2021 Canyon County
All-Hazard Mitigation Plan
Volume 1: Countywide Elements

TETRA TECH

November 2021

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EXECUTIVE SUMMARY

PURPOSE AND SCOPE

Canyon County and the incorporated cities within its boundaries are vulnerable to a wide range of hazards that have the potential to cause serious harm to the health, welfare, and security of their residents. Canyon County has experienced eight events since 1956 for which presidential disaster declarations were issued. The cost of disaster response and recovery can be lessened when attention is turned to mitigating hazard impacts before they occur. With increased attention to managing natural hazards, communities can reduce the threats to citizens and avoid creating new problems in the future.

The *Canyon County All-Hazard Mitigation Plan*—first published in 2006, previously updated in 2013, and now updated again for 2021—contains information pertaining to hazards faced by the County and options for mitigating those hazards. It identifies the County's hazards, vulnerabilities to those hazards, and actions to reduce threats to life and property. The following hazards of concern are addressed in detail in the hazard mitigation plan:

- Dam or canal failure
- Drought
- Earthquake
- Flood
- Landslide
- Severe weather (extreme temperatures, wind, thunderstorms, lightning)
- Wildfire

Additionally, the following "non-natural" hazards of interest are qualitatively profiled but not fully assessed: hazardous materials, civil disturbances, terrorism, cyber disruption, and public health.

PARTICIPANTS

Canyon County opened the planning effort for this plan to all eligible local governments within the County. Eight cities and seven special-purpose districts became planning partners participating in the plan update process. Not all planning partners completed the steps required to gain coverage under this plan (which gives jurisdictions eligibility for certain federal funding programs for hazard mitigation). The following did complete the process and are covered by the updated plan:

- Canyon County

- City of Caldwell
- City of Nampa
- Canyon County Ambulance District
- Flood Control District #11
- Golden Gate Highway District
- Nampa School District #

PLAN UPDATE APPROACH

To develop this update, Canyon County followed a process to actively involve the entire county community and to bring the best and most current information to bear in assessing the risk associated with natural hazards and identifying suitable actions to reduce that risk.

Organization and Outreach

A planning team was formed to lead the planning effort, made up of staff from the County and a professional planning consultant firm. The planning team led the process of inviting planning partners to participate. Planning partner representatives and other local stakeholders formed a steering committee that oversaw and provided input to the planning process. The planning team also coordinated with local, state and federal agencies with a stake in hazard mitigation planning for the southwest Idaho region. Community outreach included a dedicated web page on the County's website, a broadly distributed survey on hazard-related topics, and numerous public meetings to describe the plan to local residents and businesses.

Technical Analysis

This hazard mitigation plan evaluates participating jurisdictions' existing capabilities to mitigate hazards and assesses the risks associated with the natural hazards of concern.

Capability Assessment

All participating jurisdictions compiled an inventory and analysis of existing authorities and capabilities called a "capability assessment." If the capability assessment identified an opportunity to add a missing capability or expand an existing one, then doing so has been selected as an action in the jurisdiction's action plan.

Risk Assessment

The risk assessment estimated the potential loss of life, personal injury, economic injury, and property damage resulting from identified hazards, focusing on the following elements:

- **Hazard identification**—Use all available information to determine what types of hazards may affect a jurisdiction, how often they can occur, and their potential severity.
- **Exposure identification—**Estimate the total number of people and properties in the jurisdiction that are likely to experience a hazard event if it occurs.

- **Vulnerability identification and loss estimation**—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.

The Action Plan

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. Planning partners then identified appropriate actions for mitigating risk. The mission statement, goals, objectives and actions 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.

RISK ASSESSMENT

Dam/Canal Failure

The failure of a dam or canal can release a large and sudden flood of water with significant risk to people and property. Table ES-1 summarizes the risk assessment for the dam failure hazard in Canyon County.

Table ES-1. Dam Failure Risk Assessment

Profile	Nine dams in or near Canyon County pose risks to downstream Canyon County properties in the event of their failure. The 66 irrigation districts that serve Ada and Canyon counties distribute water through 1,500 miles of canals, laterals, and drains in southwest Idaho and eastern Oregon. Based on location and past history of incidents, the probability of a dam failure is considered low and the probability of a canal failure is considered medium.
Exposure & Vulnerability	The mapped inundation area that would result from failure of the Lucky Peak Dam includes 8.5 percent of Canyon County's population and 13.1 percent of assessed property values. Almost 15,000 people could be displaced by failure of the Lucky Peak Dam, and property damage could total almost $4 billion.
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.
Issues	• Inundation depth mapping should be developed for a failure of American Falls Dam. • The protocol for notifying downstream citizens of imminent failure needs to be tied to local emergency response planning. • Failure inundation area mapping is needed 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 for planning. • Addressing security concerns and the need to inform the public of the risk associated with dam failure is a challenge for public officials.

Drought

Drought is a significant decrease in water supply relative to what is "normal" in a given location. Table ES-2 summarizes the risk assessment for the drought hazard in Canyon County.

Table ES-2. Drought Risk Assessment

Profile	Historically, Canyon County has experienced drought once every five to 10 years.
Exposure & Vulnerability	Drought affects all areas of Canyon County equally. It does not generally have direct impacts on property or life safety, but can affect a wide range of economic, environmental and social activities.
Scenario	Combinations of low precipitation and unusually high temperatures could occur over several consecutive years. Surrounding communities, also in drought conditions, could increase their demand for water supplies relied upon by Canyon County, causing social and political conflicts. The economy of Canyon County could experience setbacks, especially in water dependent industries.
Issues	• Need to develop alternative water supplies • Use of groundwater recharge 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.

Earthquake

An earthquake is the vibration of the earth's surface that follows a release of energy in the earth's crust generated by a sudden dislocation of crust segments. Table ES-3 summarizes the risk assessment for the earthquake hazard in Canyon County.

Table ES-3. Earthquake Risk Assessment

Profile	Canyon County is near two fault zones: the western Idaho fault system and Owyhee Mountains fault system. The Squaw Creek fault, an active structure near Emmett, about 25 miles north of Boise, has geologic evidence for movement as recently as 7,600 years ago. The Cottonwood Mountain fault is about 40 miles northwest of Caldwell. Mapping of high-risk areas associated with unstable soils is not complete for the County.
Exposure & Vulnerability	All of Canyon County is potentially exposed to direct and indirect impacts from earthquakes. Estimated impacts on property for the four earthquake scenarios evaluated range from $300,000 to $200 million in total property damage.
Scenario	Any seismic activity of magnitude 6.0 or greater on faults within the planning area would have significant impacts throughout the county. Such earthquakes would lead to massive structural failure of property. Levees and revetments built on poor soils would likely fail, representing a loss of critical infrastructure.
Issues	• Complete liquefaction and soils mapping is needed to support better seismic risk assessment. • Twenty-seven percent of the planning area's building stock was built before seismic provisions became uniformly applied through building codes. • Critical facility owners should be encouraged to create or enhance continuity of operations plans. • Design and construction standards should be established that account for probable impacts from earthquakes. • Dam failure warning and evacuation plans and procedures should be updated to reflect the earthquake risk.

Flood

Canyon County is susceptible to flooding from rivers, canals, and urban drainage overflows. Table ES-4 summarizes the risk assessment for the flood hazard in Canyon County.

Table ES-4. Flood Risk Assessment

Profile	Most flooding in Canyon County is associated with the Boise River and tributary streams. From 1952 to 2017, federal disaster declarations for flooding in the county were issued about once every six years on average.
Exposure & Vulnerability	The 1-percent-annual-chance (100-year) floodplain in Canyon County includes residences for 2.6 percent of the county population and structures accounting for 4.5 percent of the countywide building replacement value. A 1-percent-annual-chance flood could displace nearly 2,000 people and cause about $100 million in property damage.

Scenario	A series of storms bringing warm, moist air in the planning area could flood numerous drainage basins in a short time. This could overwhelm the response and floodplain management capability within the planning area.
Issues	• The County has over 200 miles of canals that were not constructed to engineering standards. • Many drainage districts in Canyon County are not currently active, and maintenance of their drainage infrastructure is not being conducted. • 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. • 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. • Potential climate change could alter flood conditions. • 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.

Landslide

A landslide is a mass of rock, earth or debris moving down a slope. Table ES-5 summarizes the risk assessment for the landslide hazard in Canyon County.

Table ES-5. Landslide Risk Assessment

Profile	Canyon County has no record of significant historical landslide damage. However, areas of steep slopes along the northeast and southwest edges of the county pose risks of future landslides.
Exposure & Vulnerability	The mapped areas of steep slopes in Canyon County include residences for 0.56 percent of the county population and structures accounting for 0.5 percent of the countywide building replacement value
Scenario	Landslides in the planning area 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 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.
Issues	• Sub-surface soils mapping is needed to better understand the landslide risk potential within the planning area. • Future development could lead to more homes in landslide risk areas, especially as development moves upland for increased view potential. • As new data and science become available, assessments of landslide risk should be reevaluated. • If climate change impacts atmospheric conditions, then exposure to landslide risks is likely to increase.

Severe Weather

Four types of severe weather events typically impact Canyon County: thunderstorms, lightning, damaging winds, and extreme temperatures (hot and cold). Table ES-6 summarizes the risk assessment for the severe weather hazard in Canyon County.

Table ES-6. Severe Weather Risk Assessment

Profile	Severe weather events can 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. The planning area can expect to experience exposure to some type of severe weather event at least annually:
Exposure & Vulnerability	All people and property and the entire environment of the planning area are exposed to some degree to the severe weather hazard. Estimates of damage from weather are not available, but the types of severe weather most likely in Canyon County can result in property damage and harm to people, especially older buildings and vulnerable populations such as older and lower-income residents.

Scenario	A worst-case event would involve prolonged high winds accompanied by thunderstorms. Facilities could be closed due to power outages caused by high winds and downed tree obstructions. Prolonged rain could produce flooding and landslides, which in turn could further obstruct roads and bridges, further isolating residents.
Issues	• Older building stock in the planning area could be highly vulnerable to weather events such as windstorms. • Above-ground power supply lines and telephone lines are susceptible. • The capacity for backup power generation is limited. • 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.

Wildfire

A wildfire is defined as an uncontrolled fire on undeveloped or developed land that in most cases, but not all, requires fire suppression. Table ES-7 summarizes the risk assessment for the wildfire hazard in Canyon County.

Table ES-7. Wildfire Risk Assessment

Profile	Historically, large fires (greater than 10 acres) have occurred in Canyon County, with 52 large fire events burning in excess of 48,350 acres for the period of 1957 to 2011. Wildfire risk is generally low through the valley but moderate to high in the county's southernmost and northernmost areas.
Exposure & Vulnerability	Nearly 5 percent of the county population lives in moderate-high or high fire risk zones. The total value of buildings and their contents in those zones is nearly $2 billion. No estimates are available of likely future damage associated with wildfire.
Scenario	A major conflagration in the planning area might begin with a wet spring, adding to fuels on the forest floor, followed by a dry summer with dry hot winds. A multitude of small isolated fires could be ignited by lightning or human activity, and embers from these fires could be carried deep into forest, spreading further fire.
Issues	• 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. • Climate change could affect the wildfire hazard. • Area fire districts need to continue to train on wildland-urban interface events. • Additional fire department water supply is needed in high risk wildfire areas.

RISK RANKING

Through a facilitated exercise with the Steering Committee, a risk ranking was performed for the hazards of concern described in this plan using quantitative data from the risk assessment. Based on this process, a priority of high, medium or low was assigned to each hazard. This ranking was performed for the county as a whole, as well as for each individual planning partner. Local jurisdictions may differ in the identification of hazards that present the greatest risk to their communities. Table ES-8 shows the hazard risk ranking.

Table ES-8. Hazard Risk Ranking

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

MISSION, GOALS AND OBJECTIVES

The mission statement for the Canyon County Hazard Mitigation Plan Update is as follows:

> To reduce the risk of loss of life and property and to encourage long-term reduction of vulnerability and property damage due to hazards.

The following are the mitigation goals for this plan update:

- Protect lives and property
- Enhance the public's awareness of and preparedness for the impacts of hazards.
- Develop and implement hazard mitigation strategies that use public and private funds in a cost-effective manner.
- Maintain, enhance, or restore the natural environment's capacity to deal with the current/future impacts of hazard events.
- Improve emergency management preparedness, collaboration, and outreach within the planning area

The objectives are as follows:

1. Manage the incorporation of mitigation measures into repairs, major alterations, new development, and redevelopment practices, especially in areas subject to substantial hazard risk.
2. Encourage new development to occur in locations that avoid or minimize exposure to hazards and enhance design requirements to improve resiliency in future disasters.
3. Reduce losses on at-risk properties, including those subject to repetitive losses, by enhancing land use, design, and construction policies and/or by retrofit, purchase and relocation of structures in high hazard areas.
4. Use mandatory local general plan, zoning, and subdivision requirements to help establish resilient and sustainable communities by incorporating risk reduction considerations in new and updated infrastructure and development plans.
5. Actively promote effective coordination of regional and local stakeholders in hazard mitigation to create resilient and sustainable communities.
6. Create programs to motivate stakeholders, such as homeowners, private sector businesses, and nonprofit community organizations, to mitigate hazards and risk.
7. Improve systems that provide warning and emergency communications.
8. Inform the public about the risk exposure to hazards and ways to increase the public's capability to prepare, respond, recover and mitigate the impacts of hazard events.
9. Identify projects that reduce risk while meeting multiple objectives defined by this planning process.
10. Minimize disruption of local government and commerce operations caused by natural hazards.
11. Implement hazard mitigation policies and projects that not only protect the built environment but also maintain or enhance the natural environment's ability to absorb impacts from hazard events.
12. Increase the resilience and continuity of operations of identified lifelines within the planning area.

RECOMMENDED MITIGATION ACTIONS

The planning partners and the Steering Committee identified mitigation actions that could be implemented to provide hazard mitigation benefits countywide, as listed in Table ES-9. In addition to these countywide recommended actions, each covered planning partner developed its own set of recommended actions. The planning partner action plans are included in separate annexes prepared by each partner.

Table ES-9. Action Plan—Countywide Mitigation Actions

Hazards Addressed	Timeline	Implementation Priority	Grant Pursuit Priority
CW-1—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.	Short term/ ongoing	High	Low
CW-2—Coordinate all mitigation planning and project efforts, including grant application support, to maximize all resources available to the planning partnership.	Short term/ ongoing	High	Low
CW-3—Provide coordination and technical assistance in grant application preparation that includes assistance in cost-benefit analysis for grant-eligible projects.	Short term/ ongoing	High	High
CW-4—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.	Long term	High	High

Part 1. BACKGROUND AND METHODS

1. INTRODUCTION TO THE PLANNING PROCESS

1.1 WHY PREPARE THIS PLAN?

1.1.1 Federal Guidance

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.

The federal Disaster Mitigation Act (DMA), passed in 2000, emphasizes 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 and institutional 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

Canyon County and the incorporated cities that lie within its boundaries are vulnerable to natural and man-made hazards that have the potential to cause serious harm to the health, welfare, and security of their residents. The cost of response to, and recovery from, disaster events can be lessened when attention is turned to mitigating their impacts and effects before they occur.

The *Canyon County All-Hazard Mitigation Plan*—first published in 2006, previously updated in 2013, and now updated again for 2021—contains information pertaining to hazards faced by the County and options for mitigating those hazards. It is designed to interface with the *State of Idaho Multi-Hazard Mitigation Plan*, which was last revised in 2018. It was developed by and is applicable to Canyon County, the incorporated cities within its boundaries, and a number of special-purpose districts that have jurisdiction within the county.

This plan seeks to identify the County's hazards, understand the vulnerabilities to those hazards, and craft solutions that, if implemented, will significantly reduce threats to life and property. With increased attention to managing natural hazards, communities can reduce the threats to citizens and, through proper land use and emergency planning, avoid creating new problems in the future. Many solutions can be implemented at minimal cost and social impact.

1.1.3 Purposes for Planning

This update to the Canyon County All-Hazards Mitigation Plan 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. This is not an emergency response or management plan, although it can be used to identify weaknesses and refocus emergency response planning. Enhanced emergency response planning is an important mitigation strategy. The focus of this plan, however, is on better decision-making directed toward avoiding future risk and on activities or projects that will eliminate or reduce current risks.

In preparing this update, Canyon County has again partnered with local cities 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. The Federal Emergency Management Agency (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 Canyon 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 Canyon 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.
- 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 Canyon 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 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 involvement information, including the hazard mitigation survey and summary of results
  - Appendix C—Federal and state programs and regulations
  - Appendix D—Concepts and methods used for hazard mapping
  - Appendix E—Detailed risk assessment results
  - Appendix F—Plan adoption resolutions from planning partners
  - Appendix G— 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 adopted Volume 1 in its entirety, its own jurisdiction-specific annex in Volume 2, and at least the introduction and appendices to Volume 2. Partners could, at their discretion, adopt Volume 2 in its entirety.

2. PLAN UPDATE—WHAT HAS CHANGED?

2.1 PREVIOUS PLANS

2.1.1 The 2006 Plan

The 2006 Canyon County All-Hazards Mitigation Plan was developed through a collaborative process involving the County and eight incorporated cities within the county boundaries (Nampa, Caldwell, Middleton, Notus, Wilder, Parma, Melba, and Greenleaf). It focused on assessing the risk associated with five natural hazards: earthquake, flood, landslide, severe weather, and wildfire. Wildfire was assessed in the *Wildland-Urban Interface Wildfire Mitigation Plan* that was presented as a stand-alone volume of the hazard mitigation plan.

Based on the assessment completed at that time, the 2006 planning partners identified 33 projects to mitigate natural hazards in Canyon County, in the following general categories:

- Policy actions
- Home and business protection measures
- Infrastructure hardening
- Resource and capability enhancements

Fifteen of the identified projects were completed prior to the 2013 plan update. Another nine were carried forward to the project list in the 2013 plan update. The remainder were left incomplete.

2.1.2 The 2013 Plan

The Canyon County All-Hazards Mitigation Plan was updated in 2013 by a planning partnership that included the County, all municipal participants from the 2006 plan, and four special-purpose districts. The updated plan assessed risk for a broader range of hazards:

- Weather Hazards
  - Drought
  - Extreme Heat
  - Extreme Cold
  - Severe Winter Storms
  - Lightning
  - Hail
  - Tornado
  - Straight Line Wind
- Geologic
  - Earthquake
  - Landslide/Mudslide
- Other Natural Hazards
  - Wildfire
  - Communicable Disease
  - West Nile Virus
  - Burrowing Rodents - Pocket Gophers

- Flooding
  - ➢ Flash Flooding
  - ➢ River Flooding
  - ➢ Dam Failure
  - ➢ Canal/Drainage Failure
- Technological (Manmade) Hazards
  - ➢ Structural Fire
  - ➢ Hazardous Material Event
  - ➢ Riot/Demonstration/Civil Disorder
  - ➢ Terrorism

Other key differences between the 2006 and 2013 plans include the following:

- Goals and objectives were identified for individual planning partners in addition to the overall County goals and objectives.
- Risk assessments were updated with new information regarding losses, historical frequencies, and impacts.
- The county description was updated to reflect local development since the previous plan.
- The wildfire risk assessment was similar to that done for the other hazards, rather than being presented as a stand-alone volume.
- A section on land use planning was added to the plan.

The 2013 plan identified 38 county-wide actions and 26 jurisdiction-specific actions to be implemented by the planning partnership. The status of these actions was monitored over the plan performance period by a plan maintenance strategy identified in the plan that included annual progress reporting.

2.2 PLAN PROGRESS

The 2013 Plan outlined a comprehensive plan maintenance strategy that included a protocol for the annual review of actions identified in the plan as well as potential changes to the risk assessment for the planning area. This strategy included no protocol for any formal progress reporting. 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.

Components of the plan maintenance strategy were applied during the performance period of the 2013 plan, with reporting on the completion of actions through a local emergency planning committee. The plan maintenance strategy included in this plan update for 2021 was informed by lessons learned from the implementation of the 2013 plan. 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 with a plan more than five years old is not able to pursue federal funding for which a current hazard mitigation plan is a prerequisite.

2.4 THE UPDATED PLAN—WHAT IS DIFFERENT?

The updated plan differs from the initial plan in a variety of ways. Table 2-1 indicates the major changes between the two plans as they relate to 44 CFR planning requirements.

Table 2-1. Plan Changes Crosswalk

44 CFR Requirement	2013 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 2013 plan followed a 15-step process that incorporated these required components. Requirement 201.6(b)(1) was addressed under Step 2 buy use of a survey and a stakeholder review workshop of the draft plan. Requirement 201.6(b)(2) was addressed through the formation of an All Hazard Mitigation Planning Committee that oversaw the implementation of the 15-step process. Requirement 201.6(b)(3) was addressed under Step 10, in which the Canyon County Comprehensive Plan and land use ordinances were reviewed against the list of ranked hazards to determine if there were any restrictions or enabling powers that affect possible hazard mitigation alternatives.	The current update was prepared through a 7-step process that included the following: • A public outreach strategy to gauge the public's perception of risk early in the process and to receive comment on the draft plan late in the process. • A strategy for agency coordination in the plan update process • A comprehensive core capability assessment process to identify existing capabilities that can support or enhance the outcomes of this plan. The process is documented in Volume 1, Chapter 3 of the plan update.
§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.	Steps 1, 3, 6, 7, 8 and 9 of the planning process involved risk assessment of four categories of hazards of concern. These risk assessments included hazard identification and mapping, vulnerability assessment, risk analysis, and severity ranking. All vulnerability analyses in the 2013 plan were qualitative, with no loss estimation based on modeling or quantifiable risk assessment best management practices.	This plan update provided a quantifiable risk analysis using models and industry best management practices. Volume 1 Part 2 presents a risk assessment of six hazards of concern. Hazard profiles are standardized for each hazard of concern, so that there is uniformity in the discussion of hazards and the information provided can support ranking of risk for each jurisdiction. Other hazards of interest were qualitatively assessed.
§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 2013 plan includes four hazard profiles that provide the following information for each hazard: • Description of the hazard • Historical frequency • Impacts • Loss estimates • Hazard evaluation	Volume 1 Part 2 presents a risk assessment for each hazard of concern including the following: • Hazard profile, including maps of extent and location, historical occurrences, frequency, severity, and warning time. • Secondary hazards • Exposure of people, property, critical facilities and environment. • Vulnerability of people, property, critical facilities and environment. • Future trends in development • Scenarios • Issues

44 CFR Requirement	2013 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	A qualitative risk analysis for each hazard category included a description of the vulnerability to each profiled hazard.	Vulnerability was assessed for all hazards of concern. The Hazus risk assessment platform was used for the dam failure, earthquake, and flood hazards. These were Level 2 (user defined) analyses using city and county data. Site-specific data on County-identified critical facilities was 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 risk assessment methodology for this plan update is described in Part 2, Chapter 6 of this volume.
§201.6(c)(2)(ii): [The risk assessment] must also address National Flood Insurance Program insured structures that have been repetitively damaged floods	The 2013 plan does not address FEMA-identified repetitive loss properties because none were identified in the Canyon County planning area at the time of the update.	The repetitive loss status remained unchanged for the current 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.	The plan includes aggregate impact analysis based on both quantitative and qualitative data.	The current update used Hazus to model impacts from dam failure, earthquake, and flood hazards. An inventory of the numbers and types of buildings exposed was generated for each hazard of concern. Critical facilities defined for the planning area were inventoried by exposure. Each hazard chapter provides a discussion on future development trends.
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.	Qualitative loss estimates were generated for all hazards profiled.	Dollar-value loss estimates were generated for all hazards of concern. These estimates 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.

44 CFR Requirement	2013 Plan	Updated Plan
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.	The 2013 includes very limited, qualitative discussion on land uses as they interface the hazards areas as well as future trends in development.	There is a discussion of the overall land use within the planning area, and a spatial analysis of land use was performed for hazards with a clearly defined extent and location. There is a discussion on future development trends as they pertain to each hazard of concern. This discussion looks predominantly at the existing land use and the current regulatory environment that dictates this land use.
§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 2013 plan's mitigation strategy includes goals for each jurisdictions, and actions by hazard type. Each action identifies the following: • The goal for the action • The objective • Description of the project • Responsible entity • Order of magnitude cost and planning horizon	The current update contains a mission statement and new goals, objectives and actions. The actions are jurisdiction-specific and strive to meet multiple objectives. The objectives of this plan are broad but measurable. All objectives meet multiple goals and stand alone as components of the plan. Each planning partner was asked to complete a capability assessment that looks at its regulatory, technical and financial capabilities.
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.	For each action in the plan, a goal and an objective are identified. The goals and objectives are not uniform, and are jurisdiction specific.	A mission statement, five goals, and 12 objectives are described in Part 3 of this volume. These components are uniform and applicable to all planning partners. Goals were adapted from those in the 2013 plan. Objectives were identified that meet multiple goals and were used to help establish priorities for the action items identified in the plan. The objectives are measurable components of the plan and are the basis for identifying and prioritizing multi-objective actions.
Requirement §201.6(c)(3)(ii): [The mitigation strategy shall include a] section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.	The plan segregates mitigation actions by hazard type and by jurisdictions, but does not categorize the actions by type, Action plan does not list alternatives that were considered in addition to the chosen action.	Volume 1, Part 3 includes a catalog of mitigation best management practices that was developed through a facilitated process. This catalog identifies actions that manipulate the hazard, reduce exposure to the hazard, reduce vulnerability, or increase mitigation capability. The catalog segregates actions by scale of implementation. A table in each planning partner's action plan analyzes each action by mitigation type to illustrate the range of actions selected.

44 CFR Requirement	2013 Plan	Updated 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.	Table 4.2.1 of the plan chronicles NFIP participation statistics. Actions were identified associated with the maintenance of NFIP compliance	All municipal planning partners that participate in the NFIP identified an action stating their commitment to maintain compliance and good standing under the program.
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.	A detailed prioritization scheme is laid out in Section 6 of the plan. This section also includes an implementation road map that addresses the four highest priority mitigation projects identified during the planning effort, and includes possible funding options.	Each recommended action was prioritized using a qualitative methodology that looked at the objectives the project will meet, the timeline for completion, how the project will be funded, project impacts, project benefits, and project costs. This prioritization is detailed in the introduction to Volume 2 of this plan
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.	The maintenance process includes a schedule for annually monitoring and evaluating the programmatic outcomes called for in the plan, and for producing a plan revision every five years.	Volume 1, Part 3 details a plan maintenance strategy for monitoring, evaluating, and updating the mitigation plan within a five-year cycle, that includes annual progress reporting.
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.	Section 5 of the plan addresses plan integration with an emphasis on land use planning. Other points for plan integration are not identified.	Volume 1, Part 3 details recommendations for incorporating the plan into other planning mechanisms, such as: • Comprehensive plan • Emergency response plan • Capital improvement programs • Municipal code Specific current and future plan and program integration activities are detailed in each participating jurisdiction's annex in Volume 2.
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.	The plan includes a strategy for continuing public involvement centered upon making the plan available to the public by appropriate County departments and outside agencies, and providing the public an opportunity to provide input into plan updates	Volume 1, Part 3 details a comprehensive strategy for continuing public involvement centered upon a hazard mitigation planning website in conjunction with annual p[progress reporting
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).	The 2013 plan was adopted by Canyon County, 8 cities and 4 special purpose districts.	Volume 1, Appendix F includes all supporting documentation for adoption of the plan by all planning partners

3. PLANNING METHODOLOGY

To develop the 2020 Canyon County Hazard Mitigation Plan, the County followed a process that had the following primary objectives:

- Secure grant funding
- Secure a support contractor
- 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 grant program. Canyon County was the applicant agent for the grant. The grant was applied for in 2017, and funding was appropriated in 2018. 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 SUPPORT CONTRACTOR AND PLANNING TEAM

Canyon 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:

- Christine Wendelsdorph, Canyon County Emergency Manager
- Rob Flaner (Tetra Tech), Project Manager/Lead project planner
- Carol Bauman (Tetra Tech), Hazus/GIS lead
- Desmian Alexander (Tetra Tech), Planner

3.3 ESTABLISHMENT OF THE PLANNING PARTNERSHIP

Canyon County opened this planning effort to all planning partners from the 2013 planning effort and any eligible local governments within the County not covered by a hazard mitigation plan. Two kickoff meetings were conducted by the planning team (on June 5, 2019 and on August 22, 2019), where a presentation was made 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 were established (see Volume 2 of this plan) for any jurisdiction wishing to link to the Canyon 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. Please refer to Volume 2, Table 2 to see which of these jurisdictions completed this process to be covered by this plan.

Table 3-1. Planning Partners

Jurisdiction	Point of Contact	Title
Canyon County	Christine Wendelsdorf	Canyon County Emergency Manager
City of Caldwell	Ashley Newbry	Project Engineer
City of Melba	Darrel Romine	Public Works Superintendent
City of Middleton	Steve Rule	Mayor
City of Greenleaf	Doug Amick	Public Services Director
City of Wilder	Steve Rhodes	Mayor
City of Nampa	Jeff Barnes	Deputy Director of Public Works
City of Notus	Nathan Wells	Councilman
City of Parma	Angela Lee	Mayor
Canyon County Ambulance District	Michael D. Stowell	Chief
Flood Control District #11	Angie Michaels	District Consultant
Golden Gate Highway District	Gordon Bates	Director of Highways
Nampa School District #131	Anita Christenson-Koons	Assessment Administrator
Wilder Rural Fire District	Steve Rhodes	Chief
Middleton Rural Fire District	Victor Islas	Deputy Chief

Southwest District Health, an Idaho state agency, expressed an interest at the outset of the planning process in participating in the hazard mitigation plan. As a state agency, Southwest District Health is covered under the Idaho State Hazard Mitigation Plan and is therefore not considered a planning partner for this plan. However, the agency acted as a contributory stakeholder in the planning process for the Canyon County plan update.

3.4 DEFINING THE PLANNING AREA

The planning area consists of all of Canyon County, plus a small portion of Gem County that is within the boundaries of the Middleton Rural Fire District. Analyses performed for this hazard mitigation plan included the Gem County portion only for the assessment of risk to fire district critical facilities. All partners to this plan have jurisdictional authority within this planning area.

3.5 THE STEERING COMMITTEE

Hazard mitigation planning enhances collaboration among diverse parties who can be affected by hazard losses. A key element of the public engagement strategy for this plan update was the formation of a stakeholder steering committee to oversee all phases of the update. The members of this committee included planning partner representatives, citizens, and other stakeholders from within the planning area. The planning team assembled a list of candidates representing interests within the planning area that could have recommendations for the plan or be impacted by its recommendations. The planning partners confirmed a committee at the kickoff meeting. Table 3-2 lists the Steering Committee members and designated alternates.

Table 3-2. Steering Committee Members

Name	Title	Jurisdiction/Agency
PRIMARY MEMBERS		
Jeff Barnes (chair)	Deputy Public Works Director (Transportation)	City of Nampa
Ashley Newbry (vice chair)	Project Engineer	City of Caldwell
Christine Wendelsdorf	Emergency Manager	Canyon County
Crash Marusich	Project Manager	Ada County Emergency Management
Mike Dimmick	District Manager	Flood Control District #10
T.J Wilson	Planner	Southwest District Health
Clint Mills	Regional Operations Manager	Idaho Power
Mark Wendelsdorf	Chief	Caldwell Fire
Michael Stowell	Chief	Canyon County Paramedics
Heidi Novich	Area Field Officer	Idaho Office of Emergency Management
Patricia Nilsson	Director of Development Services	Canyon County
Anita Christensen-Koons	Assessment Administrator	Nampa School District#131
Kirk Carpenter	Chief	Nampa Fire
Gordon Bates	Director of Highways	Golden Gate Highway District
Roxanne Wade	Communications Manager	Canyon County Dispatch
Curt Shankel	Captain	Nampa PD
Joe Decker	Public Information Officer	Canyon County
Keri K. Smith-Sigman	Emergency Manager	Destination Caldwell
DESIGNATED ALTERNATES	For	Title
Angie Michaels	Mike Dimmick	Contract Consultant
Rick Bowman	T.J Wilson	Program Specialist
Nick Oliver	Clint Mills	Senior Safety Professional
Chris King	Kirk Carpenter	Deputy Chief, Operations

Leadership roles and ground rules were established during the Steering Committee's initial meeting on August 22, 2019. 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 eight times from August 2019 through June 2020. 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 interested groups (Section 201.6.b.2). The initial coordination activity was an invitation to agencies to provide representatives to participate on the Steering Committee. 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
- FEMA Region X
- Idaho Department of Water Resources State NFIP Coordinating Office
- U.S. Bureau of Reclamation
- U.S. Army Corps of Engineers
- Idaho Silver Jackets
- Idaho Power
- Southwest District Health
- National Weather Service
- Ada County
- Gem County Emergency Management

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, as appropriate, of existing plans, studies, reports and technical information (Section 201.6.b(3)). Chapter 5 of this volume describes a review of laws and ordinances in effect within the planning area that can affect hazard mitigation actions. The following plans, codes and programs are particularly likely to affect mitigation within the planning area:

- Building codes (city and county)
- Canyon County 2020 Comprehensive Plan
- Canyon County Emergency Operations Plan (2018)
- Canyon County Hazard Mitigation Plan (2013)

- Community wildfire protection plan.
- County and city capital improvement plans and programs
- County and city municipal codes for all municipal planning partners
- Emergency management and response plans
- Idaho State Hazard Mitigation Plan
- Individual city comprehensive plans
- Land use and open space plans
- NFIP flood damage prevention ordinances (city and county)
- Stormwater management plans (city and county)
- Zoning and subdivision ordinances (city and county)

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 Canyon 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 survey to determine if the public's perception of risk and support of hazard mitigation has changed since the previous planning process.
- Leverage existing public outreach efforts implemented by Canyon 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. One member represented Canyon County citizen and property owner interests (Destination Caldwell), while all members were considered to be stakeholders in the process. 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 Website

At the beginning of the plan update process, a website was created to keep the public posted on plan development milestones and to solicit input (see Figure 3-1): https://www.canyonco.org/elected-officials/sheriff/emergency-management/. The site's address was publicized in all press releases, mailings, questionnaires and public meetings. Information on the plan development process, the Steering Committee, a hazard mitigation survey and drafts of the plan was made available on the site to the public 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.

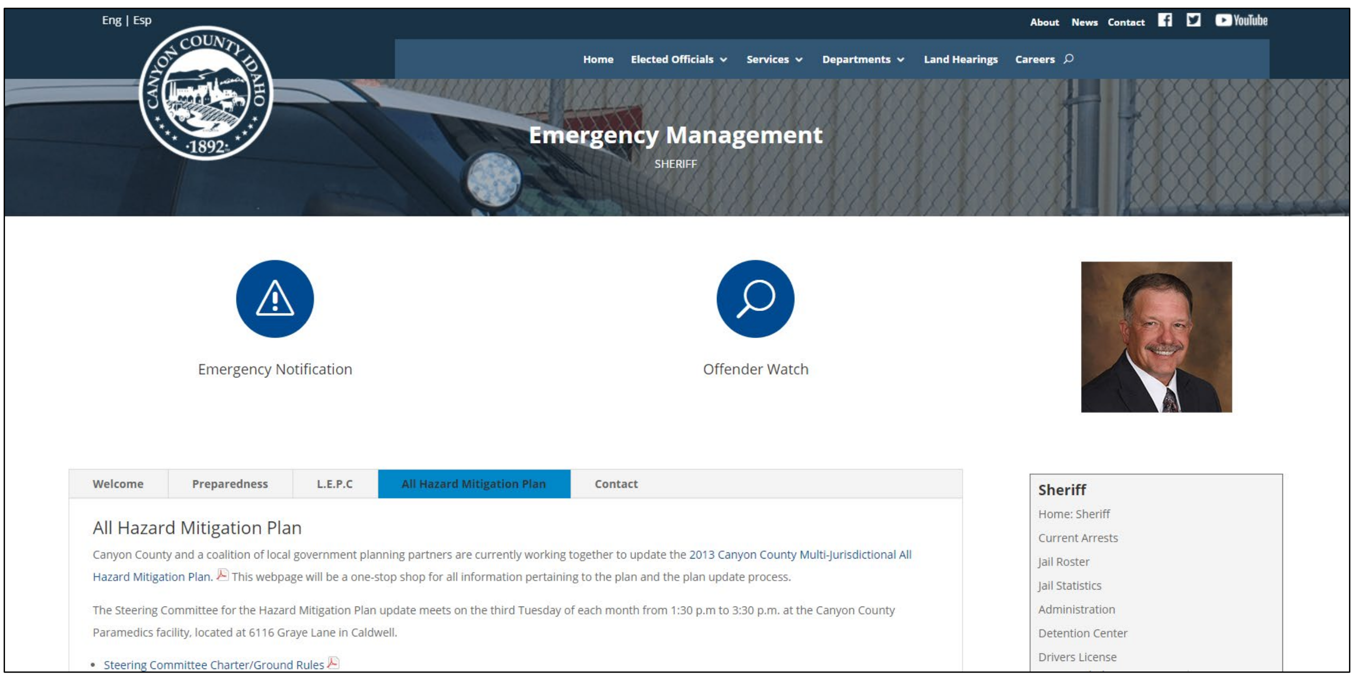
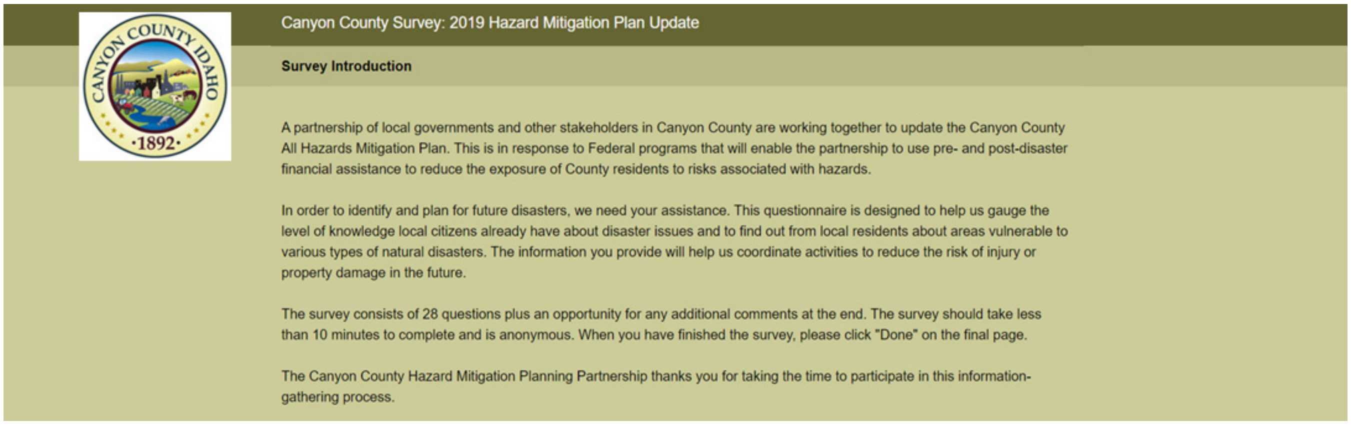


Figure 3-1. Hazard Mitigation Plan Web Site

3.8.3 Hazard Mitigation Survey

The Steering Committee deployed a survey (see Figure 3-2) 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. This survey was designed to help identify areas vulnerable to natural hazards. Responses helped guide the Steering Committee in selecting goals, objectives and mitigation strategies.



Canyon County Survey: 2019 Hazard Mitigation Plan Update

Survey Introduction

A partnership of local governments and other stakeholders in Canyon County are working together to update the Canyon 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 hazards.

In order to identify and plan for future disasters, we need your assistance. This questionnaire is designed to help us gauge the level of knowledge local citizens already have about 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 10 minutes to complete and is anonymous. When you have finished the survey, please click "Done" on the final page.

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

Figure 3-2. Sample Page from Survey Distributed to the Public

A web-based survey tool was used to develop and track the survey results. 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 Canyon County Emergency Management. The survey and the website were advertised via multiple means during the survey period. The survey was conducted from August 2018 to August of 2020. Over 530 surveys were completed, covering all geographic locations in the County. This response was much greater than the 160 surveys received for the 2013 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 Canyon County Emergency Management. The survey and a summary of results are included in Appendix B.

3.8.4 Public Meetings

Planned public meetings for this plan update process were significantly impacted by the COVID-19 pandemic. The original scope of work for this plan update process called for a two-phase public engagement strategy:

- Phase 1 involved engaging the public early in the process to gage public perception of the risk in the planning area. Phase 1 was to involve multiple media, with a focus on a centralized website, a hazard mitigation survey and public meetings.
- Phase 2 would be conducted later in the process to present the draft plan. Phase 2 would be based on an advertised public comment period, the posting of the draft plan on the website, media release and public meetings.

However, due to the impacts of the COVID-19 pandemic response, this strategy for public meetings was abandoned, emphasizing virtual means as the primary way to engage the public. The County's hazard mitigation plan website, strategic press releases, the hazard mitigation survey and an advertised two-week public comment period were the basis of the public involvement strategy for this plan update. The following sections describe these components of the strategy in lieu of public meetings

Phase 1 Public Meetings

The COVID-19 pandemic and resulting limitation on gatherings began before the scheduled Phase 1 public meetings, so all the meetings had to be canceled. The planning team concluded that the strong response to the survey and the access to the planning process made available by the hazard mitigation website met the intent of the Phase 1 outreach strategy. Therefore, no attempt was made to reschedule the Phase 1 public meetings.

Phase 2 Review of Draft Plan

A 2-week public comment period on the proposed draft of the plan was open February 8 – 22, 2021. Notices about the public comment period were posted on the County website, Facebook, and Nextdoor:

- https://www.canyonco.org/public-encouraged-to-provide-input-on-the-2021-canyon-county-all-hazard-mitigation-plan/
- https://www.facebook.com/CanyonCo/posts/10160668472294418
- https://nextdoor.com/city/feed/?post=176408274

No public meetings were conducted due to the COVID-19 pandemic. Citizens and interested stakeholders were asked to provide comment to the Core planning team via the hazard mitigation plan website. No formal comments were received on the draft plan during the public comment period.

3.8.5 Public Involvement Results

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 surveys completed (all completed via the internet)—537
- Surveys were received from 11 of the 14 planning areas identified with over 84 percent coming from the cities of Caldwell and Nampa. Houston, Riverside and Roswell had no response.
- Respondents rated the following hazards as those that concern them the most (ranked in order of concern): severe weather, household fire, drought, canal failures, hazardous materials, wildland fire, earthquake, flood, dam failure and landslide.
- Thirty-eight percent of respondents were either concerned or very concerned about impacts from climate change on the planning area.
- The majority of respondents felt that they could survive for 4 to 7 days following a hazard event.
- Almost 50 percent of respondents stated that they did not consider the impacts of natural hazards before purchasing their home; over 73 percent of respondents stated that the presence of natural hazard risk was not disclosed to them at the time of purchase.
- Over 70 percent of the respondents stated that disclosure of hazard information would influence their decision to buy or rent a home.
- The concept of incentives to promote hazard mitigation actions on a personal scale was strongly supported, with over 75 percent of the respondents supporting a property tax break or incentive to encourage them to spend money to retrofit their homes.
- Over 70 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 post-high school education.
- Fifty-eight “write-in” comments were received from the surveys.

All survey results were provided to the Steering Committee for review in support of confirming the guiding principle, goals, objectives and countywide 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.

3.8.6 Impacts of COVID-19 Response on Plan Update Process

The local and national response to the COVID-19 pandemic had significant impacts on the process of updating the Canyon County Hazard Mitigation Plan. The plan update process was about half-finished in March 2020 as the first cases began to be reported in Idaho. The Steering Committee meeting for March was postponed in response to the Governor's statewide "stay-at-home" order issued on March 25, 2020. As COVID-19 impacts continued to rise, Canyon County became a focal point as it consistently reported among the highest numbers in the state. From March through August, progression on the hazard mitigation plan stopped, as all planning partners dealt with responding to COVID-19. Attempts to conduct the planning process virtually achieved little success.

The resulting gap in the planning process led to some attrition in the planning partnership, as some of the committed planning partners were not able to fulfill their planning partner expectations. Partners who did fully participate in the plan update process are covered by this 2021 plan. Those who did not will have to seek compliance with the provisions of the Disaster Mitigation Act via other avenues such as the linkage procedures prescribed by this plan or preparing their own plans.

The planning partners covered by this 2021 plan update remain committed to all eligible local governments within Canyon County and will continue to coordinate with non-participating planning partners through implementation and maintenance of this plan.

3.9 PLAN DEVELOPMENT CHRONOLOGY/MILESTONES

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

Table 3-3. Plan Development Milestones

Date	Event	Description	Attendance
2019			
4/19	County selects Tetra Tech to facilitate plan update	• Support contractor secured	N/A
5/6	Organize Resources	Planning Team formed consisting of: • Dave Schorzman, Canyon County Emergency Management • Christine Wendelsdorf (replaced Dave after his retirement) • Rob Flaner, Tetra Tech • Carol Baumann, Tetra Tech • Des Alexander, Tetra Tech	N/A
6/5	Organizing Resources	• Planning partner kickoff meetings conducted by planning team to explain planning partner expectations and the letter-of-intent process and to get recommendations for Steering Committee members	4
8/22	Steering Committee Meeting #1	• Project overview • Organize planning partnership • Organize Steering Committee and establish ground rules • Plan review (state plan and prior Canyon County plan) • Discuss public involvement strategy	14

9/17	Steering Committee Meeting #2	• Finalize Steering Committee ground rules
		• Plan review
		  ○ Idaho State Hazard Mitigation Plan
		  ○ 2013 Canyon County Plan
		• Goal setting—The mission/vision statement
		• Public outreach strategy
			22

9/24	Phase 1 Public Outreach	Hazard mitigation plan website launched. https://www.canyonco.org/elected-officials/sheriff/emergency-management/	N/A

10/15	Steering Committee Meeting #3	• Planning partner status, letters of intent
		• Goal Setting
		  ○ Goals
		  ○ Objectives
		• Public outreach
		  ○ The survey
		  ○ The website
			22

11/19	Steering Committee Meeting #4	• Planning partner status, letters of intent • Finalize objectives • Define critical facilities/infrastructure • Public outreach strategy	16
12/9	Phase 1 Public Outreach	Hazard mitigation survey deployed https://www.surveymonkey.com/r/CanyonCo_Aware	N/A
12/10	Steering Committee Meeting #5	• Planning partner status • Finalize revised objectives • Phase 1-Jurisdictional Annex Process • Public Outreach strategy-Phase-1 public meetings	9

Date	Event	Description	Attendance
2020			
2/18	Steering Committee Meeting #6	• Planning partner status, Phase 1 annex status • Risk assessment update • Jurisdictional annex process, Phase 2 • Plan maintenance strategy • Public outreach strategy, Phase 1 public meetings	13
5/19	Steering Committee Meeting #7 (Virtual)	• Jurisdictional annex process, Phase 3 • Risk assessment results • Finalize plan maintenance strategy • Public outreach strategy, cancel Phase 1 due to COVID-19	11
6/16	Steering Committee Meeting #8 (Virtual)	• Where are we at in light of COVID-19? • Phase 3, jurisdictional annex meeting logistics • Core capability exercise results • Public outreach strategy, course correction options	8

6/23	Jurisdictional Annex Process	Phase 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
			11

2021			
2/8	Public Outreach	Opening of 2-week final public comment period	N/A
2/22	Public Outreach	Closure of 2-week final public comment period	N/A
3/26	Plan Review	Submittal draft of the plan submitted to Idaho Office of Emergency Management for review and approval	N/A
5/17	Plan Review	Approval Pending Adoption received from FEMA Region X	N/A
5/18	Adoption	Adoption window for planning partners opens	N/A
6/1 – 8/6	Approval	Proof of adoption documentation submitted to FEMA Region X and the Idaho Office of Emergency Management	N/A
8/11	Approval	Final approval of the plan by FEMA Region X	N/A

4. CANYON COUNTY PROFILE

Canyon County is a well populated area in southwest Idaho along the Oregon state border. The County received its name from the Snake River canyon, which forms a natural boundary for the County. It covers 603.55 square miles. To the north it is bordered by Payette County, Idaho. On the northeast corner it is bordered by Gem County, Idaho. To the east, it is bordered by Ada County, Idaho. Owyhee County, Idaho borders it on the south. On the west it is bordered by Malheur County, Oregon.

The county was created from a portion of Ada County by act of the Legislature on March 7, 1891. Canyon County is the second most populous county in Idaho and the seventh smallest in area. It is the home of the College of Idaho, Northwest Nazarene University, the World War II Warhawk Air Museum, and the Train Depot Museum. Its county seat is in Caldwell.

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

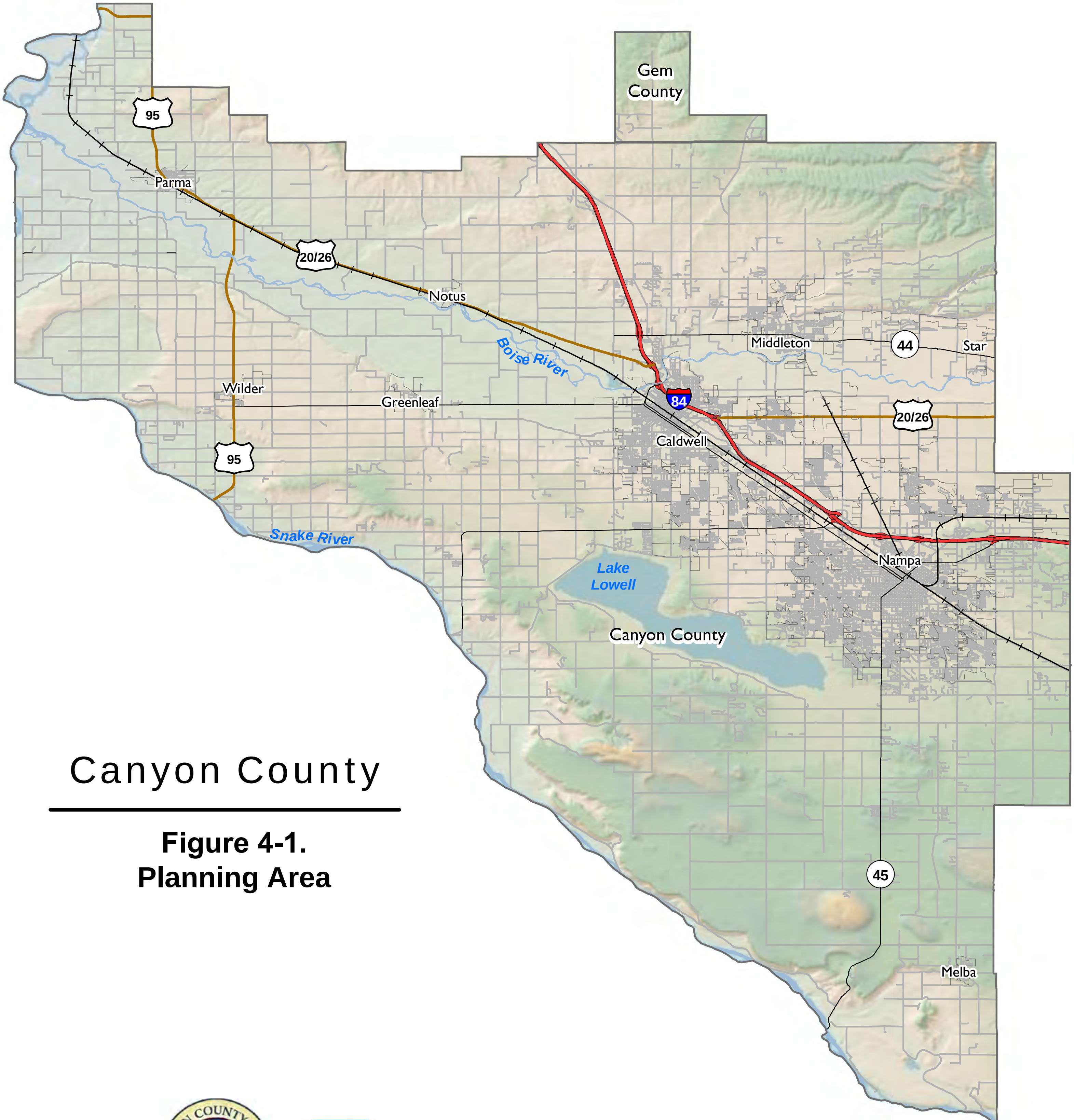
4.1 HISTORICAL OVERVIEW

Native Americans are known to have inhabited the Canyon County area at least 14,000 years ago (Canyon County, 2020). Emigrants traveled through the area on the Oregon Trail. The Oregon Short Line Railroad, completed in 1883, ran through the city of Nampa. Early inhabitants of the county were Oregon Trail settlers, Chinese immigrants, Quakers, and homesteaders. The county's economy was based on farming.

The first settlement in Canyon County was Fort Boise, established in 1834 by the Hudson's Bay Company near where the Boise River meets the Snake River, in what is now the city of Parma. Fort Boise was a shelter that provided rest for the travelers traveling along the Oregon Trail. It was abandoned in 1855.

Middleton was another of the oldest settlements in the County, so named because it was midway between Boise and an old ferry on the Snake River. The city had a stage station in the early days of the Oregon Trail, a post office, and a water powered grist mill. Middleton's land was parceled out in 1863 by William Montgomery. In 1872 the Boise River flooded and cut a new channel that isolated the town on an island; as a result, the town moved to a new location in the years after 1880.

In the 1870s and 1880s, the City of Caldwell was settled by Chinese immigrants. The town quickly became central in Idaho's aggressive anti-Chinese backlash in the 1886 convention of the Anti-Chinese League in Boise. By 1890, every immigrant had been driven from town by social pressures or violence. Later, when Canyon County was instituted in 1891, Caldwell became the County Seat.



Canyon County

Figure 4-1.
Planning Area

Data Sources: Boundaries: Canyon County GIS, 2020;
Districts: ID State Tax Commission, 2020; Basemap: ESRI, 2020

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The City of Nampa was settled in the early 1880s with construction of the Oregon Short Line Railroad from Granger, Wyoming to Huntington, Oregon. Unlike most towns where the streets run true north and south, Nampa built its streets perpendicular to the railroad tracks going northwest to southeast. The name “Nampa” came from a Shoshone word meaning either moccasin or footprint. Many of the first settlers referred to the town as “New Jerusalem” because of the strong religious focus of its citizens. The town grew quickly and became an important city in Canyon County.

Early Quaker settlers founded the City of Greenleaf in 1900. The City was named after a Quaker poet and abolitionist John Greenleaf Whittier. Most settlers in the Greenleaf area were dry land farmers and started the first fruit orchards in Canyon County.

Homesteaders arriving as early as 1904 settled in the City of Wilder. They came with the hope of irrigation water being provided soon with the development of the Boise Project—a dam for irrigation. The area bloomed into one of the most fertile agricultural regions in the nation. In 1909, a railway was constructed from Caldwell to Wilder.

Melba was the last city to be settled in Canyon County. Pioneers who homesteaded south of Melba near the Snake River were nearly 20 miles away from the nearest town. Clayton C. Todd, passing through the area on his way to Alaska to search for gold, heard about a new sale of state land and in 1912 purchased 160 acres along a siding on the railroad. He laid out a town there and named it after his daughter. The City of Melba became a boom town with stores, lumberyards, blacksmith shops and gas stations. Melba was also a well-known farming community that raised highbred sweet corn seed after the First World War.

Early Canyon County was known for farms and crops. The land was also used for cattle, ranching, and dairy settlement. The ability to irrigate farms and cropland from the Boise Project Dam, the Boise River, and the Snake River made the County an opportune place for farming homesteaders to settle into.

4.2 MAJOR PAST HAZARD EVENTS

Presidential disaster declarations are issued for hazard events that cause more damage than state and local governments can handle on their own. A presidential disaster declaration puts federal recovery programs into motion to help disaster victims, businesses and public entities. The Canyon County planning area has experienced eight 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
Idaho COVID-19 Pandemic	DR-4534	1/20/2020
Idaho Flooding	DR-4342	3/29/2017
Idaho Drought	EM-3040	05/7/1977
Idaho Flood	DR-143	2/14/1963[a]
Idaho Flood	DR-120	2/14/1962[a]
Idaho Flood	DR-116	6/26/1961[a]
Idaho Flood	DR-76	5/27/1957[a]
Idaho Floods	DR-55	4/22/1956[a]

a. Declarations prior to 1964 are Idaho-statewide, not Canyon-County-specific; FEMA did not begin distinguishing declarations by county until 1964.
Source: FEMA 2020

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.

4.3 PHYSICAL SETTING

4.3.1 Geography and Topography

Canyon County consists of 587 square miles of land and 16 square miles of surface water. The County is generally level, with some rolling hills and bench terrain. The most prominent and populated area of the County is near the cities of Nampa and Caldwell, alongside the Boise River.

Canyon County is generally level with some rolling and bench terrain. It is entirely on the Snake River plain, between the Snake River to the south and the foothills of the central Idaho Mountains to the north. The Boise River empties into the Snake River near Parma at an elevation of 2,100 feet.

4.3.2 Water

The Boise River has a wide floodplain and becomes a braided stream as it crosses the northern part of the County west, entering the Snake River at the Idaho-Oregon border west of Parma. The Boise River provides agricultural irrigation, hydroelectricity, drinking water, fishing, and recreational activities. Many small streams, rivers, canals, lakes, and reservoirs in the county also provide for recreational activity. Lake Lowell is part of the Boise Project, 5 miles southwest of Nampa. It covers 14 square miles and has 28 miles of shoreline. This reservoir provides for boating, fishing, and wildlife viewing. The total withdrawal of fresh water for public supply in Canyon County is 24.8 million gallons per day, all of it from groundwater.

4.3.3 Climate

Canyon County's average winter temperature is 40 ºF, with an average low of 28 ºF. The average summer temperature is 52 ºF, with an average daily high of 87 ºF. Prevailing winds blow from the northwest during warm months and from the southeast the rest of the year, averaging about 6 miles per hour. Annual precipitation averages 10.5 inches, with 70 percent of it falling in from November through March. Seasonal snowfall averages 16 inches at Caldwell and 22 inches in Parma. Table 4-2 summarizes climate in Canyon County.

Table 4-2. Percent of Monthly Climate Summary: 1981-2010

Average	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec	Annual
Maximum Temperature (ºF)	38.8	46.8	58.6	66.5	75.7	84.6	93.7	92.9	82.0	67.4	50.2	38.5	**66.4**
Minimum Temperature (ºF)	22.9	26.2	32.9	38.0	46.2	53.1	59.9	57.0	46.8	37.3	29.3	22.3	**39.4**
Total Precipitation (inches)	1.41	0.95	1.29	1.07	1.20	0.64	0.26	0.28	0.51	0.71	1.18	1.60	**11.10**
Total Snowfall (inches)	6.5	3.7	1.7	0.6	0.1	0	0	0	0	0.1	2.3	5.7	**20.7**

Source: NCDC, 2020

4.3.4 Vegetation

Canyon County is vegetated in the uplands with sagebrush, rabbitbrush, and Great Basin wild rye. Aquatic vegetation such as smartweed is found around lakes and marsh areas. Areas around the lakes and rivers also are home to cottonwood, peachleaf willow, coyote willow, Russian olives, and salt cedars.

Canyon County is one of the nation's major agricultural producers, specializing in seed and vegetable crops. The County has shifted away from large farms to small farms that produce specialized crops such as lavender, grape seed oil, vineyards, berry and fruit farms, and other oil seeds for small bio-fuels projects. The County's dry climate and ability to divert irrigation water from reservoirs to farms and ranches make it possible to raise specialty crops that can be grown in few other places in the world. Tree farms in Canyon County grow fruit trees, ash, birch, maple, locust, aspen/poplar, and willow trees.

4.3.5 Geology

The rocks in most of Canyon County are stratified glacial sediment, made of clay, silt, and minor sand. Such sediment is caused by distal deposits of glacial floods and outwash. In the uplands, deposits of alluvium, made from gravel, sand and silt, can be found. Basalt and lava flows, along with pyroclastic debris, can be found near the Snake Plain Canyon. The southeastern part of the County is covered in sandstone, limestone, claystone, shale, and siltstone.

4.3.6 Soils

Much of Canyon County is underlain by quaternary alluvium of the Boise River and Pleistocene gravel from glacial outwash. This gravel forms high benches above the Boise River. Soils in the county vary in texture and richness, based on elevation and water supply. Areas at elevations of about 2,200 to 2,700 feet, such as where the Boise River meets the Snake River, are the most cultivated soils. These areas are well-suited for intensive cultivation due to adequate amounts of excellent quality water. The principal crops grown are alfalfa, clover seed for hay, winter and spring wheat, field corn, sweet corn, hybrid sweet corn, sugar beets, potatoes, hops, onions, beans, and barley. Specialty crops are also grown here.

Areas at elevations of about 3,000 feet, such as at Pickles Butte, are bordered by escarpments 400 to 500 feet high that extend along the Snake River for several miles. Terraces in these areas consist of stream-laid and lacustrine deposits. Soils in these south facing slopes are more suitable for cherry, plum, peach, and apple orchards.

Found in swales and depressions in floodplains is Chance fine sandy loam, generally on slopes of less than 1 percent—usually a gray fine sandy loam that is mottled, micaceous, and non-calcareous. This soil has a moderately rapid permeability and is poorly to very poorly drained. It is used for pasture and wildlife habitat.

4.4 DEVELOPMENT

4.4.1 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. Canyon County's land is used primarily for agriculture; 84 percent of the county's land, totaling 322,800 acres, is used by irrigated farms.

Even though population and urbanization are increasing in the unincorporated county, the County has adopted the following land uses to promote community values for the benefit of future generations:

- **Agriculture**—The agricultural land use designation is the base zone throughout Canyon County. It contains areas of productive irrigated croplands, grazing lands, feedlots, dairies, seed production, rangeland, and ground of lesser agricultural value.
- **Residential**—The residential designation is a zone specifically set aside for residential development. A minimum lot size is established in order to accommodate a septic system and well on the same parcel. In areas where soils are not adequate to support septic systems, development alternatives must be considered. Residential development should be within areas that demonstrate a development pattern of residential land uses.
- **Commercial**—Commercial designations allow for a variety of commercial uses that provide goods and services to businesses, travelers and residents of the county.
- **Industrial**—The industrial category is for the general industrial needs of the county. Land uses in this category may have a mix of commercial or industrial uses that consist of assembly, fabrication, manufacturing or processing of goods and materials.

Canyon 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. The ability to manage and control the use of one's property, as well as privacy and enjoyment of land without unreasonable interference from another landowner's activities, are values that the Canyon County community was built on.

The County seeks to locate commercial areas near residential customers and to buffer residential areas from mineral resource and industrial areas, locating agricultural and natural resources areas between them (Canyon County 2020 Comprehensive Plan).

The chief uses of Canyon County's land and natural resources other than agriculture are recreation and education:

- Parks and recreational attractions include the following:
  - Deer Flat National Wildlife Refuge, which serves as a habitat for many fish and bird species and provides opportunity for volunteering, learning about the area's wildlife, and recreational activities such as hiking and fishing
  - The Ward Memorial State Park
  - Snake River Birds of Prey National Conservation Area
- Colleges in the County include the following:
  - Northwest Nazarene University in Nampa
  - The College of Idaho in Caldwell
  - Canyon College in Caldwell
  - Treasure Valley Community College in Caldwell

4.4.2 Land Ownership

The majority of Canyon County's land is privately owned. The rest of land is owned by Canyon County, the State of Idaho, cities, or the federal Bureau of Land Management.

4.4.3 Building Count, Occupancy Class and Estimated Replacement Value

Table 4-3 presents planning area building counts by occupancy class. Figure 4-2 shows the distribution of occupancy classes in Canyon County. Table 4-4 summarizes estimated replacement value for building structures and contents combined.

Table 4-3. Planning Area Building Counts by Occupancy Class

	Number of Buildings							
	Residential	Commercial	Industrial	Agricultural	Government	Religion	Education	Total
Caldwell	16,782	1,099	55	9	2	17	6	**17,970**
Greenleaf	291	24	0	0	0	1	0	**316**
Melba	182	42	1	0	3	4	3	**235**
Middleton	3,032	107	1	3	0	5	4	**3,152**
Nampa	29,116	1,986	65	16	5	26	11	**31,225**
Notus	206	19	0	1	0	1	0	**227**
Parma	622	125	5	1	1	5	1	**760**
Star	11	0	0	0	0	0	0	**11**
Wilder	484	56	2	1	3	4	0	**550**
Unincorporated	19,148	595	42	20	1	18	3	**19,827**
Total	**69,874**	**4,053**	**171**	**51**	**15**	**81**	**28**	**74,273**

Table 4-4. Estimated Replacement Value of Planning Area Buildings

Jurisdiction	Estimated Total Replacement Value (Structure and Contents)	Jurisdiction	Estimated Total Replacement Value (Structure and Contents)
Caldwell	$10,388,000,000	**Notus**	$84,000,000
Greenleaf	$160,000,000	**Parma**	$673,000,000
Melba	$237,000,000	**Star**	$3,000,000
Middleton	$1,622,000,000	**Wilder**	$259,000,000
Nampa	$20,698,000,000	**Unincorporated**	$11,771,000,000
		Total	**$45,895,000,000**

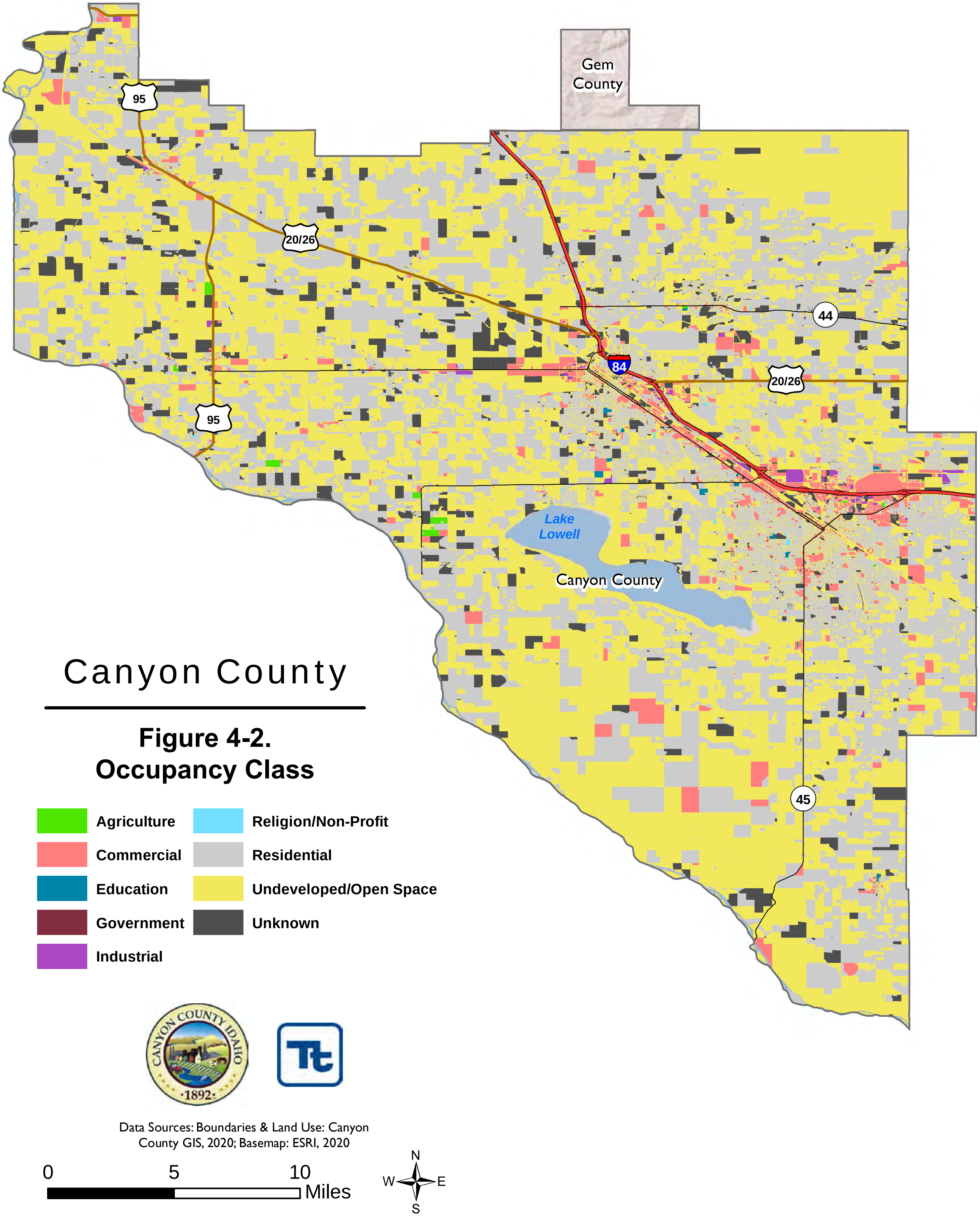
Source: Canyon County tax parcel data.

4.4.4 Critical Facilities

Critical facilities 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.

2013 Canyon County Hazard Mitigation Plan

The 2013 plan did not define critical facilities. It includes a list of what was identified as “essential facilities” and refers to a County Threat and Hazard Identification and Risk Assessment, but there was no definition.



Canyon County

Figure 4-2. Occupancy Class

- Agriculture
- Commercial
- Education
- Government
- Industrial
- Religion/Non-Profit
- Residential
- Undeveloped/Open Space
- Unknown

Data Sources: Boundaries & Land Use: Canyon County GIS, 2020; Basemap: ESRI, 2020

Current Steering Committee Recommended Definition

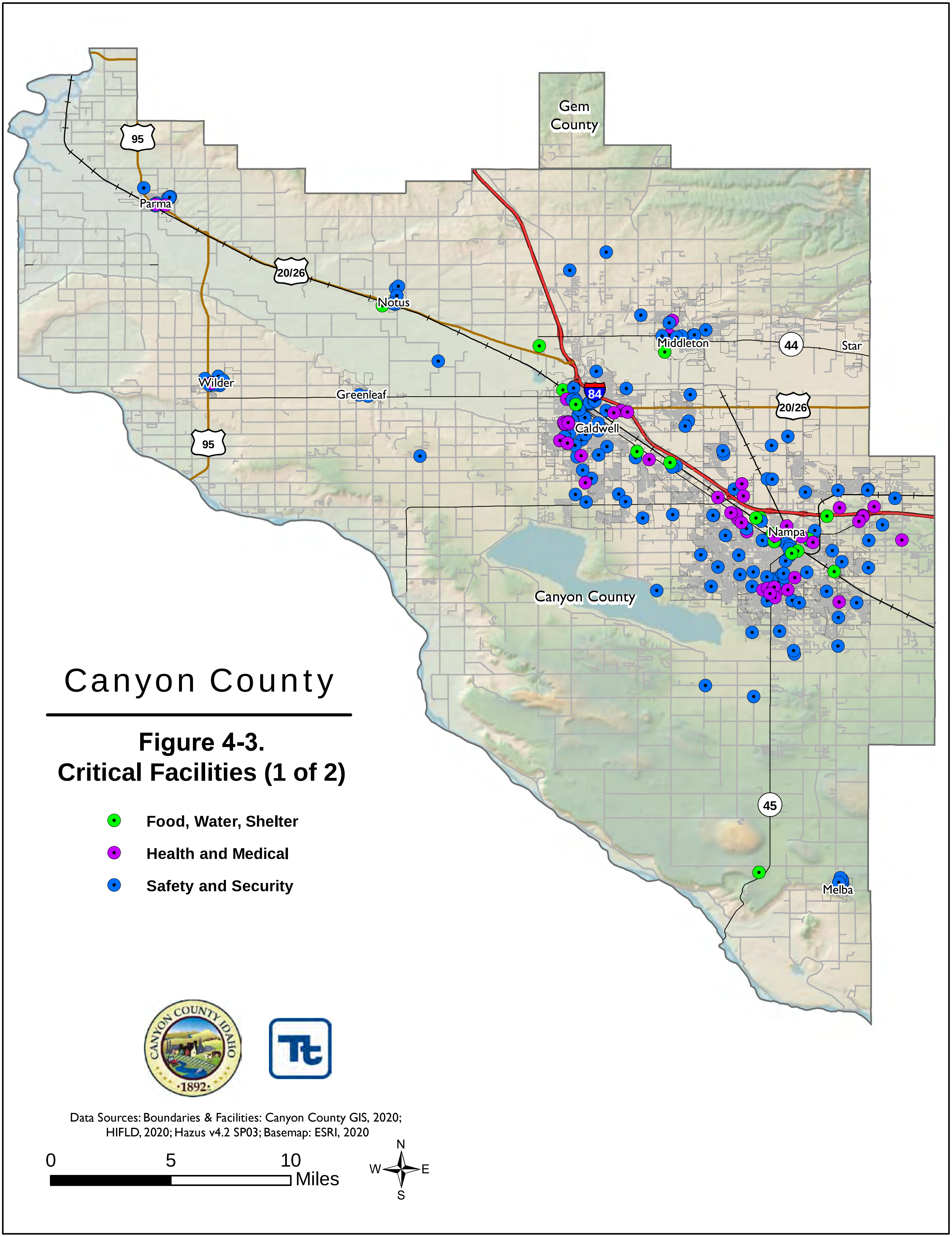
The Steering Committee recommended that this plan update include a clearly defined definition of critical facilities that aligns with FEMA's "community lifelines" concept. This will better position the County for future funding under FEMA emerging grant programs and initiatives. Through a facilitated exercise, the Steering Committee crafted the following definition of critical facilities for this plan:

> A structure, facility or other improvement that, because of its function, service area, or uniqueness, provides service that enables the continuous operation of critical business and government functions, and is critical to human health and safety, or economic security. For the purposes of this hazard mitigation plan, the following categories of lifelines are defined as critical facilities:
>
> - **Safety and Security**—Law enforcement/security, search and rescue, fire services, government service, responder safety, and imminent hazard mitigation
> - **Food, Water and Shelter—**Evacuations, schools, food/potable water, shelter, durable goods, water infrastructure and agriculture
> - **Health and Medical**—Medical care (hospitals), patient movement, public health, fatality management, health care and supply chain
> - **Energy**—Power (grid), temporary power and fuel
> - **Communications**—Infrastructure, alerts, warnings, messages, 911 and dispatch, responder communications and financial services
> - **Transportation**—Highway/roadway, mass transit, railway, aviation, maritime and pipeline
> - **Hazardous Materials**—Facilities, hazardous debris, pollutants and contaminants

General locations of identified critical facilities are shown on Figure 4-3 and Figure 4-4. Table 4-5 provides a summary of the general types of critical facilities, respectively, in the planning area as defined for this update. All critical facilities 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.

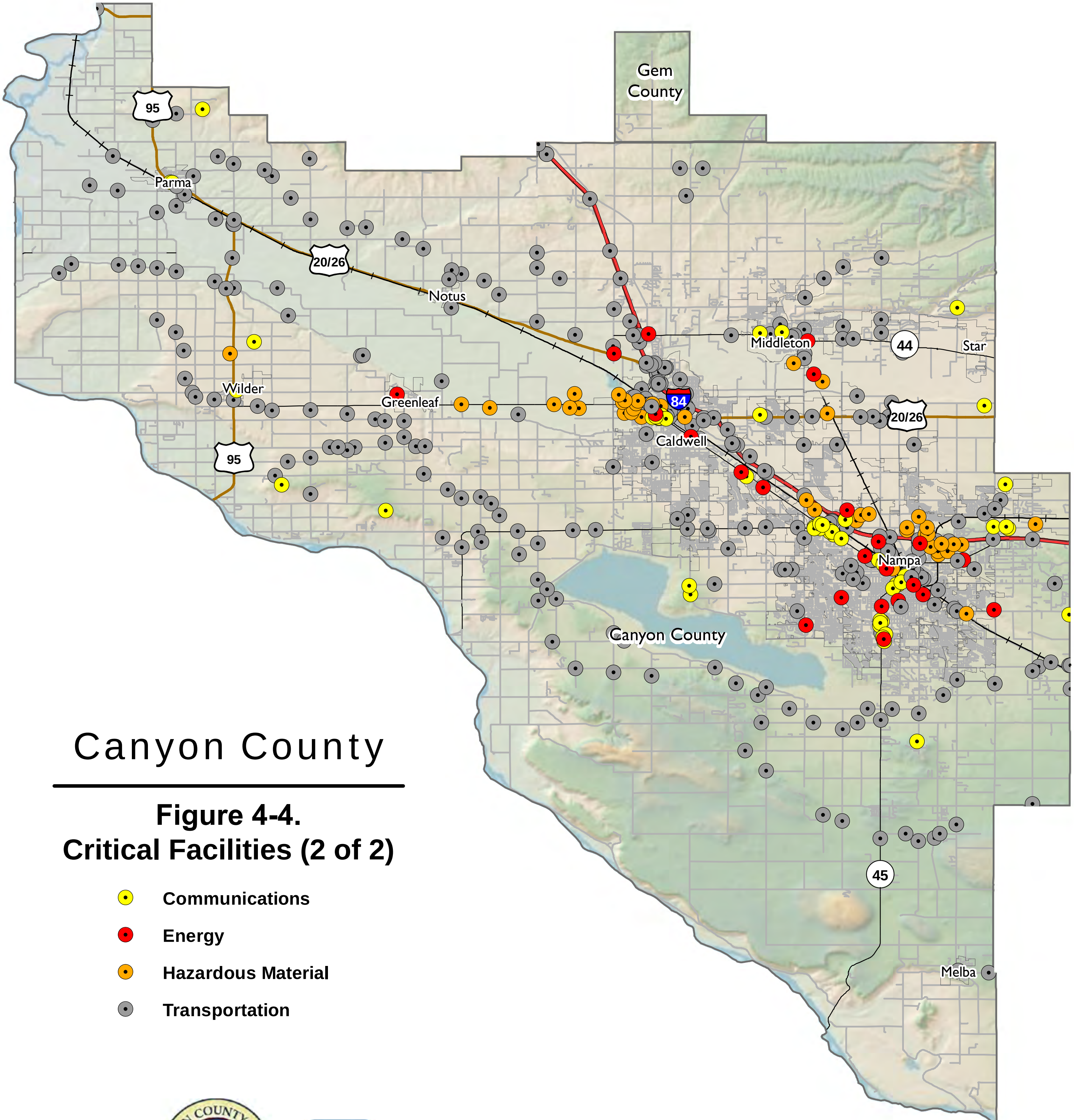
Table 4-5. Critical Facilities by Jurisdiction and Category

	Communications	Energy	Food, Water, Shelter	Hazardous Material	Health & Medical	Safety & Security	Transportation	Total
Caldwell	10	4	4	11	14	40	46	**129**
Greenleaf	0	0	0	0	0	2	0	**2**
Melba	0	0	0	0	0	5	1	**6**
Middleton	2	2	0	1	2	10	9	**26**
Nampa	29	14	9	17	30	53	61	**213**
Notus	0	0	1	0	0	3	0	**4**
Parma	2	0	0	0	2	7	3	**14**
Star	0	0	0	0	0	0	0	**0**
Wilder	1	0	0	0	1	11	0	**13**
Unincorporated	12	3	3	14	2	21	198	**253**
Total	**56**	**23**	**17**	**43**	**51**	**152**	**318**	**660**



Canyon County

Figure 4-3.
Critical Facilities (1 of 2)



Canyon County

Figure 4-4. Critical Facilities (2 of 2)

- Communications
- Energy
- Hazardous Material
- Transportation

Data Sources: Boundaries & Facilities: Canyon County GIS, 2020; ITD 2020; EPA 2020; HIFLD, 2020; Hazus v4.2 SP03; Basemap: ESRI, 2020

0 5 10 Miles

N W E S

4.4.5 Development Trends

According to the *Canyon County 2020 Comprehensive Plan*, the population in the County has more than doubled over the last 30 years. This population grown has spurred a transition in land uses in the County from rural (agricultural) to urban/suburban (residential/commercial) development. Land use in Canyon County faces pressures to accommodate its own population growth and housing expansion as a bedroom community for Boise. Unlike many of the counties in Idaho, 94 percent of Canyon County is privately owned. Although 84 percent of Canyon County is agricultural, Canyon County lost 25 percent of its agricultural lands to development between 2002 and 2007 due to phenomenal growth in the Treasure Valley. Available irrigated farmland declined by 12 percent from 1987 to 2007 to accommodate non-agricultural growth (residential housing, commercial construction, roads and parks, among others).

The *Canyon County 2020 Comprehensive Plan* is the primary document that guides land use in unincorporated areas of Canyon County. Each incorporated city included in this hazard mitigation plan has its own comprehensive plan. These plans are tools to ensure that governing bodies take actions that the community has determined to be the most orderly, beneficial and supportive of the community vision. 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.

Land resources in Canyon County are extremely valuable and should be used in a constructive manner. The goals in the Land Use Section of the comprehensive plan are based on managing growth while protecting the land as a valuable resource. The goals seek to establish policies that ensure orderly, rather than explosive growth. Mitigation techniques are used to manage incompatible land uses and policies and direct land use development in areas that are favorable for future community services. The overall land use goal seeks a balance between development and agriculture, which is the basis of the County's economy.

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 Canyon County 2020 Comprehensive Plan* is incorporated by reference into the *Canyon 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.

4.5 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 can assist the County in extending focused public outreach and education to these most vulnerable citizens.

4.5.1 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.

Historical Population

Canyon County has the second largest population of Idaho's 44 counties, with an estimated 2020 population at 234,820. Table 4-6 shows the population of the cities of Caldwell and Nampa, Canyon County unincorporated areas, and Canyon County in total from 2010 to 2020. Caldwell and Nampa are the largest cities in Canyon County, together accounting for 67.6 percent of the planning area's population in 2010 and 71.6 percent in 2020. Unincorporated areas accounted for 26.5 percent of the planning area's population in 2010 and about 21.7 percent in 2020. Overall growth in unincorporated areas was 1.5 percent from 2010 to 2020; the City of Caldwell grew 32.4 percent during the same timeframe, and the City of Nampa grew 31.0 percent.

Table 4-6. City and County Population Data

	City of Caldwell	City of Nampa	Unincorporated County	Canyon County Total[a]
2010	46,237	81,557	50,179	**188,923**
2011	46,730	81,920	50,160	**189,850**
2012	46,800	82,160	50,390	**190,400**
2013	47,580	83,840	50,270	**192,970**
2014	47,440	84,840	54,270	**198,160**
2015	51,880	89,210	53,800	**207,790**
2016	52,620	90,860	51,360	**208,180**
2017	54,120	96,820	50,560	**215,430**
2018	56,860	98,370	46,900	**217,180**
2019	58,830	102,030	48,020	**224,540**
2020	61,210	106,860	50,960	**234,820**

a. Canyon County total population also includes the cities of Greenleaf, Melba, Middleton, Notus, Parma, and Wilder, which are not shown on this table.

Data Source: https://www.compassidaho.org/prodserv/demo-current.htm

Historical Growth Rate

Population growth rate is a useful socio-economic indicator. 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. The County has experienced faster growth than the state for most of that period, especially from the mid-1990s through the mid-2000s.

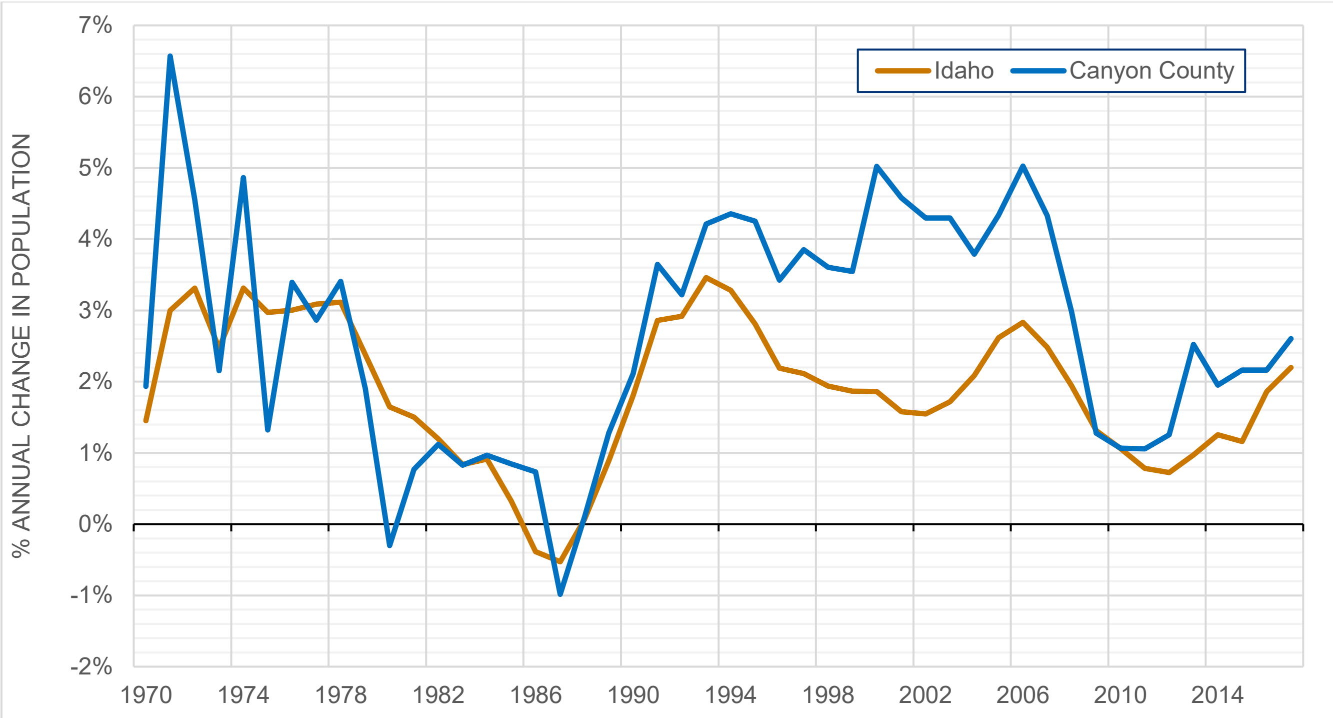


Figure 4-5. Idaho and Canyon County Population Growth

4.5.2 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 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 Canyon County is illustrated in Figure 4-6. Based on Census Bureau estimates, 13.2 percent of the planning area's population is 65 or older, compared to the state average of 12.3 percent; 24.4 percent of the County's population is 14 or younger, compared to the state average of 23 percent. According to U.S. Census data, 6.7 percent of the County's over-65 population have incomes below the poverty line. Children under 18 account for 15.1 percent of individuals who are below the poverty line (U.S. Census, 2018).

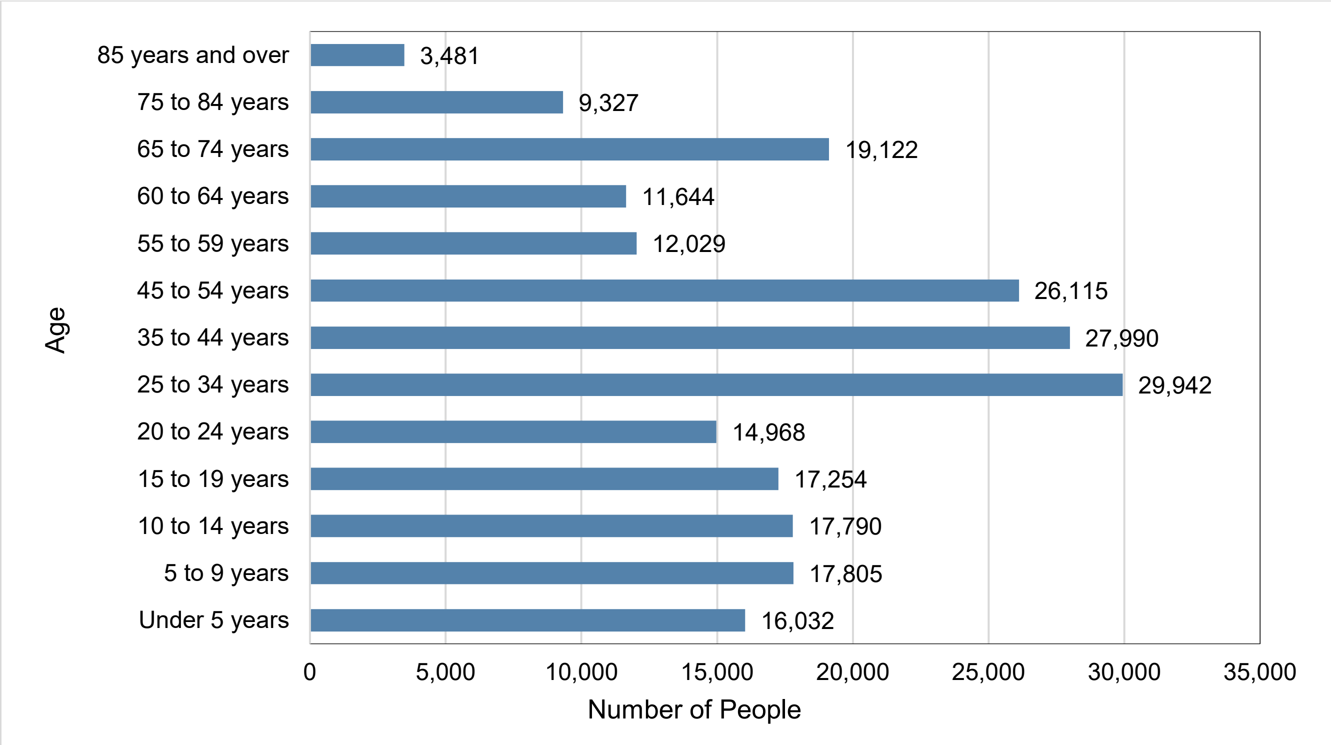


Figure 4-6. Planning Area Age Distribution

4.5.3 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 82.7 percent. The largest non-white racial segments are "some other race" at 10.9 percent and "two or more races" at 4.5 percent. Figure 4-7 shows the racial distribution in the planning area.

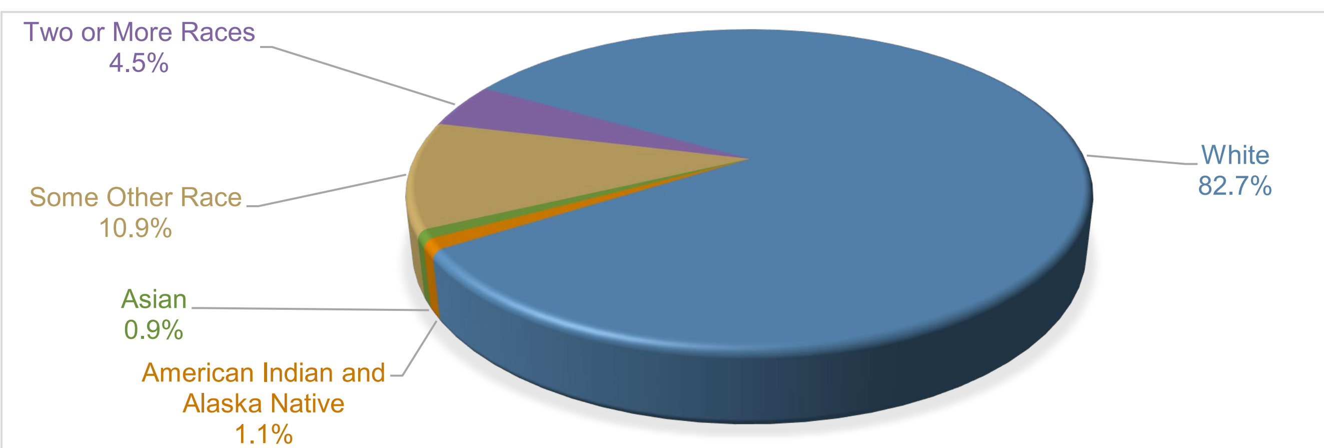


Figure 4-7. Planning Area Race Distribution

Canyon County has an 8.3-percent foreign-born population. Other than English, the most commonly spoken language in Canyon County is Spanish. The census estimates 7.1 percent of the county's residents speak English "less than very well" (U.S. Census, 2018).

4.5.4 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 4-7 summarizes the estimates of disabled people in the planning area. According to U.S. Census data, 15 percent of Canyon County's non-institutionalized civilian population has a disability.

Table 4-7. Disability Status of Non-Institutionalized Population

Age	Persons with a Disability	Percent of Age Group
Under 18 years	2,761	6.0
Age 18 to 64 years	19,049	14.8
Age 65 years and over	11,606	36.9

Source: U.S. Census, 2020

4.6 ECONOMY

4.6.1 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.

Based on U.S. Census Bureau estimates, per capita income in Canyon County in 2018 was $20,807, and the median household income was $49,143. According to the Census Bureau's American Community Survey, 12.6 percent of households in the county receive an income between $100,000 and $149,999 per year and 3.7 percent of the county's household incomes are above $150,000 annually. The Census Bureau estimated 7.4 percent of families in Canyon County below the poverty level in 2018.

4.6.2 Industry, Businesses and Institutions

According to the U.S. Census, Canyon County's economy is strongly based in the educational services industry (21.1 percent), followed by construction (16.8 percent) and the retail trade (14.0 percent). Information and agriculture make up the smallest sources of the county's economy (1.6 percent and 2 percent, respectively). Figure 4-8 shows the breakdown of industry types in Canyon County.

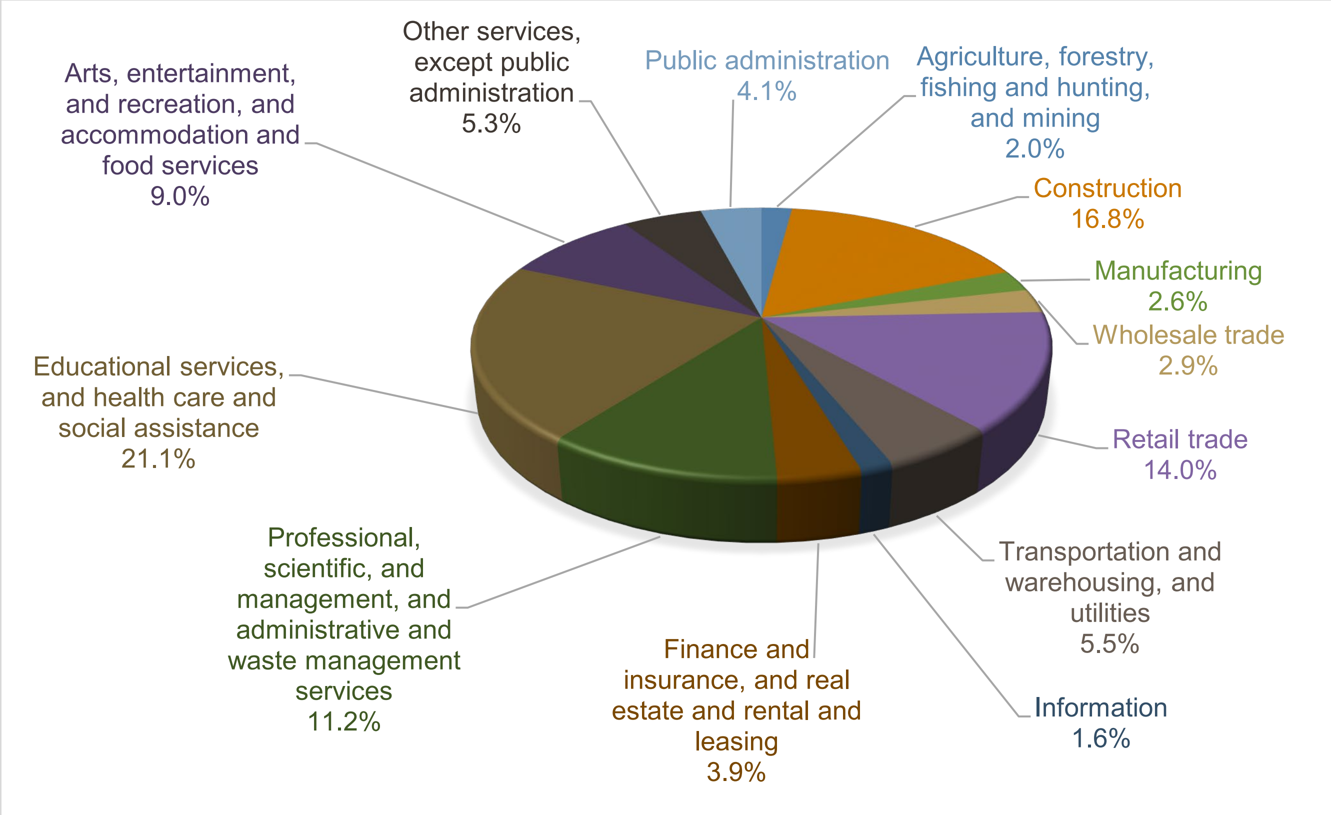


Figure 4-8. Industry in the Planning Area

The largest employers in the county are Canyon County and Wal-Mart, each with 800 to 900 employees. Other major employers include Vallivue School District #132, Caldwell School District #132, West Valley Medical Center, St. Alphonsus Medical Center, Plexus Corp., Sorrento Lactalis, Inc., and the College of Idaho.

4.6.3 Employment Trends and Occupations

According to the U.S. Census American Community Survey, 62.3 percent of Canyon County's population over the age of 16 was in the labor force as of 2018. Figure 4-9 compares Idaho's and Canyon County's unemployment trends from 2008 through 2018. During that period, Canyon County's unemployment rate was lowest in 2018, at 2.8 percent. Unemployment rates reached their peak in 2010 at 11.3 percent, then declined steadily. Figure 4-10 shows the distribution of occupation types in the county.

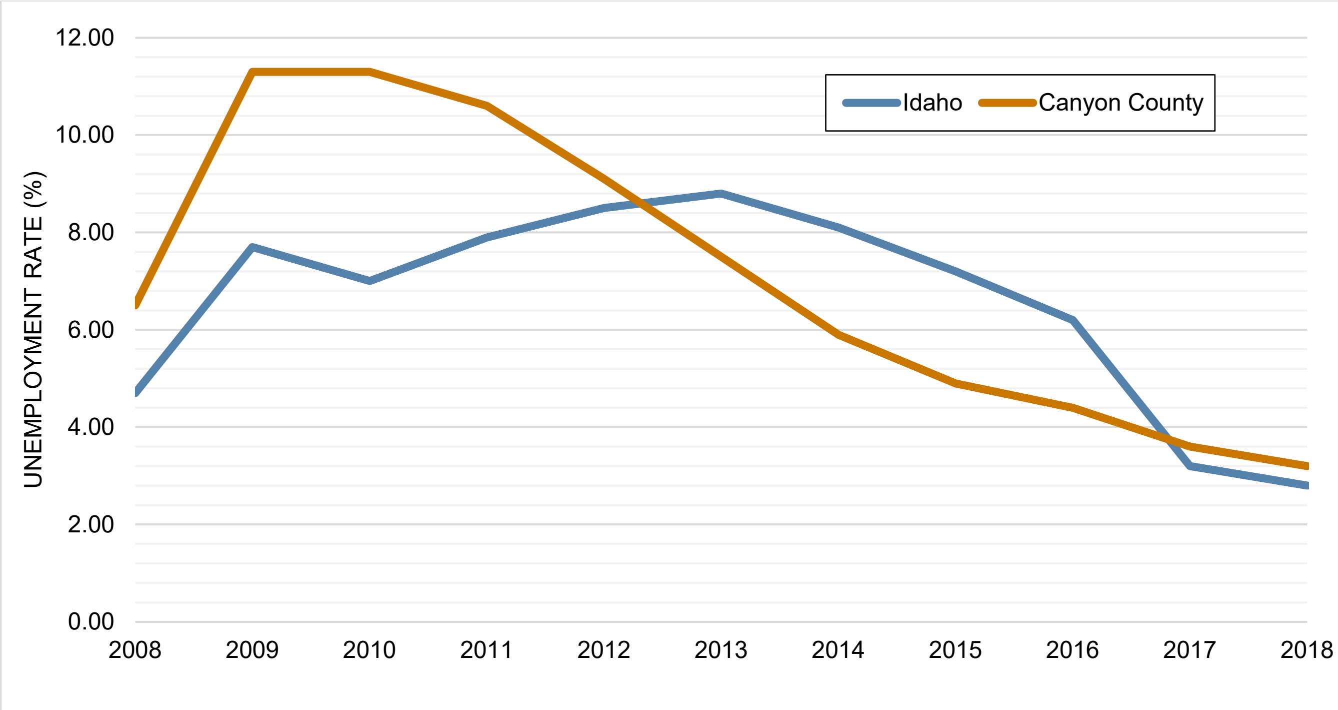


Figure 4-9. Idaho and Canyon County Unemployment Rate

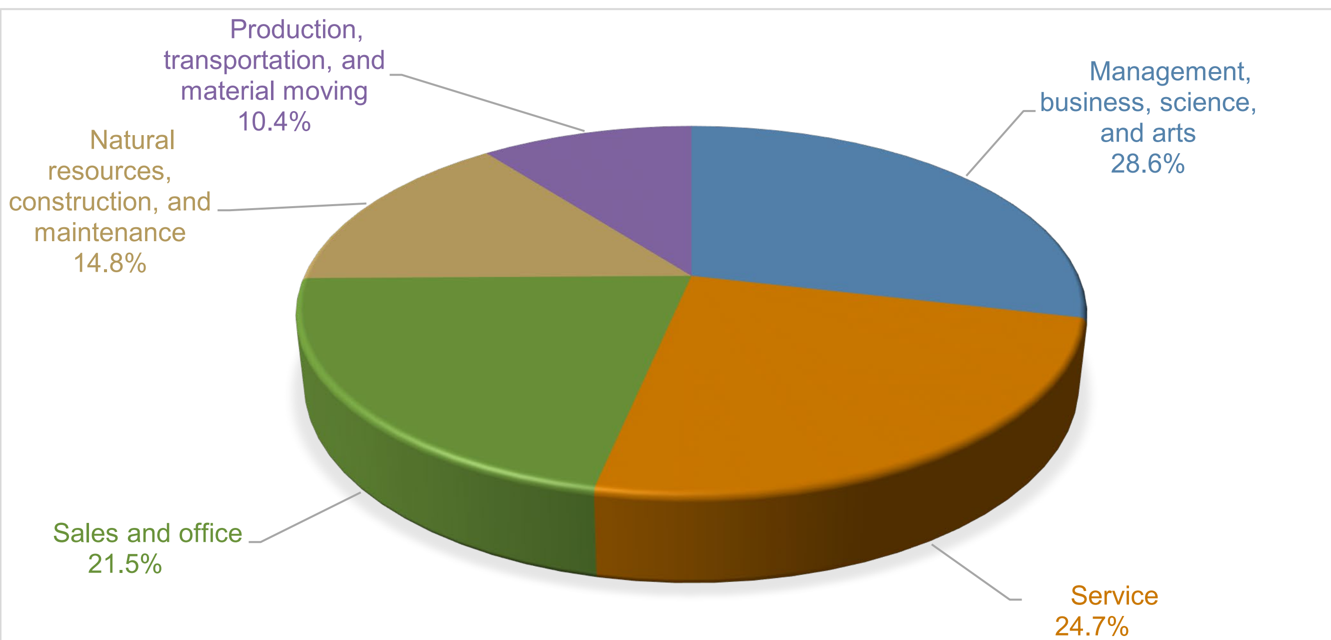


Figure 4-10. Occupations in the Planning Area

The U.S. Census estimates that 81.3 percent of Canyon County workers commute alone (by car, truck or van) to work and 10.1 percent carpool. The mean travel time to work in the county is 25.2 minutes.

5. RELEVANT LAWS, ORDINANCES AND PROGRAMS

Existing regulations, agencies 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)). Information presented in this section can be used to review local capabilities to implement the action plan this hazard mitigation plan presents. Individual review by each planning partner of existing local plans, studies, reports, and technical information is presented in the annexes in Volume 2.

5.1 RELEVANT FEDERAL AND STATE AGENCIES, PROGRAMS AND REGULATIONS

State and federal regulations and programs that need to be considered in hazard mitigation are constantly evolving. For this plan, a review was performed to determined which regulations and programs are currently most relevant to hazard mitigation planning. The findings are summarized in Table 5-1 and Table 5-2. Short descriptions of each program are provided in Appendix C.

Table 5-1. Summary of Relevant Federal Agencies, Programs and Regulations

Agency, Program or Regulation	Hazard Mitigation Area Affected	Relevance
Americans with Disabilities Act	Action Plan Implementation	FEMA hazard mitigation project grant applications require full compliance with applicable federal acts.
Bureau of Land Management	Wildfire Hazard	The Bureau funds and coordinates wildfire management programs and structural fire management and prevention on BLM lands.
Civil Rights Act	Action Plan Implementation	FEMA hazard mitigation project grant applications require full compliance with applicable federal acts.
Clean Water Act	Action Plan Implementation	FEMA hazard mitigation project grant applications require full compliance with applicable federal acts.
Community Development Block Grant Disaster Resilience Program	Action Plan Funding	This is a potential alternative source of funding for actions identified in this plan.
Community Rating System	Flood Hazard	This voluntary program encourages floodplain management activities that exceed the minimum National Flood Insurance Program requirements.
Disaster Mitigation Act	Hazard Mitigation Planning	This is the current federal legislation addressing hazard mitigation planning.
Emergency Relief for Federally Owned Roads Program	Action Plan Funding	This is a possible funding source for actions identified in this plan.
Emergency Watershed Program	Action Plan Funding	This is a possible funding source for actions identified in this plan.

Agency, Program or Regulation	Hazard Mitigation Area Affected	Relevance
Endangered Species Act	Action Plan Implementation	FEMA hazard mitigation project grant applications require full compliance with applicable federal acts.
Federal Energy Regulatory Commission Dam Safety Program	Dam Failure Hazard	This program cooperates with a large number of federal and state agencies to ensure and promote dam safety.
Federal Wildfire Management Policy and Healthy Forests Restoration Act	Wildfire Hazard	These documents mandate community-based collaboration to reduce risks from wildfire.
National Dam Safety Act	Dam Failure Hazard	This act requires a periodic engineering analysis of most dams in the country
National Environmental Policy Act	Action Plan Implementation	FEMA hazard mitigation project grant applications require full compliance with applicable federal acts.
National Fire Plan	Wildfire Hazard	This plan calls for joint risk reduction planning and implementation by federal, state and local agencies.
National Flood Insurance Program	Flood Hazard	This program makes federally backed flood insurance available to homeowners, renters, and business owners in exchange for communities enacting floodplain regulations
National Incident Management System	Action Plan Development	Adoption of this system for government, nongovernmental organizations, and the private sector to work together to manage incidents involving hazards is a prerequisite for federal preparedness grants and awards
Presidential Executive Order 11988 (Floodplain Management)	Flood Hazard	This order requires federal agencies to avoid long and short-term adverse impacts associated with modification of floodplains
Presidential Executive Order 11990 (Protection of Wetlands)	Action Plan Implementation	FEMA hazard mitigation project grant applications require full compliance with applicable presidential executive orders.
Rural Development Program	Action Plan Implementation	This program is a potential source of funding for actions identified in this plan.
U.S. Army Corps of Engineers Dam Safety Program	Dam Failure Hazard	This program is responsible for safety inspections of dams that meet size and storage limitations specified in the National Dam Safety Act.
U.S. Army Corps of Engineers Flood Hazard Management	Flood Hazard, Action Plan Implementation, Action Plan Funding	The Corps of Engineers offers multiple funding and technical assistance programs available for flood hazard mitigation actions
U.S. Bureau of Reclamation Safety Evaluation of Existing Dams Program	Dam Failure Hazard	Program identifies federal dams that pose a high threat to the public.
U.S. Fire Administration	Wildfire Hazard	This agency provides leadership, advocacy, coordination, and support for fire agencies and organizations.
U.S. Fish and Wildlife Service	Wildfire Hazard	This service's fire management strategy employs prescribed fire throughout the National Wildlife Refuge System to maintain ecological communities.

Table 5-2. Summary of Relevant State Agencies, Programs and Regulations

Agency, Program or Regulation	Hazard Mitigation Area Affected	Relevance
State and Local Building Codes	Action Plan Implementation	Local communities must adopt and enforce building codes, which include measures to improve buildings' ability to withstand hazard events.
Subdivision Regulations	Hazard Mitigation Planning	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.
Comprehensive Plans and Zoning	Hazard Mitigation Planning	The state Local Land Use Planning Act (Idaho Code, Title 67) requires every county and city to adopt a comprehensive long-range plan for community development, and related laws call for integration of hazard mitigation plans with general plans.
Floodplain Zoning	Flood Hazard	Authorizes communities to adopt floodplain zoning to regulate any mapped or unmapped flood hazard area.
Idaho Department of Water Resources Dam Safety Program	Dam Failure Hazard	Classifies dams by size and risk and requires regular inspections
Idaho Disaster Preparedness Act	Hazard Mitigation Planning	Provides for the creation of local organizations for disaster preparedness
Idaho Silver Jackets Program	Flood Hazard	Establishes a continuous intergovernmental collaborative team for flood risk management

5.2 LOCAL PROGRAMS

5.2.1 Plans, Reports and Codes

The following local plans, reports, and codes can influence the development of hazard mitigation goals, objectives, and actions that are consistent across local and regional planning and regulatory mechanisms:

- Canyon County 2020 Comprehensive Plan
- Individual city comprehensive plans
- 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.

5.2.2 County Development-Related Plans and Codes

The Canyon County 2020 Comprehensive Plan is the County's framework for land use decision making. The Comprehensive Plan is a planning tool for the future, establishing policies to help the County grow and develop. The plan meets the requirements of the State of Idaho Local Land Use Planning Act. It indicates how the County, outside of city limits, should develop.

The plan covers all land use within the County outside of city limits. The land uses addressed in the Comprehensive Plan include agriculture, residential, commercial, and industrial. The County conducts joint planning with the incorporated cities in the cities' areas of impact.

The Comprehensive Plan addresses hazard areas for flooding, unstable soil conditions and/or geological conditions, and contaminated groundwater. The plan looks at the impacts of hazards, such as human accidents, personal injury and loss of life, and limitations on activity.

The County's zoning ordinance—the formal codification of land use policies in Canyon County—is aligned with the land use policies of the Comprehensive Plan. The County has adopted the International Building Code and has an active building inspection program.

5.2.3 Community Planning Association of Southwest Idaho

Transportation planning in Canyon County is integrated into a single regional entity—COMPASS (the Community Planning Association of Southwest Idaho). This entity conducts long-range transportation planning for the entire Treasure Valley, which includes both Canyon and Ada Counties and the incorporated cities in those counties.

5.2.4 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. 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.

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.

6. HAZARDS OF CONCERN; RISK ASSESSMENT METHODOLOGY

Risk assessment is the process of estimating the potential loss of life, personal injury, economic injury, and property damage resulting from identified hazards. The process focuses on the following elements:

- **Hazard identification**—Use all available information to determine what types of hazards may affect a jurisdiction, how often they can occur, and their potential severity.
- **Exposure identification—**Estimate the total number of people and properties in the jurisdiction that are likely to experience a hazard event if it occurs.
- **Vulnerability identification and loss estimation**—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.

The risk assessment for this hazard mitigation plan 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 or canal failure
- Drought
- Earthquake
- Flood
- Landslide
- Severe weather (extreme temperatures, wind, thunderstorms, lightning)
- 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, profiles, without quantitative risk assessments, are provided for the following hazards: hazardous materials, civil disturbances, terrorism, cyber disruption, and public health.

6.2 RISK ASSESSMENT TOOLS

6.2.1 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 and the jurisdiction-specific annexes in Volume 2. Information regarding the data sources and methodologies employed in these mapping efforts is located in Appendix D.

6.2.2 Modeling

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.

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.

6.3 RISK ASSESSMENT APPROACH

The risk assessments in this plan describe the risks associated with each identified hazard of concern. The following steps were used to define the risk of each hazard:

- **Identify and profile each hazard**—The following information is given for each hazard:
  - A summary of past events that have impacted the planning area
  - Geographic areas most affected by the hazard
  - Event frequency estimates
  - Severity descriptions
  - Warning time likely to be available for response.
- **Determine exposure to each hazard**—Exposure was assessed by overlaying hazard maps with an inventory of structures, facilities, and systems to decide which of them would be exposed to each hazard.
- **Assess the vulnerability of exposed facilities**—Vulnerability of exposed structures and infrastructure was evaluated 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 Hazus were used for this assessment for the flood, earthquake, and tsunami hazards. Outputs similar to those from Hazus were generated for other hazards, using data generated through GIS.

The risk assessments performed for this plan evaluated risk countywide for individual incorporated cities, and for the unincorporated portion of the county.

6.3.1 Hazard Profile Development

Hazard profiles were developed through web-based research and review of previously developed reports and plans, including community general plans and state and local hazard mitigation plans. Frequency and severity indicators include past events and the expert opinions of geologists, emergency management specialists, and others.

6.3.2 Exposure and Vulnerability

Flood, Dam Failure and Earthquake

Community exposure and vulnerability to the following hazards were evaluated using Hazus:

- **Flood**— A Level 2 analysis was performed. Building and assessor data (replacement cost values and detailed structure information) for over 74,000 building were loaded into Hazus. An updated inventory was used in place of the Hazus defaults for community lifelines. Effective Canyon County Digital Flood Insurance Rate Maps (DFIRMs) were used to delineate flood hazard areas and estimate potential losses from the FEMA 1-percent-annual chance and 0.2-percent-annual-chance (100- and 500-year) flood events. Flood depth grids were generated using the DFIRM flood boundaries and a 10-meter U.S. Geological Survey (USGS) digital elevation model.

- **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 probabilistic earthquake data and USGS ShakeMap data were used for the analysis of this hazard. Liquefaction and NEHRP soils data from the Idaho Geological Survey were integrated into the Hazus model. Two scenario events and two probabilistic events were modeled:
    - A 2017 USGS scenario of a Magnitude-7.0 event on the Squaw Creek fault
    - A 2017 USGS scenario of a Magnitude-7.0 event on the Cottonwood Mountain fault
    - The standard Hazus analysis for the 100- and 500-year probabilistic events

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 local, state and federal sources. Frequency and severity indicators include past events and the expert opinions of geologists, emergency management specialists and others. Data sources for specific hazards were as follows:

- **Landslide**—A dataset of steep slopes was generated using the USGS 10-meter 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 National Climatic Data Center.
- **Wildfire**—Relative risk to communities from wildland fire hazard and historical fire perimeters data was provided by the Idaho Bureau of Land Management.

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.

6.4 DATA SOURCES

6.4.1 Building and Cost Data

Replacement cost values and structure information derived from parcel and tax assessor data provided by Canyon County were loaded into Hazus. When available, an updated inventory was used in place of the Hazus defaults for community lifelines.

Replacement cost is the cost to replace the entire structure with one of equal quality and utility. Replacement cost is based on industry-standard cost-estimation models published in *RS Means Square Foot Costs* (RS Means, 2019). It is calculated using the RS Means square foot cost for a structure, which is based on the Hazus occupancy class (i.e., multi-family residential or commercial retail trade), multiplied by the square footage of the structure from the tax assessor data. The construction class and number of stories for single-family residential structures also factor into determining the square foot costs.

6.4.2 Data Source Summary

Table 6-1 summarizes the data sources used for the risk assessment for this plan.

Table 6-1. Hazus Model Data Documentation

Data	Source	Date	Format
Property parcel data	Canyon County	2019	Digital (GIS)
Building characteristics (tax assessor) data	Canyon County	2019	Digital (tabular)
Building footprints	Canyon County	2019	Digital (GIS)
Mobile home parks	Canyon County	2020	Digital (GIS)
Building replacement cost	RS Means	2019	Paper
Population data (2010 U.S. Census)	FEMA Hazus version 4.2 SP03	2010	Digital (GIS and tabular)
Effective Flood Insurance Rate Map	FEMA	2019	Digital (GIS)
American Falls Dam failure structure exposure analysis results	Idaho Office of Emergency Management,	2017	Digital (GIS)
Blacks Creek Dam failure inundation depth grid	Idaho Department of Water Resources	2020	Digital (GIS)
Lucky Peak Dam & Reservoir failure inundation area	U.S. Army Corps of Engineers	2010	Digital (GIS)
ShakeMaps	USGS Earthquake Hazards Program	2017	Digital (GIS)
Boise Metro Area NEHRP Site Class	Idaho Geological Survey	2011	Digital (GIS)
Boise Metro Area Liquefaction	Idaho Geological Survey	2011	Digital (GIS)
Relative Risk to Communities from Wildland Fire in Idaho	Idaho Bureau of Land Management,	2007	Digital (GIS)
10-meter digital elevation model	U.S. Geological Survey	2016	Digital (GIS)
Critical facilities data for safety & security, food water shelter, health & medical, energy, communications, and transportation lifelines	Canyon County	2020	Digital (GIS)
Homeland Infrastructure Foundation-Level Data (HIFLD) – law enforcement, VA health, communications facilities	U.S. Department of Homeland Security	2020	Digital (GIS)
Hazus v4.2 SP03 default critical facilities – wastewater treatment plants, electric power facilities	FEMA	2019	Digital (GIS)
Rail lines	COMPASS	2015	Digital (GIS)
Toxic Release Inventory (TRI)	U.S. Environmental Protection Agency	2020	Digital (GIS)
Local and state bridges	ID Department of Transportation	2020	Digital (GIS)

6.5 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, Canyon County and its planning partners will collect additional data to assist in estimating potential losses associated with other hazards.

Part 2. Risk Assessment

7. DAM/CANAL FAILURE

7.1 GENERAL BACKGROUND

7.1.1 Causes of Dam Failure

A dam is an artificial barrier that has the ability to store water, wastewater, or liquid-borne materials for many reasons—flood control, human water supply, irrigation, livestock water supply, energy generation, containment of mine tailings, recreation, or pollution control. Many dams fulfill a combination of these functions. They are an important resource in the United States (ASDSO, 2013).

Dams can be classified according to their purpose, the construction material or methods used, their slope or cross-section, the way they resist the force of the water pressure, or the means used for controlling seepage. Materials used to construct dams include earth, rock, tailings from mining or milling, concrete, masonry, steel, timber, plastic, rubber, and combinations of these. Regulatory oversight of dams is described in Appendix C.

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 Canyon 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

Canal failures are similar to small dam failures. The associated flood wave is not as large as a dam breach, but the impacts can be significant. Idaho, primarily a high desert climate, relies on irrigation canals so that farmers can grow sugar beets, potatoes, corn and more. Reclamation projects to develop Southwest Idaho's arid lands in the early 1900s included dams to collect water and control floods and canals to deliver water to agricultural areas. Many canals crisscross Idaho, but they are not widely recognized as potential flood hazards. New development has encroached on canals and the areas adjacent to them.

7.1.3 Secondary Hazards

Canal and dam failures can cause severe downstream flooding. Other potential secondary hazards are landslides around the reservoir perimeter and bank erosion on the rivers.

7.2 HAZARD PROFILE

7.2.1 Past Events

Dams

The only recorded dam failure event to affect Canyon County was the failure of the Indian Creek Reservoir Dam (in Ada County) in the early 1890s. Both Nampa and Caldwell were affected. The *2018 State of Idaho Hazard Mitigation Plan* identifies two dam failures in the state, neither of which impacted Canyon County:

- **Teton Dam Failure, 1976**—On June 5, 1976, Teton Dam in Fremont County failed, releasing an estimated 80 billion gallons of water into the Upper Snake River Valley. At the time of its failure, the zoned earth-fill dam was brand new and stood 305 feet high, with a crest length of 3,100 feet and a base width of 1,700 feet. 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.
- **Kirby Dam Failure, 1991**—On May 26, 1991, Kirby Dam near Atlanta 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.

Canals

Table 7-1 provides narratives on some past canal failure events in Canyon County. This is not a complete list of canal failure events in the County, but it provide insight into the historical impacts of canal failure.

7.2.2 Location

Dams

Idaho's Dam Safety Program identifies six dams in the planning area, as listed in Table 7-2—three operated by federal agencies and the remainder under the jurisdiction of the state. Additionally, the 2018 *Idaho State Hazard Mitigation Plan* states that the Canyon County planning area is subject to inundation from the failure of three dams outside the county: Lucky Peak Dam and Blacks Creek Dam in Ada County and American Falls Dam in Power County (also listed in Table 7-2).

Table 7-1. Example Canal Failures in Canyon County

Date	Location	Narrative
February 1910	Nampa	Fifty families were forced to leave their homes in Nampa by a flood that partially submerged the northern part of the town. A break in a government irrigation canal made it necessary to divert the canal's water into Indian Creek, causing an overflow. Another break in the irrigation canal resulted in flooding several blocks in the northern part of the city.
July 1989	Mora Canal, S. of Nampa	Thousands of gallons of water escaped from the Mora Canal, flooding about 200 acres of farmland along a 5-mile strip. About 30 people helped block the canal leak using 600 yards of material and a mixture of gravel, clay, and topsoil.
January 2006	NW of Parma	At 3 a.m. an irrigation canal northwest of Parma broke, and water flooded a local home. The homeowner reported "a couple of inches" of water in the house. The canal was breached again at about 11 a.m. the following day.
April 2011	Phyllis Canal, Caldwell	A breach of the Phillips Canal at about 7:30 a.m. affected 30 to 40 homes. Six homes received significant damage. Water washed across Caldwell a mile from the canal.

Table 7-2. Dams that impact the Planning Area

Name	Stream	Use[a]	Hazard Rating[b]	Size Category[c]	Type	Storage (acre-feet)	Height (feet)
Nampa Land Ranch	Snake River Tributary, Irrigation Waste	REC	Low	Intermediate	Earth	30	22.4
Ethington	Snake River Tributary	REC	Low	Small	Earth	2	17
Deer Flat Lower	Boise River	IRR	High	Large	Earth	190,000	42
Deer Flat Middle Dike	Boise River, Lake Lowell	AUXDAM	High	Large	Earth	0	16
Deer Flat Upper	Boise River, Lake Lowell	AUXDAM	High	Large	Earth	0	70
Tiegs	Boise River	IRR	Significant	Small	Earth	9	11
Lucky Peak	Boise River	Multi	High	Large	Earth	307.000	258
Blacks Creek	Black's Creek	Multi	High	Large	Earth	3,640	51.5
American Falls Dam	Snake River	FC	High	Large	Concrete	1,671,300	104

a. FC = Flood Control; IRR = Irrigation; MULTI = Multi-purpose; REC = Recreation; AUXDAM = Auxiliary
b. See Section 7.2.4 for definition of hazard ratings
c. Small = 20 feet high or less, storing less than 100 acre-feet; Intermediate = 20 to 40 feet high, storing 100 to 4,000 acre-feet; Large = 40 feet high or more, storing more than 4,000 acre-feet

Source: U.S. Army Corps of Engineers, National Inventory of Dams, 2020

Dam failure inundation mapping is not available for every dam in the County. The planning team secured inundation mapping for Lucky Peak, Blacks Creek, Oakley and American Falls Dams. This hazard mapping is considered to be sensitive information and is not being presented in this plan for security purposes. The Idaho Office of Emergency Management is the manager of this data in conjunction with the Idaho Department of Water Resources, Dam Safety program.

Canals

Because of the diversity of canal ownership (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 and the Idaho Office of Emergency Management anticipates further discussions regarding this hazard.

The 66 irrigation districts that serve Ada and Canyon counties distribute water through 1,500 miles of canals, laterals, and drains in southwestern Idaho and eastern Oregon. Figure 7-1 shows the irrigation districts that service the Canyon County planning area. These canals are generally well-maintained by their owners/operators. However, they can convey flows as high as 2,500 cubic feet per second (cfs), and they have not been evaluated according to any engineering standards. In Ada County and Canyon County, a total of 80 canals and drains run for about 500 miles adjacent to homes.

7.2.3 Frequency

Dams

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 and would correlate to a low probability of occurrence as defined for the risk ranking protocol identified in Chapter 14 of this plan.

Canals

Canal failures can be influenced by events such as earthquakes and floods. Because irrigation canals are not intended to be flood control facilities, they are not designed to withstand high flow impacts such as erosion. Like dams, the functionality of canals is dependent on their inspection and maintenance. Historically, more canal failures have impacted the planning area than dam failures, with at least four events in the last 100-plus years. This correlates to a medium probability of occurrence as defined for the risk ranking protocol used in this plan.

7.2.4 Severity

Dams

The hazard ratings for dams included in Table 7-2 are from the Idaho Dam Safety Program's 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 (IDWR, 2020):

- **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. The Idaho Department of Water Resources 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.

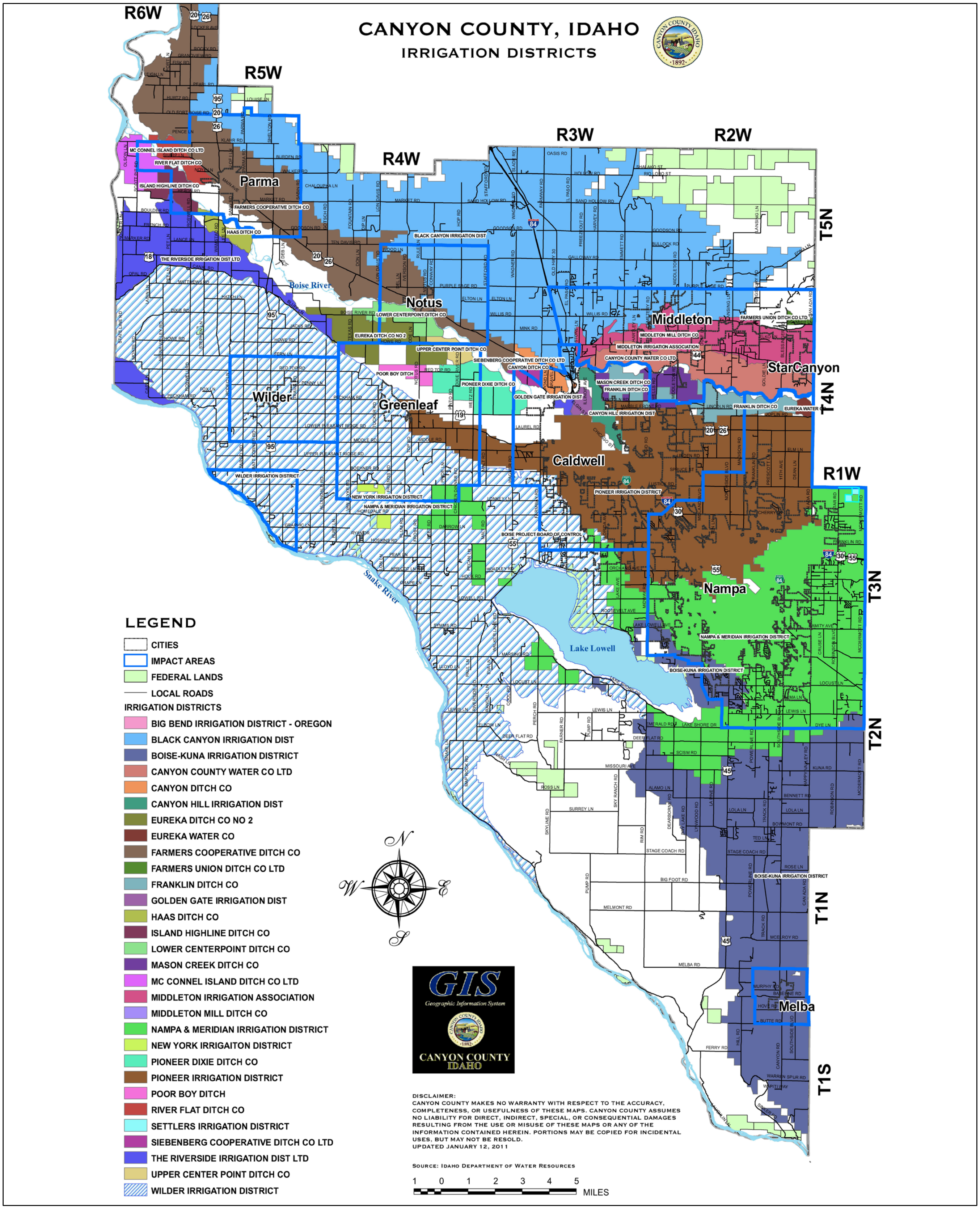


Figure 7-1. Irrigation Districts Serving Canyon County

Table 7-3 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 7-3. 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

Canals

In Canyon County, a considerable number of housing developments are situated below large-capacity canals, where the risk to life, safety and property is significant. The severity of canal failures can be classified as follows:

- Severe failures include those that last more than a day, cause significant damage to the system in more than one location, or cause significant erosion of the hillslope.
- Moderate failures include those that lasted more than a couple of hours, caused some erosion, or caused an interruption in operations.
- Small failures include those that lasted a couple of hours or less, caused little or no erosion, or caused minimal damage to the canal.

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.

7.2.5 Warning Time

Dams

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.

Canyon 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.

Canals

For canal failure, warning time can be directly attributed to owners' operations and maintenance protocols. Regular attention to the canal system during the irrigation season can help ensure the identification of problems in time to provide advanced warning. When canals are not in use for irrigation—during the wet, rainy season—unintended diversions of flood flows into canals can cause problems that go undetected and result in breaches with little or no warning. The U.S. Bureau of Reclamation *Canal Operator Manual* includes procedures and protocols for monitoring systems for problems and associated warning procedures (Bureau of Reclamation, 2018).

7.3 EXPOSURE

A quantitative assessment of exposure to the dam failure hazard was conducted using dam failure inundation mapping and the asset inventory developed for this plan. Population exposure was estimated by calculating the number of buildings in the mapped inundation areas as a percent of total planning area buildings, and then applying this percentage to the estimated planning area population. Detailed results by municipality are provided in Appendix E; results for the total planning area are presented below.

7.3.1 Population and Property

Table 7-4 summarizes the estimated population living in the mapped dam failure inundation zones and the estimated property exposure. Figure 7-2 through Figure 7-4 show the county-wide distribution of structures in the mapped dam failure inundations zones by occupancy class. In all three mapped zones, the exposed structures are primarily residential or commercial, with other occupancy classes making up 1 percent or less of the total number of exposed structures.

Table 7-4. Exposed Population and Property in the Dam Failure Inundation Zone

	Lucky Peak Dam	Blacks Creek Dam	American Falls Dam
Population			
Population Exposed	19,541	444	434
% of Total Planning Area Population	8.5%	0.2%	0.2%
Property			
Number of Buildings Exposed	7,126	161	193
Value of Exposed Structures	$3,274,906,976	$117,595,388	$111,212,990
Value of Exposed Contents	$2,717,266,238	$100,792,952	$86,942,135
Total Exposed Property Value	**$5,992,173,214**	**$218,388,340**	**$198,155,125**
Total Exposed Value as % of Planning Area Total	***13.1%***	***0.5%***	***0.4%***

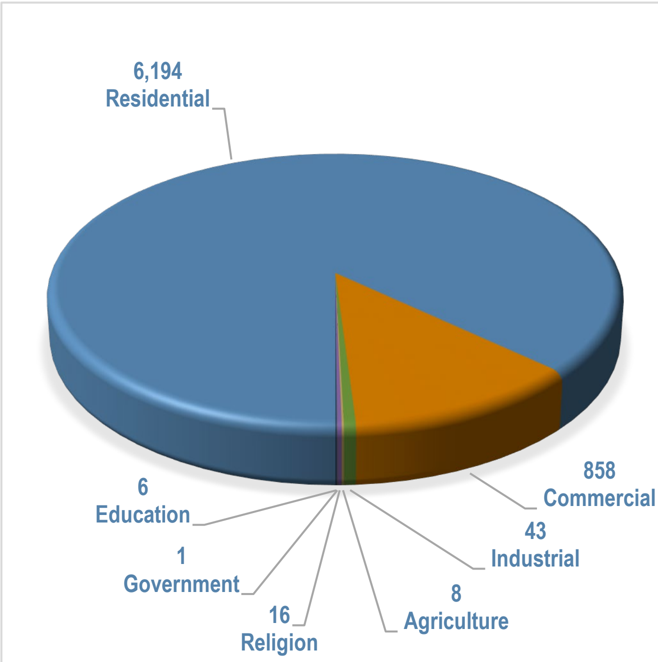


Figure 7-2. Number of Structures by Occupancy Class in the Lucky Peak Dam Failure Inundation Area

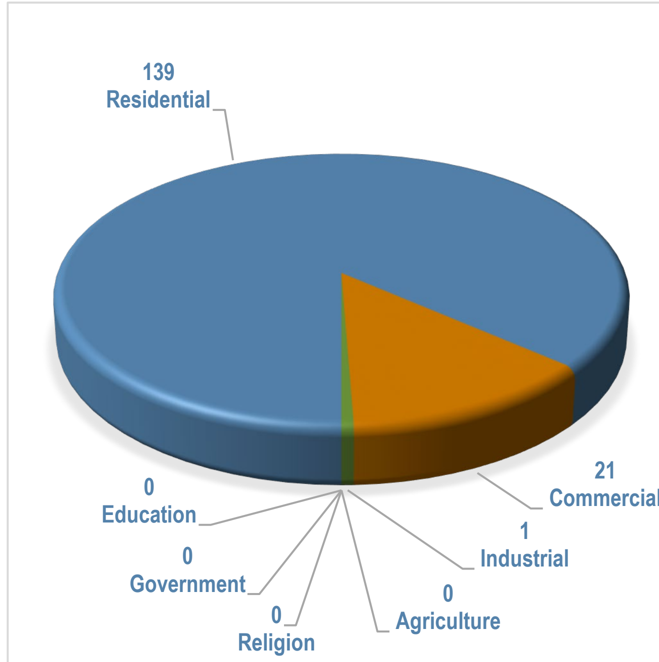


Figure 7-3. Number of Structures by Occupancy Class in the Blacks Creek Dam Failure Inundation Area

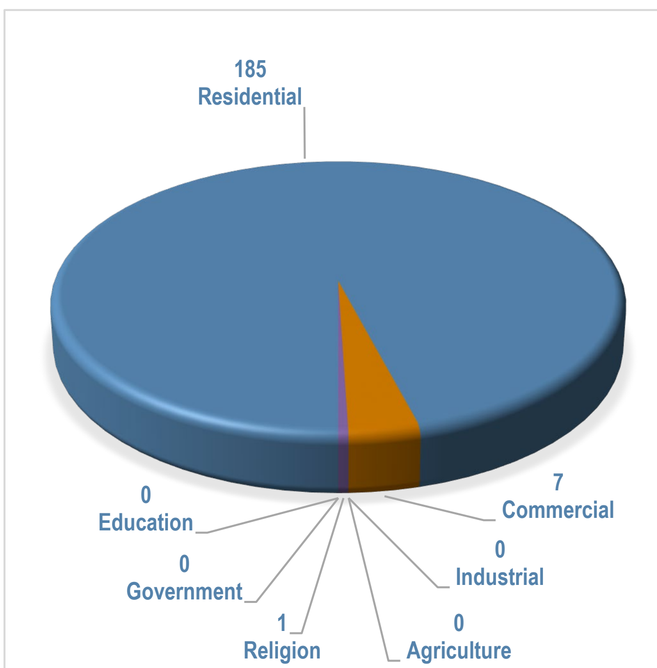


Figure 7-4. Number of Structures by Occupancy Class in the American Falls Dam Failure Inundation Area

7.3.2 Critical Facilities

Figure 7-5 summarizes the critical facilities and assets in the dam failure inundation zone.

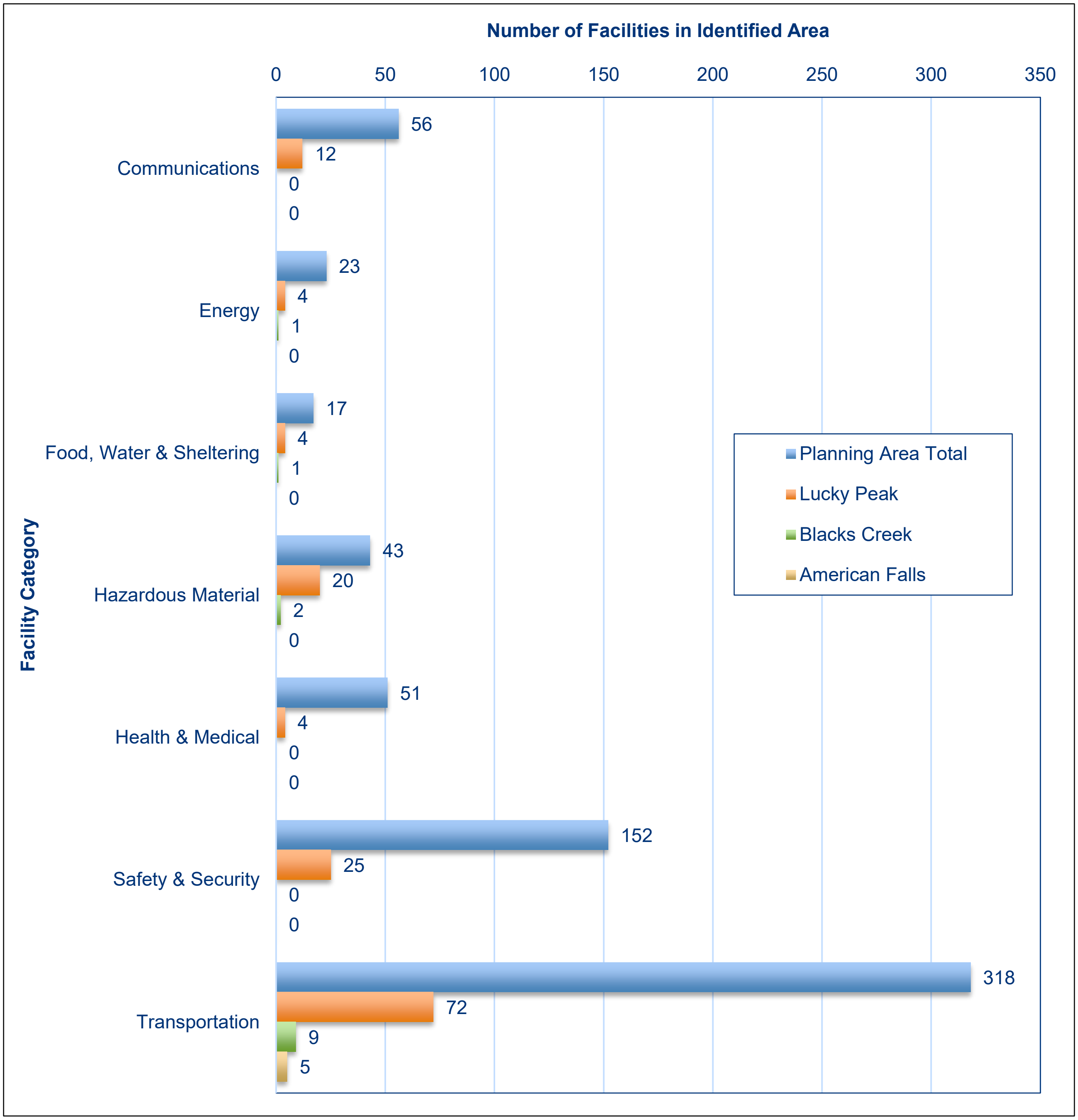


Figure 7-5. Critical Facilities in Dam Failure Inundation Zone

7.3.3 Environment

All areas of the environment within a dam failure inundations area would be exposed to a number of risks in the event of dam failure.

7.4 VULNERABILITY

Loss estimation (vulnerability analysis) was performed for inundation areas where flood depth grids are available: the Lucky Peak and Black's Creek inundation areas. No flood depth grid was available for the American Falls Dam inundation area.

7.4.1 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.

The Level 2 Hazus analysis for dam failure found that the modeled failure event could displace up to 15,000 residents and leave up to 750 residents in need of short-term shelter.

7.4.2 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. Table 7-5 summarizes the loss estimates for dam failure based on the Hazus analysis.

Table 7-5. Loss Estimates for Dam Failure

	Lucky Peak Dam	Black's Creek Dam
Structures Impacted	7,163	147
Estimated Loss Associated with Dam Failure		
Building	$1,849,703,161	$6,260,498
Contents	$2,129,274,326	$5,978,476
Total	**$3,978,977,486**	**$12,238,974**
% of Total Assessed Value	*8.7%*	*Less than 1%*

7.4.3 Critical Facilities

As shown in Figure 7-6, all critical facilities within the mapped dam failure inundation areas (Lucky Peak and Blacks Creek) are predicted to experience some effect from the dam failure event, except as follows:

- Only 11 of 12 communications facilities in the Lucky Peak Dam failure inundation area will be affected
- Only 23 of 72 transportation facilities in the Lucky Peak Dam failure inundation area will be affected
- Only 2 of 9 transportation facilities in the Blacks Creek Dam failure inundation area will be affected

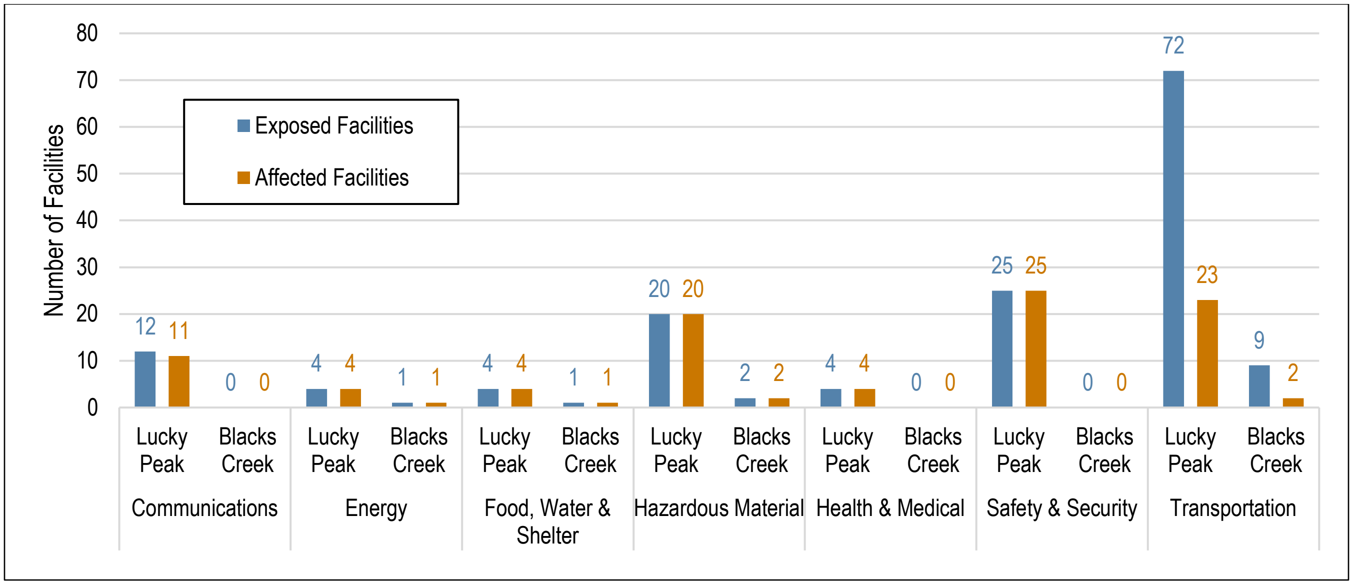


Figure 7-6. Affected Critical Facilities in the Dam Failure Inundations Zones

Figure 7-7 shows the estimated damage to critical facilities from a dam failure event. The average amount of damage, measured as a percentage of total value, is low in the Blacks Creek Dam inundation area—less than 1 percent of total value for both structure damage and content damage for all categories of critical facility. Critical facilities in the Lucky Peak Dam failure inundation area are predicted to see much higher damage rates: with average damage to structures ranging from 14 to 50 percent of total value and average damage to contents ranging from 58 to 99 percent, depending on critical facility category.

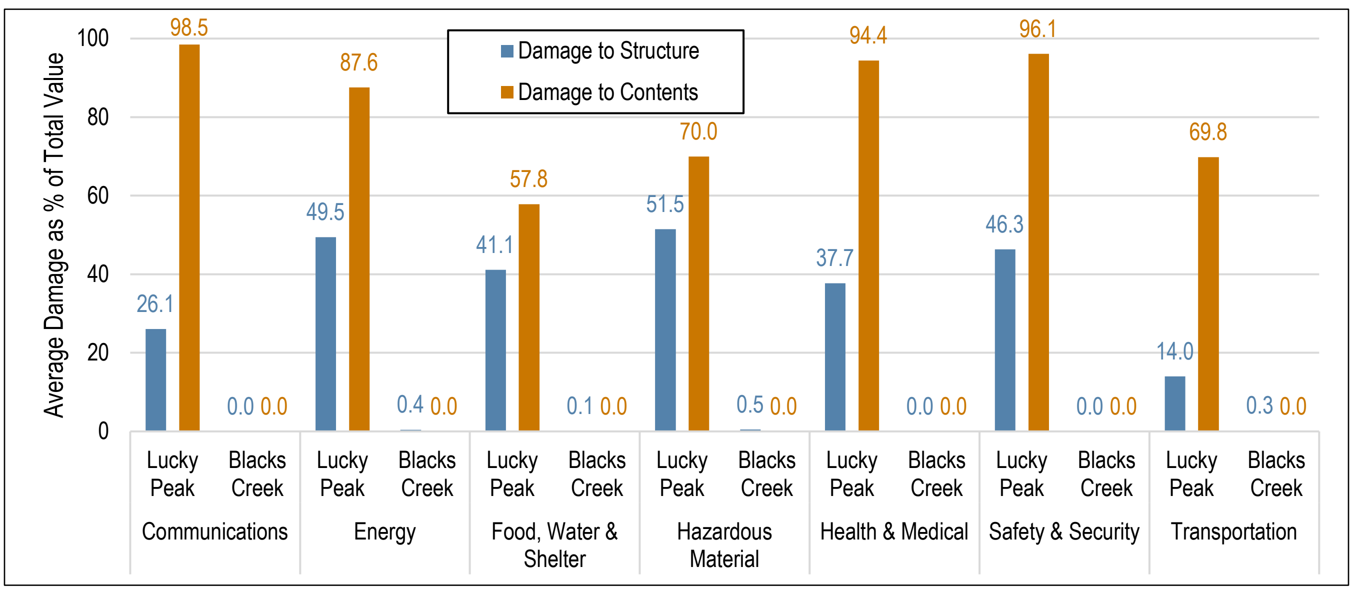


Figure 7-7. Critical Facility Damage in the Dam Failure Inundations Zones

7.4.4 Environment

The environment would be vulnerable 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 DEVELOPMENT TRENDS

While dam failures are not generally hazards addressed in comprehensive plans, the risk assessment in this plan creates an opportunity for Canyon County and its planning partners to consider the inclusion of dam 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 failures.

7.6 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.

7.7 ISSUES

Flooding as a result of a dam 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 failure hazards include the following:

- Inundation area depth grids should be developed to provide a better understanding of the vulnerability to the planning area from a failure of American Falls Dam.
- 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 significant decrease in water supply relative to what is "normal" in a given location. It originates from a deficiency of precipitation over an extended period of time and results in a water shortage for some activity, group, or environmental sector.

If the weather pattern causing a drought 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.

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.

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 May 26, 2020. Figure 8-2 shows the classification of change in drought conditions within the state of Idaho from April 9, 2019 to September 24, 2019.

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.

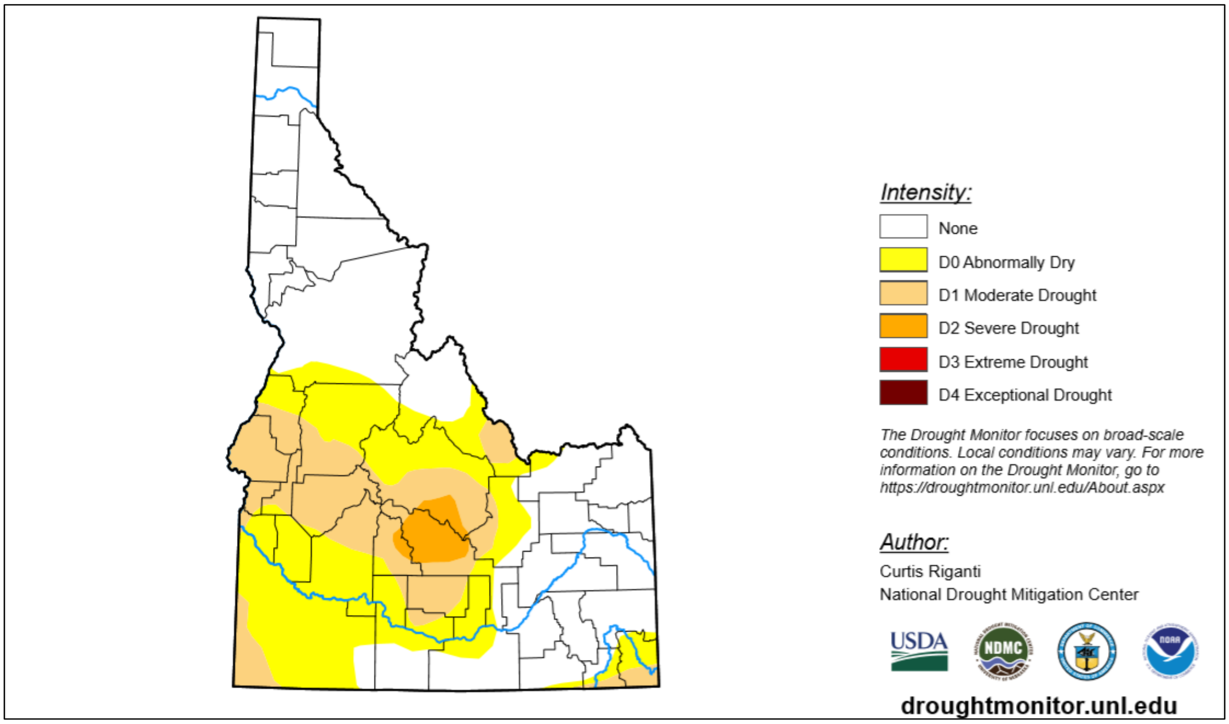


Figure 8-1. Drought Intensity Map for Idaho, as of May 26, 2020

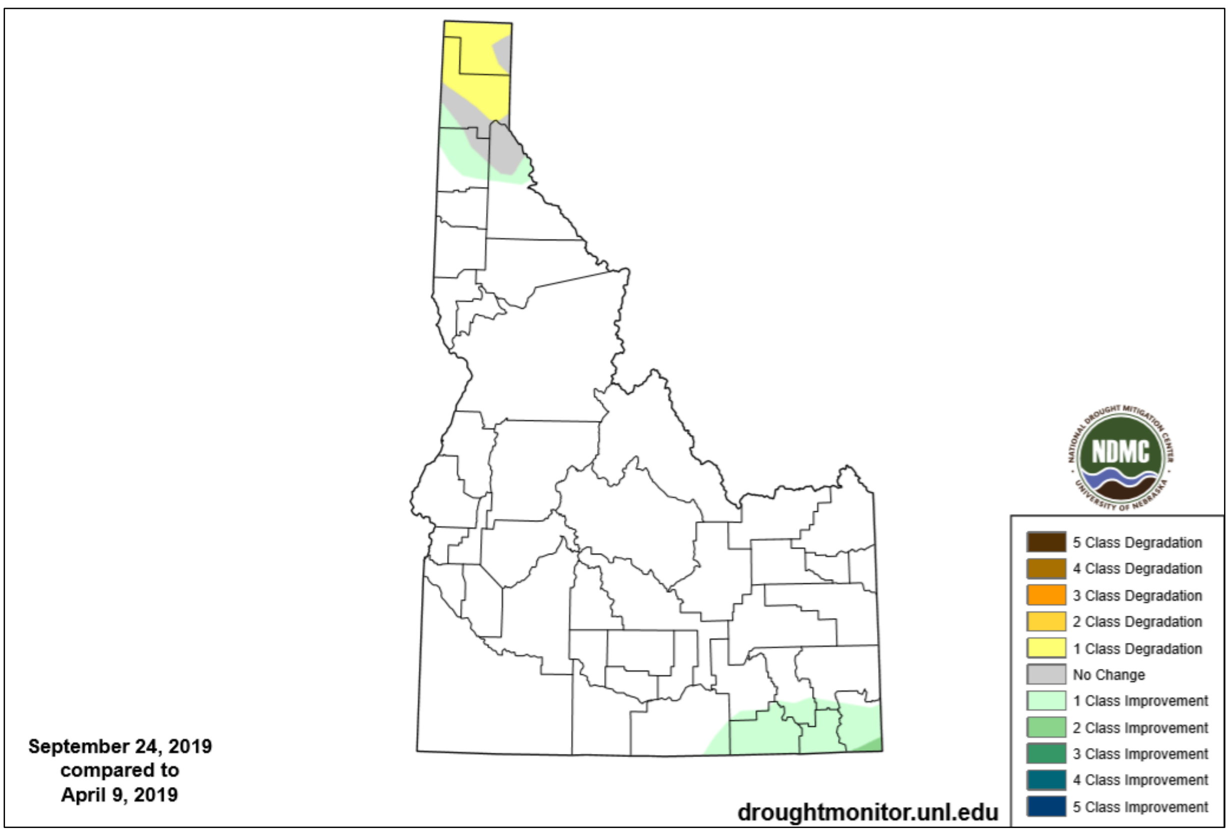


Figure 8-2. Drought Monitor Class Change, April 9, 2019 to September 24, 2019

8.1.3 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.

8.2 HAZARD PROFILE

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.

8.2.1 Past Events

In 2012 Canyon County received a contiguous drought declaration as part of a secretarial drought declaration. According to the Idaho Department of Water Resources, the only drought emergency declaration issued for Canyon County since 2002 was on April 15, 2005.

According to the Idaho State Hazard Mitigation Plan, Canyon County has been impacted by drought conditions two times since 1977 (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 Frequency

Historical drought data for the planning area indicate there were three significant droughts from 1976 to 2017, amounting to a severe drought every 5 to 10 years on average. Drought has a high probability of occurrence in the planning area as defined for the risk ranking protocol in Chapter 14 of this plan.

8.2.4 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.

8.2.5 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. 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.

8.3 EXPOSURE

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

8.4 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.

8.4.1 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.

8.4.2 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.

8.4.3 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.

8.4.4 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.

8.4.5 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.

8.5 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 11.2-percent increase in population, a 5.5-percent increase in number of general building stock structures, and a 34.2-percent increase in assessed property value. 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 Canyon County 2020 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.

8.6 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 Canyon 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 Canyon County could experience setbacks, especially in water dependent industries.

8.7 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 generated by a sudden dislocation of crust segments. 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. Unrecognized active faults probably remain, but nearly all movement between the two plates and the majority of the seismic hazards are on well-known active faults.

Faults are more likely to have earthquakes if they have more rapid movement, have had recent earthquakes, experience greater displacements, and are aligned so that movement can relieve accumulating 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 because the fault is nearby. 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.

A recent earthquake does not guarantee that all stress on a fault 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, 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).

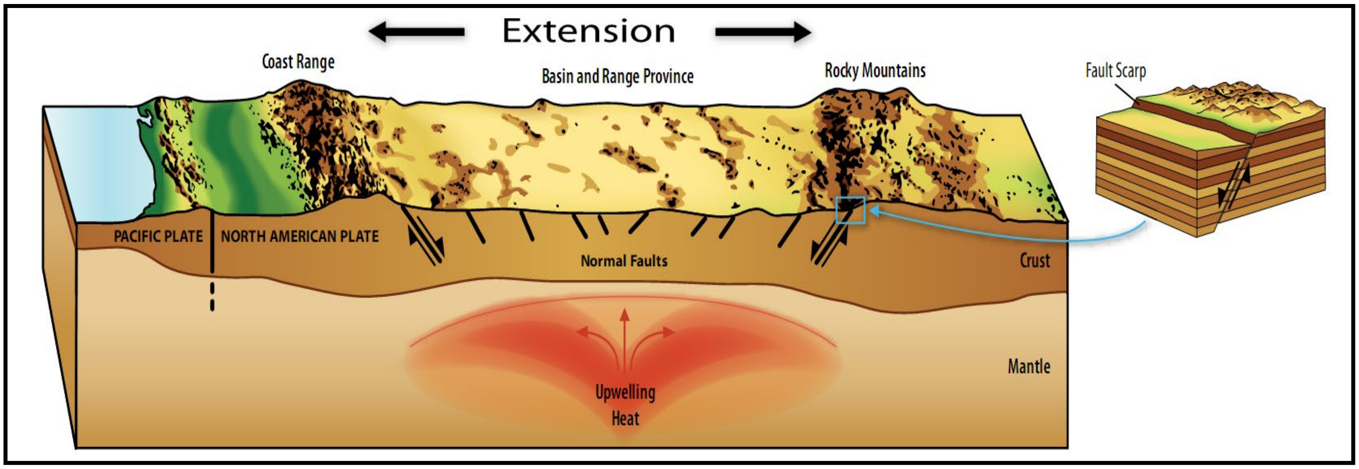


Figure 9-1. Horizontal Extension Creates Normal Faults

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 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

An earthquake's magnitude is a measure of the energy released at the source of the earthquake. Magnitude is commonly expressed by ratings on the moment magnitude scale (M_W), the most common scale used today (USGS, 2017a). This scale is based on the total moment release of the earthquake (the product of the distance a fault moved and the force required to move it). The scale is as follows:

- Great—Mw > 8
- Major—Mw = 7.0 – 7.9
- Strong—Mw = 6.0 – 6.9
- Moderate—Mw = 5.0 – 5.9
- Light—Mw = 4.0 – 4.9
- Minor—Mw = 3.0 – 3.9
- Micro—Mw < 3

Intensity

The most commonly used intensity scale is the modified Mercalli intensity scale. Ratings of the scale as well as the perceived shaking and damage potential for structures are shown in Table 9-1. The modified Mercalli intensity scale is generally represented visually using shake maps, which show the expected ground shaking at any given location produced by an earthquake with a specified 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 shake map shows the variation of ground shaking in a region immediately following significant earthquakes (for technical information about shake maps see USGS, 2018).

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

9.1.3 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).

9.1.4 Liquefaction and Soil Types

Soil liquefaction occurs when water-saturated sands, silts or gravelly soils are shaken so violently that the individual grains lose contact with one another and float freely in the water, turning 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.

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 (see SCEC, 2018 for general information on NEHRP soils data). 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.

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 across the surrounding region 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. In addition to the maps of recorded events, the USGS creates the following:

- Scenario ShakeMaps of hypothetical earthquakes of an assumed magnitude on known faults
- Probabilistic ShakeMaps, based on 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 100-year (1-percent-annual chance) event.

National Seismic Hazard Map

National probabilistic maps of earthquake shaking hazards have been produced since 1948. The USGS last updated its National Seismic Hazard Maps in 2018, incorporating the best available seismic, geologic, and geodetic information on earthquake rates and associated ground shaking. The map produced for this update include maps of the PGA expected at various probability levels of different NEHRP soil types. Figure 9-2 shows the peak ground acceleration with 10 percent probability of exceedance in 50 years on Class B/C and Class D soils. This level of ground shaking has been used for designing buildings in high seismic areas.

The National Seismic Hazard Maps provide information essential to updating seismic design requirements for building codes, insurance rate structures, earthquake loss studies, retrofit priorities and land use planning in the U.S. 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.

9.1.6 Earthquakes and Landslides

Earthquakes can cause a number of secondary hazards, but the risk of landslides is especially high. River valleys are vulnerable to slope failure, often as a result of loss of cohesion in clay-rich soils. The term landslide includes a wide range of ground movement resulting from gravity acting on a steep slope, such as rock falls, deep failure of slopes, and shallow debris flows. Earthquakes of magnitude 4.0 and greater have been known to create stresses that make weakened slopes fail. The following are contributing factors for landslides (Pacific Northwest Seismic Network, 2019):

- Erosion by rivers creating over steepened slopes
- Rock and soil slopes weakened through saturation by snowmelt or heavy rains
- Excess weight from accumulation of rain or snow, stockpiling of rock or ore, from waste piles, or from man-made structures may stress weak slopes to failure and other structures

Landslides triggered by earthquake shaking are a major concern in the Pacific Northwest. Earthquake Point in Chelan County, Washington, near Entiat is named after the ~ M7 1872 earthquake that struck nearby. The shaking split the mountain, forming a cliff to the west and causing a huge rockslide that stopped the flow of the Columbia River for several hours. Landslides into and under bodies of water can also generate tsunami or seiche waves that can be locally destructive (Pacific Northwest Seismic Network, 2019).

A recent study in Seattle suggests the next big quake on the Seattle fault may cause devastating damage from landslides beyond the areas currently defined as prone to landslides. Strong earthquake ground shaking greatly increases the likelihood of landslides where landscape is susceptible to these types of ground failure. If the ground is saturated with water, particularly following heavy rainfall, the shaking will result in more landslides than normal (Pacific Northwest Seismic Network, 2019)

Source: USGS, 2018

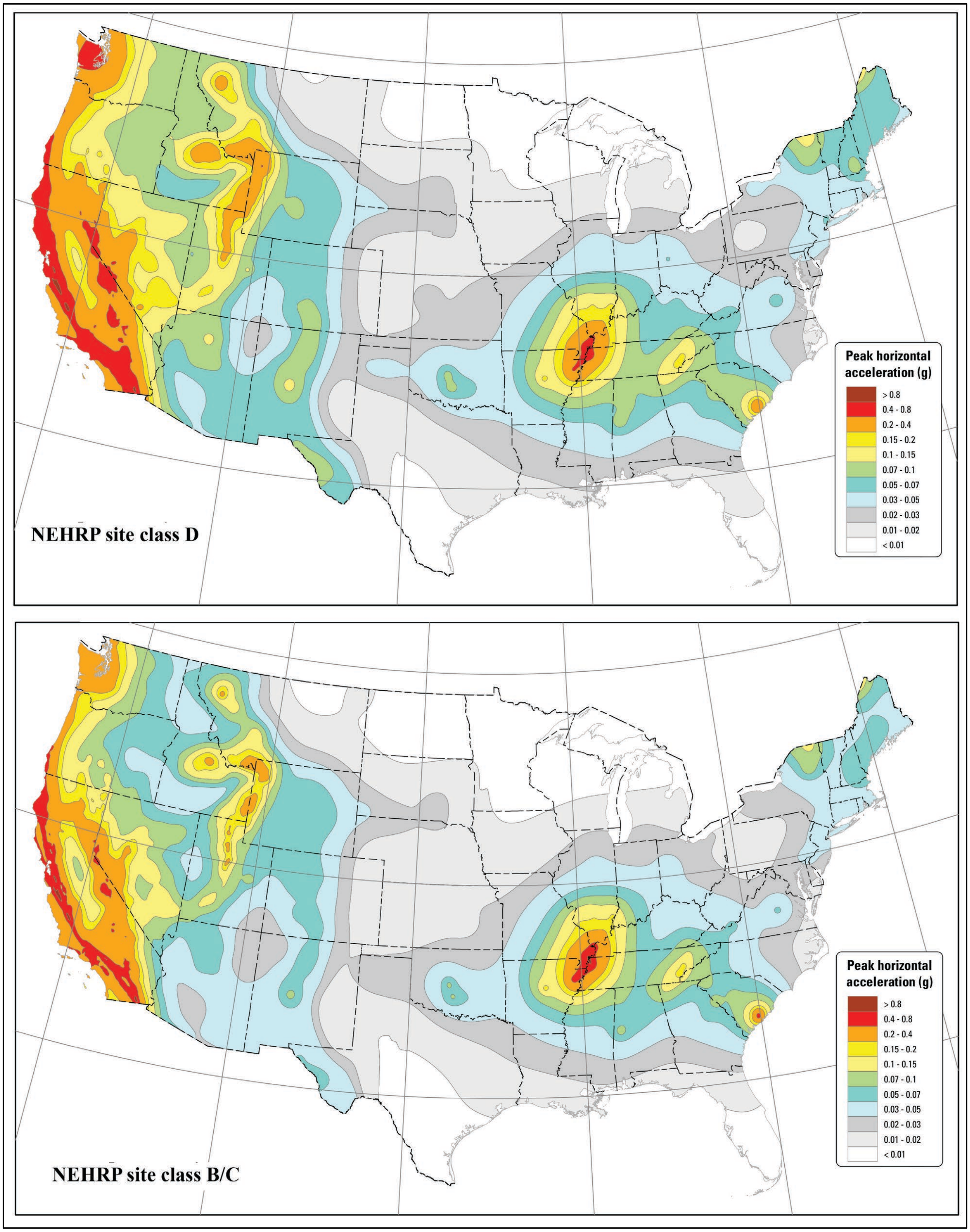


Figure 9-2. Peak Acceleration (%g) with 10% Probability of Exceedance in 50 Years

9.1.7 Secondary Hazards

In addition to the landslide risk associated with earthquakes as discussed above, seismic events pose significant risks to earthen dams. The impacts of a dam's failure can be considered a secondary risk 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.

9.2 HAZARD PROFILE

9.2.1 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 9-3). 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.

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.

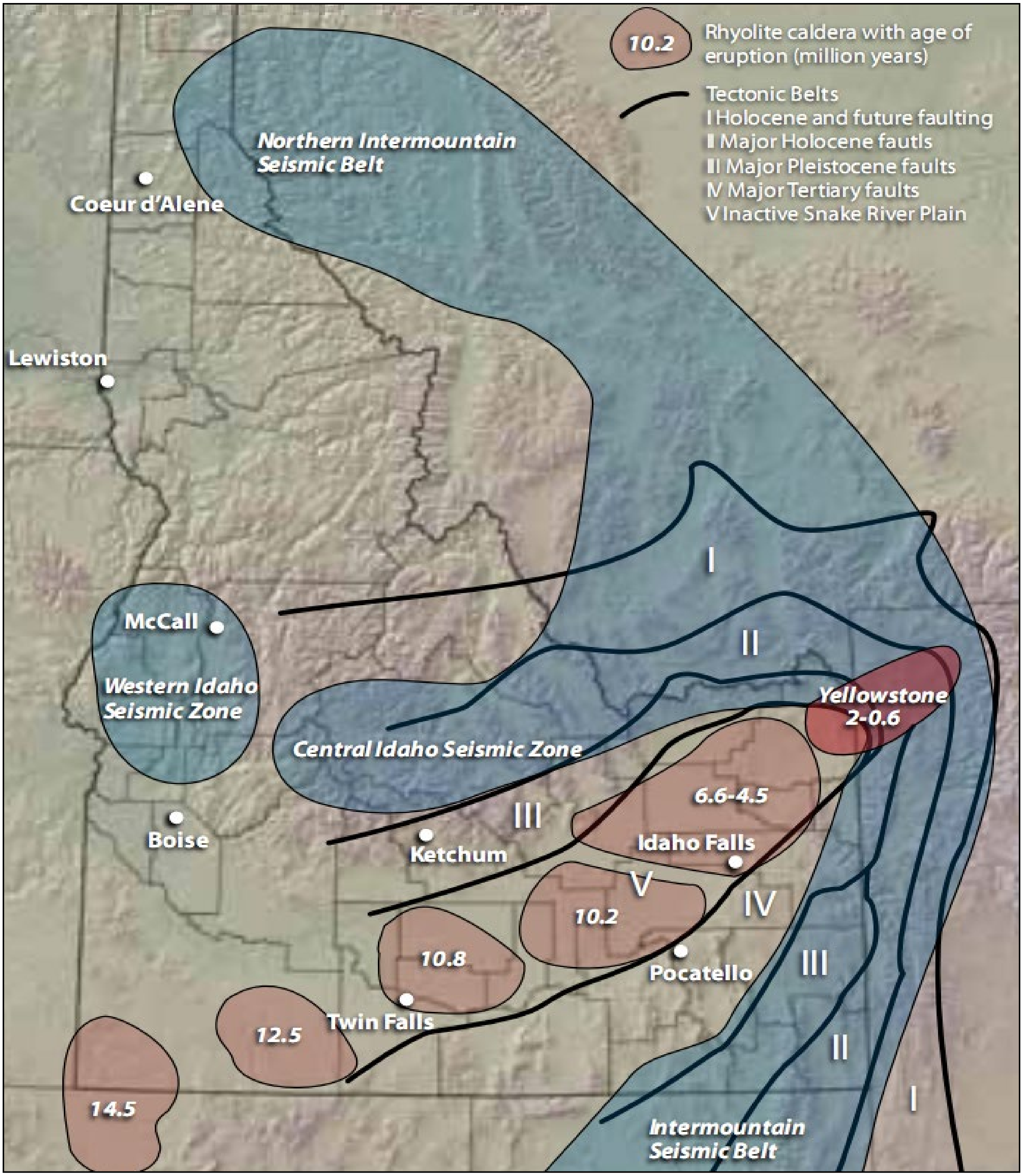


Figure 9-3. Volcanic and Tectonic Features of the Yellowstone-Snake River Plain System

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.
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
2020	6.5	44 miles west of Challis, Idaho	Felt strongly throughout southern Idaho

9.2.3 Location

Faults

Canyon County is near two fault zones: the western Idaho fault system and Owyhee Mountains fault system. The Squaw Creek fault, an active structure near Emmett, about 25 miles north of Boise, has geologic evidence for movement as recently as 7,600 years ago. The Cottonwood Mountain fault is about 40 miles northwest of Caldwell. This fault is a northwest-striking, down-to-the-northeast normal fault located along the gently sloping eastern margin of Cottonwood Mountain. Discovered in 2002, it was active as recently as 3,000 years ago. Other faults present in and around Canyon County do not appear to be active.

NEHRP Soil Maps

NEHRP soils data is available for the Canyon County planning area, but it is not a countywide data set. Figure 9-4 shows the available NEHRP soil classification for the planning area.

Liquefaction Maps

Liquefaction maps are available for the Canyon County planning area, but they are not countywide. This data tracks with where NEHRP soils data is available. Available liquefaction mapping is shown in Figure 9-5.

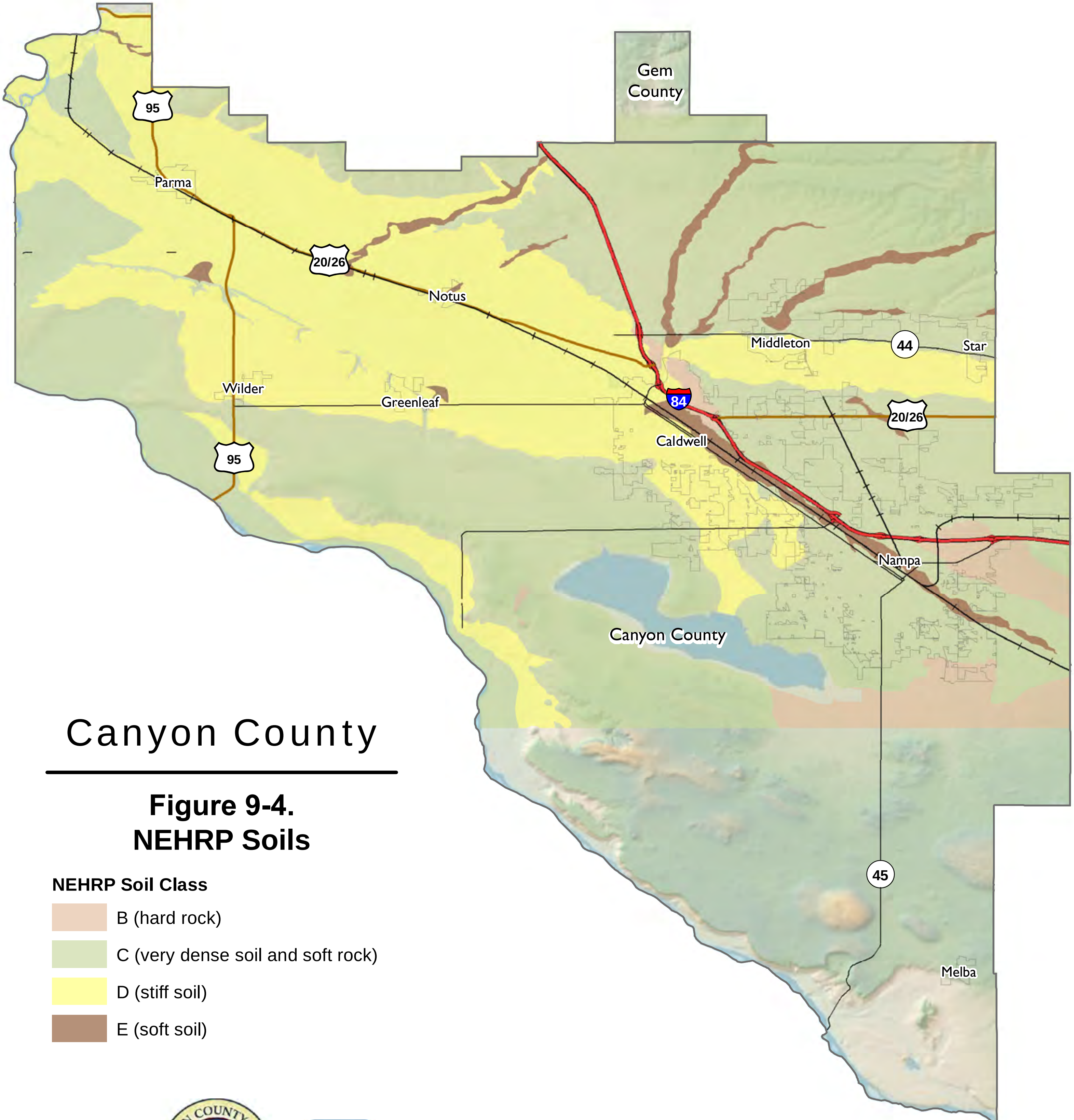
9.2.4 Frequency

Hundreds of earthquakes have been recorded in Idaho. Table 9-4 summarizes statistics from 2010 to 2020. The 2,801 events in that period represent an average of 280 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 2010-2020

	Number of events
Magnitude 2-3	1,876
Magnitude 3-4	849
Magnitude 4-5	70
Magnitude 5-6	5
Magnitude 6-7	1
Total	**2,801**

Source: USGS Earthquake Catalog



Canyon County

Figure 9-4. NEHRP Soils

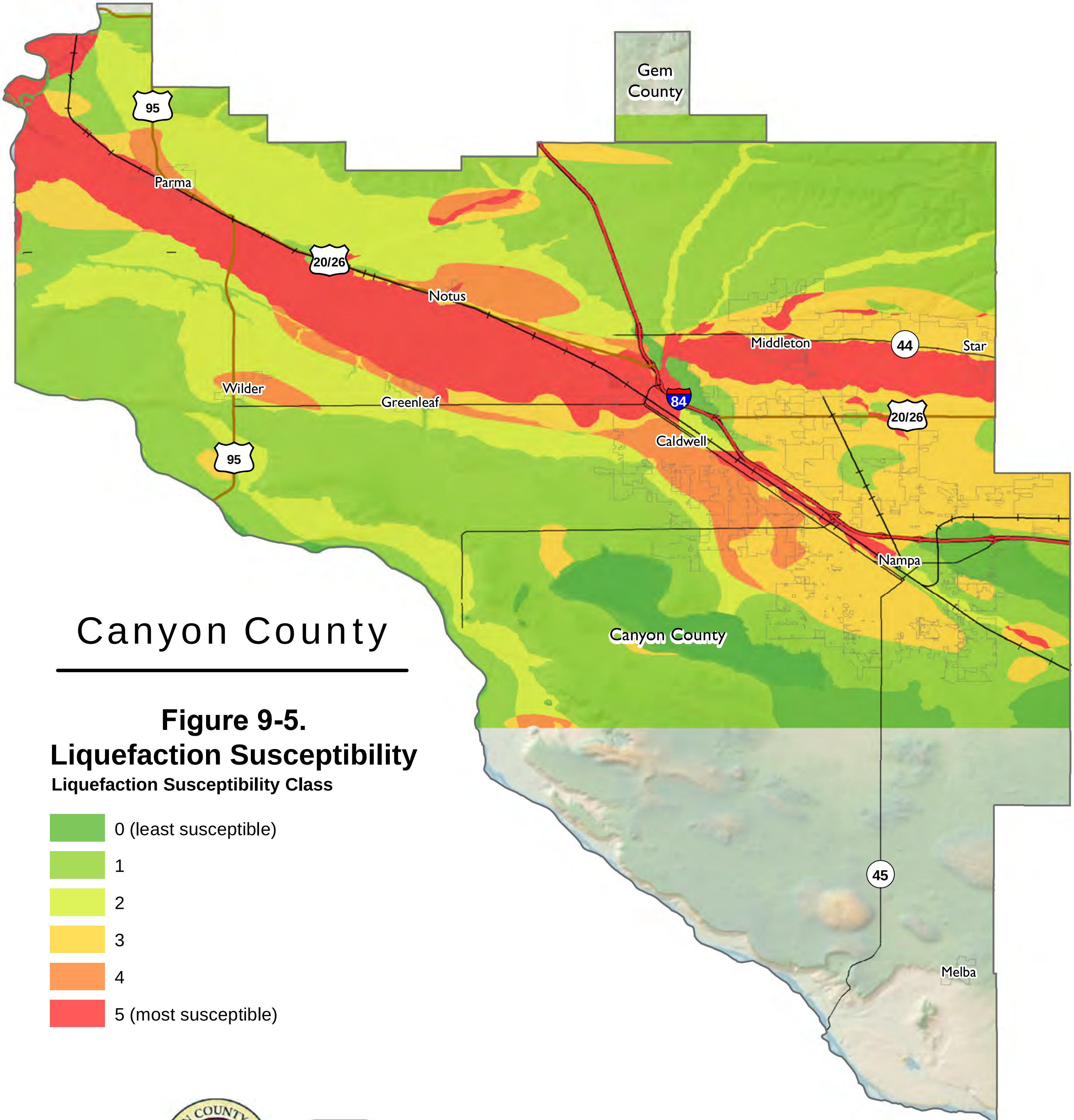
NEHRP Soil Class

- B (hard rock)
- C (very dense soil and soft rock)
- D (stiff soil)
- E (soft soil)

Data Sources: Canyon County GIS, 2020; NEHRP Soils: ID Geological Survey, 2011; Basemap: ESRI, 2020

0 5 10 Miles

N W E S



Canyon County

Figure 9-5.
Liquefaction Susceptibility

Liquefaction Susceptibility Class

- 0 (least susceptible)
- 1
- 2
- 3
- 4
- 5 (most susceptible)

Data Sources: Canyon County GIS, 2020; Liquefaction Susceptibility: ID Geological Survey, 2011; Basemap: ESRI, 2020

0 5 10 Miles

N W E S

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 Canyon 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 300 miles of the Boise area. The exact location of unstable sites is not known for the entire planning area due to the lack of complete NEHRP soils maps.

9.2.5 Severity

Potential Earthquake Intensity in the Planning Area

USGS probabilistic mapping is an indication of potential earthquake intensity in an area. Figure 9-2 shows the intensity with a 10-percent exceedance chance in 50 years in the northwestern United States. For Canyon County, this PGA is in the approximate range of 0.03g to 0.07g.

Potential Damage

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. Soil liquefaction can undermine building and road foundations.

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. Unless properly secured, hazardous materials can be released, causing significant damage to the environment and people.

The severity of a seismic event is directly correlated to the stability of the ground close to the event's epicenter. 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.

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 EXPOSURE

9.3.1 Population

The entire population of Canyon 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.

9.3.2 Property

The Canyon County Assessor estimates that there are 74,273 buildings in the planning area, with a total assessed value of $45.9 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 (87.5 percent) are residential.

9.3.3 Critical Facilities

All critical facilities in Canyon County are exposed to the earthquake hazard. Table 4-5 lists 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.

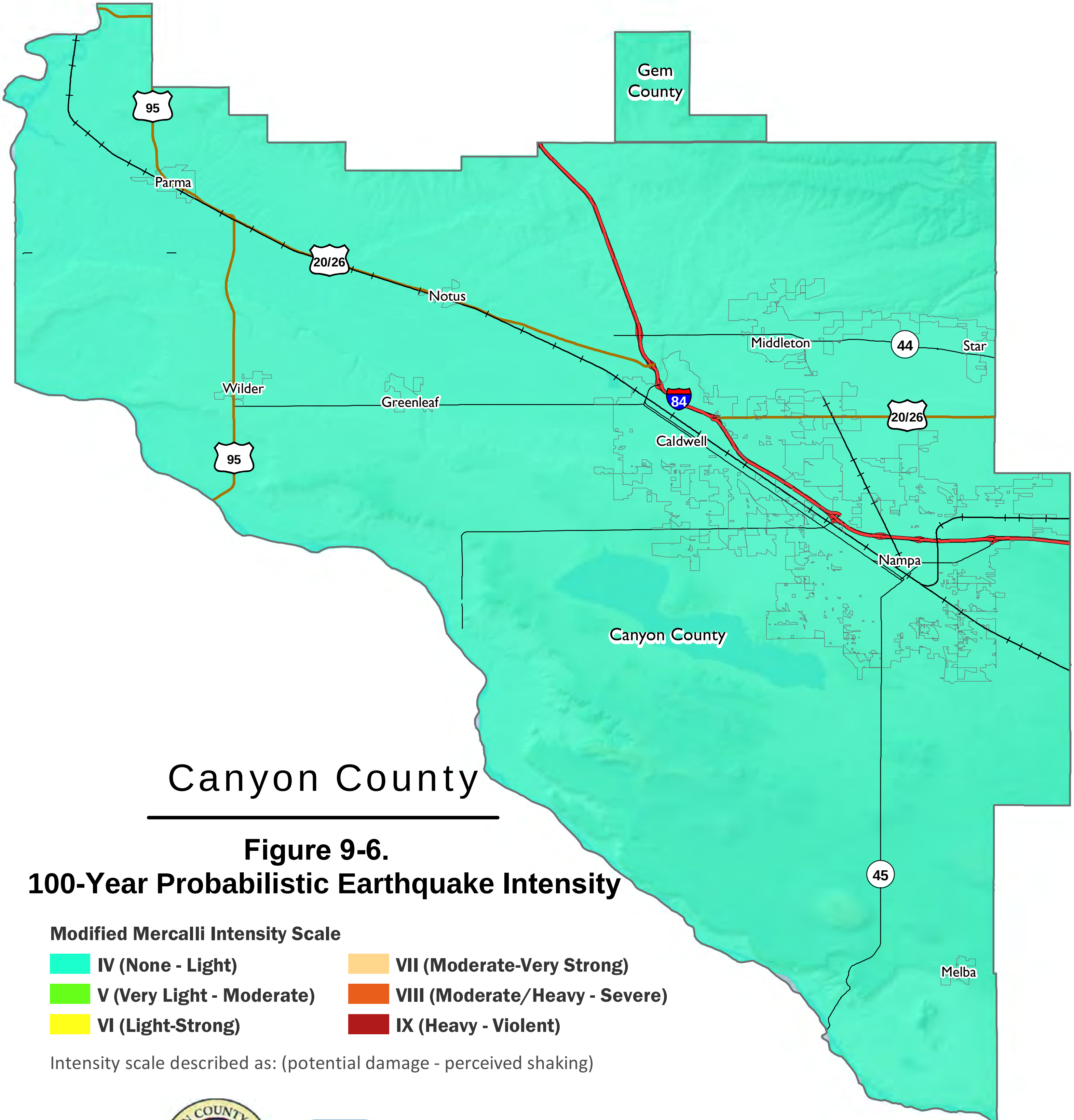
9.3.4 Environment

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.

9.4 VULNERABILITY

Earthquake vulnerability data for the Canyon County risk assessment was generated using a Hazus Level 2 analysis for the for the following events:

- 100-year and 500-year probabilistic earthquakes (see Figure 9-6 and Figure 9-7)
- A Magnitude-7.1M scenario earthquake on the Squaw Creek fault (see Figure 9-8)
- A Magnitude-7.0M scenario earthquake on the Cottonwood Mountain fault (see Figure 9-9).



Canyon County

Figure 9-6.
100-Year Probabilistic Earthquake Intensity

Modified Mercalli Intensity Scale

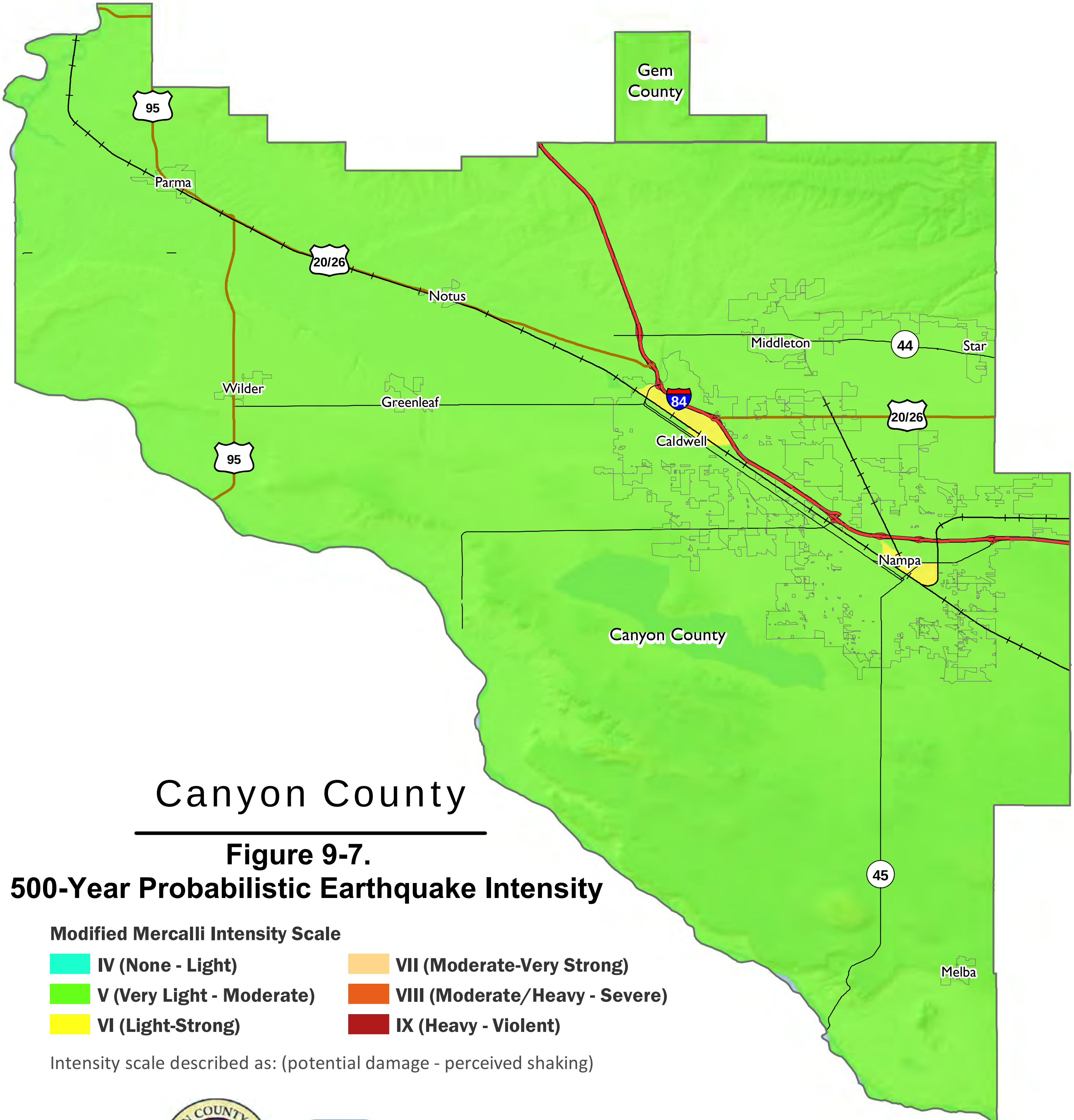
- **IV (None - Light)**
- **V (Very Light - Moderate)**
- **VI (Light-Strong)**
- **VII (Moderate-Very Strong)**
- **VIII (Moderate/Heavy - Severe)**
- **IX (Heavy - Violent)**

Intensity scale described as: (potential damage - perceived shaking)

Data Sources: Canyon County GIS, 2020; Earthquake: Hazus v4.2 SP03; Basemap: ESRI, 2020

0 5 10 Miles

N W E S



Canyon County

Figure 9-7.
500-Year Probabilistic Earthquake Intensity

Modified Mercalli Intensity Scale

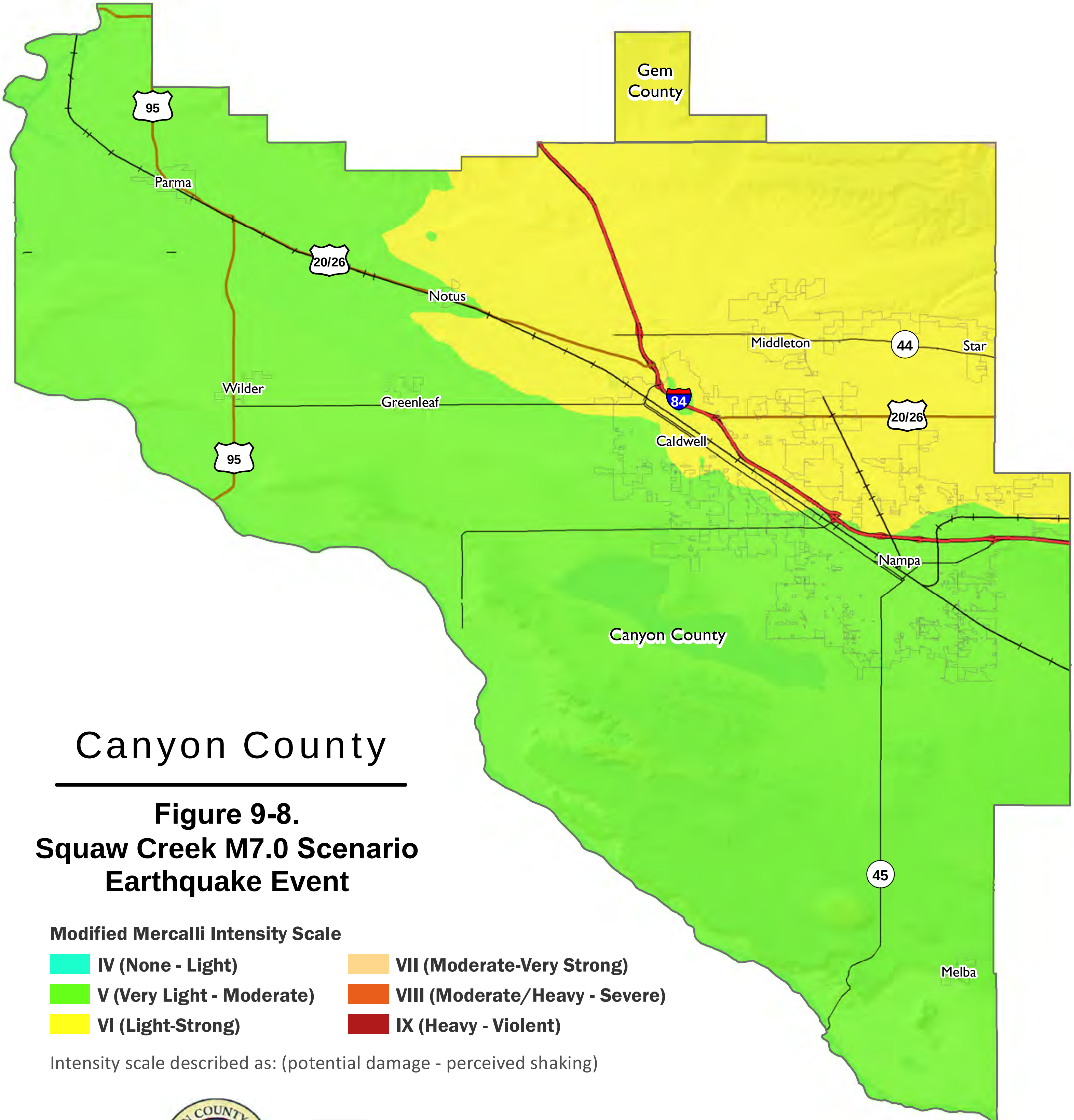
- **IV (None - Light)**
- **V (Very Light - Moderate)**
- **VI (Light-Strong)**
- **VII (Moderate-Very Strong)**
- **VIII (Moderate/Heavy - Severe)**
- **IX (Heavy - Violent)**

Intensity scale described as: (potential damage - perceived shaking)

Data Sources: Canyon County GIS, 2020; Earthquake: Hazus v4.2 SP03; Basemap: ESRI, 2020

0 5 10 Miles

N W E S



Canyon County

Figure 9-8.
Squaw Creek M7.0 Scenario Earthquake Event

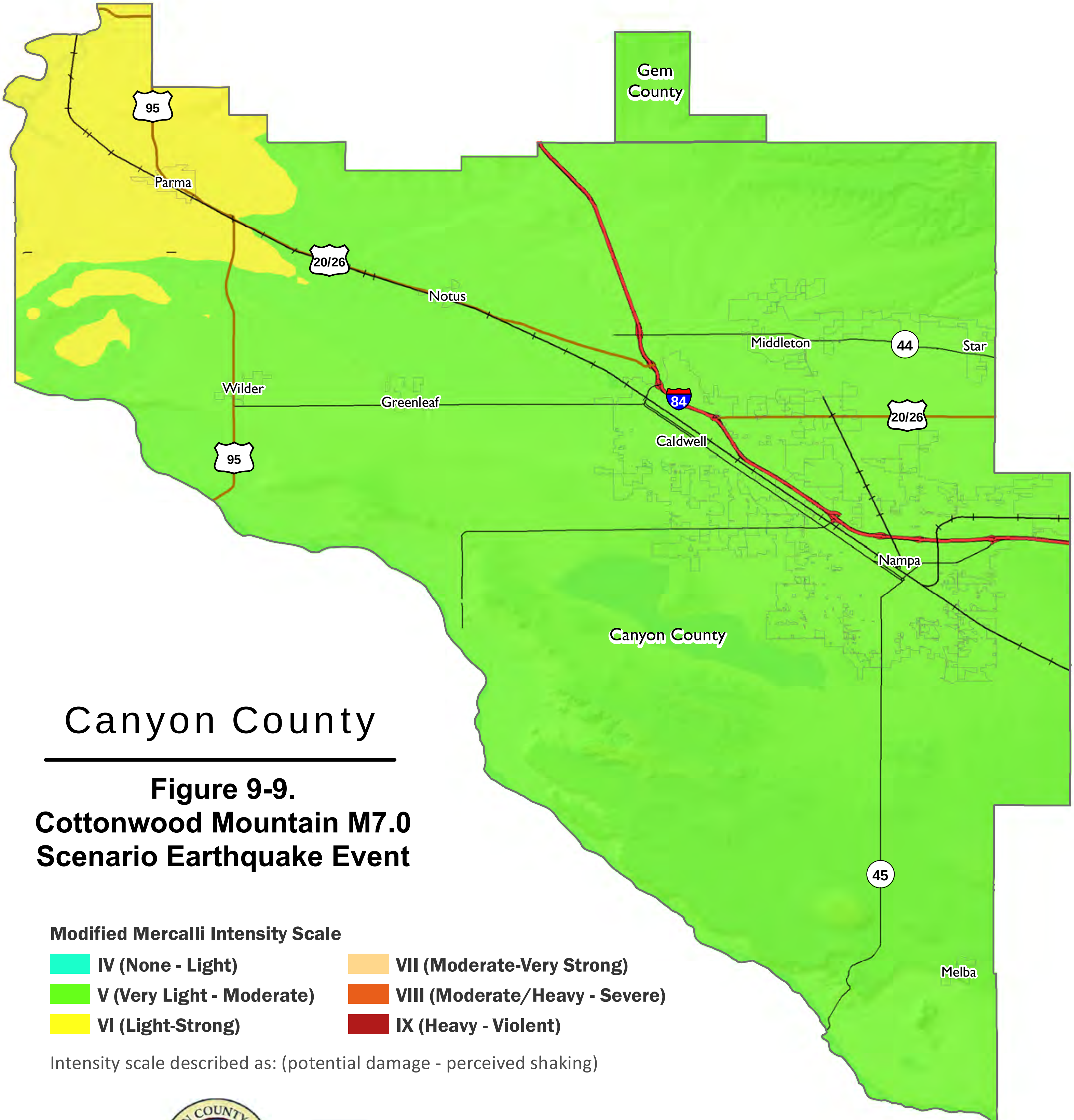
Modified Mercalli Intensity Scale

- **IV (None - Light)**
- **V (Very Light - Moderate)**
- **VI (Light-Strong)**
- **VII (Moderate-Very Strong)**
- **VIII (Moderate/Heavy - Severe)**
- **IX (Heavy - Violent)**

Intensity scale described as: (potential damage - perceived shaking)

Data Sources: Canyon County GIS, 2020; Earthquake: USGS, 2017; Basemap: ESRI, 2020

0 5 10 Miles



Canyon County

Figure 9-9. Cottonwood Mountain M7.0 Scenario Earthquake Event

Modified Mercalli Intensity Scale

- IV (None - Light)
- V (Very Light - Moderate)
- VI (Light-Strong)
- VII (Moderate-Very Strong)
- VIII (Moderate/Heavy - Severe)
- IX (Heavy - Violent)

Intensity scale described as: (potential damage - perceived shaking)

Data Sources: Canyon County GIS, 2020; Earthquake: USGS, 2017; Basemap: ESRI, 2020

0 5 10 Miles

N W E S

Scenario events were modeled using fault data pre-loaded in the Hazus program. 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. The analysis results are summarized in the sections below, and more detailed information, broken down by municipality, can be found in Appendix E.

9.4.1 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.

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

	100-Year Earthquake	500-Year Earthquake	Squaw Creek Scenario	Cottonwood Mountain
Number of Displaced Households	0	1	0	0
Number of Persons Requiring Short-Term Shelter	0	1	0	0

9.4.2 Property

Building Age

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.

The analysis shows 46.2 percent of the planning area's structures were constructed after the Uniform Building Code was amended in 1994 to include seismic safety provisions; 6.3 percent were built before 1939 when there were no building permits, inspections, or seismic standards.

Table 9-6. Age of Structures in Canyon County

Time Period	Number of Current County Structures Built in Period	Significance of Time Frame
Pre-1939	4,835	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.
1940-1960	6,638	In 1940, the first strong motion recording was made.
1961-1975	9,452	In 1960, the Structural Engineers Association of California published guidelines on recommended earthquake provisions.
1975-1994	20,119	In 1975, significant improvements were made to lateral force requirements.
1994 to present	35,204	In 1994, the Uniform Building Code was amended to include provisions for seismic safety.
Total	**76,248**	

Source: U.S. Census Bureau, 2020

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 Cottonwood Mountain scenario events. The analysis also estimated the amount of earthquake-caused debris. Table 9-7 shows the results. The debris estimate includes only structural debris; it does not include additional debris that may accumulate, such as from trees. See Appendix E for a detailed breakdown of vulnerability by community within the planning area

Table 9-7. Earthquake Building Loss Potential

	100-Year Probabilistic Earthquake	500-Year Probabilistic Earthquake	Squaw Creek Scenario Earthquake	Cottonwood Mountain Scenario Earthquake
Estimated Loss				
Structural	$168,274	$56,498,584	$131,482,374	$27,863,792
Contents	$164,193	$34,239,644	$80,330,789	$19,394,873
Total	**$332,467**	**$90,738,228**	**$211,813,163**	**$47,258,665**
% of Total Planning Area Replacement Value	*Less than 1%*	*Less than 1%*	*Less than 1%*	*Less than 1%*
Structural Debris				
Tons	330	6,750	7,120	1,800
Truckloads	13	270	285	72

9.4.3 Critical Facilities

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 estimates the probability of each damage category for every critical facility. The analysis of critical facilities found that the greatest probability of damage is expected for the 500-year probabilistic and Squaw Creek Fault earthquake events. Figure 9-10 and Figure 9-11 show the results for these events as the average estimated probability for all facilities in each category.

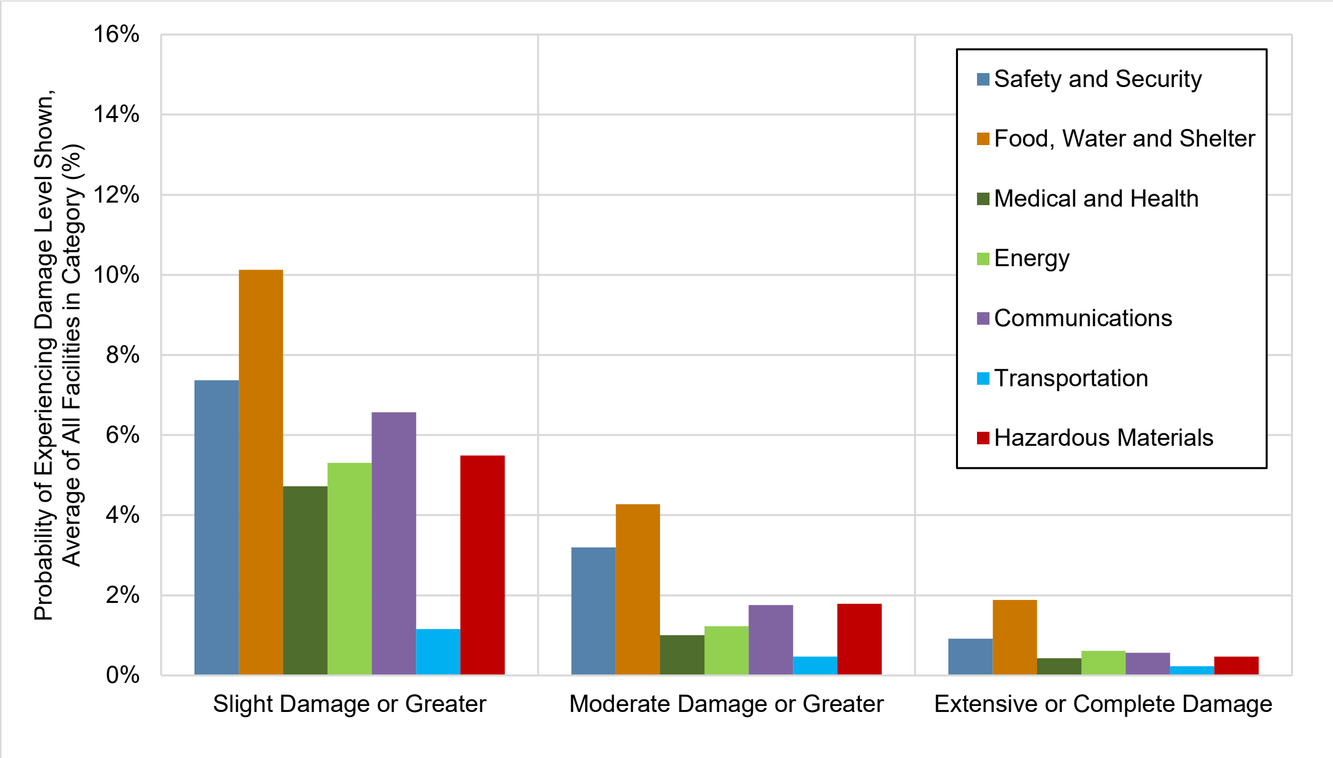


Figure 9-10. Critical Facility Damage Potential, 500-Year Probabilistic Earthquake Scenario

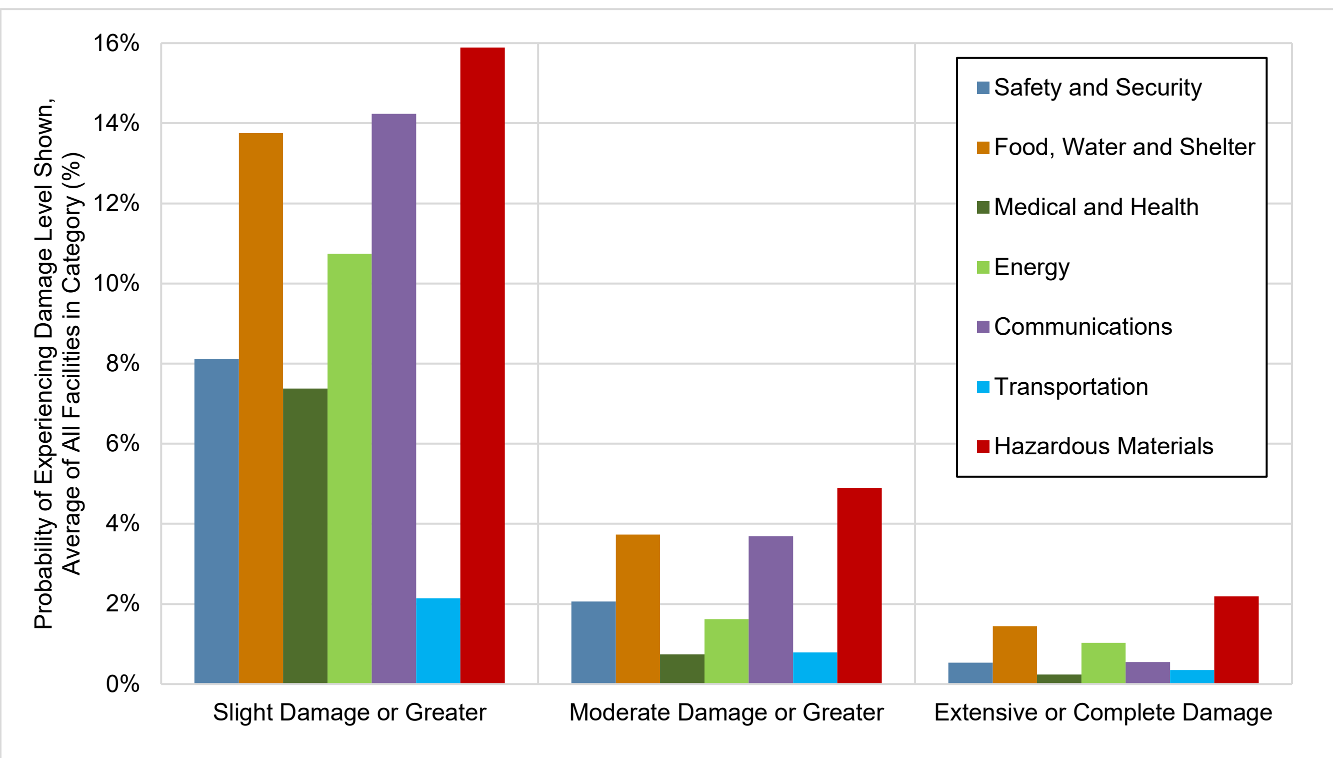


Figure 9-11. Critical Facility Damage Potential, Squaw Creek M7.0 Earthquake Scenario

For all four earthquake scenarios evaluated in this plan almost every critical facility was found to have less than a 50 percent probability of experiencing any damage. The only exceptions are four communications facilities with an estimated 65 percent probability of experience some level of damage for the Squaw Creek scenario event. Hazus estimated damage probabilities for those four facilities as follows:

- 34.7 percent probability of no damage
- 30.7 percent probability of slight damage
- 31.6 percent probability of moderate damage
- 3.0 percent probability of extensive damage

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 found that the slowest return to functionality is expected for the 500-year probabilistic and Squaw Creek Fault earthquake events. Figure 9-12 and Figure 9-13 show the results for these events as the average estimated probability for all facilities in each category.

9.4.4 Environment

Environmental problems as a result of an earthquake can be numerous. Secondary hazards will likely have some of the most damaging effects on the environment. Earthquake-induced landslides can significantly damage surrounding habitat. It is also possible for streams to be rerouted after an earthquake. Rerouting can change the water quality, possibly damaging habitat and feeding areas. Streams fed by groundwater wells can dry up because of changes in underlying geology.

9.5 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 11.2-percent increase in population, a 5.5-percent increase in number of general building stock structures, and a 34.2-percent increase in assessed property value.

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 for the entire planning area. The Idaho Geologic Survey has taken the lead in trying to create this information. As information becomes available, Canyon County and its planning partners will be better equipped to deal with future development as it expands into areas with potential seismic risk.

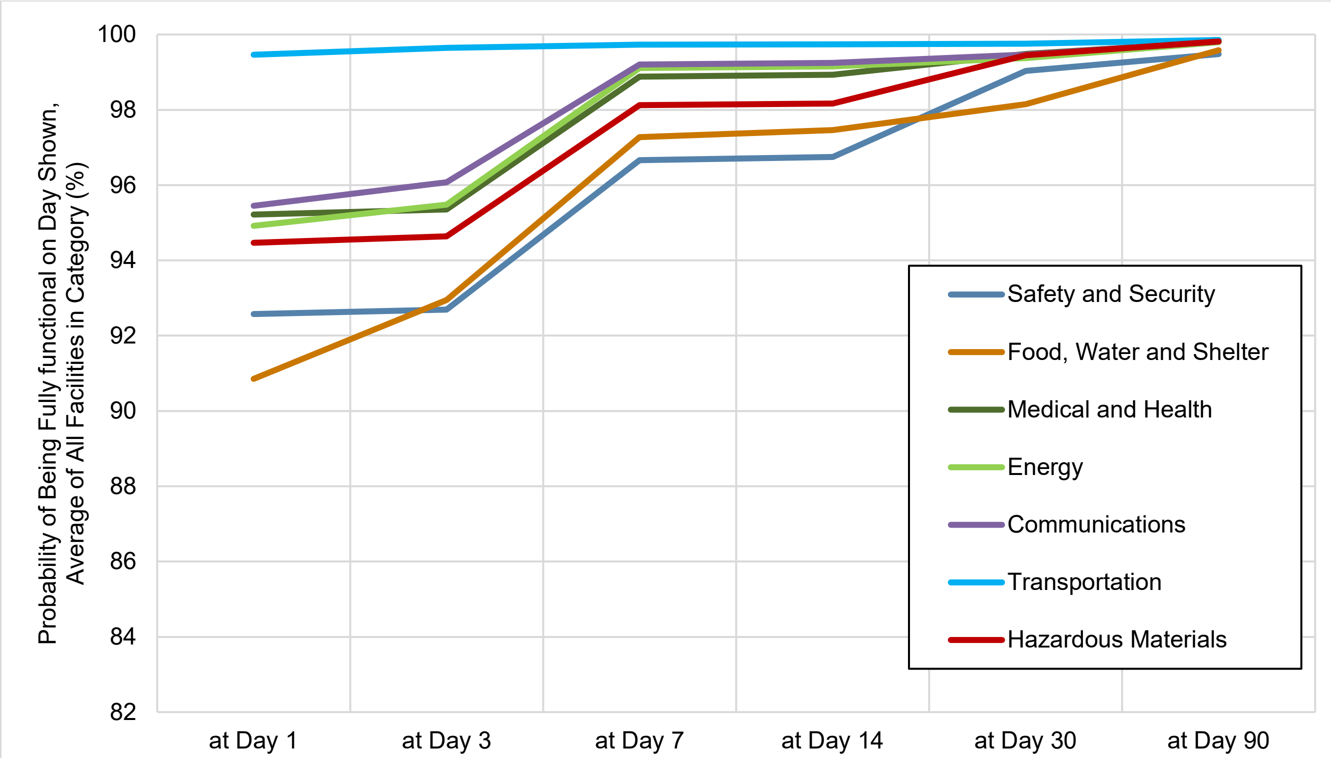


Figure 9-12. Critical Facility Functionality, 500-Year Probabilistic Earthquake Scenario

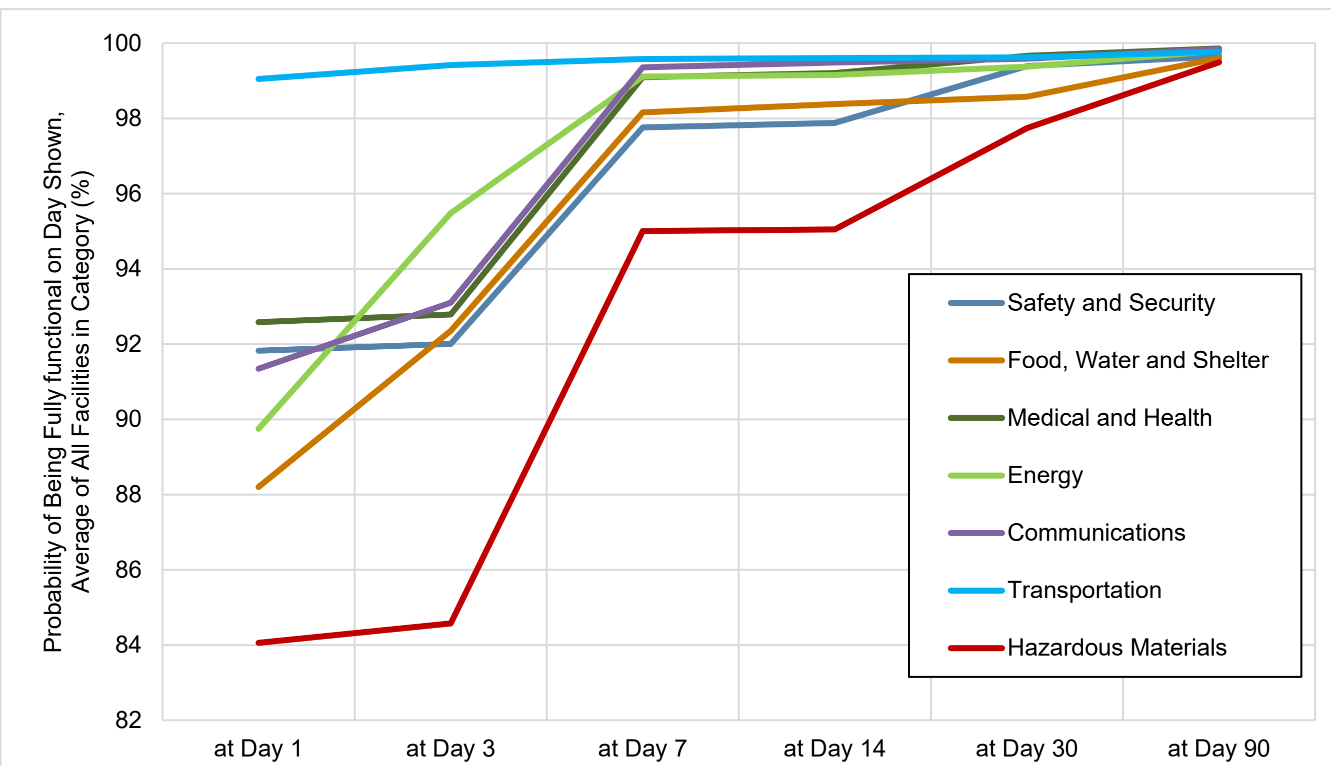


Figure 9-13. Critical Facility Functionality, Squaw Creek M7.0 Earthquake Scenario

9.6 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 Cottonwood Mountain faults within the planning area, any seismic activity on these systems could impact the planning area. The scenario event on these faults mapped by USGS could cause significant damage within the planning area as estimated by the Hazus models.

9.7 ISSUES

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

- Complete NEHRP soils mapping is needed to support better seismic risk assessment.
- Complete Liquefaction mapping is needed to support better seismic risk assessment.
- Twenty-seven 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.
- 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

10.1.1 River Flooding

River flooding occurs when a river rises to overflow its natural banks due to causes such as prolonged, general rainfall, locally intense thunderstorms, snowmelt, or ice jams.

Measuring Floods on Rivers

River flooding is 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 flow that historical data show to have a 1 percent chance of being equaled or exceeded in any given year is called the 1-percent-annual-chance flood. Also called the "base flood," this flood event is a regulatory standard used in assessing flood risk, regulating new development, and setting requirements for purchasing flood insurance.

Discharge probabilities have an inverse relationship to river flows—that is, a lower probability indicates a higher flow. The 0.2-percent-annual chance flood represents a higher river flow than a 1-percent-annual-chance flood. These probabilities reflect statistical averages only; it is possible for two or more low-probability floods to occur in a short time period. The probabilities also can vary along a single river: the same storm event can cause a 1-percent-annual-chance flood at one location on a river and only a 10-percent-annual-chance flood at a point further upstream or downstream.

River Floodplains

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.

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.

Floodplain Mapping

The extent of the floodplain during a 1-percent-annual-chance flood is called the special flood hazard area (SFHA) and is used as a regulatory boundary by many agencies. 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.

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.

10.1.2 Urban Flooding

Drainage facilities in urbanized areas consists of 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 can be low and people may still be able drive through the flood. The water may rise relatively slowly and usually does not reach life endangering depths.

Urban floods can occur suddenly as flash floods after a brief but intense downpour. In these cases, they can move rapidly, end suddenly, and occur in areas not generally associated with flooding (such as subdivisions not adjacent to a water body). Although the duration of these events is usually brief, the damage they cause can be severe.

10.1.3 Canal Flooding

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. Canals pose several flood threats:

- 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.

Impacts from canal failure are similar to those of flash and riverine flooding. With canal failure flooding there is usually large amounts of debris and erosion. Canal failure can happen without warning and residents may be stranded.

10.1.4 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.

10.2 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. 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 Federal Flood Program Participation

National Flood Insurance Program

The National Flood Insurance Program (NFIP) makes federally backed flood insurance available to homeowners, renters, and business owners in participating communities that enact floodplain regulations. Canyon County and participating cities entered the NFIP at varying times beginning in 1980 (see Table 10-1).

Table 10-1. Flood Insurance Statistics

Jurisdiction	Date of Entry Initial FIRM Effective Date	# of Flood Insurance Policies as of 07/31/2019	Insurance In Force	Total Annual Premium	Claims, 11/1978 to 07/31/2019	Value of Claims paid, 11/1978 to 07/31/2019
Canyon County	09/28/1984	202	$49,151,000	$139,358	11	$52,657
Caldwell	09/03/1980	17	$4,935,000	$7,095	1	$0
Greenleaf	05/24/2011	0	$0	$0	0	$0
Melba	Not Participating	0	0	0	0	0
Middleton	09/03/1980	62	$13,410,000	$35,299	11	$37,076
Nampa	09/28/1984	194	$49,423,000	$176,947	2	$7,186
Notus	03/18/1980	7	$1,143,000	$7,453	0	$0
Parma	09/30/1980	17	$4,204,000	$24,742	0	$0
Wilder	Not Participating	0	0	0	0	0
Total		499	$122,266,000	$390,894	25	$96,919

The County and participating cities 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 mitigation actions in this plan to maintain their compliance and good standing.

Table 10-1 lists flood insurance statistics that help identify vulnerability in the planning area. The County and all cities except for Melba and Wilder participate in the NFIP, with 499 flood insurance policies providing $122.3 million in insurance coverage. The average premium within the planning area is $783. According to FEMA statistics, 25 flood insurance claims were paid between 1978 and 2019, for a total of $96,919, an average of $3,877 per claim.

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 23.5 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 are covered by flood insurance nationwide.
- The average claim paid in the planning area represents about 0.4 percent of the 2020 average assessed value of structures in the floodplain.
- The average amount of coverage per policy for the planning area is $245,022, which represents 25 percent of the average assessed value of structures in the special flood hazard area.

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 CRS goals. Currently none of the eligible communities within the planning area participate in the CRS program.

10.2.2 Local Flooding Characteristics

The following are excerpts from the June 7, 2019 Flood Insurance Study for Canyon County prepared by FEMA describing the principal flooding problems within the county.

Unincorporated County

Flooding from the Boise River results primarily from spring snowmelt in the 2,650-square-mile upper watershed. A combination of rainfall and snowmelt could cause large releases from the upstream reservoirs (Anderson Ranch Reservoir, Arrowrock Reservoir, and Lucky Peak Reservoir) during the winter. Significant flooding from tributaries draining the Boise River valley could be caused by a combination of a winter rainstorm associated with a warm air-mass, melting snow, and possibly frozen ground. Flooding from the Snake River could occur during late winter or early spring when higher-than-normal releases from reservoirs would be necessary. Ice jams during the winter could also cause some localized flood problems.

As reported by the USGS, with the decrease in peak flows below Lucky Peak, aggradation (deposition of materials in the streambed) has caused increased flood elevations over time for the same flow. As an example, a flow of 8,000 cfs flowed in 1972 at Notus, at the same stage as 11,800 cfs flowed in 1938. It is estimated that a flow of 21,000 cfs, which occurred in April 1943, would now flow at 2.5 feet higher than in 1943.

Nampa

A combination of a rainstorm and melting snow, possibly on frozen ground, is apt to cause flooding on Indian and Mason Creeks. Flooding has occurred many times in the past where debris has lodged on the upstream side of some of the numerous bridges and culverts, causing backwater.

Elijah, Wilson, and 12th Avenue Drains have no known history of flooding in Nampa. Flooding could occur only after extremely heavy rainstorms, or from lesser runoff if the drain were obstructed by debris.

Caldwell

Three bridges span the Boise River near Caldwell. Debris accumulation during high flow at any of these bridge sites could cause flooding due to backwater. Only slight over-bank flooding is known to have occurred.

Flooding on Indian Creek would be caused by runoff from a combination of a rainstorm and melting snow, possibly over frozen ground. There are numerous crossings over Indian Creek, and reaches of the channel, up to approximately 1,200 feet in length, are covered. The banks of Indian Creek have been overtopped.

The channel for Wilson Drain is cleaned periodically, minimizing its over-bank flooding in Caldwell. Dixie Drain has been channelized, which limits over-bank flooding to a low area at the southern end of the Municipal Park Golf Course.

Elijah Drain has no known history of flooding in Caldwell. Flooding could occur only after extremely heavy rainstorms or from lesser runoff if the drain is obstructed by debris. Its flood potential is considered negligible.

Middleton

Flooding in Middleton has occurred as a result of high flows on Willow Creek and Mill Slough.

Notus

Since construction of the Lucky Peak and Anderson Ranch Dams, the 1-percent-annual-chance flood of the Boise River at Notus has been determined by the Corps of Engineers to be 16,600 cfs. The most recent flood having a recurrence interval of approximately 10 years was recorded in 1972, with a discharge of 7,850 cfs.

Parma

The 1-percent-annual-chance flood of the Boise River at Parma was determined by the Corps of Engineers to be 16,600 cfs. Flood discharge at Parma is considered essentially the same as that through the entire Lower Boise River.

Flood Protection Measures

The Boise River flow is regulated upstream of the City of Boise by storage in Anderson Ranch Reservoir, Arrowrock Reservoir, and Lucky Peak Lake, which have a combined active storage capacity of 988,800 acre-feet. This storage lowers the expected discharge for the 10-, 2-, 1-, and 0.2-percent-annual-chance floods. The natural 10-percent-annual-chance flood peak would be 25,000 cfs; for regulated flow it is 7,200 cfs. The natural 0.2-percent-annual-chance flood peak would be 54,000 cfs; for regulated flow it is 34,800 cfs.

Flood magnitudes along Lower Indian Creek are affected by operation of the New York Canal. The New York Canal is an irrigation canal that starts from the Boise River just below the Lucky Peak Project. To the south of Eager Road and Kuna Road (in Ada County), the canal splits to the Mora Canal and the New York Canal.

Approximately 1,200 feet downstream of Stroebel Road in the City of Kuna, the New York Canal converges with Indian Creek. The New York Canal and Indian Creek continue as one stream until about 2,100 feet upstream of Columbia Road, where there is a Callopy gate across the stream channel. Indian Creek splits from the combined channel and flows to the northwest through the cities of Nampa and Caldwell to the Boise River. The New York Canal continues west to Lake Lowell. The Callopy gate controls how much water is allowed to flow through the New York Canal. The gate currently maintains the design flow of 1,500 cfs in the New York Canal. Flood flow in excess of 1,500 cfs is diverted to Indian Creek over a broad crested weir.

During the flood season (December 1 to March 31), it is assumed that 1,000 cfs is maintained in the joint New York Canal/Indian Creek channel 20 percent of the time. The percentage of time the canal was in use was determined by analyzing observed records. During a flood event, natural discharges from the Indian Creek basin are increased by the flow diverted to the New York Canal.

Willow Creek was included in the U.S. Bureau of Reclamation Black Canyon Irrigation Project. Watershed rehabilitation, levee work, channelization, and construction of vertical drops to control velocity were done as part of the project from 1946 through 1950.

10.2.3 Past Events

Table 10-2 lists flood events in the planning area since 1950 for which federal disaster declarations were issued.

Table 10-2. History of Flood Events

Date	Declaration #	Type of event	Estimated Damage
04/22/1956	DR-55	Flood	N/.A
Some flood damage occurred along the Snake River between Heise and Roberts, near Idaho Falls. Runoff of the Snake River at Heise was the third highest of record. Greater flood damage was prevented by the operation of irrigation reservoirs.			
02/14/1962	DR-120	Flood	N/A
Floods resulted from an unusual combination of prolonged low-intensity rainfall, moderate amounts of snow on low-altitude areas, warm days and nights, and a glaze of ice over deeply frozen ground.			
02/14/1963	DR-143	Flood	$3.5 Million statewide
Record-breaking flood peaks occurred in February in southern Idaho. A considerable number had recurrence intervals of more than 50 years. The floods resulted from above-freezing temperatures and prolonged light-to-moderate rainfall on light snow cover on ground that was frozen to considerable depth.			
June 1983	N/A	Flooding	N/A
The highest flow with existing flood control storage in the Boise River was 9,500 cfs in June 1983. The reservoirs were over 98 percent full when the inflow subsided and normal regulation was resumed. Irrigation canals at maximum flow took 3,700 cfs from the total discharge or flooding would have been worse.			
05/06/2005	N/A	Flash Flood	$50K
Flooding at the Caldwell Airport, parts of Caldwell, Conway Rd washed out			
09/05/2013	N/A	Flash Flood	N/A
Severe thunderstorms crossed parts of Southeast Oregon and Southwest Idaho. Flash flooding was reported in Nampa and an inch and a half of rainfall in 30 minutes was reported south of Nampa.			
05/26/1998	N/A	Flooding	N/A
Unusually heavy rainfall caused many Idaho rivers to crest above flood stage. The Weiser River and Snake River at Weiser, the Payette River at Emmett and the Boise River at Boise all flooded during the final week of May. The Weiser crested at 2.3 feet above flood stage, closing a section of Highway 95 and flooding a car dealership, a radio station and a church. This flooding was exacerbated by flood levels on the Snake River, which crested at Weiser 1.8 feet above flood stage. Mostly farmland and city park land was flooded, however a flood-caused levee break forced the evacuation of a trailer park along the river. The Boise River continued to flood until June 10.			
05/15/2012	N/A	Flooding	N/A
Melting high-elevation snowpack in the Boise River basin prompted water managers to clear more reservoir storage space and continue discharge from Lucky Peak Dam with the associated minor flooding in Ada and Canyon Counties. Regulated flows on the Boise River increased above flood flow (7,000 cfs) on April 28, and were reduced below flood flow on May 15. Lowland flooding occurred along the river from Boise to Parma. Sections of the greenbelt path were flooded along with some pasture and fields. Floodwaters inundated a section of Boise River Road between Highway 95 and Notus. Several large trees were up-rooted and became snagged on bridges.			
3/29/2017	DR-4342	Idaho Flooding	$750K
The Boise River flooded for the entire month of May due to planned release at Lucky Peak. Regulated flows were above flood stage for 101 days, resulting in extensive bank erosion and flooding of lowlands along the river.			

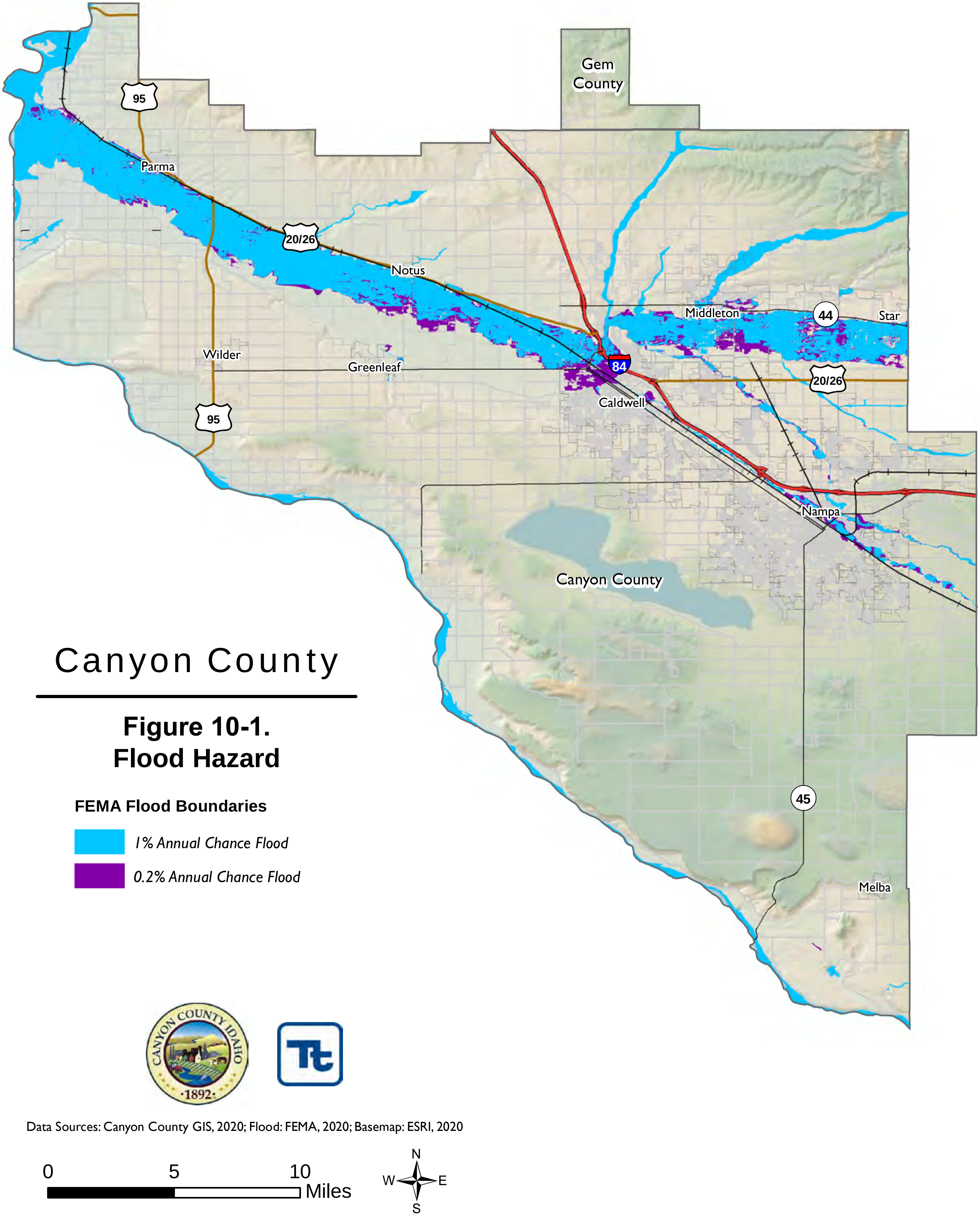
In addition to the federally declared events, FEMA's Flood Insurance Study for Canyon County lists the following historical events:

- In 1896, flooding occurred on the Boise River, near Boise. This flood, the maximum on record, was equal to a 47-year event on the natural curve. However, on the regulated flood flow frequency curve developed for FEMA's Flood Insurance Study, it would have a recurrence interval of 500 years.
- In 1937, floodwaters from the Boise River reached northward in Parma to the Union Pacific Rail Road tracks. This flooding was the result of a 1-percent-annual-chance flood (1,530 cfs), as recorded at the gaging station in Notus.
- Flooding occurred on the Boise River in 1943. Discharge for this flood at Notus was estimated at 20,500 cfs with a recurrence interval of 23 years. This flood occurred before the Lucky Peak and Anderson Ranch Dams were built on Boise River. The same discharge would now be greater than the 1-percent-annual-chance flood because of regulated flows.
- Indian Creek overflowed its banks in February 1952, flooding several basements in Nampa and causing road closures due to mud and debris left by the high water.
- On February 14, 1979, the state declared Canyon County a disaster area because of extreme flooding. Widespread flooding occurred throughout Canyon County, mostly from small drains within the Boise River valley that had rapid snowmelt over frozen ground. The City of Middleton experience flooding from two sources:
  - It is estimated that a flow of 1,160 cfs on Willow Creek. entered Middleton from above the railroad bridge at the northeastern edge of town. This discharge approximated the calculated discharge for a 10-year flood event and showed close agreement with computed 10-year flood profiles. Willow Creek overflowed its banks almost continuously downstream to its mouth, causing shallow to moderate flooding in most of western Middleton. Flood depths along the left bank ranged from 1.7 feet along the north side of Concord Street to 1.2 feet at the entrance to the Middleton High School football field south of State Highway 44. Flood depths along the right bank ranged from 0.8 feet on the north side of Concord Street to 2.5 feet at the northwest corner of State Highway 44 and Cemetery Road. Shallow flooding occurred as far as 1,000 feet out from the main channel.
  - The estimated peak discharge of Mill Slough in Middleton was 625 cfs above the railroad tracks (exceeding the 1-percent-annual-chance flood discharge of 317 cfs calculated for the Flood Insurance Study) and 325 cfs below. The difference was 300 cfs that flowed over State Highway 44 east of the railroad tracks. The flood in February 1979 was the first flood on Mill Slough in more than 33 years. Flood depths ranged from 3.0 feet along State Highway 44 just east of the railroad tracks to 0.5 feet at Second Street South and Duncan Avenue. South of State Highway 44, most flooding was shallow, with depths to 0.5 feet.

10.2.4 Location

Area Within the Mapped Floodplain

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 1984 FIRMs generated by FEMA for Canyon County. Figure 10-1 show the FEMA flood mapping for the planning area.



Canyon County

Figure 10-1. Flood Hazard

Data Sources: Canyon County GIS, 2020; Flood: FEMA, 2020; Basemap: ESRI, 2020

Repetitive Loss

A repetitive loss property is an NFIP-insured property that has repeated flood damage. The key identifiers for repetitive loss properties are the existence of flood insurance policies and claims paid by the policies. 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, Canyon County has no identified repetitive loss properties. Therefore, no repetitive loss area analysis has been performed for this risk assessment.

10.2.5 Frequency

Canyon County experiences episodes of river flooding almost every winter. Urban portions of the county annually experience nuisance flooding related to drainage issues. From 1952 to 2017, federal disaster declarations for flooding in the county were issued about once every six years on average.

10.2.6 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 10-3 lists peak flows used by FEMA to map the floodplains of Canyon County.

10.2.7 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 Boise River system are regulated by the U.S. Army Corps of Engineers, warning on this system is tied to water release rates set by the Corps. The Corps is required to notify emergency managers of any significant increase in release rates from Lucky Peak Dam. These announcements usually occur well in advance of increased release rates (24 to 48 hours).

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.

Canyon County Emergency Management has established flood warning protocols outlining the response to flooding in the planning area.

Table 10-3. Summary of Peak Discharges Within Canyon County

Source/Location	Drainage Area (square miles)	Discharge (cubic feet/second)			
		10-Year	50-Year	100-Year	500-Year
Boise River[a]					
At the Mouth	4,130	7,200	11,000	16,600	34,800
Railroad Bridge (split flow location)	3,220	7,200	11,000	16,600	34,800
N. of UPRR Bridge	3,220	7,200	11,000	16,600	34,800
Indian Creek[b]					
At the Mouth	264	88	983	1,725	3,900
Between the Wilson Drain and New York Canal	234	23	860	1,560	3,630
Wilson Creek (Lower)					
Upstream of Middleton	82	1,170	2,160	2,700	4.220
Wilson Creek (Upper)					
At Duff Lane	c	c	c	2,700	c
Renshaw Canal					
Above Confluence with West End Drain	9	160	305	385	615
At Downstream End of Study Area	c	300	565	715	1,135
Renshaw Canal Overflow					
At Divergence From Renshaw Canal	c	21	129	200	408
Mason Creek					
At the Mouth	52	424	951	1,266	2,255
Upstream of Purdam Gulch Drain	30	326	723	957	1,691
At Kings Road	27	310	826	907	1,595
Mill Slough[c]					
At Union Pacific Railroad	c	345	c	810	1,180

a. Regulated Discharges from Lucky Peak Dam
b. Flow partly diverted to New York Canal
c. Not Available

10.3 EXPOSURE

A quantitative assessment of exposure to the flood hazard was conducted using the flood mapping shown in Figure 10-1 and the asset inventory developed for this plan. Population exposure was estimated by calculating the number of buildings in the FEMA-mapped floodplain as a percent of total planning area buildings, and then applying this percentage to the estimated planning area population. Detailed results by municipality are provided in Appendix E; results for the total planning area are presented below.

10.3.1 Population and Property

Table 10-4 summarizes the estimated population living in the mapped flood zones and the estimated property exposure. Figure 10-2 and Figure 10-3 show the county-wide distribution of structures in the mapped flood zones by occupancy class. In both the 1 percent-annual-chance flood zone and the 0.2 percent-annual-chance flood zone, the exposed structures are primarily residential or commercial, with other occupancy classes making up less than 1 percent of the total number of exposed structures.

Table 10-4. Exposed Population and Property in Mapped Flood Zones

	1% Annual Chance Flood Zone	0.2% Annual Chance Flood Zone
Population		
Population Exposed	5,936	12,308
% of Total Planning Area Population	2.6	5.4
Property		
Number of Buildings Exposed	2,117	4,485
Value of Exposed Structures	$1,126,491,091	$2,343,626,350
Value of Exposed Contents	$955,774,214	$2,056,345,045
Total Exposed Property Value	**$2,082,265,305**	**$4,399,971,395**
Total Exposed Value as % of Planning Area Total	***4.5***	***9.6***

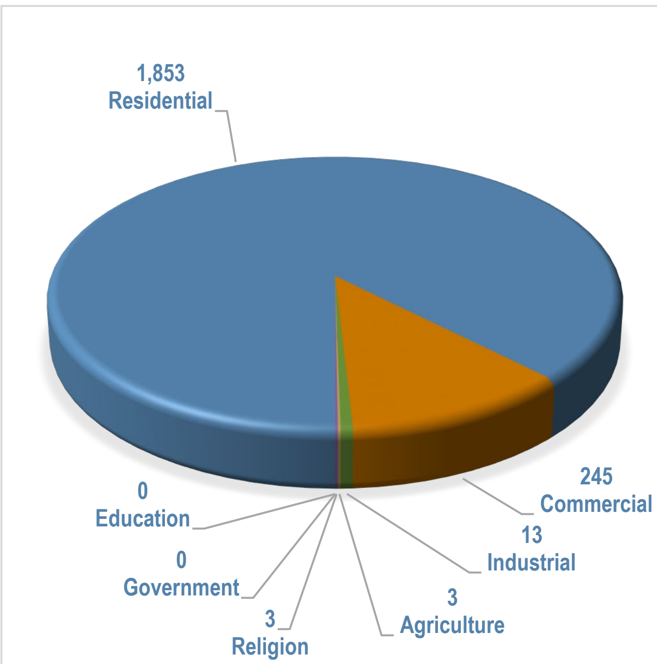


Figure 10-2. Number of Structures by Occupancy Class in the 1 Percent-Annual-Chance Flood Hazard Area

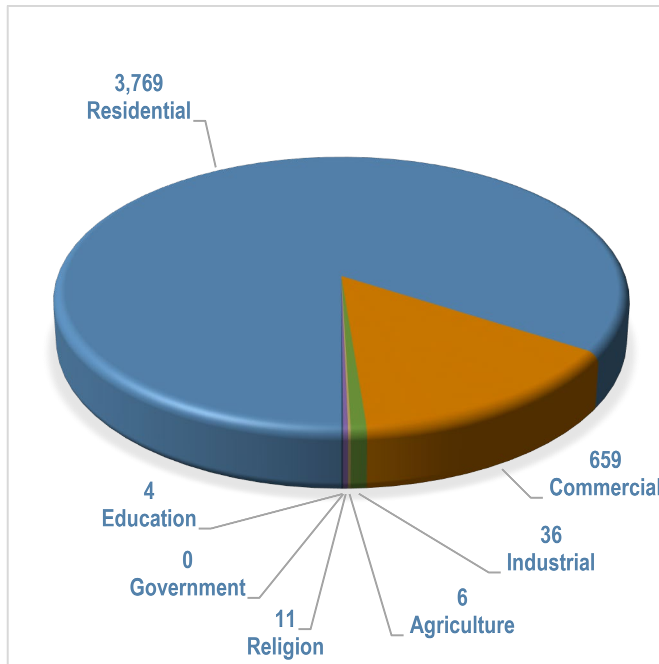


Figure 10-3. Number of Structures by Occupancy Class in the 0.2 Percent-Annual-Chance Flood Hazard Area

10.3.2 Critical Facilities

Critical facilities exposed to the flood hazard represent 6.7 percent (44 facilities) of the total critical infrastructure and facilities in the planning area for the 1-percent-annual-chance flood hazard and 13.9 percent (92 facilities) for the 0.2-percent-annual-chance flood hazard. The breakdown of exposure by facility type is shown in Figure 10-4. Linear infrastructure is also exposed, including utility lines and roads.

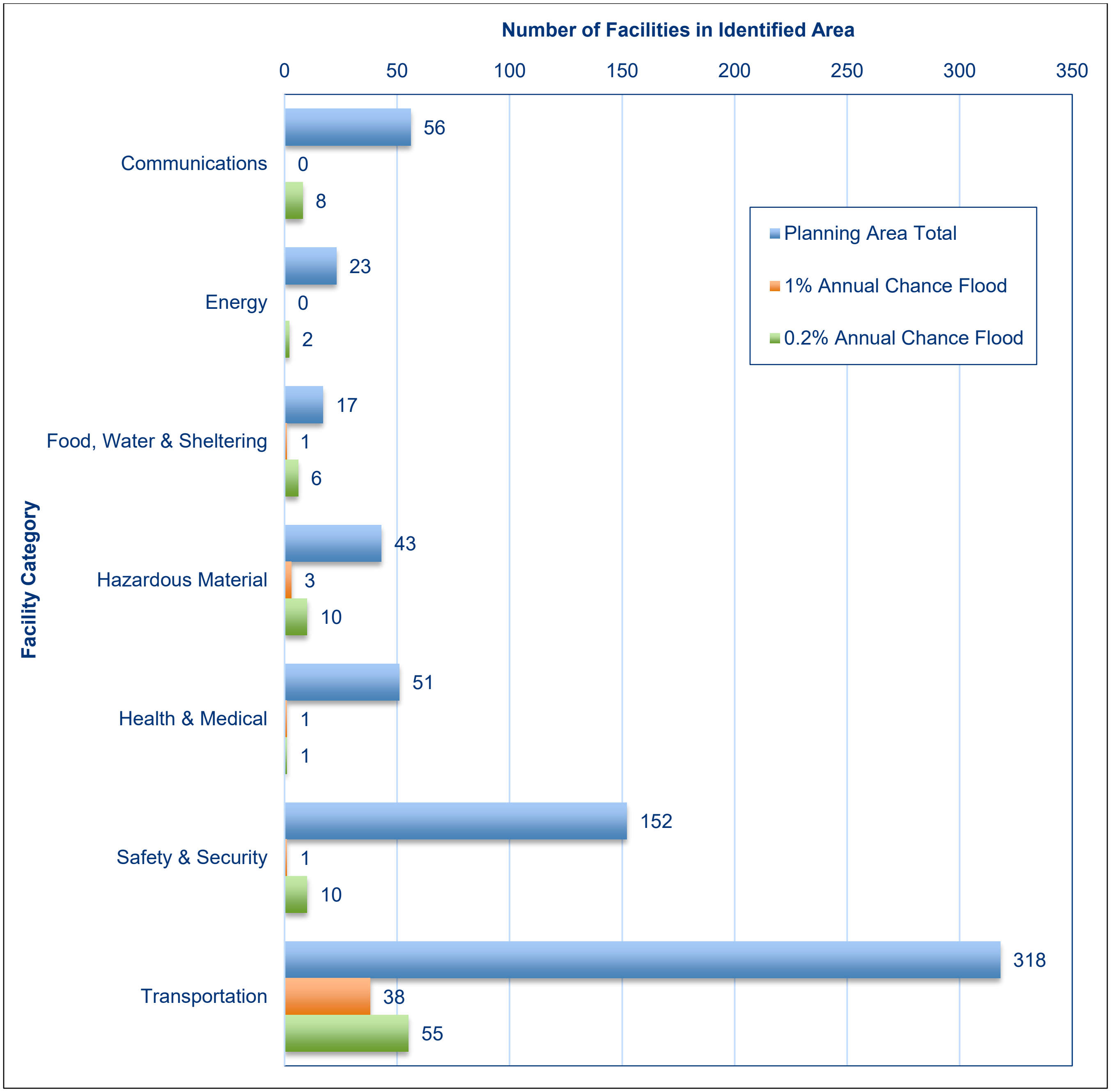


Figure 10-4. Critical Facilities in Mapped Flood Hazard Areas and Countywide

Toxic Release Inventory Reporting Facilities

Toxic Release Inventory facilities are known facilities that manufacture, process, store or other wise use certain chemicals above minimum thresholds. If damaged by a flood, these facilities may potentially release chemicals that cause cancer or other human health effects, significant adverse acute human health effects, significant adverse environmental effects. During a flood event, containers holding these materials can rupture and leak into the surrounding area, having a disastrous effect on the environment as well as residents. Three facilities in the 1 percent-annual-chance flood zone are Toxic Release Inventory reporting facilities.

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. no major roads in the planning area pass through the 1 percent-annual-chance flood zone.

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 36 bridges that are in or cross over the 1 percent-annual-chance flood zone.

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. One wastewater treatment facility was identified as being within the 1 percent-annual-chance flood zone.

10.3.3 Environment

Riparian areas, the zones along the edge of a river or stream that are influenced by or are an influence upon the water body, are particularly exposed to the flood hazard. The exposed environment includes wildlife that relies on riparian areas in the following ways:

- Mammals depend on a supply of water for their existence.
- 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 they inhabit the waterways and wetlands.
- Fish habitat throughout the county varies widely based on natural conditions and human influence.

10.4 VULNERABILITY

Many of the areas exposed to flooding may not experience serious flooding or flood damage. This section describes vulnerabilities in terms of population, property, infrastructure and environment. Detailed results by municipality are provided in Appendix E; results for the total planning area are presented below.

10.4.1 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 35 percent of the households in the census blocks that intersect the FEMA 100-year floodplain are economically disadvantaged, defined as having household incomes of $30,000 or less.
- **Population over 65 Years Old**—It is estimated that 9 percent of the population in the census blocks that intersect the FEMA 100-year floodplain are over 65 years old.
- **Population under 16 Years Old**—It is estimated that 32 percent of the population in the census blocks that intersect 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 1,965 people, with 75 of those people needing short-term shelter. For a Hazus-generated 500-year flood, it is estimated that up to 6,264 people could be displaced, with 290 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.

10.4.2 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.

Table 10-5 summarizes Hazus estimates of flood damage in the planning area. The debris estimate includes only structural debris and building finishes; it does not include additional debris that may result from a flood event, such as from trees, sediment, building contents, bridges or utility lines. The 3,342 tons of estimated debris from a 1-percent-annual-chance flood event is enough to fill 134 25-ton trucks.

Table 10-5. Estimated Impact of a Flood Event in the Planning Area

Damage Type	100-Year Flood	500-Year Flood
Structure Debris (Tons)	3,342	9,991
Buildings Impacted	1,552	3,575
Total Value (Structure + Contents) Damaged	$101,314,192	$464,886,547
Damage as % of Total Replacement Value	0.2%	1%

10.4.3 Critical Facilities

Figure 10-5 shows the number of affected critical facilities within the mapped floodplains (1 percent and 0.2 percent annual chance) compared to the total number exposed. The number of affected facilities as a percentage of total exposed facilities ranges from 34 percent (13 of 38 transportation facilities in the 1 percent annual chance floodplain) to 100 percent (1 of 1 safety/security, health/medical, and food/water/shelter facilities in the 1 percent annual chance floodplain and health/medical facilities in the 0.2 percent annual chance floodplain).

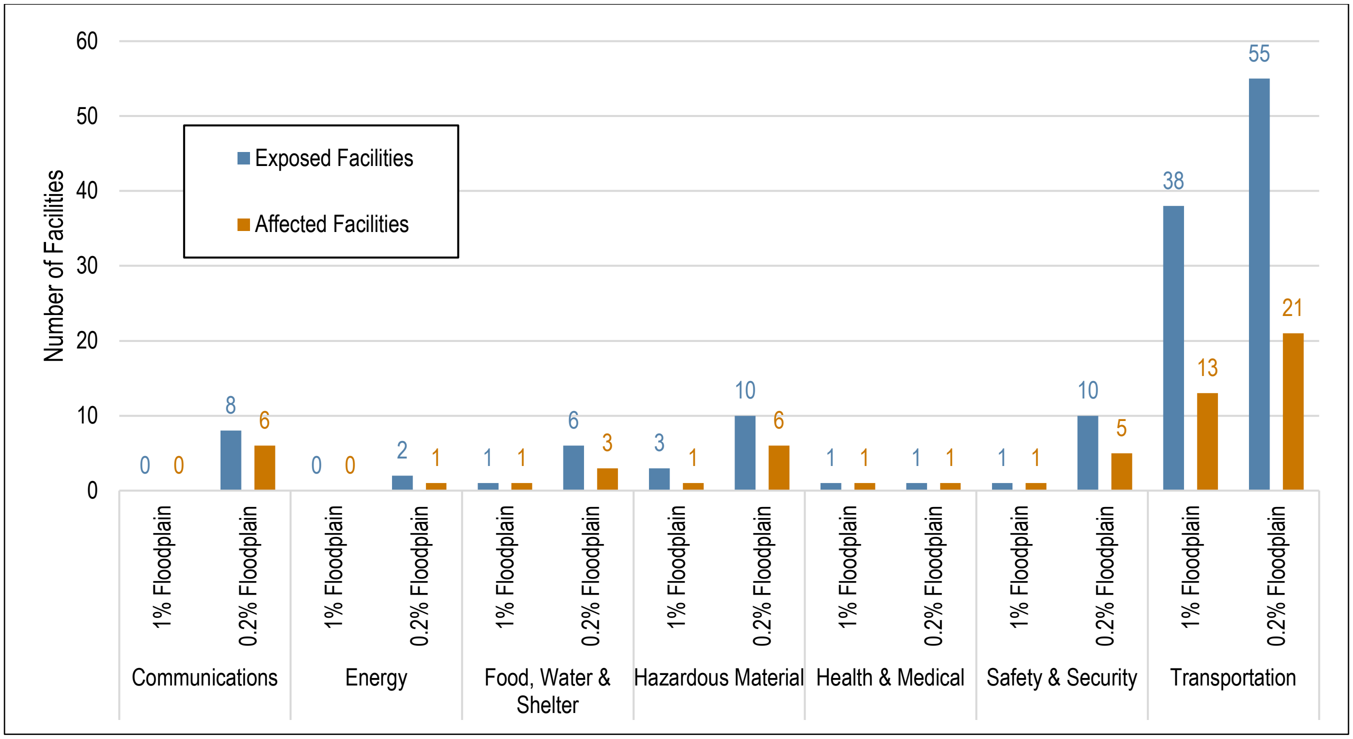


Figure 10-5. Affected Critical Facilities in the 1% and 0.2% Annual Chance Floodplains

Figure 10-6 shows the estimated damage to critical facilities from a flood event. The average amount of damage, measured as a percentage of total value, is low in the 1 percent annual chance floodplain—less than 5 percent of total value for both structure damage and content damage for all categories of critical facility except hazardous materials. Critical facilities in the 0.2 percent annual chance floodplain are predicted to see higher damage rates: with average damage to structures ranging from 2 to 16 percent of total value and average damage to contents ranging from 2 to 81 percent, depending on critical facility category.

10.4.4 Environment

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, levees or 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 the planning area in plant communities that are dependent upon streams, wetlands and floodplains. Wildlife and fish are impacted when plant communities are eliminated or fundamentally altered to reduce habitat. Since water supply is a major limiting factor for many animals, riparian communities are of special importance.

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.

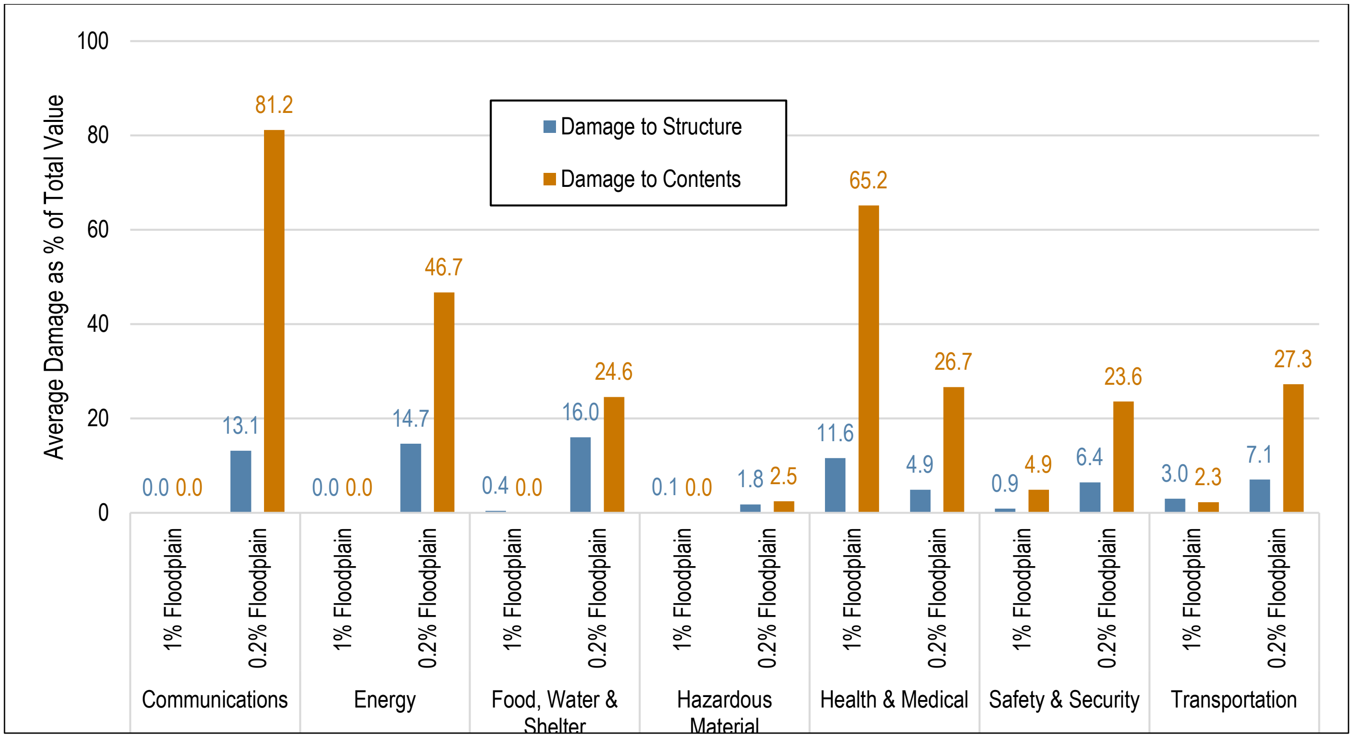


Figure 10-6. Critical Facility Damage in the 1% and 0.2% Annual Chance Floodplains

10.5 DEVELOPMENT TRENDS

The value of planning area properties exposed to the 100-year flood hazard has increased by 44.3 percent ($498.9 million) since the last hazard mitigation plan update in 2013. This increase in risk exposure can be attributed to the population growth of over 16 percent in the same period and property value increases associated with continued economic recovery from the 2008 economic downturn.

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. 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. Canyon County and its partner cities 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 cities have committed to maintaining their good standing under the NFIP through initiatives identified in this plan.

10.6 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.

10.7 ISSUES

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

- Issues related to canals and flood-control facilities:
  - The County has over 200 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.
  - Many drainage districts in Canyon County are not currently active, and maintenance of the drainage infrastructure is not being conducted. A countywide program to address this issue would be supportive of goals in this hazard mitigation plan.
  - 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.
  - The risk associated with flooding due to canal failure is unknown at this time. The lack of regulatory oversight of these facilities results is a void in the level of available information that can be used to assess risk and vulnerability. Data on this risk need to be gathered to better support communities' preparedness and response efforts.
  - 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 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.
- Issues related to land use and development:
  - 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.
  - 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.
  - 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.
- Issues related to partnerships and education:
  - 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 promotion of flood insurance as a means of protecting private property owners from the economic impacts of frequent flood events should continue.
  - 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.
- Issues related to funding:
  - Ongoing flood hazard mitigation will require funding from multiple sources.

- The economy affects a jurisdiction’s ability to manage its floodplains. Budget cuts and personnel losses can strain resources needed to support floodplain management.

- Issues related to information needs:
  - 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.

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. 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.

Slides can pose serious hazard to property in hillside terrain. When they move, they can destroy foundations, offset roads, break underground pipes, or override downslope property and structures. A mudslide can move rapidly down slopes or through channels, and can strike with little or no warning. It 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 they carry.

11.1.1 Landslide Causes

Slides are caused by a combination of geological and climate conditions and the influence of urbanization. They can be initiated by storms, earthquakes, fires, volcanic eruptions or human modification of the land. Vulnerable natural conditions are affected by human development and the infrastructure that supports it. In some cases, irrigation increases the landslide potential. The following factors can contribute to slide formation:

- 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
- Removing or changing the type of vegetation covering slopes.

11.1.2 Landslide Types

Common types of slides are shown in Figure 11-1. 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.

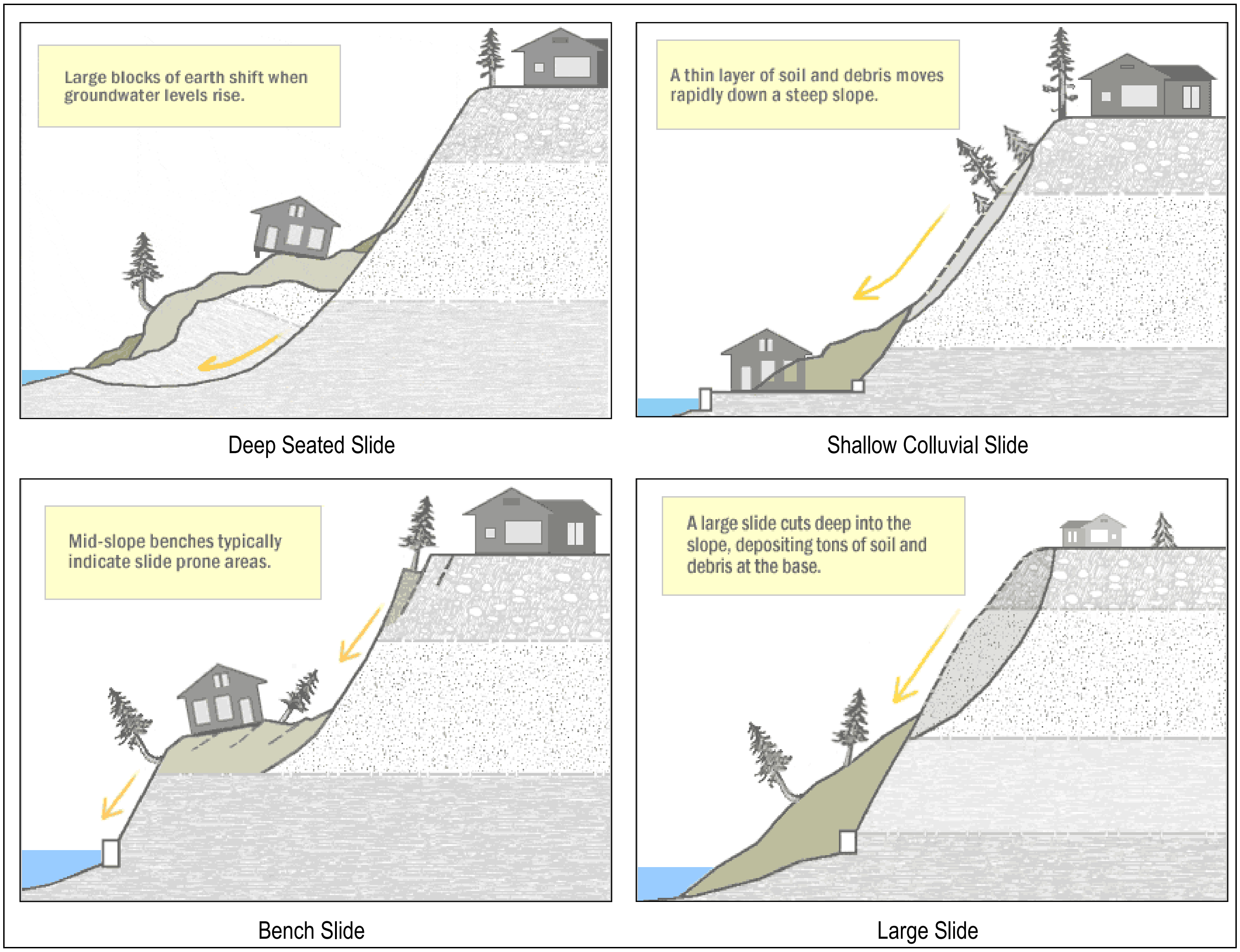


Figure 11-1. Common Types of Landslide

11.1.3 Landslide Risk Areas

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. 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. 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. Such landslides are common along the Salmon River and in Hells Canyon.

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 or gravel.

The best predictor of where slides 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.

11.1.4 Secondary Hazards

Landslides that block rivers or streams can contribute to flooding.

11.2 HAZARD PROFILE

11.2.1 Past Events

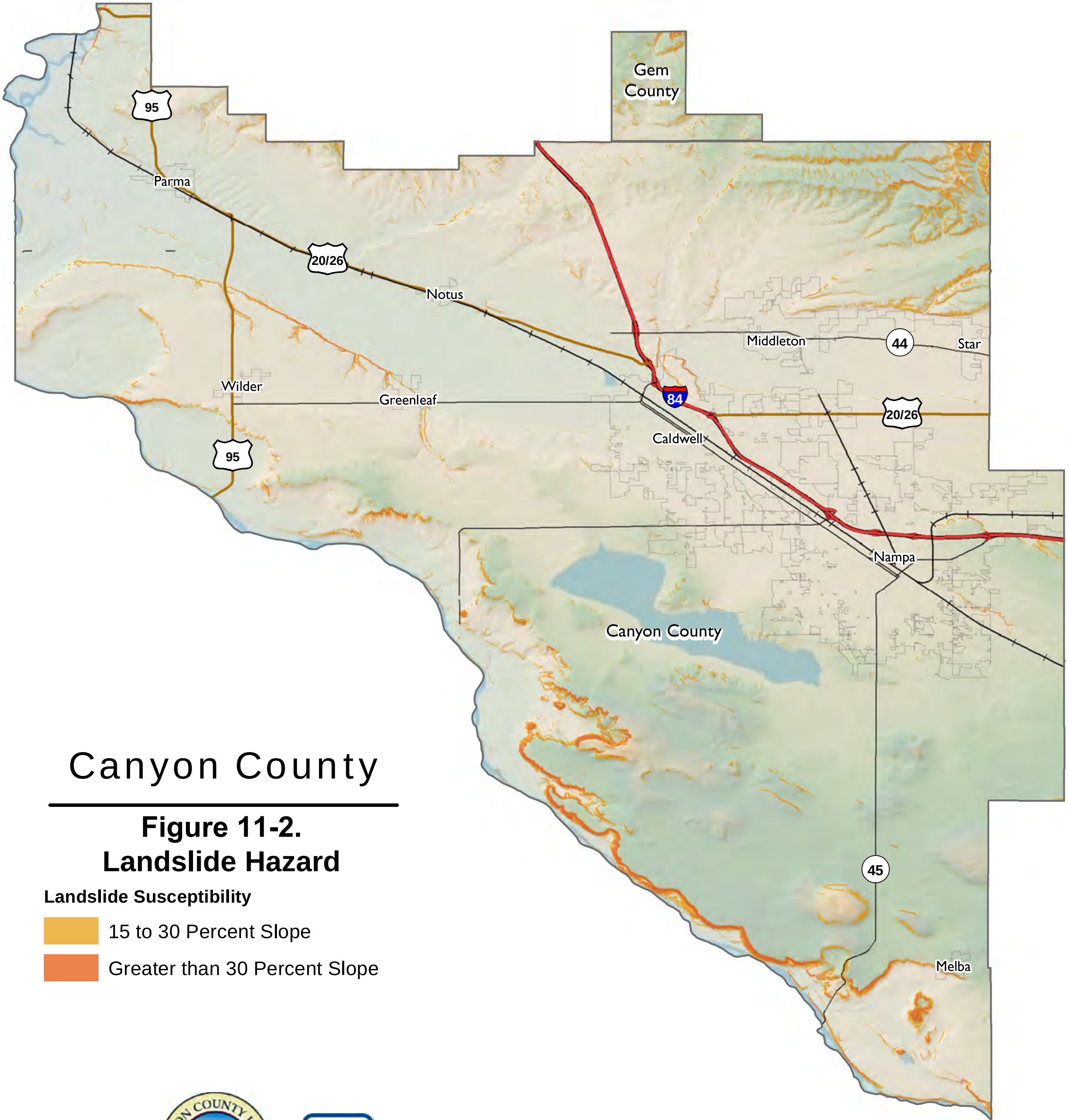
Landslides are likely underreported in Canyon County. No historical damaging landslides have been reported in the county.

11.2.2 Location

Due to a lack of available soils data for Canyon County, the extent and location of the landslide hazard has been estimated for this hazard mitigation plan based on steepness of 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. Figure 11-2 shows the estimated landslide hazard areas in the Canyon County planning area, based on these two categories. The mapping shows a potential for landslides mostly in the northern and southern portions of the County.

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 Canyon County, landslides could 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.



Canyon County

Figure 11-2.
Landslide Hazard

Landslide Susceptibility

- 15 to 30 Percent Slope
- Greater than 30 Percent Slope

Data Sources: Canyon County GIS, 2020; Landslide Susceptibility: USGS, 2020; Basemap: ESRI, 2020

0 5 10 Miles

N W E S

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 EXPOSURE

A quantitative assessment of exposure to the landslide hazard was conducted using the hazard mapping shown in Figure 11-2 and the asset inventory developed for this plan. Population exposure was estimated by calculating the number of buildings in the mapped hazard areas as a percent of total planning area buildings, and then applying this percentage to the estimated planning area population. Detailed results by municipality are provided in Appendix E; results for the total planning area are presented below.

11.3.1 Population and Property

Table 11-1 summarizes the estimated population living in the landslide hazard zones and the estimated property exposure.

Table 11-1. Exposed Population and Property in Mapped Steep Slope Areas

	Areas with 15% – 30% Slopes	Areas with >30% Slopes
Population		
Population Exposed	1,157	144
% of Total Planning Area Population	0.50%	0.06%
Property		
Number of Buildings Exposed	384	55
Value of Exposed Structures	$113.4 million	$35.7 million
Value of Exposed Contents	$59.4 million	$28.6 million
Total Exposed Property Value	**$172.8 million**	**$64.3 million**
Total Exposed Value as % of Planning Area Total	***0.4%***	***0.1%***

Figure 11-3 and Figure 11-4 show the county-wide distribution of structures in the mapped landslide hazard zones by occupancy class. In both the 15 to 30 percent slope zone and the >30 percent slope zone, the exposed structures are primarily residential or commercial, with other occupancy classes making up less than 1 percent of the total number of exposed structures.

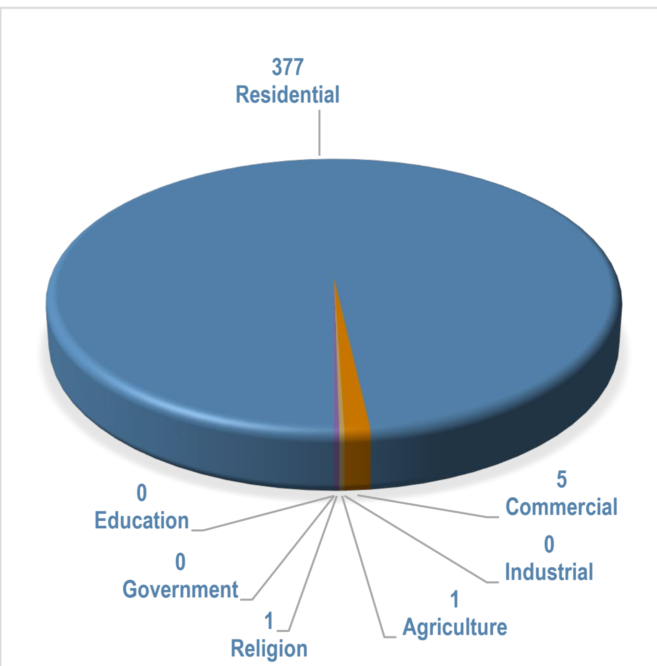


Figure 11-3. Number of Structures by Occupancy Class in the 15% – 30% Slope Area

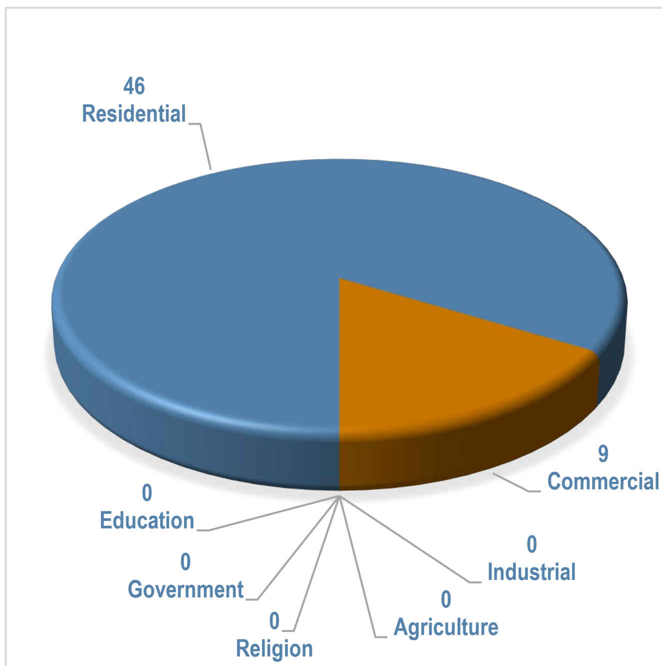


Figure 11-4. Number of Structures by Occupancy Class in the >30% Slope Area

11.3.2 Critical Facilities

Critical facilities on slopes of 15 to 30 percent represent 0.6 percent (4 facilities) of the total critical infrastructure and facilities in the planning area. No critical facilities were identified on slopes greater than 20 percent. The breakdown of exposure by facility type is shown in Figure 11-5.

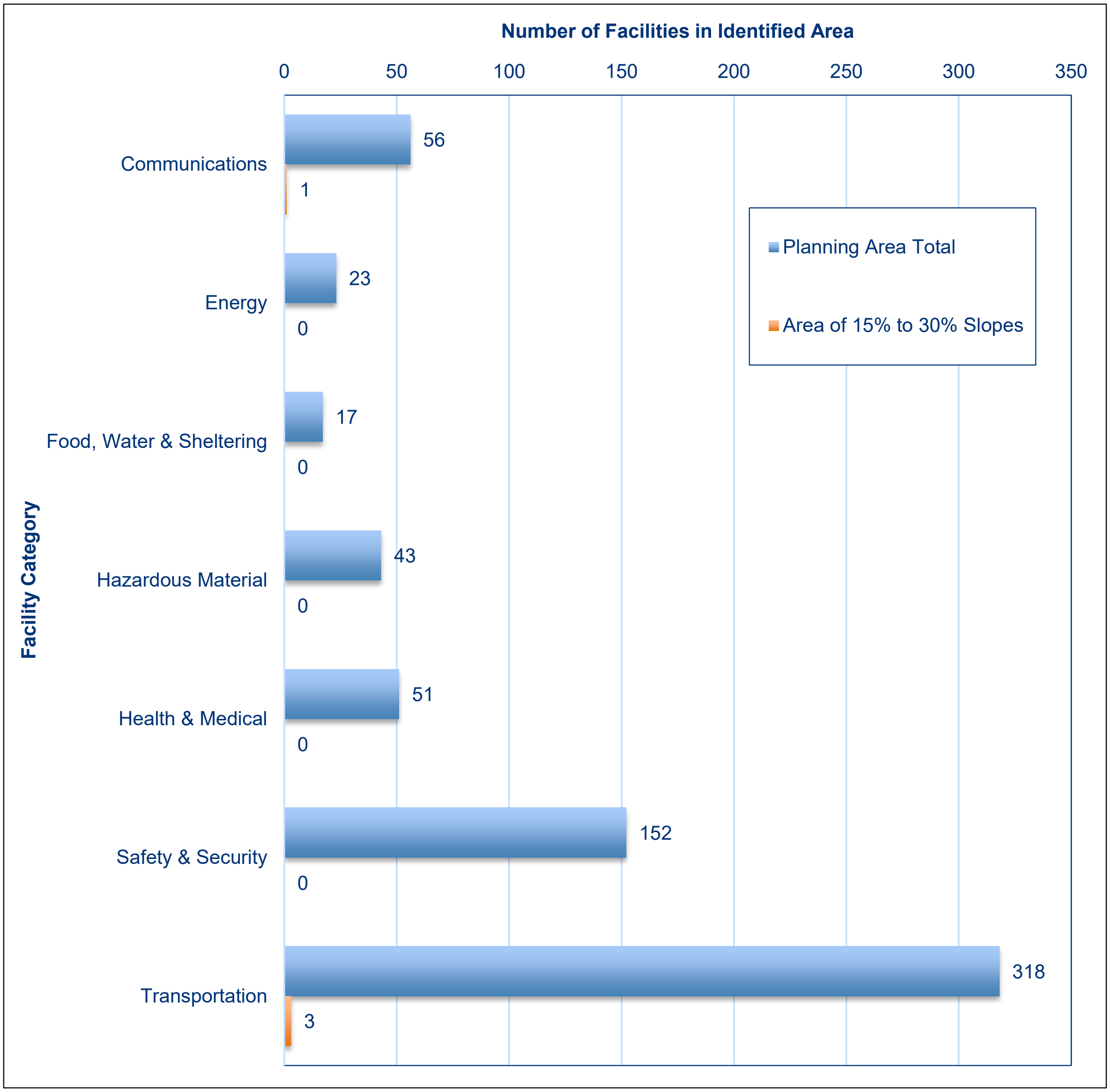


Figure 11-5. Critical Facilities in Mapped Steep Slope Areas and Countywide

A significant amount of infrastructure can be exposed to the landslide hazard:

- **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.
- **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.

11.3.3 Environment

All land and water within the mapped landslide risk areas are considered to be exposed to the landslide hazard.

11.4 VULNERABILITY

11.4.1 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 1,301 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 increase the number of lives endangered by this hazard.

11.4.2 Property

Losses associated with landslide in Canyon County are represented by the cost of debris removal and repair of transportation networks. 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 11-2 shows the general building stock loss estimates in landslide risk areas.

Table 11-2. Estimated Building Losses in the Steep Slope Areas

		Damage = 10% of Exposed Value		Damage = 30% of Exposed Value		Damage = 50% of Exposed Value	
Landslide Susceptibility Zone	Exposed Value	Loss	% of Total Replacement Value	Loss	% of Total Replacement Value	Loss	% of Total Replacement Value
Slope Areas Greater than 30%:	$64,315,144	$6,461,511	0.01	$19,294,543	0.04	$32,157,572	0.07
Slope Areas 15%-30%	$172,781,477	$17,278,148	0.04	$51,683,444	0.11	$86,390,739	0.19
Total	$237,096,621	$23,739,659	**0.05**	$70,977,987	**0.15**	$118,548,311	**0.26**

11.4.3 Critical Facilities

There are four critical facilities (three bridges and one cellular tower) 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.

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 DEVELOPMENT TRENDS

The value of planning area properties exposed to the landslide hazard has increased by 54.2 percent ($69.9 million) since the last hazard mitigation plan update in 2013. 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 over 16 percent in the same period, and property value increases associated with continued economic recovery from the 2008 economic downturn.

While landslides are not generally addressed in comprehensive plans, the risk assessment in this plan creates an opportunity for Canyon 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, Canyon 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.

11.6 SCENARIO

Major landslides in Canyon County can 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 are 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 Canyon County.

11.7 ISSUES

Important issues associated with landslides in Canyon 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.
- 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. Four types of severe weather events typically impact Canyon County: thunderstorms, lightning, damaging winds, and extreme temperatures (hot and cold). Each of these types of severe weather is described in the following sections.

12.1.1 Thunderstorms

NOAA classifies a thunderstorm as a storm with lightning and thunder produced by cumulonimbus clouds, usually producing gusty winds, heavy rain, and sometimes hail or tornados. Thunderstorms are usually short in duration (seldom more than two hours), but they may deliver enough rainfall to cause urban or flash flooding.

Measuring and Categorizing Thunderstorm Hazards

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 58 mph, or tornado. Approximately 10 percent of the 100,000 thunderstorms that occur nationally every year are classified as severe.

As shown in Table 12-1, thunderstorm risk categories are based on three-day outlooks prepared by NOAA's Storm Prediction Center. These outlooks depict non-severe thunderstorm areas and severe thunderstorm threats across the contiguous United States. The risk categories specify the level of the overall threat via numbers (1 – 5), descriptive labeling (marginal – high), and colors (green – magenta).

Hail

Hailstorms are an outgrowth of severe thunderstorms. Early in the developmental stages of a hailstorm, ice crystals form within a low-pressure front due to the rapid rising of warm air into the upper atmosphere and the subsequent cooling of the air mass. Frozen droplets gradually accumulate on the ice crystals until, having developed sufficient weight; they fall as precipitation — as balls or irregularly shaped masses of ice greater than 0.75 inches in diameter.

The size of hailstones is a direct function of the size and severity of the storm. High velocity updraft winds are required to keep hail in suspension in thunderclouds. The strength of the updraft is a function of the intensity of heating at the Earth's surface. Higher temperature gradients relative to elevation above the surface result in increased suspension time and hailstone size.

Table 12-1. Thunderstorm Risk Categories

Thunderstorm Risk Category	Thunderstorm Risk Label	Thunderstorm Risk Description[a]
General or Non- Severe Thunderstorms	TSTM (light green)	• Delineates where a 10% or greater probability of thunderstorms is forecast. • No severe thunderstorms expected. Lightning/flooding threats exist with all thunderstorms. Winds to 40 mph and small hail.
Marginal Risk	1-MRGL (dark green)	• Severe storms of limited organization and longevity or very low coverage and marginal intensity. • Isolated severe thunderstorms possible. Limited in duration and/or coverage and/or intensity. Winds 40-60 mph, hail up to 1 inches and low tornado risk.
Slight Risk	2-SLGT (yellow)	• Organized severe storms, not widespread and with varying levels of intensity. • Scattered severe thunderstorms possible. Short-lived and/or not widespread, isolated intense storms possible. One or two tornados, reports of strong winds/wind damage, and hail approximately 1 inches and isolated 2 inches.
Enhanced Risk	3-ENH (orange)	• Greater (relative to slight risk) severity storm coverage with varying levels of intensity. • Numerous severe storms possible. More persistent and/or widespread, a few intense. A few tornados, several reports of wind damage and damaging hail, 1- 2 inches.
Moderate Risk	4-MDT (red)	• Widespread severe weather with several tornados and/or numerous severe thunderstorms likely, some of which should be intense. Usually reserved for days with several supercells producing intense tornados and/or very large hail, or an intense squall line with widespread damaging winds. • Widespread severe storms likely. Long-lived, widespread and intense. Strong tornados, widespread wind damage and destructive hail 2 inches (+).
High Risk	5-HIGH (magenta)	• Severe weather outbreak expected from numerous intense and long-tracked tornados or a long-lived derecho-producing thunderstorm complex with hurricane-force wind gusts and widespread damage. Reserved for when high confidence exists in widespread coverage of severe weather with embedded instances of extreme severity (violent tornados or very damaging convective winds). • Widespread severe storms expected. Long-lived, very widespread and particularly intense. Tornado outbreak and derecho.

a. All thunderstorm categories imply lightning and the potential for flooding. Categories are also tied to the probability of a severe weather event within 25 miles.

Source: NOAA, NWS, Storm Prediction Center

NOAA uses the Modified NOAA/TORRO Hailstorm Intensity Scale to assist in measuring hailstorm intensity (see Table 12-2). The scale extends from H0 to H10, with increments of intensity or damage potential related to hail size (distribution and maximum), texture, numbers, fall speed, speed of storm translation, and strength of the accompanying wind.

12.1.2 Lightning

Lightning is an electrical discharge between positive and negative regions of a thunderstorm. It occurs in all thunderstorms. 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. 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.

Table 12-2. Modified NOAA/TORRO Hailstorm Intensity Scale

Size Code	Intensity Category	Hail Diameter (inches)	Potential Damage
H0	Hard Hail	0.25	No Damage
H1	Potentially Damaging	0.25 - 0.50	Slight general damage to plants, crops
H2	Significant	0.50 - 0.75	Significant damage to fruit, crops, vegetation
H3	Severe	0.75 - 1.25	Severe damage to fruit and crops, damage to glass and plastic structures, paint and wood scored
H4	Severe	1.0 - 1.50	Widespread glass damage, vehicle bodywork damage
H5	Destructive	1.25 - 1.75	Wholesale destruction of glass, damage to tiled roofs, significant risk of injuries
H6	Destructive	1.50 - 2.25	Bodywork of grounded aircraft dented, brick walls pitted
H7	Destructive	2.0 - 3.0	Severe roof damage, risk of serious injuries
H8	Destructive	2.50 - 3.50	Severe damage to aircraft bodywork
H9	Super Hailstorms	3.0 – 4.0	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open
H10	Super Hailstorms	4.0 +	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open

Source: TORRO, 2019

Types of Lightning

There are two main types of lightning:

- **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.
- **Cloud-to-ground lightning** is the most damaging form of lightning. It frequently strikes ahead of or behind the thunderstorm, as far as 10 miles from the storm. Most flashes deliver negative charge to earth. However, many flashes carry positive charge to earth, often during the dissipating stage of a thunderstorm. Positive flashes are more common during winter. Positive lightning has a longer duration, so fires are more easily ignited. 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.

Measuring and Categorizing Lightning

Lightning is an electrical discharge that results from the buildup of positive and negative charges within a thunderstorm. When the buildup becomes strong enough, lightning appears as a “bolt.” This flash of light usually occurs within the clouds or between the clouds and the ground. A bolt of lightning instantaneously reaches temperatures approaching 50,000ºF. The rapid heating and cooling of air near the lightning causes thunder.

NOAA's Lightening Activity Level (LAL) scale indicates the amount of lightning associated with thunderstorms, as well as whether or not wetting rains accompany the storms.

- LAL 1—No thunderstorms.
- LAL 2—Isolated thunderstorms. Light rain will occasionally reach the ground. Lightening is very infrequent, 1 to 5 cloud to ground strikes in a 5-minute period.
- LAL 3—Widely scattered thunderstorms. Light to moderate rain will reach the ground. Lightning is infrequent, 6 to 10 cloud to ground strikes in a 5-minute period.
- LAL 4—Scattered thunderstorms. Moderate rain is commonly produced. Lightning is frequent, 11 to 15 cloud to ground strikes in a 5-minute period.
- LAL 5—Numerous thunderstorms. Rainfall is moderate to heavy. Lightning is frequent and intense, greater than 15 cloud to ground strikes in a 5-minute period.
- LAL 6—Dry lightning (same as LAL 3 but without rain). This type of lightning has the potential for extreme fire activity and is normally highlighted in fire weather forecasts with a Red Flag Warning.

12.1.3 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 (IOEM, 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.
- **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. 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. A wet microburst is accompanied by heavy precipitation. Dry microbursts, common in places like the intermountain west, occur with little or no precipitation.
- **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.

As shown in Table 12-3 the Beaufort Wind Scale is an empirical measure that relates wind speed to observed conditions at sea or on land.

Table 12-3. Beaufort Wind Scale

Force	Wind (knots)	Classification	Appearance of Wind Effects On Land
0	< 1	Calm	Calm, smoke rises vertically
1	1-3	Light Air	Smoke drift indicates wind direction, still wind vanes
2	4-6	Light Breeze	Wind felt on face, leaves rustle, vanes begin to move
3	7-10	Gentle Breeze	Leaves and small twigs constantly moving, light flags extended
4	11-16	Moderate Breeze	Dust, leaves, and loose paper lifted, small tree branches move
5	17-21	Fresh Breeze	Small trees in leaf begin to sway
6	22-27	Strong Breeze	Larger tree branches moving, whistling in wires
7	28-33	Near Gale	Whole trees moving, resistance felt walking against wind
8	34-40	Gale	Twigs breaking off trees, generally impedes progress
9	41-47	Strong Gale	Slight structural damage occurs, slate blows off roofs
10	48-55	Storm	Seldom experienced on land, trees broken or uprooted, considerable structural damage
11	56-63	Violent Storm	Seldom experienced on land
12	64+	Hurricane	Seldom experienced on land

Source: NOAA, NWS, Storm Prediction Center

12.1.4 Extreme Temperature

Extreme heat can be defined as temperatures that hover 10 ºF or more above the average high temperature for the region, last for prolonged periods of time, and are often accompanied by high humidity. The "urban heat island effect" can produce significantly higher nighttime temperatures where asphalt and concrete (which store heat longer) gradually release heat at night. The National Weather Service (NWS) monitors a heat index that takes both temperature and humidity into account (see Figure 12-1).

Extreme cold can often accompany severe winter storms. Very cold temperatures become a particular hazard when accompanied by winds of 10 mph or greater. The NWS has developed a formula for calculating "wind chill" based on temperature and wind speed (see Figure 12-2).

12.1.5 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.

Source: National Weather Service

Temperature (°F)

Relative Humidity (%)	80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110
40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	136
45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137	
50	81	83	85	88	91	95	99	103	108	113	118	124	131	137		
55	81	84	86	89	93	97	101	106	112	117	124	130	137			
60	82	84	88	91	95	100	105	110	116	123	129	137				
65	82	85	89	93	98	103	108	114	121	128	136					
70	83	86	90	95	100	105	112	119	126	134						
75	84	88	92	97	103	109	116	124	132							
80	84	89	94	100	106	113	121	129								
85	85	90	96	102	110	117	126	135								
90	86	91	98	105	113	122	131									
95	86	93	100	108	117	127										
100	87	95	103	112	121	132										

Likelihood of Heat Disorders with Prolonged Exposure or Strenuous Activity

Caution Extreme Caution Danger Extreme Danger

Figure 12-1. Extreme Heat Index

Source: National Weather Service

Temperature (°F)

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

Frostbite Times: 30 minutes, 10 minutes, 5 minutes

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

Where, T= Air Temperature (°F) V= Wind Speed (mph)

Effective 11/01/01

Figure 12-2. Wind Chill Chart

12.2 HAZARD PROFILE

12.2.1 Past Events

Table 12-4 summarizes severe weather events in Canyon County since 2000 that caused property damage, as recorded by the National Oceanic and Atmospheric Administration (NOAA).

Table 12-4. Severe Weather Events Impacting Planning Area Since 2000

Date	Type	Deaths or Injuries	Property Damage[a]
2/25/2018	Hail	0	None Reported
Description: *A vigorous upper level low spread strong to severe thunderstorms across southeast Oregon and southwest Idaho with large hail and damaging winds. Trained spotters south of Caldwell reported lime and half dollar sized hail.*			
01/18/2017	Heavy Snow	0	$100,000,000
Description*: A major snow storm dumped heavy snow over most of eastern Oregon and southwest Idaho leading to snow emergencies in many locations. Numerous reports from social media indicated 6 to 9 inches of snow around Caldwell. Emergency management reported 15 to 16 inches from Ontario to Payette and Weiser. Significant damage occurred to agricultural buildings housing fresh produce in the Lower Treasure Valley, which includes Canyon County.*			
03/17/2014	High Wind	0	None reported
Description: *A powerful cold front crossed southwest and south central Idaho with many reports of damage and power outages.*			
04/24/2012	Hail	0	None Reported
Description: *A line of severe thunderstorms moved through parts of southwest Idaho producing large hail and damaging winds. A National Weather Service employee reported 1-inch size hail and damage to vehicles.*			
08/26/2010	High Wind	0	None Reported
Description*: A strong cold front swept across southeast Oregon and southwest Idaho bringing sustained high winds over a 3- to 4-hour period. Dead Indian Ridge recorded wind gusts of 68 and 71 mph.*			
05/06/2005	Flash Flood	0	$50,000
Description: *Flooding at the Caldwell Airport, parts of Caldwell, Conway Road washed out.*			
04/24/2003	Thunderstorm, Wind	0	$100,000
Description: *A cold front moving through the area had strong convection embedded along the leading edge. A strong downburst from a cell moving through the Middleton area produced damaging winds in the vicinity of the Middleton High School.*			

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

12.2.2 Location

Severe weather events can 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 planning area can expect to experience exposure to some type of severe weather event at least annually:

- The National Weather Service collected data for thunder days, the number and duration of thunder events, and lightning strike density for the 30-year period from 1948 to 1977. Figure 12-3 illustrates thunderstorm hazard severity based on the annual average number of thunder events during that period.

Source: National Weather Service

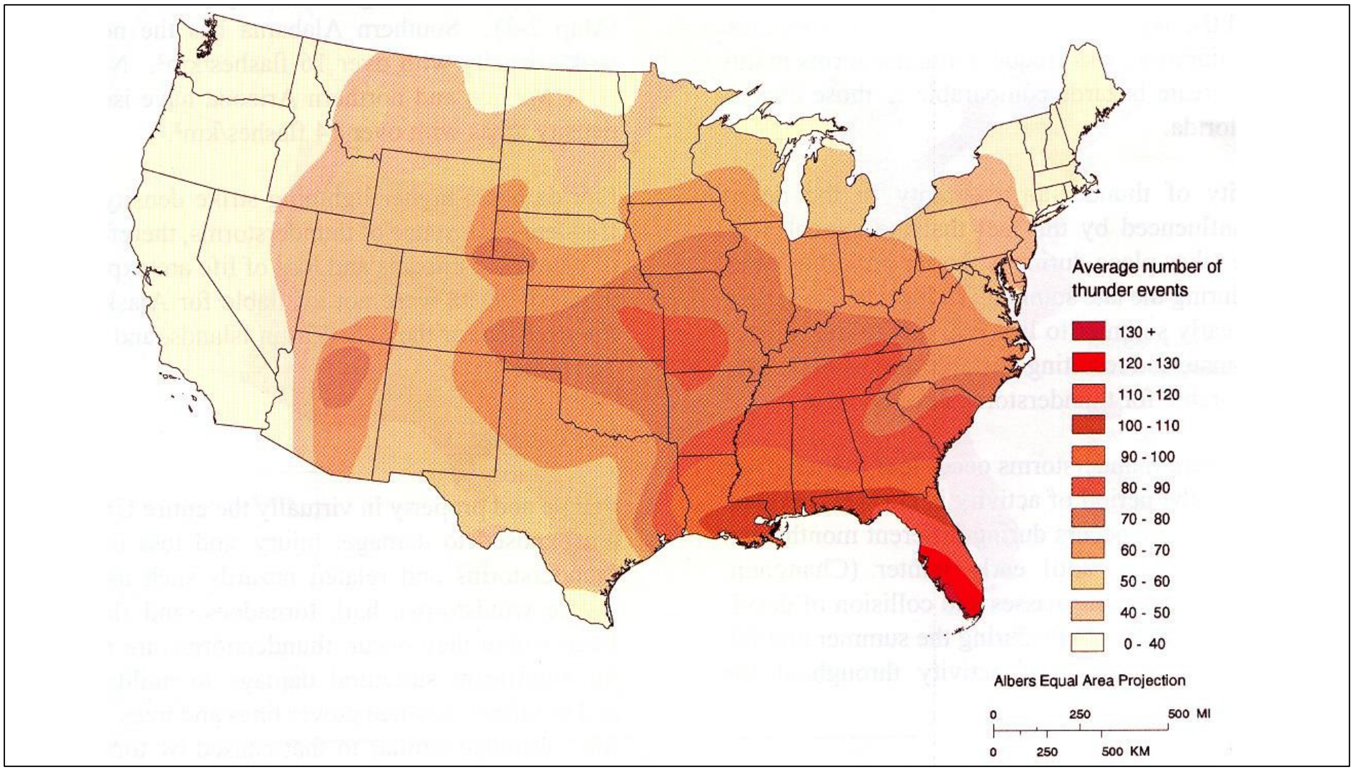


Figure 12-3. Annual Average Number of Thunder Events

- Lightning strikes occur frequently in Canyon County. From 1972 to 2012 there were 4 injuries and 2 deaths attributed to lightning in Canyon County. The return interval for damaging lightning events (excluding wildfire) is in the 5 to 25 year interval. Based on the historic frequency, it can be expected that there is 1 death per 20 years and 1 injury per decade from lightning. On average, 60 to 70 deaths per year are attributed to lightning nationally; in Idaho the average is less than one per year.
- Damaging straight line wind events occur multiple times a year in Canyon County. There were four recorded wind-related injuries between 1956 and 2010.
- Extreme heat events occur relatively frequently in Canyon County. Table 12-5 details the return interval of extreme heat events in Canyon County, based on daily weather summaries taken from the Sugar Factory COOP Station in Nampa for a 35-year period (1977-2011).
- Extreme cold events occur in Canyon County. Daily weather summaries were taken from the Sugar Factory COOP Station in Nampa for a 35 year period (1977-2011). For that period the lowest daily minimum temperature was -26 ºF, with three of 35 years recording a minimum temperature at -20 ºF or below. The average yearly minimum temperature was 0 ºF. The return interval for extreme cold events with temperatures below -19 ºF is 11.6 years.

12.2.4 Severity

The most common problems associated with severe weather 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, and services such as water or phone may not be able to operate without power.

Table 12-5. Historical Extreme Heat Summary

Maximum Temperature (ºF)	Return Period (years)	Percent Annual Chance (%)
99	1.05	95.2
100	1.11	90.1
101	1.25	80
103	2	50
105	5	20
107	10	10
108	25	4
109	50	2
110	100	1
111	200	0.5

Thunderstorm

Thunderstorm severity varies with the type of storm formed by specific conditions at any given time and place:

- **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 severity is typically assessed based on property damage and life safety (injuries and fatalities). 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.

Injuries and fatalities due to lightning do occur in Canyon County. 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. Despite the enormous energy carried by lightning, only about 10 percent of strikes are fatal. Injuries include central nervous system damage, burns, cardiac effects, hearing loss, and trauma. The effects of central nervous system injures tend to be long-lasting and severe, leading to such disorders as depression, alcoholism, and chronic fatigue and in some cases to suicide.

Lightning strikes structures causing fires and damaging electrical equipment. About one third of all power outages are lightning-related. It also causes forest and brush fires and deaths and injuries to livestock and other animals. Wildfires are often initiated by lightning strikes as are petroleum storage tank fires.

Wind

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, Canyon County is located in Wind Zone I, where wind speeds can reach up to 130 mph. Figure 12-4 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

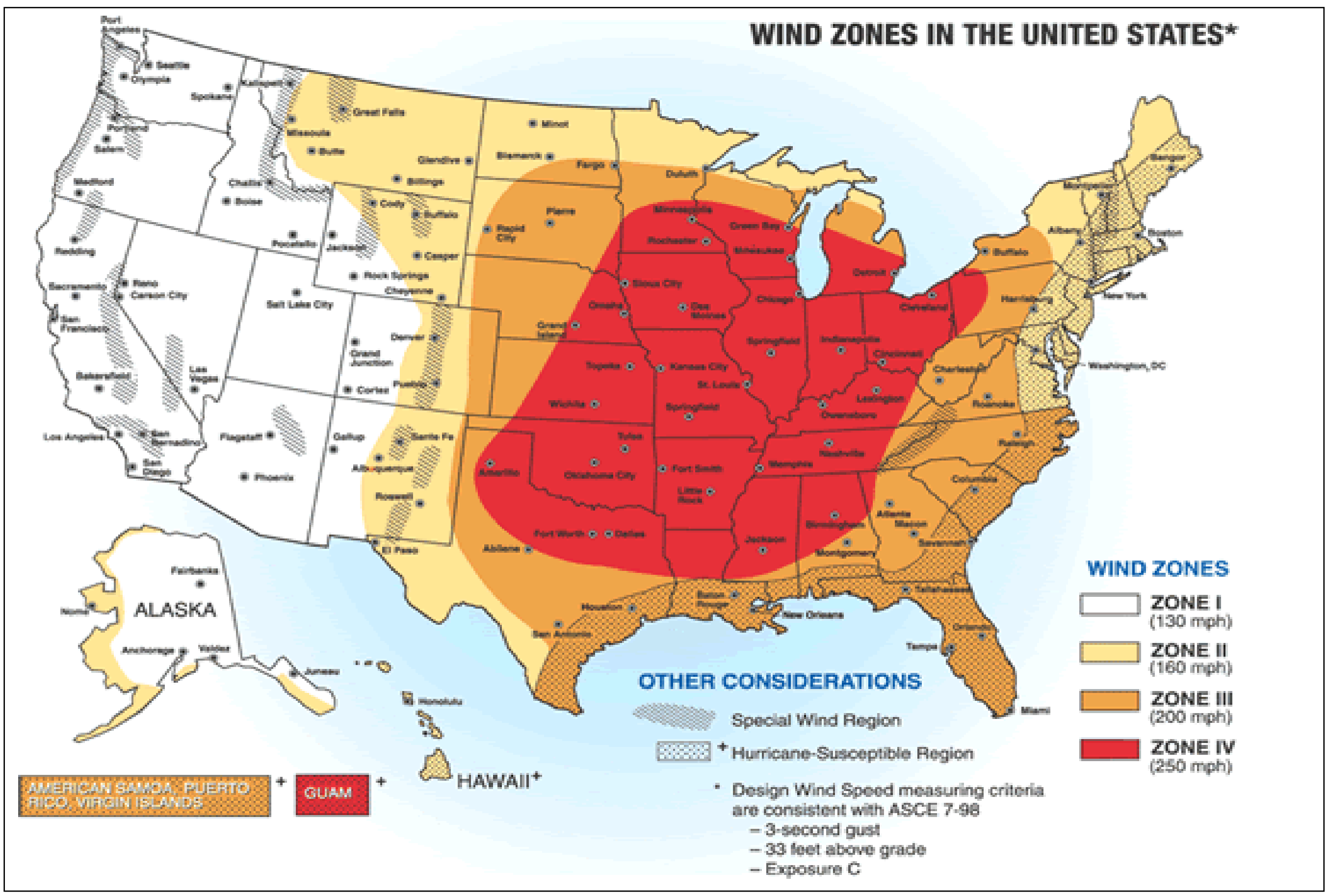


Figure 12-4. Wind Zones in the United States

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. Downed trees and power lines and damaged property 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.

Wind pressure can damage structures, 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 are magnified in 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. In wet winters, saturated soils cause trees to become unstable and vulnerable to uprooting from high winds. 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. Utility lines brought down by high winds in summer have been known to cause fires, which start in dry roadside vegetation. Electric power lines falling to the pavement create the possibility of lethal electric shock.

Extreme Temperatures

Extreme Heat

Extreme heat can pose a significant risk to humans. Under normal conditions, the human body produces perspiration that evaporates and cools the body. However, in extreme heat and high humidity, evaporation is slowed and the body must work much harder to maintain a normal temperature. Studies have shown that a significant rise in heat-related illness occurs when excessive heat persists for more than two days.

The primary impact of extreme heat is on human health, causing such disorders as sunstroke, heat exhaustion, and heat cramps. Particularly susceptible are the elderly, small children, and persons with chronic illnesses. There are also undoubtedly indirect and chronic health effects from extreme heat the magnitude of which are difficult or impossible to estimate. Environmental effects can include loss of wildlife and vegetation, and increased probability of wildfires.

Extreme heat places high demand on power supplies that can lead to blackouts or brownouts. Economic impacts result from such factors as increased energy prices, loss of business as people avoid leaving their homes to avoid the heat, and agricultural losses. The magnitude of these and other, more indirect impacts is, again, difficult to assess, but for severe heat waves, has been estimated to be in the billions to hundreds of billions of dollars.

The magnitude of the effects of extreme heat is centered on the individual citizen. Shelters might be opened for the elderly and/or homeless who do not have a means of relief from the heat. Heat related illnesses could cause death if shelter and hydration are not provided. Because the higher elevations are typically 5 to 10 ºF cooler than the valley, extreme heat would most likely affect only that portion of the County at the lower elevations. Economic loss would primarily be related to the cost of energy consumption and to agricultural impacts. Extreme heat would exacerbate drought conditions and make response to wildfire more hazardous.

Extreme Cold

Agricultural production is seriously affected when temperatures remain below the freezing point for an extended period of time. Wind can exacerbate the effects of cold temperatures by carrying heat away from the body more quickly, thus making it feel colder than is indicated by the temperature. This phenomenon is known as wind chill. Wind chill is the temperature that your body feels when the air temperature is combined with wind speed. shows the value of wind chill based on ambient temperature and wind speed. As the wind increases, the body is cooled at a faster rate, causing the skin temperature to drop. Wind chill does not impact inanimate objects like car radiators and exposed water pipes, because these objects cannot cool below the actual air temperature.

What might be considered extreme cold varies considerably in the State of Idaho where normal winter temperatures in the southwest are appreciably more moderate than those in the northwest and far north. Health effects of exposure to extreme cold include hypothermia and frostbite, both of which can be life-threatening. Infants and the elderly are most susceptible. In the United States, nearly 700 deaths are directly attributed to hypothermia annually. When temperatures reach -20 ºF, a large amount of electrical consumption on the existing electric system occurs.

Extreme cold may cause loss of wildlife, vegetation, and kill livestock and other domestic animals. Economic loss may result from flooding due to burst pipes and diminish

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. The NWS has no warning system associated with lightning but issues advisories, watches and warnings associated with thunderstorms, wind and temperature as listed in Table 12-6.

12.3 EXPOSURE

All people and property and the entire environment of the planning area are exposed to some degree to the severe weather hazard. Certain areas are more exposed due to geographic location and local weather patterns. Higher elevations with large stands of trees or power lines, for example, may be more susceptible to wind damage and black out.

12.4 VULNERABILITY

12.4.1 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.

Table 12-6. NWS Weather Warnings, Watches and Advisories

	Warning	Watch	Advisory
Thunderstorm	A severe thunderstorm that produces winds 58 mph or stronger and/or hail 1 inch in diameter or larger is imminent or occurring; it is either detected by weather radar or reported by storm spotters	Severe thunderstorms with large hail, damaging winds, and/or tornadoes are possible, but the exact time and location of storm development is still uncertain	A strong thunderstorm below severe criteria is indicated by Doppler weather radar and may create some adverse impacts on travel
Wind[a]	Strong sustained winds for one hour or longer, or wind gusts for any duration that are not associated with thunderstorms are occurring or will occur within six to 12 hours	Strong sustained winds for one hour or longer, or wind gusts for any duration that are not associated with thunderstorms are occurring or will occur within 12 to 48 hours	Strong winds are occurring or will occur within 12 to 24 hours but are not so strong as to warrant a high wind warning
Excessive heat[b]	Heat index values are forecast to meet or exceed locally defined warning criteria for more than three hours over at least two consecutive days; issued within 12 hours of the onset of the high heat index	Conditions are favorable in the next 24 to 72 hours for extreme heat index values during the day, combined with nighttime low temperatures of 80 °F or higher that limit perspiration recovery,	Heat index values are forecast to meet or exceed locally defined warning criteria for one or two days; usually issued within 12 hours of the onset of the high heat index
Wind chill[c]	Extreme wind chills, capable of causing life-threatening medical conditions (such as severe frostbite and hypothermia) or death associated with accelerated heat loss from exposed skin, are imminent or occurring	Extreme wind chills that are capable of causing life-threatening medical conditions associated with accelerated heat loss from exposed skin are possible within the next 12 to 48 hours	Dangerous wind chills making it feel very cold are imminent or occurring

a. NWS offices issue wind-related products based on local criteria for strong sustained winds or gusts
b. Specific criteria varies among local weather forecast offices due to climate variability and the effect of excessive heat on the local population. Typical criteria are maximum daytime temperatures above 105 ºF to 110 °F for up to three hours per day, with minimum nighttime temperatures above 75 °F for two consecutive days. Criteria may be lowered if the heat event occurs early in the season or during a multi-day heat wave or a widespread power outage
c. Wind chill criteria vary significantly over different county warning areas based on climate variability
Source: Wikipedia, 2020

12.4.2 Property

All property is vulnerable during severe weather events. According to the Canyon County Assessor, there are 74,273 structures in the planning area, most of them residential. All of these buildings are vulnerable to the severe weather hazard. Properties in poor condition or in particularly vulnerable locations (on hilltops or in open areas) may experience the most damage.

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 12-7 lists the loss estimates to the general building stock.

Table 12-7. Potential Damage to Buildings from Severe Weather Hazard

City	Assessed Value	10% Damage	30% Damage	50% Damage
Caldwell	$10,387,912,448	$1,038,791,245	$3,116,373,735	$5,193,956,224
Melba	$160,047,309	$16,004,731	$48,014,193	$80,023,654
Middleton	$237,097,875	$1,054,795,976	$3,164,387,927	$5,273,979,879
Greenleaf	$1,621,812,777	$162,181,278	$486,543,833	$810,906,388
Wilder	$20,697,926,294	$2,069,792,629	$6,209,377,888	$10,348,963,147
Nampa	$84,189,080	$8,418,908	$25,256,724	$42,094,540
Notus	$673,146,588	$67,314,659	$201,943,977	$336,573,294
Parma	$3,247,639	$324,764	$974,292	$1,623,819
Wilder	$259,156,358	$25,915,636	$77,746,907	$129,578,179
Unincorporated	$11,770,680,831	$1,177,068,083	$3,531,204,249	$5,885,340,415
Total	**$45,895,217,199**	**$4,589,521,720**	**$13,768,565,160**	**$22,947,608,599**

12.4.3 Critical Facilities

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.

12.4.4 Environment

Natural habitats such as streams and trees are exposed to the elements during a severe storm and risk major damage and destruction.

12.5 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: an 11.2-percent increase in population, a 5.5-percent increase in number of general building stock structures, and a 34.2-percent increase in assessed property value. 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.

12.6 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 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.

12.7 ISSUES

Important issues associated with a severe weather in the Canyon 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 212 ºF. Next, the wood releases flammable gases at 450 ºF. Finally, wood can smolder at 720 ºF, and ignite at 1,000 ºF. 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, is the amount of vegetative material available to burn. 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.

13.1.4 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.

13.2 HAZARD PROFILE

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.

13.2.1 Past Events

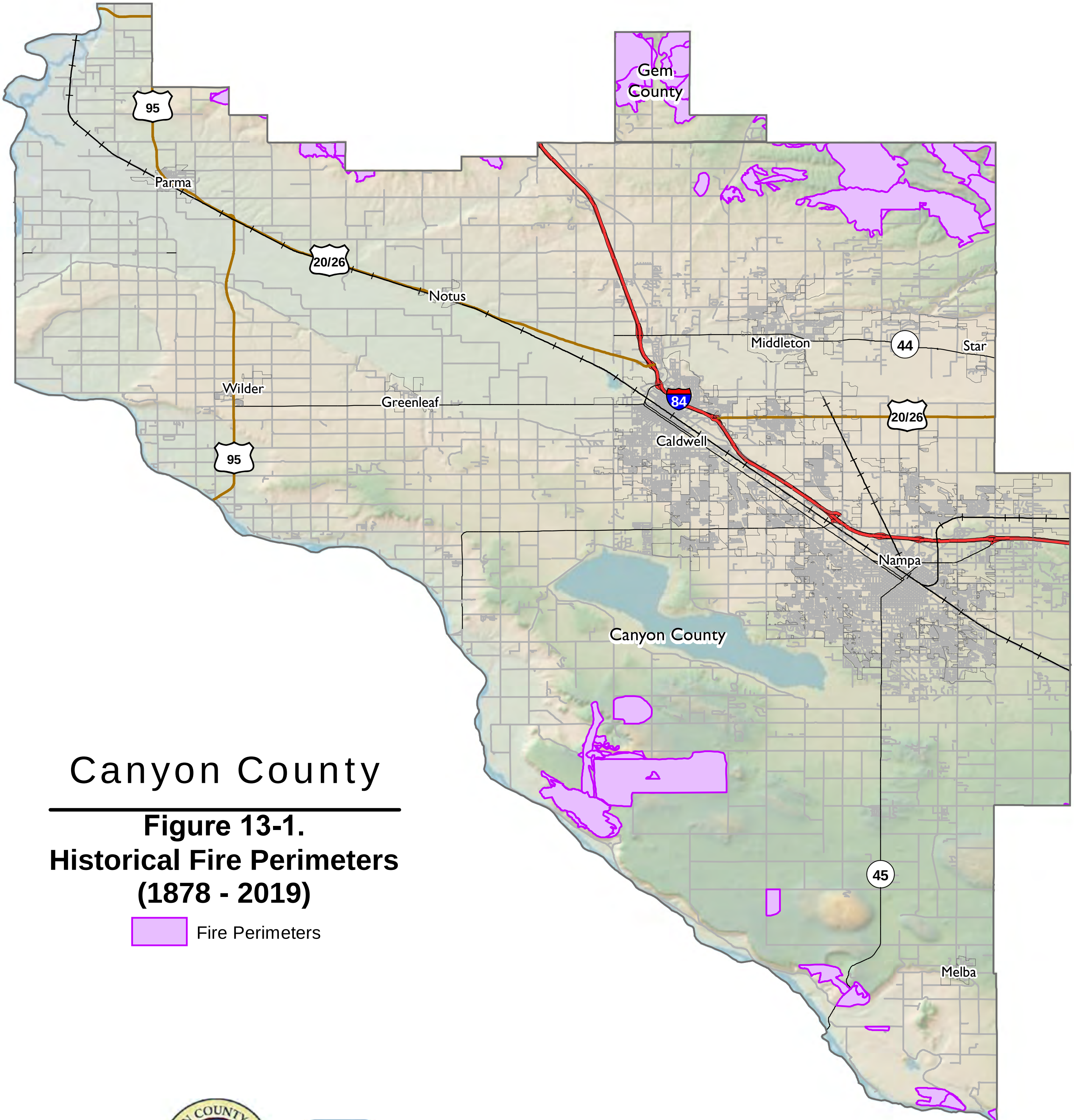
Figure 13-1 shows the location of all major historical fires recorded in Gem County through 2012, the last year for which these data are available. The fire perimeters for each year over the past 10 years is shown on Figure 13-2.

The Canyon County planning area is within the Idaho Department of Lands Southwest Idaho Fire Protection District. The Boise Interagency Dispatch Center (BIDC) provided interagency coordination within southwest Idaho for Boise District Bureau of Land Management (BLM), Boise National Forest, and Southwest Idaho Department of Lands. Historically, large fires (greater than 10 acres) have occurred in Canyon County, with 52 large fire events burning in excess of 48,350 acres for the period of 1957 to 2011. Table 13-2 details fire statistics reported by BIDC for the period 2015 to 2020.

Table 13-2. Historical Fire Statistics in BIDC Jurisdiction, 2015-2020

	Number of Reported Fires			Area Burned (acres)		
Year/Category	BLM	Boise National Forest	Southwest Idaho Department of Lands	BLM	Boise National Forest	Southwest Idaho Department of Lands
2015						
Human-Caused	58	22	18	22,968	208	4,702
Lightning-Caused	32	46	10	285,745	1,622	2
Total	**90**	**68**	**28**	**308,714**	**1,830**	**4,704**
2016						
Human-Caused	62	19	14	10,923	188,821	43
Lightning-Caused	9	24	2	2,201	5,412	1
Total	**71**	**43**	**16**	**13,123**	**194,232**	**44**
2017						
Human-Caused	72	13	10	3,871	104	123
Lightning-Caused	47	18	8	27,886	28,142	82
Total	**119**	**31**	**18**	**31,756**	**28,246**	**205**
2018						
Human-Caused	73	18	13	10,923	6,267	5,182
Lightning-Caused	27	13	3	58,080	152	2
Total	**100**	**31**	**16**	**69,003**	**6,419**	**5,184**
2019						
Human-Caused	63	31	10	4,420	258	3
Lightning-Caused	26	53	12	3,689	364	3
Total	**89**	**84**	**22**	**8,109**	**622**	**6**
2020						
Human-Caused	61	27	13	4,923	4,087	55
Lightning-Caused	6	24	7	2,226	19,822	442
Total	**67**	**51**	**20**	**7,150**	**23,909**	**497**

Source: BIDC, 2020



Canyon County

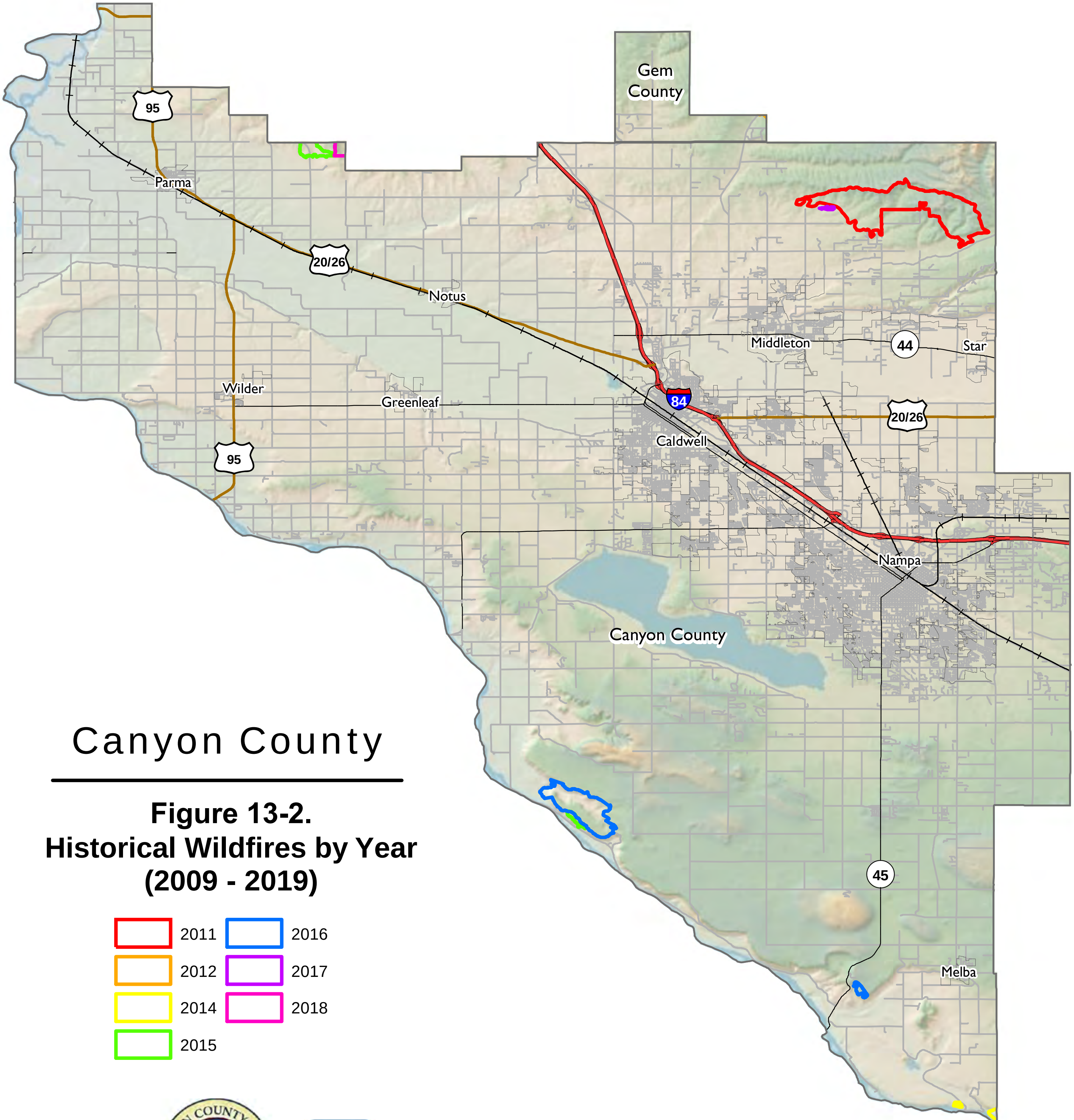
Figure 13-1. Historical Fire Perimeters (1878 - 2019)

Fire Perimeters

Data Sources: Canyon County GIS, 2020; Fire Perimeters: US BLM, 2020; Basemap: ESRI, 2020

0 5 10 Miles

N W E S



Canyon County

Figure 13-2. Historical Wildfires by Year (2009 - 2019)

2011
2016
2012
2017
2014
2018
2015

Data Sources: Canyon County GIS, 2020; Fire Perimeters: US BLM, 2020; Basemap: ESRI, 2020

0 5 10 Miles

N W E S

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 Canyon County. This data set and the modeling it was based on are the best data available to assess the wildfire risk for this plan.

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:

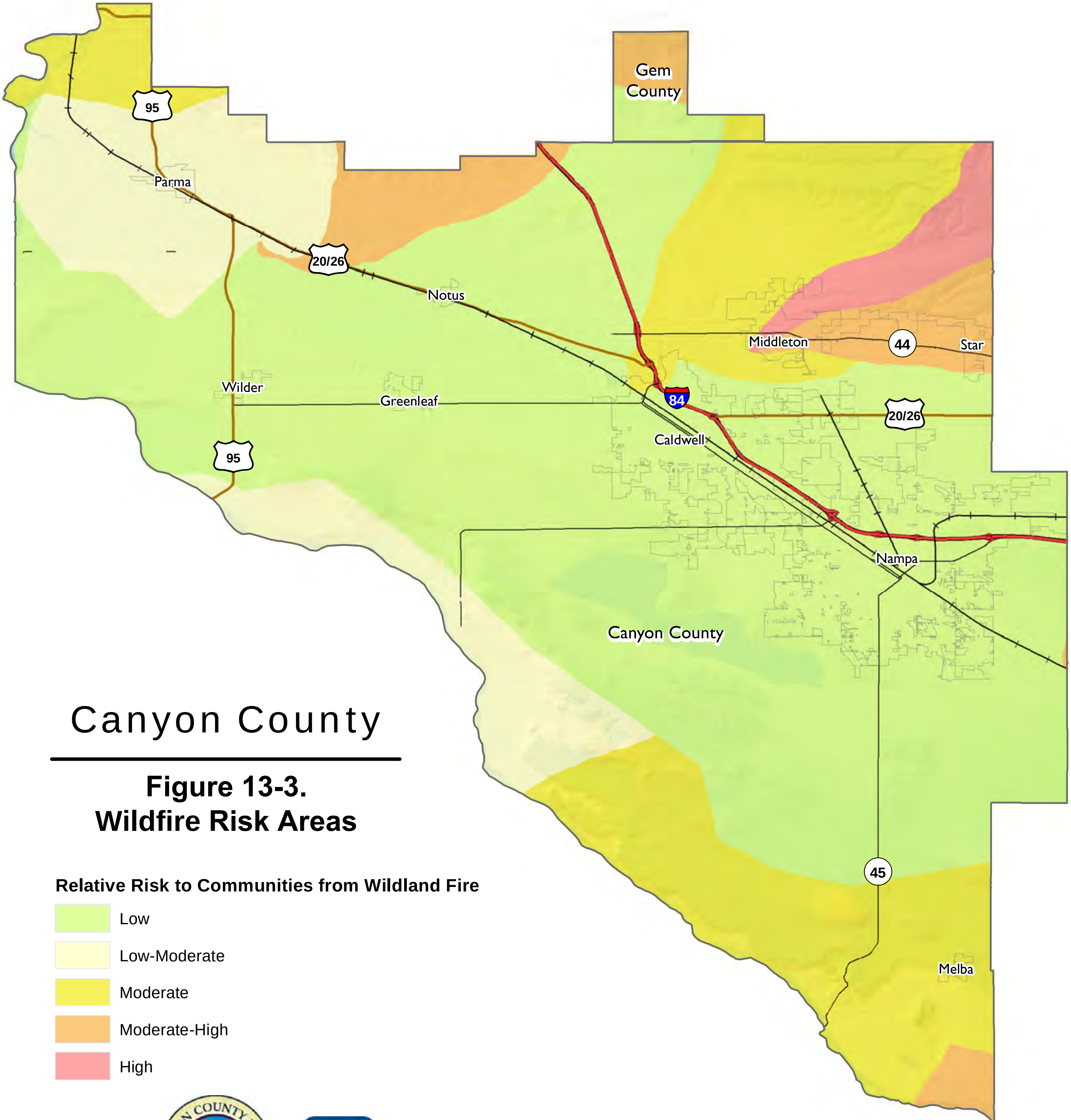
- High (fire rotation less than 100 years)
- Medium (fire rotation more than 100 years and less than 300 years)
- Low (fire rotation more than 300 years).

From 2015 to 2019, the Idaho Department of Lands Southwest Idaho Fire Protection District experienced an average of 20 fires per year, burning 2,029 acres per year on state-monitored lands. This yields a natural fire rotation of 147 years, a medium rating.

13.2.4 Severity

Potential losses from wildfire include human life, structures and other improvements, and natural resources. 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. 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.

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. As a result of wildfire, there may be changes in water quality in the area. Erosion rates may increase, along with increased rainfall runoff and flash flood threat and decreased rainfall interception and infiltration.



Canyon County

Figure 13-3. Wildfire Risk Areas

Relative Risk to Communities from Wildland Fire

- Low
- Low-Moderate
- Moderate
- Moderate-High
- High

Data Sources: Canyon County GIS, 2020; Wildfire Risk: US BLM, 2007; Basemap: ESRI, 2020

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. There is a heightened state of readiness by fire response personnel during spring, summer and fall as weather and increased recreational uses in the WUI can trigger events.

Dry seasons and droughts 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 EXPOSURE

A quantitative assessment of exposure to the wildfire hazard was conducted using the hazard mapping shown in Figure 13-3 and the asset inventory developed for this plan. Population exposure was estimated by calculating the number of buildings in the mapped hazard areas as a percent of total planning area buildings, and then applying this percentage to the estimated planning area population. Detailed results by municipality are provided in Appendix E; results for the total planning area are presented below.

13.3.1 Population and Property

Table 13-3 summarizes the estimated population living in the moderate-high and high wildfire hazard zones and the estimated property exposure.

Table 13-3. Exposed Population and Property in Mapped Wildfire Hazard Zones

	Moderate-High Wildfire Hazard Zone	High Wildfire Hazard Zone
Population		
Population Exposed	7,675	3,315
% of Total Planning Area Population	3.3%	1.4%
Property		
Number of Buildings Exposed	2,717	1,192
Value of Exposed Structures	$879.1 million	$360.0 million
Value of Exposed Contents	$521.0 million	$227.3 million
Total Exposed Property Value	**$1.4001 billion**	**$587.4 million**
Total Exposed Value as % of Planning Area Total	***3.1%***	***1.3%***

Figure 13-4 and Figure 13-5 show the county-wide distribution of structures in the mapped wildfire hazard zones by occupancy class. In both the moderate-high and high hazard zones, the exposed structures are primarily residential or commercial, with other occupancy classes making up less than 1 percent of the total number of exposed structures.

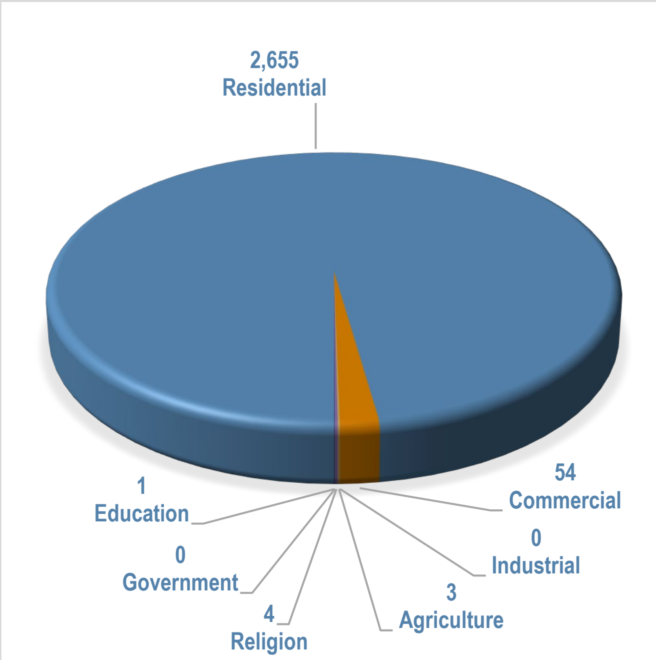


Figure 13-4. Number of Structures by Occupancy Class in the Moderate-High Wildfire Hazard Area

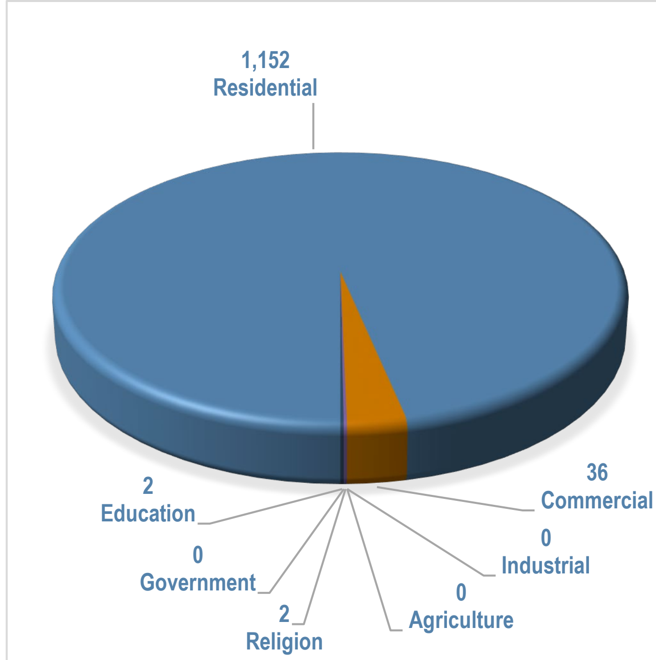


Figure 13-5. Number of Structures by Occupancy Class in the High Wildfire Hazard Area

13.3.2 Critical Facilities

Critical facilities in the moderate to high wildfire hazard severity zones represent 11.1 percent of the total critical infrastructure and facilities in the planning area. The breakdown of exposure by severity zone and facility type is shown in Figure 13-6.

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. One identified Tier II facilities is within the moderate wildfire hazard severity zone.

13.3.3 Environment

All land and water within mapped moderate to high wildfire risk areas are considered to be exposed to the wildfire hazard.

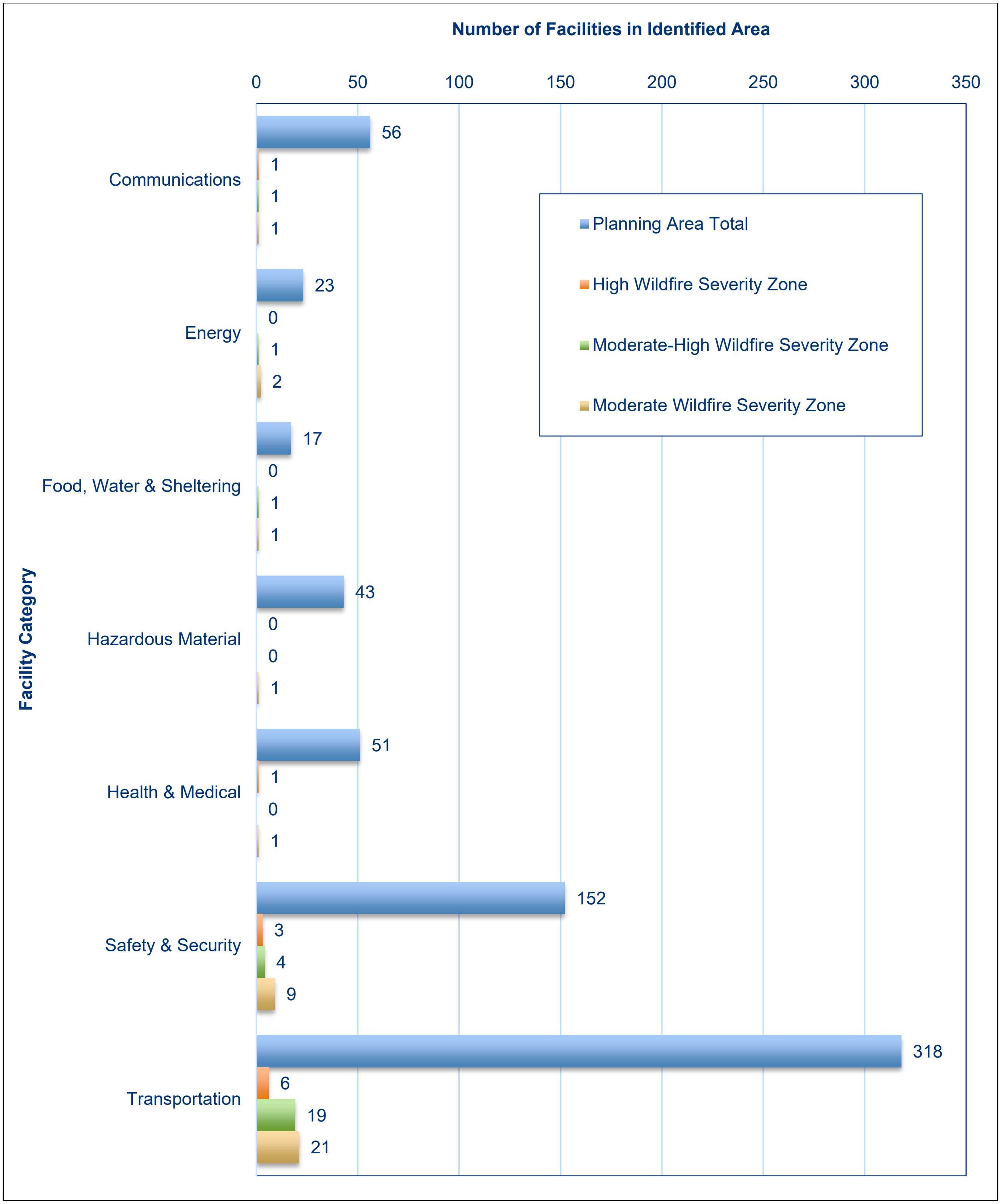


Figure 13-6. Critical Facilities in Mapped Fire Hazard Severity Zones and Countywide

13.4 VULNERABILITY

Vulnerability estimates for the wildfire hazard are described qualitatively. No loss estimation of these facilities was performed because damage functions have not been established for the wildfire hazard. Modeling based on identified fire hazard areas would overestimate potential losses because it is unlikely that all areas susceptible to wildfire would experience a fire at the same time.

13.4.1 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.

13.4.2 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 13-4 lists the loss estimates for the general building stock for jurisdictions that have an exposure to a fire hazard severity zone.

Table 13-4. Potential Building Losses Due to Wildfire Hazard

		Damage = 10% of Exposed Value		Damage = 30% of Exposed Value		Damage = 50% of Exposed Value	
Fire Hazard Severity Zone	Exposed Value	Loss	% of Total Replacement Value	Loss	% of Total Replacement Value	Loss	% of Total Replacement Value
High	$587,375,508	$58,737,551	0.13	$176,212,652	0.38	$293,687,754	0.64
High-Moderate	$1,400,119,095	$140,011,909	0.31	$420,035,729	0.92	$700,059,548	1.53
Moderate	$2,600,019,101	$260,001,910	0.57	$780,005,730	1.70	$1,300,009,551	2.83
Total	$4,587,513,704	$458,751,370	**1.01**	$1,376,254,111	**3**	$2,293,756,853	**5**

13.4.3 Critical Facilities

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.

13.4.4 Environment

Wildfire is a part of nature. It plays a key role in shaping ecosystems by serving as an agent of renewal and change. It 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.

Considering the unique ecological roles of fire in mediating and regulating ecosystems, fire should be incorporated as an integral component of ecosystems and management. However, fire as a destructive force can rapidly consume large amount of biomass and cause negative impacts such as habitat destruction, post-fire soil erosion, water runoff, and air pollution. When any of the attributes for a given fire regime diverge from its range of natural variability, 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 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 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.

13.6 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.

13.7 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. Figure 14-1 summarizes the probability assessment for each hazard of concern for this plan.

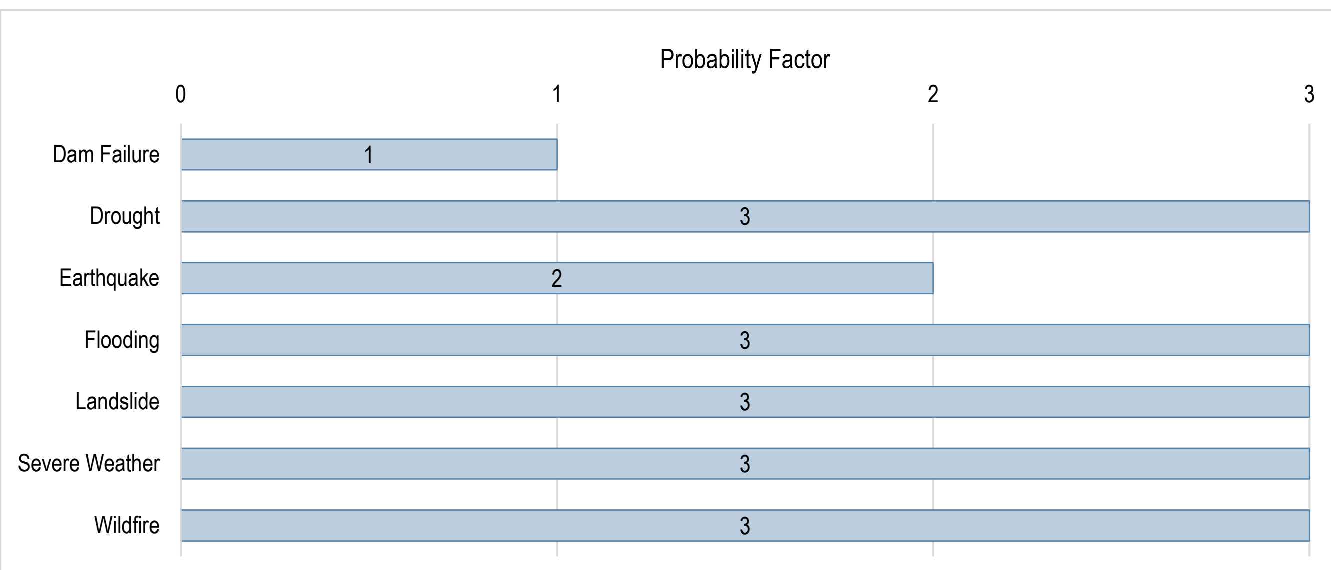


Figure 14-1. Probability Factors for Hazards of Concern

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. Figure 14-2 and Figure 14-3 summarize the unweighted and weighted impact factors, respectively, for each hazard.

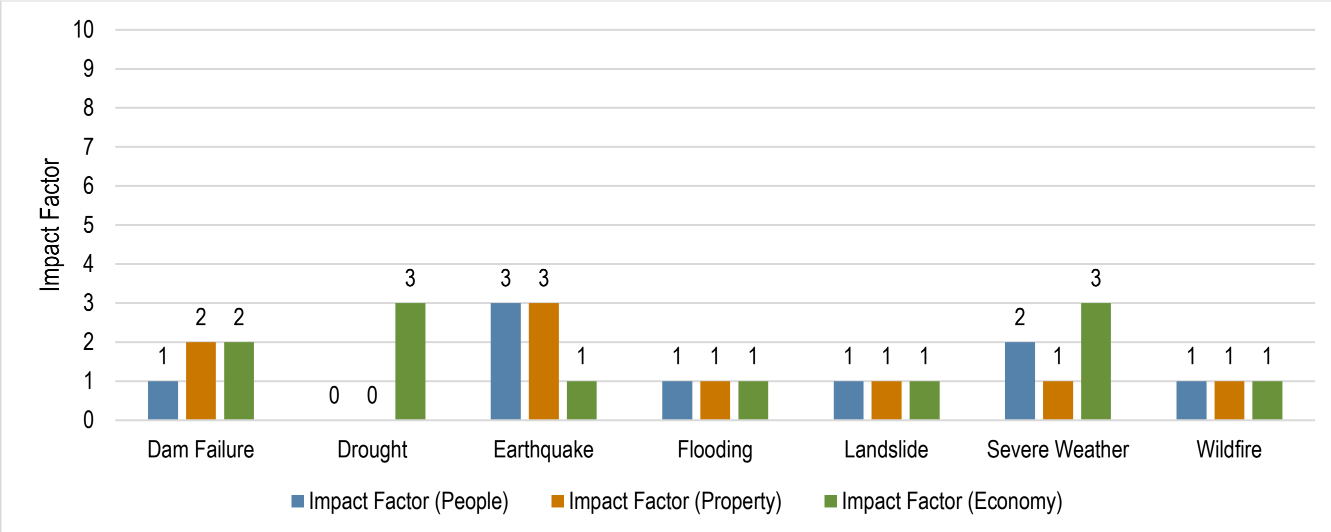


Figure 14-2. Impact Factors for Hazards of Concern

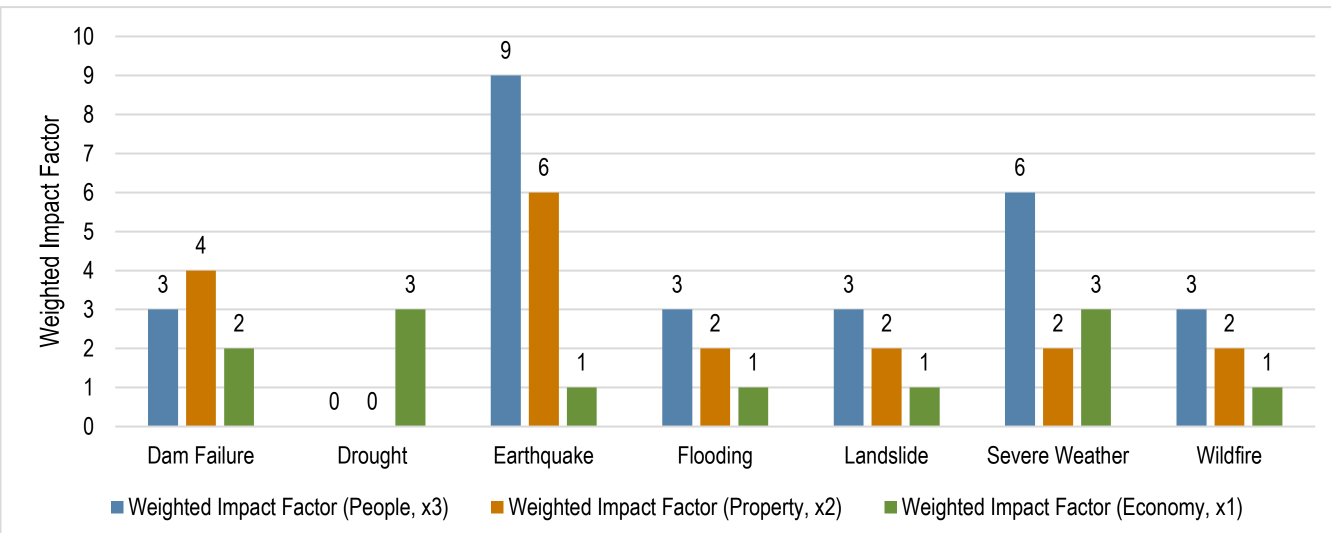


Figure 14-3. Weighted Impact Factors for Hazards of Concern

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 Figure 14-4.

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 14-1 shows the hazard risk ranking.

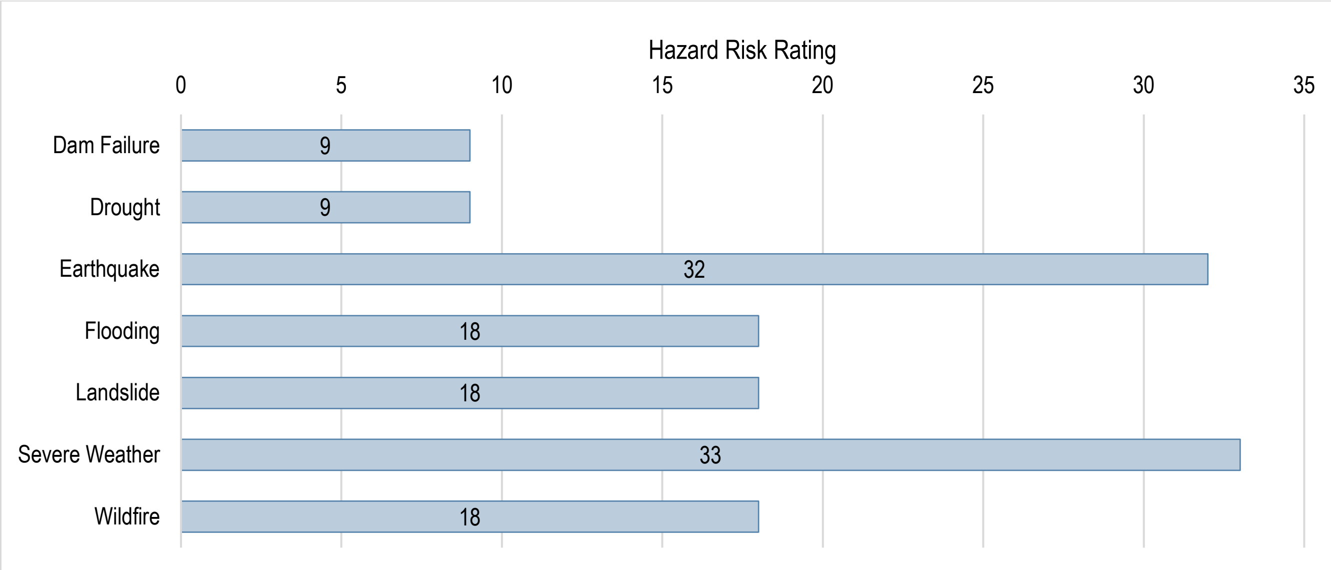


Figure 14-4. Total Risk Rating for Hazards of Concern

Table 14-1. Hazard Risk Ranking

Hazard Ranking	Hazard Event	Category
1	Severe Weather	High
2	Earthquake	High
3	Flood	Medium
3	Landslide	Medium
3	Wildfire	Medium
4	Dam Failure	Low
4	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. 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, 2015 and NASA, 2016) (see Figure 15-1).

Source: EPA, 2016

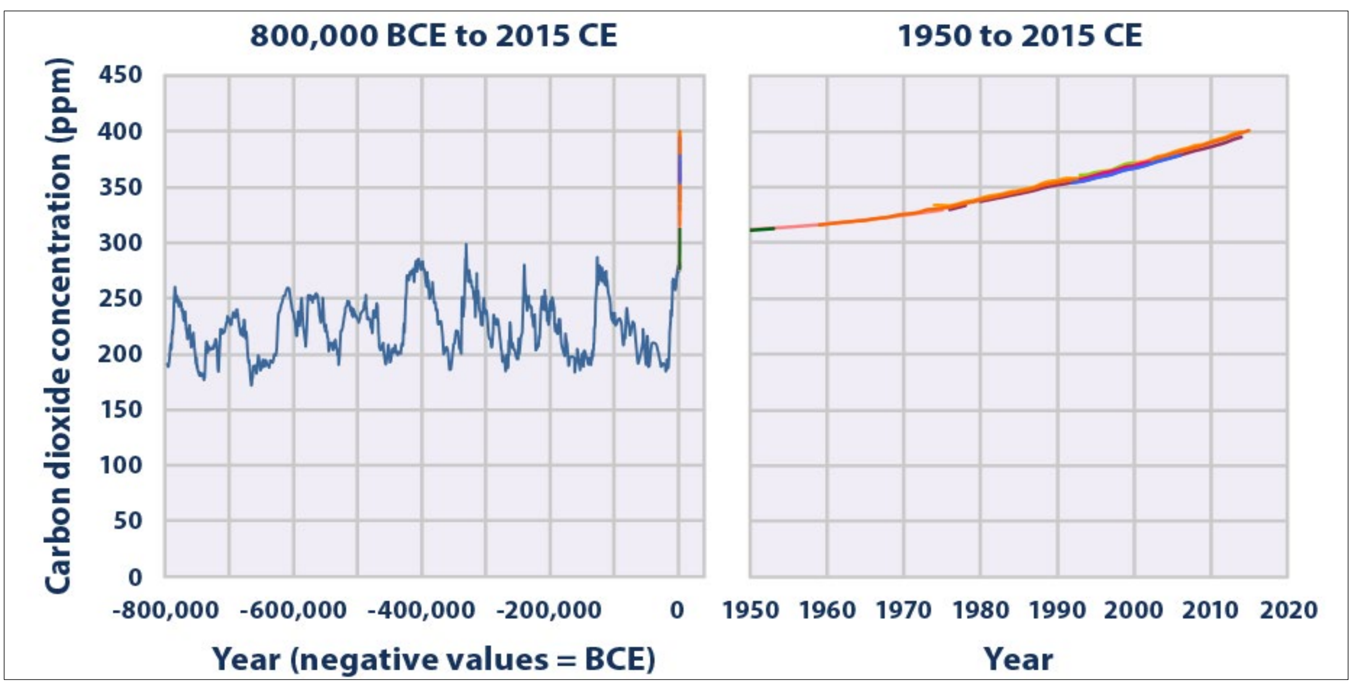


Figure 15-1. Global Carbon Dioxide Concentrations Over Time

Climate change will affect the people, property, economy and ecosystems of the planning area 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 those climate conditions change. 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.

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, 2014). 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 6 to 8 inches in the last 100 years (NASA, 2020). This has already put some coastal homes, beaches, roads, bridges, and wildlife at risk (USGCRP, 2009). In 2017, NASA reported the following trends (NASA, 2016):

- 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 (University of Idaho, 2020) 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).

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 the planning area 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 and Property

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

15.7.3 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.

15.7.4 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 stresses on water supplies and by building a flexible, robust program, Canyon 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. Prolonged or more frequent drought resulting from climate change may 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 SEVERE WEATHER

15.11.1 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 in recent decades (see Figure 15-2). Historical data shows that the probability for severe weather events increases in a warmer climate.

Source: Munich RE, 2020

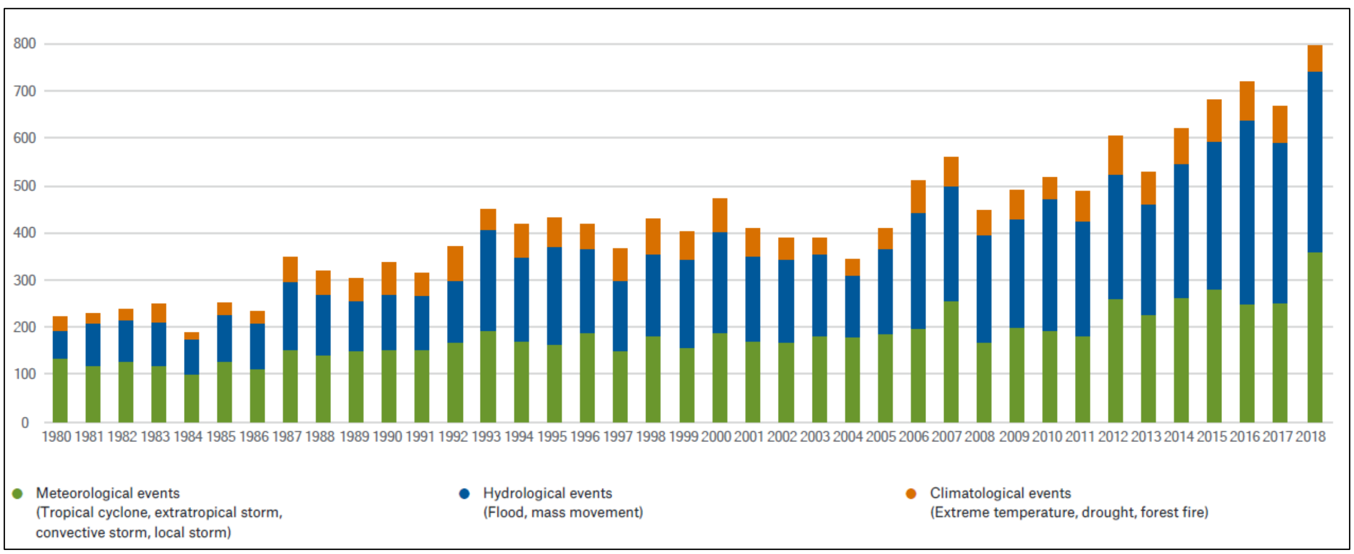


Figure 15-2. Worldwide Natural Catastrophe Events, 1980 – 2018

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.

15.11.2 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.

15.11.3 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.

15.11.4 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.

15.12 WILDFIRE

15.12.1 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.

15.12.2 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.

15.12.3 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 planning area.

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 *Canyon County All-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 HUMAN-CAUSED HAZARDS

16.1.1 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. 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.

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. Regulations and safety practices make large-scale events unlikely, but smaller scale incidents may have severe impacts:

- Human deaths, injuries, and permanent disabilities
- Livestock/animal deaths
- Destruction of vegetation and crops
- Property damage and destruction
- Pollution of groundwater, drinking water supplies, and the environment
- Contamination of food, property, land and structures
- Temporary or long-term closure of transportation routes or facilities
- Loss of business and industrial productivity
- Utility outages
- Clean-up and restoration costs
- Losses and inconvenience due to evacuation
- Loss of valuable chemical product

A sample hazardous material transportation incident was used to show the potential impacts of this type of incident. The scenario is a chlorine transportation incident that occurs on I-84 at the Highway 20 interchange. The incident would affect a residential population of 5,430 people. The estimated number of housing units that would be affected is 1,836. The following essential facilities would also be affected:

- O'Connor Event Center
- Well House #6
- Well House #9
- Exhibition Building
- Shop/Building Maintenance
- Vehicle Maintenance Building
- Radio Tower
- Van Buren Elementary

Planning Capability for Hazardous Materials

Canyon County Emergency Management maintains National Incident Management System and emergency operations/response plans for the entire Canyon County area (in compliance with FEMA's Civil Planning Guidance #101).

16.1.2 Civil Disturbances

(The following are excerpts from the 2018 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. Uncontrolled, unorganized, angry, and emotional, mobs share a common purpose. Mobs are typically associated with disorder and lack of respect for the law.

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.

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.

Civil disturbance severity depends on the nature of the disturbance. 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 are less likely to occur in a smaller city, due to the noncontiguous nature of suburban development patterns. There is a low, medium, and high range that can be associated with the severity of the hazard of civil disturbance.

- 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.

Planning Capability for Civil Disturbances

Canyon County Emergency Management maintains the following planning capabilities for civil disturbances:

- National Incident Management System and emergency operations/response plans for the entire Canyon County area (in compliance with FEMA's Civil Planning Guidance #101)

16.1.3 Terrorism

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. 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 lengthen the duration.	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; 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. Buildings and terrain can alter travel and duration of agents. Sheltering in place can protect people and property.
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 at target. Effects generally static other than cascading consequences.	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.	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 or munitions.	Hours to years, depending on the agent and the conditions in which it exists.	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.
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 may be limited to specific sites. 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.

Hazard	Application Mode[a]	Hazard Duration[b]	Static/Dynamic Characteristics[c]	Mitigating and Exacerbating Conditions[d]
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 localized attack site; depending on weather, subsequent behavior of 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.	Shock wave lasts seconds; radiation and fallout can last years. Electromagnetic pulse lasts seconds and affects only electronics.	Initial light, heat, and blast effects of a subsurface, ground or air burst are static and determined by the device's characteristics; fallout of contaminants may be dynamic.	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 transport)	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.

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.

Planning Capability for Terrorism

Canyon County Emergency Management maintains the following planning capabilities for civil disturbances:

- A National Incident Management System and emergency operations/response plans for the entire Canyon County area (in compliance with FEMA's Civil Planning Guidance #101)

16.1.4 Cyber Disruption

(The following are excerpts from the 2018 Idaho State Hazard Mitigation Plan)

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.

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.

Planning Capability for Cyber Disruption

Canyon County currently has prepared no plans or programs that address cyber disruption.

16.2 PUBLIC HEALTH

The U.S. Centers for Disease Control and Prevention (CDC) defines an outbreak as the occurrence of more cases of disease over a given period of time than normally expected within a specific place or group of

NOTE REGARDING COVID-19

As this planning process was being completed, the world remained in the midst of the COVID-19 global pandemic. COVID-19 is the name of the disease caused by the virus whose name is SARS-CoV-2 (severe acute respiratory syndrome coronavirus 2)

The impacts from this event will be long term and change the way society as a whole views, prepares for and responds to pandemics.

Data on the impacts of this pandemic and policies to respond were still being formed as of this writing and were not fully developed enough to inform this plan update. It is anticipated that future updates to this plan will have well informed, expanded dialogue on the matter of pandemics.

people. State and local regulations require immediate reporting of 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 an 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).

16.2.1 Location, Extent and Magnitude

Health hazards that affect the residents of the planning area 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 the planning area 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.

16.2.2 Planning Capability for Pandemic

The Southwest District Health Department has developed and maintains a regional preparedness and response plan for pandemic that covers the Canyon County planning area. More information on the District's capabilities and capacities is available on the District web site.

Part 3. Mitigation Plan

17. MISSION STATEMENT, 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 mission statement 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 mission statement for the Canyon County Hazard Mitigation Plan Update is as follows:

> To reduce the risk of loss of life and property and to encourage long-term reduction of vulnerability and property damage due to hazards.

17.2 GOALS

The following are the mitigation goals for this plan update:

- Protect lives and property
- Enhance the public's awareness of and preparedness for the impacts of hazards.
- Develop and implement hazard mitigation strategies that use public and private funds in a cost-effective manner.
- Maintain, enhance, or restore the natural environment's capacity to deal with the current/future impacts of hazard events.
- Improve emergency management preparedness, collaboration, and outreach within the planning area

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:

13. Manage the incorporation of mitigation measures into repairs, major alterations, new development, and redevelopment practices, especially in areas subject to substantial hazard risk.
14. Encourage new development to occur in locations that avoid or minimize exposure to hazards and enhance design requirements to improve resiliency in future disasters.
15. Reduce losses on at-risk properties, including those subject to repetitive losses, by enhancing land use, design, and construction policies and/or by retrofit, purchase and relocation of structures in high hazard areas.
16. Use mandatory local general plan, zoning, and subdivision requirements to help establish resilient and sustainable communities by incorporating risk reduction considerations in new and updated infrastructure and development plans.
17. Actively promote effective coordination of regional and local stakeholders in hazard mitigation to create resilient and sustainable communities.
18. Create programs to motivate stakeholders, such as homeowners, private sector businesses, and nonprofit community organizations, to mitigate hazards and risk.
19. Improve systems that provide warning and emergency communications.
20. Inform the public about the risk exposure to hazards and ways to increase the public's capability to prepare, respond, recover and mitigate the impacts of hazard events.
21. Identify projects that reduce risk while meeting multiple objectives defined by this planning process.
22. Minimize disruption of local government and commerce operations caused by natural hazards.
23. Implement hazard mitigation policies and projects that not only protect the built environment but also maintain or enhance the natural environment's ability to absorb impacts from hazard events.
24. Increase the resilience and continuity of operations of identified lifelines within the planning area.

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 developed 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 (personal scale)
    - Businesses (corporate scale)
    - Government (government scale)

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 Failure

Personal Scale	Corporate Scale	Government Scale
Manipulate Hazard		
None	1. Remove dams 2. Remove levees 3. Harden dams 4. Replace earthen dams with hardened structures	1. Remove dams 2. Remove flood control impounding facilities 3. Harden dams 4. Replace earthen dams with hardened structures 5. Develop effective underground water storage as an alternative to dams and reservoir storage.
Reduce Exposure		
1. Relocate out of dam failure inundation areas.	1. Relocate critical facilities out of dam failure inundation areas.	1. Relocate critical facilities out of dam failure inundation areas. 2. Consider open space land use in designated dam failure inundation areas.
Reduce Vulnerability		
1. Elevate home to appropriate levels.	1. 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	None
Reduce Exposure		
None	None	None
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. Groundwater recharge through stormwater management 2. Identify and create groundwater backup sources 3. Water use conflict regulations 4. Reduce water system losses 5. Distribute water saving kits
Increase Preparation or Response Capability		
1. Practice active water conservation	1. 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		
1. Locate outside of hazard area (off soft soils)	1. Locate or relocate mission-critical functions outside hazard area where possible	1. 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. Elevate structures above base flood elevation 2. Elevate items within house above base flood elevation 3. Build new home 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

<table>
<tr><th>Personal Scale</th><th>Corporate Scale</th><th colspan="2">Government Scale</th></tr>
<tr><th colspan="4">Increase Preparation or Response Capability</th></tr>
<tr><td>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</td><td>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.</td><td>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</td><td>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</td></tr>
</table>

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 3. Minimize vegetation removal and the addition of impervious surfaces.	1. Stabilize slope (dewater, armor toe) 2. Reduce weight on top of slope
Reduce Exposure		
1. Locate structures outside of hazard area (off unstable land and away from slide-runout area)	1. Locate structures outside of hazard area (off unstable land and away from slide-runout 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		
1. Retrofit home.	1. 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	1. Relocate critical infrastructure (such as power lines) underground	1. Relocate critical infrastructure (such as power lines) underground
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. Reinforce or relocate critical infrastructure such as power lines to meet performance expectations 2. Install tree wire	1. Harden infrastructure 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		
1. Clear potential fuels on property such as dry overgrown underbrush and diseased trees	1. 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

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	Timeline[a]	Objectives
CW-1—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	Canyon County Emergency Management	General Fund	Short term/ ongoing	2, 7, 10
CW-2—Coordinate all mitigation planning and project efforts, including grant application support, to maximize all resources available to the planning partnership.				
All Hazards	Canyon County Emergency Management/ All Planning Partners	General Fund, FEMA mitigation grants	Short term/ ongoing	1, 4, 10
CW-3—Provide coordination and technical assistance in grant application preparation that includes assistance in cost-benefit analysis for grant-eligible projects.				
All Hazards	Canyon County Emergency Management	General Fund, FEMA mitigation grants	Short term/ ongoing	2, 7, 10
CW-4—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

a. 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 ACTION PLAN PRIORITIZATION

The actions recommended in the action plan were prioritized based on the following factors:

- Cost and availability of funding
- Benefit, based on likely risk reduction to be achieved
- Number of plan objectives achieved
- Timeframe for project implementation

- Eligibility for grand funding programs

Two priorities were assigned for each action:

- A high, medium or low priority for implementing the action
- A high, medium or low priority for pursuing grant funding for the action.

The sections below describe the analysis of benefits and costs and the assignment of the two priority ratings.

19.2.1 Benefit and Cost

The action plan must be prioritized according to a benefit/cost analysis of the proposed actions (44 CFR, Section 201.6(c)(3)(iii)). For this hazard mitigation plan, a qualitative benefit-cost review was performed for each action by assigning ratings for benefit and cost as follows:

- Cost:
  - **High**—Existing funding will not cover the cost of the action; implementation would require new revenue through an alternative source (for example, bonds, grants, and fee increases).
  - **Medium**—The action could be implemented with existing funding but would require a re-apportionment of the budget or a budget amendment, or the cost of the action would have to be spread over multiple years.
  - **Low**—The action could be funded under the existing budget. The action is part of or can be part of an ongoing existing program.
- Benefit:
  - **High—**Action will provide an immediate reduction of risk exposure for life and property.
  - **Medium—**Action will have a long-term impact on the reduction of risk exposure for life and property, or action will provide an immediate reduction in the risk exposure for property.
  - **Low—**Long-term benefits of the action are difficult to quantify in the short term.

To assign priorities, each action with a benefit rating equal to or higher than its cost rating (such as high benefit/medium cost, medium benefit/medium cost, medium benefit/low cost, etc.) was considered to be cost-beneficial. This is not the detailed level of benefit/cost analysis required for some FEMA hazard-related grant programs. Such analysis would be performed at the time a given action is being submitted for grant funding.

19.2.2 Implementation Priority

Implementation priority ratings were assigned as follows:

- **High Priority**—An action that meets multiple objectives, has benefits that exceed costs, and has a secured source of funding. Action can be completed in the short term (1 to 5 years).
- **Medium Priority**—An action that meets multiple objectives, has benefits that exceed costs, and is eligible for funding though no funding has yet been secured for it. Action can be completed in the short term (1 to 5 years), once funding is secured. Medium-priority actions become high-priority actions once funding is secured.
- **Low Priority**—An action that will mitigate the risk of a hazard, has benefits that do not exceed the costs or are difficult to quantify, has no secured source of funding, and is not eligible for any known grant

funding. Action can be completed in the long term (1 to 10 years). Low-priority actions may be eligible for grant funding from programs that have not yet been identified.

19.2.3 Grant Pursuit Priority

Grant pursuit priority ratings were assigned as follows:

- **High Priority**—An action that meets identified grant eligibility requirements, has high benefits, and is listed as high or medium implementation priority; local funding options are unavailable or available local funds could be used instead for actions that are not eligible for grant funding.
- **Medium Priority**—An action that meets identified grant eligibility requirements, has medium or low benefits, and is listed as medium or low implementation priority; local funding options are unavailable.
- **Low Priority**—An action that has not been identified as meeting any grant eligibility requirements.

19.2.4 Prioritization Summary for Countywide Actions

Table 19-2 lists the priority of each action.

Table 19-2. Mitigation Action Priority

Action #	# of Objectives Met	Benefit	Cost	Do Benefits Equal or Exceed Costs?	Is Action Grant Eligible?	Can Action be Funded Under Existing Programs/ Budgets?	Implementation Priority	Grant Pursuit Priority
CW-1	3	Low	Low	Yes	No	Yes	High	Low
CW-2	3	Low	Low	Yes	No	Yes	High	Low
CW-3	3	Medium	Medium	Yes	Yes	Yes	High	High
CW-4	4	High	Medium	Yes	Yes	Yes	High	High

19.3 CLASSIFICATION OF MITIGATION ACTIONS

Each recommended action was classified based on the hazard it addresses and the type of mitigation it involves. Mitigation types used for this categorization are as follows:

- **Prevention**—Government, administrative or regulatory actions that influence the way land and buildings are developed to reduce hazard losses. Includes planning and zoning, floodplain laws, capital improvement programs, open space preservation, and stormwater management regulations.
- **Property Protection**—Modification of buildings or structures to protect them from a hazard or removal of structures from a hazard area. Includes acquisition, elevation, relocation, structural retrofit, storm shutters, and shatter-resistant glass.
- **Public Education and Awareness**—Actions to inform residents and elected officials about hazards and ways to mitigate them. Includes outreach projects, real estate disclosure, hazard information centers, and school-age and adult education.
- **Natural Resource Protection**—Actions that minimize hazard loss and preserve or restore the functions of natural systems. Includes sediment and erosion control, stream corridor restoration, watershed management, forest and vegetation management, wetland restoration and preservation, and green infrastructure.

- **Emergency Services**—Actions that protect people and property during and immediately after a hazard event. Includes warning systems, emergency response services, and the protection of essential facilities.
- **Structural Projects**—Actions that involve the construction of structures to reduce the impact of a hazard. Includes dams, setback levees, floodwalls, retaining walls, and safe rooms.
- **Climate Resiliency**—Actions that incorporate methods to mitigate and/or adapt to the impacts of climate change. Includes aquifer storage and recovery activities, incorporating future conditions projections in project design or planning, or actions that specifically address jurisdiction-specific climate change risks, such as sea level rise or urban heat island effect.
- **Community Capacity Building**—Actions that increase or enhance local capabilities to adjust to potential damage, to take advantage of opportunities, or to respond to consequences. Includes staff training, memorandums of understanding, development of plans and studies, and monitoring programs.

Table 19-3 shows the classification by mitigation type and hazard mitigated for each action in the action plan.

Table 19-3. Analysis of Countywide Mitigation Actions

Hazard	Actions That Address the Hazard, by Mitigation Type[a]							
	Prevention	Property Protection	Public Education and Awareness	Natural Resource Protection	Emergency Services	Structural Projects	Climate Resiliency	Community Capacity Building
Dam Failure		CW-4	CW-1					CW-2, CW-3
Drought		CW-4	CW-1					CW-2, CW-3
Earthquake		CW-4	CW-1					CW-2, CW-3
Flood		CW-4	CW-1					CW-2, CW-3
Landslide		CW-4	CW-1					CW-2, CW-3
Severe Weather		CW-4	CW-1					CW-2, CW-3
Wildfire		CW-4	CW-1					CW-2, CW-3

20. Plan Adoption and Implementation

20.1 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. 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 F of this volume.

20.2 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 method and schedule for 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 strategy for allowing the community to continue public participation in the plan maintenance process.

This section details the formal process that will ensure that the 2021 Canyon County Hazard Mitigation Plan remains an active and relevant document and that the planning partners maintain their eligibility for applicable funding sources. Responsibilities for plan maintenance are identified in each jurisdiction's annex (see Volume 2) and summarized in Table 20-1.

20.2.1 Plan Implementation and Monitoring

The action items outlined in the two volumes of this hazard mitigation plan represent an action plan 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. At a minimum, the planning partners will track and report the status of the jurisdiction-specific mitigation actions for inclusion into an annual progress report. Implementation will also include tracking grant opportunities as funding sources for actions included in the plan.,

Table 20-1. Plan Maintenance Matrix

Task	Approach	Timeline	Lead Responsibility	Support Responsibility
Monitoring	Prepare status updates and action implementation tracking as part of annual progress reporting.	Annually after the adoption and final approval of the plan by FEMA.	Canyon County Emergency Manager	Designated point of contact for each planning partner
	As grant opportunities present themselves, the planning partners will consider options to pursue grants to fund actions identified in this plan	As grants become available	Canyon County Emergency Manager through the local emergency planning committee	Designated point of contact for each planning partner
Annual Progress Reporting	Review the status of previous actions as submitted by the monitoring task lead and assess the effectiveness of the plan; compile the annual progress report; assess appropriate action for preparing next hazard mitigation plan update.	Annually after final plan approval by FEMA, or upon a major disaster or a comprehensive update to a general plan	Canyon County and all planning partners	Designated point of contact for each planning partner; Steering Committee to review
Plan Update	The Canyon County partnership will reconvene the planning partners, at a minimum, every 5 years to guide a comprehensive update to review and revise the plan.	Every 5 years or upon comprehensive update to General Plan or major disaster	The governing body for all planning partners covered by this plan	Designated point of contact for each planning partner; Steering Committee to provide input
Continuing Public Involvement	The principle means for providing the public access to the implementation of this plan will be the Canyon County Hazard Mitigation Plan website. https://www.canyonco.org/elected-officials/sheriff/emergency-management/	Annually	Canyon County Emergency Management	All planning partners will provide a link to County's hazard mitigation plan website on their own websites
Plan Integration	Integrate relevant information from hazard mitigation plan into other plans and programs where viable and opportunities arise	Ongoing	The governing body for all planning partners covered by this plan	Designated point of contact for each planning partner

20.2.2 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. 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 Canyon County on possible enhancements to be considered at the next update. Future plan updates will be overseen by a new 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.

20.2.3 Annual Progress Report

The plan maintenance process will include evaluating and reporting progress annually. Completion of the progress report will be 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. 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.

This report will be posted on the Canyon County website page dedicated to the hazard mitigation plan. It also will be presented to planning partner governing bodies to inform them of the progress of actions implemented during the reporting period. Uses of the progress report will be at the discretion of each planning partner.

The planning team has created a template to guide the planning partners in preparing a progress report (see Appendix G). The plan maintenance steering committee will provide feedback to the planning team on items included in the template.

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.

20.2.4 Plan Update

The plan maintenance process includes a schedule for monitoring and producing an updated plan every five years. 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 planning 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

This plan's format allows sections to be reviewed and updated when new data become available, resulting in a plan that will remain current. It will not be the intent of future updates to develop a completely 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.

20.2.5 Continuing Public Involvement

The public will continue to be apprised of the plan's progress through the Canyon 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. Canyon 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 site 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.

20.2.6 Incorporation into Other Planning Mechanisms

This mitigation actions recommended 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 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 Canyon 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 hazard mitigation plan update provided the County and the cities with an 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 Canyon 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:

- Local 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.

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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

IOEM—Idaho Office of Emergency Management

IRC—International Residential Code

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

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

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 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.

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.

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 floodwaters 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.

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.

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.

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.

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.

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.

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.

2021 Canyon County All-Hazard Mitigation Plan

Appendix A. Steering Committee Ground Rules

A. STEERING COMMITTEE GROUND RULES

PURPOSE

As the title suggests, 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 Canyon 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 **Mr. Jeff Barnes from the City of Nampa Department of Public Works** 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. **Ms. Ashley Newbry** 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 9 members in attendance. This quorum can be met with an attendance augmented by designated alternates.

ALTERNATES

It was the decision of the SC to not designate alternates for each SC member. However, for those members that feel they will not be able to attend multiple meetings due to schedule conflicts, they should attempt to identify an alternate. For those members that designate alternates, those designees shall become official members of this committee. 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 than 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 also assist in the presentation of the Plan to the elected bodies of participating organizations.

SPOKESPERSONS

Ideally, the 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, the Committee spokesperson will be the same as the Committee Chairperson.

In addition, 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 **Christine Wendelsdorf**, Canyon 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 Canyon 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 (5 minutes per subject, limited to 3 comments 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 **3rd Tuesday of each month** from **1:30 PM to 3:30 PM** at the **Canyon County Paramedics facility located at 6116 Graye Lane, Caldwell, ID, 83605**, 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

Canyon County Hazard Mitigation Plan Update—STEERING COMMITTEE			
Name	Representing	E-Mail	Phone
Jeff Barnes	City of Nampa	barnesj@cityofnampa.us	208.468.5521
Christine Wendelsdorf	Canyon County	cwnendelsdorph@canyonco.org	208-454-7271
Crash Marusich	Ada County	pmarusich@adaweb.net	208-577-4754
Mike Dimmick	Flood Control District #10	projectmgr@boiseriver.org	208-861-2766
T.J. Wilson	Southwest District Health	Terry.wilson@phd3.idaho.gov	208-455-5326
Nick Oliver	Idaho Power	NOliver@idahopower.com	208 465-8659
Mark Wendelsdorf	Caldwell Fire	mwendelsdorf@cityofcaldwell.org	208-455-3032
Michael Stowell	Canyon County Paramedics	mstowell@ccparamedics.com	208-573-3795
Heidi Novich	Idaho Office of Emergency Management	hnovich@imd.idaho.gov	208-954-2932
Patricia Nilsson	Canyon County	pnilsson@canyonco.org	208-454-6634
Anita Christenson Koons	NSD #131	achristenson@nsd131.org	208-468-4600

Name	Representing	E-Mail	Phone
Kirk Carpenter	Nampa Fire	carpenterk@cityofnampa.org	208-250-3258
Gordon Bates	Golden Gate Highway District	gordonb@gghd3.org	208-482-6267
Roxane Wade	Canyon County Dispatch	rwade@canyonco.org	208-455-5975
Kurt Shankle	Nampa PD	shanklek@cityofnampa.us	208-465-2257
Joe Decker	Canyon County	jdecker@canyonco.org	208-454-7401

Canyon County Hazard Mitigation Plan Update—STEERING COMMITTEE ALTERNATES

Name	Alternate for	E-mail	Phone
Angie Michaels	Mike Dimmick	angie@ewsia.com	208-870-9495
Chris King	Kirk Carpenter	kingc@cityofnampa.org	208-477-4541
Rick Bowman	T.J. Wilsom	Rick.bowman@ph3.idaho.gov	208-455-5326

Canyon County Hazard Mitigation Plan Update—PLANNING TEAM

Name	Representing	E-Mail	Phone
Christine Wendelsdorf	Canyon Emergency Management	cwnendelsdorph@canyonco.org	208-454-7271
Joe Decker	Canyon County	jdecker@canyonco.org	208-454-7401
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)
Desmian Alexander	Tetra Tech, Inc-Planner	Des.alexander@tetratech.com	609-558-6676

2021 Canyon County All-Hazard Mitigation Plan

Appendix B. Public Involvement Materials

APPENDIX B.
PUBLIC INVOLVEMENT MATERIALS

SUMMARY OF SURVEY RESULTS

About the Survey

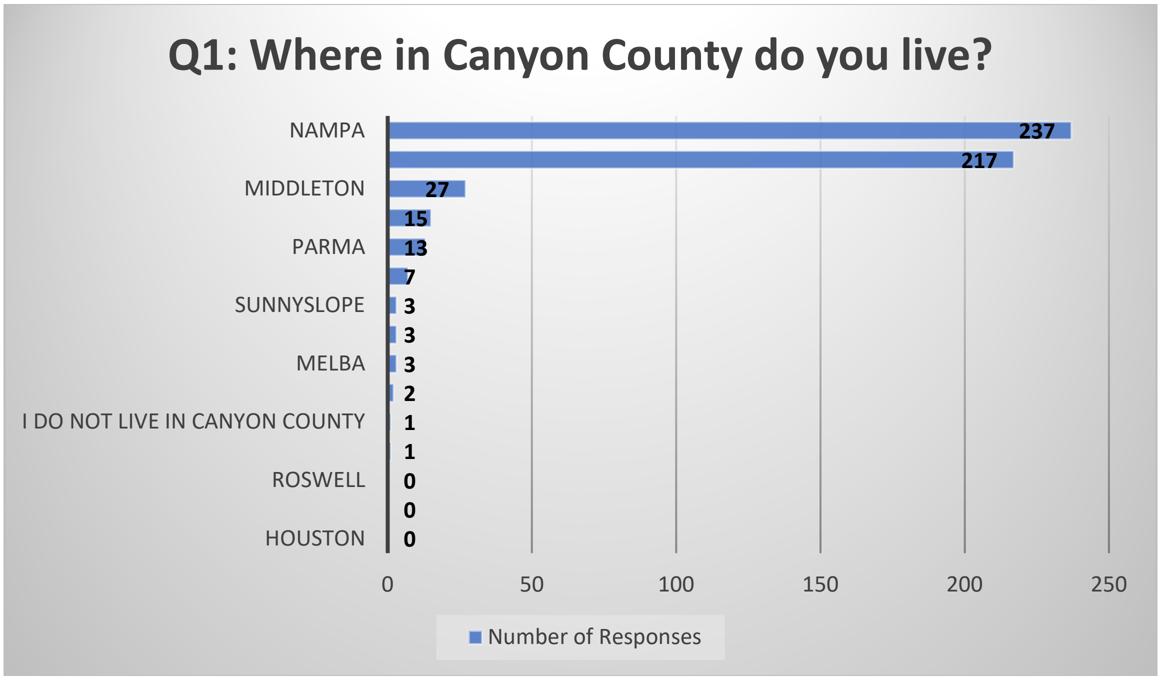
The Canyon County Sheriff's Bureau developed and disseminated a 29-question online survey to assist with the incorporation of public outreach in its 2020 Hazard Mitigation Plan update. The survey was available through a link on the County website. In addition to multiple choice questions, Canyon County residents were offered the opportunity to provide additional information and detail through several open response sections, the majority of which were associated with a closed response question to ensure as much detail as possible. The survey, completed by 528 County residents, sought to determine public awareness and perception on several hazards, including:

- Hazard Perception
- Hazard Preparedness and Education
- Hazard Control and Risk Reduction Measures

About the Survey Respondents

As noted above, 528 residents provided information via the survey to enhance the 2020 Hazard Mitigation Plan update. All respondents were over the age of 18, with over half of the respondents being 61 or older (Question 22). While most respondents were female (68.16 percent) men still provided a sizeable contribution of responses (Question 24). Most respondents had at least some college experience, if not a degree or graduate degree (combined total of 89.07 percent). Only 60 respondents owned a business in Canyon County. The respondents were about evenly split between those that worked in Canyon County (33.78 percent), those that did not work in Canyon County (27.13 percent), and those who had retired (39.09 percent) (Question 2). Only four respondents indicated a primary language spoken at home other than English; for 99.11 percent of all respondents, English is the primary language spoken in their households (Question 23).

The survey respondents represented a narrow geographical range, with most of the respondents residing in either Caldwell or Nampa (85.82 percent) (Question 1). Additionally, most respondents were homeowners (91.67 percent) rather than renters (8.33 percent) (Question 27). In Question 30, respondents were asked how long they had lived in Canyon County, with those who had lived in the area for more than 20 years (at 33.11 percent) and those who had lived there 1 to 5 years (at 32.44 percent) making up the majority of responses. In descending order, those who lived in Canyon County for 11 to 20 years (18.12 percent), 6 to 10 years (12.98 percent), and less than 1 year (3.36 percent) made up the difference.



Within the past 20 years, respondents stated that they or someone in their household had experienced several kinds of hazard events. Of the 13 listed, the most common hazard events experienced were (in order):

- Severe Weather (wind, lightning, snow accumulation, etc.) – 67.05 percent
- Earthquake – 32.18 percent
- Public Health (Influenza, West-Nile, SARA, etc.) – 31.61 percent
- Drought – 13.60 percent
- Wildland Fire – 11.49 percent
- Flood – 9.96 percent
- Household Fire – 8.62 percent
- Human Caused (terrorism, Active Shooter, etc.) – 3.26 percent
- Hazardous Materials Release – 2.11 percent
- Landslide – 1.53 percent
- Dam/Levee Failure – 1.15 percent
- Evacuation – 0.77 percent

Respondents who had experienced no hazards made up 20.31 percent of responses, while other hazards than those listed made up 6.32 percent of collective responses.

Perception of Hazards

Question 8 asked respondents to rank how concerned they are about hazards in Canyon County, such as climate change, dam/levee failure, drought, earthquake, flood, canal failures, hazardous materials, household fire, landslide, severe weather, wildland fire, and other hazards. Respondents identified severe weather as the hazard that they were concerned or very concerned about (74 percent of respondents indicated one of those levels). Household fire was the second highest concern (65.75 percent of respondents were concerned or higher), and drought was the third highest concern (59.96 percent of respondents were concerned or higher). Climate change and severe weather were selected as the two hazards where respondents indicated they were very concerned (13.38 percent and 11.32 percent respectively). Wildland fires, household fires, hazardous materials, canal failures, and other hazards were also listed as events respondents were very concerned about.

Hazard Preparedness and Education

Survey respondents were also asked a series of questions to gauge their level of preparedness and how they would like to receive preparedness/outreach information. Question 5 asks respondents how many days their household could survive if it were impacted/isolated due to a hazard event. The responses were evenly split between being prepared enough to last 4 to 7 days (27.62 percent); being prepared enough to last 8 to 15 days (26.36 percent); and being prepared enough to last 16 days or more (24.90 percent). 16.53 percent of respondents could last 1 to 3 days and only 4.6 percent stated they couldn't last any days. Most respondents have received useful hazard preparedness information from the internet (44.68 percent) and personal experience with one or more natural hazards/disasters (41.34 percent) (Question 6). Emergency preparedness information from a government source (36.33 percent); social media (29.02 percent); word of mouth (28.18 percent); and church (20.04 percent) were also significant sources of hazard preparedness information.

Question 7 asks which steps respondents' households had taken to prepare for a hazard event. The vast majority of respondents had installed smoke detectors on each level of the house (85.18 percent); stored flashlights and batteries (72.03 percent); stored medical supplies (first aid kit, medications) (65.14 percent); and stored food and water (64.3 percent). Other responses included receiving first aid/CPR training (57.41 percent); identifying utility shutoffs (47.81 percent); making a fire escape plan (34.45 percent); storing a battery-powered radio (33.61 percent); preparing a disaster supply kit (27.35 percent); designating a meeting space (26.10 percent); natural hazard insurance (ex. Flood, earthquake, wildfire) (14.20 percent); and developing a communication plan (11.06 percent). Only 4.18 percent of respondents stated they did not taken any steps to prepare for a hazard event and smaller percentages listed sandbags and other preparation steps (1.88 percent for each response).

Respondents were about evenly split between whether they considered the impact of a disaster on their home prior to moving (43.54 percent said yes, 52.30 percent said no) (Question 15). Most respondents were also aware of their household's risk of flood and wildfire hazards. When asked if their property was located in or near a designated floodplain, 24.79 percent of respondents were not sure, yet 75.21 percent of respondents had definitive answers (6.72 percent yes, 68.49 percent no) (Question 9). 79.25 percent of respondents knew their property was not in an area at risk for wildfire, with only 14.88 percent not sure (Question 13). Question 11 asked about earthquake faults on respondents' property. 48.54 percent of respondents stated there was not an earthquake fault on their property, but another 47.70 percent were unsure meaning more can be done to inform regarding earthquake risk.

Hazard Control and Risk Reduction Measures

Hazard Insurance

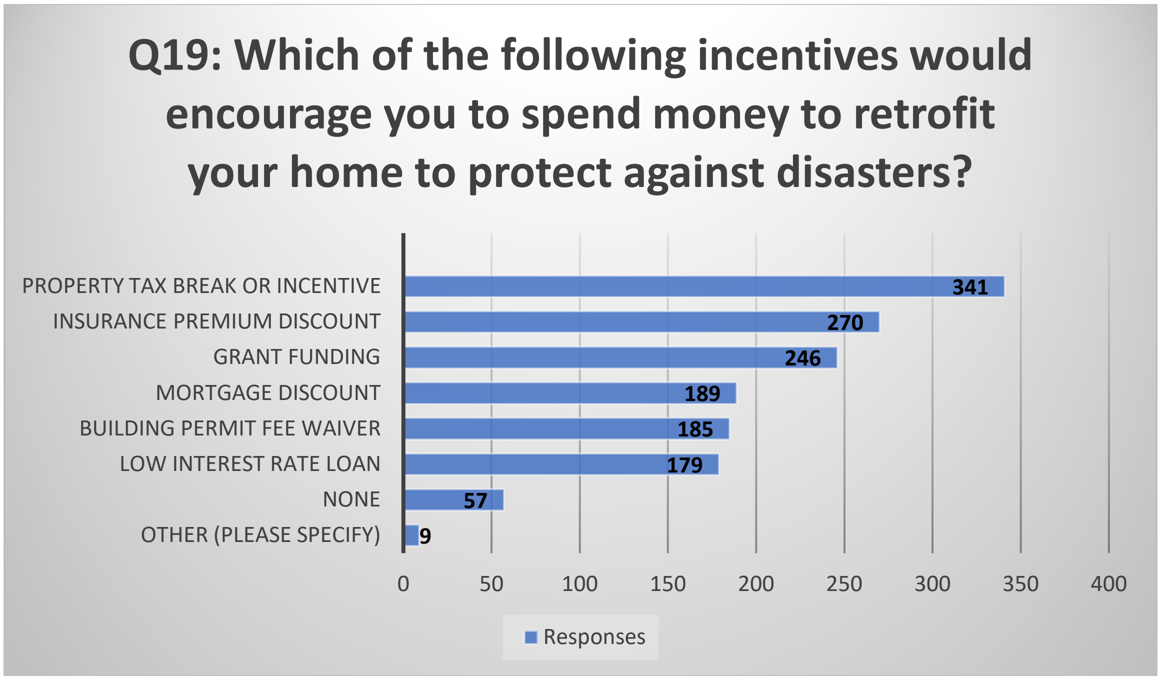
The survey also asked respondents questions regarding the purchase of specific types of hazard insurance. Question 10 asks if respondents have flood insurance; only 8.82 percent of respondents checked yes (80.46 percent checked no; 10.71 percent checked not sure). Respondents were also asked if they have earthquake insurance (Question 12); like for Question 10, nearly 80 percent (79.92 percent exactly) said no and 16.11 percent said they weren't sure (only 3.97 percent said yes). Respondents were also asked if they had ever had problems getting homeowners or renters insurance due to risks from hazards (Question 14). Since 95.18 percent of respondents claimed that they did not have problems getting insurance, it can be assumed that most respondents have enough knowledge of their hazard risk to believe that the risks are not large enough to merit the purchase of insurance.

Hazard Disclosure

The survey also asked respondents about the disclosure of a hazard risk zone's presence and how that may influence their decision to buy or rent their home. 75.51 percent of respondents said that the presence of a hazard risk zone was not disclosed to them by a real estate agent, seller, or landlord before they purchased or moved into their homes (Question 16). Only 13.69 percent of respondents said a hazard risk zone was disclosed to them and another 12.8 percent were not sure. Question 17 asked about how a disclosure of that type of hazard risk would influence their decision to buy or rent a home; a large majority of respondents said yes, it would (71.27 percent). Nearly equal numbers of responders said no or they were not sure if a hazard risk disclosure would affect their decision to buy or rent a home (14.69 percent said no; 14.04 percent said not sure).

Other Risk Reduction Measures

The survey also asked respondents their opinions regarding other measures that could be taken to reduce their household hazard risk. Question 18 asks if respondents were eligible for funding assistance that required a local contribution, how much money respondents would be willing to spend to retrofit their home to reduce disaster risk. Most respondents stated they were unsure how much money they would spend (41.19 percent). The next most popular responses were $1,000 to $4,999 (16.96 percent); nothing (14.54 percent); $5,000 to $9,999 (12.11 percent); less than $1,000 (9.69 percent); and $10,000 or above (5.51 percent). Respondents were also asked which incentives would encourage them to spend money to retrofit their homes (Question 19). Respondents could check all that applied, with 75.61 percent stating a property tax break or incentive would encourage them to retrofit their property.

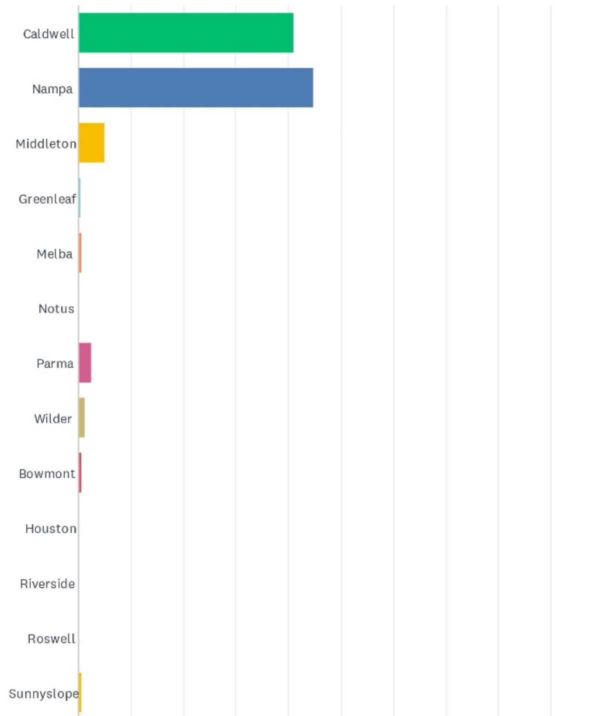


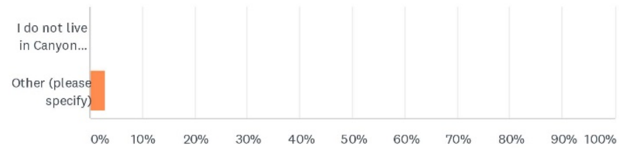
Respondents were also asked if they would consider a "buyout" from a Federal agency in the event their property were located in a "high hazard" area (Question 20). More than half said yes (52.32 percent), followed by not sure (36.87 percent), and no (10.82 percent). Finally, respondents were asked how they feel about the following statement: "Information about the risks associated with hazards is readily available and easy to locate" (Question 21). Most respondents stated they neither agree nor disagree (61.67 percent); 22.69 percent said they strongly disagree, and 15.64 percent stated they strongly agree.

SURVEY RESPONSES AND CHARTS

Q1 Where in Canyon County do you live?

Answered: 529 Skipped: 0

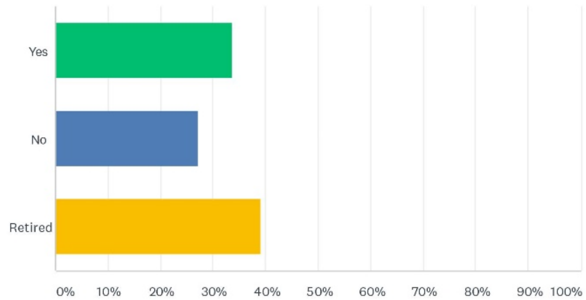




ANSWER CHOICES	RESPONSES	
Caldwell	41.02%	217
Nampa	44.80%	237
Middleton	5.10%	27
Greenleaf	0.38%	2
Melba	0.57%	3
Notus	0.19%	1
Parma	2.46%	13
Wilder	1.32%	7
Bowmont	0.57%	3
Houston	0.00%	0
Riverside	0.00%	0
Roswell	0.00%	0
Sunnyslope	0.57%	3
I do not live in Canyon County	0.19%	1
Other (please specify)	2.84%	15
TOTAL		529

Q2 Do you work in Canyon County?

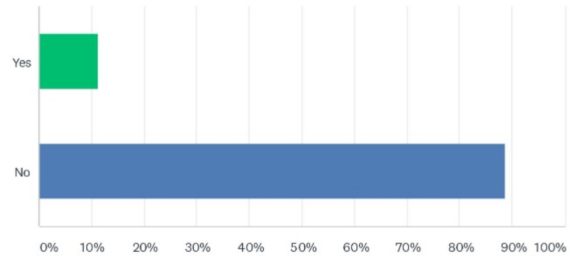
Answered: 527 Skipped: 2



ANSWER CHOICES	RESPONSES	
Yes	33.78%	178
No	27.13%	143
Retired	39.09%	206
TOTAL		527

Q3 Do you own or operate a business in Canyon County?

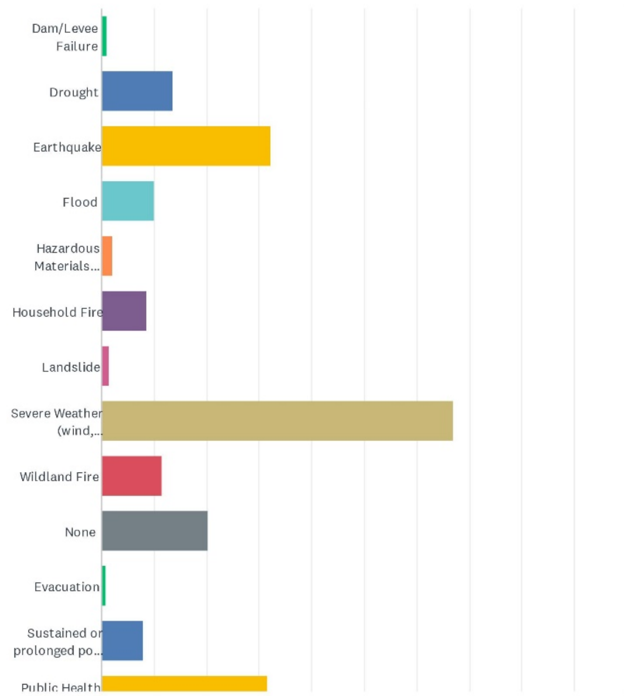
Answered: 527   Skipped: 2

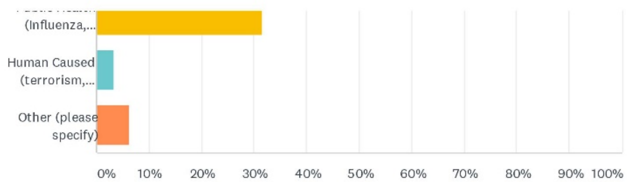


ANSWER CHOICES	RESPONSES	
Yes	11.39%	60
No	88.61%	467
TOTAL		527

Q4 Which of the following hazard events have you or has anyone in your household observed and/or experienced in the past 20 years within Canyon County? (Check all that apply)

Answered: 522 Skipped: 7

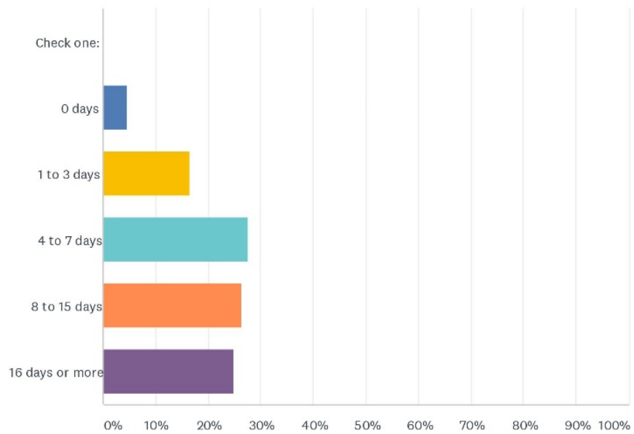




ANSWER CHOICES	RESPONSES	
Dam/Levee Failure	1.15%	6
Drought	13.60%	71
Earthquake	32.18%	168
Flood	9.96%	52
Hazardous Materials Release	2.11%	11
Household Fire	8.62%	45
Landslide	1.53%	8
Severe Weather (wind, lightning, snow accumulation, etc.)	67.05%	350
Wildland Fire	11.49%	60
None	20.31%	106
Evacuation	0.77%	4
Sustained or prolonged power outage	8.05%	42
Public Health (Influenza, West-Nile, SARA, etc)	31.61%	165
Human Caused (terrorism, Active Shooter, etc)	3.26%	17
Other (please specify)	6.32%	33
Total Respondents: 522		

Q5 If your household were impacted/isolated due to a hazard event, how many days could your household survive due to your preparedness?

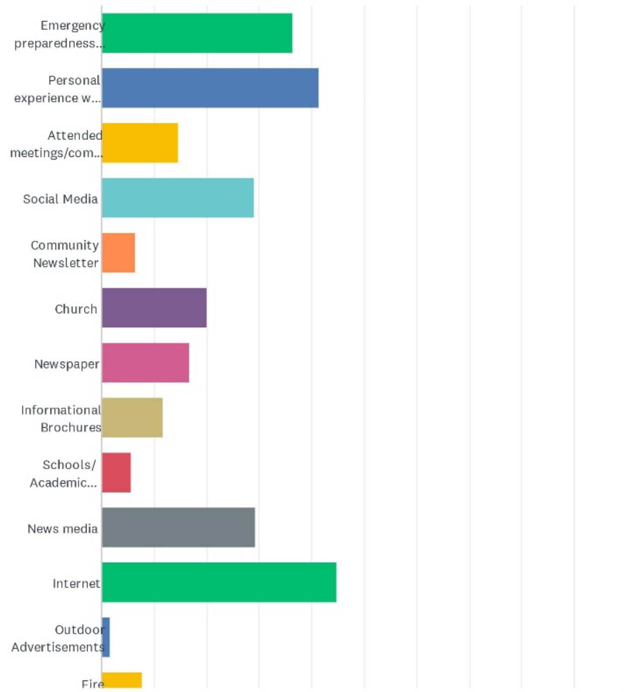
Answered: 478 Skipped: 51

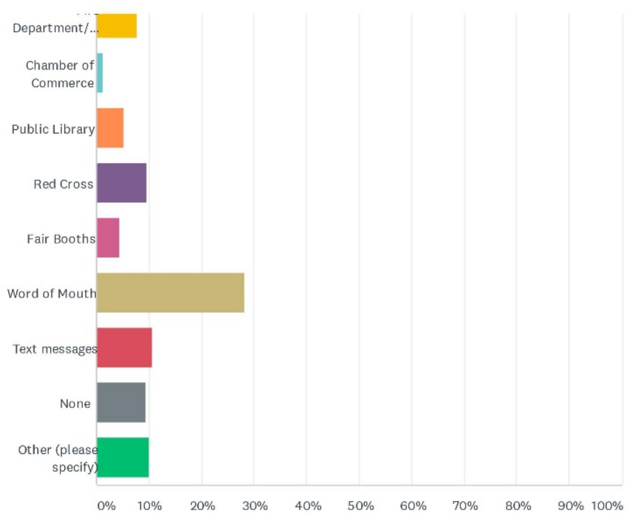


ANSWER CHOICES	RESPONSES	
Check one:	0.00%	0
0 days	4.60%	22
1 to 3 days	16.53%	79
4 to 7 days	27.62%	132
8 to 15 days	26.36%	126
16 days or more	24.90%	119
TOTAL		478

Q6 Which of the following have provided you with useful information to help you be prepared for a hazard event? (Check all that apply)

Answered: 479 Skipped: 50

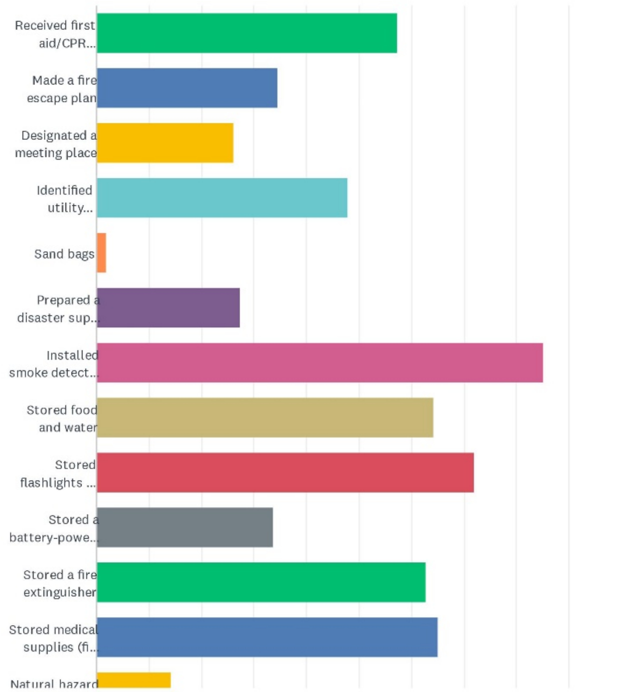


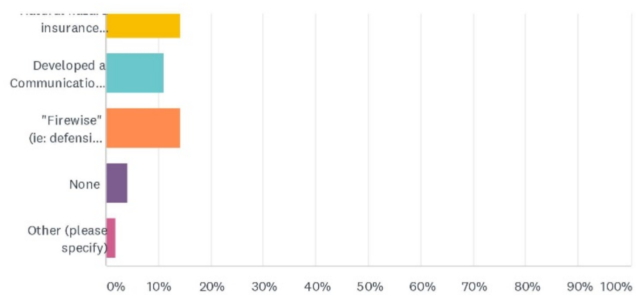

Department/...
Chamber of Commerce
Public Library
Red Cross
Fair Booths
Word of Mouth
Text messages
None
Other (please specify)
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%

ANSWER CHOICES	RESPONSES	
Emergency preparedness information from a government source (e.g., federal, state, or local emergency management)	36.33%	174
Personal experience with one or more natural hazards/disasters	41.34%	198
Attended meetings/community events or workshops that have dealt with disaster preparedness	14.61%	70
Social Media	29.02%	139
Community Newsletter	6.47%	31
Church	20.04%	96
Newspaper	16.70%	80
Informational Brochures	11.69%	56
Schools/ Academic Institutions	5.64%	27
News media	29.23%	140
Internet	44.68%	214
Outdoor Advertisements	1.67%	8
Fire Department/ Rescue	7.72%	37
Chamber of Commerce	1.25%	6
Public Library	5.22%	25
Red Cross	9.60%	46
Fair Booths	4.38%	21
Word of Mouth	28.18%	135
Text messages	10.65%	51
None	9.39%	45
Other (please specify)	10.02%	48
Total Respondents: 479		

Q7 Which of the following steps has your household taken to prepare for a hazard event? (Check all that apply)

Answered: 479 Skipped: 50

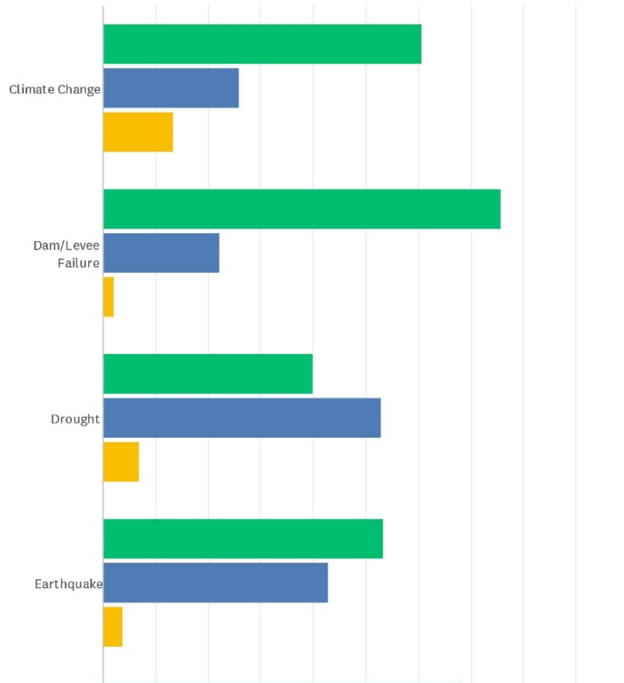


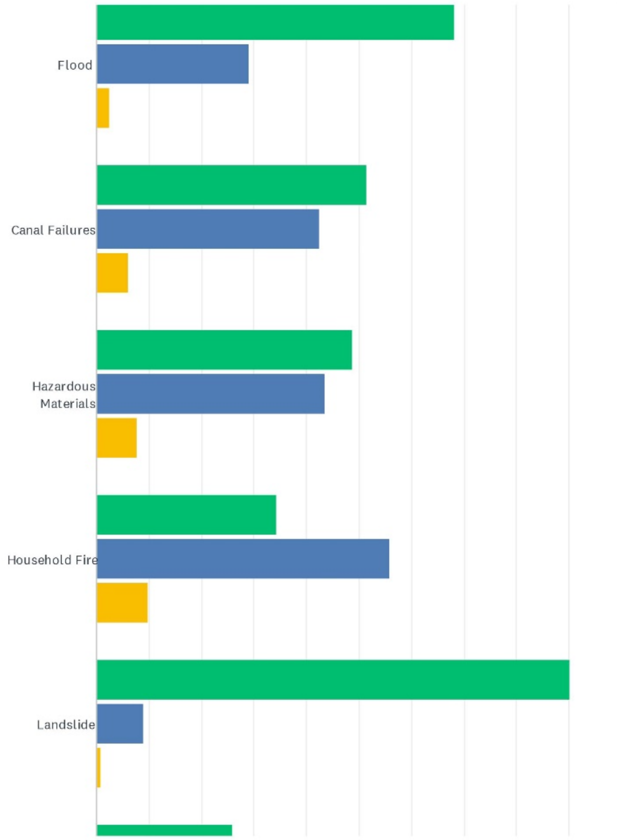

insurance...
Developed a
Communicatio...
"Firewise"
(ie: defensi...
None
Other (please
specify)
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%

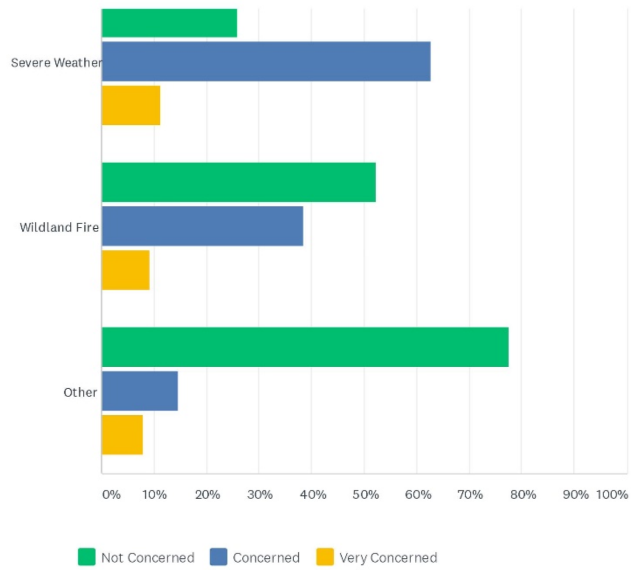
ANSWER CHOICES	RESPONSES	
Received first aid/CPR training	57.41%	275
Made a fire escape plan	34.45%	165
Designated a meeting place	26.10%	125
Identified utility shutoffs	47.81%	229
Sand bags	1.88%	9
Prepared a disaster supply kit	27.35%	131
Installed smoke detectors on each level of the house	85.18%	408
Stored food and water	64.30%	308
Stored flashlights and batteries	72.03%	345
Stored a battery-powered radio	33.61%	161
Stored a fire extinguisher	62.84%	301
Stored medical supplies (first aid kit, medications)	65.14%	312
Natural hazard insurance (Flood, Earthquake, Wildfire)	14.20%	68
Developed a Communication Plan	11.06%	53
"Firewise" (ie: defensible space, fire resistant landscapes, alternative Water sources) https://www.nfpa.org/Public-Education/By-topic/Wildfire/Firewise-USA	14.20%	68
None	4.18%	20
Other (please specify)	1.88%	9
Total Respondents: 479		

Q8 How concerned are you about the following hazards in Canyon County? (Check one response for each hazard)

Answered: 480 Skipped: 49



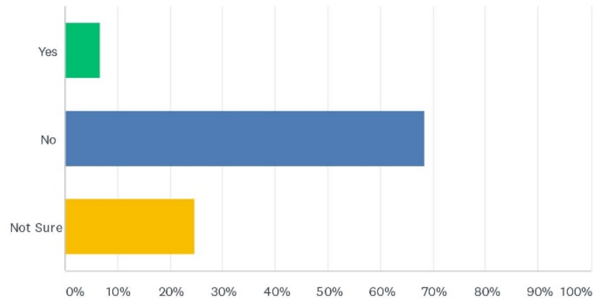

Flood
Canal Failures
Hazardous Materials
Household Fire
Landslide


Severe Weather
Wildland Fire
Other
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Not Concerned
Concerned
Very Concerned

	NOT CONCERNED	CONCERNED	VERY CONCERNED	TOTAL	WEIGHTED AVERAGE
Climate Change	60.72% 286	25.90% 122	13.38% 63	471	1.53
Dam/Levee Failure	75.70% 352	22.15% 103	2.15% 10	465	1.26
Drought	40.04% 189	52.97% 250	6.99% 33	472	1.67
Earthquake	53.26% 253	42.95% 204	3.79% 18	475	1.51
Flood	68.25% 316	29.16% 135	2.59% 12	463	1.34
Canal Failures	51.50% 240	42.49% 198	6.01% 28	466	1.55
Hazardous Materials	48.82% 228	43.47% 203	7.71% 36	467	1.59
Household Fire	34.26% 161	55.96% 263	9.79% 46	470	1.76
Landslide	90.17% 413	8.95% 41	0.87% 4	458	1.11
Severe Weather	26.00% 124	62.68% 299	11.32% 54	477	1.85
Wildland Fire	52.25% 244	38.54% 180	9.21% 43	467	1.57
Other	77.58% 128	14.55% 24	7.88% 13	165	1.30

Q9 Is your property located in or near a designated floodplain?

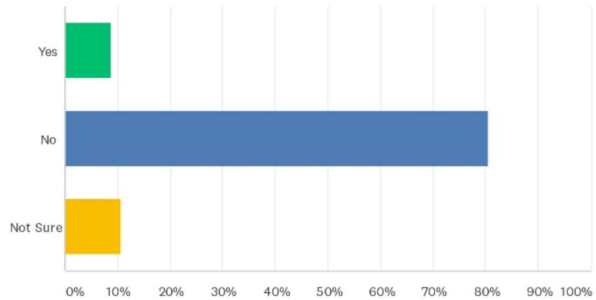
Answered: 476 Skipped: 53



ANSWER CHOICES	RESPONSES	
Yes	6.72%	32
No	68.49%	326
Not Sure	24.79%	118
TOTAL		476

Q10 Do you have flood insurance?

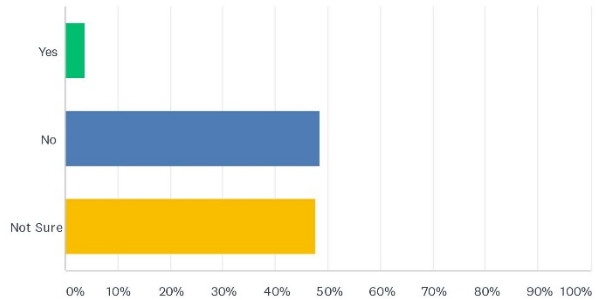
Answered: 476 Skipped: 53



ANSWER CHOICES	RESPONSES	
Yes	8.82%	42
No	80.46%	383
Not Sure	10.71%	51
TOTAL		476

Q11 Is your property located near an earthquake fault?

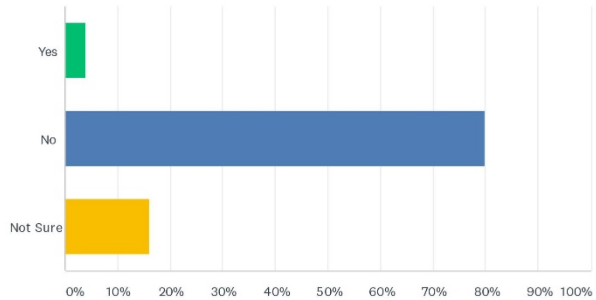
Answered: 478 Skipped: 51



ANSWER CHOICES	RESPONSES	
Yes	3.77%	18
No	48.54%	232
Not Sure	47.70%	228
TOTAL		478

Q12 Do you have earthquake insurance?

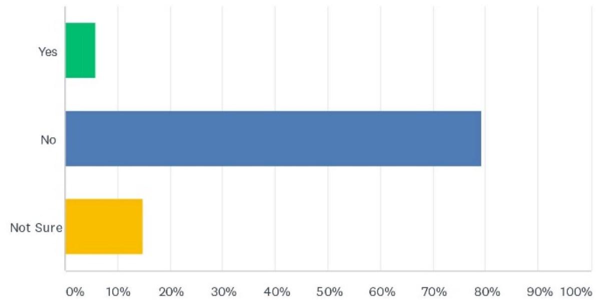
Answered: 478 Skipped: 51



ANSWER CHOICES	RESPONSES	
Yes	3.97%	19
No	79.92%	382
Not Sure	16.11%	77
TOTAL		478

Q13 Is your property located in an area at risk for wild fires?

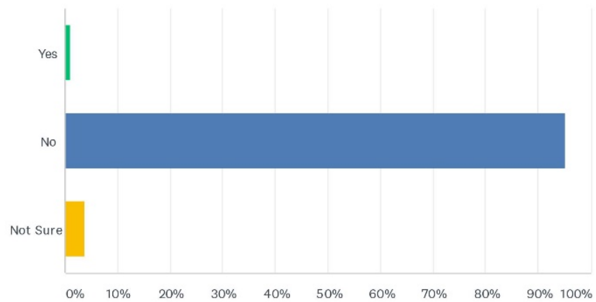
Answered: 477   Skipped: 52



ANSWER CHOICES	RESPONSES	
Yes	5.87%	28
No	79.25%	378
Not Sure	14.88%	71
TOTAL		477

Q14 Have you ever had problems getting homeowners or renters insurance due to risks from hazards?

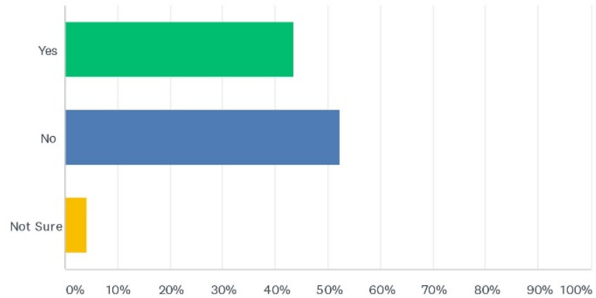
Answered: 477 Skipped: 52



ANSWER CHOICES	RESPONSES	
Yes	1.05%	5
No	95.18%	454
Not Sure	3.77%	18
TOTAL		477

Q15 When you moved into your home, did you consider the impact a disaster could have on your home?

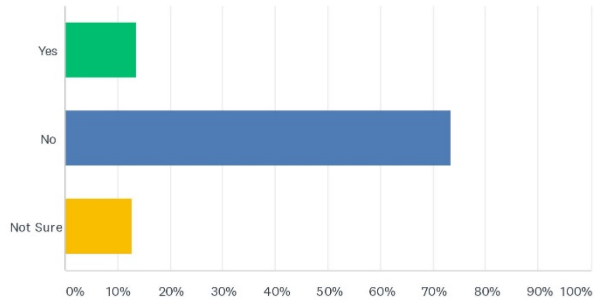
Answered: 457 Skipped: 72



ANSWER CHOICES	RESPONSES	
Yes	43.54%	199
No	52.30%	239
Not Sure	4.16%	19
TOTAL		457

Q16 Was the presence of a 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?

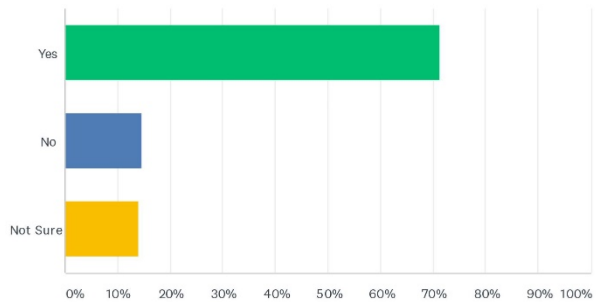
Answered: 453 Skipped: 76



ANSWER CHOICES	RESPONSES	
Yes	13.69%	62
No	73.51%	333
Not Sure	12.80%	58
TOTAL		453

Q17 Would the disclosure of this type of hazard risk information influence your decision to buy or rent a home?

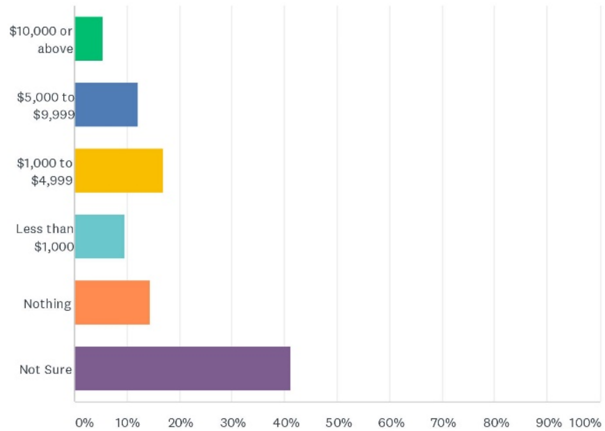
Answered: 456 Skipped: 73



ANSWER CHOICES	RESPONSES	
Yes	71.27%	325
No	14.69%	67
Not Sure	14.04%	64
TOTAL		456

Q18 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 disasters? (for example, by elevating a home above the flood level, performing seismic upgrades, or replacing a combustible roof with non-combustible roofing)

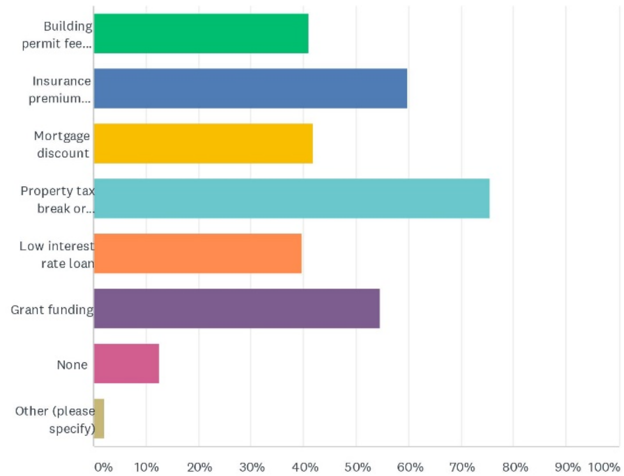
Answered: 454 Skipped: 75



ANSWER CHOICES	RESPONSES	
$10,000 or above	5.51%	25
$5,000 to $9,999	12.11%	55
$1,000 to $4,999	16.96%	77
Less than $1,000	9.69%	44
Nothing	14.54%	66
Not Sure	41.19%	187
TOTAL		454

Q19 Which of the following incentives would encourage you to spend money to retrofit your home to protect against disasters? (Check all that apply). Please note that your answers to this question does not obligate any of the planning partners to implement the incentives.

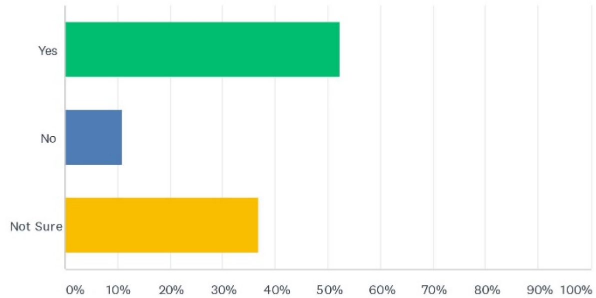
Answered: 451 Skipped: 78



ANSWER CHOICES	RESPONSES	
Building permit fee waiver	41.02%	185
Insurance premium discount	59.87%	270
Mortgage discount	41.91%	189
Property tax break or incentive	75.61%	341
Low interest rate loan	39.69%	179
Grant funding	54.55%	246
None	12.64%	57
Other (please specify)	2.00%	9
Total Respondents: 451		

Q20 If your property were located in a designated “high hazard” area or had received repetitive damages from a hazard event, would you consider a ”buyout” offered by a Federal agency?

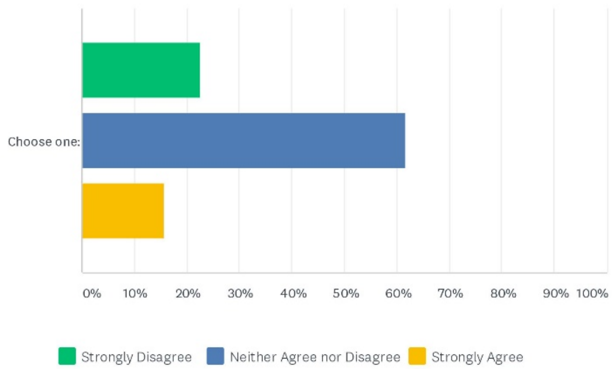
Answered: 453 Skipped: 76



ANSWER CHOICES	RESPONSES	
Yes	52.32%	237
No	10.82%	49
Not Sure	36.87%	167
TOTAL		453

Q21 Please indicate how you feel about the following statement:Information about the risks associated with hazards is readily available and easy to locate.

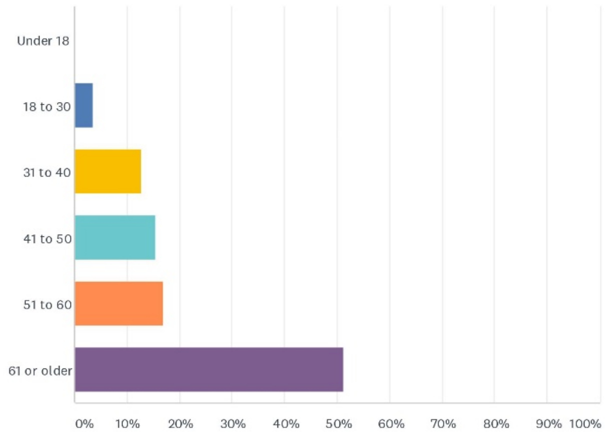
Answered: 454 Skipped: 75



	STRONGLY DISAGREE	NEITHER AGREE NOR DISAGREE	STRONGLY AGREE	TOTAL	WEIGHTED AVERAGE
Choose one:	22.69% 103	61.67% 280	15.64% 71	454	1.93

Q22 Please indicate your age range:

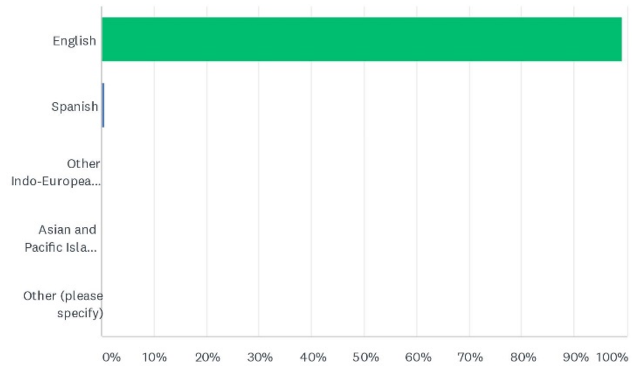
Answered: 447 Skipped: 82



ANSWER CHOICES	RESPONSES	
Under 18	0.00%	0
18 to 30	3.58%	16
31 to 40	12.75%	57
41 to 50	15.44%	69
51 to 60	17.00%	76
61 or older	51.23%	229
TOTAL		447

Q23 Please indicate the primary language spoken in your household.

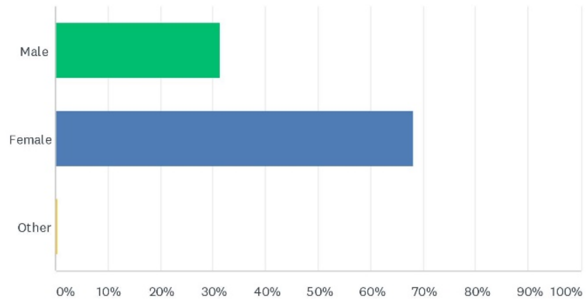
Answered: 447 Skipped: 82



ANSWER CHOICES	RESPONSES	
English	99.11%	443
Spanish	0.67%	3
Other Indo-European Languages	0.22%	1
Asian and Pacific Island Languages	0.00%	0
Other (please specify)	0.00%	0
TOTAL		447

Q24 Please indicate your gender:

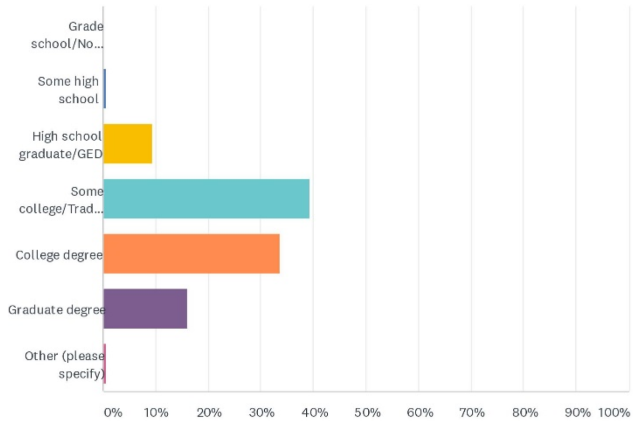
Answered: 446 Skipped: 83



ANSWER CHOICES	RESPONSES	
Male	31.39%	140
Female	68.16%	304
Other	0.45%	2
TOTAL		446

Q25 Please indicate your highest level of education.

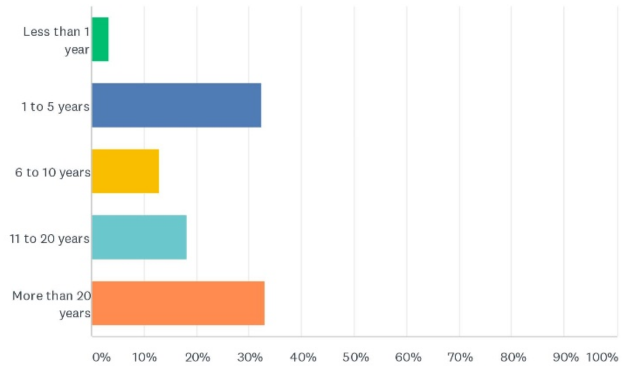
Answered: 448 Skipped: 81



ANSWER CHOICES	RESPONSES	
Grade school/No schooling	0.22%	1
Some high school	0.67%	3
High school graduate/GED	9.38%	42
Some college/Trade school	39.29%	176
College degree	33.71%	151
Graduate degree	16.07%	72
Other (please specify)	0.67%	3
TOTAL		448

Q26 How long have you lived in Canyon County?

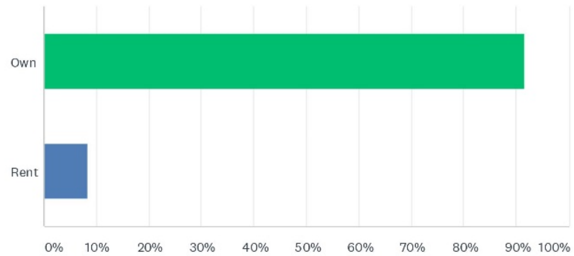
Answered: 447 Skipped: 82



ANSWER CHOICES	RESPONSES	
Less than 1 year	3.36%	15
1 to 5 years	32.44%	145
6 to 10 years	12.98%	58
11 to 20 years	18.12%	81
More than 20 years	33.11%	148
TOTAL		447

Q27 Do you own or rent your place of residence?

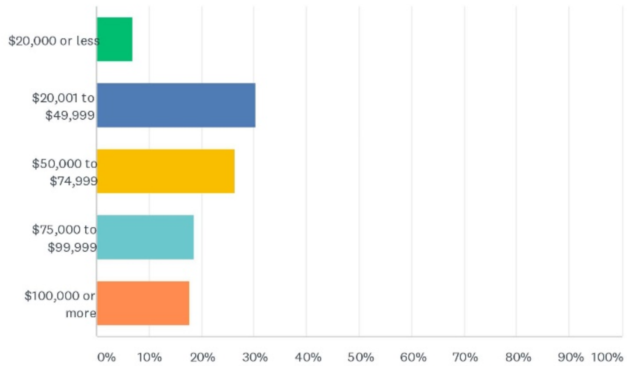
Answered: 444 Skipped: 85



ANSWER CHOICES	RESPONSES	
Own	91.67%	407
Rent	8.33%	37
TOTAL		444

Q28 How much is your gross household income?

Answered: 415 Skipped: 114



ANSWER CHOICES	RESPONSES	
$20,000 or less	6.99%	29
$20,001 to $49,999	30.36%	126
$50,000 to $74,999	26.27%	109
$75,000 to $99,999	18.55%	77
$100,000 or more	17.83%	74
TOTAL		415

Q29 Comments

Answered: 57 Skipped: 472

MEETING SUMMARY

Date/Time of Meeting:	Tuesday – September 17, 2019
Location:	Canyon County Paramedics, 6116 Graye Lane
	Caldwell, Idaho 83605
Subject:	Steering Committee No.2
Project Name:	Canyon County Hazard Mitigation Plan-Update
In Attendance	**Attendees: 22 (see attached)**
	Phoned in: None
	Planning Team: Rob Flaner
Not Present:	N/A
Summary Prepared by:	Rob Flaner (10/11/2019)
Quorum – Yes or No	Yes

Item	Action

Welcome and Introductions, Review Agenda

- Mr. Clay Long, standing in for Chair Jeff Barns, open the meeting and facilitated group introductions.
- Distributed handouts included: Agenda; SC Meeting # 1 meeting summary, Hazards of concern , Plan framework, example Mission statements and draft ground rules document.
- The agenda was reviewed, and no modifications were made.
- No members of the public were present

Plan Review

- SC members were asked to share their views from their review of both the 2013 Canyon County plan, and the 2018 plan. No critical feedback was received, and the SC was open to direction from the Core Planning Team (CPT).
- Discussion followed on what hazards of concern the 2019 plan update should address. Rob Flaner informed the SC that 2 key components are required for hazards of concern:
    - Must be consistent with what the state plan says
    - Natural hazards are mandatory and non-natural hazards are optional, but highly encouraged by the state.

Item	Action

- After review and discussion of the meeting materials, the SC approved the following hazards of concern for the 2019 plan update:
    - Dam Failure
    - Drought
    - Earthquake-To include discussion of landslide
    - Flood- to include riverine, urban drainage and canal exposure
    - Severe Weather- to include: extreme heat/Cold, Wind, Thunderstorm, Lightning
    - Wildfire
- The Risk assessment portion of the plan will also include profiles on others hazards of interest that will include: Power Interruption, Public Health, Human Caused hazards
- Next, Rob provided the SC an outline for the proposed plan. Rob explained that the plan will be prepared in a 2 volume format, where volume 1 includes all information for the entire planning area (planning process, outreach strategy, risk assessment, goals/objectives and plan maintenance strategy), and volume 2 includes all components that are jurisdiction specific (profile, core capability assessment, risk ranking and mitigation action plan).
- No comments were received as to the proposed plan format

Goal Setting- Mission Statement

Under this segment of the agenda, the SC reviewed the mission/vision statement that was developed for the 2013 Canyon County Hazard Mitigation Plan. Example mission statements from other planning efforts within the State of Idaho, including the 2013 Canyon County mission statement was provided for the SC to review. After review and discussion, the SC approved the following mission statement for the plan:

To reduce the risk of loss of life and property, encourage long-term reduction of the vulnerability and property damage due to hazards.

Public Engagement

Under this segment of the agenda, Rob discussed the concept of a public engagement strategy for the plan update process. Rob stated that the plan update process must provide the public access to all phases of the process. To do that, we must identify a strategy for public engagement built upon exist core public outreach capabilities of the planning partnership. So, rob asked the SC, what are those existing outreach

Item	Action
capabilities? Rob explained that the Tetra Tech scope of work for this plan update proposed a 2-phase outreach strategy, where the 1st phase would be deployed early in the planning process with an emphasis on gaging the Public's perception of risk, and the 2nd phase being deployed towards the end of the process to present the draft plan for public comment. After discussion on outreach capabilities within the planning area, it was determined that the outreach strategy for this update would consist of the flowing components:	

- Hazard mitigation planning website house on the County EM page.
- A hazard mitigation survey that would be distributed during the phase 1 outreach efforts.
- Use of social media
- Press releases to solicit press coverage of the plan and the planning process
- Public meetings that will attempt to canvas the planning area over the 2 outreach phases.

It was mentioned during the discussion that there will be a "safety Festival" in January that may be a good opportunity for a phase 1 public meeting. Rob explained that the public outreach strategy will be an on-going discussion for the SC on every agenda moving forward.

Meeting was adjourned at 3:00

The next meeting will be Tuesday, October 15, 2019, at Canyon County Paramedics, 6116 Graye Lane, Caldwell, Idaho 83605; from 1:30 PM to 3:00 PM.

Attachment: Sign-in Sheet

Canyon County Hazard Mitigation Plan-Update
SC meeting #2, September 17, 2019

Name	Representing	Phone	E-mail
MaryAnn Waldinger	COMPASS	208-475-2242	mwaldinger@compassidaho.org
Marv Dashiell	Canyon County Sheriff	208 454 7267	mdashiell@canyonco.org
Dave Schorzman	Canyon Co. E.M.	208-982-2132	dschorzman@canyonco.org
Roxanne Wade	CCSO Disp	208-455-5975	RWade@canyonco.org
Stephanie Hailey	CCDSD * alternate to Nilsson	208-454-7254	shailey@canyonco.org
Patricia Nilsson	Canyon Co.	208-454-6634	pnilsson@canyonco.org
Amy Bowman	City of Nampa	208-697-1414	bowmana@cityofnampa.us
Kathleen Tuck	Nampa Schools	208-891-4376	Ktuck@nsd131.org
Clay Long	City of Nampa	208-468-5401	longc@cityofnampa.us
Oren McGuire	Nampa P.D.	208-250-4039	mcguireo@cityofnampa.us
Nicole Fletcher	City of Nampa	208-565-5263	fletchern@cityofnampa.us

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Canyon County Hazard Mitigation Plan-Update
SC meeting #2, September 17, 2019

Name	Representing	Phone	E-mail
Mike Sterling	Flood Dist 11	208-861-9954	mike@farmpoorandale.com
Ron Manning	" "	208 383-4140	rmanning@SPFWater.com
Angie Michaels	Flood Dist 10	208 870 9495	angie@ewsid.com
Heidi Novich	IOEM		
Anita Christenson Kerns	NSD#131	208-468-4600	achristenson@nsd131.org
Tom Wright	Nampa Fire	208 550 2633	wrightt@cityofnampa.us
Michael D. Stowell	CCP	208-573-3795	mstowell@ccparamedics.com
Ashley Newbry	City of Caldwell	208-455-4672	anewbry@cityofcaldwell.org
Nick Oliver	IPCo	208-880-3603	noliver@idahopower.com
Darrel Bates	CC Paramedics	208-800-1600	dbates@ccparamedics.com

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2

Canyon County Hazard Mitigation Plan-Update
SC meeting #2, September 17, 2019

Name	Representing	Phone	E-mail
Clemente Salinas	City of Nampa	208-468-4462	salinasc@cityofnampa.us

2

3

MEETING SUMMARY

Date/Time of Meeting:	Tuesday – November 19,20109
Location:	Canyon County Paramedics, 6116 Graye Lane
	Caldwell, Idaho 83605
Subject:	Steering Committee No.3
Project Name:	Canyon County Hazard Mitigation Plan-Update
In Attendance	**Attendees: 22 (see attached)**
	Phoned in: None
	Planning Team: Rob Flaner
Not Present:	N/A
Summary Prepared by:	Rob Flaner (1114/2019)
Quorum – Yes or No	Yes

Item	Action

Welcome and Introductions, Review Agenda

- Chair, Mr. Jeff Barns opened the meeting and facilitated group introductions.
- Distributed handouts included: Agenda; SC Meeting # 2 meeting summary, Hazards of concern, Plan framework, draft ground rules document, Example goal statements, and example survey.
- The agenda was reviewed, and no modifications were made.
- No members of the public were present
- Meeting facilitation was turned over to Rob Flaner, the lead project planner from Tetra Tech.

Old Business

- Meeting Summary. The meeting summary from Steering Committee Meeting # 2 was reviewed and approved by the SC (motion-Joe Decker, 2nd -Roxanne Wade)
- Planning partner status. Rob in formed the SC that the Core Planning team (CPT) was in receipt of 4 letters of intent to participate (LOI's) as follows:
    - City of Caldwell
    - City of Nampa
    - Canyon Co Ambulance District
    - Southwest District Health

Item	Action
COMPASS has also provided a letter of intent to participate as a stakeholder in the process. Rob explained that this level of commitment is well short of what participated in the 2014 planning effort. Rob explained that the target would be at a minimum, to get an LOI from at least all of the Cities within the County. There was discussion on how to achieve this goal and when the CPT should stop trying. Rob explained that to meet the planning partner participation requirements as defined for this project (see planning partner expectation document from SC meeting #1), LOI's must be received prior to deploying the phase 1 Jurisdictional Annex process. It was determined that the time up to the next SC meeting would be used to lock in the planning partnership	County OES to continue to pursue LOI's from non-committed planning partners
• SC Ground Rules. The final ground rules document was provided to the SC for their review and comment. Changes to the contact information was requested during this discussion. The CPT will revise accordingly and provide to the County for posting on the HMP website.	CPT to revise ground rules document and provide to County OES for posting on the HMP website.

<u>New Business</u>

- **Goal Setting**. Now that the SC has confirmed a Mission/Vision statement for the plan, the next step is to confirm a set of goals that will support achieving that vision. Rob provided the SC and handout that included example goal statements from other plans within the region as well as the goals from the current ID State Hazard Mitigation Plan and the 2013 Canyon County Hazard Mitigation Plan. After a review and discussion on the expels that were provided, the SC voted to confirm a new set of goals for this plan update (Motion-TJ Wilson, 2nd -Christine Wendelsdorf). The revised goals for the plan update are as follows:
  - ***Protect lives and Property***
  - ***Enhance the public's awareness of and preparedness for the impacts of hazards.***
  - ***Develop and implement hazard mitigation strategies that use public and private funds in a cost-effective manner.***
  - ***Maintain, enhance, or restore the natural environment's capacity to deal with the current/future impacts of hazard events.***
  - ***Improve emergency management preparedness, collaboration, and outreach within the planning area***
- **Goal Setting-Objectives**. Now that goals have been identified and confirmed, Objectives will be identified that meet multiple

Item	Action
goals. Rob explained that the Mission, goals and objectives and linear planning components, meaning that each of these components stand on their own merit are and selected on their basis to support achievement of the higher-level component. For example, goals are identified to support the achievement of the mission for the plan. Then objectives are identified that will meet multiple goals. Those objectives will be used to prioritize actions with and emphasis towards multi-objective actions. To facilitate the identification of objectives, the CPT will be sending out an exercise via survey monkey. This exercise will include a catalog of objective statements and the 5 goals just approved by the SC. The assignment will be for each SC member to review each objective statement provided and identify which of the 5 goals identified for the plan that objective will meet. The link to the survey will be sent out by the CPT. The results of this exercise will be discussed to finalize objectives at the next meeting.	CPT to distribute Survey Monkey Exercise to the SC before the next SC meeting
• **Public Engagement.** Under this segment of the agenda, The Steering Committee reviewed an example hazard mitigation survey that will be adapted to meet the unique characteristics of Canyon County. A 28-question example survey was reviewed and amended as appropriate for Canyon County by the SC. The CPT will incorporate those changes into a final version of the survey that will be ready for deployment at the next SC meeting.	CPT to finalize survey to be ready for deployment by the next SC meeting
• There was discussion on setting up an HMP website for information on this update process. It was brought to the SC attention that the current information available on the website does not include a copy of the 2013 plan and is very much out of date. The CPT agreed to look in to getting that website updated as soon as possible so that it can me the cornerstone of the public outreach strategy for this plan update.	County to set up a revised webpage for posting of all information as it pertains to this plan update
• Media release. As soon as the revised website is up and running, a media release will need to be made by the County that advertises both the website and the survey.	Once website is up, County to distribute a media release that advertises the survey and the website.

Meeting was adjourned at 2:59 PM

The next meeting will be Tuesday, November 19, 2019, at Canyon County Paramedics, 6116 Graye Lane, Caldwell, Idaho 83605; from 1:30 PM to 3:00 PM.

SUMMARY MEETING

Attachment: Sign-in Sheet

Canyon County Hazard Mitigation Plan-Update
SC meeting #3, October 15, 2019

Name	Representing	Phone	E-mail
Liisa Itkonen	COMPASS	208-475-2241	litkonen@compassidaho.org
Chris King	Nampa Fire Dept.	208 477-4541	kingc@cityofnampa.us
Roxanne Wade	Canyon Dispatch	208-455-5975	RWade@canyonco.org
Christine Wendelsdorf	CCSO	208-941-3053	cwendelsdorf@canyonco.org
Mark Wendelsdorf	Caldwell Fire	208-455-4706	mwendelsdorf@cityofcaldwell.org
Adam Gonzalez	Payette County EM	208-741-2828	agonzalez@payettecounty.org
Joe Decker	CC PIO	208-965-4463	jdecker@canyonco.org
Curt Shankel	NPD	208-761-9005	shankelc@cityofnampa.us
Tom Dale	Canyon Co.	208 454-7507	tdale@canyonco.org
Crash Marusich	ADA Co EMCR	208-577-4750	pmarusich@adacounty.id.gov
Patricia Nilsson	Canyon Co. DSD	208-454-6634	pnilsson@canyonco.org

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Canyon County Hazard Mitigation Plan-Update
SC meeting #3, October 15, 2019

Name	Representing	Phone	E-mail
Stephanie Hailey	Canyon County	454-7254	shailey@canyonco.org
Jeff Barnes	Nampa	208-965-0052	barnesj@cityofnampa.us
TJ Wilson	SWDH	208-455-5326	terry.wilson@phd3.idaho.gov
Joe Ramirez	Nampa Police	208-465-5615	RamirezJ@cityofnampa.us
Jamie Burns	Nampa Police	208-936-5330	BurnsJ@CityofNampa.us
Michael D. Stowell	Canyon County Paramedics	208-795-6922	mstowell@ccparamedics.com
Vice Chair Ashley Newbry	City of Caldwell	208-455-3006	anewbry@cityofcaldwell.org
Anita Christensen	Nampa SD #131	208-468-4600	achristenson@nsd131.org
Clay Long	City of Nampa	208-468-5401	longc@cityofnampa.us
Gordon Bates	Golden Gate Hwy Dist.	208/482-6267	gordonb@gghd3.org
Dave Schorzman	Canyon Co OES	208-454-7271	dschorzman

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MEETING SUMMARY

Date/Time of Meeting:	Tuesday – November 19,2019
Location:	Canyon County Paramedics, 6116 Graye Lane
	Caldwell, Idaho 83605
Subject:	Steering Committee No.4
Project Name:	Canyon County Hazard Mitigation Plan-Update
In Attendance	**Attendees: 16 (see attached)**
	Phoned in: None
	Planning Team: Rob Flaner
Not Present:	N/A
Summary Prepared by:	Rob Flaner (12/6/2019)
Quorum – Yes or No	Yes

Item	Action

Welcome and Introductions, Review Agenda

- Vice Chair, Ms. Ashley Newbry opened the meeting and facilitated group introductions.
- Distributed handouts included: Agenda; SC Meeting # 3 meeting summary, objectives exercise, FEMA "Lifelines" fact sheet, proposed critical facilities/Infrastructure definition, Hazard mitigation survey.
- The agenda was reviewed, and no modifications were made.
- No members of the public were present
- Meeting facilitation was turned over to Rob Flaner, the lead project planner from Tetra Tech.

Old Business

- Meeting Summary. The meeting summary from Steering Committee Meeting # 3 was reviewed and approved by the SC (motion-Mark Wendelsdorf, 2nd -Roxanne Wade)
- Planning partner status. Rob in formed the SC that the Core Planning team (CPT) was in receipt of 6 letters of intent to participate (LOI's) as follows:
    - Canyon County
    - City of Caldwell
    - City of Nampa

Item	Action
o City of Greenleaf o Canyon Co Ambulance District o Southwest District Health COMPASS has also provided a letter of intent to participate as a stakeholder in the process. Rob explained that this level of commitment is well short of what participated in the 2014 planning effort. Rob explained that the target would be at a minimum, to get an LOI from at least all of the Cities within the County. There was discussion on how to achieve this goal and when the CPT should stop trying. Rob explained that to meet the planning partner participation requirements as defined for this project (see planning partner expectation document from SC meeting #1), LOI's must be received prior to deploying the phase 1 Jurisdictional Annex process. It was determined that the time up to the next SC meeting would be used to lock in the planning partnership	County OES to continue to pursue LOI's from non-committed planning partners
New Business • **Objectives exercise**. Rob apologized to the committee that the electronic version of the objectives was not distributed to the SC as was stated at the last meeting. Rob explained that tetra tech had been seeing better results with the exercise as a facilitated exercise during a SC meeting, rather doing it remote via electronic means. Therefore, the CPT had decided to make the exercise as part of this meeting. So, Rob then presented the exercise. The SC was provided with a catalog of 54 objective statements along with the 5 goals the SC had confirmed at the last meeting. Each SC member was asked to review each of the 54 statements, and determine which of the 5 goal statements, each objective met. The object of the exercise is to identify a cadre of objective statements that meet the most goals, based on the average for the exercise. To facilitate discussion amongst the SC for this exercise, the attendees were split into 2 groups. Each group took half of the statements and completed the exercise as a group. Once the exercise was completed, each group would report out the entire committee, the results of which were recorded by the CPT. The CPT will tally the results of this exercise, identify those objective statement that fall above the average, and the SC will consider those statements for refinement at the next SC meeting.	CPT to Tally objectives exercise results for presentation to the SC at the next meeting
• **Critical facilities/Infrastructure**. Under this segment of the meeting, Rob explained to the SC that it is a principle objective	

Item	Action

of any local hazard mitigation plan to assess risk to identified critical facilities/infrastructure as defined by the planning process. Rob noted that the 2013 plan did not formally define CF/CI facilities but did inventory facilities typically considered as "essential" by FEMA BMP's. To increase the versatility of this plan update, Rob recommends that the SC clearly define CF/CI as it pertains to the planning area. This will allow for an expansion of scope for projects that benefit identified CF/CI as mitigation projects, which is a priority for FEMA HMA grant funding.

Rob also introduced the SC to the FEMA community "Lifelines" construct. FEMA developed the community lifelines construct to increase effectiveness in disaster operations and better position the Agency to respond to catastrophic incidents. The lifelines construct will become the epicenter of new FEMA initiatives, most notable, the Building Resilient Infrastructure and Communities (BRIC) initiative. A fact sheet on the lifelines construct was provided to the committee.

Following this discussion, Rob presented a recommended definition for CF/CI that incorporates the lifeline construct terminology. After a review and discussion on this proposed definition, the SC approved the formal definition for CF/CY for this plan update as follows (Motion-Angie Michaels, 2nd- Ashley Newbry):

A structure, facility or other improvement that, because of its function, service area, or uniqueness, provides service that enables the continuous operation of critical business and government functions, and is critical to human health and safety, or economic security. For the purposes of this hazard mitigation plan, the following categories of lifelines are defined as critical facilities:

1. ***Safety and Security: Law Enforcement/Security, Search and Rescue, Fire Services, Government Service, Responder Safety, and Imminent Hazard Mitigation***
2. ***Food, Water and Sheltering: Evacuations, schools, Food/Potable Water, Shelter, Durable Goods, Water Infrastructure and Agriculture***

Item	Action
3. Health and Medical: Medical Care (Hospitals): Patient Movement, Public Health, Fatality Management, Health Care and Supply Chain ***4. Energy: Power (Grid), Temporary Power and Fuel*** ***5. Communications: Infrastructure, Alerts, Warnings, Messages, 911 and Dispatch, Responder Communications and Financial Services*** ***6. Transportation: Highway/Roadway, Mass Transit, Railway, Aviation, Maritime and Pipeline*** ***7. Hazardous Materials: Facilities, Hazardous Debris, Pollutants and Contaminants***	
• **Public Engagement.** Under this segment of the agenda, The Steering Committee reviewed the hazard mitigation survey that was revised based on comments received at the last meeting. Rob walked the SC through those changes. The SC was asked if any more changes desired. None were presented, so the Survey is considered to be final. The CPT will finalize the survey for deployment. The CPT will coordinate with Joe Decker to get the survey deployed. Rob asked that all SC members make an effort to distribute the survey by whatever means, to whatever groups they have access to. A survey is only as good as the number of responses that we get. So, we need to get the word out.	CPT to finalize the survey for distribution.
• There was discussion on setting up an HMP website for information on this update process. The website is still not updated to reflect this plan update process. Rob asked for help in getting this done. This will need to be coordinated through Joe Decker. Christine Wendelsdorf stated that she would reach out to Joe to check on the status of website updates.	Christine Wendelsdorf to coordinate with Joe Deck on status of website update.
• Media release. As soon as the revised website is up and running, a media release will need to be made by the County that advertises both the website and the survey.	
• **Action Items**. Rob asked the Committee if they wanted to postpone SC meeting # 5 until January due to the Holidays. It was the consensus of the group that they did not want to delay the process and determined that SC # 5 would be held on December 10, 2019, at the usual time and location.	

Meeting was adjourned at 2:59 PM

Item	Action
The next meeting will be Tuesday, December 10, 2019, at Canyon County Paramedics, 6116 Graye Lane, Caldwell, Idaho 83605; from 1:30 PM to 3:00 PM.	

SUMMARY MEETING

Attachment: Sign-in Sheet

Canyon County Hazard Mitigation Plan-Update
SC meeting #4, November 19, 2019

Name	Representing	Phone	E-mail
Adam Gonzalez	Payette Co EM	208-741-2828	agonzalez@payettecounty.org
Clay Long	City of Nampa	208-468-5401	longc@cityofnampa.us
Liisa Itkonen	COMPASS	208-475-2241	litkonen@compassidaho.org
Christine Wendelsdorf	CCSO emerg Mgt	208-989-2132	Cwendelsdorf@canyonco.org
Roxanne Wade	CCSO Dispatch	208-455-5975	RWade@canyonco.org
TJ Wilson	SWDH	208-455-5326	terry.wilson@phd3.idaho.gov
Mark Wendelsdorf	CFD	208-455-4706	mwendelsdorf@cityofcaldwell.org
Heidi Novich	IOEM	208-954-2932	hnovich@imd.idaho.gov
Josh McIntosh	IOEM	208-608-1579	JmcIntosh@Imd.idaho.gov
Angela Michaels	Flood District #11 + #10	208-870-9495	angie@ewsid.com
Michael Stowell	CCP	208-573-3795	mstowell@ccparamedics.com

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Canyon County Hazard Mitigation Plan-Update
SC meeting #4, November 19, 2019

Name	Representing	Phone	E-mail
Ashley Newbry	City of Caldwell	208-455-4672	anewbry@cityofcaldwell.org
David Schorzman	Canyon County Sheriff	208-989-6475	dschorzman@icloud.com
Stephanie Hailey	Canyon County	208-454-7254	shailey@canyonco.org
Anita Christenson	Koon's NSD	208-468-4600	achristenson@nsd131.org
Keri K. Smith-Sigman	+ Community Citizen's Destination Caldwell	2089604811	kerikay@hotmail.com

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2021 Canyon County All-Hazard Mitigation Plan

Appendix C. Federal and State Programs and Regulations

C. FEDERAL AND STATE PROGRAMS AND REGULATIONS

Existing laws, ordinances, plans and programs at the federal and state 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. Information presented in this section can be used to review local capabilities to implement the actions found in the jurisdictional annexes of Volume 2. Each planning partner has individually reviewed existing local plans, studies, reports, and technical information in its jurisdictional annex, presented in Volume 2.

FEDERAL

Americans with Disabilities Act

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 regards 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.

Bureau of Land Management

The U.S. Bureau of Land Management (BLM) funds and coordinates wildfire management programs and structural fire management and prevention on BLM lands. BLM works closely with the Forest Service and state and local governments to coordinate fire safety activities. The Interagency Fire Coordination Center in Boise, Idaho serves as the center for this effort.

Civil Rights Act

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.

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, and 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. Numerous 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.

Community Development Block Grant Disaster Resilience 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 FEMA, 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 alternative source of funding for actions identified in this plan.

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 following three goals of the CRS:

- Reduce flood losses.
- Facilitate accurate insurance rating.
- Promote awareness of flood insurance.

For participating communities, flood insurance premium rates are discounted in increments of 5 percent. For example, a Class 1 community would receive a 45 percent premium discount, and a Class 9 community would receive a 5 percent discount. (Class 10 communities are those that do not participate in the CRS; they receive no discount.) The discount partially depends on location of the property. Properties outside the special flood hazard area receive smaller discounts: a 10-percent discount if the community is at Class 1 to 6 and a 5-percent discount if the community is at Class 7 to 9. The CRS classes for local communities are based on 18 creditable activities in the following categories:

- Public information
- Mapping and regulations
- Flood damage reduction
- Flood preparedness.

CRS activities can help to save lives and reduce property damage. 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, including both coastal and riverine flood risks.

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 Assistance grant funds are available to communities. This plan is designed to meet the requirements of DMA, improving eligibility for future hazard mitigation funds.

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. 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.

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 (Natural Resources Conservation Service, 2018):

- 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.

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.

Federal Energy Regulatory Commission Dam Safety Program

The Federal Energy Regulatory Commission (FERC) cooperates with a large number of federal and state agencies to ensure and promote dam safety. More than 3,000 dams are part of regulated hydroelectric projects 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 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 engineer approved by the FERC must inspect and evaluate projects with dams higher than 32.8 feet (10 meters), or with a total storage capacity of more than 2,000 acre-feet.

FERC monitors seismic research and applies it in performing structural analyses of hydroelectric projects. FERC also evaluates the effects of potential and actual large floods on the safety of dams. During and following floods, FERC 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.

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.

Federal Wildfire Management Policy and Healthy Forests Restoration Act

Federal Wildfire Management Policy and Healthy Forests Restoration Act (2003). These documents call for a single comprehensive federal fire policy for the Interior and Agriculture Departments (the agencies using federal fire management resources). They mandate community-based collaboration to reduce risks from wildfire.

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.

National Environmental Policy Act

The National Environmental Policy Act requires federal agencies to consider the environmental impacts of proposed actions and reasonable alternatives to those actions, alongside technical and economic considerations. The National Environmental Policy Act established the Council on Environmental Quality, whose regulations (40 CFR Parts 1500-1508) set standards for compliance. Consideration and decision-making regarding environmental impacts must be documented in an environmental impact statement or environmental assessment. Environmental impact assessment requires the evaluation of reasonable alternatives to a proposed action, solicitation of input from organizations and individuals that could be affected, and an unbiased presentation of direct, indirect, and cumulative environmental impacts. 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.

National Fire Plan

The 2001 National Fire Plan was developed based on the National Fire Policy. A major aspect of the National Fire Plan is joint risk reduction planning and implementation carried out by federal, state and local agencies and communities. The National Fire Plan presented a comprehensive strategy in five key initiatives:

- Firefighting—Be adequately prepared to fight fires each fire season.
- Rehabilitation and Restoration—Restore landscapes and rebuild communities damaged by wildfires.
- Hazardous Fuel Reduction—Invest in projects to reduce fire risk.
- Community Assistance—Work directly with communities to ensure adequate protection.
- Accountability—Be accountable and establish adequate oversight, coordination, program development, and monitoring for performance.

National Flood Insurance Program

The National Flood Insurance Program (NFIP) makes federally backed flood insurance available to homeowners, renters, and business owners in participating communities that enact floodplain regulations. Participation and good standing under NFIP are prerequisites to grant funding eligibility under the Robert T. Stafford Act.

Flood Study and Mapping

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.

Base flood elevations and the boundaries of the flood hazard areas are shown on Flood Insurance Rate Maps, which are the principle tool for identifying the extent and location of the flood hazard. Flood Insurance Rate Maps are the most detailed and consistent data source available, and for many communities they represent the minimum area of oversight under the local floodplain management program. Structures permitted or built in a jurisdiction before its first flood map was approved are called "pre-FIRM" structures, and structures built afterwards are called "post-FIRM." The insurance rate is different for the two types of structures. In recent years, Flood Insurance Rate Maps have been digitized as Digital Flood Insurance Rate Maps, which are more accessible to residents, local governments and stakeholders.

Requirements for Development Regulations

NFIP participants must, at a minimum, regulate development in floodplain areas in accordance with NFIP criteria. 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.

NFIP participation is limited to local governments that possess permit authority and have the ability to adopt and enforce regulations that govern land use. This does not typically apply to special purpose districts.

Repetitive Loss Properties and Areas

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.

National Incident Management System

The National Incident Management System (NIMS) is a systematic approach for government, nongovernmental organizations, and the private sector to work together to manage incidents involving hazards. The NIMS 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 NIMS 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, technological hazards, and human-caused hazards) regardless of size or complexity.

Although participation is voluntary, federal departments and agencies are required to make adoption of NIMS by local and state jurisdictions a condition to receive federal preparedness grants and awards. The content of this plan is considered to be a viable support tool for any phase of emergency management. The NIMS program is considered as a response function, and information in this hazard mitigation plan can support the implementation and update of all NIMS-compliant plans within the planning area.

Presidential Executive Order 11988, Floodplain Management

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 take action 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, 2015a):

- 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.

Presidential Executive Order 11990, Protection of Wetlands

Executive Order 11990 requires federal agencies to provide leadership and take action 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:

- 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.

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. This program is a potential source of funding for actions identified in this plan.

U.S. Army Corps of Engineers Dam Safety Program

The U.S. Army Corps of Engineers operates and maintains approximately 700 dams nationwide. It is also responsible for safety inspections of some federal and non-federal dams in the United States that meet the 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 Flood Hazard Management

The following U.S. Army Corps of Engineers authorities and programs related to flood hazard management:

- The Floodplain Management Services program offers 100-percent federally funded technical services such as development and interpretation of site-specific data related to the extent, duration and frequency of flooding. Special studies may be conducted to help a community understand and respond to flood risk. These may include flood hazard evaluation, flood warning and preparedness, or flood modeling.
- For more extensive studies, the Corps of Engineers offers a cost-shared program called Planning Assistance to States and Tribes. Studies under this program generally range from $25,000 to $100,000 with the local jurisdiction providing 50 percent of the cost.
- The Corps of Engineers has several cost-shared programs (typically 65 percent federal and 35 percent non-federal) aimed at developing, evaluating and implementing structural and non-structural capital projects to address flood risks at specific locations or within a specific watershed:
  - The Continuing Authorities Program for smaller-scale projects includes Section 205 for Flood Control, with a $7 million federal limit and Section 14 for Emergency Streambank Protection with a $1.5 million federal limit. These can be implemented without specific authorization from Congress.
  - Larger scale studies, referred to as General Investigations, and projects for flood risk management, for ecosystem restoration or to address other water resource issues, can be pursued through a specific authorization from Congress and are cost-shared, typically at 65 percent federal and 35 percent non-federal.
  - Watershed management planning studies can be specifically authorized and are cost-shared at 50 percent federal and 50 percent non-federal.
- The Corps of Engineers provides emergency response assistance during and following natural disasters. Public Law 84-99 enables the Corps to assist state and local authorities in flood fight activities and cost share in the repair of flood protective structures. Assistance is provided in the flowing categories:
  - Preparedness—The Flood Control and Coastal Emergency Act establishes an emergency fund for preparedness for emergency response to natural disasters; for flood fighting and rescue operations; for rehabilitation of flood control and hurricane protection structures. Funding for Corps of Engineers emergency response under this authority is provided by Congress through the annual Energy and

Water Development Appropriation Act. Disaster preparedness activities include coordination, planning, training and conduct of response exercises with local, state and federal agencies.

- Response Activities—Public Law 84-99 allows the Corps of Engineers to supplement state and local entities in flood fighting urban and other non-agricultural areas under certain conditions (Engineering Regulation 500-1-1 provides specific details). All flood fight efforts require a project cooperation agreement signed by the public sponsor and the sponsor must remove all flood fight material after the flood has receded. Public Law 84-99 also authorizes emergency water support and drought assistance in certain situations and allows for "advance measures" assistance to prevent or reduce flood damage conditions of imminent threat of unusual flooding.
- Rehabilitation—Under Public Law 84-99, an eligible flood protection system can be rehabilitated if damaged by a flood event. The flood system would be restored to its pre-disaster status at no cost to the federal system owner, and at 20-percent cost to the eligible non-federal system owner. All systems considered eligible for Public Law 84-99 rehabilitation assistance have to be in the Rehabilitation and Inspection Program prior to the flood event. Acceptable operation and maintenance by the public levee sponsor are verified by levee inspections conducted by the Corps on a regular basis. The Corps has the responsibility to coordinate levee repair issues with interested federal, state, and local agencies following natural disaster events where flood control works are damaged.

These authorities and programs are all available to the planning partners to support any related mitigation actions.

U.S. Bureau of Reclamation Safety Evaluation of Existing Dams Program

The U.S. Bureau of Reclamation's Safety Evaluation of Existing Dams 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. Program development and administration of dam safety activities is the responsibility of the Bureau 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 Bureau of Reclamation and other Interior Department 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 program focuses on evaluating and implementing actions to resolve safety concerns at Bureau of Reclamation dams. Under this program, the Bureau of Reclamation completes studies and identifies and implements needed corrective action on Bureau of 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.

U.S. Fire Administration

There are federal agencies that provide technical support to fire agencies/organizations. For example, the U.S. Fire Administration, which is a part of FEMA, provides leadership, advocacy, coordination, and support for fire agencies and organizations.

U.S. Fish and Wildlife Service

The U.S. Fish and Wildlife Service fire management strategy uses prescribed fire to maintain early successional fire-adapted grasslands and other ecological communities throughout the National Wildlife Refuge system.

STATE

State 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.

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.

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. The Code identifies the chapters that should be placed in the plan. The Code does not tell local governments how the plan should be developed, where they should get their information, or documentation on how the plan should be assembled. That is the responsibility of each jurisdiction.

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.

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.

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.

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 the Idaho Department of Water Resources 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 Department of Water Resources 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 Department of Water Resources for non-federal dams are available through the state office in Boise (IDWR, 2020).

Idaho Silver Jackets Program

The Silver Jackets Program is the state-level implementation of the U.S. 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.

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Appendix D. Concepts and Methods Used for Hazard Mapping

D. CONCEPTS AND METHODS USED FOR HAZARD MAPPING

DAM FAILURE MAPPING

Dam failure inundation area data (2010) for the Lucky Peak Dam and Reservoir, provided by the U.S. Army Corps of Engineers, 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).

A dam failure inundation depth grid for Blacks Creek Dam was provided by Idaho Department of Water Resources (DWR). DWR generated the data for the Idaho Office of Emergency Management's 2020 dam risk assessment project, using the Decision Support System for Water Infrastructure Security tool. This project expanded the dam risk assessment in the 2018 Idaho State Hazard Mitigation Plan.

American Falls Dam exposure analysis results data from the 2018 Idaho State Hazard Mitigation Plan provided by the Idaho Office of Emergency Management. The analysis results include information about the structures and population exposed to the American Falls Dam failure inundation area.

EARTHQUAKE MAPPING

Liquefaction Susceptibility

Liquefaction data was provided by the Idaho Geological Survey. Liquefaction occurs during strong earthquake ground shaking when saturated, cohesionless earth materials lose strength because of high excess pore-water pressure. The database was produced using a standard methodology relating deposit age, texture (grain size and sorting), and environment of deposition to liquefaction susceptibility, and depth to the local water table. The database uses 1:100,000-scale geologic map information and water well records. The water well data have uncertainties in data quality and location. For each geologic map unit, a score between 0 and 5 was assigned for each classifying factor based upon unit descriptions. The methods and data used to make this map are described in detail in Phillips and Welhan, 2011. This dataset covers the Boise metro area. A liquefaction susceptibility default value of 0 ("Underlain by bedrock. Liquefaction will not occur even where saturated except in the case of undocumented cohesionless materials.") was used for the remainder of the planning area.

National Earthquake Hazard Reduction Program Soils

National Earthquake Hazard Reduction Program (NEHRP) site class data was provided by the Idaho Geologic Survey. The intensity of ground shaking during an earthquake varies according to the nature of near-surface materials. NEHRP site classes quantify this effect and permit adjustment of expected ground motion. Site classes B, BC, C, D, and E are used. Classification of sites is largely based on a geologic map (Othberg and Stanford,

1992) and a compilation of standard penetration test N (blows per foot) data from geotechnical foundation reports in the project area. This work is a regional screening exercise based on widely separated localities at a scale of 1:100,000. Site-specific geotechnical investigations are required to determine actual ground conditions for individual building sites. The methods and data used to make this map are described in detail in Philips and Welhan, 2011. This dataset overs the Boise Metro area. A NEHRP soil default value of D was used for the remainder of the planning area.

Probabilistic Peak Ground Acceleration Maps

Probabilistic peak ground acceleration data are generated by Hazus 4.2 SP03. 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 the 2018 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 portrays the extent and variation of ground shaking throughout an 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. This plan used shake maps prepared by the USGS for two earthquake scenarios:

- An earthquake on the Cottonwood Mountain fault with the following characteristics:
  - Magnitude: 7.0
  - Epicenter: N 44.06 W 117.33
  - Depth: 9 km
- An earthquake on the Squaw Creek fault with the following characteristics:
  - Magnitude: 7.0
  - Epicenter: N 44.15 W 116.24
  - Depth: 9 km

FLOOD MAPPING

Flood hazard areas are from the effective FEMA Digital Flood Insurance Rate Map (DFIRM) dated June 7, 2019 with latest incorporated LOMR effective January 17, 2020. Flood depth grids were created using the USGS 10-meter digital elevation model.

LANDSLIDE MAPPING

A dataset of steep slopes was generated using the USGS 10-meter digital elevation model. Two slope classifications were created: 15 to 30 percent and greater than 30 percent.

WILDFIRE MAPPING

The Idaho 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 currently available for download from the USGS ScienceBase-Catalog website.

REFERENCES

Othberg, K. L. and Stanford, L.R. 1992. Geologic Map of the Boise Valley and Adjoining Area, Western Snake River Plain, Idaho. Idaho Geological Survey Map GM-18, 1:100,000 Scale.

Phillips, William M., and Welhan, John A., 2011, NEHRP Site Class and Liquefaction Susceptibility Maps for the Boise Metro Area, Idaho. Idaho Geological Survey. Published August 2011.

2021 Canyon County All-Hazard Mitigation Plan

Appendix E. Detailed Risk Assessment Results

Total Count, Exposed Critical Facilities

	Communications	Energy	Food, Water, Shelter	Hazardous Material	Health & Medical	Safety & Security	Transportation	Total
Caldwell	10	4	4	11	14	40	46	**129**
Greenleaf	0	0	0	0	0	2	0	**2**
Melba	0	0	0	0	0	5	1	**6**
Middleton	2	2	0	1	2	10	9	**26**
Nampa	29	14	9	17	30	53	61	**213**
Notus	0	0	1	0	0	3	0	**4**
Parma	2	0	0	0	2	7	3	**14**
Star	0	0	0	0	0	0	0	**0**
Wilder	1	0	0	0	1	11	0	**13**
Unincorporated	12	3	3	14	2	21	198	**253**
Total	**56**	**23**	**17**	**43**	**51**	**152**	**318**	**660**

Jurisdiction	Estimated Population (1)	Total Number of Buildings (2)	Total Number of Residential Buildings (2)	Total Building Value (Structure and contents in $) (2)
Caldwell	58,481	17,970	16,782	$10,387,912,448
Greenleaf	886	316	291	$160,047,309
Melba	558	235	182	$237,097,875
Middleton	8,466	3,152	3,032	$1,621,812,777
Nampa	99,277	31,225	29,116	$20,697,926,294
Notus	638	227	206	$84,189,080
Parma	2,147	760	622	$673,146,588
Star	30	11	11	$3,247,639
Wilder	1,823	550	484	$259,156,358
Unincorporated County	57,543	19,827	19,148	$11,770,680,831
Total	**229,849**	**74,273**	**69,874**	**$45,895,217,198**

Sources

(1) 2019 Census population estimates downloaded from the Idaho State Department of Labor website.

(2) Values based off of tax assessor data provided by Canyon County in January 2020.

(3) Percent of residential buildings exposed multiplied by the Estimated Population.

(4) Calculated using a Census block level, general building stock (GBS) analysis in Hazus 4.2 SP03.

(5) Calculated using a Census block level, general building stock (GBS) analysis in Hazus 4.2 SP03, and adjusted to reflect the estimated population.

(6) Calculated using a user-defined (UDF) analysis in Hazus 4.2 SP03.

Risk Assessment Results for Lucky Peak Dam Failure

Jurisdiction	Estimated Building Exposure						
	Buildings Exposed (2)	Population Exposed (3)	% of Population Exposed	Value Structure in $ Exposed (2)	Value Contents in $ Exposed (2)	Value (Structure and contents in $) Exposed (2)	% of Total Value Exposed
Caldwell	2,750	7,670	13.1%	$1,457,291,235	$1,289,846,020	$2,747,137,255	26.4%
Greenleaf	0	0	0.0%	$0	$0	$0	0.0%
Melba	0	0	0.0%	$0	$0	$0	0.0%
Middleton	2,316	6,140	72.5%	$703,414,942	$481,564,297	$1,184,979,240	73.1%
Nampa	0	0	0.0%	$0	$0	$0	0.0%
Notus	42	77	12.1%	$21,359,884	$19,560,008	$40,919,892	48.6%
Parma	364	863	40.2%	$194,494,699	$182,497,175	$376,991,874	56.0%
Star	11	30	100.0%	$2,165,093	$1,082,546	$3,247,639	100.0%
Wilder	0	0	0.0%	$0	$0	$0	0.0%
Unincorporated County	1,643	4,532	7.9%	$821,161,725	$676,573,109	$1,497,734,834	12.7%
Total	**7,126**	**19,312**	**8.4%**	**$3,199,887,578**	**$2,651,123,155**	**$5,851,010,734**	**12.7%**

Jurisdiction	Economic Impact							
	Structure Debris (Tons) (4)	Displaced Population (5)	People Requiring Short-Term Shelter (5)	Buildings Impacted (6)	Value Structure in $ Damaged (6)	Value Contents in $ Damaged (6)	Total Value (Structure and Contents in $) Damaged (6)	% of Total Value Damaged
Caldwell	145,872	5,664	349	2,731	$702,903,604	$1,038,586,998	$1,741,490,602	16.8%
Greenleaf	164	0	0	0	$0	$0	$0	0.0%
Melba	0	0	0	0	$0	$0	$0	0.0%
Middleton	73,007	5,896	292	2,311	$517,117,062	$406,675,644	$923,792,706	57.0%
Nampa	0	0	0	0	$0	$0	$0	0.0%
Notus	398	34	0	40	$6,363,457	$11,930,377	$18,293,834	21.7%
Parma	51,983	612	7	361	$110,767,187	$154,031,408	$264,798,595	39.3%
Star	520	30	0	11	$1,809,293	$866,037	$2,675,330	82.4%
Wilder	0	0	0	0	$0	$0	$0	0.0%
Unincorporated County	112,898	2,653	84	1,634	$508,063,842	$531,313,617	$1,039,377,459	8.8%
Total	**384,842**	**14,888**	**734**	**7,088**	**$1,847,024,445**	**$2,143,404,080**	**$3,990,428,525**	**8.7%**

Risk Assessment Results for Lucky Peak Dam Failure

Jurisdiction	Acres of Floodplain	Number of Structures in Floodplain (2)							
		Residential	Commercial	Industrial	Agriculture	Religion	Government	Education	Total
Caldwell	3,009	2,201	508	28	3	8	0	2	2750
Greenleaf	63	0	0	0	0	0	0	0	0
Melba	0	0	0	0	0	0	0	0	0
Middleton	2,373	2,199	104	1	3	5	0	4	2316
Nampa	0	0	0	0	0	0	0	0	0
Notus	118	25	16	0	1	0	0	0	42
Parma	381	250	104	5	1	3	1	0	364
Star	824	11	0	0	0	0	0	0	11
Wilder	0	0	0	0	0	0	0	0	0
Unincorporated County	48,945	1,508	126	9	0	0	0	0	1643
Total	**55,713**	**6,194**	**858**	**43**	**8**	**16**	**1**	**6**	**7126**

Risk Assessment Results for Lucky Peak Dam Failure

	Probability		Impact on People			
	Probability (High, Medium, Low, None)	Probability Factor (3,2,1,0)	% Population Exposed	Impact (High, Medium, Low, None)	Impact Factor	Weighted Impact Factor
Caldwell	Medium	2	13.12%	Medium	2	6
Greenleaf	Medium	2	0.00%	None	0	0
Melba	Medium	2	0.00%	None	0	0
Middleton	Medium	2	72.53%	High	3	9
Nampa	Medium	2	0.00%	None	0	0
Notus	Medium	2	12.14%	Medium	2	6
Parma	Medium	2	40.19%	High	3	9
Star	Medium	2	100.00%	High	3	9
Wilder	Medium	2	0.00%	None	0	0
Unincorporated County	Medium	2	0.00%	None	0	0
Total	Medium	2	8.40%	Low	1	3

RISK RANKING-Dam Failure Lucky Peak

	Impact on Property				Impact on Economy			
	% of Total Value Exposed	Impact (High, Medium, Low, None)	Impact Factor	Weighted Impact Factor	% of Total Value Damaged	Impact (High, Medium, Low, None)	Impact Factor	Weighted Impact Factor
Caldwell	26.45%	High	3	6	16.76%	High	3	3
Greenleaf	0.00%	None	0	0	0.00%	None	0	0
Melba	0.00%	None	0	0	0.00%	None	0	0
Middleton	73.07%	High	3	6	56.96%	High	3	3
Nampa	0.00%	None	0	0	0.00%	None	0	0
Notus	48.60%	High	3	6	21.73%	High	3	3
Parma	56.00%	High	3	6	39.34%	High	3	3
Star	100.00%	High	3	6	82.38%	High	3	3
Wilder	0.00%	None	0	0	0.00%	None	0	0
Unincorporated County	0.00%	None	0	0	0.00%	None	0	0
Total	12.75%	Medium	2	4	8.69%	Medium	2	2

Risk Assessment Results for Lucky Peak Dam Failure

	Risk Ranking Score	Hazard Risk Rating
Caldwell	30	High
Greenleaf	0	Low
Melba	0	Low
Middleton	36	High
Nampa	0	Low
Notus	30	High
Parma	36	High
Star	36	High
Wilder	0	Low
Unincorporated County	0	Low
Total	18	Medium

Dam Failure Lucky Peak Count, Exposed Critical Facilities

	Communications	Energy	Food, Water, Shelter	Hazardous Material	Health & Medical	Safety & Security	Transportation	Total
Caldwell	8	1	2	11	2	13	21	**58**
Greenleaf	0	0	0	0	0	0	0	**0**
Melba	0	0	0	0	0	0	0	**0**
Middleton	2	2	0	1	1	8	8	**22**
Nampa	0	0	0	0	0	0	0	**0**
Notus	0	0	1	0	0	0	0	**1**
Parma	2	0	0	0	1	3	2	**8**
Star	0	0	0	0	0	0	0	**0**
Wilder	0	0	0	0	0	0	0	**0**
Unincorporated	0	1	1	8	0	1	41	**52**
Total	**12**	**4**	**4**	**20**	**4**	**25**	**72**	**141**

Risk Assessment Results for Blacks Creek Dam Failure

Jurisdiction	Estimated Population (1)	Total Number of Buildings (2)	Total Number of Residential Buildings (2)	Total Building Value (Structure and contents in $) (2)
Caldwell	58,481	17,970	16,782	$10,387,912,448
Greenleaf	886	316	291	$160,047,309
Melba	558	235	182	$237,097,875
Middleton	8,466	3,152	3,032	$1,621,812,777
Nampa	99,277	31,225	29,116	$20,697,926,294
Notus	638	227	206	$84,189,080
Parma	2,147	760	622	$673,146,588
Star	30	11	11	$3,247,639
Wilder	1,823	550	484	$259,156,358
Unincorporated County	57,543	19,827	19,148	$11,770,680,831
Total	**229,849**	**74,273**	**69,874**	**$45,895,217,198**

Sources

(1) 2019 Census population estimates downloaded from the Idaho State Department of Labor website.

(2) Values based off of tax assessor data provided by Canyon County in January 2020.

(3) Percent of residential buildings exposed multiplied by the Estimated Population.

(4) Calculated using a Census block level, general building stock (GBS) analysis in Hazus 4.2 SP03.

(5) Calculated using a Census block level, general building stock (GBS) analysis in Hazus 4.2 SP03, and adjusted to reflect the estimated population.

(6) Calculated using a user-defined (UDF) analysis in Hazus 4.2 SP03.

Risk Assessment Results for Blacks Creek Dam Failure

Jurisdiction	Estimated Building Exposure						
	Buildings Exposed (2)	Population Exposed (3)	% of Population Exposed	Value Structure in $ Exposed (2)	Value Contents in $ Exposed (2)	Value (Structure and contents in $) Exposed (2)	% of Total Value Exposed
Caldwell	3	10	0.0%	$408,193	$204,097	$612,290	0.0%
Greenleaf	0	0	0.0%	$0	$0	$0	0.0%
Melba	0	0	0.0%	$0	$0	$0	0.0%
Middleton	7	3	0.0%	$19,860,991	$23,292,369	$43,153,360	2.7%
Nampa	62	211	0.2%	$22,306,806	$11,153,403	$33,460,209	0.2%
Notus	0	0	0.0%	$0	$0	$0	0.0%
Parma	0	0	0.0%	$0	$0	$0	0.0%
Star	0	0	0.0%	$0	$0	$0	0.0%
Wilder	0	0	0.0%	$0	$0	$0	0.0%
Unincorporated County	89	219	0.4%	$75,019,398	$66,143,083	$141,162,480	1.2%
Total	**161**	**444**	**0.2%**	**$117,595,388**	**$100,792,952**	**$218,388,340**	**0.5%**

Jurisdiction	Economic Impact							
	Structure Debris (Tons) (4)	Displaced Population (5)	People Requiring Short-Term Shelter (5)	Buildings Impacted (6)	Value Structure in $ Damaged (6)	Value Contents in $ Damaged (6)	Total Value (Structure and Contents in $) Damaged (6)	% of Total Value Damaged
Caldwell	11	1	0	3	$29,284	$18,387	$47,671	0.0%
Greenleaf	0	0	0	0	$0	$0	$0	0.0%
Melba	0	0	0	0	$0	$0	$0	0.0%
Middleton	11	1	0	7	$15,371	$19,891	$35,262	0.0%
Nampa	0	41	0	62	$3,537,127	$2,069,953	$5,607,080	0.0%
Notus	0	0	0	0	$0	$0	$0	0.0%
Parma	0	0	0	0	$0	$0	$0	0.0%
Star	0	0	0	0	$0	$0	$0	0.0%
Wilder	0	0	0	0	$0	$0	$0	0.0%
Unincorporated County	84	60	3	75	$2,678,716	$3,870,245	$6,548,961	0.1%
Total	**107**	**103**	**3**	**147**	**$6,260,498**	**$5,978,476**	**$12,238,974**	**0.0%**

Jurisdiction	Acres of Floodplain	Number of Structures in Floodplain (2)							
		Residential	Commercial	Industrial	Agriculture	Religion	Government	Education	Total
Caldwell	116	3	0	0	0	0	0	0	3
Greenleaf	0	0	0	0	0	0	0	0	0
Melba	0	0	0	0	0	0	0	0	0
Middleton	152	1	5	1	0	0	0	0	7
Nampa	105	62	0	0	0	0	0	0	62
Notus	11	0	0	0	0	0	0	0	0
Parma	0	0	0	0	0	0	0	0	0
Star	0	0	0	0	0	0	0	0	0
Wilder	0	0	0	0	0	0	0	0	0
Unincorporated County	5,305	73	16	0	0	0	0	0	89
Total	**5,689**	**139**	**21**	**1**	**0**	**0**	**0**	**0**	**161**

	Probability		Impact on People			
	Probability (High, Medium, Low, None)	Probability Factor (3,2,1,0)	% Population Exposed	Impact (High, Medium, Low, None)	Impact Factor	Weighted Impact Factor
Caldwell	Medium	2	0.02%	Low	1	3
Greenleaf	Medium	2	0.00%	None	0	0
Melba	Medium	2	0.00%	None	0	0
Middleton	Medium	2	0.03%	Low	1	3
Nampa	Medium	2	0.21%	Low	1	3
Notus	Medium	2	0.00%	None	0	0
Parma	Medium	2	0.00%	None	0	0
Star	Medium	2	0.00%	None	0	0
Wilder	Medium	2	0.00%	None	0	0
Unincorporated County	Medium	2	0.00%	None	0	0
Total	Medium	2	0.19%	Low	1	3

Risk Assessment Results for Blacks Creek Dam Failure

RISK RANKING-Dam Failure Lucky Peak

	Impact on Property				Impact on Economy			
	% of Total Value Exposed	Impact (High, Medium, Low, None)	Impact Factor	Weighted Impact Factor	% of Total Value Damaged	Impact (High, Medium, Low, None)	Impact Factor	Weighted Impact Factor
Caldwell	0.01%	None	0	0	0.00%	None	0	0
Greenleaf	0.00%	None	0	0	0.00%	None	0	0
Melba	0.00%	None	0	0	0.00%	None	0	0
Middleton	0.026608102	Low	1	2	0.00%	None	0	0
Nampa	0.001616597	Low	1	2	0.03%	Low	1	1
Notus	0.00%	None	0	0	0.00%	None	0	0
Parma	0.00%	None	0	0	0.00%	None	0	0
Star	0.00%	None	0	0	0.00%	None	0	0
Wilder	0.00%	None	0	0	0.00%	None	0	0
Unincorporated County	0.00%	None	0	0	0.00%	None	0	0
Total	0.48%	Low	1	2	0.03%	Low	1	1

Risk Assessment Results for Blacks Creek Dam Failure

	Risk Ranking Score	Hazard Risk Rating
Caldwell	6	Low
Greenleaf	0	Low
Melba	0	Low
Middleton	10	Low
Nampa	12	Low
Notus	0	Low
Parma	0	Low
Star	0	Low
Wilder	0	Low
Unincorporated County	0	Low
Total	12	Low

Dam Failure Blacks Cr Count, Exposed Critical Facilities

	Communications	Energy	Food, Water, Shelter	Hazardous Material	Health & Medical	Safety & Security	Transportation	Total
Caldwell	0	0	0	0	0	0	1	**1**
Greenleaf	0	0	0	0	0	0	0	**0**
Melba	0	0	0	0	0	0	0	**0**
Middleton	0	1	0	1	0	0	0	**2**
Nampa	0	0	0	0	0	0	0	**0**
Notus	0	0	0	0	0	0	0	**0**
Parma	0	0	0	0	0	0	0	**0**
Star	0	0	0	0	0	0	0	**0**
Wilder	0	0	0	0	0	0	0	**0**
Unincorporated	0	0	1	1	0	0	8	**10**
Total	**0**	**1**	**1**	**2**	**0**	**0**	**9**	**13**

Jurisdiction	Estimated Population (1)	Total Number of Buildings (2)	Total Number of Residential Buildings (2)	Total Building Value (Structure and contents in $) (2)
Caldwell	58,481	17,970	16,782	$10,387,912,448
Greenleaf	886	316	291	$160,047,309
Melba	558	235	182	$237,097,875
Middleton	8,466	3,152	3,032	$1,621,812,777
Nampa	99,277	31,225	29,116	$20,697,926,294
Notus	638	227	206	$84,189,080
Parma	2,147	760	622	$673,146,588
Star	30	11	11	$3,247,639
Wilder	1,823	550	484	$259,156,358
Unincorporated County	57,543	19,827	19,148	$11,770,680,831
Total	**229,849**	**74,273**	**69,874**	**$45,895,217,198**

Sources:
(1) 2019 Census population estimates downloaded from the Idaho State Department of Labor website.

(2) Values based off of tax assessor data provided by Canyon County in January 2020.

(3) Extent of dam failure inundation area determined from 2017 State of Idaho HMP exposure analysis results which identified the Census blocks exposed to the hazard.

(4) Percent of residential buildings exposed multiplied by the Estimated Population.

Jurisdiction	Dam Failure American Falls (3)						
	Estimated Exposure						
	Estimated Buildings Exposed (2)	Population Exposed (4)	% of Population Exposed	Value Structure in $ Exposed (2)	Value Contents in $ Exposed (2)	Value (Structure and contents in $) Exposed (2)	% of Total Value
Caldwell	0	0	0.0%	$0	$0	$0	0.0%
Greenleaf	0	0	0.0%	$0	$0	$0	0.0%
Melba	0	0	0.0%	$0	$0	$0	0.0%
Middleton	0	0	0.0%	$0	$0	$0	0.0%
Nampa	0	0	0.0%	$0	$0	$0	0.0%
Notus	0	0	0.0%	$0	$0	$0	0.0%
Parma	0	0	0.0%	$0	$0	$0	0.0%
Star	0	0	0.0%	$0	$0	$0	0.0%
Wilder	0	0	0.0%	$0	$0	$0	0.0%
Unincorporated County	193	556	1.0%	$111,212,990	$86,942,135	$198,155,125	1.7%
Total	**193**	**556**	**0.2%**	**$111,212,990**	**$86,942,135**	**$198,155,125**	**0.4%**

Risk Assessment Results for American Falls Dam Failure

Jurisdiction	Number of Structures in Floodplain (2)							
	Residential	Commercial	Industrial	Agriculture	Religion	Government	Education	Total
Caldwell	0	0	0	0	0	0	0	0
Greenleaf	0	0	0	0	0	0	0	0
Melba	0	0	0	0	0	0	0	0
Middleton	0	0	0	0	0	0	0	0
Nampa	0	0	0	0	0	0	0	0
Notus	0	0	0	0	0	0	0	0
Parma	0	0	0	0	0	0	0	0
Star	0	0	0	0	0	0	0	0
Wilder	0	0	0	0	0	0	0	0
Unincorporated County	185	7	0	0	1	0	0	193
Total	**185**	**7**	**0**	**0**	**1**	**0**	**0**	**193**

Risk Assessment Results for American Falls Dam Failure

	Probability		Impact on People			
	Probability (High, Medium, Low, None)	Probability Factor (3,2,1,0)	% Population Exposed	Impact (High, Medium, Low, None)	Impact Factor	Weighted Impact Factor
Caldwell	Medium	2	0.00%	None	0	0
Greenleaf	Medium	2	0.00%	None	0	0
Melba	Medium	2	0.00%	None	0	0
Middleton	Medium	2	0.00%	None	0	0
Nampa	Medium	2	0.00%	None	0	0
Notus	Medium	2	0.00%	None	0	0
Parma	Medium	2	0.00%	None	0	0
Star	Medium	2	0.00%	None	0	0
Wilder	Medium	2	0.00%	None	0	0
Unincorporated County	Medium	2	0.97%	Low	1	3
Total	Medium	2	0.24%	Low	1	3

RISK RANKING-Dam Failure American Falls

	Impact on Property				Impact on Economy			
	% of Total Value Exposed	Impact (High, Medium, Low, None)	Impact Factor	Weighted Impact Factor	% of Total Value Damaged	Impact (High, Medium, Low, None)	Impact Factor	Weighted Impact Factor
Caldwell	0.00%	None	0	0	0.00%	None	0	0
Greenleaf	0.00%	None	0	0	0.00%	None	0	0
Melba	0.00%	None	0	0	0.00%	None	0	0
Middleton	0.00%	None	0	0	0.00%	None	0	0
Nampa	0.00%	None	0	0	0.00%	None	0	0
Notus	0.00%	None	0	0	0.00%	None	0	0
Parma	0.00%	None	0	0	0.00%	None	0	0
Star	0.00%	None	0	0	0.00%	None	0	0
Wilder	0.00%	None	0	0	0.00%	None	0	0
Unincorporated County	1.68%	Low	1	2	0.42%	Low	1	1
Total	0.43%	Low	1	2	0.11%	Low	1	1

Risk Assessment Results for American Falls Dam Failure

	Risk Ranking Score	Hazard Risk Rating
Caldwell	0	Low
Greenleaf	0	Low
Melba	0	Low
Middleton	0	Low
Nampa	0	Low
Notus	0	Low
Parma	0	Low
Star	0	Low
Wilder	0	Low
Unincorporated County	12	Low
Total	12	Low

Dam Fail American Falls Count, Exposed Critical Facilities

	Communications	Energy	Food, Water, Shelter	Hazardous Material	Health & Medical	Safety & Security	Transportation	Total
Caldwell	0	0	0	0	0	0	0	**0**
Greenleaf	0	0	0	0	0	0	0	**0**
Melba	0	0	0	0	0	0	0	**0**
Middleton	0	0	0	0	0	0	0	**0**
Nampa	0	0	0	0	0	0	0	**0**
Notus	0	0	0	0	0	0	0	**0**
Parma	0	0	0	0	0	0	0	**0**
Star	0	0	0	0	0	0	0	**0**
Wilder	0	0	0	0	0	0	0	**0**
Unincorporated	0	0	0	0	0	0	5	**5**
Total	**0**	**0**	**0**	**0**	**0**	**0**	**5**	**5**

Risk Assessment Results for Squaw Creek M7.0 Earthquake Scenario

Jurisdiction	Estimated Exposure				
	Estimated Population (1)	% Population Exposed	Total Number of Buildings (2)	Total Building Value (Structure and contents in $) (2)	% of Total Value Exposed
Caldwell	58,481	100%	17,970	$10,387,912,448	100%
Greenleaf	886	100%	316	$160,047,309	100%
Melba	558	100%	235	$237,097,875	100%
Middleton	8,466	100%	3,152	$1,621,812,777	100%
Nampa	99,277	100%	31,225	$20,697,926,294	100%
Notus	638	100%	227	$84,189,080	100%
Parma	2,147	100%	760	$673,146,588	100%
Star	30	100%	11	$3,247,639	100%
Wilder	1,823	100%	550	$259,156,358	100%
Unincorporated County	57,543	100%	19,827	$11,770,680,831	100%
TOTAL	**229,849**	100%	**74,273**	**$45,895,217,198**	100%

Sources:
(1) 2019 Census population estimates downloaded from the Idaho State Department of Labor website.
(2) Values based off of tax assessor data provided by Canyon County in January 2020.
(3) Calculated using a Census tract level, general building stock (GBS) analysis in Hazus 4.2 SP03.
(4) Calculated using an Advanced Engineering Building Model (AEBM) analysis in Hazus 4.2 SP03.

Risk Assessment Results for Squaw Creek M7.0 Earthquake Scenario

Jurisdiction	Economic Impact						
	Structure Debris (x 1,000 Tons) (3)	Number of Displaced Households (3)	People Requiring Short-Term Shelter (3)	Value Structure in $ Damaged (4)	Value Contents in $ Damaged (4)	Total Value (Structure and Contents in $) Damaged (4)	% of Total Value Damaged
Caldwell	1.95	0	0	$55,820,571	$33,573,088	$89,393,659	0.9%
Greenleaf	0.02	0	0	$115,810	$94,368	$210,177	0.1%
Melba	0.00	0	0	$22,968	$21,797	$44,765	0.0%
Middleton	0.38	0	0	$12,958,479	$6,009,839	$18,968,318	1.2%
Nampa	3.14	0	0	$29,766,978	$21,015,895	$50,782,872	0.2%
Notus	0.02	0	0	$163,606	$100,489	$264,096	0.3%
Parma	0.08	0	0	$644,275	$554,276	$1,198,551	0.2%
Star	0.00	0	0	$10,780	$5,337	$16,117	0.5%
Wilder	0.02	0	0	$290,604	$220,601	$511,205	0.2%
Unincorporated County	1.52	0	0	$31,688,304	$18,735,099	$50,423,403	0.4%
TOTAL	**7.12**	**0**	**0**	**$131,482,374**	**$80,330,789**	**$211,813,162**	0.5%

	Probability		Impact on People			
	Medium, Low, None)	Probability Factor (3,2,1,0)	% Population Exposed	Impact (High, Medium, Low, None)	Impact Factor	Weighted Impact Factor
Caldwell	Medium	2	100.00%	High	3	9
Greenleaf	Medium	2	100.00%	High	3	9
Melba	Medium	2	100.00%	High	3	9
Middleton	Medium	2	100.00%	High	3	9
Nampa	Medium	2	100.00%	High	3	9
Notus	Medium	2	100.00%	High	3	9
Parma	Medium	2	100.00%	High	3	9
Star	Medium	2	100.00%	High	3	9
Wilder	Medium	2	100.00%	High	3	9
Unincorporated County	Medium	2	100.00%	High	3	9
TOTAL	Medium	2	100.00%	High	3	9

SK RANKING-Squaw Creek M7.0 Earthquake Scenario

	Impact on Property				Impact on Economy			
	% of Total Value Exposed	Impact (High, Medium, Low, None)	Impact Factor	Weighted Impact Factor	% of Total Value Damaged	Impact (High, Medium, Low, None)	Impact Factor	Weighted Impact Factor
Caldwell	100.00%	High	3	6	0.86%	Low	1	1
Greenleaf	100.00%	High	3	6	0.13%	Low	1	1
Melba	100.00%	High	3	6	0.02%	Low	1	1
Middleton	100.00%	High	3	6	1.17%	Low	1	1
Nampa	100.00%	High	3	6	0.25%	Low	1	1
Notus	100.00%	High	3	6	0.31%	Low	1	1
Parma	100.00%	High	3	6	0.18%	Low	1	1
Star	100.00%	High	3	6	0.50%	Low	1	1
Wilder	100.00%	High	3	6	0.20%	Low	1	1
Unincorporated County	100.00%	High	3	6	0.43%	Low	1	1
TOTAL	100.00%	High	3	6	0.46%	Low	1	1

Risk Assessment Results for Squaw Creek M7.0 Earthquake Scenario

	Risk Ranking Score	Hazard Risk Rating
Caldwell	32	High
Greenleaf	32	High
Melba	32	High
Middleton	32	High
Nampa	32	High
Notus	32	High
Parma	32	High
Star	32	High
Wilder	32	High
Unincorporated County	32	High
TOTAL	32	High

Risk Assessment Results for Cottonwood Mountain M7.0 Earthquake Scenario

Jurisdiction	Estimated Exposure				
	Estimated Population (1)	% Population Exposed	Total Number of Buildings (2)	Total Building Value (Structure and contents in $) (2)	% of Total Value Exposed
Caldwell	58,481	100%	17,970	$10,387,912,448	100%
Greenleaf	886	100%	316	$160,047,309	100%
Melba	558	100%	235	$237,097,875	100%
Middleton	8,466	100%	3,152	$1,621,812,777	100%
Nampa	99,277	100%	31,225	$20,697,926,294	100%
Notus	638	100%	227	$84,189,080	100%
Parma	2,147	100%	760	$673,146,588	100%
Star	30	100%	11	$3,247,639	100%
Wilder	1,823	100%	550	$259,156,358	100%
Unincorporated County	57,543	100%	19,827	$11,770,680,831	100%
TOTAL	**229,849**	100%	**74,273**	**$45,895,217,198**	100%

Sources:
(1) 2019 Census population estimates downloaded from the Idaho State Department of Labor website.
(2) Values based off of tax assessor data provided by Canyon County in January 2020.
(3) Calculated using a Census tract level, general building stock (GBS) analysis in Hazus 4.2 SP03.
(4) Calculated using an Advanced Engineering Building Model (AEBM) analysis in Hazus 4.2 SP03.

Risk Assessment Results for Cottonwood Mountain M7.0 Earthquake Scenario

Jurisdiction	Economic Impact						
	Structure Debris (x 1,000 Tons) (3)	Number of Displaced Households (3)	People Requiring Short-Term Shelter (3)	Value Structure in $ Damaged (4)	Value Contents in $ Damaged (4)	Total Value (Structure and Contents in $) Damaged (4)	% of Total Value Damaged
Caldwell	0.43	0	0	$6,387,055	$4,951,991	$11,339,046	0.1%
Greenleaf	0.01	0	0	$96,773	$84,805	$181,579	0.1%
Melba	0.00	0	0	$5,250	$5,754	$11,004	0.0%
Middleton	0.04	0	0	$824,289	$629,013	$1,453,303	0.1%
Nampa	0.41	0	0	$4,262,021	$3,227,042	$7,489,062	0.0%
Notus	0.01	0	0	$109,620	$75,780	$185,400	0.2%
Parma	0.26	0	0	$7,509,957	$4,444,188	$11,954,145	1.8%
Star	0.00	0	0	$783	$474	$1,257	0.0%
Wilder	0.02	0	0	$343,503	$245,890	$589,393	0.2%
Unincorporated County	0.62	0	0	$8,324,541	$5,729,937	$14,054,478	0.1%
TOTAL	**1.80**	**0**	**0**	**$27,863,792**	**$19,394,873**	**$47,258,666**	0.1%

	RISK RA					
	Probability		Impact on People			
	Probability (High, Medium, Low, None)	Probability Factor (3,2,1,0)	% Population Exposed	Impact (High, Medium, Low, None)	Impact Factor	Weighted Impact Factor
Caldwell	Medium	2	100.00%	High	3	9
Greenleaf	Medium	2	100.00%	High	3	9
Melba	Medium	2	100.00%	High	3	9
Middleton	Medium	2	100.00%	High	3	9
Nampa	Medium	2	100.00%	High	3	9
Notus	Medium	2	100.00%	High	3	9
Parma	Medium	2	100.00%	High	3	9
Star	Medium	2	100.00%	High	3	9
Wilder	Medium	2	100.00%	High	3	9
Unincorporated County	Medium	2	100.00%	High	3	9
TOTAL	Medium	2	100.00%	High	3	9

ANKING-Cottonwood Mountain M7.0 Earthquake Scenario

	Impact on Property				Impact on Economy			
	% of Total Value Exposed	Medium, Low, None)	Impact Factor	Weighted Impact Factor	% of Total Value Damaged	Impact (High, Medium, Low, None)	Impact Factor	Weighted Impact Factor
Caldwell	100.00%	High	3	6	0.11%	Low	1	1
Greenleaf	100.00%	High	3	6	0.11%	Low	1	1
Melba	100.00%	High	3	6	0.00%	None	0	0
Middleton	100.00%	High	3	6	0.09%	Low	1	1
Nampa	100.00%	High	3	6	0.04%	Low	1	1
Notus	100.00%	High	3	6	0.22%	Low	1	1
Parma	100.00%	High	3	6	1.78%	Low	1	1
Star	100.00%	High	3	6	0.04%	Low	1	1
Wilder	100.00%	High	3	6	0.23%	Low	1	1
Unincorporated County	100.00%	High	3	6	0.12%	Low	1	1
TOTAL	100.00%	High	3	6	0.10%	Low	1	1

Risk Assessment Results for Cottonwood Mountain M7.0 Earthquake Scenario

	Risk Ranking Score	Hazard Risk Rating
Caldwell	32	High
Greenleaf	32	High
Melba	30	Low
Middleton	32	High
Nampa	32	High
Notus	32	High
Parma	32	High
Star	32	High
Wilder	32	High
Unincorporated County	32	High
TOTAL	32	High

Risk Assessment Results for 100-Year Probabilistic Earthquake

Jurisdiction	Estimated Exposure				
	Estimated Population (1)	**% Population Exposed**	**Total Number of Buildings (2)**	**Total Building Value (Structure and contents in $) (2)**	**% of Total Value Exposed**
Caldwell	58,481	100%	17,970	$10,387,912,448	100%
Greenleaf	886	100%	316	$160,047,309	100%
Melba	558	100%	235	$237,097,875	100%
Middleton	8,466	100%	3,152	$1,621,812,777	100%
Nampa	99,277	100%	31,225	$20,697,926,294	100%
Notus	638	100%	227	$84,189,080	100%
Parma	2,147	100%	760	$673,146,588	100%
Star	30	100%	11	$3,247,639	100%
Wilder	1,823	100%	550	$259,156,358	100%
Unincorporated County	57,543	100%	19,827	$11,770,680,831	100%
TOTAL	**229,849**	100%	**74,273**	**$45,895,217,198**	100%

Sources:
(1) 2019 Census population estimates downloaded from the Idaho State Department of Labor website.
(2) Values based off of tax assessor data provided by Canyon County in January 2020.
(3) Calculated using a Census tract level, general building stock (GBS) analysis in Hazus 4.2 SP03.
(4) Calculated using an Advanced Engineering Building Model (AEBM) analysis in Hazus 4.2 SP03.

Risk Assessment Results for 100-Year Probabilistic Earthquake

Jurisdiction	Economic Impact						
	Structure Debris (x 1,000 Tons) (3)	Number of Displaced Households (3)	People Requiring Short-Term Shelter (3)	Value Structure in $ Damaged (4)	Value Contents in $ Damaged (4)	Total Value (Structure and Contents in $) Damaged (4)	% of Total Value Damaged
Caldwell	0.11	0	0	$80,564	$73,565	$154,129	0.0%
Greenleaf	0.00	0	0	$409	$437	$846	0.0%
Melba	0.00	0	0	$494	$569	$1,063	0.0%
Middleton	0.01	0	0	$3,719	$3,623	$7,342	0.0%
Nampa	0.12	0	0	$54,814	$56,464	$111,278	0.0%
Notus	0.00	0	0	$471	$451	$922	0.0%
Parma	0.01	0	0	$2,325	$2,510	$4,834	0.0%
Star	0.00	0	0	$2	$2	$4	0.0%
Wilder	0.00	0	0	$790	$847	$1,637	0.0%
Unincorporated County	0.07	0	0	$24,689	$25,724	$50,413	0.0%
TOTAL	**0.33**	**0**	**0**	**$168,274**	**$164,193**	**$332,468**	0.0%

Risk Assessment Results for 100-Year Probabilistic Earthquake

	Probability		Impact on People			
	(High, Medium, Low, None)	Probability Factor (3,2,1,0)	% Population Exposed	Impact (High, Medium, Low, None)	Impact Factor	Weighted Impact Factor
Caldwell	Medium	2	100.00%	High	3	9
Greenleaf	Medium	2	100.00%	High	3	9
Melba	Medium	2	100.00%	High	3	9
Middleton	Medium	2	100.00%	High	3	9
Nampa	Medium	2	100.00%	High	3	9
Notus	Medium	2	100.00%	High	3	9
Parma	Medium	2	100.00%	High	3	9
Star	Medium	2	100.00%	High	3	9
Wilder	Medium	2	100.00%	High	3	9
Unincorporated County	Medium	2	100.00%	High	3	9
TOTAL	Medium	2	100.00%	High	3	9

RISK RANKING-100-yr Probabilistic

	Impact on Property				Impact on Economy			
	% of Total Value Exposed	Medium, Low, None)	Impact Factor	Weighted Impact Factor	% of Total Value Damaged	Impact (High, Medium, Low, None)	Impact Factor	Weighted Impact Factor
Caldwell	100.00%	High	3	6	0.00%	None	0	0
Greenleaf	100.00%	High	3	6	0.00%	None	0	0
Melba	100.00%	High	3	6	0.00%	None	0	0
Middleton	100.00%	High	3	6	0.00%	None	0	0
Nampa	100.00%	High	3	6	0.00%	None	0	0
Notus	100.00%	High	3	6	0.00%	None	0	0
Parma	100.00%	High	3	6	0.00%	None	0	0
Star	100.00%	High	3	6	0.00%	None	0	0
Wilder	100.00%	High	3	6	0.00%	None	0	0
Unincorporated County	100.00%	High	3	6	0.00%	None	0	0
TOTAL	100.00%	High	3	6	0.00%	None	0	0

Risk Assessment Results for 100-Year Probabilistic Earthquake

	Risk Ranking Score	Hazard Risk Rating
Caldwell	30	Low
Greenleaf	30	Low
Melba	30	Low
Middleton	30	Low
Nampa	30	Low
Notus	30	Low
Parma	30	Low
Star	30	Low
Wilder	30	Low
Unincorporated County	30	Low
TOTAL	30	Low

Risk Assessment Results for 500-Year Probabilistic Earthquake

Jurisdiction	Estimated Exposure				
	Estimated Population (1)	**% Population Exposed**	**Total Number of Buildings (2)**	**Total Building Value (Structure and contents in $) (2)**	**% of Total Value Exposed**
Caldwell	58,481	100%	17,970	$10,387,912,448	100%
Greenleaf	886	100%	316	$160,047,309	100%
Melba	558	100%	235	$237,097,875	100%
Middleton	8,466	100%	3,152	$1,621,812,777	100%
Nampa	99,277	100%	31,225	$20,697,926,294	100%
Notus	638	100%	227	$84,189,080	100%
Parma	2,147	100%	760	$673,146,588	100%
Star	30	100%	11	$3,247,639	100%
Wilder	1,823	100%	550	$259,156,358	100%
Unincorporated County	57,543	100%	19,827	$11,770,680,831	100%
TOTAL	**229,849**	100%	**74,273**	**$45,895,217,198**	100%

Sources:
(1) 2019 Census population estimates downloaded from the Idaho State Department of Labor website.
(2) Values based off of tax assessor data provided by Canyon County in January 2020.
(3) Calculated using a Census tract level, general building stock (GBS) analysis in Hazus 4.2 SP03.
(4) Calculated using an Advanced Engineering Building Model (AEBM) analysis in Hazus 4.2 SP03.

Risk Assessment Results for 500-Year Probabilistic Earthquake

Jurisdiction	Economic Impact						
	Structure Debris (x 1,000 Tons) (3)	Number of Displaced Households (3)	People Requiring Short-Term Shelter (3)	Value Structure in $ Damaged (4)	Value Contents in $ Damaged (4)	Total Value (Structure and Contents in $) Damaged (4)	% of Total Value Damaged
Caldwell	2.16	0	0	$30,247,402	$17,566,774	$47,814,176	0.5%
Greenleaf	0.02	0	0	$56,737	$54,693	$111,430	0.1%
Melba	0.03	0	0	$68,435	$72,584	$141,019	0.1%
Middleton	0.19	0	0	$3,107,917	$1,238,522	$4,346,439	0.3%
Nampa	2.61	0	0	$14,157,429	$9,253,924	$23,411,353	0.1%
Notus	0.02	0	0	$234,584	$93,682	$328,266	0.4%
Parma	0.19	0	0	$312,613	$315,182	$627,795	0.1%
Star	0.00	0	0	$496	$378	$874	0.0%
Wilder	0.04	0	0	$106,280	$105,365	$211,645	0.1%
Unincorporated County	1.49	0	0	$8,206,692	$5,538,540	$13,745,232	0.1%
TOTAL	**6.75**	**1**	**1**	**$56,498,584**	**$34,239,644**	**$90,738,228**	0.2%

Risk Assessment Results for 500-Year Probabilistic Earthquake

	Probability		Impact on People			
	Probability (High, Medium, Low, None)	Probability Factor (3,2,1,0)	% Population Exposed	Impact (High, Medium, Low, None)	Impact Factor	Weighted Impact Factor
Caldwell	Medium	2	100.00%	High	3	9
Greenleaf	Medium	2	100.00%	High	3	9
Melba	Medium	2	100.00%	High	3	9
Middleton	Medium	2	100.00%	High	3	9
Nampa	Medium	2	100.00%	High	3	9
Notus	Medium	2	100.00%	High	3	9
Parma	Medium	2	100.00%	High	3	9
Star	Medium	2	100.00%	High	3	9
Wilder	Medium	2	100.00%	High	3	9
Unincorporated County	Medium	2	100.00%	High	3	9
TOTAL	Medium	2	100.00%	High	3	9

Risk Assessment Results for 500-Year Probabilistic Earthquake

RISK RANKING-500-yr Probabilistic

	Impact on Property				Impact on Economy			
	% of Total Value Exposed	Impact (High, Medium, Low, None)	Impact Factor	Weighted Impact Factor	% of Total Value Damaged	Impact (High, Medium, Low, None)	Impact Factor	Weighted Impact Factor
Caldwell	100.00%	High	3	6	0.46%	Low	1	1
Greenleaf	100.00%	High	3	6	0.07%	Low	1	1
Melba	100.00%	High	3	6	0.06%	Low	1	1
Middleton	100.00%	High	3	6	0.27%	Low	1	1
Nampa	100.00%	High	3	6	0.11%	Low	1	1
Notus	100.00%	High	3	6	0.39%	Low	1	1
Parma	100.00%	High	3	6	0.09%	Low	1	1
Star	100.00%	High	3	6	0.03%	Low	1	1
Wilder	100.00%	High	3	6	0.08%	Low	1	1
Unincorporated County	100.00%	High	3	6	0.12%	Low	1	1
TOTAL	100.00%	High	3	6	0.20%	Low	1	1

Risk Assessment Results for 500-Year Probabilistic Earthquake

	Risk Ranking Score	Hazard Risk Rating
Caldwell	32	High
Greenleaf	32	High
Melba	32	High
Middleton	32	High
Nampa	32	High
Notus	32	High
Parma	32	High
Star	32	High
Wilder	32	High
Unincorporated County	32	High
TOTAL	32	High

Risk Assessment Results for 100-Year Flood

Jurisdiction	Estimated Population (1)	Total Number of Buildings (2)	Total Number of Residential Buildings (2)	Total Building Value (Structure and contents in $) (2)
Caldwell	58,481	17,970	16,782	$10,387,912,448
Greenleaf	886	316	291	$160,047,309
Melba	558	235	182	$237,097,875
Middleton	8,466	3,152	3,032	$1,621,812,777
Nampa	99,277	31,225	29,116	$20,697,926,294
Notus	638	227	206	$84,189,080
Parma	2,147	760	622	$673,146,588
Star	30	11	11	$3,247,639
Wilder	1,823	550	484	$259,156,358
Unincorporated County	57,543	19,827	19,148	$11,770,680,831
Total	**229,849**	**74,273**	**69,874**	**$45,895,217,198**

Sources

(1) 2019 Census population estimates downloaded from the Idaho State Department of Labor website.

(2) Values based off of tax assessor data provided by Canyon County in January 2020.

(3) Percent of residential buildings exposed multiplied by the Estimated Population.

(4) Calculated using a Census block level, general building stock (GBS) analysis in Hazus 4.2 SP03.

(5) Calculated using a Census block level, general building stock (GBS) analysis in Hazus 4.2 SP03, and adjusted to reflect the estimated population.

(6) Calculated using a user-defined (UDF) analysis in Hazus 4.2 SP03.

Risk Assessment Results for 100-Year Flood

Jurisdiction	Estimated Building Exposure						
	Buildings Exposed (2)	Population Exposed (3)	% of Population Exposed	Value Structure in $ Exposed (2)	Value Contents in $ Exposed (2)	Value (Structure and contents in $) Exposed (2)	% of Total Value Exposed
Caldwell	224	634	1.1%	$159,417,623	$139,797,311	$299,214,934	2.9%
Greenleaf	0	0	0.0%	$0	$0	$0	0.0%
Melba	0	0	0.0%	$0	$0	$0	0.0%
Middleton	242	639	7.6%	$64,666,112	$43,591,612	$108,257,724	6.7%
Nampa	857	2,499	2.5%	$476,609,061	$428,014,284	$904,623,345	4.4%
Notus	8	22	3.4%	$1,202,715	$733,664	$1,936,380	2.3%
Parma	102	249	11.6%	$85,063,802	$83,293,207	$168,357,009	25.0%
Star	0	0	0.0%	$0	$0	$0	0.0%
Wilder	0	0	0.0%	$0	$0	$0	0.0%
Unincorporated County	684	1,893	3.3%	$339,531,778	$260,344,135	$599,875,914	5.1%
Total	**2,117**	**5,936**	**2.6%**	**$1,126,491,091**	**$955,774,214**	**$2,082,265,305**	**4.5%**

Risk Assessment Results for 100-Year Flood

Jurisdiction	Economic Impact							
	Structure Debris (Tons) (4)	Displaced Population (5)	People Requiring Short-Term Shelter (5)	Buildings Impacted (6)	Value Structure in $ Damaged (6)	Value Contents in $ Damaged (6)	Total Value (Structure and Contents in $) Damaged (6)	% of Total Value Damaged
Caldwell	386	133	3	142	$1,989,038	$2,705,132	$4,694,170	0.0%
Greenleaf	0	0	0	0	$0	$0	$0	0.0%
Melba	0	0	0	0	$0	$0	$0	0.0%
Middleton	130	203	9	159	$2,749,375	$1,767,011	$4,516,386	0.3%
Nampa	1,152	1,023	47	688	$18,300,197	$30,888,039	$49,188,237	0.2%
Notus	21	3	0	5	$71,941	$31,208	$103,149	0.1%
Parma	14	140	2	67	$1,002,564	$1,796,127	$2,798,691	0.4%
Star	0	0	0	0	$0	$0	$0	0.0%
Wilder	0	0	0	0	$0	$0	$0	0.0%
Unincorporated County	1,639	462	10	491	$18,924,723	$21,088,836	$40,013,560	0.3%
Total	**3,342**	**1,965**	**70**	**1,552**	**$43,037,839**	**$58,276,354**	**$101,314,192**	**0.2%**

Risk Assessment Results for 100-Year Flood

Jurisdiction	Acres of Floodplain	Number of Structures in Floodplain (2)							
		Residential	Commercial	Industrial	Agriculture	Religion	Government	Education	Total
Caldwell	643	182	42	0	0	0	0	0	224
Greenleaf	5	0	0	0	0	0	0	0	0
Melba	0	0	0	0	0	0	0	0	0
Middleton	706	229	13	0	0	0	0	0	242
Nampa	646	733	113	6	2	3	0	0	857
Notus	46	7	1	0	0	0	0	0	8
Parma	213	72	26	3	1	0	0	0	102
Star	203	0	0	0	0	0	0	0	0
Wilder	0	0	0	0	0	0	0	0	0
Unincorporated County	31,061	630	50	4	0	0	0	0	684
Total	**33,523**	**1,853**	**245**	**13**	**3**	**3**	**0**	**0**	**2117**

Risk Assessment Results for 100-Year Flood

	Probability		Impact on People			
	Probability (High, Medium, Low, None)	Probability Factor (3,2,1,0)	% Population Exposed	Impact (High, Medium, Low, None)	Impact Factor	Weighted Impact Factor
Caldwell	Medium	2	1.08%	Low	1	3
Greenleaf	Medium	2	0.00%	None	0	0
Melba	Medium	2	0.00%	None	0	0
Middleton	Medium	2	7.55%	Low	1	3
Nampa	Medium	2	2.52%	Low	1	3
Notus	Medium	2	3.40%	Low	1	3
Parma	Medium	2	11.58%	Medium	2	6
Star	Medium	2	0.00%	None	0	0
Wilder	Medium	2	0.00%	None	0	0
Unincorporated County	Medium	2	0.00%	None	0	0
Total	Medium	2	2.58%	Low	1	3

RISK RANKING-100-Year Flood

	Impact on Property				Impact on Economy			
	% of Total Value Exposed	Impact (High, Medium, Low, None)	Impact Factor	Weighted Impact Factor	% of Total Value Damaged	Impact (High, Medium, Low, None)	Impact Factor	Weighted Impact Factor
Caldwell	2.88%	Low	1	2	0.05%	Low	1	1
Greenleaf	0.00%	None	0	0	0.00%	None	0	0
Melba	0.00%	None	0	0	0.00%	None	0	0
Middleton	6.68%	Low	1	2	0.28%	Low	1	1
Nampa	4.37%	Low	1	2	0.24%	Low	1	1
Notus	2.30%	Low	1	2	0.12%	Low	1	1
Parma	25.01%	High	3	6	0.42%	Low	1	1
Star	0.00%	None	0	0	0.00%	None	0	0
Wilder	0.00%	None	0	0	0.00%	None	0	0
Unincorporated County	0.00%	None	0	0	0.00%	None	0	0
Total	4.54%	Low	1	2	0.22%	Low	1	1

Risk Assessment Results for 100-Year Flood

	Risk Ranking Score	Hazard Risk Rating
Caldwell	**12**	**Low**
Greenleaf	**0**	**Low**
Melba	**0**	**Low**
Middleton	**12**	**Low**
Nampa	**12**	**Low**
Notus	**12**	**Low**
Parma	**26**	**Medium**
Star	**0**	**Low**
Wilder	**0**	**Low**
Unincorporated County	**0**	**Low**
Total	**12**	**Low**

Flood 100-yr Count, Exposed Critical Facilities

	Communications	Energy	Food, Water, Shelter	Hazardous Material	Health & Medical	Safety & Security	Transportation	Total
Caldwell	0	0	0	1	0	1	2	**4**
Greenleaf	0	0	0	0	0	0	0	**0**
Melba	0	0	0	0	0	0	0	**0**
Middleton	0	0	0	0	1	0	6	**7**
Nampa	0	0	0	0	0	0	10	**10**
Notus	0	0	0	0	0	0	0	**0**
Parma	0	0	0	0	0	0	1	**1**
Star	0	0	0	0	0	0	0	**0**
Wilder	0	0	0	0	0	0	0	**0**
Unincorporated	0	0	1	2	0	0	19	**22**
Total	**0**	**0**	**1**	**3**	**1**	**1**	**38**	**44**

Risk Assessment Results for 500-Year Flood

Jurisdiction	Estimated Population (1)	Total Number of Buildings (2)	Total Number of Residential Buildings (2)	Total Building Value (Structure and contents in $) (2)
Caldwell	58,481	17,970	16,782	$10,387,912,448
Greenleaf	886	316	291	$160,047,309
Melba	558	235	182	$237,097,875
Middleton	8,466	3,152	3,032	$1,621,812,777
Nampa	99,277	31,225	29,116	$20,697,926,294
Notus	638	227	206	$84,189,080
Parma	2,147	760	622	$673,146,588
Star	30	11	11	$3,247,639
Wilder	1,823	550	484	$259,156,358
Unincorporated County	57,543	19,827	19,148	$11,770,680,831
Total	**229,849**	**74,273**	**69,874**	**$45,895,217,198**

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(6) Calculated using a user-defined (UDF) analysis in Hazus 4.2 SP03.

Risk Assessment Results for 500-Year Flood

Jurisdiction	Estimated Building Exposure						
	Buildings Exposed (2)	**Population Exposed (3)**	**% of Population Exposed**	**Value Structure in $ Exposed (2)**	**Value Contents in $ Exposed (2)**	**Value (Structure and contents in $) Exposed (2)**	**% of Total Value Exposed**
Caldwell	1,532	3,952	6.8%	$972,952,401	$908,028,626	$1,880,981,027	18.1%
Greenleaf	0	0	0.0%	$0	$0	$0	0.0%
Melba	0	0	0.0%	$0	$0	$0	0.0%
Middleton	572	1,513	17.9%	$162,518,404	$118,915,381	$281,433,785	17.4%
Nampa	1,451	4,347	4.4%	$672,416,484	$575,248,737	$1,247,665,221	6.0%
Notus	8	22	3.4%	$1,202,715	$733,664	$1,936,380	2.3%
Parma	121	286	13.3%	$91,203,406	$88,960,928	$180,164,334	26.8%
Star	1	3	9.1%	$93,293	$46,646	$139,939	4.3%
Wilder	0	0	0.0%	$0	$0	$0	0.0%
Unincorporated County	800	2,185	3.8%	$443,239,647	$364,411,062	$807,650,710	6.9%
Total	**4,485**	**12,308**	**5.4%**	**$2,343,626,350**	**$2,056,345,045**	**$4,399,971,395**	**9.6%**

Jurisdiction	Economic Impact							
	Structure Debris (Tons) (4)	Displaced Population (5)	People Requiring Short-Term Shelter (5)	Buildings Impacted (6)	Value Structure in $ Damaged (6)	Value Contents in $ Damaged (6)	Total Value (Structure and Contents in $) Damaged (6)	% of Total Value Damaged
Caldwell	2,899	2,206	112	1,158	$50,811,771	$126,098,484	$176,910,255	1.7%
Greenleaf	1	0	0	0	$0	$0	$0	0.0%
Melba	0	0	0	0	$0	$0	$0	0.0%
Middleton	134	645	22	395	$4,715,531	$2,918,793	$7,634,324	0.5%
Nampa	4,420	2,617	142	1,307	$80,767,476	$134,783,459	$215,550,935	1.0%
Notus	20	4	0	5	$71,941	$31,208	$103,149	0.1%
Parma	67	202	2	100	$3,544,730	$10,231,343	$13,776,073	2.0%
Star	0	0	0	0	$0	$0	$0	0.0%
Wilder	0	0	0	0	$0	$0	$0	0.0%
Unincorporated County	2,370	590	12	610	$26,318,767	$24,593,044	$50,911,811	0.4%
Total	**9,911**	**6,264**	**290**	**3,575**	**$166,230,217**	**$298,656,331**	**$464,886,547**	**1.0%**

Risk Assessment Results for 500-Year Flood

Jurisdiction	Acres of Floodplain	Number of Structures in Floodplain (2)							
		Residential	Commercial	Industrial	Agriculture	Religion	Government	Education	Total
Caldwell	1,619	1,134	371	16	2	7	0	2	1532
Greenleaf	8	0	0	0	0	0	0	0	0
Melba	0	0	0	0	0	0	0	0	0
Middleton	929	542	28	1	0	0	0	1	572
Nampa	1,025	1,275	160	8	3	4	0	1	1451
Notus	47	7	1	0	0	0	0	0	8
Parma	247	83	34	3	1	0	0	0	121
Star	225	1	0	0	0	0	0	0	1
Wilder	0	0	0	0	0	0	0	0	0
Unincorporated County	34,352	727	65	8	0	0	0	0	800
Total	**38,451**	**3,769**	**659**	**36**	**6**	**11**	**0**	**4**	**4485**

Risk Assessment Results for 500-Year Flood

	Probability		Impact on People			
	Probability (High, Medium, Low, None)	Probability Factor (3,2,1,0)	% Population Exposed	Impact (High, Medium, Low, None)	Impact Factor	Weighted Impact Factor
Caldwell	Medium	2	6.76%	Low	1	3
Greenleaf	Medium	2	0.00%	None	0	0
Melba	Medium	2	0.00%	None	0	0
Middleton	Medium	2	17.88%	Medium	2	6
Nampa	Medium	2	4.38%	Low	1	3
Notus	Medium	2	3.40%	Low	1	3
Parma	Medium	2	13.34%	Medium	2	6
Star	Medium	2	9.09%	Low	1	3
Wilder	Medium	2	0.00%	None	0	0
Unincorporated County	Medium	2	0.00%	None	0	0
Total	Medium	2	5.35%	Low	1	3

RISK RANKING-500-Year Flood

	Impact on Property				Impact on Economy			
	% of Total Value Exposed	Impact (High, Medium, Low, None)	Impact Factor	Weighted Impact Factor	% of Total Value Damaged	Impact (High, Medium, Low, None)	Impact Factor	Weighted Impact Factor
Caldwell	18.11%	Medium	2	4	1.70%	Low	1	1
Greenleaf	0.00%	None	0	0	0.00%	None	0	0
Melba	0.00%	None	0	0	0.00%	None	0	0
Middleton	17.35%	Medium	2	4	0.47%	Low	1	1
Nampa	6.03%	Low	1	2	1.04%	Low	1	1
Notus	2.30%	Low	1	2	0.12%	Low	1	1
Parma	26.76%	High	3	6	2.05%	Low	1	1
Star	4.31%	Low	1	2	0.00%	None	0	0
Wilder	0.00%	None	0	0	0.00%	None	0	0
Unincorporated County	0.00%	None	0	0	0.00%	None	0	0
Total	9.59%	Low	1	2	1.01%	Low	1	1

Risk Assessment Results for 500-Year Flood

	Risk Ranking Score	Hazard Risk Rating
Caldwell	**16**	**Medium**
Greenleaf	**0**	**Low**
Melba	**0**	**Low**
Middleton	**22**	**Medium**
Nampa	**12**	**Low**
Notus	**12**	**Low**
Parma	**26**	**Medium**
Star	**10**	**Low**
Wilder	**0**	**Low**
Unincorporated County	**0**	**Low**
Total	**12**	**Low**

Flood 500-yr Count, Exposed Critical Facilities

	Communications	Energy	Food, Water, Shelter	Hazardous Material	Health & Medical	Safety & Security	Transportation	Total
Caldwell	8	1	2	7	0	9	15	**42**
Greenleaf	0	0	0	0	0	0	0	**0**
Melba	0	0	0	0	0	0	0	**0**
Middleton	0	1	0	0	1	1	6	**9**
Nampa	0	0	3	0	0	0	12	**15**
Notus	0	0	0	0	0	0	0	**0**
Parma	0	0	0	0	0	0	1	**1**
Star	0	0	0	0	0	0	0	**0**
Wilder	0	0	0	0	0	0	0	**0**
Unincorporated	0	0	1	3	0	0	21	**25**
Total	**8**	**2**	**6**	**10**	**1**	**10**	**55**	**92**

Jurisdiction	Estimated Population (1)	Total Number of Buildings (2)	Total Number of Residential Buildings (2)	Total Building Value (Structure and contents in $) (2)
Caldwell	58,481	17,970	16,782	$10,387,912,448
Greenleaf	886	316	291	$160,047,309
Melba	558	235	182	$237,097,875
Middleton	8,466	3,152	3,032	$1,621,812,777
Nampa	99,277	31,225	29,116	$20,697,926,294
Notus	638	227	206	$84,189,080
Parma	2,147	760	622	$673,146,588
Star	30	11	11	$3,247,639
Wilder	1,823	550	484	$259,156,358
Unincorporated County	57,543	19,827	19,148	$11,770,680,831
Total	**229,849**	**74,273**	**69,874**	**$45,895,217,198**

Jurisdiction	Estimated Population (1)	Total Number of Buildings (2)	Total Number of Residential Buildings (2)	Total Building Value (Structure and contents in $) (2)
Caldwell	58,481	17,970	16,782	$10,387,912,448
Greenleaf	886	316	291	$160,047,309
Melba	558	235	182	$237,097,875
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Wilder	1,823	550	484	$259,156,358
Unincorporated County	57,543	19,827	19,148	$11,770,680,831
Total	**229,849**	**74,273**	**69,874**	**$45,895,217,198**

Sources:
(1) 2019 Census population estimates downloaded from the Idaho State Department of Labor website.

(2) Values based off of tax assessor data provided by Canyon County in January 2020.

(3) Slope determined from USGS 10-m DEM.

(4) Percent of residential buildings exposed multiplied by the Estimated Population.

Jurisdiction	Landslide-Slope Greater Than 30% (3)						
	Estimated Exposure						
	Estimated Buildings Exposed (2)	Population Exposed (4)	% of Population Exposed	Value Structure in $ Exposed (2)	Value Contents in $ Exposed (2)	Value (Structure and contents in $) Exposed (2)	% of Total Value
Caldwell	10	28	0.0%	$5,129,248	$4,471,495	$9,600,743	0.1%
Greenleaf	0	116	13.1%	$0	$0	$0	0.0%
Melba	0	0	0.0%	$0	$0	$0	0.0%
Middleton	0	0	0.0%	$0	$0	$0	0.0%
Nampa	0	0	0.0%	$0	$0	$0	0.0%
Notus	0	0	0.0%	$0	$0	$0	0.0%
Parma	0	0	0.0%	$0	$0	$0	0.0%
Star	0	0	0.0%	$0	$0	$0	0.0%
Wilder	0	0	0.0%	$0	$0	$0	0.0%
Unincorporated County	45	0	0.0%	$30,582,587	$24,131,814	$54,714,400	0.5%
Total	**55**	**144**	**0.1%**	**$35,711,835**	**$28,603,309**	**$64,315,144**	**0.1%**

Jurisdiction	Landslide-Slope 15% to 30% (3)						
	Estimated Exposure						
	Estimated Buildings Exposed (2)	Population Exposed (4)	% of Population Exposed	Value Structure in $ Exposed (2)	Value Contents in $ Exposed (2)	Value (Structure and contents in $) Exposed (2)	% of Total Value
Caldwell	35	122	0.2%	$7,167,066	$3,583,533	$10,750,599	0.1%
Greenleaf	2	6	0.7%	$562,462	$281,231	$843,694	0.5%
Melba	0	0	0.0%	$0	$0	$0	0.0%
Middleton	2	6	0.1%	$905,885	$452,943	$1,358,828	0.1%
Nampa	19	61	0.1%	$4,700,228	$2,812,303	$7,512,531	0.0%
Notus	0	0	0.0%	$0	$0	$0	0.0%
Parma	1	3	0.2%	$285,830	$142,915	$428,745	0.1%
Star	0	0	0.0%	$0	$0	$0	0.0%
Wilder	0	0	0.0%	$0	$0	$0	0.0%
Unincorporated County	325	959	1.7%	$99,800,780	$52,086,300	$151,887,080	1.3%
Total	**384**	**1,157**	**0.5%**	**$113,422,252**	**$59,359,225**	**$172,781,477**	**0.4%**

Jurisdiction	Number of Structures in Category ` (2)							
	Residential	Commercial	Industrial	Agriculture	Religion	Government	Education	Total
Caldwell	8	2	0	0	0	0	0	10
Greenleaf	38	7	0	0	0	0	0	45
Melba	0	0	0	0	0	0	0	0
Middleton	0	0	0	0	0	0	0	0
Nampa	0	0	0	0	0	0	0	0
Notus	0	0	0	0	0	0	0	0
Parma	0	0	0	0	0	0	0	0
Star	0	0	0	0	0	0	0	0
Wilder	0	0	0	0	0	0	0	0
Unincorporated County	0	0	0	0	0	0	0	0
Total	**46**	**9**	**0**	**0**	**0**	**0**	**0**	**55**

Jurisdiction	Number of Structures in Category 2 (2)							
	Residential	Commercial	Industrial	Agriculture	Religion	Government	Education	Total
Caldwell	35	0	0	0	0	0	0	35
Greenleaf	2	0	0	0	0	0	0	2
Melba	0	0	0	0	0	0	0	0
Middleton	2	0	0	0	0	0	0	2
Nampa	18	1	0	0	0	0	0	19
Notus	0	0	0	0	0	0	0	0
Parma	1	0	0	0	0	0	0	1
Star	0	0	0	0	0	0	0	0
Wilder	0	0	0	0	0	0	0	0
Unincorporated County	319	4	0	1	1	0	0	325
Total	**377**	**5**	**0**	**1**	**1**	**0**	**0**	**384**

	RISK RANKING					
	Probability		Impact on People			
	Probability (High, Medium, Low, None)	Probability Factor (3,2,1,0)	% Population Exposed	Impact (High, Medium, Low, None)	Impact Factor	Weighted Impact Factor
Caldwell	Medium	2	0.26%	Low	1	3
Greenleaf	Medium	2	13.75%	Medium	2	6
Melba	Medium	2	0.00%	None	0	0
Middleton	Medium	2	0.07%	Low	1	3
Nampa	Medium	2	0.06%	Low	1	3
Notus	Medium	2	0.00%	None	0	0
Parma	Medium	2	0.16%	Low	1	3
Star	Medium	2	0.00%	None	0	0
Wilder	Medium	2	0.00%	None	0	0
Unincorporated County	Medium	2	1.67%	Low	1	3
Total	Medium	2	0.57%	Low	1	3

-Landslide (Categories Slope Greater Than 30% and Slope 15% to 30%)

	Impact on Property				Impact on Economy					
	% of Total Value Exposed	Impact (High, Medium, Low, None)	Impact Factor	Weighted Impact Factor	% of Total Value Damaged	Impact (High, Medium, Low, None)	Impact Factor	Weighted Impact Factor	Risk Ranking Score	Hazard Risk Rating
Caldwell	0.20%	Low	1	2	0.05%	Low	1	1	**12**	**Low**
Greenleaf	0.53%	Low	1	2	0.13%	Low	1	1	**18**	**Medium**
Melba	0.00%	None	0	0	0.00%	None	0	0	**0**	**Low**
Middleton	0.08%	Low	1	2	0.02%	Low	1	1	**12**	**Low**
Nampa	0.04%	Low	1	2	0.01%	None	0	0	**10**	**Low**
Notus	0.00%	None	0	0	0.00%	None	0	0	**0**	**Low**
Parma	0.06%	Low	1	2	0.02%	Low	1	1	**12**	**Low**
Star	0.00%	None	0	0	0.00%	None	0	0	**0**	**Low**
Wilder	0.00%	None	0	0	0.00%	None	0	0	**0**	**Low**
Unincorporated County	1.76%	Low	1	2	0.44%	Low	1	1	**12**	**Low**
Total	0.52%	Low	1	2	0.13%	Low	1	1	**12**	**Low**

Landslide Count, Exposed Critical Facilities

	Communications	Energy	Food, Water, Shelter	Hazardous Material	Health & Medical	Safety & Security	Transportation	Total
Caldwell	0	0	0	0	0	0	1	**1**
Greenleaf	0	0	0	0	0	0	0	**0**
Melba	0	0	0	0	0	0	0	**0**
Middleton	0	0	0	0	0	0	0	**0**
Nampa	0	0	0	0	0	0	1	**1**
Notus	0	0	0	0	0	0	0	**0**
Parma	0	0	0	0	0	0	0	**0**
Star	0	0	0	0	0	0	0	**0**
Wilder	0	0	0	0	0	0	0	**0**
Unincorporated	1	0	0	0	0	0	1	**2**
Total	**1**	**0**	**0**	**0**	**0**	**0**	**3**	**4**

Jurisdiction	Estimated Population (1)	Total Number of Buildings (2)	Total Number of Residential Buildings (2)	Total Building Value (Structure and contents in $) (2)
Caldwell	58,481	17,970	16,782	$10,387,912,448
Greenleaf	886	316	291	$160,047,309
Melba	558	235	182	$237,097,875
Middleton	8,466	3,152	3,032	$1,621,812,777
Nampa	99,277	31,225	29,116	$20,697,926,294
Notus	638	227	206	$84,189,080
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Unincorporated County	57,543	19,827	19,148	$11,770,680,831
Total	**229,849**	**74,273**	**69,874**	**$45,895,217,198**

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Jurisdiction	Wildfire Risk Category-High (3)						
	Estimated Exposure						
	Estimated Buildings Exposed (2)	Population Exposed (4)	% of Population Exposed	Value Structure in $ Exposed (2)	Value Contents in $ Exposed (2)	Value (Structure and contents in $) Exposed (2)	% of Total Value
Caldwell	0	0	0.0%	$0	$0	$0	0.0%
Greenleaf	0	0	0.0%	$0	$0	$0	0.0%
Melba	0	0	0.0%	$0	$0	$0	0.0%
Middleton	730	1,927	22.8%	$217,315,426	$155,962,970	$373,278,396	23.0%
Nampa	0	0	0.0%	$0	$0	$0	0.0%
Notus	0	0	0.0%	$0	$0	$0	0.0%
Parma	0	0	0.0%	$0	$0	$0	0.0%
Star	0	0	0.0%	$0	$0	$0	0.0%
Wilder	0	0	0.0%	$0	$0	$0	0.0%
Unincorporated County	462	1,388	2.4%	$142,731,408	$71,365,704	$214,097,112	1.8%
Total	**1,192**	**3,315**	**1.4%**	**$360,046,834**	**$227,328,674**	**$587,375,508**	**1.3%**

Jurisdiction	Wildfire Risk Category-Moderate-High (3)						
	Estimated Exposure						
	Estimated Buildings Exposed (2)	Population Exposed (4)	% of Population Exposed	Value Structure in $ Exposed (2)	Value Contents in $ Exposed (2)	Value (Structure and contents in $) Exposed (2)	% of Total Value
Caldwell	0	0	0.0%	$0	$0	$0	0.0%
Greenleaf	0	0	0.0%	$0	$0	$0	0.0%
Melba	0	0	0.0%	$0	$0	$0	0.0%
Middleton	1,458	3,937	46.5%	$426,870,635	$268,131,092	$695,001,727	42.9%
Nampa	0	0	0.0%	$0	$0	$0	0.0%
Notus	0	0	0.0%	$0	$0	$0	0.0%
Parma	0	0	0.0%	$0	$0	$0	0.0%
Star	11	30	100.0%	$2,165,093	$1,082,546	$3,247,639	100.0%
Wilder	0	0	0.0%	$0	$0	$0	0.0%
Unincorporated County	1,248	3,708	6.4%	$450,108,222	$251,761,507	$701,869,730	6.0%
Total	**2,717**	**7,675**	**3.3%**	**$879,143,950**	**$520,975,146**	**$1,400,119,095**	**3.1%**

Jurisdiction	Number of Structures in High Category (2)							
	Residential	Commercial	Industrial	Agriculture	Religion	Government	Education	Total
Caldwell	0	0	0	0	0	0	0	0
Greenleaf	0	0	0	0	0	0	0	0
Melba	0	0	0	0	0	0	0	0
Middleton	690	36	0	0	2	0	2	730
Nampa	0	0	0	0	0	0	0	0
Notus	0	0	0	0	0	0	0	0
Parma	0	0	0	0	0	0	0	0
Star	0	0	0	0	0	0	0	0
Wilder	0	0	0	0	0	0	0	0
Unincorporated County	462	0	0	0	0	0	0	462
Total	**1,152**	**36**	**0**	**0**	**2**	**0**	**2**	**1,192**

Jurisdiction	Number of Structures in Moderate-High Category (2)							
	Residential	Commercial	Industrial	Agriculture	Religion	Government	Education	Total
Caldwell	0	0	0	0	0	0	0	0
Greenleaf	0	0	0	0	0	0	0	0
Melba	0	0	0	0	0	0	0	0
Middleton	1,410	42	0	2	3	0	1	1,458
Nampa	0	0	0	0	0	0	0	0
Notus	0	0	0	0	0	0	0	0
Parma	0	0	0	0	0	0	0	0
Star	11	0	0	0	0	0	0	11
Wilder	0	0	0	0	0	0	0	0
Unincorporated County	1,234	12	0	1	1	0	0	1,248
Total	**2,655**	**54**	**0**	**3**	**4**	**0**	**1**	**2,717**

Jurisdiction	Estimated Population (1)	Total Number of Buildings (2)	Total Number of Residential Buildings (2)	Total Building Value (Structure and contents in $) (2)
Caldwell	58,481	17,970	16,782	$10,387,912,448
Greenleaf	886	316	291	$160,047,309
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Sources:
(1) 2019 Census population estimates downloaded from the Idaho State Department of Labor website.

(2) Values based off of tax assessor data provided by Canyon County in January 2020.

(3) Relative Risk to Communities from Wildland Fire downloaded from Idaho State Geospatial Office website.

(4) Percent of residential buildings exposed multiplied by the Estimated Population.

Jurisdiction	Wildfire Risk Category-Moderate (3)						
	Estimated Exposure						
	Estimated Buildings Exposed (2)	Population Exposed (4)	% of Population Exposed	Value Structure in $ Exposed (2)	Value Contents in $ Exposed (2)	Value (Structure and contents in $) Exposed (2)	% of Total Value
Caldwell	204	693	1.2%	$63,115,434	$45,404,936	$108,520,370	1.0%
Greenleaf	0	0	0.0%	$0	$0	$0	0.0%
Melba	235	558	100.0%	$125,202,619	$111,895,256	$237,097,875	100.0%
Middleton	964	2,602	30.7%	$344,947,337	$208,585,317	$553,532,654	34.1%
Nampa	0	0	0.0%	$0	$0	$0	0.0%
Notus	0	0	0.0%	$0	$0	$0	0.0%
Parma	0	0	0.0%	$0	$0	$0	0.0%
Star	0	0	0.0%	$0	$0	$0	0.0%
Wilder	0	0	0.0%	$0	$0	$0	0.0%
Unincorporated County	2,718	7,910	13.7%	$1,008,206,040	$692,662,163	$1,700,868,203	14.5%
Total	**4,121**	**11,763**	**5.1%**	**$1,541,471,429**	**$1,058,547,672**	**$2,600,019,101**	**5.7%**

Jurisdiction	Number of Structures in Moderate Category (2)							
	Residential	Commercial	Industrial	Agriculture	Religion	Government	Education	Total
Caldwell	199	5	0	0	0	0	0	204
Greenleaf	0	0	0	0	0	0	0	0
Melba	182	42	1	0	4	3	3	235
Middleton	932	29	1	1	0	0	1	964
Nampa	0	0	0	0	0	0	0	0
Notus	0	0	0	0	0	0	0	0
Parma	0	0	0	0	0	0	0	0
Star	0	0	0	0	0	0	0	0
Wilder	0	0	0	0	0	0	0	0
Unincorporated County	2,632	82	3	1	0	0	0	2,718
Total	**3,945**	**158**	**5**	**2**	**4**	**3**	**4**	**4,121**

	RISK F						
	Probability		Impact on People				
	Probability (High, Medium, Low, None)	Probability Factor (3,2,1,0)	% Population Exposed	Impact (High, Medium, Low, None)	Impact Factor	Weighted Impact Factor
Caldwell	Medium	2	0.00%	None	0	0
Greenleaf	Medium	2	0.00%	None	0	0
Melba	Medium	2	0.00%	None	0	0
Middleton	Medium	2	69.26%	High	3	9
Nampa	Medium	2	0.00%	None	0	0
Notus	Medium	2	0.00%	None	0	0
Parma	Medium	2	0.00%	None	0	0
Star	Medium	2	100.00%	High	3	9
Wilder	Medium	2	0.00%	None	0	0
Unincorporated County	Medium	2	8.86%	Low	1	3
Total	Medium	2	4.78%	Low	1	3

RANKING-Wildfire Risk (Categories High and Moderate-High)

	Impact on Property				Impact on Economy					
	% of Total Value Exposed	Impact (High, Medium, Low, None)	Impact Factor	Weighted Impact Factor	% of Total Value Damaged	Impact (High, Medium, Low, None)	Impact Factor	Weighted Impact Factor	Risk Ranking Score	Hazard Risk Rating
Caldwell	0.00%	None	0	0	0.00%	None	0	0	**0**	**Low**
Greenleaf	0.00%	None	0	0	0.00%	None	0	0	**0**	**Low**
Melba	0.00%	None	0	0	0.00%	None	0	0	**0**	**Low**
Middleton	65.87%	High	3	6	16.47%	High	3	3	**36**	**High**
Nampa	0.00%	None	0	0	0.00%	None	0	0	**0**	**Low**
Notus	0.00%	None	0	0	0.00%	None	0	0	**0**	**Low**
Parma	0.00%	None	0	0	0.00%	None	0	0	**0**	**Low**
Star	100.00%	High	3	6	25.00%	High	3	3	**36**	**High**
Wilder	0.00%	None	0	0	0.00%	None	0	0	**0**	**Low**
Unincorporated County	7.78%	Low	1	2	1.95%	Low	1	1	**12**	**Low**
Total	4.33%	Low	1	2	1.08%	Low	1	1	**12**	**Low**

Wildfire High Count, Exposed Critical Facilities

	Communications	Energy	Food, Water, Shelter	Hazardous Material	Health & Medical	Safety & Security	Transportation	Total
Caldwell	0	0	0	0	0	0	0	**0**
Greenleaf	0	0	0	0	0	0	0	**0**
Melba	0	0	0	0	0	0	0	**0**
Middleton	1	0	0	0	1	3	3	**8**
Nampa	0	0	0	0	0	0	0	**0**
Notus	0	0	0	0	0	0	0	**0**
Parma	0	0	0	0	0	0	0	**0**
Star	0	0	0	0	0	0	0	**0**
Wilder	0	0	0	0	0	0	0	**0**
Unincorporated	0	0	0	0	0	0	3	**3**
Total	**1**	**0**	**0**	**0**	**1**	**3**	**6**	**11**

Wildfire Moderate-High Count, Exposed Critical Facilities

	Communications	Energy	Food, Water, Shelter	Hazardous Material	Health & Medical	Safety & Security	Transportation	Total
Caldwell	0	0	0	0	0	0	0	**0**
Greenleaf	0	0	0	0	0	0	0	**0**
Melba	0	0	0	0	0	0	0	**0**
Middleton	0	1	0	0	0	4	6	**11**
Nampa	0	0	0	0	0	0	0	**0**
Notus	0	0	0	0	0	0	0	**0**
Parma	0	0	0	0	0	0	0	**0**
Star	0	0	0	0	0	0	0	**0**
Wilder	0	0	0	0	0	0	0	**0**
Unincorporated	1	0	1	0	0	0	13	**15**
Total	**1**	**1**	**1**	**0**	**0**	**4**	**19**	**26**

Wildfire Moderate Count, Exposed Critical Facilities

	Communications	Energy	Food, Water, Shelter	Hazardous Material	Health & Medical	Safety & Security	Transportation	Total
Caldwell	0	0	0	0	0	0	5	**5**
Greenleaf	0	0	0	0	0	0	0	**0**
Melba	0	0	0	0	0	5	1	**6**
Middleton	1	1	0	1	1	3	0	**7**
Nampa	0	0	0	0	0	0	0	**0**
Notus	0	0	0	0	0	0	0	**0**
Parma	0	0	0	0	0	0	0	**0**
Star	0	0	0	0	0	0	0	**0**
Wilder	0	0	0	0	0	0	0	**0**
Unincorporated	0	1	1	0	0	1	15	**18**
Total	**1**	**2**	**1**	**1**	**1**	**9**	**21**	**36**

Appendix F. Plan Adoption Resolutions from Planning Partners

U.S. Department of Homeland Security
FEMA Region 10
130 228th Street, SW
Bothell, WA 98021-8627

FEMA

November 5, 2021

The Honorable Keri Smith
Chair, Canyon County Commissioners
1115 Albany St
Caldwell, ID 83605

Dear Commissioner Smith:

On August 11, 2021, the United States Department of Homeland Security's Federal Emergency Management Agency (FEMA) Region 10, approved the Canyon County Hazard Mitigation Plan as a multi-jurisdictional local plan as outlined in Code of Federal Regulations Title 44 Part 201. This approval provides the below jurisdictions eligibility to apply for the Robert T. Stafford Disaster Relief and Emergency Assistance Act's, Hazard Mitigation Assistance grants projects through August 10, 2026, through your state:

City of Caldwell	Canyon County	Boise River Flood Control District, 11
City of Nampa	Golden Gate Highway District	Nampa School District, 131

The updated list of approved jurisdictions includes the Nampa School District number 131 that recently adopted the Canyon County Natural Hazards Mitigation Plan. To continue eligibility, jurisdictions must review, revise as appropriate, and resubmit the plan within five years of the original approval date.

If you have questions regarding your plan's approval or FEMA's mitigation grant programs, please contact, Lorrie Pahl, Senior Mitigation Planner with Idaho Office of Emergency Management, at (208) 258-6508, who coordinates and administers these efforts for local entities.

Sincerely,

KRISTEN C MEYERS

Digitally signed by KRISTEN C MEYERS
Date: 2021.11.05 15:06:52 -07'00'

Kristen Meyers, Director
Mitigation Division

cc: Susan Cleverley, Idaho Office of Emergency Management

Enclosure

KM:vl

CANYON COUNTY IDAHO MULTI-JURISDICTIONAL

ALL HAZARD MITIGATION PLAN

PROMULGATION OF ADOPTION

Be it known that the Canyon County Idaho Board of County Commissioners do hereby approve the Adoption of the Canyon County Idaho Multi-Jurisdictional All Hazard Mitigation Plan and direct its implementation through the Canyon County All Hazard Mitigation Planning Committee.

Be it also known that the Board of County Commissioners hereby directs the Emergency Management Coordinator, to continue to lead the implementation of this plan as the Canyon County All Hazard Mitigation Committee Chair.

This Plan has been developed in the interest of providing all hazard mitigation protection to populations living in Canyon County and the incorporated Cities within its boundary. Through the adoption of this Plan, all County and City agencies are requested to develop directives, Standing Operating Procedures, checklists, or other supplemental guidance to insure its maximum effectiveness.

Canyon County Commissioner — 7/13/21 Date

Canyon County Commissioner — Date

Canyon County Commissioners — 07.13.21 Date

Attest:

Chris Yamamoto

Canyon County Clerk JR08, Deputy Clerk — 07.13.21 Date

Endorsed: Christine Wendelsdorf — 7/13/2021 Date

Emergency Management Coordinator

RESOLUTION NO. 276-21

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF CALDWELL AUTHORIZING THE ADOPTION OF THE CANYON COUNTY HAZARD MITIGATION PLAN

WHEREAS, all of Canyon County has exposure to natural hazards that increase the risk to life, property, environment and the County's economy; and

WHEREAS, pro-active mitigation of known hazards before a disaster event can reduce or eliminate long-term risk to life and property; and

WHEREAS, The Disaster Mitigation Act of 2000 (Public Law 106-390) established new requirements for pre and post disaster hazard mitigation programs; and

WHEREAS; a coalition of Canyon County stakeholders with like planning objectives has been formed to pool resources and create consistent mitigation strategies to be implemented within each partners identified capabilities, within the Canyon County Planning Area; and

WHEREAS, the coalition has completed a planning process that engages the public, assesses the risk and vulnerability to the impacts of natural hazards, develops a mitigation strategy consistent with a set of uniform goals and objectives, and creates a plan for implementing, evaluating and revising this strategy;

NOW, THEREFORE, BE IT RESOLVED that the City of Caldwell:

1.) Adopts in its entirety, Volume I and parts 1, the CITY OF CALDWELL jurisdictional annex of part 2, part 3 and the appendices of Volume II of the Canyon County Hazard Mitigation Plan (ACHMP).

2.) Will use the adopted and approved portions of the GCHMP to guide pre and post disaster mitigation of the hazards identified.

3.) Will coordinate the strategies identified in the GCHMP with other planning programs and mechanisms under its jurisdictional authority.

4.) Will continue to support of the Steering Committee and continue to participate in the Planning Partnership as described by the GCHMP.

5.) Will help promote and support the mitigation successes of all GCHMP Planning Partners.

PASSED AND ADOPTED on this 16TH day of August, 2021 by the following vote:

~~AYES:~~
~~NOES:~~
~~ABSENT:~~
~~ABSTAIN:~~
consent calendar approval

Mayor, City of Caldwell

ATTEST: City Clerk, City of Caldwell

RESOLUTION NO. 53-2021
A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF_NAMPA AUTHORIZING THE ADOPTION OF THE CANYON COUNTY HAZARD MITIGATION PLAN

WHEREAS, all of Canyon County has exposure to natural hazards that increase the risk to life, property, environment and the County's economy; and

WHEREAS, pro-active mitigation of known hazards before a disaster event can reduce or eliminate long-term risk to life and property; and

WHEREAS, The Disaster Mitigation Act of 2000 (Public Law 106-390) established new requirements for pre and post disaster hazard mitigation programs; and

WHEREAS; a coalition of Canyon County stakeholders with like planning objectives has been formed to pool resources and create consistent mitigation strategies to be implemented within each partners identified capabilities, within the Canyon County Planning Area; and

WHEREAS, the coalition has completed a planning process that engages the public, assesses the risk and vulnerability to the impacts of natural hazards, develops a mitigation strategy consistent with a set of uniform goals and objectives, and creates a plan for implementing, evaluating and revising this strategy;

NOW, THEREFORE, BE IT RESOLVED that the City of Nampa:

1.) Adopts in its entirety, Volume I and parts 1, the Canyon County jurisdictional annex of part 2, part 3 and the appendices of Volume II of the Canyon County Hazard Mitigation Plan (ACHMP).

2.) Will use the adopted and approved portions of the GCHMP to guide pre and post disaster mitigation of the hazards identified.

3.) Will coordinate the strategies identified in the GCHMP with other planning programs and mechanisms under its jurisdictional authority.

4.) Will continue to support of the Steering Committee and continue to participate in the Planning Partnership as described by the GCHMP.

5.) Will help promote and support the mitigation successes of all GCHMP Planning Partners.

PASSED AND ADOPTED on this 20th day of September, 2021 by the following vote:

AYES: 6
NOES: 0
ABSENT: 0
ABSTAIN: 0

Mayor, City of Nampa

ATTEST: City Clerk, City of Nampa

RESOLUTION NO. 2021-1

A RESOLUTION OF THE BOARD OF BOISE RIVER FLOOD CONTROL DISTRICT #11

AUTHORIZING THE ADOPTION OF THE CANYON COUNTY HAZARD MITIGATION PLAN

WHEREAS, all of Canyon County has exposure to natural hazards that increase the risk to life, property, environment and the County's economy; and

WHEREAS, pro-active mitigation of known hazards before a disaster event can reduce or eliminate long-term risk to life and property; and

WHEREAS, The Disaster Mitigation Act of 2000 (Public Law 106-390) established new requirements for pre and post disaster hazard mitigation programs; and

WHEREAS; a coalition of Canyon County stakeholders with like planning objectives has been formed to pool resources and create consistent mitigation strategies to be implemented within each partners identified capabilities, within the Canyon County Planning Area; and

WHEREAS, the coalition has completed a planning process that engages the public, assesses the risk and vulnerability to the impacts of natural hazards, develops a mitigation strategy consistent with a set of uniform goals and objectives, and creates a plan for implementing, evaluating and revising this strategy;

NOW, THEREFORE, BE IT RESOLVED that the Boise River Flood Control District #11:

1.) Adopts in its entirety, Volume I and parts 1, the ____________________ jurisdictional annex of part 2, part 3 and the appendices of Volume II of the Canyon County Hazard Mitigation Plan (ACHMP).

2.) Will use the adopted and approved portions of the GCHMP to guide pre and post disaster mitigation of the hazards identified.

3.) Will coordinate the strategies identified in the GCHMP with other planning programs and mechanisms under its jurisdictional authority.

4.) Will continue to support of the Steering Committee and continue to participate in the Planning Partnership as described by the GCHMP.

5.) Will help promote and support the mitigation successes of all GCHMP Planning Partners.

PASSED AND ADOPTED on this 11th day of AUGUST, 2021 by the following vote:

AYES: 2
NOES: 0
ABSENT: 0
ABSTAIN: 0

Chairman, Boise River Flood Control District #11
JAMES THORPE

ATTEST:

Secretary, Boise River Flood Control District #11
SCOTT YEKEL

RESOLUTION NO. 2021-12
A RESOLUTION OF THE BOARD OF GOLDEN GATE HIGHWAY DISTRICT
AUTHORIZING THE ADOPTION OF THE CANYON COUNTY HAZARD MITIGATION PLAN

WHEREAS, all of Canyon County has exposure to natural hazards that increase the risk to life, property, environment and the County's economy; and

WHEREAS, pro-active mitigation of known hazards before a disaster event can reduce or eliminate long-term risk to life and property; and

WHEREAS, The Disaster Mitigation Act of 2000 (Public Law 106-390) established new requirements for pre and post disaster hazard mitigation programs; and

WHEREAS; a coalition of Canyon County stakeholders with like planning objectives has been formed to pool resources and create consistent mitigation strategies to be implemented within each partners identified capabilities, within the Canyon County Planning Area; and

WHEREAS, the coalition has completed a planning process that engages the public, assesses the risk and vulnerability to the impacts of natural hazards, develops a mitigation strategy consistent with a set of uniform goals and objectives, and creates a plan for implementing, evaluating and revising this strategy;

NOW, THEREFORE, BE IT RESOLVED that the Golden Gate Highway District:

1.) Adopts in its entirety, Volume I and parts 1, the ____________________ jurisdictional annex of part 2, part 3 and the appendices of Volume II of the Canyon County Hazard Mitigation Plan (ACHMP).

2.) Will use the adopted and approved portions of the GCHMP to guide pre and post disaster mitigation of the hazards identified.

3.) Will coordinate the strategies identified in the GCHMP with other planning programs and mechanisms under its jurisdictional authority.

4.) Will continue to support of the Steering Committee and continue to participate in the Planning Partnership as described by the GCHMP.

5.) Will help promote and support the mitigation successes of all GCHMP Planning Partners.

PASSED AND ADOPTED on this 12th day of August, 2021 by the following vote:

AYES: Commissioners Leavitt, Bishop, Sarceda.
NOES: –
ABSENT: –
ABSTAIN: –

Director, Golden Gate Highway District

ATTEST:

Secretary, Golden Gate Highway District

RESOLUTION NO. 2021-1
A RESOLUTION OF THE BOARD OF NAMPA SCHOOL DISTRICT #131 AUTHORIZING THE ADOPTION OF THE CANYON COUNTY HAZARD MITIGATION PLAN

WHEREAS, all of Canyon County has exposure to natural hazards that increase the risk to life, property, environment and the County's economy; and

WHEREAS, pro-active mitigation of known hazards before a disaster event can reduce or eliminate long-term risk to life and property; and

WHEREAS, The Disaster Mitigation Act of 2000 (Public Law 106-390) established new requirements for pre and post disaster hazard mitigation programs; and

WHEREAS, a coalition of Canyon County stakeholders with like planning objectives has been formed to pool resources and create consistent mitigation strategies to be implemented within each partners identified capabilities, within the Canyon County Planning Area; and

WHEREAS, the coalition has completed a planning process that engages the public, assesses the risk and vulnerability to the impacts of natural hazards, develops a mitigation strategy consistent with a set of uniform goals and objectives, and creates a plan for implementing, evaluating and revising this strategy;

NOW, THEREFORE, BE IT RESOLVED that the Nampa School District #131:

1.) Adopts in its entirety, Volume I and parts 1, the NAMPA SCHOOL DISTRICT jurisdictional annex of part 2, part 3 and the appendices of Volume II of the Canyon County Hazard Mitigation Plan (CCHMP).

2.) Will use the adopted and approved portions of the CCHMP to guide pre and post disaster mitigation of the hazards identified.

3.) Will coordinate the strategies identified in the CCHMP with other planning programs and mechanisms under its jurisdictional authority.

4.) Will continue to support of the Steering Committee and continue to participate in the Planning Partnership as described by the CCHMP.

5.) Will help promote and support the mitigation successes of all CCHMP Planning Partners.

PASSED AND ADOPTED on this 18th day of October, 2021 by the following vote:

AYES: Chairman Simpson, Trustee Kipp, Trustee Westfall, Trustee Rost and Trustee Keller
NOES:
ABSENT:
ABSTAIN:

Paula D Kellerer
Superintendent, Nampa School District #131

ATTEST:
Chairman, Nampa School District #131

2021 Canyon County All-Hazard Mitigation Plan

Appendix G. Progress Report Template

G. PROGRESS REPORT TEMPLATE

2021 Canyon County Hazard Mitigation Plan

Annual Progress Report

Reporting Period: *(Insert reporting period)*

Background: Canyon 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.canyonco.org/elected-officials/sheriff/emergency-management/

Summary Overview of the Plan's Progress: The performance period for the *2020 Canyon 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 *2020 Canyon 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 _____, 202_. 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]				

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 Canyon County Hazard Mitigation Plan website. Any questions or comments regarding the contents of this report should be directed to:*

Canyon County Emergency Management
1115 Albany Street, Room 137
Caldwell, ID 83605
208-454-7271