC went through the prior survey and made some changes to questions and format. Rob will set up the survey in Survey Monkey and deploy prior to the next SC meeting.	Rob to set up survey in Survey Monkey and deploy prior to next SC meeting

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Meeting was adjourned at 11:51 AM

The next meeting will be Tuesday, February 20, 2018, at the Gem County EOC, 415 East Main Street, Emmett, Idaho 83617; from 10:00 AM to noon.

SUMMARY MEETING

Attachment: Sign-in Sheet

2017/2018 Gem County All Hazard Mitigation Plan Update
Steering Committee Meeting #3
January 16, 2018 ~~10:00~~ 9:40 a.m. - Noon

9:40 - Noon

Meeting Hours 2.33

NAME	AGENCY	EMAIL	PHONE	NON-MTG. HRS	SIGNATURE
Rick Sego	Bureau of Rec	RSego@usbr.gov	208.383.2262 w) 208.859.4718 c)	1	R. Sego 10:00-Noon
Greg Bradley (ALT)	Bureau of Rec	gbradley@usbr.gov	208.378.5207 w)		
Rick Johnston	Gem County Assessor	rjohnston@co.gem.id.us	208.365.2982 w)	2	[illegible] 10:00-Noon
Hollie Ann Strang (ALT)	G.C. Assessor's Ofc.	hstrang@co.gem.id.us	208.477.2010 w)		
Bruce Evans	Emmett City Public Works	bevans@cityofemmett.org	208.941.7365 c) 208.365.9569 o)	10	Bruce Evans
Clint Seamons (ALT)	Public Works	cseamons@cityofemmett.org	208-941-1251 c)		
Chuck Rolland	Gem County Sheriff	sheriff@co.gem.id.us			
Donnie Wunder (ALT)	G. C. Chief Deputy	dwunder@co.gem.id.us			D. Wunder Left @ 10:30 9:40-10:30
Neal Capps	Gem County Road & Bridge	ncapps@co.gem.id.us	208.477.8641 c)		
Jason Brown (ALT)	G.C. Road & Bridge	gcrb@co.gem.id.us	208.365.3305 w)		
Bill Butticci	G. C. Commissioner	commissioners@co.gem.id.us			
Bryan Elliott	G.C. Commissioner/ SWDH Board	commissioners@co.gem.id.us			M Bryan Elliott
Mark Rekow	G. C. Commissioner	commissioners@co.gem.id.us			
Shelly Tilton	Gem County Clerk	stilton@co.gem.id.us	208.365.4561 w)		
Wayne Rush (ALT)	School District	wrush@isd221.net	208.365.6301 w)		
Jay Hummel	School District	jhummel@isd221.net	208-880-5801(#)	2	[illegible] 10:25-Noon
Bev Martin	Ola Rep/Sheriff Posse	bearcreekranches@juno.com	208.584.3494 h)	3	Beverly J. Martin
Dennis Weaver	Ola Representative	imperial@wildblue.net	208-584-3522	4	Dennis Weaver
Jennifer Kharrl	Planning & Zoning	jkharrl@co.gem.id.us	208.365.5144 w)	1	Jennifer Kharrl 9:55-Noon
Michelle Barron (ALT)	Planning & Zoning	mbarron@co.gem.id.us	208.365.5144 w)		
Ken Sheldon	EMS	ksheldon@~~co.gem.id.us~~ gemfireems...	208.559.6976 c)		K Sheldon
Curt Christensen	City Fire	cchristensen@cityofemmett.org	208.941.7367 c)		Curt R Christensen
Mike Giery (ALT)	City Fire				
Rick Welch	County Fire	gcfdistrict1@gmail.com	208.859.4775 c)		
Michele Chadwick	Former S.C. Member/ GCMAD Board	idahomom@q.com	208.861.4424 c)		
Jason Kinley (ALT)	Mosquito Abatement	director@gcmad.org	208.440.7243 c) 208.365.5628 w)		

Chris Davidson	Idaho Power Phys. Sec. & Bus Cont. Mgr.	CDavidson@idahopower.com	208.388.6401 w) 858.232.0398 c)	2	10-Noon
Heath Schab **(ALT)**	Idaho Power	HSchab@idahopower.com			
Marci Anderson **(ALT)**	Idaho Power	MAnderson2@idahopower.com		2	Marci Anderson 10-Noon
Myra Church	Sweet Representative	Churchent1@gmail.com	208.584.3703 h)		
Terry Wilson	SWDH, Planner	Terry.Wilson@phd3.idaho.gov	208.455.5326 w) 208.590.2524 c)		
Ricky Bowman	SWDH, PHP Mgr.	Ricky.Bowman@phd3.idaho.gov	208.455.5311 w)		
Tahja Jensen	G.C. Pros. Attorney	tjensen@co.gem.is.us		2	TJ
Lorrie Pahl	Mitigation Planner, IOEM	lpahl@imd.idaho.gov	208.258.6508 w)	**N/A**	Lorrie Pahl
Dale Nalder	SW Area Field Officer IOEM	dnalder@imd.idaho.gov	208.258.6512 w) 208.830.8059 c)	**N/A**	
Heidi Novich **(ALT)**	SW/SC Area Field Officer IOEM	hnovich@imd.idaho.gov	208.258.6523 w) 208.954.2932 c)	**N/A**	Heidi Novich
Rob Flaner	Tetra Tech Consultant	rob.flaner@tetratech.com	208.939.4391 w) 208.830.3844 c)	**N/A**	
Laurie Boston	Gem Cty. Emergency Mgr.	lboston@co.gem.id.us	208.284.0772 c)	**N/A**	Laurie Boston
Bonnie LaBonte	Gem Cty. Emergency Mgmt.	blabonte@co.gem.id.us		**N/A**	
Molly Smith	SWDH, Health Educator	molly.smith@phd3.idaho.gov	208 455 5372		Molly Smith

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RSego@usbr.gov; gbradley@usbr.gov; rjohnston@co.gem.id.us; hstrang@co.gem.id.us; bevans@cityofemmett.org; cseamons@cityofemmett.org; sheriff@co.gem.id.us; dwunder@co.gem.id.us; ncapps@co.gem.id.us; gcrb@co.gem.id.us; commissioners@co.gem.id.us; stilton@co.gem.id.us; ihummel@isd221.net; wrush@isd221.net; bearcreekranches@juno.com; imperial@wildblue.net; jkharrl@co.gem.id.us; mbarron@co.gem.id.us; ksheldon@co.gem.id.us; cchristensen@cityofemmett.org; gcfdistrict1@gmail.com; idahomom@q.com; Churchent1@gmail.com; CDavidson@idahopower.com; HSchab@idahopower.com; MAnderson2@idahopower.com; Terry.Wilson@phd3.idaho.gov; Ricky.Bowman@phd3.idaho.gov; tjensen@co.gem.id.us; lpahl@imd.idaho.gov; dnalder@imd.idaho.gov; hnovich@imd.idaho.gov; rob.flaner@tetratech.com; lboston@co.gem.id.us; blabonte@co.gem.id.us; director@gcmad.org

ksheldon@gemfireems.ORG   molly.smith@phd3.idaho.gov

MEETING SUMMARY

Date/Time of Meeting:	Tuesday – February 20, 2018; 10:00am to Noon
Location:	Emergency Operations Center, 415 East Main Street Emmett, Idaho 83617
Subject:	Steering Committee No. 4
Project Name:	Gem County Hazard Mitigation Plan-Update
In Attendance (See Attachment):	**Attendees:** Rick Johnston, Bruce Evans, Chuck Rolland, Donnie Wunder, Bryan Elliott, Jay Hummel, Bev Martin, Dennis Weaver, Jennifer Kharrl, Rick Welch, Curt Christensen, Michele Chadwick, Myra Church, Ray Moses **Planning Team:** Rob Flaner, Laurie Boston, Bonnie LaBonte
Not Present:	N/A
Summary Prepared by:	Rob Flaner (3/12/2018
Quorum – Yes or No	Yes

Item	Action

Welcome and Introductions, Review Agenda

- Chairman, Mr. Bruce Evans open the meeting and facilitated group introductions.
- Distributed handouts included: Agenda; SC Meeting # 3 meeting summary, Final Critical Facility Definition, CDMS export file for critical facility inventory. Laurie Boston provided thumb drives to all SC members with a digital copy of the previous hazard mitigation plan for Gem County.
- The agenda was reviewed and no modifications were made.

Planning Process

- No members of the public were present and no public comment was received by the SC.
- The meeting summary for SC meeting #3 was tables for approval until next meeting since the minutes were not distributed to the SC early enough for their review.
- Planning Partner Update-Laurie Boston informed the Committee that she had received a LOI from Squaw Butte Ditch Company, and that the School district provided an updated LOI. This represents the completion of the LOI process. No more LOI's will be received at this point from non-participating planning partners. Laurie had sent written communication to all non-

Item	Action
participating, eligible "local governments" within the planning area as well as calling them. Besides Squaw Butte DC and the School District, no other local government followed up on this outreach. • The Final definition for "critical facilities/infrastructure" was reviewed and approved by the EC.	
Hazard Scenarios for Risk Assessment	
Rob Flaner explained to the SC that hazard event scenarios needed to be identified for the risk assessment to be completed. These scenario events are to be those events most likely to impact the Gem County planning area and that may cause damages. This discussion proceeded as follows:	
Earthquake- Robe explained to the SC that there are basically 2 types of scenario events for the earthquake hazard: Probabilistic and deterministic. A probabilistic event is one that shakes the entire planning area to a given intensity that has been assigned and annual probability of occurrence. There are most often referred to as the 100-year or 500-year probabilistic earthquakes. Probabilistic scenarios are used to measure building performance or what is referred to as fragility.	
A deterministic event is one that is based upon an actual historic event or a specific event that USGS feels is likely to happen. A deterministic event has an epicenter and a focal depth reflected on a "shake-map" that is prepared by USGS. Recurrence intervals are not usually established for deterministic events.	
Rob explained to the SC that for the last plan, 1 probabilistic (the 100-year) and 1 deterministic (7.1 M event on the Squaw Creek fault) were analyzed. Rob felt that both events were still relevant, and no new data has been identified that states otherwise. Therefore, the SC determined that the 100-year probabilistic and the 7.1 M Squaw Creek fault events should be utilized for this plan update.	The risk assessment to include an analysis of a 100-year probabilistic event and a 7.1 M deterministic event on the Squaw Butte Fault.
Flood- Rob explained that FEMA typically maps 4 flood events as part of a standard Flood Insurance Study. These events are the 10, 50, 100 and 500-year flood events. The 100-year flood plain is also referred to as the Special Flood Hazard Area (SFHA) and is there area where floodplain development must be regulated under the National Flood Insurance program (NFIP). The last plan assessed the exposure and vulnerability to the 100-year event. Rob explained that while new mapping is in the preliminary stages by FEMA, it is not likely to be completed in time for this plan update. Therefore, the data utilized for the old plan is still	The Flood Hazard Risk Assessment to use the 100—year flood event as reflected on current FEMA mapping for Gem County

Item	Action
considered relevant for this plan update. Therefore, the SC determined the 100-flood event to be the appropriate scenario for this plan update.	At a minimum, the risk assessment will fully assess Black Canyon Dam.
Dam Failure: Any Dam Failure risk assessment is dependent upon hazard mapping that clearly defines the extent and location of the probable maximum flood (PMF). The last plan only assessed the dam failure risk from Black Canyon Dam, since it was the only one that had available mapping. The Black Canyon data was not in a digital format and had to be digitized from paper maps by the planning team. This data is still available for this update, but digitized data that utilizes modern techniques would be preferred. The SC determined that there are 4 state classified "high hazard" dams that have inundation areas within Gem County. These are: Black Canyon, Deadwood, Sage hen and Cascade. At a minimum, this plan update will assess the Black Canyon dam using data created for the last plan update. Laurie Boston was tasked to check on available data on the other dams that may be utilized for this plan update from State Federal or local sources.	Laurie Boston to check on available data from State, Federal, and local sources for Deadwood, Sage Hen and Cascade Dams.
Landslide: Landslide risk assessments typically involve the creation of a layer of information that looks at slope and soil type. Slopes greater that 15% with soft soil classification are typically considered to be vulnerable to landslides. For the last plan, a dataset of steep slopes was generated using a 1/3-arcsecond digital elevation model. Two slope classifications were created: 15 to 30 percent; and greater than 30 percent. This data is considered to still be the best available data for this plan update. Therefore, the SC determined existing plan's data should be utilized for this plan update.	The Landslide risk assessment will utilize the slope/soils dataset that was created for the last plan update.
Wildfire: Rob informed the SC that information on wildfire hazards areas was provided by rural fire districts, Gem County and the Idaho Bureau of Land Management, or taken from the Gem County Wildland Urban Interface Wildfire Mitigation Plan. This data does not appear to have been update and is still considered to be relevant for this plan update. Therefore, the SC determined existing plan's data should be utilized for this plan update.	The wildfire risk assessment will utilize the wildfire relative risk dataset that was created for the last plan update.
Severe Weather: All data sets and sources utilized for the last plan update are still relevant. The planning team will utilize any available new data. The SC asked to have profiles added for snow accumulation and space weather.	The severe weather risk assessment will utilize best available data from the data sources utilized by the last plan. Show accumulation and space weather will be added to the hazard profile for severe weather.
Critical Facility Inventory	
Rob explained to the SC that now that critical facilities/infrastructure have been defined, they needed to be inventoried. Rob provided the SC with a copy of the Comprehensive Data Management System (CDMS) export file from the last plan update. CDMS was utilized by the planning	

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team to update the CF/CI inventory during the last plan update. Rob informed the SC that this was sensitive information and not for public distribution. This data is segregated by facility type in the following categories: • Emergency Operation centers • Fire facilities • Medical care facilities • Police facilities • Schools • Dams • Bridges • Communication Facilities • Electric Power facilities • Natural Gaz Facilities • Potable Water supply • Waste water • Levees • Government facilities • Mass gathering facilities Rob tasked the EC to review the data to confirm that it has everything that meets the definition and verify the data in CDMS. The planning team will provide the excel file to the SC to perform this review. It would be ideal if this review could be completed prior to the next SC meeting	Planning team to provide digital copy (excel spreadsheet) to SC for review and update
Public Involvement Strategy	
• Press release has been provided to Laurie who will strive to get that out prior to the next meeting.	
• Rob informed the SC that the final survey has been deployed via survey monkey. The link to the survey is: https://www.surveymonkey.com/r/GemCOHazMit2018 Rob explained that the overall goal for this plan update is to double the # of surveys that were received from the last plan update (110). Rob asked for the SC to get the word out and post the link where every it is viable. Laurie asked Rob to provide here with a hard copy of the survey so this it could be distributed to the schools.	Rob to provide Laurie with a printable hard copy of the survey.
• Public Meeting Logistics: It was determined that 4 total public meetings will be conducted in 2 phases. Phase one will be earlier in the overall planning process with the intent to gauge the public's perception of risk. The 2nd phase will be at the end of the planning process to present the draft plan. The Phase 1 meetings will be held in Ola and Emmett, and the phase 2 meetings will be held in Sweet and Emmett. The 1st public meeting will be held in Ola on March	1st phase 1 public is scheduled for Thursday March 15, 2018 in Ola from 7:00 PM to 9:00 PM.

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15th, from 7:00 PM to 9:00 PM. The 2nd phase 1 meeting will be held in Emmett on March 21st or 22nd depending on meeting space availability. The Emmett meetings will run from 6:00 PM to 8:00 PM. The phase 1 meetings will be "Town Hall" format meetings designed to inform and seek input from the public. These will be interactive meetings. Laurie will distribute a press release announcing the phase 1 meeting dates, times and locations.	Laurie to distribute press release

Meeting was adjourned at 12:00 PM

The next meeting will be Tuesday, March 20, 2018, at the Gem County EOC, 415 East Main Street, Emmett, Idaho 83617; from 10:00 AM to noon.

Attachment: Sign-in Sheet

2017/2018 Gem County All Hazard Mitigation Plan Update
Steering Committee Meeting #4
February 20, 2018 9:45 **a.m. -** 11:40 **p.m.**

NAME	AGENCY	EMAIL	PHONE	NON-MTG. HRS	SIGNATURE
Rick Sego	Bureau of Rec	RSego@usbr.gov	208.383.2262 w) 208.859.4718 c)		
Greg Bradley (ALT)	Bureau of Rec	gbradley@usbr.gov	208.378.5207 w)		
Rick Johnston	Gem County Assessor	rjohnston@co.gem.id.us	208.365.2982 w)	ARRIVED @ 10:00	[illegible]
Hollie Ann Strang (ALT)	G.C. Assessor's Ofc.	hstrang@co.gem.id.us	208.477.2010 w)		
Bruce Evans	Emmett City Public Works	bevans@cityofemmett.org	208.941.7365 c) 208.365.9569 o)	4	Bruce Evans
Clint Seamons (ALT)	Public Works	cseamons@cityofemmett.org	208-941-1251 c)		
Chuck Rolland	Gem County Sheriff	sheriff@co.gem.id.us		LEFT @ 10:00	Chuck Rolland
Donnie Wunder (ALT)	G. C. Chief Deputy	dwunder@co.gem.id.us		LEFT @ 11:25	[illegible]
Neal Capps	Gem County Road & Bridge	ncapps@co.gem.id.us	208.477.8641 c)		
Jason Brown (ALT)	G.C. Road & Bridge	gcrb@co.gem.id.us	208.365.3305 w)		
Bill Butticci	G. C. Commissioner	commissioners@co.gem.id.us			
Bryan Elliott	G.C. Commissioner/ SWDH Board	commissioners@co.gem.id.us			M. Bryan Elliott
Mark Rekow	G. C. Commissioner	commissioners@co.gem.id.us			
Shelly Tilton	Gem County Clerk	stilton@co.gem.id.us	208.365.4561 w)		
Wayne Rush (ALT)	School District	wrush@isd221.net	208.365.6301 w)		
Jay Hummel	School District	jhummel@isd221.net	208-880-5801	(c)	[illegible]
Bev Martin	Ola Rep/Sheriff Posse	bearcreekranches@juno.com	208.584.3494 h)	[illegible]	Bev Martin
Dennis Weaver	Ola Representative	imperial@wildblue.net	208-584-3522	[illegible]	Dennis Weaver
Jennifer Kharrl	Planning & Zoning	jkharrl@co.gem.id.us	208.365.5144 w)	1 hr	Jennifer Kharrl
Michelle Barron (ALT)	Planning & Zoning	mbarron@co.gem.id.us	208.365.5144 w)		
Rick Welch	County Fire	RWelch@gemfireems.com	208.859.4775 c)	LEFT @ 11:25	[illegible]

Ken Sheldon	EMS	ksheldon@gemfireems.com	208.559.6976 c)		
Curt Christensen	City Fire	cchristensen@cityofemmett.org	208.941.7367 c)		Curt Christensen
Mike Giery **(ALT)**	City Fire				
Michele Chadwick	Former S.C. Member/ GCMAD Board	idahomom@q.com	208.861.4424 c)		M Chadwick
Jason Kinley **(ALT)**	Mosquito Abatement	director@gcmad.org	208.440.7243 c) 208.365.5628 w)		
Chris Davidson	Idaho Power Phys. Sec. & Bus Cont. Mgr.	CDavidson@idahopower.com	208.388.6401 w) 858.232.0398 c)		
Heath Schab **(ALT)**	Idaho Power	HSchab@idahopower.com			
Marci Anderson **(ALT)**	Idaho Power	MAnderson2@idahopower.com			
Myra Church	Sweet Representative	Churchent1@gmail.com	208.584.3703 h)		M Ch
Brent Baldwin	Sweet Fire Dist. Chair	bbaldwi542@gmail.com			
Terry Wilson	SWDH, Planner	Terry.Wilson@phd3.idaho.gov	208.455.5326 w) 208.590.2524 c)		
Ricky Bowman	SWDH, PHP Mgr.	Ricky.Bowman@phd3.idaho.gov	208.455.5311 w)		
Molly Smith	SWDH, PHP Educ.	Molly.smith@phd3.idaho.gov	208.455.5372		
Tahja Jensen	G.C. Pros. Attorney	tjensen@co.gem.is.us			
Lorrie Pahl	Mitigation Planner, IOEM	lpahl@imd.idaho.gov	208.258.6508 w)	**N/A**	
Dale Nalder	SW Area Field Officer IOEM	dnalder@imd.idaho.gov	208.258.6512 w) 208.830.8059 c)	**N/A**	
Heidi Novich **(ALT)**	SW/SC Area Field Officer IOEM	hnovich@imd.idaho.gov	208.258.6523 w) 208.954.2932 c)	**N/A**	
Rob Flaner	Tetra Tech Consultant	rob.flaner@tetratech.com	208.939.4391 w) 208.830.3844 c)	**N/A**	rf
Laurie Boston	Gem Cty. Emergency Mgr.	lboston@co.gem.id.us	208.284.0772 c)	**N/A**	
Bonnie LaBonte	Gem Cty. Emergency Mgmt.	blabonte@co.gem.id.us		**N/A**	
Roy Moses	Squaw Creek Irrigation	# + moses9 @aol	2083658475		

MEETING SUMMARY

Date/Time of Meeting:	Tuesday – March 20, 2018; 9:45am to Noon
Location:	Emergency Operations Center, 415 East Main Street Emmett, Idaho 83617
Subject:	Steering Committee No. 5
Project Name:	Gem County Hazard Mitigation Plan-Update
In Attendance **(See Attachment):**	**Attendees:** Rick Johnston, Bruce Evans, Chuck Rolland, Bryan Elliott, Jay Hummel, Bev Martin, Dennis Weaver, Jennifer Kharrl, Terry Wilson, Heidi Novich **Planning Team:** Rob Flaner, Laurie Boston, Bonnie LaBonte
Not Present:	N/A
Summary Prepared by:	Rob Flaner (4/10/2018)
Quorum – Yes or No	Yes

Item	Action

Welcome and Introductions, Review Agenda

- Vice-Chairman, Chuck Rolland open the meeting and facilitated group introductions.
- Distributed handouts included: Agenda; SC Meeting # 4 meeting summary, plan maintenance strategy from last plan, phase-1 jurisdictional annex templates for both municipalities and districts, phase-1 jurisdictional annex template instructions for both municipalities and districts and copies of the latest Survey results.
- The agenda was reviewed and no modifications were made.

Planning Process

- No members of the public were present and no public comment was received by the SC.
- The meeting summaries for both meeting # 3 and meeting # 4 were approved for posting by the SC.
- Critical facility data-base Update- Rob Flaner provided the SC an update on the update of the critical facility/infrastructure inventory. So far, updates have been provided by Dennis Weaver for Ola, and the Squaw Creek Ditch Company. No other updates have been received to date. Rob stated that the

Item	Action

deadline to submit updates to this inventory will be by the next SC meeting on 4/17/2018

Plan Maintenance Strategy

Under this segment, Rob Flaner provided an overview of the plan maintenance requirements for local hazard mitigation plans. Rob explained that the law requires that the plan include a maintenance process that includes:

- A section describing the method and schedule of monitoring, evaluating and updating the mitigation plan within a 5-year cycle.
- A process by which local governments incorporate the requirements of the mitigation plan in to other planning mechanisms such as comprehensive or capital improvement plans, when appropriate.
- Discussion on how the community will continue public participation in the plan maintenance process.

Rob provided the SC a copy of the plan maintenance section from the last plan. He explained that the strategy from the last plan was more robust that the requirements listed above due to program requirements of FEMA's CRS program. This strategy included a component to produce an annual progress report where each planning partners would report annually on the status of their action plan, which would be folded in to an overall report to the plan. This report was to be reviewed and approved annually by the LEPC. This protocol was described in Chapter 16, section 16.5 of the prior plan.

Rob explained to the SC that he was not aware of a single progress report being prepared during the last performance period to the plan. He stated that the plan did include a progress report template. So, the question posed to the SC was, do they want to keep the plan maintenance strategy as currently stated in the plan, or revise the strategy to amend the progress reporting component of the strategy? There was a lot of good discussion on the topic, after which the SC decided to keep the strategy as written.

Phase 1, Jurisdictional Annex process

Under this segment, Rob introduced the SC to the Jurisdictional annex process. The concept of the 2-volume plan was re-introduced. Volume 1 of the plan contains are required planning components that apply to the entire planning area (description of the planning process, risk assessment, goals/objectives and plan maintenance strategy) and volume 2 contains all required components that are jurisdiction specific

Item	Action
(jurisdiction profile, core capability assessment, risk ranking and action plan). So, each planning partner will have a chapter in volume 2. Templates have been created to capture all relevant information for the completion of the jurisdictional annexes for volume 2. Rob explained that the last planning effort, the jurisdictional annex process was deployed singularly with a mandatory ½ day workshop, followed by a preparation deadline. This approach did not work too well, in that planning partners failed to meet the deadline, which required extensions, that ultimately impacted the timeline.	

For this update, the Jurisdictional Annex process will be deployed in 3 phases. This will break up the process into more management pieces and hopefully result in keeping with the timeline for the project. Phase 1 of the process will be updating the Jurisdictional profiles for each planning partner. Templates and instructions were provided to the SC for their review. There are 2 different templates; one for municipalities (the County and the city) and one for Districts (everyone else). Rob explained that this will be the easiest of the 3 phases, since most information can be carried over from the prior plan. Rob stated that pre-populated phase 1 templates along with a digital copy of the instructions will be sent out to all planning partners by Friday, March 23rd. All planning partners are asked to submit their phase 1 templates on or before the April 17th SC meeting

<u>Public Involvement Strategy</u>

- Survey Status- Current survey status results were provided to the SC. Almost 4 surveys have been received to date. We have received responses from all defined areas of the county. So far, nothing surprising about the responses.
- Phase 1, Meeting #1 (Ola)- The 1st public meeting was held in Ola on 3/15/2018. There were 24 attendees at the meeting. A 30-minute presentation was provided by Rob, followed by a capability exercise and Q&A.
- Phase 1, Meeting #2- Meeting # 2 has been scheduled for Tuesday, April 3, 2018 from 6:00 to 8:00 PM at Emmett City Hall

Meeting was adjourned at 12:00 PM

The next meeting will be Tuesday, April 17, 2018, at the Gem County EOC, 415 East Main Street, Emmett, Idaho 83617; from 10:00 AM to noon.

Attachment: Sign-in Sheet

2017/2018 Gem County All Hazard Mitigation Plan Update
Steering Committee Meeting #5
March 20, 2018 9:45 a.m. - 11:09 p.m.

NAME	AGENCY	EMAIL	PHONE	NON-MTG. HRS	SIGNATURE
Rick Sego	Bureau of Rec	RSego@usbr.gov	208.383.2262 w) 208.859.4718 c)		
Greg Bradley (ALT)	Bureau of Rec	gbradley@usbr.gov	208.378.5207 w)		
Rick Johnston	Gem County Assessor	rjohnston@co.gem.id.us	208.365.2982 w)		[illegible]
Hollie Ann Strang (ALT)	G.C. Assessor's Ofc.	hstrang@co.gem.id.us	208.477.2010 w)		
Bruce Evans	Emmett City Public Works	bevans@cityofemmett.org	208.941.7365 c) 208.365.9569 o)	2	Bruce Evans (in 9:5 left 10:15)
Clint Seamons (ALT)	Public Works	cseamons@cityofemmett.org	208-941-1251 c)		
Chuck Rolland	Gem County Sheriff	sheriff@co.gem.id.us			
Donnie Wunder (ALT)	G. C. Chief Deputy	dwunder@co.gem.id.us			
Neal Capps	Gem County Road & Bridge	ncapps@co.gem.id.us	208.477.8641 c)		
Jason Brown (ALT)	G.C. Road & Bridge	gcrb@co.gem.id.us	208.365.3305 w)		
Bill Butticci	G. C. Commissioner	commissioners@co.gem.id.us			
Bryan Elliott	G.C. Commissioner/ SWDH Board	commissioners@co.gem.id.us	208-859-0374	3	Bryan Elliott
Mark Rekow	G. C. Commissioner	commissioners@co.gem.id.us			
Shelly Tilton	Gem County Clerk	stilton@co.gem.id.us	208.365.4561 w)		
Wayne Rush (ALT)	School District	wrush@isd221.net	208.365.6301 w)		
Jay Hummel	School District	jhummel@isd221.net		2	[illegible]
Bev Martin	Ola Rep/Sheriff Posse	bearcreekranches@juno.com	208.584.3494 h)	17	[illegible]
Dennis Weaver	Ola Representative	imperial@wildblue.net	208-584-3522	32	Dennis Weaver
Jennifer Kharrl	Planning & Zoning	jkharrl@co.gem.id.us	208.365.5144 w)	2	Jennifer Kharrl
Michelle Barron (ALT)	Planning & Zoning	mbarron@co.gem.id.us	208.365.5144 w)		
Rick Welch	County Fire	RWelch@gemfireems.com org	208.859.4775 c)		

Ken Sheldon	EMS	ksheldon@gemfireems.~~com~~ org	208.559.6976 c)		
Curt Christensen	City Fire	cchristensen@cityofemmett.org	208.941.7367 c)		
Mike Giery **(ALT)**	City Fire				
Michele Chadwick	Former S.C. Member/ GCMAD Board	idahomom@q.com	208.861.4424 c)		
Jason Kinley **(ALT)**	Mosquito Abatement	director@gcmad.org	208.440.7243 c) 208.365.5628 w)		
Chris Davidson	Idaho Power Phys. Sec. & Bus Cont. Mgr.	CDavidson@idahopower.com	208.388.6401 w) 858.232.0398 c)		
Heath Schab **(ALT)**	Idaho Power	HSchab@idahopower.com			
Marci Anderson **(ALT)**	Idaho Power	MAnderson2@idahopower.com			
~~Myra Church~~	~~Sweet Representative~~	~~Churchent1@gmail.com~~	~~208.584.3703 h)~~		
Brent Baldwin	Sweet Fire Dist. Chair	bbaldwi542@gmail.com			
Roy Moses	Squaw Creek Irrigation	Tmoses9@aol.com	208.365.8475		
Terry Wilson	SWDH, Planner	Terry.Wilson@phd3.idaho.gov	208.455.5326 w) 208.590.2524 c)		[illegible]
Ricky Bowman	SWDH, PHP Mgr.	Ricky.Bowman@phd3.idaho.gov	208.455.5311 w)		
Molly Smith	SWDH, PHP Educ.	Molly.smith@phd3.idaho.gov	208.455.5372		
Tahja Jensen	G.C. Pros. Attorney	tjensen@co.gem.is.us			
Lorrie Pahl	Mitigation Planner, IOEM	lpahl@imd.idaho.gov	208.258.6508 w)	**N/A**	
Dale Nalder	SW Area Field Officer IOEM	dnalder@imd.idaho.gov	208.258.6512 w) 208.830.8059 c)	**N/A**	
Heidi Novich **(ALT)**	SW/SC Area Field Officer IOEM	hnovich@imd.idaho.gov	208.258.6523 w) 208.954.2932 c)	**N/A**	Heidi Novich
Rob Flaner	Tetra Tech Consultant	rob.flaner@tetratech.com	208.939.4391 w) 208.830.3844 c)	**N/A**	[illegible]
Laurie Boston	Gem Cty. Emergency Mgr.	lboston@co.gem.id.us	208.284.0772 c)	**N/A**	Laurie Boston
Bonnie LaBonte	Gem Cty. Emergency Mgmt.	blabonte@co.gem.id.us		**N/A**	Bonnie LaBonte

MEETING SUMMARY

Date/Time of Meeting:	Tuesday – April 17, 2018; 9:45am to Noon
Location:	Emergency Operations Center, 415 East Main Street Emmett, Idaho 83617
Subject:	Steering Committee No. 6
Project Name:	Gem County Hazard Mitigation Plan-Update
In Attendance (See Attachment):	**Attendees:** Rick Johnston, Chuck Rolland, Bryan Elliott, Jay Hummel, Bev Martin, Dennis Weaver, Curt Christensen, Terry Wilson, Tahja Jensen, **Planning Team:** Rob Flaner, Laurie Boston
Not Present:	N/A
Summary Prepared by:	Rob Flaner (6/19/2018)
Quorum – Yes or No	Yes

Item	Action

Welcome and Introductions, Review Agenda

- Vice-Chairman, Chuck Rolland open the meeting and facilitated group introductions.
- Distributed handouts included: Agenda; SC Meeting # 5 meeting summary, phase-2 jurisdictional annex templates for both municipalities and districts, phase-1 jurisdictional annex template instructions for both municipalities.
- The agenda was reviewed and no modifications were made.

Planning Process

- No members of the public were present and no public comment was received by the SC.
- The meeting summary for #5 was approved for posting by the SC.
- Phase 1 Jurisdictional Annex Status-Rob updated the SC on the status of the phase 1 jurisdictional annex process. Phase 1 annexes were due to be turned by Friday, March 23rd, 2018. Rob informed the SC that he had only received 2, phase 1 templates (The school District and the Gem County Mosquito Abatement District) for the 7 planning partners to be covered by the plan. Rob informed the SC, that it is not mission critical for those planning partners that did not turn in their phase 1 templates.

Item	Action

The will just need to complete that part of their template under phase 2.

Risk Assessment Results

Under this segment, Rob Flaner provided an overview of Risk assessment results. The General Building Stock (GBS) results are complete. General building stock is the building inventory within the planning area that have not been identified as critical facilities or infrastructure (CF/CI). The results are summarized as follows:

- **Flood**- 3 flood scenarios were modeled using FEMA's risk assessment platform, Hazus-MH. The 3 scenarios were the 100 and 500-year flood events based on The FEMA hazard mapping, as well as mapping of areas not mapped in detail by FEMA using Hazus-MH. For the 100-year, Hazus estimated: 77 structures exposed, with an assessed value of $ $34,111,137. The population exposed to the 100-year flood equals 105 people. Hazus estimates that 51 of the 77 structures exposed would be damaged by a 100-year flood, for a total $ $5,810,719 in losses to both structures and contents. A 100-year flood could displace up to 38 people with 1 person requiring short term shelter. The 100-yer flood could generate 366 tons of debris.

  For the 500-yeaar event Hazus estimates that 118 structures exposed, with an assessed value of $57,492,155. The population exposed to the 500-year flood equals 166 people. Hazus estimates that 77 of the 118 structures exposed would be damaged by a 500-year flood, for a total $9,167,038 in losses to both structures and contents. A 500-year flood could displace up to 61 people with 2 people requiring short term shelters. The 500-yer flood could generate 689 tons of debris.

  For the Hazus-MH generated scenario, Hazus estimates that 1,472 structures exposed, with an assessed value of $578,309,781. The population exposed to the Hazus flood equals 3,316 people. Hazus estimates that 1,459 of the 1,472 structures exposed would be damaged by the Hazus Flood scenario, for a total $219,423,437 in losses to both structures and contents. A Hazus Flood scenario could displace up to 2,605 people with 150 people requiring short term shelters. The 100-yer flood could generate 8,909 tons of debris.

- **Earthquake:** Four earthquake scenarios were modeled using Hazus. 100 and 500-year, probabilistic scenarios, a M7.0 shake

Item	Action

map scenario event on the Squaw Creek fault and a M6.8 event on the Big Flat-Jakes Creek fault. For all 4 scenarios, 100% of the population and building stack are considered exposed to the Earthquake hazard. For to 100-year event, Hazus estimates $1,285,904 in structure and contents damages, with no people being displaced or needing short term shelters. This event could generate up to 0.18 tons of debris.

For the 500-year event, Hazus estimates $19,412,536 in structure and contents damages, with no people being displaced and no people needing short term shelters. This event could generate up to 2.05 tons of debris.

For the Squaw Crew scenario event, Hazus estimates $210,452,512 in structure and contents damages, with no people being displaced no people needing short term shelters. This event could generate up to 21.99 tons of debris.

For the Big Flat-Jakes Creek scenario event, Hazus estimates $63,055,408 in structure and contents damages, with no people being displaced no people needing short term shelters. This event could generate up to 4.78 tons of debris.

- **Landslide**: An exposure analysis was performed for the landslide hazard that looked at assets that were located on steep slopes within the planning area. The breakdown for this analysis was properties located on slopes 30% of greater, and those located on slopes of 15% to 30 %. This was a geospatial exercise with no hazard modeling. This analysis estimates that there are 73 structures with an assessed value of $33,711,240 exposed to slopes of 30% of greater. There are approximately 237 structures with an assessed value of $95,397,229 exposed to slopes of 15-30%.
- **Wildfire**: For the wildfire hazard, The Wildland Fire Communities at Relative Risk data was used for the spatial analysis. This data was designed to characterize mid-scale patterns across Idaho of the risks of wildland fire to communities. The data were created for the Statewide Interagency National Fire Plan Working Group and used in the 2007 Idaho Interagency Assessment of Wildland Fire Risk to Communities. The relative measure of the risks to communities from wildland fire was characterized by integrating relative wildland fire risk, relative wildland fire hazard, and wildland urban interface. For this assessment, the exposure to 2 zones were analyzed. The High and Moderate-High zones are

Item	Action
the 2 most severe in the data set. Like landslide, this was a geospatial analysis. The analysis estimates that there are 844 structures with and assessed value of $316,394,391 exposed to the "High Fire Severity" zone, and 7,996 structures with an assessed value of $2,907,516,718 exposed to the "Moderate-High Fire Severity" zone.	
• **Dam Failure**: Hazus-MH was utilized to assess dam failure for the Black Canyon Dam using dam failure inundation mapping for the probable maximum flood (PMF). For the PMF Hazus estimates that 4,314 structures exposed, with an assessed value of $1,496,996,084. The population exposed to the PMF equals 9,039 people. Hazus estimates that 1,351 of the 4,314 structures exposed would be damaged by a PMF, for a total $90,062,044 in losses to both structures and contents. A PMF could displace up to 8,085 people with 546 people requiring short term shelters. The PMF could generate 3,027 tons of debris.	
There was much good discussion during this presentation manly focused on the data sources for the analysis, how the models estimate damages and how this data could be used beyond the development of this mitigation Plan.	
<u>Phase 2, Jurisdictional Annex process</u>	
Under this segment, Rob presented the Phase 2 Jurisdictional Annex instructions and templates to the SC and planning partners. Rob explained that this phase would be the heaviest lift for the planning partnership of the 3 phases, in that it focuses on an assessment of the core capabilities of each planning partners. As with phase 1, this phase includes a detailed set of instructions and a data capture template that will need to be turned in by each planning partner to be merged with their phase 1 templates. Rob stressed that it is mission critical for all planning partners to complete their templates in that this is the predominate way that we will illustrate plan development participation for each planning partner. This is a must for plan approval for all partners. ***The deadline of turning in the Phase 2 annexes will be May 18, 2018***.	All Planning partners to turn in their phase 2 annexes by May 18, 2018
<u>Public Involvement Strategy</u>	
• Survey Status- Current survey status results were provided to the SC. Over 400 surveys have been received to date. We have received responses from all defined areas of the county. So far, nothing surprising about the responses.	
• Phase 1, Meeting #2 (Emmett)- The 2nd public meeting was held in Emmett on 4/2/2018. There were about 18 people in attendance. A	

Item	Action
30-minute presentation was provided by Rob, followed by a capability exercise and Q&A.	

Meeting was adjourned at 12:00 PM

There will be no meeting in May to allow time for the Planning partners to complete their phase 1 and phase 2 jurisdictional annex templates.

Attachment: Sign-in Sheet

2017/2018 Gem County All Hazard Mitigation Plan Update
Steering Committee Meeting #6
April 17, 2018 10:00 a.m. - 11:24 p.m.

NAME	AGENCY	EMAIL	PHONE	NON-MTG. HRS	SIGNATURE
Rick Sego	Bureau of Rec	RSego@usbr.gov	208.383.2262 w) 208.859.4718 c)		
Greg Bradley (ALT)	Bureau of Rec	gbradley@usbr.gov	208.378.5207 w)		
Rick Johnston	Gem County Assessor	rjohnston@co.gem.id.us	208.365.2982 w)	1	R Johnston
Hollie Ann Strang (ALT)	G.C. Assessor's Ofc.	hstrang@co.gem.id.us	208.477.2010 w)		
Bruce Evans	Emmett City Public Works	bevans@cityofemmett.org	208.941.7365 c) 208.365.9569 o)		
Clint Seamons (ALT)	Public Works	cseamons@cityofemmett.org	208-941-1251 c)		
Chuck Rolland	Gem County Sheriff	sheriff@co.gem.id.us			
Donnie Wunder (ALT)	G. C. Chief Deputy	dwunder@co.gem.id.us			
Neal Capps	Gem County Road & Bridge	ncapps@co.gem.id.us	208.477.8641 c)		
Jason Brown (ALT)	G.C. Road & Bridge	gcrb@co.gem.id.us	208.365.3305 w)		
Bill Butticci	G. C. Commissioner	commissioners@co.gem.id.us			
Bryan Elliott	G.C. Commissioner/ SWDH Board	commissioners@co.gem.id.us		2 hr	W Bryan Elliott
Mark Rekow	G. C. Commissioner	commissioners@co.gem.id.us			
Shelly Tilton	Gem County Clerk	stilton@co.gem.id.us	208.365.4561 w)		
Wayne Rush (ALT)	School District	wrush@isd221.net	208.365.6301 w)		
Jay Hummel	School District	jhummel@isd221.net		2 hrs	[illegible]
Bev Martin	Ola Rep/Sheriff Posse	bearcreekranches@juno.com	208.584.3494 h)	2 hrs.	[illegible] Martin
Dennis Weaver	Ola Representative	imperial@wildblue.net		6 hrs	Dennis Weaver
Jennifer Kharrl	Planning & Zoning	jkharrl@co.gem.id.us	208.365.5144 w)		
Michelle Barron (ALT)	Planning & Zoning	mbarron@co.gem.id.us	208.365.5144 w)		
Rick Welch	County Fire	RWelch@gemfireems.com	208.859.4775 c)		

Ken Sheldon	EMS	ksheldon@gemfireems.com	208.559.6976 c)		
Curt Christensen	City Fire	cchristensen@cityofemmett.org	208.941.7367 c)		Curmelt
Mike Giery (ALT)	City Fire				
Michele Chadwick	Former S.C. Member/ GCMAD Board	idahomom@q.com	208.861.4424 c)		
Jason Kinley (ALT)	Mosquito Abatement	director@gcmad.org	208.440.7243 c) 208.365.5628 w)		
Chris Davidson	Idaho Power Phys. Sec. & Bus Cont. Mgr.	CDavidson@idahopower.com	208.388.6401 w) 858.232.0398 c)		
Heath Schab (ALT)	Idaho Power	HSchab@idahopower.com			
Marci Anderson (ALT)	Idaho Power	MAnderson2@idahopower.com			
~~Myra Church~~	~~Sweet Representative~~	~~Churchent1@gmail.com~~	~~208.584.3703 h)~~		
Brent Baldwin	Sweet Fire Dist. Chair	bbaldwi542@gmail.com			
Roy Moses	Squaw Creek Irrigation	Tmoses9@aol.com	208.365.8475		
Terry Wilson	SWDH, Planner	Terry.Wilson@phd3.idaho.gov	208.455.5326 w) 208.590.2524 c)		TW left 10:40
Ricky Bowman	SWDH, PHP Mgr.	Ricky.Bowman@phd3.idaho.gov	208.455.5311 w)		
Molly Smith	SWDH, PHP Educ.	Molly.smith@phd3.idaho.gov	208.455.5372		
Tahja Jensen	G.C. Pros. Attorney	tjensen@co.gem.is.us		2 - Town Hall	TJ
Lorrie Pahl	Mitigation Planner, IOEM	lpahl@imd.idaho.gov	208.258.6508 w)	N/A	
Dale Nalder	SW Area Field Officer IOEM	dnalder@imd.idaho.gov	208.258.6512 w) 208.830.8059 c)	N/A	
Heidi Novich (ALT)	SW/SC Area Field Officer IOEM	hnovich@imd.idaho.gov	208.258.6523 w) 208.954.2932 c)	N/A	
Rob Flaner	Tetra Tech Consultant	rob.flaner@tetratech.com	208.939.4391 w) 208.830.3844 c)	N/A	RF
Laurie Boston	Gem Cty. Emergency Mgr.	lboston@co.gem.id.us	208.284.0772 c)	N/A	LB
Bonnie LaBonte	Gem Cty. Emergency Mgmt.	blabonte@co.gem.id.us		N/A	

PUBLIC MEETING ATTENDANCE

Gem County All Hazard Mitigation Plan, Public Meeting - Ola
3/15/2018 7:00-9:00 p.m.

NAME	CITY
Dennis Weaver	OLA
Joy Weaver	OLA
Bev Martin	OLA
Laurie Boston	Emmett Gem County Emer Mgmt
Marc [illegible]	OLa
Allen Cole	OLA
Kent & Robin Close	Ola
Judie McCauley	Ola
Robert Mark Cole	Ola
Chris Van Dusel	Sweet
Butch Biggers	Ola
Joyce Biggers	"
Rob Flaner	TETRA TECH
Shannon Miller	Ola
Roy Moses	~~[illegible]~~ Sweet
Bill Manee	OLA
Gary McCauley	Ola
Susan Jacobus	Ola
Shannon McCalla	Sweet
Mitchell Sanders	Sweet
Dale Myers Sage Hen Campgrounds Chemist	Ola

Gem County All Hazard Mitigation Plan, Public Meeting - Ola
3/15/2018 7:00-9:00

NAME	CITY
Robert Lucas	Ola
Jim Anderson	Ola
Justin Nelson	Ola

2018 Gem County All Hazard Mitigation Plan Update
Town Hall Meeting
Emmett City Hall
Emmett, Idaho
April 3, 2018 6:00 – 8:00 p.m.

NAME	CITY
Gus Grant	Emmett
Jim [illegible]	Emmett
Vince Lombardo	Emmett
Barb Loeding	~~Emmett~~ Gem Co (on the Bench)
Lisa Blankenship	Emmett
JR SMITH	EMMETT
CR STAREN	EMMETT
Todd Smith	Eagle/Emmett
Joyce Benscoter	Emmett
[illegible]	Emmett

2018 Gem County All Hazard Mitigation Plan Update
Town Hall Meeting
Emmett City Hall
Emmett, Idaho
April 3, 2018 6:00 – 8:00 p.m.

NAME	CITY
Paul & Kathleen Dervig	Emmett, ID
Gary Vincent	Emmett, ID
Joyce & David Miller	Ola
Laurie Boston	Emmett
Michelle Baum	Emmett left@ 7:00 pm
Tanja Jensen	Emmett
Earl DeFur	"
Mike Giery	Emmett
Chase-TG	Gem Co.
Jana Munson	Gem Cty / outside Emmett city limits
Martin W. Fry	Gem Co

MEETING REGISTER ***PLEASE PRINT***

REGULAR MEETING X

SPECIAL MEETING ____

PUBLIC HEARING ____

DATE: **December 11, 201**

PURPOSE: **Regular-Public**

If you are going to speak during the meeting, you MUST print your name and give a complete address.

NAME	ADDRESS
John Example	401 E. Main Street Emmett, ID 83617
Laurie Boston	415 E Main Emmett, ID 83617
Rob Flaner	90 S. Blackwood Ave, Eagle, 83616
Bill [illegible]	132 S. Washington Emmett
Mike Hughes	1008 E MAIN ST
Sandy Cuthbirth	2415 S John
JOHN AUGSBURGER	3205 W. IDAHO BLVD
Barb Laughlin	"
Jason Floyd	421 E. 2nd St Not speaking
Cooper Floyd	" " " "
Chason Coles	900 Evergreen Dr.
Brittni Coles	" "
GUS PORTER	2030 S. WASHINGTON AVE
Krista Cole	GCCC
[illegible]	4957 Old Freezeout Rd
Jan Benson	1401 Shady Ln Em
Dean Wilkinson	4080 Old Freezeout Rd

2018 Gem County All Hazard Mitigation Draft Plan Update
Town Hall Meeting--Sweet
Sweet-Montour Elementary
Sweet, Idaho
December 12, 2018 6:00 p.m.

NAME	CITY
Robb Menlove	Sweet
Dannell Bunn	Sweet
Bob Simpson	Sweet
Travis M[illegible]	Sweet
Kathy Johns	Sweet
Tom Gatfield	Montour-Emmett
[illegible] Kerr	Sweet
[illegible] Church	Sweet
Tim [illegible]	Sweet
Becky D. Menlove	Sweet
[illegible] Menlove	Sweet
[illegible]	Emmett
Geoff Neyman	Horseshoe Bend -(Sweet)
Glenna Bingham	Montour
[illegible] Church	Sweet

2018 Gem County All Hazard Mitigation Draft Plan Update
Town Hall Meeting--Sweet
Sweet-Montour Elementary
Sweet, Idaho
December 12, 2018 6:00 p.m.

NAME	CITY
Bus Cronk	Emmett
ROB FLANER	TETRA TECH
Judie McCaulou	Ola
Harry McCaulou	Ola
Marshall Stelling	Emmett
Art Beal	Sweet
Sheryl Stelling	EMMETT
Laurie Boston	Emmett
Bev Martin	Ola
Dee Hurd	New Plymouth
JIM ANDERSON	Ola
Bryan Moses	Sweet
Jeremy Kildow	sweet
Gail & Terry MacDonald	Sweet -
Ben Boles	Sweet
Stephanie Goshi	Sweet

Appendix C. Concepts and Methods Used for Hazard Mapping

C. CONCEPTS AND METHODS USED FOR HAZARD MAPPING

EARTHQUAKE MAPPING

Probabilistic Peak Ground Acceleration Maps

Probabilistic peak ground acceleration data are generated by Hazus. In Hazus' probabilistic analysis procedure, the ground shaking demand is characterized by spectral contour maps developed by the U.S. Geological Survey (USGS) as part of a 2014 update of the National Seismic Hazard Maps. USGS probabilistic seismic hazard maps are revised about every six years to reflect newly published or thoroughly reviewed earthquake science and to keep pace with regular updates of the building code. Hazus includes maps for eight probabilistic hazard levels: ranging from ground shaking with a 39-percent probability of being exceeded in 50 years (100-year return period) to the ground shaking with a 2-percent probability of being exceeded in 50 years (2,500-year return period). Earthquake mapping for this plan used the 100-year and 500-year probabilistic events.

Shake Maps

A shake map is designed as a rapid response tool to portray the extent and variation of ground shaking throughout the affected region immediately following significant earthquakes. Ground motion and intensity maps are derived from peak ground motion amplitudes recorded on seismic sensors (accelerometers), with interpolation based on estimated amplitudes where data are lacking, and site amplification corrections. Color-coded instrumental intensity maps are derived from empirical relations between peak ground motions and Modified Mercalli intensity. For this plan, shake maps were prepared by the USGS for two earthquake scenarios:

- An earthquake on the Squaw Creek fault with the following characteristics:
  - Magnitude: 7.0
  - Epicenter: N 44.22 W 116.22
  - Depth: 15 km
- An earthquake on the Big Flat/Jakes Creek fault with the following characteristics:
  - Magnitude: 6.8
  - Epicenter: N 44.26 W 116.35
  - Depth: 9 km

FLOOD MAPPING

Flood hazard areas are a combination of digitized effective FEMA Flood Insurance Rate Maps dated April 17, 1978, and 100-year flood hazard areas generated by Tetra Tech using the Hazus Hydrology and Hydraulics Flood Module.

LANDSLIDE MAPPING

A dataset of steep slopes was generated using a 1/3-arc-second digital elevation model. Two slope classifications were created: 15 to 30 percent and greater than 30 percent.

WILDFIRE MAPPING

The wildfire exposure analysis was performed using the Bureau of Land Management's (BLM) Relative Risk to Communities from Wildland Fire Hazard (2007) dataset. The BLM Relative Risk to Communities from Wildland Fire Hazard data was downloaded from the INSIDE Idaho geospatial data clearinghouse. This dataset was designed to characterize mid-scale patterns across Idaho of the risks of wildland fire to communities. It was assumed that a relative measure of the risks to communities from wildland fire could be characterized by integrating relative wildland fire risk, relative wildland fire hazard, and wildland urban interface. That is, within the wildland urban interface, risks are directly associated with the probability that an area will burn, as well as the likely fire behavior that would occur if that area did in fact burn. It was assumed that burn probability and likely fire behavior would contribute equally to the risks to communities. Agriculture, rock, urban, and water were not assigned a burn probability or relative fire behavior. The methodology used to create this data is described in detail in the dataset metadata available from the INSIDE Idaho geospatial data clearinghouse.

Historical fire perimeter data is a combination of data from the INSIDE Idaho Geospatial Clearinghouse & Bureau of Land Management (Fire Years 1878-2012) and the U.S. Geological Survey Geospatial Multi-Agency Coordination (GeoMAC) Wildland Fire Support Viewer (Fire Years 2013-2017).

DAM FAILURE MAPPING

Dam failure inundation area data (2010) for Black Canyon Dam & Reservoir, provided by the US Bureau of Reclamation, identifies the maximum pool inundation area. This is the area inundated by dam failure occurring when the pool elevation is at the top of the impounding structure. This data was prepared in accordance with the Federal Guidelines for Dam Safety (FEMA Publication 64, FEMA 2004).

Gem County Hazard Mitigation Plan—Volume 1: Countywide Elements

Appendix D. Plan Adoption Resolutions from Planning Partners

D. Plan Adoption Resolutions from Planning Partners

TO BE PROVIDED WITH FINAL DRAFT

Gem County Hazard Mitigation Plan—Volume 1: Countywide Elements

Appendix E. Progress Report Template

E. PROGRESS REPORT TEMPLATE

2018 Gem County Hazard Mitigation Plan
Annual Progress Report

Reporting Period: *(Insert reporting period)*

Background: Gem County and participating cities and special purpose districts in the county developed a hazard mitigation plan to reduce risk from all hazards by identifying resources, information, and strategies for risk reduction. The federal Disaster Mitigation Act requires state and local governments to develop hazard mitigation plans as a condition for federal disaster grant assistance. To prepare the plan, the participating partners organized resources, assessed risks from natural hazards within the county, developed planning goals and objectives, reviewed mitigation alternatives, and developed an action plan to address probable impacts from natural hazards. By completing this process, these jurisdictions maintained compliance with the Disaster Mitigation Act, achieving eligibility for mitigation grant funding opportunities afforded under the Robert T. Stafford Act. The plan can be viewed on-line at:

https://www.gemcounty.org/disaster-services/ahmp/

Summary Overview of the Plan's Progress: The performance period for the 2018 Gem County Hazard Mitigation Plan became effective in Month Year with the final approval of the plan by FEMA. The initial performance period for this plan will be 5 years, with an anticipated update to the plan to occur before Month Year. As of this reporting period, the performance period for this plan is considered to be __% complete. The hazard mitigation plan has targeted __ hazard mitigation actions to be pursued during the 5-year performance period. As of the reporting period, the following overall progress can be reported:

- __ out of __ actions (__%) reported ongoing action toward completion.
- __ out of __ actions (__%) were reported as being complete.
- __ out of __ actions (___%) reported no action taken.

Purpose: The purpose of this report is to provide an annual update on the implementation of the action plan identified in the 2018 Gem County Hazard Mitigation Plan. The objective is to ensure that there is a continuing and responsive planning process that will keep the hazard mitigation plan dynamic and responsive to the needs and capabilities of the partner jurisdictions. This report discusses the following:

- Natural hazard events that have occurred within the last year
- Changes in risk exposure within the planning area
- Mitigation success stories
- Review of the action plan
- Changes in capabilities that could impact plan implementation
- Recommendations for changes/enhancement.

The Hazard Mitigation Plan Steering Committee: The Hazard Mitigation Plan Steering Committee, made up of planning partners and stakeholders within the planning area, reviewed and approved this progress report at its annual meeting held on _____, 201_. It was determined through the plan's development process that a steering committee would remain in service to oversee maintenance of the plan. At a minimum, the Steering Committee will provide technical review and oversight on the development of the annual progress report. It is anticipated that there will be turnover in the membership annually, which will be documented in the progress reports. For this reporting period, the Steering Committee membership is as indicated in Table 1.

Table 1. Steering Committee Members

Name	Title	Jurisdiction/Agency

Natural Hazard Events within the Planning Area: During the reporting period, there were __ natural hazard events in the planning area that had a measurable impact on people or property. A summary of these events is as follows:

- ______________________________
- ______________________________

Changes in Risk Exposure in the Planning Area: *(Insert brief overview of any natural hazard event in the planning area that changed the probability of occurrence or ranking of risk for the hazards addressed in the hazard mitigation plan)*

Mitigation Success Stories: *(Insert brief overview of mitigation accomplishments during the reporting period)*

Review of the Action Plan: Table 2 reviews the action plan, reporting the status of each action. Reviewers of this report should refer to the hazard mitigation plan for more detailed descriptions of each action and the prioritization process.

Address the following in the "status" column of the following table:

- *Was any element of the action carried out during the reporting period?*
- If no action was completed, why?
- Is the timeline for implementation for the action still appropriate?
- If the action was completed, does it need to be changed or removed from the action plan?

Table 2. Action Plan Matrix

Action Taken? (Yes or No)	Time Line	Priority	Status	Status (X, O,✓)
Action #__—____________________[description]				
Action #__—____________________[description]				
Action #__—____________________[description]				
Action #__—____________________[description]				
Action #__—____________________[description]				
Action #__—____________________[description]				
Action #__—____________________[description]				
Action #__—____________________[description]				
Action #__—____________________[description]				
Action #__—____________________[description]				
Action #__—____________________[description]				
Action #__—____________________[description]				
Action #__—____________________[description]				
Action #__—____________________[description]				

Completion status legend:
✓= Project Completed
O = Action ongoing toward completion
X = No progress at this time

Changes That May Impact Implementation of the Plan: *(Insert brief overview of any significant changes in the planning area that would have a profound impact on the implementation of the plan. Specify any changes in technical, regulatory and financial capabilities identified during the plan's development)*

Recommendations for Changes or Enhancements: Based on the review of this report by the Hazard Mitigation Plan Steering Committee, the following recommendations will be noted for future updates or revisions to the plan:

- ______________________________
- ______________________________
- ______________________________
- ______________________________

Public review notice: *The contents of this report are considered to be public knowledge and have been prepared for total public disclosure. Copies of the report have been provided to the governing boards of all planning partners and to local media outlets and the report is posted on the Gem County Hazard Mitigation Plan website. Any questions or comments regarding the contents of this report should be directed to:*

Gem County Emergency Management
Gem County Courthouse
415 E. Main
Emmett, ID 83617