REGIONAL TRI-COUNTY
Hazard Mitigation Plan Update
2021

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List of Abbreviations

ACS	American Community Survey
BLM	U.S. Bureau of Land Management
CDC	Center for Disease Control
cfs	cubic feet per second
CFR	Code of Federal Regulations
DEWS	Drought Early Warning Systems
DMA 2000 (DMA)	Disaster Mitigation Act of 2000
DOJ	Department of Justice
EMPG	Emergency Management Planning Grant
EOC	Emergency Operation Center
EPA	U.S. Environmental Protection Agency
EPCRA	Emergency Planning and Community Right to Know Act
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FMA	Flood Mitigation Assistance
FMAG	Fire Management Assistance Program
GIS	Geographic Information System
HAZUS-MH	Hazards United States
HHPD	High Hazard Potential Dam
HMA	Hazard Mitigation Assistance
HMGP	Hazard Mitigation Grant Program
HMP	Hazard Mitigation Plan
M	Magnitude
mph	miles per hour
NDEM	Nevada Division of Emergency Management
NDEP	Nevada Division of Environmental Protection
NDF	Nevada Division of Forestry
NDOT	Nevada Department of Transportation
NDWR	Nevada Division of Water Resources
NFIP	National Flood Insurance Program
NIDIS	National Integrated Drought Information System
NBMG	Nevada Bureau of Mines & Geology
NOAA	National Oceanic Atmospheric Administration
NWS	National Weather Service
PA	Public Assistance Grant Program
PDM	Pre-Disaster Mitigation
SERC	State Emergency Response Commission
SRIA	Sandy Recovery Improvement Act
SRL	Severe Repetitive Loss
UBC	Uniform Building Code
UNR	University of Nevada Reno

URM	Unreinforced Masonry Buildings
USDA	U.S. Department of Agriculture
USFS	U.S. Fire Service
USGS	U.S. Geological Survey
WIIN	Water Infrastructure Improvement for the Nation Act Funding

1.0 PLAN ADOPTION

This section provides an overview of the Disaster Mitigation Act of 2000 (DMA 2000; Public Law 106-390), the adoption of the updated Tri-County Hazard Mitigation Plan (HMP) by the local governing body and supporting documentation for the adoption.

1.1 OFFICIAL RECORD OF ADOPTION

1.1.1 Adoption by the Local Governing Body and Supporting Document

The requirements for the adoption of an HMP by the local governing body, as stipulated in the DMA 2000 and its implementing regulations, are described below.

DMA 2000 REQUIREMENTS: PREREQUISITES
Adoption by the Local Governing Body
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).
Element
Has the local governing body adopted the plan?
Is supporting documentation, such as a resolution, included?
Source: FEMA, March 2008.

Humboldt County, Pershing County and Lander County, or the Tri-Counties as referred to throughout this plan, and their respective County Seats, are the jurisdictions represented in this HMP. The HMP meets the requirements of Section 409 of the Stafford Act and Section 322 of the DMA 2000.

The local governing body of Humboldt County (Humboldt County Board of Commissioners) and City of Winnemucca (City of Winnemucca City Council) and the Pershing County (Pershing County Board of Commissioners) has adopted this HMP. The signed resolutions are provided in Appendix A.

The Humboldt, Pershing and Lander County Local Emergency Planning Committees approved this Plan. The signed resolutions are provided in Appendix A.

1.2 DISASTER MITIGATION ACT OF 2000

The DMA 2000 was passed by Congress to emphasize the need for mitigation planning to reduce vulnerability to natural and human-caused hazards. The DMA 2000 amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act; 42 United States Code [USC] 5121-5206 [2008]) by repealing the act's previous Mitigation Planning section (409) and replacing it with a new Mitigation Planning section (322). In addition, Section 322 provides the legal basis for the Federal Emergency Management Agency's (FEMA) mitigation plan requirements for mitigation grant assistance.

To implement the DMA's planning requirements FEMA published an Interim Final Rule in the Federal Register on February 26, 2002. This rule (44 Code of Federal Regulations [CFR] Part 201) established the mitigation planning requirements for states, tribes, and local communities. The planning requirements are described in detail in Chapter 2 of this document and identified in their appropriate sections throughout this Plan.

This Mitigation Plan Update is intended to meet the requirements of the Stafford Act and Title 44 Code of Federal Regulations (CFR) §201. This multi-jurisdictional Tri-County Hazard Mitigation Plan is being updated to maintain compliance with Title 44 CFR §201.6.1 and to maintain eligibility for FEMA hazard mitigation project grant funding. Under the requirements of 44 CFR §201.6(d)(3) a local jurisdiction must review and revise its HMP to reflect changes in development, progress in local mitigation efforts, and changes in priorities. The plan must be resubmitted for approval within five (5) years in order to continue to be eligible for mitigation project grant funding.

The Federal Emergency Management Agency's (FEMA) *Local Mitigation Plan Review Guide* was relied on as an official interpretation and explanation for the Mitigation Planning regulation in 44 CFR Part 201.

2.0 BACKGROUND

This plan was created and officially adopted in 2014 by three Northern Nevada counties: Humboldt, Lander, and Pershing Counties. In 2014 this planning effort was led by Pershing County. This update was developed throughout 2020 and planned to be completed by early 2021, was led by Humboldt County, on behalf of the Tri-Counties.

2.1 PLAN PURPOSE AND AUTHORITY

This multi-jurisdictional Hazard Mitigation Plan update meets the requirements of the Stafford Act, the DMA 2000, and Title 44 Code of Federal Regulations (CFR) §201. The Federal Emergency Management Agency's (FEMA) Local Mitigation Plan Review Guide was relied on as an official interpretation and explanation for the Mitigation Planning regulation in 44 CFR Part 201.

A local jurisdiction must review and revise its plan to reflect changes in development, progress in local mitigation efforts, and changes in priorities, and resubmit it for approval within five (5) years in order to continue to be eligible for mitigation project grant funding (44 CFR §201.6(d)(3)). The multi-jurisdictional Tri-County Hazard Mitigation Plan (HMP) is being updated to maintain compliance with Title 44 CFR §201.6.1 and eligibility for FEMA hazard mitigation project grant funding. By preparing this HMP, Pershing, Humboldt, and Lander Counties are eligible to receive Federal mitigation funding after disasters and to apply for mitigation grants before disasters strike.

The purpose of this HMP is to reduce potential losses from future disasters. The intent of the Tri-Counties is to maintain the planning process to accomplish existing and future identified hazard mitigation actions. Hazard mitigation is any sustained action taken to reduce or eliminate the long-term risk to human life and property from hazards (44 CFR §201.2). Hazard mitigation activities may be implemented prior to, during, or after an event. However, it has been demonstrated that hazard mitigation is most effective when based on an inclusive, comprehensive, long-term plan that is developed before a disaster occurs.

This HMP identifies the hazards that impact communities, identifies actions to reduce losses from those hazards, and establishes a coordinated process to implement the plan. (44 CFR §201.1(b)) This HMP update continues the ongoing process of evaluating risks that different types of hazards pose to the Counties and their respective Cities, and to engage the Counties and their communities in dialogue to identify the steps that are most important in reducing these risks. This continual focus on planning for disasters will make the Counties, including their residents, property, infrastructure, and the environment, much safer.

The local hazard mitigation planning requirements encourage agencies at all levels, local residents, businesses, and the non-profit sector to participate in the mitigation planning and implementation process. This broad public participation enables the development of mitigation actions that are supported by these various stakeholders and reflect the needs of the entire community.

States are required to coordinate with local governments in the formation of hazard mitigation strategies, and the local strategies combined with initiatives at the state level form the basis for the State Mitigation Plan. The information contained in HMPs helps states to identify technical assistance needs and prioritize project funding. Furthermore, as communities prepare their plans, states can continually improve the level of detail and comprehensiveness of statewide risk assessments.

After November 1, 2004, for FEMA's Pre-Disaster Mitigation (PDM) grant program and Hazard Mitigation Grant Program (HMGP), a local jurisdiction must have an approved HMP to be eligible for funding after a presidentially declared disaster. Plans approved after November 1, 2004 allow communities to be eligible to receive PDM and HMGP project grants.

Adoption by the local governing body demonstrates the jurisdiction's commitment to fulfilling the mitigation goals and objectives outlined in the HMP. Adoption legitimizes the updated HMP and authorizes responsible agencies to execute their responsibilities. The resolutions adopting this HMP are included in Appendix A.

2.2 FEMA GRANT PROGRAMS

In order to be eligible for many of FEMA's resources and funding opportunities communities must meet the requirement of a current FEMA approved Hazard Mitigation Plan. States, tribal, and local governments are required to develop and adopt hazard mitigation plans as a condition for receiving certain types of FEMA non-emergency disaster assistance, including funding for mitigation projects. Jurisdictions must update their hazard mitigation plans every five years and re-submit them for FEMA approval to maintain eligibility. Through the Hazard Mitigation Assistance (HMA) grant programs (Hazard Mitigation Grant Program, Pre-Disaster Mitigation, and Flood Mitigation Assistance), FEMA offers planning grants that support state, tribal, and local governments in developing and updating mitigation plans. The table below summarizes how FEMA's mitigation plan requirement applies to states and Federally-recognized tribal governments applying directly to FEMA for assistance as applicants, and to local or tribal governments (Federally-recognized or non-Federally-recognized) applying for FEMA assistance through a state as sub-applicants. (https://www.fema.gov/hazard-mitigation-plan-requirement) FEMA funding is now managed through an online web portal https://go.fema.gov. Table 1 shows the various funding sources and the HMP requirement.

Table 1: Grant Funding and Hazard Mitigation Plans (www.FEMA.gov)

Mitigation Plan Requirement for State, Tribal, and Local Governments Applying for Certain FEMA Grants			
Enabling Legislation	FEMA Assistance Program	Is a Mitigation Plan Required?	
		State / Tribal Applicant	Tribal / Local Sub-applicant
Stafford Act	Individual Assistance (IA)	No	No
	Public Assistance (PA) Categories A and B (e.g., debris removal, emergency protective measures)	No	No
	Public Assistance (PA) Categories C through G (e.g., repairs to damaged infrastructure, publicly owned buildings)	Yes	No
	Fire Mitigation Assistance Grants (FMAG)	Yes	No

	Hazard Mitigation Grant Program (HMGP) planning grant	Yes	No
	Hazard Mitigation Grant Program (HMGP) project grant	Yes	Yes
	Pre-Disaster Mitigation (PDM) planning grant	No	No
	Pre-Disaster Mitigation (PDM) project grant	Yes	Yes
National Flood Insurance Act	Flood Mitigation Assistance (FMA) planning grant	Yes	No
	Flood Mitigation Assistance (FMA) project grant	Yes	Yes
Water Infrastructure Improvements for the Nation (WIIN) Act	Rehabilitation of High Hazard Potential Dam (HHPD) Grant Program	Yes	Yes

2.2.1 Stafford Act Funding Programs

The Stafford Act authorizes the following grant programs:

Hazard Mitigation Grant Program (HMGP)

HMGP provides grants to State, tribes, and local entities to implement long-term hazard mitigation measures after a major disaster declaration. This program also funds development and update of hazard mitigation plans. The purpose of the HMGP is to reduce the loss of life and property as a result of natural disasters and to enable mitigation measures to be implemented during the immediate recovery from disaster. Projects must provide a long-term solution to a problem: for example, elevation of a home to reduce the risk of flood damages as opposed to buying sandbags and pumps to fight the flood. In addition, a project's potential savings must be more than the cost of implementing the project. Funds may be used to protect either public or private property or to purchase property that has been subjected to, or is in danger of, repetitive damage. The amount of funding available for the HMGP under a particular disaster declaration is limited. The program may provide a State or tribe with up to 20 percent of the total disaster grants awarded by FEMA. The cost-share for this grant is 75/25 percent (Federal/non-Federal).

Pre-Disaster Mitigation (PDM) Project Grants

PDM provides funds to State, tribes, and local entities, including universities, for hazard mitigation planning and the implementation of mitigation projects before a disaster event, including the development or update of a hazard mitigation plan. PDM grants are awarded on a nationally competitive basis. Like HMGP funding, a PDM project's potential savings must be more than the cost of implementing the project. In addition, funds may be used to protect either public or private property or to purchase property that has been subjected to, or is in danger of, repetitive damage. Congress appropriates the total amount of PDM funding available on an annual basis. The cost-share for this grant is 75/25 percent (Federal/non-Federal).

Public Assistance Grant Program (PA)

The PA grant program provides assistance to state, tribal, territorial and local governments, and certain types of private nonprofit organizations so that communities can quickly respond to and recover from major disasters or emergencies declared by the President.

Fire Management Assistance Grant Program (FMAG)

FMAG provides assistance to state, tribal, territorial and local governments for the mitigation, management, and control of fires on publicly or privately owned forests or grasslands that threaten such destruction as would constitute a major disaster.

The Sandy Recovery Improvement Act (SRIA) of 2013 amended the Stafford Act to provide federally-recognized tribal governments the option to request a Presidential emergency or major disaster declaration independent of a state. Tribal governments may still choose to seek assistance, as they have historically, under a state declaration request.

2.2.2 National Flood Insurance Act Funding

The National Flood Insurance Act of 1968, as amended (42 U.S.C. § 4104c), authorizes the Flood Mitigation Assistance (FMA) grant program with the goal of reducing or eliminating claims under the National Flood Insurance Program (NFIP). FMA provides funding to states, territories, tribes, and local communities for flood hazard mitigation projects, plan development, and management costs. The FMA program provides funds on an annual basis so that measures can be taken to reduce or eliminate risk of flood damage to buildings insured under the National Flood Insurance Program (NFIP). FMA provides up to 75% Federal funding for a mitigation activity grant and/or up to 90% Federal funding for a mitigation activity grant containing a repetitive loss strategy.

Severe Repetitive Loss Grant Program (SRL)

The Severe Repetitive Loss (SRL) grant program provides funding to reduce or eliminate the long-term risk of flood damage to severe repetitive loss structures insured under the National Flood Insurance Program (NIFP). The SRL program provides funds on an annual basis to reduce the risk of flood damage to residential structures insured under the NFIP that have had one or more claim payments for flood damages. SRL provides up to 75% Federal funding for eligible projects in communities that qualify for the program.

2.2.3 Water Infrastructure Improvements for the Nation (WIIN) Act Funding

On December 16, 2016, the Water Infrastructure Improvements for the Nation (WIIN) Act was signed into law. The WIIN Act adds a new grant program under FEMA's National Dam Safety Program (33 U.S.C. 467f). Section 5006 of the Act, Rehabilitation of High Hazard Potential Dams (HHPD), provides technical, planning, design, and construction assistance in the form of grants for rehabilitation of eligible high hazard potential dams. High Hazard Potential is a classification standard for any dam whose failure or mis-operation will cause loss of human life and significant property destruction. The HHPD Grant Program will provide funding to eligible applicants and subapplicants to rehabilitate, repair, or remove HHPDs. The statute allows for funding to be awarded to non-federal sponsors or non-federal governments and nonprofit organizations. Projects shall be approved by the dam safety agency in the state where the dam is located.

2.3 PLAN ORGANIZATION

The remainder of this HMP includes the following sections:

Section 3 Community Descriptions

Section 3 provides a general history and background of the Counties and County seats and historical trends for population, demographic and economic conditions that have shaped the area. Trends in land use and development are also discussed.

Section 4 Planning Process

Section 4 describes the planning process, identifies Planning Committee members, and the key stakeholders within the community and surrounding region. In addition, this section documents public outreach activities and the review and incorporation of relevant plans, reports, and other appropriate information.

Section 5 Risk Assessments

Section 5 describes the process through which the Planning Committee identified and compiled relevant data on all potential natural hazards that threaten the Counties and primary Cities and the immediately surrounding area. Information collected includes historical data on natural hazard events that have occurred in and around the Counties and Cities and how these events impacted residents and their property. This Section includes hazard identification and hazard screening.

Section 6 Hazard Profiles

Section 6 The descriptions of natural hazards that could affect the Counties and Cities are based on historical occurrences and best available data from agencies such as FEMA, the U.S. Geological Survey (USGS), and the National Weather Service (NWS). Detailed hazard profiles include information on the frequency, magnitude, location, and impact of each hazard as well as probabilities for future hazard events

Section 7 Asset Inventory

Section 7 includes identification of assets in each County. Population and Building stock was identified and values calculated by FEMA's HAZUS software and County Assessors data. Critical Facilities and Infrastructure were identified and valued. Methodology is also included in this section.

Section 8 Vulnerability Assessment

Section 8 identifies potentially vulnerable assets such as people, housing units, critical facilities, infrastructure and lifelines, hazardous materials facilities, and commercial facilities. These data were compiled by assessing the potential impacts from each hazard using GIS and FEMA's natural hazards loss estimation model, HAZUS-MH. The resulting information identifies the full range of hazards that the Counties and Cities could face and potential social impacts, damages, and economic losses.

Section 9 Capability Assessment

Although not required by the DMA 2000, Section 9 provides an overview of the Counties and Cities resources in the following areas for addressing hazard mitigation activities:

- Legal and regulatory resources
- Administrative and technical: The staff, personnel, and department resources available to expedite the actions identified in the mitigation strategy
- Fiscal: The financial resources to implement the mitigation strategy

Section 10 Mitigation Strategy

As Section 10 describes, the Planning Committee developed a list of mitigation goals, objectives, and actions based upon the findings of the risk assessment and the capability assessment. Based upon these goals, the Planning Committee reviewed and prioritized a comprehensive range of appropriate mitigation actions to address the risks facing the community. Such measures include preventive actions, property protection techniques, natural resource protection strategies, structural projects, emergency services, and public information and awareness activities.

Section 11 Plan Maintenance

Section 11 describes the Planning Committee's formal plan maintenance process to ensure that the HMP remains an active and applicable document. The process includes monitoring, evaluating, and updating the HMP; implementation through existing planning mechanisms; and continued public involvement.

Section 12 References

Section 12 lists the reference materials used to prepare this HMP.

Appendices

The appendices include the Adoption Resolution, Maps, Planning Committee Meetings, Public Involvement, and Maintenance Tools.

3.0 COMMUNITY DESCRIPTIONS

In this HMP update, U.S. Census population estimates for 2018 and American Community Survey data was used to update demographic information for all three counties.

3.1 HUMBOLDT COUNTY

3.1.1 History, Location, and Geography

Humboldt County is located in Northwestern Nevada, approximately 2 hours northeast of Reno. Humboldt County is one of Nevada's original nine counties. Created in 1861 with Unionville as the first county seat, it is in northwestern Nevada in high desert country. Winnemucca, named for Chief Winnemucca of the Paiute Tribe, is the current county seat and is the only incorporated city in Humboldt County. Northern Paiute and Shoshones were the predominant tribes in Humboldt County at the time of settlement. The county is named after the Humboldt River, which explorer John Fremont named after the German naturalist Baron Friedrich Heinrich Alexander von Humboldt.

The Humboldt River runs through southeastern Humboldt County. Humboldt County has a great variety of valley and mountain lands, suitable for agriculture, grazing, stock raising and mining. Some of the mountain peaks have an elevation of 10,000 feet above the sea level and 5,000 feet above the surrounding plains. The Humboldt River and its tributaries form the principal water supply for the irrigation of lands, though small mountain streams furnish the supply for some quite extensive individual ranches in the various parallel valleys.

Gold was discovered in 1907 in the National district, but ores were soon depleted. Other significant gold findings were found in these districts: Awakening, Dutch Flat, Gold Run, Paradise Valley, Potosi, Warm Springs and Winnemucca.

According to the U.S. Census Bureau, the county has a total area of 9,658 square miles, of which, 9,648 square miles is land and 10 square miles is water.

3.1.2 Government

The County government consists of an elected, five member board. The board members (Commissioners) represent districts within the county and are elected for terms of four years.

The Commissioners appoint a County Administrator who supervises County affairs. Key County officials and County departments are listed in Table 2 and Table 3.

Table 2: Humboldt County Key Officials

Commissioner District 1	County Administrator	District Attorney
Commissioner District 2	Assessor	Judge
Commissioner District 3	Building Official	Planning Official
Commissioner District 4	Clerk	Public Administrator
Commissioner District 5	Comptroller	Recorder
	County Sheriff	

Table 3: Humboldt County Departments and Offices

Assessor	Justice Court
Building	Planning and Zoning
Child Support	Public Administrator
Commissioners	Recorder's Office
Comptroller	Sheriff's Office
County Clerk	Treasurer
District Attorney	Winnemucca Events Complex

Winnemucca is the Humboldt County Seat and is the only incorporated city within the County. The City government is organized as follows:

Mayor

The Mayor is the official head of the City and is elected for a four (4) year term. The Mayor presides at all meetings of the Council and votes only in the case of a tie in ordinances, resolutions and other Council actions. The Mayor has veto power over the Council's votes but can be overridden by a 4/5 Council vote.

City Council

The City Council is the governing body of the City of Winnemucca. There are five (5) Council Seats of which all officers serve four (4) year staggered terms. Candidates run for office and are elected by the electors of the City at large. Three (3) members of the Council constitute a quorum and may conduct City business. Ordinances and Resolutions require three (3) affirmative votes to pass.

City Manager

The City Manager is the administrative head of the City government. The City Manager is appointed by the City Council for an indefinite term to supervise the administrative affairs of the City and to carry out policies set by the Council. The City Manager can also serve as the City Engineer.

City Attorney

The City Attorney provides all the non-criminal legal services for the City. The City Attorney advises the Council, City Manager, department heads, and offices of the City on matters and procedures of the City that must be in conformity with the law. The City Attorney formulates Ordinances and Resolutions according to state and local laws. The District Attorney's office, acting as the City Prosecutor, provides City criminal services.

City Clerk / Treasurer

The City Clerk / Treasurer is appointed by the Mayor with confirmation by the City Council, and is responsible for maintaining all of the Council's records and proceedings, and all records of the various departments.

Table 4: City of Winnemucca Key Officials

Mayor	City Clerk /Treasurer
Councilman Seat 1	City Attorney
Councilman Seat 2	Recreation Director
Councilman Seat 3	Fire Chief
Councilman Seat 4	Building Inspector
Councilman Seat 5	Police Chief
City Manager	Public Works Director

Table 5: City of Winnemucca Departments

Administrative	Golf Course
Building Inspector	Public Works
Cemetery	Recreation
City Clerk / Treasurer	Sewer/Water Utilities
City Parks	Volunteer Fire

Multiple Tribes are governed in Humboldt County. The Winnemucca Indian Colony is home to the Western Band of the Western Shoshone. The governing body for the Colony is known as the Winnemucca Colony Council and is composed of five (5) members including a Chairman and a Vice Chairman selected by the council from within its own members. Council members serve a term of two (2) years or until their successors are duly elected and seated. A secretary/treasurer may be selected by the Council from within or without its own membership.

The Summit Lake Paiute Reservation is also governed by a five (5) member Council. The Council includes a Chairman, Vice Chairperson, and a Secretary/Treasurer. Due to the Reservation's remote location and primitive conditions, the Tribe's primary administrative office is located in Sparks, Nevada.

The governing body of the Fort McDermitt Paiute and Shoshone Tribe consists of a council known as the Fort McDermitt Tribal Council. The Tribal Council includes eight elected councilmen. A Chairman and Vice Chairman are selected from within the Council and a secretary and treasurer are selected from within or without the council. Council members serve four (4) year terms.

3.1.3 Demographics

According to the 2010 U.S. Census, the population of Humboldt County is 16,528. Between 2000 and 2010 the population grew 2.6%, or an average of 0.26 % per year. In this report update, American Community Survey estimates for 2018 were used. Humboldt County’s estimated population in 2018 was 16,904, an increase of 2.02% since 2010. This data should be updated when 2020 Census information becomes available.

In 2010 Winnemucca, the County seat, had the largest population at 7,798, approximately 47% of the County’s total population.

According to the American Community Survey (ACS) the average household size in Humboldt County from 2014-2018 was 2.66 persons, a slight increase since the original plan. The median household income from 2014-2018 was $70,373, a large increase over the previous median household income of $55,656.

From 2014-2018, there were 7,549 total housing units in Humboldt County of which 75% are owner-occupied (ACS). The median value of owner-occupied homes is $173,300. Both total housing and median home value have increased since the original plan was completed. The population overview for Humboldt County from 2000, 2010 and 2018 is shown in Figure 1 through Figure 3. Employment characteristics are shown in **Figure 4**.

City of Winnemucca

Winnemucca is located on Interstate 80 (I-80) approximately 170 miles northeast of Reno, Nevada. In addition to I-80, the Humboldt River and the Union Pacific Railroad pass through the City, which has a total area of 8.3 sq. miles.

According to the 2010 U.S. Census Winnemucca has a total population of 7,396. This represents an increase of 222 over the 2000 Census. The average number of persons per household is 2.72 and the median household income is $62,614. According to the American Community Survey, housing units total 3,046 of which 1,790 are owner-occupied. The median value of owner-occupied units is $163,300.

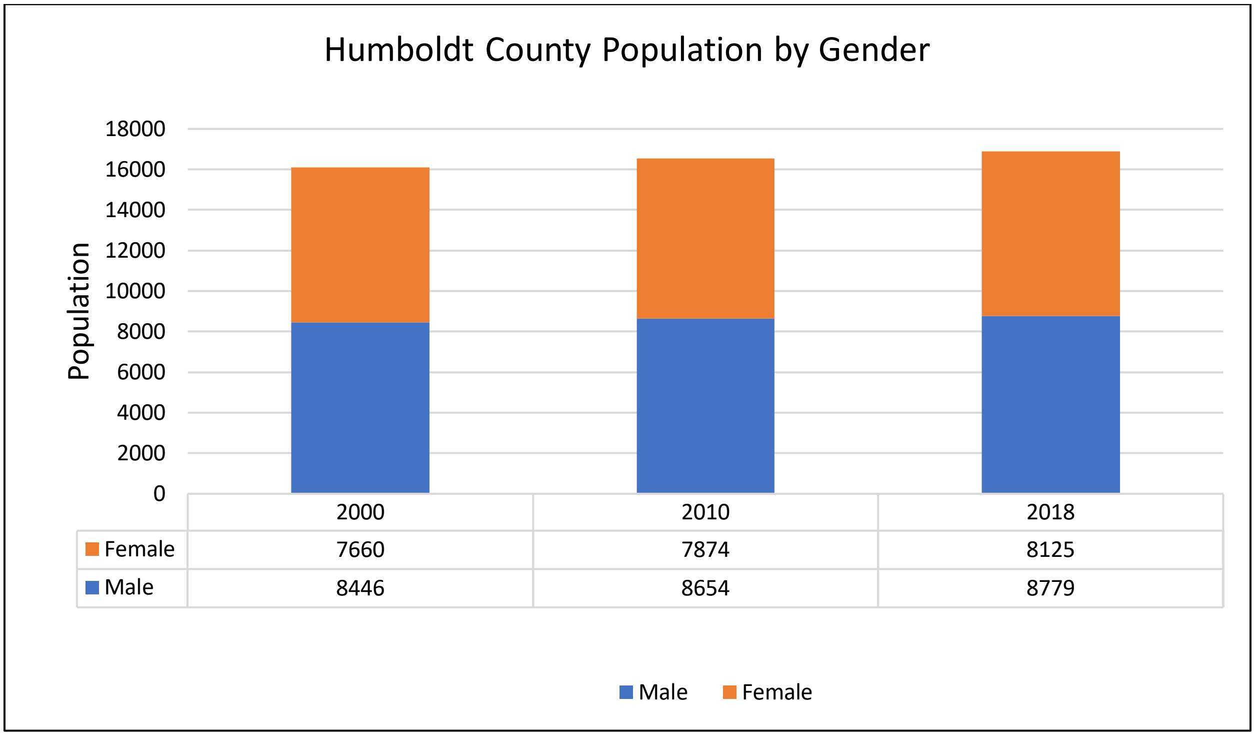


Figure 1: Humboldt County Population by Gender (U.S. Census and American Community Survey)

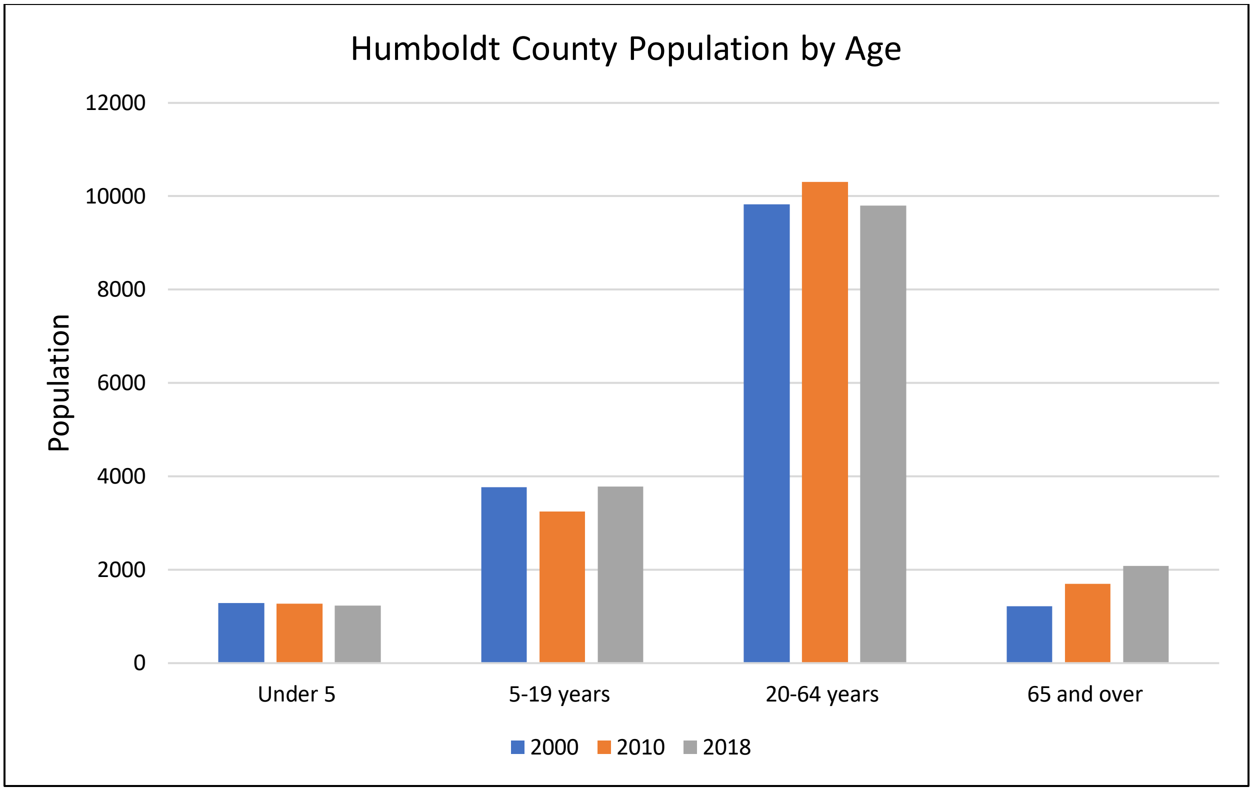
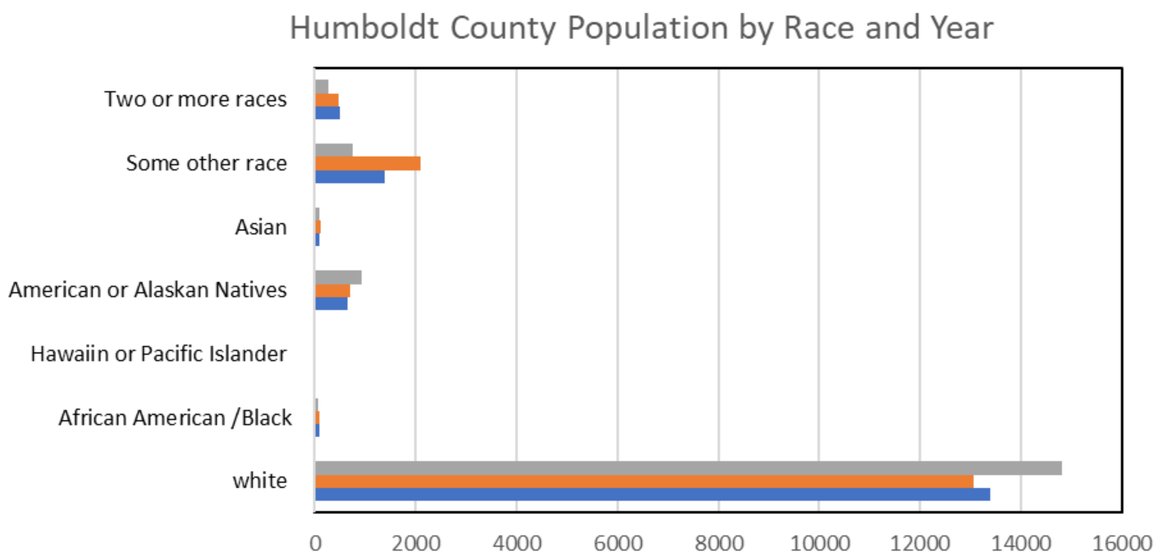


Figure 2: Humboldt County Population by Age (U.S. Census)



	white	African American /Black	Hawaiin or Pacific Islander	American or Alaskan Natives	Asian	Some other race	Two or more races
2018	14803	70	0	926	84	745	276
2010	13053	87	19	692	120	2095	462
2000	13401	82	11	647	92	1375	498

Figure 3: Humboldt County Population by Race (U.S. Census)

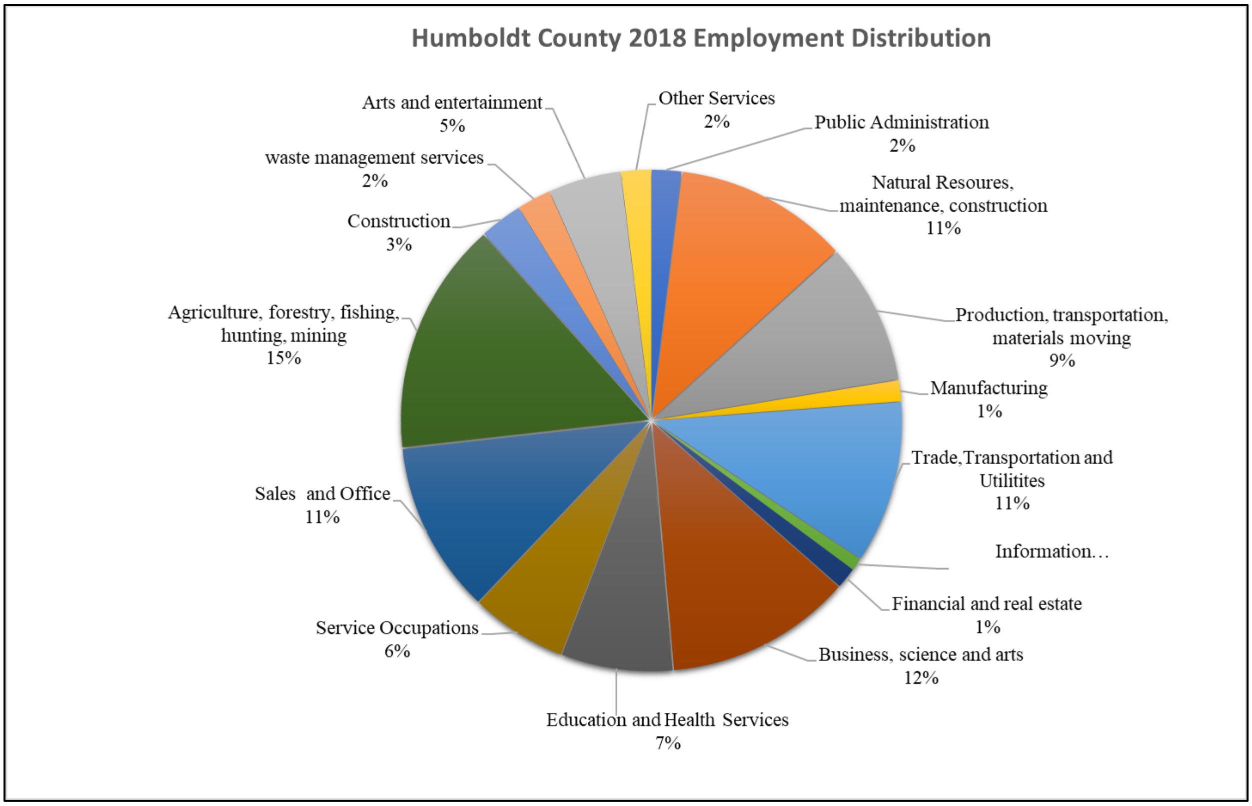


Figure 4: Humboldt County Employment Distribution (U.S. Census)

3.1.4 Land Use and Development Trends

The Humboldt County Master Plan states that the dominant land use in the combined urbanized area of Winnemucca, Grass Valley, Rose Creek, Jungo Road and Outer County is range land. Over the past 30 years, the urban pattern has become less compact while population density has declined. The less compact urban pattern of the built environment, most significantly in the Grass Valley area, has increased the cost of providing urban services and decreased the feasibility of extending water, sewer and roads to serve this area. (Humboldt County, 2012). This development pattern makes hazard and emergency response planning even more important for the safety of Humboldt County residents.

3.2 LANDER COUNTY

3.2.1 History, Location, and Geography

The following history by Gina Little was found on the Lander County website. A similar summary is included in the Lander County Policy Plan for Federally Administered Lands.

> *"Lander County was formed on December 19, 1862 and was named after General Frederick W. Lander, Civil War hero and prominent builder of a wagon road across Nevada. Situated in the center of the state, the Lander County region attracted prospectors fanning out across the Great Basin after the 1859 discovery of the Comstock Lode. The County originally encompassed the eastern third of the State and was called "The Mother of Counties." It was later divided into the Counties of Lander, Eureka, White Pine, and Elko. The first County seat was located in Jacobsville, six miles west of Austin. In September 1863, voters mandated its move to Austin and in May 1979 to Battle Mountain.*

Located in north central Nevada, Lander County encompasses 5,621 square miles. Over 85 percent of the County is currently public land managed by federal agencies. Interstate 80 traverses the County in an east-west fashion on the northern end, as does Highway 50 on the southern end. State Highway 305, which runs north and south, bisects the center of Lander County. This highway links the cities of Battle Mountain and Austin. The town of Kingston is located in the southern part of Lander County on Highway 376.

The total population of Lander County in 2002 was estimated to be 5691. The population density is relatively .99 persons per square mile. Approximately 85 percent of Lander County residents live in the northern portion of the County.

In recent years Lander County's economy has been dominated by mining. Agriculture also plays a significant role in the local economy. High quality alfalfa and alfalfa seed is produced. Although the mining industry has declined in Lander County in recent years, it is still the dominant sector of the local economy.

Lander County claims fame to celebrations and events which include Austin Gridley Days, the Human Powered Race, the annual Basque Dinner and Picnic, the Performing Arts Crab Feed, the Community Christmas Celebration, the 4th of July Festival, the Lander County Fair, the Battle Mountain Bluegrass Festival and its newest event, the Chukar Tournament and Feed."

3.2.2 Government

The Lander County government consists of an elected, five member board. The board members (Commissioners) represent districts within the county and are elected for terms of four years.
The Commissioners appoint an Executive Director who supervises County affairs. Key County officials and departments are listed in Table 6 and Table 7. Battle Mountain is the Lander County Seat and is unincorporated.

Table 6: Lander County Key Officials

Commissioner District 1	Executive Director	District Attorney
Commissioner District 2	Public Works Director	Judge
Commissioner District 3	Finance Director	Recorder
Commissioner District 4	Clerk	Treasurer
Commissioner District 5	Public Defender	Sheriff

Table 7: Lander County Departments and Offices

Assessor	District Attorney
Building	Justice Court
Finance	Planning and Zoning
Executive Director	Recorder's Office
Public Works	Sheriff's Office
County Clerk	Treasurer

The Te-Moak Tribe of Western Shoshone Indians of Nevada is a coalition government with headquarters in Elko, Nevada, serving four distinct Shoshone colonies in Nevada: Battle Mountain Colony, Elko Colony, South Fork Colony, and Wells Colony. The Te-Moak Tribal Council has total jurisdiction over all tribal lands, though the colonies retain sovereignty over all the other affairs, and each has its own separate governing Band Council. The Te-Moak Tribe's constitution and by-laws was adopted and approved in 1938 and amended in 1982.

According to the Te-Moak Constitution, Tribal Council consists of eight members serving terms of three years. The members are selected by the membership of the Band Councils. The Tribal Council officers include a Chairperson, Vice-Chairperson, Secretary, and Finance Officer.

Band Councils are made up of seven (7) elected members who serve terms of three years. Band Council leadership includes a Chairperson, Vice-Chairperson, Secretary, and/or Treasurer. Band Councils conduct business affairs related solely to the Band.

The Battle Mountain Reservation is located on the west side of the city limits of the town of Battle Mountain, Nevada. It consists of two separate parcels of land totaling 683.3 acres. The original 677.05-acre reservation was established by Executive Order on June 18, 1917, for Shoshones living near Winnemucca and Battle Mountain. By an Act of Congress on August 21, 1967, an additional 6.25 acres were added to colony lands.

3.2.3 Demographics

American Community Survey population estimates for 2018 were used in this report update. Lander County's estimated population in 2018 was 5,746, a decrease of 0.5% from 2010 when the population of Lander County was 5,775. Between 2000 and 2010 the population decreased 0.3%, or an average of .03 % per year. The population of Lander County appears to be steadily, slightly declining since 2000. This data should be updated when 2020 Census information becomes available.

In 2018 Battle Mountain, the County Seat, had the largest population at 3,317, approximately 57% of the County's total population.

According to the U.S. Census Quick Facts estimates, the average household size in Lander County from 2014-2018 was 2.73 persons and the median household income was $93,583. Both of these numbers showed an increase over 2010.There are an estimated 2,717 total housing units in Lander County, of which 80% are owner-occupied (ACS). The median value of owner-occupied homes is $185,300. The population overview for Lander County from 2000 to 2018 is shown in Figure 5 through Figure 7. Employment characteristics are shown in Figure 8.

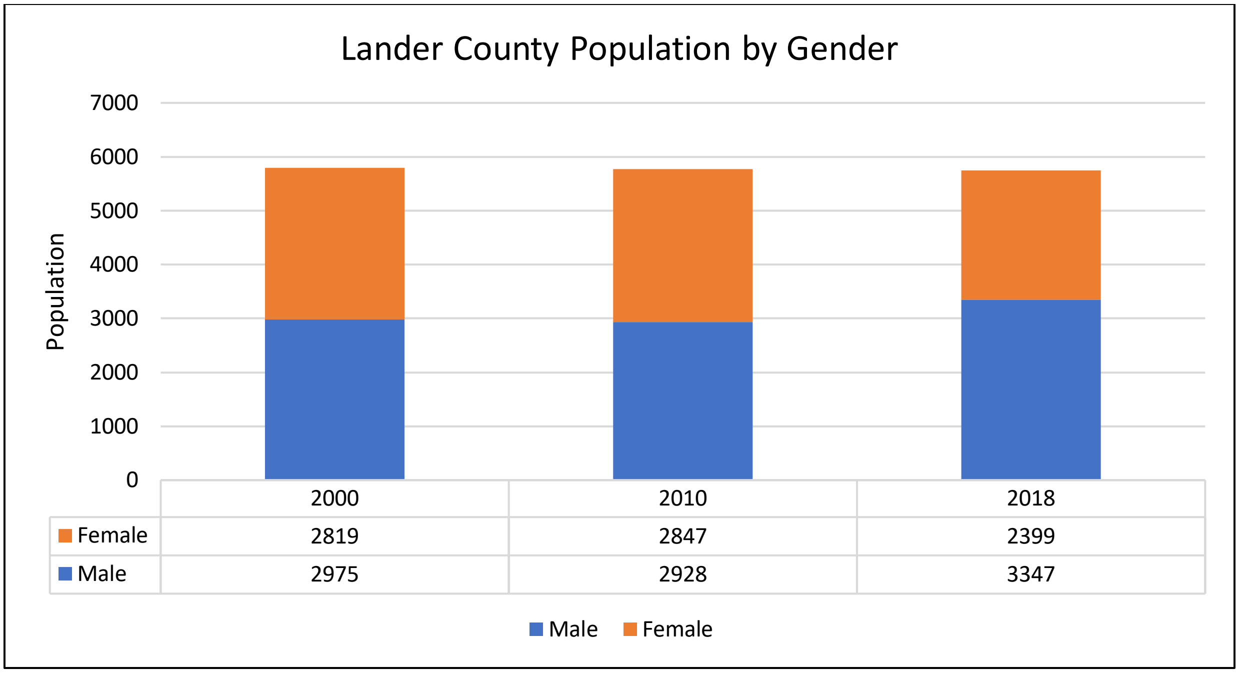


Figure 5: Lander County Population by Gender (Source: U.S. Census and ACS)

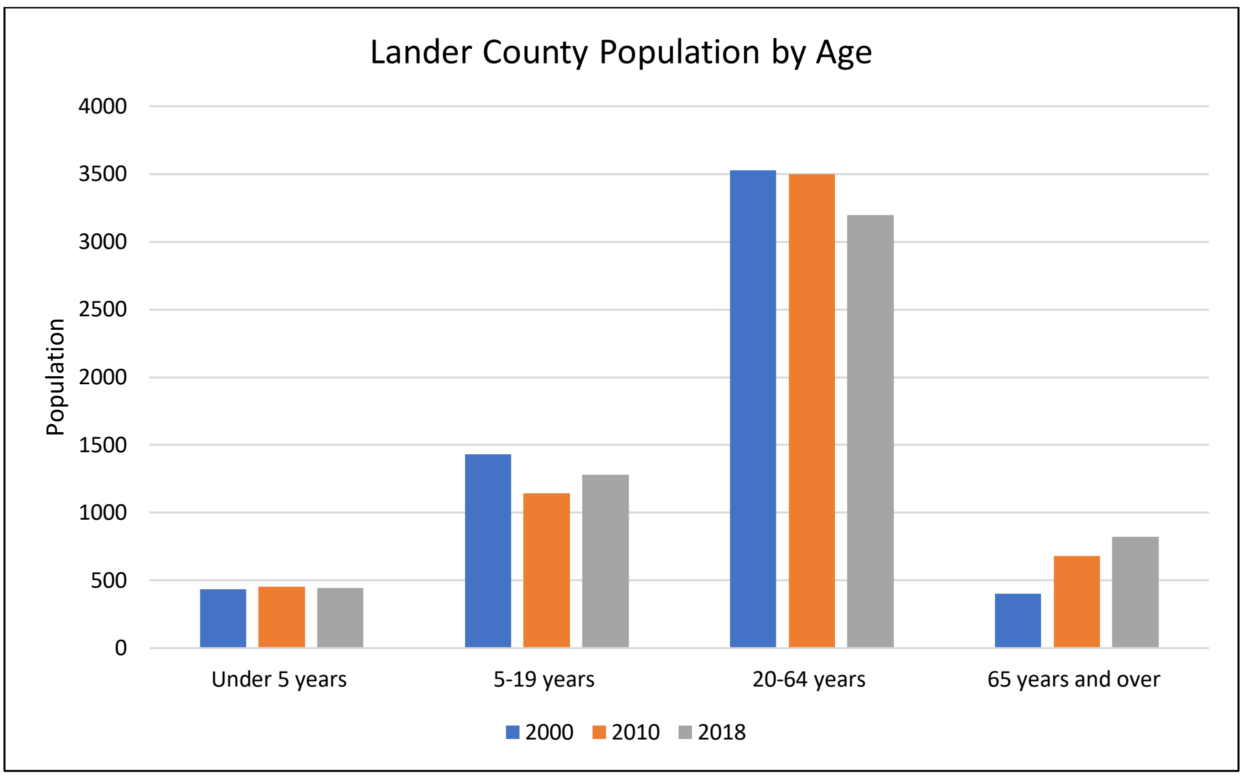
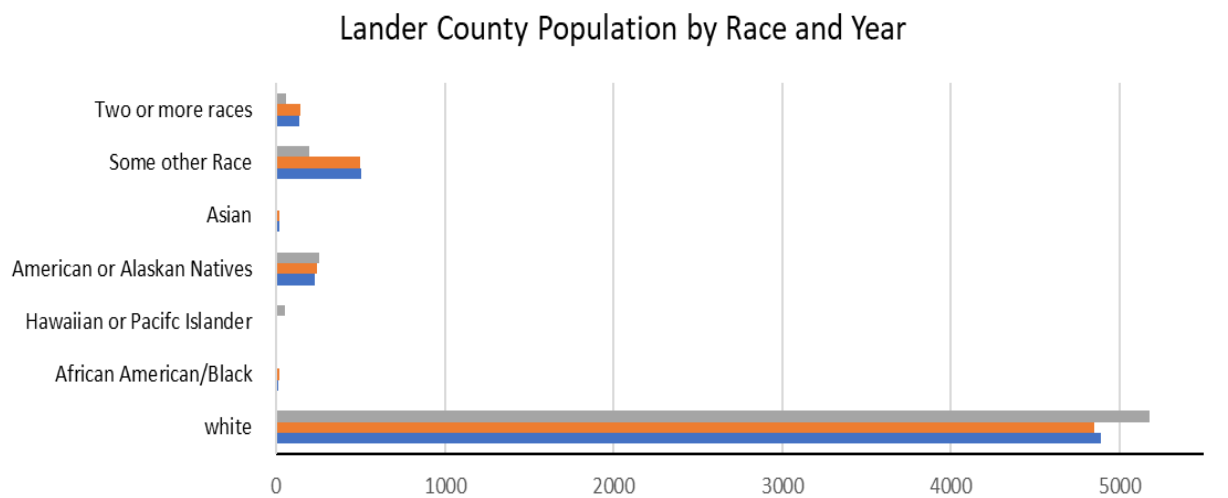


Figure 6: Lander County Population by Age (Source: U.S. Census and ACS)



	white	African American/Black	Hawaiian or Pacifc Islander	American or Alaskan Natives	Asian	Some other Race	Two or more races
2018	5178	6	50	252	7	193	60
2010	4853	20	1	242	21	496	142
2000	4891	12	2	231	20	502	136

Figure 7: Lander County Population by Race (Source: U.S. Census and ACS)

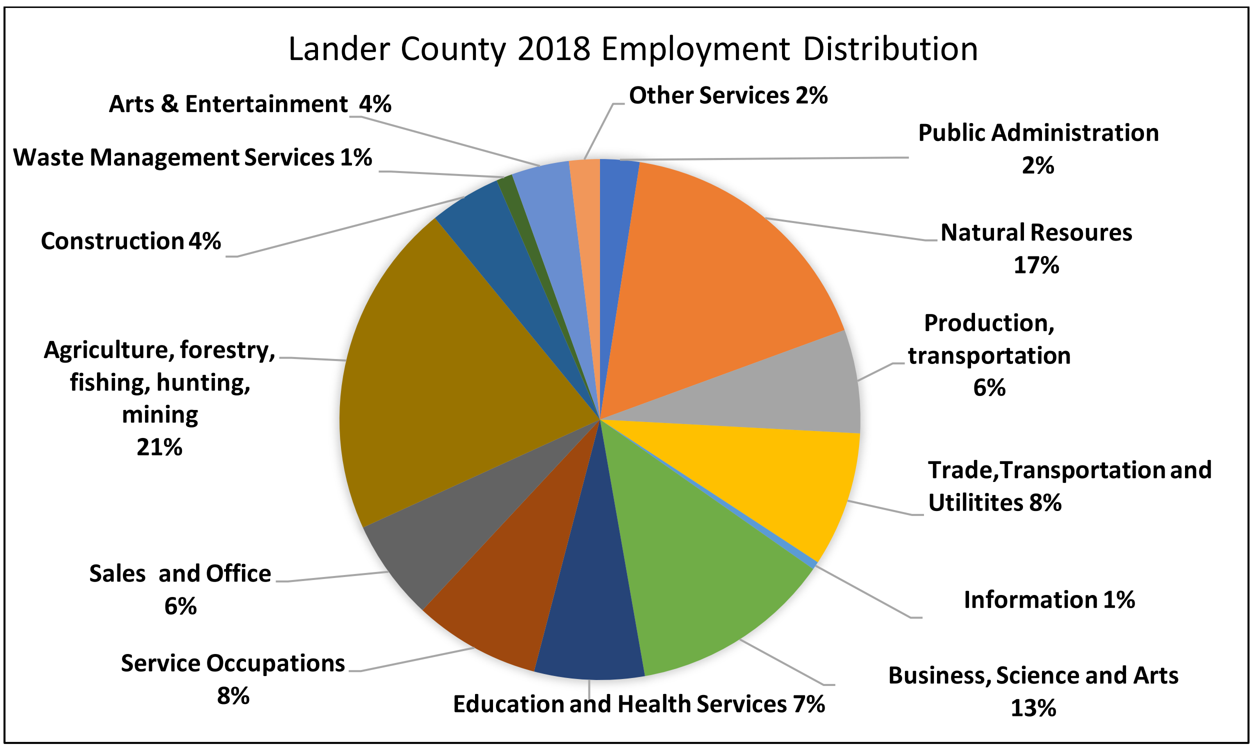


Figure 8: Lander County Employment Distribution (Source: U.S. Census and ACS)

Town of Battle Mountain

Battle Mountain is located on Interstate 80 (I-80) approximately 220 miles northeast of Reno, Nevada. In addition to I-80, the Humboldt River and the Union Pacific Railroad pass through the Town, which has a total area of 1.9 sq. miles. According to the 2010 U.S. Census Battle Mountain has a total population of 3,635. This represents an increase of 764 over the 2000 Census. In 2018 Battle Mountain's estimated population was 3,317, a decrease since 2010. The average number of persons per household is 2.57 and housing units total 1,565, 82.5% of which are owner-occupied. (ACS)

3.2.4 Land Use and Development Trends

Almost 93 percent of the land in Lander County is public land managed by the Bureau of Land Management. This land is primarily used for livestock grazing, mining, geothermal energy production and outdoor recreation. The single greatest land use within the County is open space agriculture. Active mining operations can be found primarily in the northern portion of the County near Battle Mountain with fewer mineral developments in the southern portion of the County.

Private lands are generally found in and around the communities of Battle Mountain, Austin and Kingston. There is some interest for second home development which has driven growth in the Kingston area. Otherwise, private lands are scattered throughout the County and are associated with agricultural operations.

3.3 PERSHING COUNTY

3.3.1 History, Location, and Geography

Pershing County is located in Northwestern Nevada approximately 1.5 hours northeast of Reno. Pershing County was the last County Established in Nevada. Created in 1919 with Lovelock as the County Seat, it was originally part of southern Humboldt County. Lovelock has the largest population in the County and is the only incorporated City in the County. The County was named after army general John J. Pershing (1860–1948).

The Pershing County landscape includes foothills, salt flats, and mountains and the Humboldt River, Interstate 80, and the Union Pacific Railroad run through its center. Rye Patch reservoir is used for irrigation storage and also serves as a recreational resource for fisherman and water sports enthusiasts. Primary industries in the County include agriculture and mining. Agricultural lands in the Lovelock area include approximately 37,000 irrigable acres.

According to the U.S. Census Bureau, the county has a total area of 6,068 square miles, of which, 6,037square miles is land and 31 square miles is water.

3.3.2 Government

The County government consists of an elected, three member board. The board members (Commissioners) are elected for terms of four years and include a Chairman and Vice-Chairman. An Administrative Assistant also provides support for County management. Key County officials and departments are listed in Table 8 and Table 9.

Table 8: Pershing County Key Officials

Commissioner, Chairman	Assessor	District Attorney
Commissioner, Vice-Chairman	Planning & Building Director	Justice of the Peace
Commissioner	District Court Clerk	Recorder
Administrative Assistant	Sheriff	Clerk/Treasurer
Emergency Manager		

Table 9: Pershing County Departments and Offices

Assessor	Justice Court
Building and Grounds	Planning and Building
Clerk and Treasurer	Recorder/Auditor
District Attorney	Road Department
District Court and Clerk	Sheriff's Office

The Lovelock Paiute Tribe has a federal reservation in Pershing County. The 20-acre reservation is located in Lovelock and was established in 1907. In 1990, 80 tribal members lived on the reservation. In 1992, 110 people were enrolled in the tribe. The tribe is governed by a five-person tribal council.

3.3.3 Demographics

In this report update, American Community Survey population estimates for 2018 were used. Pershing County's estimated population in 2018 was 6,611, a decrease of 0.2% from 2010. Between 2000 and 2010 the population grew 0.9%, or an average of .09 % per year. This data should be updated when 2020 Census information becomes available.

According to the American Community Survey, the average household size in Pershing County is 2.42 persons and the median household income is $50,846. There are 2,486 total housing units in Pershing County of which 73.6% are owner-occupied. The median value of owner-occupied homes is $100,800. Median household income and median value of owner occupied homes has decreased since 2010, while number of housing units and average household size has increased since 2010.

The population overview for Pershing County from 2000 to 2018 is shown in Figure 9 through Figure 11 Employment characteristics are shown in Figure 12.

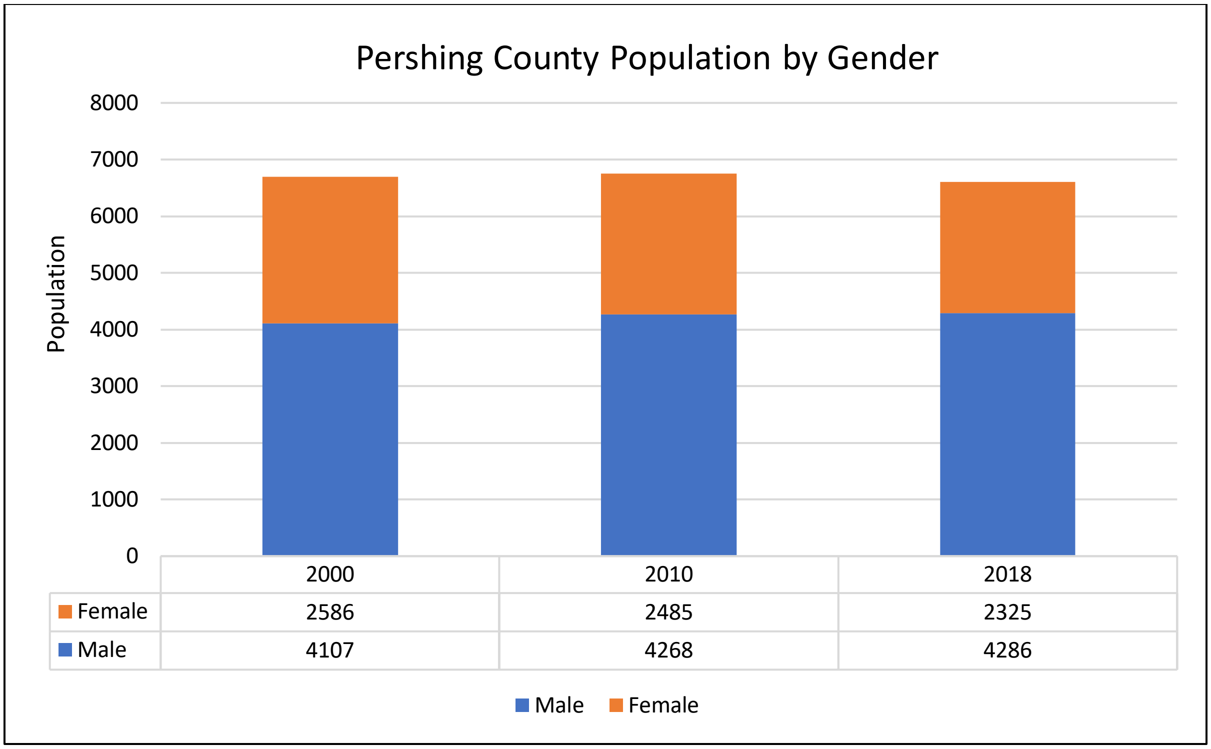


Figure 9: Pershing County Population by Gender (Source: U.S. Census and ACS)

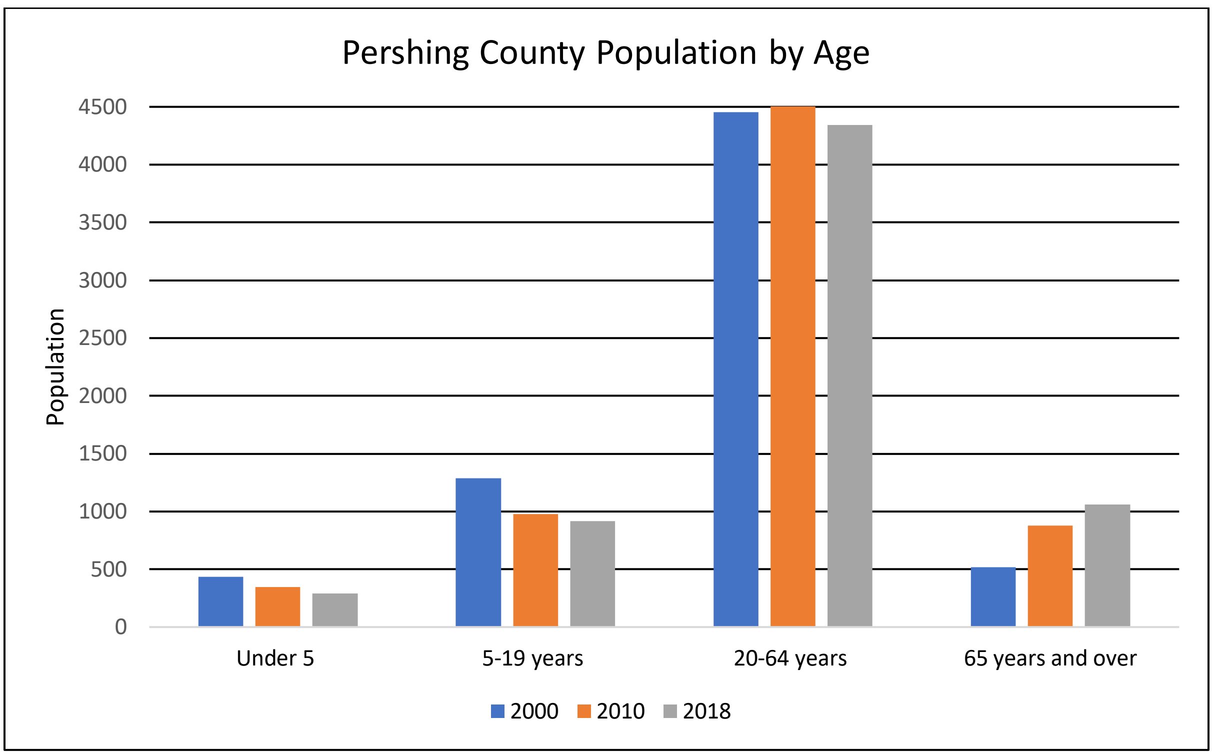
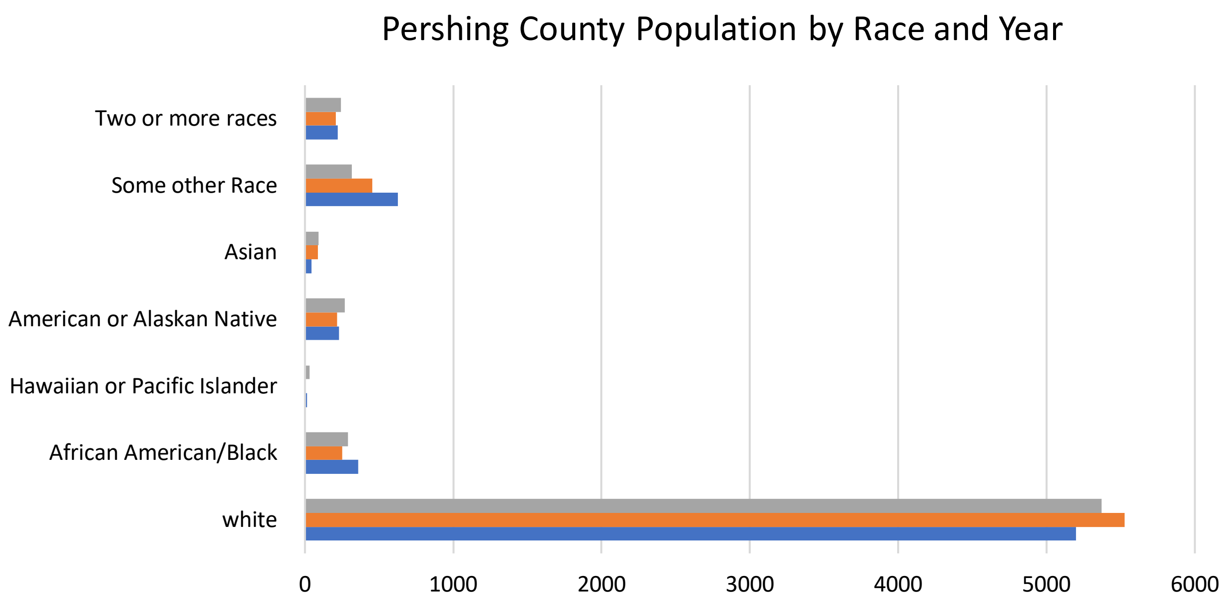


Figure 10: Pershing County Population by Age (Source: U.S. Census and ACS)



	white	African American/Black	Hawaiian or Pacific Islander	American or Alaskan Native	Asian	Some other Race	Two or more races
2018	5369	292	30	269	92	315	244
2010	5528	253	7	217	87	455	206
2000	5200	358	15	229	42	628	221

Figure 11: Pershing County Population by Race (Source: U.S. Census and ACS)

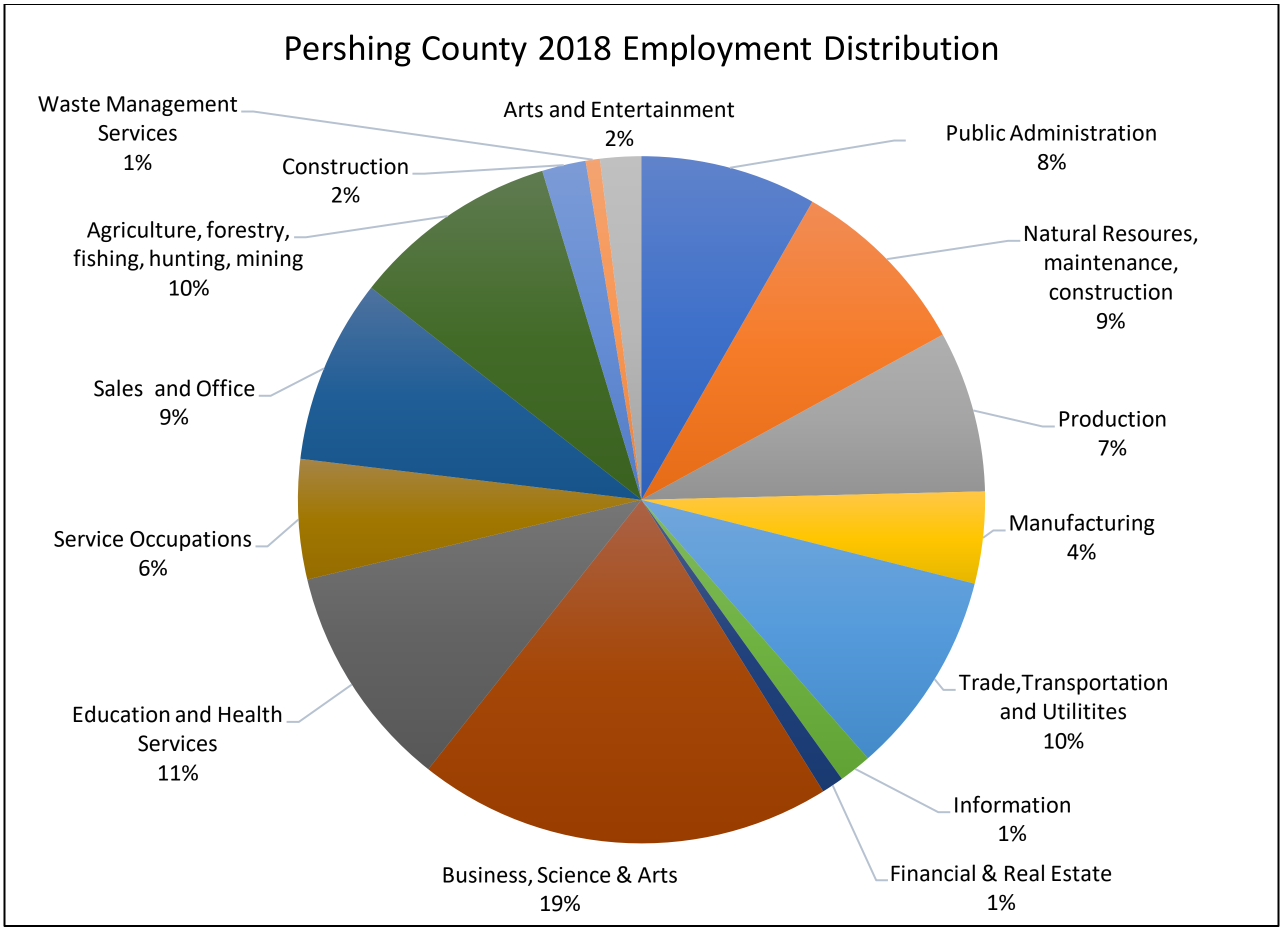


Figure 12: Pershing County Employment Distribution (Source: ACS)

City of Lovelock

Lovelock is located on Interstate 80 (I-80) approximately 95 miles northeast of Reno, Nevada. In addition to I-80, the Humboldt River and the Union Pacific Railroad pass through the City, which has a total area of 0.87 sq. miles.

According to the American Community Survey the population estimate for Lovelock was 1,806 in 2018, a decrease of 88 since 2010. According to the U.S. Census, in 2010 Lovelock had a total population of 1,894, a decrease of 109 over the 2000 Census. The average number of persons per household was 2.28, also down from the 2010 Census and total housing units of 1,038 of which is an increase from 2010 (ACS). This information should be updated when 2020 Census data becomes available.

3.3.4 Land Use and Development Trends

Growth in the County has generally consisted of large lot residential set among farms and ranches and large tracts of publicly owned land. Pershing County includes several distinct residential communities developed around transportation crossroads. Some of these communities have densities that have (or will require) urban services. These include Grass Valley, Imlay, Humboldt River Ranch Association and Rye Patch. Since 2004, ongoing water system infrastructure improvements have been implemented in Lovelock and Imlay in advance of anticipated growth however, growth in these areas and throughout the County has been stagnant during the last 15 years. Consequently, no significant development is anticipated for the near future.

4.0 PLANNING PROCESS

This section provides an overview of the planning process; identifies Planning Committee members, and key stakeholders; documents public outreach efforts; and summarizes the review and incorporation of existing plans, studies, and reports used in the development of this HMP. Additional information regarding the Planning Committee and public outreach efforts is provided in the Appendices.

The requirements for the planning process, as stipulated in the DMA 2000 and its implementing regulations, are described below.

DMA 2000 Requirements: Planning Process

Documentation of the Planning Process

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 nonprofit interests to be involved in the planning process; and
3. Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.

Requirement §201.6(c)(1): [The plan shall document] the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.

Element

Does the new or updated plan provide a narrative description of the process followed to prepare the plan?

Does the new or updated plan indicate who was involved in the planning process? (For example, who led the development at the staff level and were there any external contributors such as contractors? Who participated on the plan Committee, provided information, reviewed drafts, etc.?)

Does the new or updated plan indicate how the public was involved? (Was the public provided an opportunity to comment on the plan during the drafting stage and prior to the plan approval?)

Does the new or updated plan indicate that an opportunity was given for neighboring communities, agencies, businesses, academia, nonprofits, and other interested parties to be involved in the planning process?

Does the updated plan document how the planning team reviewed and analyzed each section of the plan?

Does the planning process describe the review and incorporation, if appropriate, of existing plans, studies, reports, and technical information?

Does the updated plan indicate for each section whether or not it was revised as part of the update process?

4.1 HOW THE PLAN UPDATE WAS PREPARED

Humboldt County hired Farr West Engineering to assist in the development of the Tri-County HMP Update. The combined plan required coordination with Humboldt, Lander, and Pershing Counties. The initial planning phase included establishing contact persons from each of the Counties and meeting with their corresponding Local Emergency Planning Committees (LEPC). The Counties and their associated County Seats (Winnemucca, Battle Mountain, and Lovelock) prepared this HMP with the assistance of Farr West Engineering and the State of Nevada, Hazard Mitigation Officer. Each section of the initial HMP plan was reviewed for content and the committees revised every section of the plan.

The first step in the planning process was to meet with Local Emergency Planning Committees (LEPC) in each County. Primary Points of Contact for each County are as follows:

- Captain Sean Wilkin and Sheriff Mike Allen, Humboldt County
- Esther Gandolfo, Judie Allen, Holly Heese and MeShell Young, Lander County
- Charlie Sparke and Sean Burke, Pershing County

4.1.1 Local Emergency Planning Committee (LEPC)

Planning for the HMP update began in January 2020. Initially the planning process, including hazard profiling, was presented to the LEPC of Humboldt, Lander, and Pershing Counties. Each LEPC included representatives from public and private community entities. LEPC members for each County are included in Table 10. The Planning Committee meetings are described in this Section. Meeting minutes are provided in Appendix D.

Table 10: LEPC Members by County

Humboldt LEPC		Lander LEPC		Pershing LEPC	
Name	**Department**	**Name**	**Department**	**Name**	**Department**
Tony Roth	Nevada Highway Patrol	Holly Heese	Battle Mountain Hospital	Sean Burke	Emergency Manager
Marsha Foreman	Division of Public Health	MeShell Young	LEPC Chair	Rod Wilcox	Lovelock Valley Fire Department
Mike Allen	Humboldt County Sheriff/Emergency Manager	Judie Allan	Former LEPC Chair	Larry Rackley	Pershing County Commissioner
Sean Wilkin	Humboldt County Sheriff/Emergency Response Coordinator	Ester Gandolfo	Former LEPC Chair	Rusty Kiel	Lovelock Meadows Fire District
Torrey Sheen	Winnemucca Rural Fire Department	Kerry Tucket	Newmont Gold/NV Gold Mines	David Skelton	Elected Official
Dave Garrison	Winnemucca Police Department	Bart Negro	Battle Mountain Volunteer Fire Department	Peter Olsen	Search and Rescue
David Jensen	Humboldt County School District	Matt Lower	Lander County Search and Rescue	Cindy Hixenbaugh	Hospital

Jacob Hammer	UPR	Nilla Fuller	Lander County Community Health	Star Gentry	City of Lovelock
Joe Dendary	Winnemucca Fire District	Kim Schacht	Southern District Emergency Medical Services		Pershing County School District
Jordan Kohler	Humboldt General Hospital	Ron Unger	Lander County Sheriff's Office	Marsha Foreman/Cheryl Haas	Division of Public Health
Tom Hoss	HCC	Brandy Bengoa	Lander County Community Health	Mark Pilon/Joe Crim	Transportation
Stan Rorex	CAP/Red Cross	Robert Quick	Lander County Sheriff's Office	Mike Giles	Mayor of Lovelock
Travis Petersen	Newmont	-	-	-	-
Scott Goldblatt	Cyanco (EPCRA Facility Owner/Operators)	-	-	-	-
Don Hogg	AT&T (EPCRA Facility Owner/Operator)	-	-	-	-
Brad Shultz	University of Nevada Coop Extension (Local Environment)	-	-	-	-
Don Kalkoske	Humboldt County Public Works (Transportation)	-	-	-	-
Joyce Sheen	The Humboldt Sun (Broadcast/Print Media)	-	-	-	-

Non-LEPC members also in attendance at the various County LEPC meetings include the following:

- Brian Aitken, Cyanco
- Daniel Hayes, Southwest Gas
- Rachelle Piquet, Humboldt County
- Deb Reid, Lovelock Regional Medical Center
- Kaitlyn McConville, Lander County Administration
- Jessica Dugan, Farr West Engineering

Planning Committee Meetings

- ***January 2020***

  The Humboldt County LEPC met and discussed general information regarding the HMP. Members of the LEPC completed the "Hazard Profiling Worksheet".

- ***March 2020***

The Lander County LEPC met and discussed general information regarding the HMP. Members of the LEPC completed the "Hazard Profiling Worksheet". Public notices were placed in the Humboldt Sun, Battle Mountain Bugle, and the Lovelock Review-Miner (see Appendix C). Notice letters were sent to neighboring Counties.

- ***May 2020***

  The Pershing County LEPC met and discussed general information regarding the HMP. Members of the LEPC completed the "Hazard Profiling Worksheet".

- ***August 2020***

  A hazard mitigation questionnaire was distributed throughout the Tri-County area. The Humboldt County LEPC reviewed the first three chapters of the HMP and provided comments. The Pershing and Humboldt County LEPCs reviewed vulnerability assessments and discussed the planning priorities identified in the hazard screening.

- ***September 2020***

  The Lander County LEPC met and discussed general information regarding the HMP. Members of the LEPC were asked to complete the "Hazard Profiling Worksheet".

- ***October 2020***

  Pershing County LEPC reviewed mitigation projects, established mitigation priorities, and completed Staple E worksheet.

  Public mitigation survey was published in paper after distributed through all LEPC's

- ***November 2020***

  Humboldt LEPC reviewed mitigation projects, established mitigation priorities, and completed Staple E worksheet. HMP draft chapters 4-8 were reviewed for approval.

  Lander County LEPC meeting- hazard profile worksheet, reviewed mitigation projects, established mitigation priorities, and completed Staple E worksheet. HMP draft chapters 4-8 were reviewed for approval.

- ***December 2020***

  Humboldt County reviewed mitigation projects, established mitigation priorities, and completed Staple E worksheet.

- ***January 2021***

  Lander County LEPC reviewed mitigation projects, established mitigation priorities, and completed Staple E worksheet. Humboldt Lander and Pershing Counties held meetings to take public comment and review and approve the HMP. Draft Resolutions were provided for submission to local jurisdictions for approval of the Plan.

Once the Planning Committee was formed, the following five-step planning process took place during the period from January 2020 to December 2020.

Organize resources: The Planning Committees identified resources, including County and City staff, agencies, and local community members, which could provide technical expertise and historical information needed in the development of the HMP.

Create an outreach strategy: stakeholders and the general public were given opportunities to be involved during the planning process and in the plan's maintenance and implementation. Outreach strategies were discussed at the first meeting with each LEPC to determine the best methods for outreach and public participation.

Assess risks: The Planning Committees identified the hazards specific to the County and developed the risk assessment for the nine identified hazards. The Planning Committees reviewed the risk assessment, including the vulnerability analysis, prior to and during the development of the mitigation strategy.

Assess capabilities: The Planning Committees reviewed current administrative and technical, legal and regulatory, and fiscal capabilities to determine whether existing provisions and requirements adequately address relevant hazards.

Develop a mitigation strategy: After reviewing the risks posed by each hazard, the Planning Committees worked to develop a comprehensive range of potential mitigation goals, objectives, and actions. Subsequently, the Planning Committees identified and prioritized the actions to be implemented.

Monitor progress: The Planning Committees developed an implementation process to ensure the success of an ongoing program to minimize hazard impacts to their respective Counties.

4.1.2 Incorporation of Existing Plans and Other Relevant Information

During the planning process, the Planning Committee reviewed and incorporated information from existing plans, studies, reports, and technical reports into the HMP. A synopsis of the sources is below.

Humboldt County

- ***Humboldt County Regional Master Plan:*** Includes population characteristics, natural resources, land use, public facilities and services, and transportation. This document is used for planning purposes.
- ***Humboldt County Building Code:*** The building code specifies all adopted standards for construction within the County. This includes the 20018 International Building, Fire, and Residential, Codes. It also includes the 2017 National Electric Code and the 2018 Uniform Mechanical and Plumbing Codes.
- ***Humboldt County Fire Plan:*** Plan created by Resource Concepts Inc. (RCI) Includes risk and hazard assessments, risk and hazard reduction recommendations, and roles and responsibilities. Also includes maps showing suppression resources, critical community features, and fire history for a County wide assessment as well as assessments for the communities of Winnemucca, McDermitt, Golconda, Denio, Denio Junction, Grass Valley, Orovada, Paradise Valley, Quinn River, Fort McDermitt, Valmy, and Paradise Ranchos.
- ***Humboldt County Water Resource Plan which*** includes policy for Public Lands in Humboldt County, USFS Humboldt Nat. Forest Land and Resource Management Plan, USFWS Sheldon Nat. Wildlife Refuge Comprehensive Conservation Plan, BLM Winnemucca Dist. Resource Management Plan, BLM Black Rock Canyon-High Rock Canyon Conservation Area Resource Management plan.
- ***Water Conservation Plans:*** The following water systems have Water Conservation Plans on file with the Nevada Division of Water Resources: Barrick Turquoise Ridge, Inc., Diamond Plastics, Golconda, Humboldt County School District, McDermitt GID, NDOT District II Valmy Roadside Park, Newmont-Lone Tree Mine, Newmont-Twin Creeks, NV Energy, Orovada GID, Scott Shady Court Motel, Virgin Valley Campground, and Winnemucca.

Lander County

- ***Lander County 2010 Master Plan:*** Includes population characteristics, natural resources, land use, public facilities and services, and transportation. This document is used for planning purposes.
- ***Lander County Building Code:*** The building code specifies all adopted standards for construction within the County. This includes the 1994 Uniform Building, Fire, Mechanical, and Plumbing Codes. It also includes the 1996 National Electric Code.
- ***Lander County 2010 Water Resource Plan:*** This Plan includes information concerning water quality and quantity for both ground and surface water. It discusses mining and agricultural demand. It also includes water profiles for the communities of Battle Mountain, Austin, and Kingston.
- ***Lander County Fire Plan:*** Plan created by RCI Includes risk and hazard assessments, risk and hazard reduction recommendations, and roles and responsibilities. Also includes maps showing suppression resources, critical community features, and fire history for a County wide assessment as well as assessments for the communities of Battle Mountain, Austin, Kingston, Battle Mountain Colony, Carico Valley, Grass Valley, Gilman Springs, Hilltop, and Smokey Valley.
- ***Water Conservation Plans:*** The following water systems have Water Conservation Plans on file with the Nevada Division of Water Resources: Barrick Cortez, Battle Mountain, Greystone Mine, Kingston, Klondex Gold and Silver mining Company, Lander County Water and Sewer Dist. No. 2, Newmont-Phoenix, and Newmont-Twin Creeks.

Pershing County

- ***Pershing County 2012 Master Plan:*** Includes population characteristics, natural resources, land use, public facilities and services, and transportation. This document is used for planning purposes.
- ***Pershing County Water Conservation District Master Plan:*** This is the planning document for agricultural irrigation in Pershing County. It describes the irrigation facilities and proposed improvements to those facilities.
- ***Pershing County Building Code:*** The building code specifies all adopted standards for construction within the County. This includes the 2003 International Building, Fire, Residential, Plumbing, and Mechanical Codes. It also includes the 2002 National Electric Code.
- ***Pershing County Fire Plan:*** Plan created by RCI Includes risk and hazard assessments, risk and hazard reduction recommendations, and roles and responsibilities. Also includes maps showing suppression resources, critical community features, and fire history for a County wide assessment as well as assessments for the communities of Lovelock, Imlay, Mill City, Grass Valley, Unionville, Humboldt, Oreana, and Rye Patch.
- ***Water Conservation Plans:*** The following water systems have Water Conservation Plans on file with the Nevada Division of Water Resources: Couer Rochester Mine, Lovelock Meadows Water District, Imlay, NDOT District III Cosgrove Roadside Park, Star Point Mobile Home Park, Rye Patch Recreation Area, and TSA Store 181.

Additional Applicable State and Federal Plans

The following are State and Federal planning documents that apply to the Tri-County area that were used in the Hazard Mitigation Planning process:

- ***State of Nevada Drought Response Plan (2012):*** A Plan that defines drought conditions and makes recommendations regarding mitigation.
- ***State of Nevada Drought Strategic Plan (2014)***: A long term plan for mitigating drought in Nevada**.**
- ***California-Nevada Drought Early Warning System Strategic Plan (2017-2018):*** A plan prepared by the National Integrated Drought Information System (NIDIS) in partnership with the California-Nevada Climate Applications Program (CNAP) and Western Regional Climate Center (WRCC) which discuss the Drought Early Warning System. (DEWS).
- ***State of Nevada Enhanced Multi-Hazard Mitigation Plan (2018)**:* This plan, prepared by NDEM, was used to ensure that the County's HMP was consistent with the State's Plan.
- ***State Maintained Highways of Nevada (2012):*** This report provides descriptions and Maps of Highways by County.
- ***FEMA Flood Insurance Study for Churchill County, NV (*FEMA 2009*):*** This outlined the principal flood problems and floodplains within the County.

The following FEMA guides were also consulted for general information on the HMP process:

- ***How-To Guide #1: Getting Started: Building Support for Mitigation Planning*** **(FEMA 2002c)**
- ***How-To Guide #2: Understanding Your Risks – Identifying Hazards and Estimating Loss Potential*** **(FEMA 2001)**
- ***How-To Guide #3: Developing the Mitigation Plan: Identifying Mitigation Actions and Implementing Strategies*** **(FEMA 2003a)**
- ***How-To Guide #4: Bringing the Plan to Life: Implementing the Hazard Mitigation Plan*** **(FEMA 2003b)**
- ***State mitigation Planning Key Topics Bulletins: Risk Assessment (FEMA 2016)***
- ***Mitigation Idea; A Resource for Reducing Risk to natural Hazards (FEMA, 2013)***
- ***Hazard Mitigation Assistance Interim Guidance on 2 C.F.R. Part 200 (FEMA 2015)***
- ***Hazard Mitigation Assistance Guide and Addendum (FEMA 2015)***
- ***How-To Guide #8 Multi-jurisdictional Mitigation Planning: State and Local mitigation Planning (FEMA 2006)***
- ***Local Mitigation Planning Handbook (FEMA 2013)***

A complete list of the sources consulted is provided in References – Section 12.0.

4.2 PUBLIC OUTREACH

The Planning Committee mailed letters (see Appendices for copies) regarding the update of the HMP to neighboring County representatives inviting participation and comments. Letters were also sent to:

- FEMA
- State NDEM
- Counties of Churchill, Elko, Eureka, Humboldt, Lander, Lyon, Mineral, Nye, Pershing, Storey, Washoe, and White Pine

The HMP update was published in local newspapers giving notice of the plan update, the community mitigation survey and seeking public comment. Newspaper publication included:

- Humboldt Sun: 3/4/2020 and 10/7/2020

- Battle Mountain Bugle: 3/4/2020 and 10/7/2020
- Lovelock Review-Miner: 3/4/2020 and 10/7/2020

Copies of newspaper advertisements are available in the Appendices.

Public outreach was expanded to include digital formats to reach as many residents as possible, including those in isolation or quarantine due to COVID-19. Digital outreach included:

- Websites: Pershing County Commission website, Farr West Engineering Pershing County Facebook page
- Hazard Mitigation Questionnaires were made available on-line via a web link and a QR code which were distributed via email, web notices and social media throughout the tri county area including The Pershing County Economic Development Association, Emergency Managers, Grass Valley Advisory Board, and Mining industry representatives.

4.2.1 Coordination with Other Agencies and Stakeholders

Coordination with other agencies was sought throughout the plan update process. The Planning Committee reached out to local officials and community groups to obtain information related to the plan update. **Table 11** lists agencies and groups that participated in the plan update, by county.

Table 11: Agency Participation

Humboldt	Lander	Pershing
City of Winnemucca Staff	Emergency Medical Services Southern District Lander County	Pershing County Water Conservation District
Bureau of Land Management	Nevada Gold Mines- Cortez	Pershing County Economic Development Authority
National Weather Service	Lander County Staff	Northeast Nevada Regional Development Authority
Humboldt County Staff	-	Grass Valley Advisory Board

4.3 SECTIONS REVISED AS PART OF THE PLAN UPDATE

All Sections of the plan were reviewed in this 2020-2021 plan update. Updating community descriptions and demographics will be necessary in the next update, after 2020 Census results become available. Significant changes were made to update the Planning Process, Risk Assessments, Hazard Profiles and Mitigation Strategy based on the direction and participation of the Planning Committee. **Table 12** lists the Sections updated in this Plan Update.

Table 12: Sections Updated in this Plan

Sections Revised	Material Updated
2.2	FEMA related Grant opportunities
3.0	Community Descriptions- Demographic Data
4.0	Planning Process
5.0	Risk Assessment
6.0	Hazard Profiles
7.0	Asset Inventory
8.0	Vulnerability Assessment
9.0	Capability Assessment
10.0	Mitigation Strategy
12.0	References

5.0 RISK ASSESSMENT

The requirements for a risk assessment, as stipulated in the DMA 2000 and its implementing regulations, are described below.

DMA 2000 Requirements: Risk Assessment, Assessing Vulnerability, Overview Assessing Vulnerability: Overview Requirement §201.6(c)(2)(ii): [The risk assessment shall include a] description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community. Element Does the new or updated plan include an overall summary description of the jurisdiction's vulnerability to each hazard? Does the new or updated plan address the impact of each hazard on the jurisdiction? Source: FEMA 2008.

5.1 HAZARD IDENTIFICATION

Hazard analysis includes the identification, screening, and profiling of natural and human-caused hazards that could affect the tri-county area. A hazard is a natural or human-caused threat that may result in an impact or possible disaster occurring in a populated, commercial, or industrial area. A natural hazard refers to all atmospheric, hydrologic, geologic (seismic and volcanic), and wildland fire phenomena that, because of their location, severity, and frequency, have the potential to affect humans, their structures, or their activities adversely.

Human-caused (Technological) hazards are a range of hazards emanating from the manufacture, transportation, and use of such substances as radioactive materials, chemicals, explosives, flammables, agricultural pesticides, herbicides, and disease agents; oil spills on land, coastal waters, or inland water systems; and debris from space (www.ready.gov). Chemical, biological, radiological and nuclear hazards are dangerous and can be life-threatening to local communities and people who work in the area. Often there is little or no advance warning to prepare and evacuate to safety.

Even though a particular hazard may not have occurred in or affected the tri-county area within recent history, all hazards potentially affecting the area have been included in the screening process. Hazards unlikely to occur or for which the risk of damage is accepted as being very low, have been eliminated from consideration.

Hazards identified in the screening process as potentially occurring within the tri-county area are profiled in this section in terms of their nature, history, magnitude, frequency, location, and probability. Hazards have been identified through the compilation of historical and scientific information, review of existing plans and studies, and preparation of hazard maps of the study area. Hazard maps are used to determine the geographic extent of potential hazards and define the approximate boundaries of the areas at risk.

5.2 HAZARD SCREENING

The requirements for hazard identification, as stipulated in DMA 2000 and its implementing regulations, are described below.

DMA 2000 Requirements: Risk Assessment – Overall Identifying Hazards

DMA 2000 Requirements: Risk Assessment – Overall
§201.6(c)(2)(i): [The risk assessment shall include a] description of the type of all natural hazards that can affect the jurisdiction. Element • Does the new or updated plan include a description of all the types of all natural hazards that affect the jurisdiction? Source: FEMA, March 2008.

The first step of the hazard analysis is the identification and screening of hazards, as shown in Table 13. During the first HMP meetings, the LEPC (comprised of representatives from the County agencies, City agencies, local businesses, State Division of Emergency Management, and Farr West Engineering) reviewed hazards identified in the State of Nevada Hazard Mitigation Plan and identified 15 possible hazards for further consideration: 13 natural hazards and 2 human-caused hazards.

Table 13: Hazard Screening for Humboldt, Lander and Pershing Counties

Hazard Type	Profile Required?	Reasoning
Avalanche	No	No history of occurrence in these Counties.
Drought	Yes	History of severe drought in these Counties.
Earthquake	Yes	Largest recorded earthquake in Nevada affected these Counties.
Epidemic	Yes	Epidemic was addressed in the State Multi-Hazard Mitigation Plan.
Expansive Soils	No	No history of effects from this hazard in these Counties
Extreme Heat	No	No historical record of this hazard in the County.
Flood (Including Dam/Levee Failure)	Yes	All three Counties have a history of flood damage.
Hazardous Material Event	Yes	Interstate 80 and the railroad pass through all three of these Counties.
Infestations	Yes	History of weed and insect infestations in all three Counties.
Land Subsidence & Ground Failure	No	No historic events.
Severe Weather Snow/Ice/Wind/Tornado	Yes	All three Counties have a history of extreme weather.
Seiche	No	No historic events.
Volcano	Yes	No historic events the Tri-County area. However, there is a volcanic field located in Pershing County. Some effects from Volcanoes in California are possible.
WMD / Terrorism	No	This hazard is not addressed due to committee determining this is a moderate hazard and should not be addressed in a public document. Probability and extent could not be determined.
Wildland Fire	Yes	The terrain, vegetation, and weather conditions in the region are favorable for the ignition and rapid spread of wildland fires.

Assigning Vulnerability Ratings

During a Committee meeting the members were tasked to prioritize the hazards by their total impact in the community. An exercise requiring the committee to complete a form which tabulated their ratings of each hazard was accomplished. The exercise formula took into account the historical occurrence of each respective hazard, the potential area of impact when the disaster does occur, and the magnitude.

It is important to note that hazards of the same magnitude and the same frequency can occur in similar sized areas; however, the overall impact to the areas would be different because of population densities and property values in the areas impacted.

The rubric used in the State Hazard Mitigation plan was used as guidance for this Tri-County HMP update. Table 14 is a reproduction of Hazard Prioritization Criteria of the Nevada State HMP (Table 3.2) and is reproduced here for informational purposes (State Enhanced HMP, 2018)

Table 14: Vulnerability Ratings Rubric

Hazard Prioritization Criteria			
Criterion	**Value**	**Category**	**Description**
Probability/ Frequency	1	Very Low	Occurs less than once in 1000 years
	2	Low	Occurs less than once in 100 to once in 1000 years
	3	Medium	Occurs less than once in 10 to once in 100 years
	4	High	Occurs less than once in 5 to once in 10 years
	5	Very High	Occurs more frequently than once in 5 years
Magnitude/ Severity (includes Economic Impact, Area Affected and vulnerability)	1	Very Low	• Negligible property damages (less than 5% of all buildings and infrastructure) • Negligible loss of quality of life • Local emergency response capability is sufficient to manage the hazard
	2	Low	• Slight property damages (5% to 15%) of all buildings and infrastructure) • Slight loss of quality of life • Emergency response capability of the city or surrounding community is sufficient to manage the hazard
	3	Medium	• Moderate property damages (15% to 30% of all buildings and infrastructure) • Some loss of quality of life • Emergency response capability, economic, and geographic effects of the hazard are of sufficient magnitude to involve one or more counties

	4	High	• Moderate property damages (30% to 50% of all buildings and infrastructure) • Moderate loss of quality of life • Emergency response capability, economic, and geographic effects of the hazard are of sufficient magnitude to require state assistance
	5	Very High	• Property damages to greater than 50% of all buildings and infrastructure. • Significant loss of quality of life • Emergency response capability, economic, and geographic effects of the hazard are of sufficient magnitude to require federal assistance
Warning Time	1	Very Low	> 48hrs
	2	Low	24 to 48 hrs
	3	Medium	12 -24 hrs
	4	High	12 - 6 hrs
	5	Very High	<6 hrs
Duration of loss of critical facilities and services.	1	Very Low	1 to 3 days
	2	Low	4 to 7 days
	3	Medium	8 to 14 days
	4	High	15 to 20 days
	5	Very High	More than 20 days

The Committees referenced the NV DEM historical records, RCI plans and HAZUS runs from Nevada Bureau of Mines and Geology (NBMG) for scientific data that was used for magnitude, economic and frequency scores based on historical frequencies and / or projected probabilities of the hazards identified.

Upon obtaining total scores for each hazard, the team utilized the scores to analyze and prioritize the hazards to focus upon during the profiling, vulnerability assessment and mitigation strategy. Table 15 through Table 18 summarize the hazard scoring results of both the members present at the LEPC meeting and those that supplied feedback via e-mail after the meeting.

In reviewing the results, and to better facilitate analysis, hail, thunderstorm, extreme heat, severe winter storm, windstorm, and tornado were combined into one category “Severe Weather”.

The Planning Committees determined the following hazards pose a threat to their Counties: drought, earthquakes, epidemic, floods, hazardous materials (HAZMAT) events, infestation, severe weather, volcano, and wildland fires. The Committee then discussed the results of the ranking and through additional deliberation determined drought, earthquake, flood, wildfire, epidemic/pandemic and hazardous materials to be high/moderate hazards. Infestation and severe weather and volcano were considered lower priority hazards.

Table 15 through Table 18 summarize the results of hazard rankings for the LEPC's of the individual Counties. Hazards ranked as Very High, High, or Moderate are carried through to the Vulnerability Analysis and will be addressed in the Mitigation Strategy portion of the plan.

When the Planning Committee reviewed and discussed the hazard screening results and the committee planning priorities some adjustments to hazard priority planning were made according to the Committees' discussion and approval. Humboldt County LEPC increased the planning priority of epidemic/pandemic from low to moderate priority based on the financial impacts seen during the COVID-19 pandemic, and the possibility of increased financial impacts to the County if more residents are impacted. Pershing County also made adjustments to hazard planning priorities after discussion of the hazard screening results. The Pershing County LEPC increased hazard planning priority of epidemic/pandemic and flood from a low to moderate priority level.

Table 15: Hazard Ranking Results for Humboldt County (Winnemucca)

Hazard Type	Probability/Frequency	Magnitude (affected area/vulnerability/ Economic Impact)	Warning Time	Duration of loss of critical Facilities and Services	Planning Significance
Natural					
Drought	Moderate	Moderate	Moderate	Low	Moderate
Earthquakes	Moderate	High	High	High	High
Epidemic	Low	Low	Low	Low	Moderate
Flood[1]	Moderate	Moderate	Moderate	Moderate	Moderate
Infestations	Moderate	Low	Low	Very Low	Low
Severe Weather[2]	Moderate	Low	Moderate	Low	Low
Volcano	Very Low	Very Low	Very Low	Very Low	Very Low
Wildfire	Very High	High	High	Moderate	High
Human Caused					
HAZMAT	High	High	High	Moderate	High

[1]Flood included dam and/or canal failure
[2]Severe Weather includes extreme heat, thunderstorm/hail, snow, tornado, and windstorm

The Lander County LEPC completed the Hazard Screening using a collaborative process. The committee discussed each hazard by referencing the Nevada State Mitigation Plan Hazard Prioritization Criteria. Hazard prioritization included discussion of the probability, frequency, magnitude, warning time and duration of loss of critical facilities. The committee reached a consensus determination for the planning significance for each hazard. The committee had extensive discussion regarding landslides, hazmat, and terrorism related hazards.

Table 16: Hazard Ranking Results for Lander County (Battle Mountain)

Hazard Type	Probability/ Frequency	Magnitude (affected area/vulnerability /Economic Impact)	Warning Time	Duration of loss of critical Facilities and Services	Planning Significance
Natural					
Drought	-	-	-	-	High
Earthquakes	-	-	-	-	Low/Moderate
Epidemic	-	-	-	-	High
Flood[1]	-	-	-	-	Low
Infestations	-	-	-	-	Very Low
Severe Weather[2]	-	-	-	-	Moderate/High
Volcano	-	-	-	-	Very Low
Wildfire	-	-	-	-	High
Human Caused					
HAZMAT	-	-	-	-	High

[1]Flood included dam and/or canal failure
[2]Severe Weather includes extreme heat, thunderstorm/hail, snow, tornado, and windstorm

Table 17: Hazard Ranking Results for Pershing County (Lovelock)

Hazard Type	Probability/Frequency	Magnitude (affected area/vulnerability/Economic Impact)	Warning Time	Duration of loss of critical Facilities and Services	Planning Significance
Natural					
Drought	High	Low	Very Low	Moderate	Moderate
Earthquakes	High	High	High	Moderate	Moderate
Epidemic	Moderate	Low	Low	Low	Moderate
Flood[1]	Low	Low	Moderate	Moderate	Moderate
Infestations	Moderate	Low	Low	Low	Low
Severe Weather[2]	High	Moderate	Low	Low	Low
Wildfire	High	Low	High	Moderate	Moderate
Human Caused					
HAZMAT	High	Moderate	Moderate	Low	Moderate

[1]Flood included dam and/or canal failure
[2]Severe Weather includes extreme heat, thunderstorm/hail, snow, tornado, and windstorm

Table 18: Hazard Rankings Summary, All Hazards

	Ranking			
Hazard	**Humboldt**	**Lander**	**Pershing**	**State of Nevada**
Avalanche	Low	Low	Low	Low
Drought	Moderate	High	Moderate	Moderate
Earthquake	High	Low/Moderate	Moderate	High
Epidemic	Moderate	High	Moderate	Low
Expansive Soils	Very Low	Very Low	Very Low	Low
Extreme Heat	Low	Moderate	Low	Moderate
Flood[1]	Moderate	Low	Moderate	High
Infestations	Low	Very Low	Low	Low
Landslide	Low	Very Low	Low	Low
Severe Weather[2]	Low	Moderate/High	Low	Moderate
Subsidence	Low	Low	Very Low	Low
Tsunami/Seiche	Very Low	Very Low	Very Low	Low
Volcano	Very Low	Very Low	Very Low	Low
Wildfire	High	High	Moderate	High
HAZMAT	High	High	Moderate	Moderate
Terrorism/WMD	Low	Moderate	Low	N/A

[1]Flood includes dam and/or canal failure
[2]Severe Weather includes extreme heat, thunderstorm/hail, snow, tornado, and windstorm

A hazard profile will be developed for hazards with a "low" ranking but these hazards will not be carried through to the Vulnerability Analysis or Mitigation Strategy, as historically those hazards have occurred in unpopulated areas having little to no impact, measurable magnitude, or feasible mitigation actions. The "low" ranked hazards will be profiled for future reference in order to monitor the possible impact of these hazards in relation to the growth within the Tri-Counties.

County hazard ranking results generally correspond with those in the State of Nevada Hazard Mitigation Plan. Exceptions include epidemic, extreme heat, flood and severe weather. The State Plan was last updated in 2018 with the State of Nevada's Enhanced Mitigation Plan and the Covid-19 Pandemic had not yet occurred in the United States. This event brought epidemic/pandemic to the forefront of emergency planners. The broad and sweeping effects of the pandemic increased the planning priority for Tri-County emergency planners. Extreme heat is ranked lower in the cooler northern Counties in this plan, and while extreme weather still occurs in the Tri County area, hazard screening results showed a decrease in planning priority at the time of this plan update. Hazardous material was ranked higher in Humboldt County due to the highway and rail corridors that have the potential to impact a significant portion of the County's facilities.

The remaining hazards excluded through the screening process were considered to pose little or no threat to life and property in the Counties due to the low likelihood of occurrence or the low probability that life and/or property would be significantly affected. Should the risk from these hazards increase in the future, the HMP can be updated to incorporate a vulnerability analyses for these hazards. The committee determined that Terrorism should not be addressed in this public document.

6.0 HAZARD PROFILES

The requirements for hazard profiles, as stipulated in the DMA 2000 and its implementing regulations, are described below.

DMA 2000 Requirements: Risk Assessment – Profiling Hazards Profiling Hazards Requirement §201.6(c)(2)(i): [The risk assessment **shall** include a] description of the location and extent of all natural hazards that can affect the jurisdiction. The plan **shall** include information on previous occurrences of hazard events and on the probability of future hazard events. Element Does the risk assessment identify the **location** (i.e., geographic area affected) of each natural hazard addressed in the plan? Does the risk assessment identify the **extent** (i.e., magnitude or severity) of each hazard addressed in the plan? Does the plan provide information on **previous occurrences** of each hazard addressed in the plan? Does the plan include the **probability of future events** (i.e., chance of occurrence) for each hazard addressed in the plan? Source: FEMA, March 2008.

The specific hazards selected by the Planning Committee for profiling have been examined in a methodical manner based on the following factors:

- Probability/Frequency
- Magnitude/Severity (including economic impact)
- Warning Time
- Duration of Loss of Critical Facilities and Services

The hazards profiled for the County are presented in Section 5.2 hazards in alphabetical order. The order of presentation does not signify the level of importance or risk.

6.1 CLIMATE CHANGE

In this plan update, climate change was not included in the LEPC's specific hazard screenings establishing planning significance. A profile of climate change related hazards is included in this section, but is not included in additional assessments in this Plan update. In the future, the committees may consider climate change to determine planning significance in future HMP updates.

Background for this section was obtained from the Fourth National Climate Assessment (NCA4). This report draws on science described in the Climate Science Special Report (CSSR) and on the human welfare, societal, and environmental elements of climate change and variability for 10 regions and 18 national topics, including observed and projected risks, impacts, consideration of risk reduction, and implications under different mitigation pathways. The Global Change Research Act of 1990 mandates that the U.S. Global Change Research Program (USGCRP) deliver a report to Congress and the President no less than every four years that analyzes the effects of global change on the natural environment, agriculture, energy production and use, land and water resources, transportation, human health and welfare, human social systems, and biological diversity. The assessment analyzes current trends in global change, both human-induced and natural, and projects major trends for the subsequent 25 to 100 years. The fifth national assessment is underway now and may be referenced in future updates of this plan.

6.1.1 Description

Potential hazards which may be amplified due to climate change factors in the Tri-County area include increased risks for extreme heat events, prolonged and more frequent drought events and increased wildfires.

6.1.2 History, Location, Extent, and Probability of Future Events

Regional impacts related to climate change may include water resources, ecosystems and ecosystem services, energy, food production and human health. Additional updates of this plan may address climate change in more detail.

6.2 DROUGHT

Planning Significance	Humboldt- Moderate, Pershing-Moderate, Lander- High

Much of the information contained in this section was kindly provided courtesy of the National Weather Service regional office.

6.2.1 Description

Drought is defined by the Glossary of Meteorology (1959) as “a period of abnormally dry weather sufficiently prolonged for the lack of water to cause serious hydrologic imbalance in the affected area”. Characteristics of drought can vary significantly from one region to another and, partly due to differences in impact, there are scores of definitions. Drought is often described simply as a period of deficient precipitation, usually lasting a season or more, resulting in extensive damage to agricultural crops with consequential economic losses. This deficiency can result in a water shortage for some activity, group, or environmental sector. Operational definitions define the beginning, end, and degree of intensity of drought.

The onset and end of a drought are difficult to determine due to the slow accumulation and lingering of effects caused by an event after its apparent end. In contrast with other natural hazards, the impact of drought is less obvious and may be spread over a larger geographic area. The impact of a particular drought depends on numerous factors including duration, intensity, and geographic extent as well as regional water supply demands by humans and vegetation. Other climatic characteristics, such as high temperature, high wind, and low relative humidity amplify the impact of drought conditions.

There are many different types of drought and factors other than monthly or even annual precipitation, to be considered when determining drought classification. Four types of drought that are commonly referenced are: 1) meteorological, 2) hydrological, 3) agricultural and 4) socioeconomic.

1) *Meteorological Drought:* Meteorological drought is usually defined on the basis of the degree of dryness (in comparison to some “normal” or average amount) and the duration of the dry period. Thus, meteorological drought can vary greatly from location to location.
2) *Agricultural Drought:* A good definition of agricultural drought should be able to account for the variable susceptibility of crops during different stages of crop development, from emergence to maturity. This type of drought focuses on such conditions as precipitation shortages, differences between actual and potential evapotranspiration, soil water deficits and reduced groundwater or reservoir levels. When drought begins, the agricultural sector is usually the first to be affected because of its heavy dependence on stored soil water.
3) *Hydrological Drought:* Hydrological drought is associated with the effects of periods of precipitation shortage, including snowfall, on surface or subsurface water supply (i.e., stream

flow, reservoir and lake levels, and groundwater). All droughts originate with a deficiency of precipitation and the impacts are determined by how this deficiency plays out through the hydrologic system. Hydrological droughts may or may not be in phase with a meteorological or agricultural drought since it takes longer for precipitation deficiencies to show up in some components of the hydrological system.

4) *Socioeconomic Drought* (also known as Water Management Drought): This definition of drought associates the supply and demand of economic goods or services with elements of meteorological, hydrological, and agricultural drought. This type of drought is diagnosed when the demand for water exceeds the supply as a direct result of precipitation shortage.

The negative impacts of drought increase with duration. Lower than normal reservoir or river levels can impact recreational opportunities, fire suppression activities and animal habitat. Patterns of human consumption can also be altered. Non-irrigated croplands are most susceptible to precipitation shortage. Rangeland and irrigated agricultural crops may not respond to moisture shortage as rapidly, however, yield during periods of drought can be substantially lower. During periods of severe drought, lower moisture in plant and forest fuels create an increased potential for devastating wildfires. An increase in insect infestation can be a particularly damaging impact from severe drought conditions.

The U.S. Drought Monitor product (available at https://www.droughtmonitor.unl.edu) utilizes several indices along with data retrieved from various organizations and personnel directly involved in the field to create a graphical assessment of drought conditions. The four five drought intensities or classifications offered by the authors of this product are: D0 Abnormally Dry, D1 Moderate Drought, D2 Severe Drought, D3 Extreme Drought and D4 Exceptional Drought.

The Drought Monitor summary map (**Figure 13**) identifies general drought areas. Drought intensity categories are based on five key indicators and numerous supplementary indicators. **Figure 14** shows the ranges for each indicator for each dryness level. Because the ranges of the various indicators often don't coincide, the final drought category tends to be based on what the majority of the indicators show. The analysts producing the map also weight the indices according to how well they perform in various parts of the country and at different times of the year. Also, additional indicators are often needed in the West, where winter snowfall has a strong bearing on water supplies.

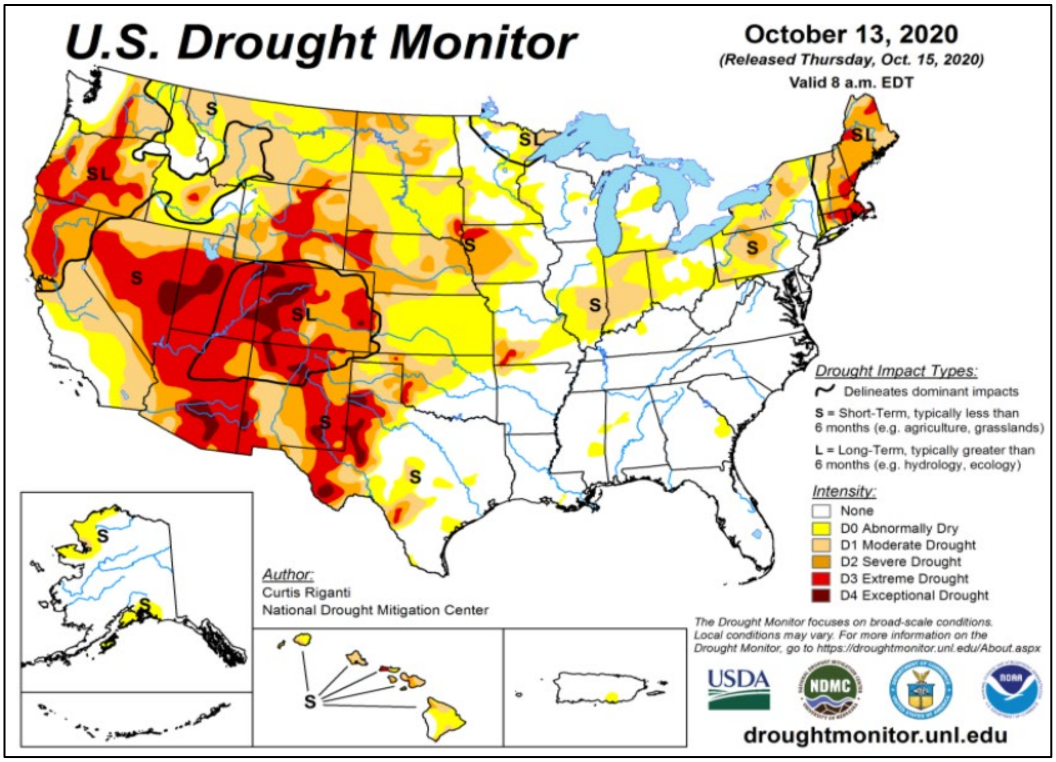
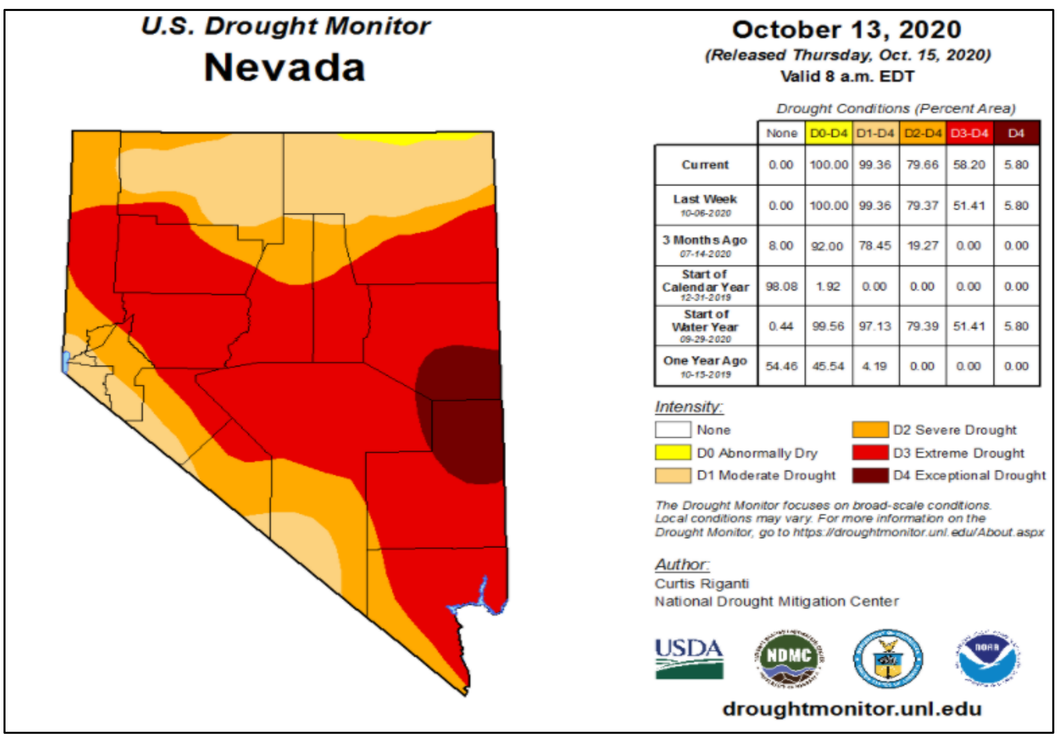


Figure 13: Example of the US Drought Monitor



	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	0.00	100.00	99.36	79.66	58.20	5.80
Last Week 10-06-2020	0.00	100.00	99.36	79.37	51.41	5.80
3 Months Ago 07-14-2020	8.00	92.00	78.45	19.27	0.00	0.00
Start of Calendar Year 12-31-2019	98.08	1.92	0.00	0.00	0.00	0.00
Start of Water Year 09-29-2020	0.44	99.56	97.13	79.39	51.41	5.80
One Year Ago 10-15-2019	54.46	45.54	4.19	0.00	0.00	0.00

Figure 14: Example of the Drought Monitor for the State of Nevada

Table 19: Drought Severity Classification Table (U.S. Drought Monitor)

		Ranges					
Category	**Description**	**Possible Impacts**	**Palmer Drought Index**	**CPC Soil Moisture Model (Percentiles)**	**USGS Weekly Streamflow (Percentiles)**	**Standardized Precipitation Index (SPI)**	**Objective Short and Long-term Drought Indicator Blends (Percentiles)**
D0	Abnormally Dry	Going into drought: short-term dryness slowing planting, growth of crops or pastures. Coming out of drought: some lingering water deficits; pastures or crops not fully recovered	-1.0 to -1.9	21-30	21-30	-0.5 to -0.7	21-30
D1	Moderate Drought	Some damage to crops, pastures; streams, reservoirs, or wells low, some water shortages developing or imminent; voluntary water-use restrictions requested	-2.0 to -2.9	11-20	11-20	-0.8 to -1.2	11-20
D2	Severe Drought	Crop or pasture losses likely; water shortages common; water restrictions imposed	-3.0 to -3.9	6-10	6-10	-1.3 to -1.5	6-10
D3	Extreme Drought	Major crop/pasture losses; widespread water shortages or restrictions	-4.0 to -4.9	3-5	3-5	-1.6 to -1.9	3-5
D4	Exceptional Drought	Exceptional and widespread crop/pasture losses; shortages of water in reservoirs, streams, and wells creating water emergencies	-5.0 or less	0-2	0-2	-2.0 or less	0-2

6.2.2 History

Increased wildfire risk, water shortages and an anomalous insect infestation have all been attributed to recent droughts. The severe to extreme drought which ended in 2016 brought significant impacts to the recreational, ranching, and agricultural communities. Table 20 is a list of recent drought periods extracted from data supplied by the U.S. Drought Monitor.

Table 20: Drought Severity (Severe or Higher) and Duration for Counties in the Tri-County Area

Drought Period	Duration of Drought (approximate)	Maximum Intensity
Humboldt County		
July 3, 2001 - January 8, 2002	6 months	Severe
January 21, 2003 – April 12, 2005	28 months	Extreme
June 26, 2012 – June 5, 2016	47 months	Extreme
September 22, 2020 - Present	> 1 month	Severe
Lander County		
July 3, 2001 - January 8, 2002	7 months	Severe
January 21, 2003 - January 11, 2005	24 months	Severe
July 24, 2012 - May 17, 2016	46 months	Extreme
August 25, 2020 - Present	> 2 months	Severe
Pershing County		
July 3, 2001 - January 8, 2002	7 months	Severe
January 28, 2003 - December 30, 2003	11 months	Severe
May 25, 2004 - February 1, 2005	9 months	Severe
July 3, 2007 - January 8, 2008	7 months	Severe
June 26, 2012 - June 7, 2016	47 months	Extreme
September 22, 2020 - Present	>1 month	Severe

There are 344 climate divisions in the contiguous United States. For each climate division, monthly station temperature and precipitation values are computed from daily observations. The divisional values are weighted by area to compute statewide values and the statewide values are weighted by area to compute regional values. (Karl and Koss, 1984). Humboldt and Pershing Counties are located in Nevada's northwestern Climate Division 1. Lander County is located Division 2. See Figure 15 for the map of United States climate divisions.

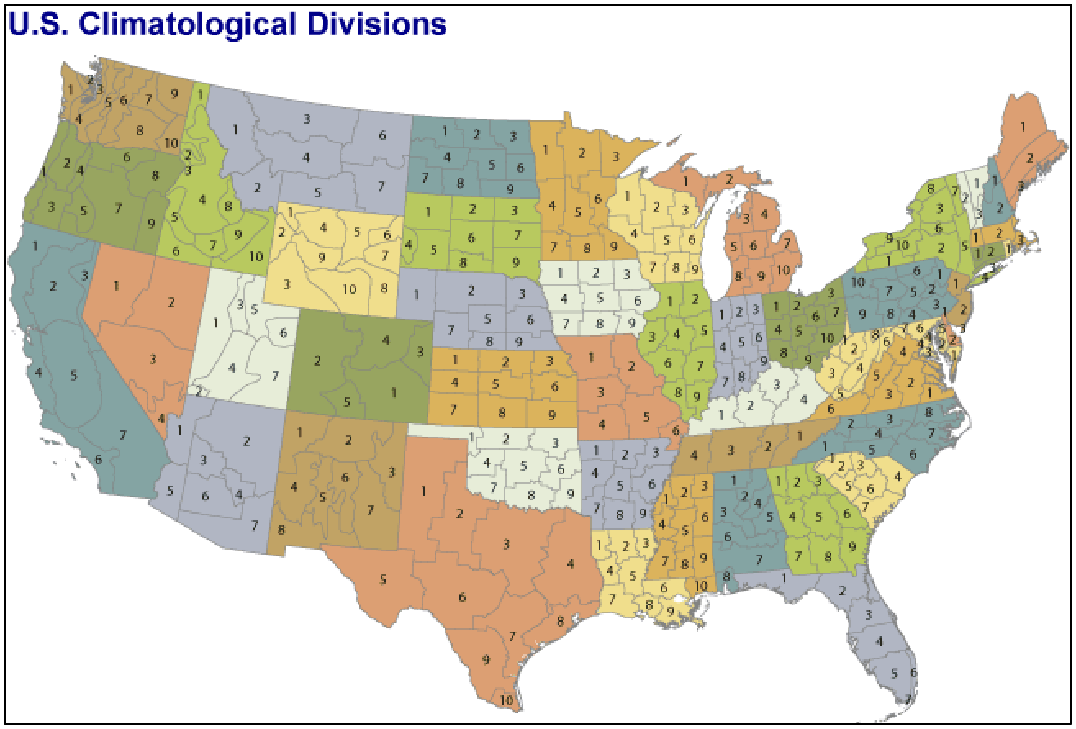


Figure 15: U.S. Climatological Divisions (NOAA)

The Palmer Index is a meteorological measurement of dryness based on recent precipitation and temperature. The Index is most effective in determining long-term drought, a matter of several months. It uses a 0 as normal, and drought is shown in terms of minus numbers; for example, minus 2 is moderate drought, minus 3 is severe drought, and minus 4 is extreme drought. Figure 18 shows an example of a Palmer Drought index map. The National Oceanic and Atmospheric Administration (NOAA) updates these maps often and they can be accessed online to track drought conditions anywhere in the United States.

Palmer Index drought data for Division 1 is reported from 1895 through 2017 by NOAA's National Center for Environmental Information (NCEI), formerly the National Climatic Data Center (NCDC). In Division 1 there were 8 years in the span between 1895—2011 that experienced an average 12 month Palmer Index Rating indicating extreme drought. Of the 21 extreme drought years that occurred between 1895 and 2011, 7 occurred between 2000 and 2010. Between 2011 and 2017 the Palmer Drought Severity Index indicated moderate to severe drought persisted from 2012 through early 2015 in Nevada's Climate Division 1.

Lander County is located in Climate Division 2. Although drought events that have occurred in Division 2 have not matched those of Division 1, four of the fourteen droughts between 1895—2011 that were rated "severe" on the Palmer Index occurred between 2000 and 2010. The Palmer Index indicated that a station in Lander County within Climate Division 2 showed moderate to severe drought occurring from 2014 through early 2016.

In 2002, 2004, and 2008 the U.S. Department of Agriculture designated all 17 counties in Nevada as drought affected. the longest duration of drought (D1-D4) in Nevada lasted 269 weeks. It began on December 27, 2011 and ended February 14, 2017. The most intense period of drought occurred the week of February 17, 2015 where D4 affected 18.38% of Nevada land. See Figure 16 for historical drought percentages from 2000-2020. Implications of drought include increased risk of wildland fires, water shortages, insect infestations, and crop damages.

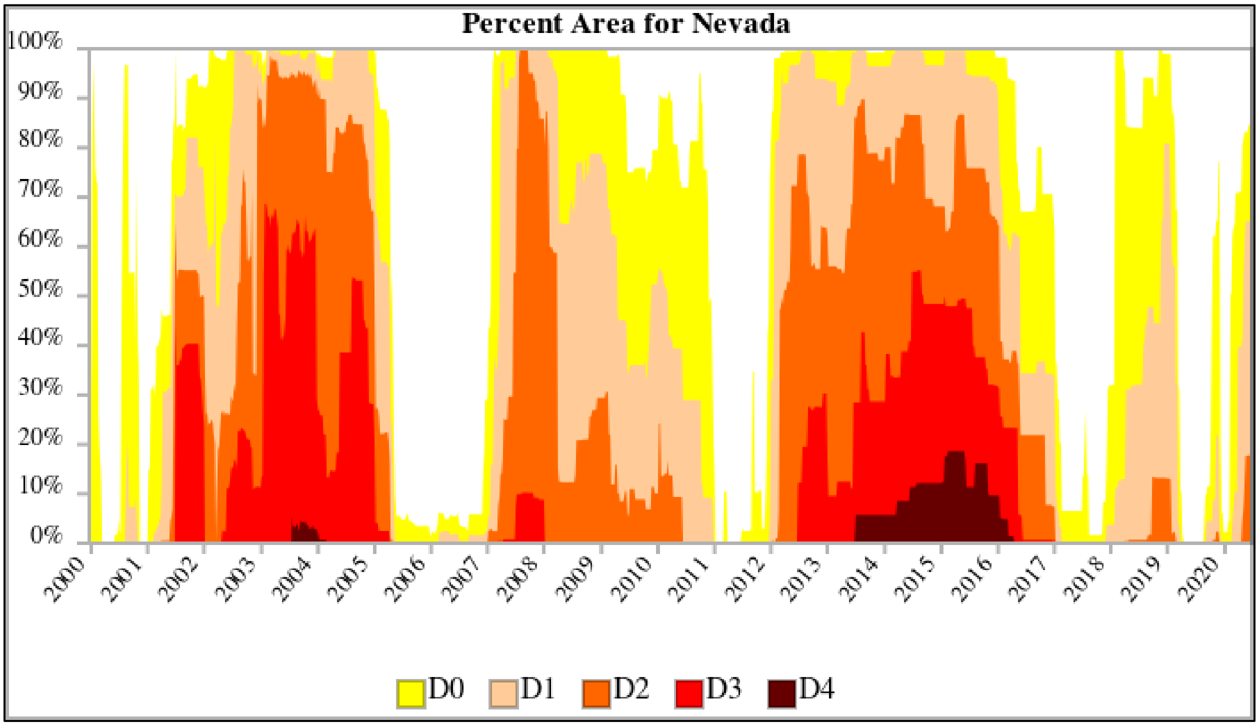


Figure 16: Historical Drought Percentage Areas for Nevada 2000-2020 (DEWS)

6.2.3 Location, Extent, and Probability of Future Events

Droughts are a naturally-occurring cyclical part of climate and the Tri-County area is highly susceptible to periods of dry conditions. As a result, the Tri-County area has experienced between 4 and 6 drought periods (depending on county) greater than or equal to classification D3 (severe) since 2000. While exceptional droughts are relatively rare, drought conditions across the Tri-County can be classified as extreme by the authors of the U.S. Drought Monitor. Based on recent cycles, the planning area can expect varying degrees of drought to continue in the future with a wide ranging time duration based on past cycles.

In Humboldt and Pershing Counties, severe and extreme drought conditions (D2 to D3-rated intensities on the U.S. Seasonal Drought Monitor) have persisted over the last decade. Fortunately, the Humboldt River is supplied by run-off from mountains located in climate division 2. If not for this, drought would have a significant impact due to the economic reliance on agriculture in these Counties.

The U.S. Seasonal Drought Outlook forecasts that Nevada, including Humboldt and Pershing Counties, will continue to be affected by drought. Although it is difficult to forecast future droughts, the general trend in Humboldt and Pershing Counties is an increase in the number and severity of droughts.

Generally, Lander County fairs better than Humboldt and Pershing Counties regarding drought. However, Climate Division 2 is also trending toward increasing drought.

The Palmer Index from January 2020 shows northern Nevada to be in the midrange for moisture with precipitation in the above average range at the time. Figure 17 through

Figure 19 show US Drought monitor indicators in the Tri Counties area in June 2020. For the same time snapshot, the Drought Early Warning Systems (DEWS) shows 19% of the area under D2-D3 drought conditions.

Warning Time

Drought Early Warning Systems (DEWS) are currently being developed in partnership with the National Integrated Drought Information System (NIDIS). The CA-NV DEWS Strategic Plan outlines priority tasks and activities that build upon existing stakeholder networks to improve drought early warning capacity and long-term resilience in California and Nevada. It includes a list of current partners, outcomes, and key milestones. This Plan is a “living document” to which additional actions and partners may be added as needed. Dedicated partners across California and Nevada contributed to the development of the CA-NV DEWS Strategic Plan, including federal, tribal, state, local, academic, and non-profit organizations and entities.

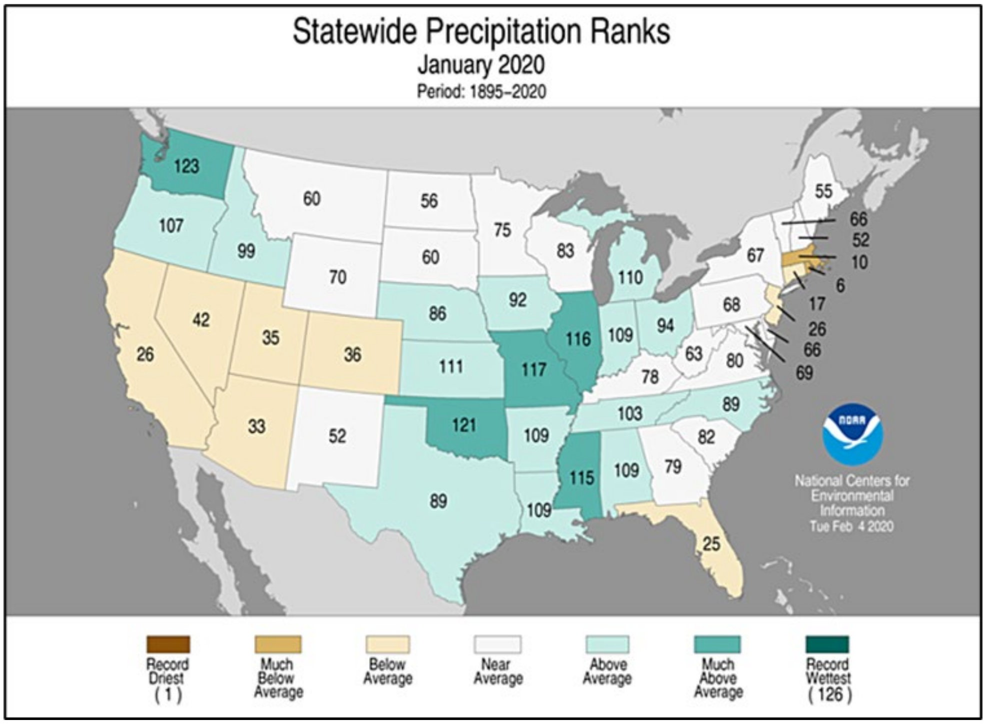


Figure 17: Precipitation Ranks by State as of January 2020 (NOAA)

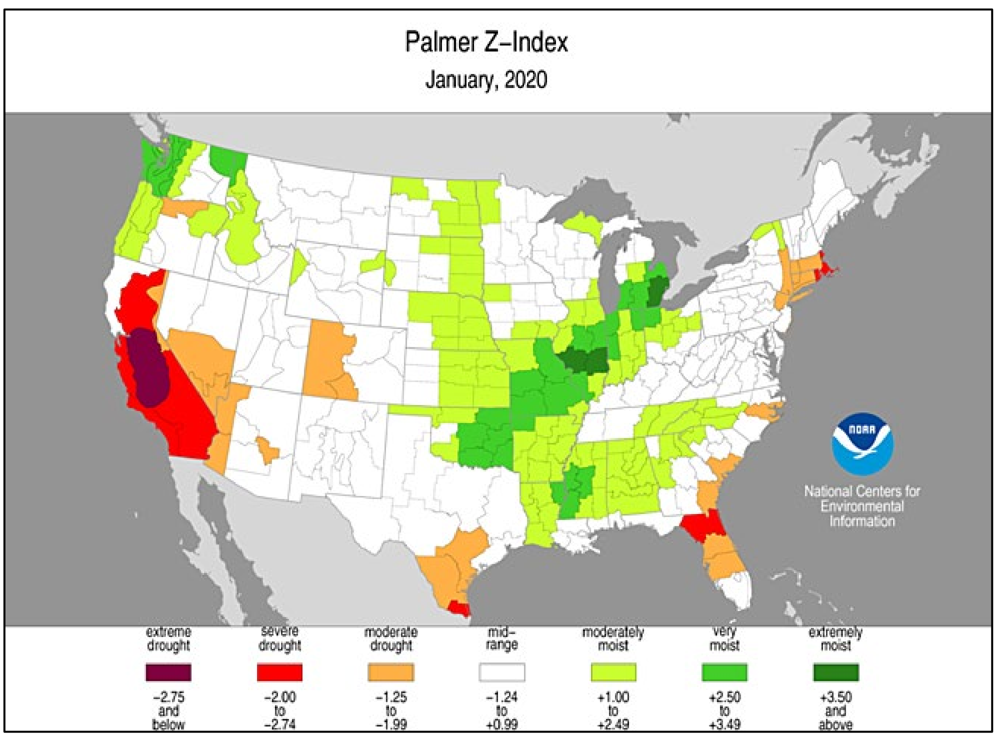


Figure 18: Palmer Z-Index January 2020 (NOAA)

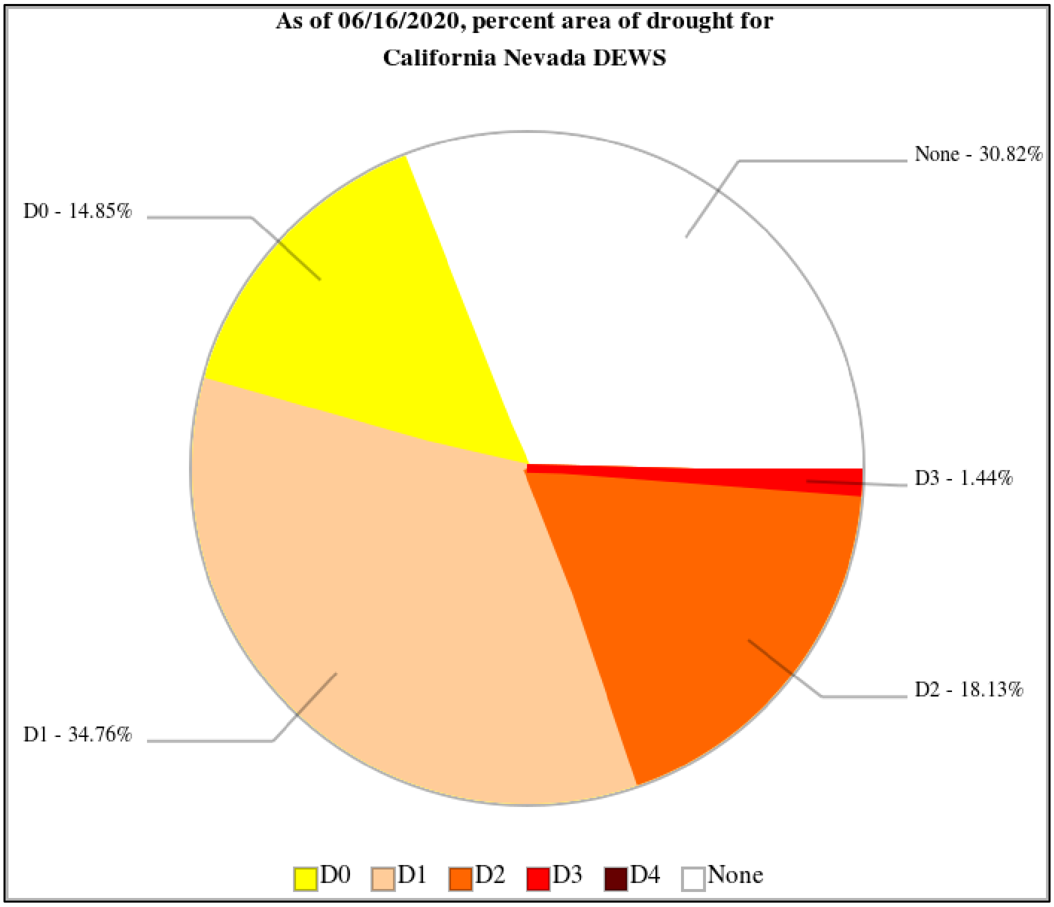


Figure 19: Percent Drought for California and Nevada as of June 2020 (DEWS)

6.3 EARTHQUAKES AND SEISMIC EVENTS

Planning Significance	Humboldt- High, Pershing- Moderate, Lander- Low/Moderate

6.3.1 Description

Earthquake is a term used to describe both sudden slip on a fault, and the resulting ground shaking and radiated seismic energy caused by the slip, or by volcanic or magmatic activity, or other sudden stress changes in the earth (USGS, 2009). Earthquakes occur without warning and can cause a significant amount of damage in a short period of time. Earthquake hazards include anything associated with an earthquake that may affect the normal activities of people. This includes surface faulting, ground shaking, landslide, liquification, tectonic deformation, tsunamis and seiches. The effects of an earthquake can be felt far beyond the site of its occurrence (USGS).

When earthquakes occur, stored energy is released and travels through the earth in the form of seismic waves. There are two main types of waves generated by earthquakes: body and surface waves. While body waves travel through the interior of the earth, surface waves travel through the crust. Each of these types of waves has two subtypes.

Body Waves
The subtypes of body waves include primary waves (P waves) and secondary waves (S waves). P waves can pass through solid rock as well as fluids and, as the fastest traveling waves, are the first that are felt during an earthquake. P waves are also known as compression waves because they tend to push and pull at the particles they encounter. These particles tend to travel in the direction the wave is traveling which is the direction the energy is traveling. This direction is known as the "direction of wave propagation".

Secondary waves (S waves) are the second waves felt during an earthquake. Unlike P waves, S waves can pass through rock but not through fluids. S waves make rock particles move up and down or side to side, perpendicular to the direction of wave propagation.

Surface Waves
Surface waves arrive after body waves and cause most of the damage associated with earthquakes. Usually the amount of damage caused by surface waves depends on their depth.

Surface Waves have two basic categories: Love waves and Raleigh waves. Love waves are the fastest surface waves and move the ground from side-to-side producing a horizontal motion. Raleigh waves move the ground up and down and side-to-side in the direction the wave is traveling. Most of the shaking felt in and earthquake is due to Raleigh waves since they tend to be much larger than other waves.

Earthquake Measurement
Earthquakes can be measured in regard to magnitude and intensity. The magnitude of an earthquake is a number that represents the relative size of an earthquake and is based on the maximum movement recorded on a seismograph. The most common scale used for measuring magnitude is the local magnitude, also referred to as the "Richter magnitude". Magnitude on the Richter scale is expressed in whole numbers and decimal fractions. Because of the logarithmic basis of the scale, each whole number increase in magnitude represents a tenfold increase in measured amplitude; as an estimate of energy, each whole number step in the magnitude scale corresponds to the release of about 31 times more energy than the amount associated with the preceding whole number value.

The intensity measurement of an earthquake describes its effect on the earth's surface, on humans, and on structures. In the U.S. the most commonly used intensity scale is the Mercalli scale. The scale uses roman numerals from I (imperceptible) to XII (total destruction) to quantify an earthquake's effects. The scale is based on perception in regard to the shaking that is felt and the resulting damage.

Peak ground acceleration (PGA) can also be used to quantify intensity. The acceleration of the ground can be measured by an accelerometer during an earthquake. The largest acceleration recorded by a particular accelerometer during an earthquake is the PGA at that location. A comparison of magnitude, intensity, and ground acceleration is shown in **Table 21**.

Secondary Hazards

There are secondary hazards that occur as a result of an earthquake. These hazards have the potential to cause damage in addition to that caused by shaking. Secondary hazards include the following:

- *Liquefaction* is a process by which water-saturated sediment temporarily loses strength and acts as a fluid. When liquefaction occurs, the strength of the soil decreases and, the ability of a soil deposit to support foundations for buildings and bridges is reduced. Liquefied soil also exerts higher pressure on retaining walls, which can cause them to tilt or slide. This movement can cause settlement of the retained soil and destruction of structures on the ground surface. Increased water pressure can also trigger landslides and cause the collapse of dams.

- *Surface faulting* is displacement that reaches the earth's surface during slip along a fault. Surface faults can be significant in terms of width and length. Surface fault can cause severe damage to highways, railways, pipelines, tunnels, and canals.
- *Landslides* can occur when unstable slopes fail due to seismic activity. Earthquake-induced landslides can include rock falls, rockslides, and soil slides. Slide risks can be amplified by weather conditions. Snow avalanches and mudslides can be caused by earthquakes.
- *Fires* can occur when gas pipelines rupture due to seismic activity. Also, power lines that sway during earthquakes can arc and cause fires.
- *Flooding* can result from the failure of manmade structures during seismic events. Dams, canal structures, and canals are susceptible to damage due to both primary (shaking) and secondary (liquefaction, faulting, and landslides) effects of earthquakes.

Table 21: Magnitude/Intensity/Ground Acceleration Relationships

Richter Magnitude	Mercalli Intensity	PGA (%g)	Potential Damage	Perceived Shaking
1.0 – 3.9	I	<.17	None	Not felt
	II – III	.17 – 1.4	None	Weak
4.0 – 4.9	IV	1.4 – 3.9	None	Light
	V	3.9 – 9.2	Very light	Moderate
5.0 – 5.9	VI	9.2 – 18	Light	Strong
	VII	18 – 34	Moderate	Very Strong
6.0 – 6.9	VIII	34 – 65	Moderate/Heavy	Severe
	IX	65 – 124	Heavy	Violent
>7.0	X	>124	Very Heavy	Extreme

Source: USGS Earthquake Hazards Program

6.3.2 History

Nevada is ranked third in the U.S. behind Alaska and California in having the highest number of large earthquakes. The Counties of Pershing, Humboldt and Lander were directly affected by the largest earthquake recorded in Nevada. The next three largest earthquakes occurred in neighboring Churchill County. Historical earthquakes of magnitude 6.0 or greater are shown in Table 22. This data was obtained through the United States Geological Survey (USGS).

Table 22: Historical Earthquakes in the Region (USGS)

Date	Magnitude	Location	Nearest Town
October 3, 1915	7.8	Pleasant Valley, NV	Winnemucca, NV
July 6, 1954	6.8	Fallon-Stillwater, NV	Fallon, NV
August 23, 1954	6.8	Stillwater, NV	Fallon, NV
December 16, 1954	7.0	Fairview Peak, NV	Fallon, NV

Although three of the earthquakes in Table 22 were located in Churchill County, they occurred only 60 to 75 miles east of Austin, located in Lander County; and 40 to 60 miles south of Lovelock, located in Pershing County.

6.3.3 Location, Extent, and Probability of Future Events

Figure 20 shows the quaternary faults that have been identified within the Tri-County area. Quaternary faults are those active faults that have been recognized at the surface and which have evidence of movement in the past 1.6 million years.

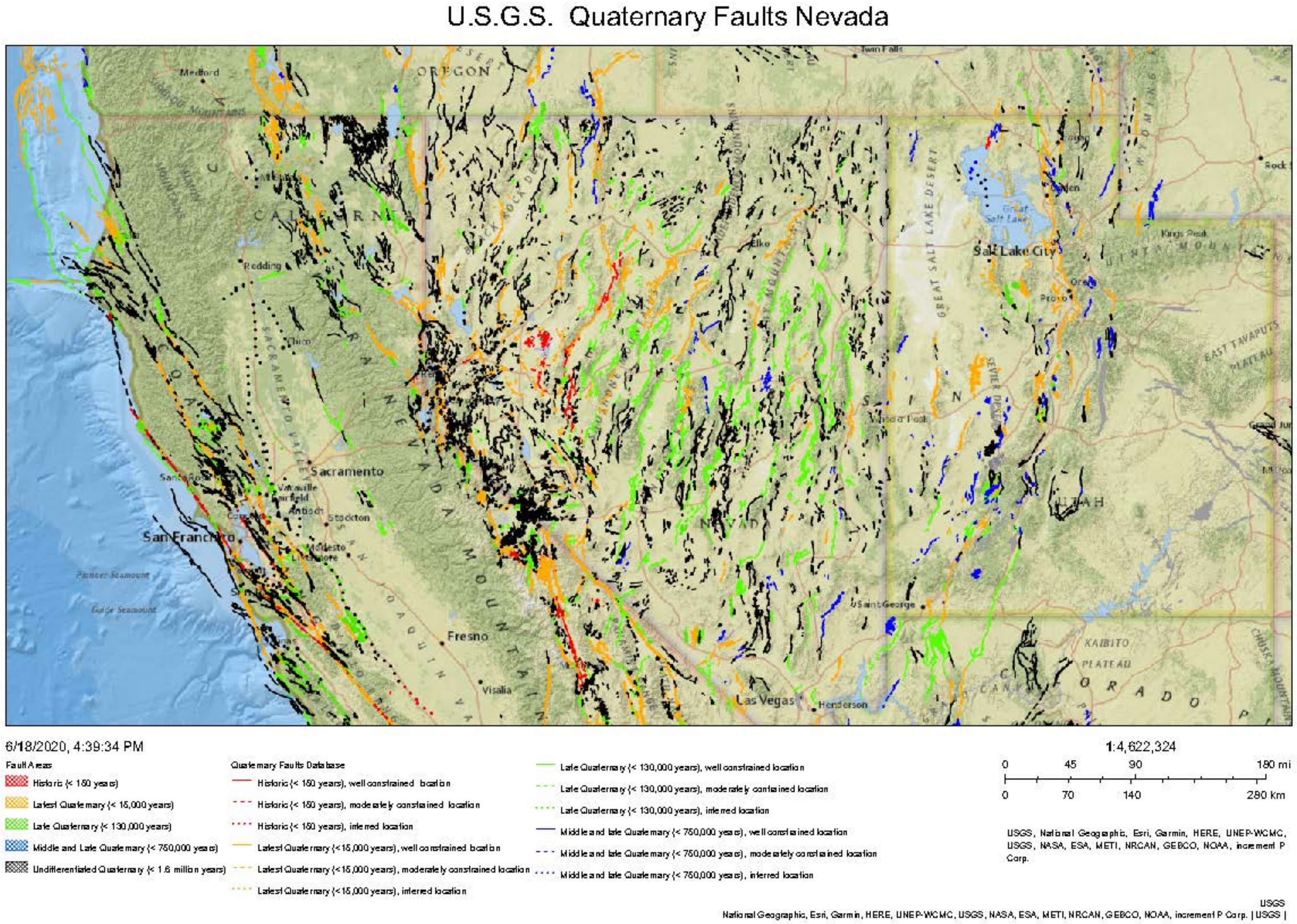


Figure 20: Quaternary Faults in Nevada

Although the more recent fault activity has occurred in Pershing County, the Counties are close enough geographically that earthquakes centered in Pershing County have caused damage in both Humboldt and Lander Counties as well. In fact, the largest earthquake recorded in Nevada was centered in an uninhabited area of Pershing County but caused damage in the population centers of Battle Mountain, Lovelock, and Winnemucca.

The USGS monitors and reports on earthquakes, assesses earthquake impacts and hazards, and conducts targeted research on the causes and effects of earthquakes. USGS is part of the larger National Earthquake Hazards Reduction Program (NEHRP), a four-agency partnership established by Congress.

(https://www.usgs.gov/natural-hazards/earthquake-hazards) Figure 21 shows USGS long-term seismic hazards for the United States. The state of Nevada includes areas with the highest hazard rating.

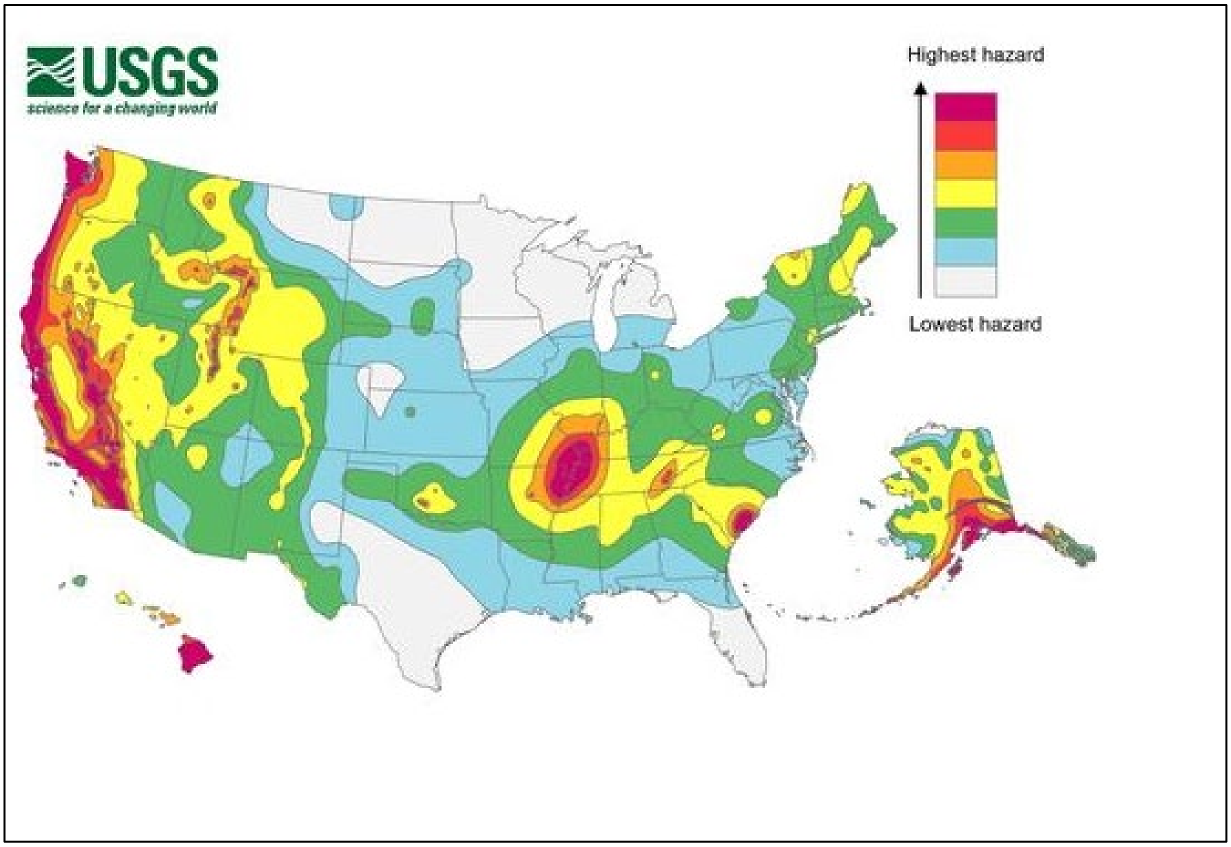


Figure 21: USGS 2018 Long-Term National Seismic Hazard Map

Figure 22 is a USGS earthquake hazard map showing peak ground accelerations having a 2 percent probability of being exceeded in 50 years, for a firm rock site. The map is based on the most recent USGS models for the conterminous U.S. (2018), Hawaii (1998), and Alaska (2007). Models are based on seismicity and fault-slip rates and take into account the frequency of earthquakes of various magnitudes. Locally, the hazard may be greater than shown, because site geology may amplify ground motions. (https://www.usgs.gov/media/images/2014-seismic-hazard-map-nevada) Figure 23 shows earthquakes between January 2010 and March of 2020 with a recorded magnitude of 2.5 or higher within Tri-County area. (USGS)

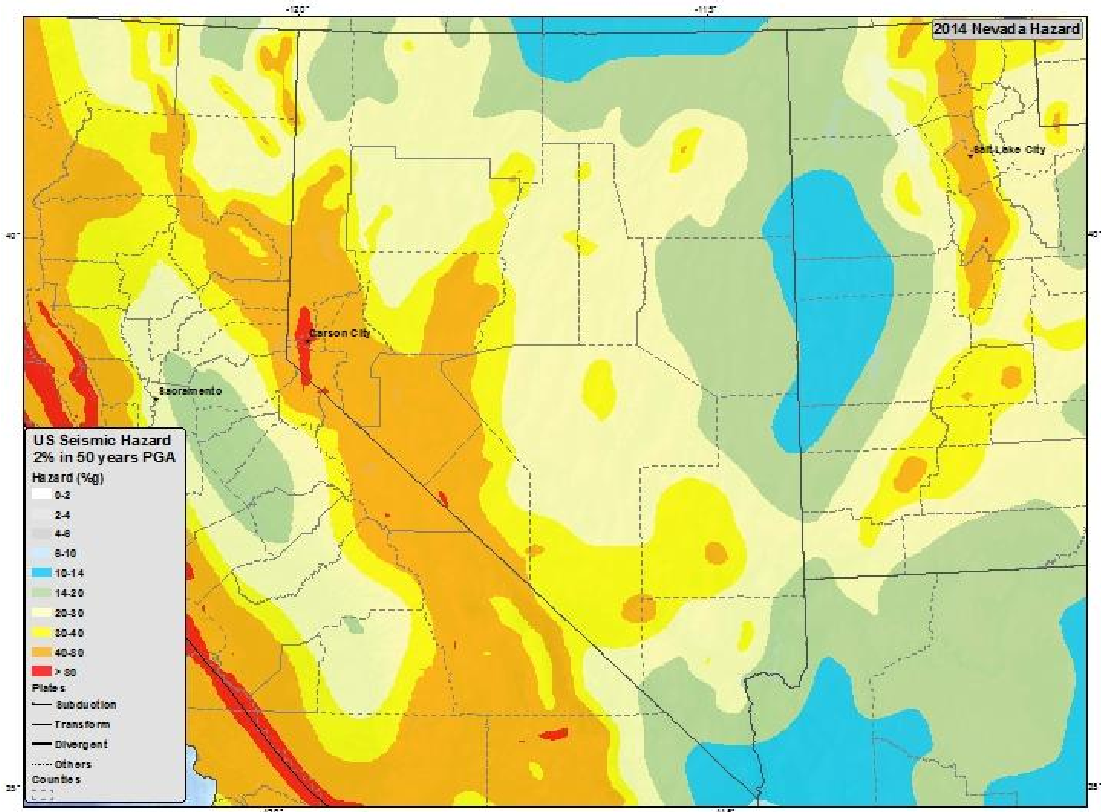


Figure 22: USGS 2014 Seismic Hazard Map of State of Nevada

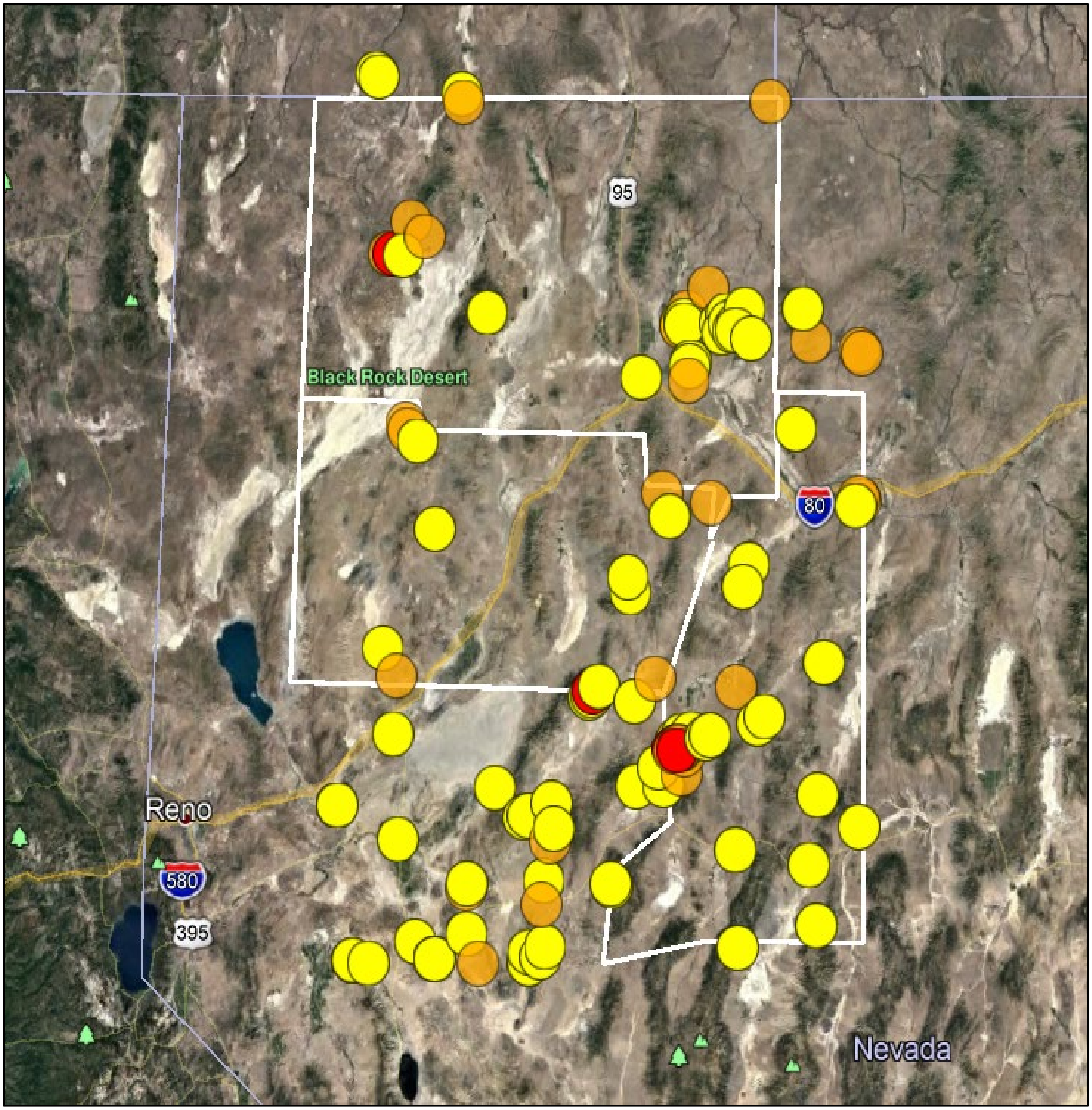


Figure 23: Earthquakes Within Tri-County Area Magnitude 2.5 or Higher 1/1/2010-3/2/2020 (USGS)

6.3.4 Warning Time

Early warning systems are being developed to better alert residents surrounding the northern and southern San Andreas Fault which includes California, Oregon and Washington. Although development for the Earthquake Early Warning (EEW) system is anticipated to have the capability to provide up to a minute of warning time, there are limitations due to differences in conditions available data.

6.4 EPIDEMIC/PANDEMIC

Planning Significance	Humboldt- Moderate, Pershing- Moderate, Lander-High

6.4.1 Description

A disease is a pathological (unhealthy or ill) condition of a living organism or part of the organism that is characterized by an identifiable group of symptoms or signs. Disease can affect any living organism, including people, animals, and plants. Disease can both directly (via infection) and indirectly (via secondary impacts) harm these living things. Some infections can cause disease in both people and animals. The major concern here is an epidemic, a disease that affects an unexpected number of people or sentinel animals at one time. (Note: an epidemic can result from even one case of illness if that illness is unheard of in the affected population, i.e., smallpox).

Of great concern for human health are infectious diseases caused by the entry and growth of microorganisms in man. Most, but not all, infectious diseases are communicable, they can be spread by coming into direct contact with someone infected with the disease, someone in a carrier state who is not sick at the time, or another living organism that carries the pathogen. Disease-producing organisms can also be spread by indirect contact with something a contagious person or other carrier has touched and contaminated, like a tissue or doorknob, or another medium (e.g., water, air, food).

According to the Centers for Disease Control and Prevention (CDC), during the first half of the twentieth century, optimism grew as steady progress was made against infectious diseases in humans via improved water quality and sanitation, antibiotics, and inoculations (October 1998). The incidences and severity of infectious diseases such as tuberculosis, typhoid fever, smallpox, polio, whooping cough, and diphtheria were all significantly reduced during this period. This optimism proved premature, however, for a variety of reasons, including the following: antibiotics began to lose their effectiveness against infectious disease (e.g., Staphylococcus aureus); new strains of influenza emerged in China and spread rapidly around the globe; sexually transmitted diseases resurged; new diseases were identified in the U.S. and elsewhere (e.g., Legionnaires' disease, Lyme disease, toxic shock syndrome, and Ebola hemorrhagic fever); acquired immunodeficiency syndrome (AIDS) appeared; and tuberculosis (including multidrug-resistant strains) reemerged (CDC, October 1998).

In a 1992 report titled *Emerging Infections: Microbial Threats to Health in the United States*, the Institute of Medicine (IOM) identified the growing links between U.S. and international health and concluded that emerging infections are a major and growing threat to U.S. health. An emerging infectious disease is one that has newly appeared in a population or that has been known for some time but is rapidly increasing in incidence or geographical range. Emerging infectious diseases are a product of modern demographic and environmental conditions, such as global travel, globalization and centralized processing of the food supply, population growth and increased urbanization.

In response to the threat of emerging infectious diseases, the CDC launched a national effort to protect the US public in a plan titled *Addressing Emerging Infectious Disease Threats*. Based on the CDC's plan, major improvements to the US health system have been implemented, including improvements in surveillance, applied research, public health infrastructure, and prevention of emerging infectious diseases (CDC, October 1998).

Despite these improvements, infectious diseases are the leading cause of death in humans worldwide and the third leading cause of death in humans in the U.S. (American Society for Microbiology, June 21, 1999). A recent follow-up report from the Institute of Medicine, titled *Microbial Threats to Health: Emergence, Detection, and Response*, noted that the impact of infectious diseases on the U.S. has only grown in recent years and that public health and medical communities remain inadequately prepared. Further improvements are necessary to prevent, detect, and control emerging, as well as resurging, microbial threats to health. The dangers posed by infectious diseases are compounded by other important trends: the continuing increase in antimicrobial resistance; the diminished capacity of the U.S. to recognize and respond to microbial threats; and the intentional use of biological agents to do harm (Institute of Medicine, 2003).

The CDC has established a list of over 50 nationally reportable diseases. A reportable disease is one that, by law, must be reported by health providers to federal, state or local public health officials. Reportable diseases are those of public interest by reason of their communicability, severity, or frequency. The long list includes such diseases as the following: anthrax; botulism; cholera; Coronavirus Disease 2019 (COVID-19), diphtheria; encephalitis; gonorrhea; Hantavirus pulmonary syndrome; hepatitis (A, B, C); HIV infection; Legionellosis; Lyme disease; Malaria; Measles; Mumps; Plague; Polio (paralytic); Rabies (animal and human); Rocky Mountain spotted fever; Rubella; Salmonellosis; SARS; Streptococcal disease (Group A); Streptococcal toxic-shock syndrome; *Streptococcus pneumoniae* (drug resistant); Syphilis; Tetanus; Toxic-shock syndrome; Trichinosis, Tuberculosis, Typhoid fever; Yellow fever and Zika virus (Centers for Disease Control and Prevention, May 2, 2020).

Many other hazards, such as floods, earthquakes or droughts, may create conditions that significantly increase the frequency and severity of diseases. These hazards can affect basic services (e.g., water supply and quality, wastewater disposal, electricity), the availability and quality of food, and the public and agricultural health system capacities. As a result, concentrated areas of diseases may result and, if not mitigated right away, increase, potentially leading to large losses of life and damage to the economic value of the area's goods and services.

At the time of preparation of this HMP Update the world is facing an unprecedented pandemic. The novel Coronavirus, which results in the disease COVID-19, was first identified at the end of 2019 in Wuhan City, Hubei Province, China. In March 2020, the state of Nevada, and other states including California, closed local and state government offices, schools, non-essential businesses, restaurants, bars, gyms, sporting events, and events of over 50 people. The State of Nevada, Pershing County and other counties declared a state of emergency, imposing many restrictions in the face of the coronavirus pandemic.

In addition to impacts to human health and life the ongoing pandemic has caused large economic impacts worldwide. The effect on Nevada's economy has been particularly strong. In April of 2020 the state recorded an unemployment rate of 28.2 percent, the highest of any state in any month since modern record keeping began in 1976. This unemployment rate is higher even that that during the great depression of the 1930s.

6.4.2 History

The following are examples of high-profile infectious diseases that have occurred in Nevada and specifically the Tri-County area. Updates to infectious diseases discussed in the 2014 plan are provided, and a discussion of COVID-19 is included.

Coronavirus –2019 (COVID-19) - COVID-19 is caused by infection of a new coronavirus (called SARS-CoV-2). Because some of the symptoms of influenza and COVID-19 are similar, it may be hard to tell the difference between them based on symptoms alone, and testing may be needed to help confirm a diagnosis. While more is being learned, there is still much that is unknown about COVID-19 and the virus that causes it. The virus is thought to spread mostly person-to-person, by respiratory droplets released when an infected person coughs, sneezes, or talks. These droplets can land in the mouths or noses of people who are nearby or possibly be inhaled into the lungs. The virus might also spread to hands from a contaminated surface and then to the nose, mouth, or eyes. Infected people can spread the virus whether or not they have symptoms. As of July 22, 2020, there were 38,657 confirmed COVID-19 cases in Nevada. Table 23 shows the number of confirmed COVID-19 cases, as of July 22, 2020 for each of the Tri-Counties.

Table 23: Confirmed COVID-19 Cases for the Tri-Counties (CDC December 31, 2020)

County	Number of Cases	Number of Deaths
Humboldt	813	10
Pershing	340	8
Lander	384	7

Influenza Virus - Although seasonal flu commonly occurs, in the spring of 2009, a new influenza A (H1N1) virus emerged to cause illness in people. This virus was very different from regular human influenza A viruses and the new virus caused the first influenza pandemic in more than 40 years. Pandemic flu can have a significant impact on society. The influenza pandemic of 1918 and 1919, known as the Spanish Flu, had the highest mortality rate in recent history for an infectious disease. More than 20 million persons were killed worldwide, some 500,000 of which were in the U.S. alone (Centers for Disease Control and Prevention, October 1998). Nine cases of the H1N1 virus were reported in Nevada in May of 2009.

***West Nile Virus (WNV)* -** Human and animal WNV infections were not documented in the Western Hemisphere until the 1999 outbreak in the New York City metropolitan area. Since then, the disease has spread across the United States. In 2003, WNV activity occurred in 46 states and caused illness in over 9,800 people.

WNV is transmitted to humans through mosquito bites. Mosquitoes become infected when they feed on infected birds that have high levels of WNV in their blood. Infected mosquitoes can then transmit WNV when they feed on humans or other animals.

The CDC aggregates data by state for various diseases including WNV. **Table 24** shows reported WNV cases in NV since 2014. Only 3 cases have been reported in the Tri-Counties since 2013, however a growing number of cases have been reported state-wide (CDC).

Table 24: West Nile Virus Cases 2014-2019

County	2014	2015	2016	2017	2018	2019
Humboldt	0	0	0	3	0	0
Pershing	0	0	0	0	0	0
Lander	0	0	0	0	0	0
State Total	3	7	16	67	9	44

***Severe Acute Respiratory Syndrome (SARS)*-**SARS is estimated to have killed 774 and infected 8,098 worldwide. In the U.S., there were 175 suspect cases and 8 confirmed cases all who traveled to other parts of the world, although no reported deaths (Centers for Disease Control and Prevention, October 2009). Nevada reported 3 cases, none of which were confirmed. Since 2004, there have not been any known cases of SARS reported anywhere in the world. The Coronavirus-2019 is a type of SARS (SARS-CoV-2 which causes COVID-19)

Norovirus - CDC estimates that 23 million cases of acute gastroenteritis are due to norovirus infection, and it is now thought that at least 50% of all food borne outbreaks of gastroenteritis can be attributed to noroviruses (Centers for Disease Control and Prevention, October 2009).

Escherichia coli (abbreviated as E. coli) are a large and diverse group of bacteria. Although most strains of E. coli are harmless, others can make you sick. Some kinds of E. coli can cause diarrhea, while others cause urinary tract infections, respiratory illness and pneumonia, and other illnesses. Experts think that there may be about 70,000 infections with E. coli O157 each year in the United States (Centers for Disease Control and Prevention, October 2009). In past years, Nevada has been listed among other States having E. coli outbreaks.

Hantavirus Pulmonary Syndrome (HPS)-Discovered in 1993, HPS is a severe, sometimes fatal, respiratory disease in humans caused by infection with a hantavirus. Anyone who comes into contact with rodents that carry hantavirus is at risk of HPS. Rodent infestation in and around the home remains the primary risk for hantavirus exposure. Even healthy individuals are at risk for HPS infection if exposed to the virus. To date, no cases of HPS have been reported in the United States in which the virus was transmitted from one person to another

6.4.3 Location, Extent and Probability of Future Events

The probability and magnitude of disease occurrence, particularly an epidemic, is difficult to evaluate due to the wide variation in disease characteristics, such as rate of spread, morbidity and mortality, detection and response time, and the availability of vaccines and other forms of prevention. There is growing concern, however, about emerging infectious diseases as well as the possibility of a bioterrorism attack.

Concerns about the emergence of a new pandemic have proven to be well founded, as discussed above with the emergence of the Coronavirus 2019, As of December 31, 2020 there were 83, 538, 316 confirmed cases of Coronavirus worldwide. These numbers are estimated to be underreported due asymptomatic contraction and spread of the virus. The World Health Organization (WHO) reported 1,820,469 deaths at the end of 2020. The COVID-19 has caused significant disruption in various employment sectors and economies, and the distribution of goods ranging from paper products to poultry and including freight transportation sectors, causing cascading disruptions of social and economic systems. Spread of the disease was quickened through air and cruise ship travel. Cruise ships were under a "no sail order" issued by the CDC in April and extended through October 31, 2020. The CDC has stated that between March 1 and July 10, data showed 2,973 cases of COVID-19 or "COVID-like" illnesses emerged on cruise ships, with 34 deaths. During that period, there were 99 outbreaks on 123 cruise ships meaning that 80% of U.S. jurisdiction ships were impacted.

Over the last 300 years, ten major influenza pandemics have occurred. The 1918 pandemic (Spanish Flu) is considered to be yet the most severe. 30% of the world's population became ill and between 50 and 100 million died. One important factor why the Spanish Flu spread so quickly and so extensively was through modern transportation, which at the beginning of the 20th century offered a global coverage. The virus was spread around the world by infected crews and passengers of ships and trains and severe epidemics occurred in shipyards and railway personnel.

The more efficient transportation is, the more efficient the transmission of infectious disease. International and long distance transport such as air and rail, modes and terminals alike, concentrates passengers and increase the risk of exposure. The velocity of transportation systems for long distance travel is superior to the incubation time of many flu variants. Since the incubation time for the average influenza virus is between 1 and 4 days, there is ample time for someone being infected to travel to the other side of the world before noticing symptoms. Thus, in a window of a few days before an outbreak could become apparent to global health authorities, a virus could have easily been translocated in many different locations around the world.

I-80 and the railroad pass through Lovelock, Winnemucca, and Battle Mountain. All three towns have small airports as well. Additionally, Reno and Las Vegas attract international tourists who could potentially carry disease to these cities. Of highest concern is in the Reno area, in various entertainment venues, and

Reno/Tahoe International Airport. The transient nature of the Washoe County population coupled with primary highway and rail arteries that connect the County to the Tri-County area increase the potential for an epidemic as well as for its spread into neighboring counties.

An epidemic in the Tri-County area would affect a regional response requiring coordination among Pershing, Humboldt, and Battle Mountain General Hospitals, neighboring counties, and State and Federal agencies. Segments of the population at highest risk for contracting an illness from a foreign pathogen are the very young, the elderly, or individuals who currently experience respiratory or immune deficiencies. These segments of the population are present within the Tri-Counties.

Due to the wide variation in disease characteristics, the warning time for a disease disaster can vary from no time to months, depending upon the nature of the disease. No warning time may be available due to an extremely contagious disease with a short incubation period, particularly if combined with a terrorist attack in a crowded environment. However, there are agencies in place that have capabilities to prevent, detect, and respond to these types of diseases, such as the Centers for Disease Control (CDC), and the Nevada State Health Division (NSHD). This provides a positive, balancing influence to the overall outcome of a disease disaster event. Lessons and techniques found to be effective at limiting the spread of COVID-19, and lasting effects of the pandemic will inform future updates of this Plan.

6.5 FLOODING

Planning Significance	Humboldt- Moderate, Pershing- Moderate, Lander-Low

Much of the information contained in this section was kindly provided courtesy of the National Weather Service regional office.

6.5.1 Description

Floods occur when excess water from snowmelt, rainfall, or dam failures accumulate and overflow onto adjacent floodplains or downstream channels incapable of containing the flow. Floodplains are lowlands adjacent to rivers, lakes, and oceans that are subject to recurring floods. As a natural event, floods are considered hazards when people or property are affected. The State of Nevada Standard Multi-Hazard Mitigation Plan identified common flood types occurring in Nevada. These categories are described as follows:

1) *Channel flooding* is characterized by lateral channel migration during major flows, which results in abrupt changes in the horizontal alignment or location of the channel. Other characteristics include localized channel bed and bank-scour in addition to the potential for over-bank flow inundation.

2) *Sheet flooding* is characterized by channels having minimal capacity, water flowing across broad areas at relatively shallow depths, and gently sloping terrain. Damage from these events include localized scour and deposition of extensive amounts of sediments and debris typically associated with sheet flow. If the depth of the water is high enough, water may encroach into low-lying structures within the floodplain.

3) *Alluvial fan flooding* refers to flooding occurring on the surface of an alluvial fan or similar landform characterized by high-velocity flows, active erosion processes, sediment transportation and deposition, and unpredictable flow paths. Flow depths with alluvial fan flooding are generally shallow with damage resulting from inundation variable flow paths, localized scour and the deposition of debris. Alluvial flooding is potentially more dangerous than riverine flooding due to its unpredictable nature resulting in difficulties associated with threat identification.

4) An *additional type of flooding* is caused by heavy rainfall in the mountain areas resulting in the massive melting of the snowpack leading to heavy runoff, widespread damage to roads and other transportation facilities, and bank erosion.
5) Finally, *flooding from dam failures* is generally rare and far more unpredictable. When it does happen, it can quickly become hazardous to catastrophic, depending on development and societal infrastructure downstream.

Floods also occur along streams and arroyos (stream channels that are normally dry) that do not have classic floodplains. These include flash floods in mountains (sometimes with rapidly rising water several tens of feet deep) and on alluvial fans, which are typically fan-shaped, gently sloping areas between the steep parts of mountain ranges and the nearly flat valley floors. Because much of Nevada is part of the Great Basin (an area of internal drainage, in which streams are not connected to rivers that flow to the oceans), flood waters will commonly drain into interior lakes, wetland areas, or playas.

Floods are natural events that are considered hazards only when people and property are affected. Nationwide, on an annual basis, floods have resulted in more property damage than any other natural hazard. Nationwide, floods result in more deaths than any other natural hazard. Physical damage from floods includes the following:

- Inundation of structures, causing water damage to structural elements and contents.
- Erosion or scouring of stream banks, roadway embankments, foundations, footings for bridge piers, and other features.
- Impact damage to structures, roads, bridges, culverts, and other features from high-velocity flow and from debris carried by floodwaters. Such debris may also accumulate on bridge piers and in culverts, increasing loads on these features or causing overtopping or backwater effects.
- Destruction of crops, erosion of topsoil, and deposition of debris and sediment on croplands.
- Release of sewage and hazardous or toxic materials as wastewater treatment plants are inundated, storage tanks are damaged, and pipelines are severed.

Floods also cause economic losses through closure of businesses and government facilities; disrupt communications; disrupt the provision of utilities such as water and sewer service; result in excessive expenditures for emergency response; and generally disrupt the normal function of a community.

Flooding in the Tri-County area, including the County seats of Battle Mountain, Lovelock, and Winnemucca, is due primarily to the overflow of the Humboldt River. The Humboldt River originates at a spring in the East Humboldt range and receives most of its water from the Ruby, Jarbidge, and Independent mountain ranges. The river flows through each of the Counties and terminates in the Humboldt Sink southeast of Lovelock.

Flooding along the Humboldt River is caused historically by abrupt warming trends that melt large areas of snow or by rainfall on snow or frozen ground. These conditions are generally associated with wet-mantle flooding. See Table 25 for characteristics of wet and dry mantle flooding.

The USGS defines a flash-flood as the result of heavy or excessive amounts of rainfall within a short period of time, usually less than 6 hours, causing water to rise and fall quite rapidly. Flash-floods can occur in either dry-mantle or wet-mantle conditions and can reach their peak volume in a matter of a few minutes, often carrying large loads of debris including mud and rock fragments.

Table 25: Characteristics of Dry-Mantle and Wet-Mantle Flooding (USGS)

Factor	Dry-Mantle Flood	Wet-Mantle Flood
Soil Mantle Condition	Dry (high water storage capacity)	Wet (storage capacity exhausted)
Precipitation	Short intense rainfall	Prolonged rainfall and/or snowmelt
Storm Area	Usually small, only 5 to 10% of flooding drainage.	Large, usually all of flooding drainage
Volume of Water	Small, may be only a few acre-feet	Large, thousands of acre-feet
Flow to Stream Channels	Over surface	Mainly seepage, bleeding of saturated soil
Sediment Carried	High, as much as 60% of volume	Low in relation to water volume

Canal and Dam Failures

Many of the historical floods that have occurred in the Tri-County area have been the result of the failure of structures including dams, canals, and levies. Dam or canal failures involve unintended releases or surges of impounded water resulting in downstream flooding. The high-velocity, debris-laden wall of water released from dam failures results in the potential for human casualties, economic loss, lifeline disruption, and environmental damage. Failures may involve either the total collapse of a dam, or other hazardous situations such as damaged spillways, overtopping from prolonged rainfall, or unintended consequences from normal operations. Severe storms with unusually high amounts of rainfall within a drainage basin, earthquakes, or landslides may cause or increase the severity of the failure.

Factors causing failure may include natural or human-caused events, or a combination of both.

Structure failures usually occur when the spillway capacity is inadequate, and water overtops the dam. Piping, when internal erosion through the dam foundation or levy bank occurs, is another factor in a structure failure. Structural deficiencies from poor initial design or construction, lack of maintenance or repair, or gradual weakening from aging are factors that contribute to this hazard.

FEMA has established a dam hazard potential classification system. The system categorizes dams according to the degree of adverse incremental consequences of a failure or mis-operation of a dam. The hazard potential classification does not reflect in any way on the current condition of the dam (*e.g.,* safety, structural integrity, flood routing capacity). Three classification levels have been adopted: Low, Significant, and High, listed in order of increasing adverse incremental consequences. Each level is defined as follows and summarized in Table 26.

1. Low Hazard Potential

Dams assigned the low hazard potential classification are those where failure or mis-operation results in no probable loss of human life and low economic and/or environmental losses. Losses are principally limited to the owner's property.

2. Significant Hazard Potential

Dams assigned the significant hazard potential classification are those dams where failure or mis-operation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or can impact other concerns. Significant hazard potential classification dams are often located in predominantly rural or agricultural areas but could be located in areas with population and significant infrastructure.

3. High Hazard Potential

Dams assigned the high hazard potential classification are those where failure or mis-operation will probably cause loss of human life.

Table 26: Hazard Potential Classification Summary

Hazard Potential Classification	Loss of Human Life	Economic, Environmental, Lifeline Losses
Low	None Expected	Low and generally limited to owner
Significant	None Expected	Yes
High	Probable. One or more expected.	Yes (but not necessary for this classification)

6.5.2 History

Severe fluvial, or riverine, flooding in the planning area generally occurs along the Humboldt River. While it is not common for riverine flooding to occur in this area of Nevada, when it does, it is often caused by rapid mid-winter thawing combined with light to moderate rain. Some of the more serious floods caused by such conditions occurred in 1910, 1962, 1983, 1984, 2006, and 2017.

Table 27: Significant Flooding Events for Counties in the Tri-County Area

Time Period	Location	Flooding Event	Impacts
Humboldt County			
1906 May	Golconda	Pole Creek Dam failure	➢ 6 Fatalities, ➢ Numerous injuries, ➢ Undetermined financial damage, loss of livestock and SP Railroad track.
1907 March-April	Winnemucca, Paradise Valley	Heavy rain on deep winter snowpack	➢ 1 Fatality, ➢ Numerous injuries, ➢ Undetermined financial damage
1910 February-April	Entire Humboldt River Basin	Worst documented flooding on Humboldt River Basin	➢ Undetermined fatalities, ➢ Undetermined injuries, ➢ Undetermined financial damage due to roads, extensive loss of livestock.
1914 January-April	Winnemucca, Paradise Valley	Rain on melting snow	➢ Undetermined fatalities, ➢ Undetermined injuries, ➢ Over 1 million dollars in damage. Damage to hay fields in Paradise Valley
1952 February-June	Entire Humboldt River Basin Martin Creek	Rapid melting of deep snowpack	➢ Undetermined fatalities, ➢ Undetermined injuries, ➢ Over 1 million dollars in damage
1962 February-June	Entire Humboldt River Basin	Six (6) days of intermittent mixed precipitation	➢ Undetermined fatalities, ➢ Undetermined injuries,

Time Period	Location	Flooding Event	Impacts
			➢ Over 1.5 million dollars in damage
1984 April-June	Entire Humboldt River Basin	Greatest snowmelt flood. The total volume of runoff for the year 1984 was more than twice any volume recorded in the years before 1983. In addition to the magnitude of the floods, Damage to bridges, highways, and agriculture was the most severe in history.	➢ Undetermined fatalities, ➢ Undetermined injuries, ➢ Over 1.5 million dollars in damage
2005 April-June	Entire Humboldt River Basin	Above-normal snowpack followed by a wet April	➢ Undetermined fatalities, ➢ Undetermined injuries, ➢ Undetermined financial damage
2006 April-June	Entire Humboldt River Basin	Upper and Lower Humboldt River Basins, received more than double their average amounts of precipitation.	➢ Undetermined fatalities, ➢ Undetermined injuries, ➢ Undetermined financial damage. High flows along the Humboldt River and its tributaries produced scattered flooding, closed roads and isolated homes in rural areas
2017 February	Entire Humboldt River Basin	Wet Fall, Cold Winter, Above-normal snowpack, Ground thaw, Atmospheric river	➢ Undetermined fatalities, ➢ Undetermined injuries, ➢ 68 roads were damaged or destroyed with travel disruptions, ➢ Martin Creek reached a major flood stage. ➢ Water was flowing through Paradise Valley ➢ Paradise Valley school and other areas were evacuated. ➢ Over 4 million dollars in damage
Lander County			➢
1910 February-April	Entire Humboldt River Basin	Worst documented flooding on Humboldt River Basin	➢ Undetermined fatalities, ➢ Undetermined injuries, ➢ Undetermined financial damage
1942 April-May	Battle Mountain	Snowmelt	➢ Undetermined fatalities, ➢ Undetermined injuries, ➢ Undetermined financial damage
1952 February-June	Entire Humboldt River Basin Martin Creek	Rapid melting of deep snowpack	➢ Undetermined fatalities, ➢ Undetermined injuries, ➢ Over 1 million dollars in damage
1962 February-June	Entire Humboldt River Basin	Six (6) days of intermittent mixed precipitation. In the city	➢ Undetermined fatalities, ➢ Undetermined injuries,

Time Period	Location	Flooding Event	Impacts
		of Winnemucca, rainfall of about 1.5 inches combined with snowmelt resulted in floods having recurrence intervals of 50-100 years.	➢ Over 1.5 million dollars in damage: greatest flood in Battle Mountain since 1910. Damage to structures, roads, railroad, irrigation structures, crops, and cattle. ➢ Some Battle Mountain Residents evacuated
1984 April-June	Entire Humboldt River Basin	Greatest snowmelt flood. The total volume of runoff for the year 1984 was more than twice any volume recorded in the years before 1983. In addition to the magnitude of the floods, Damage to bridges, highways, and agriculture was the most severe in history.	➢ Undetermined fatalities, ➢ Undetermined injuries, ➢ Over 1.5 million dollars in damage
2005 April-June	Entire Humboldt River Basin	Above-normal snowpack followed by a wet April	➢ Undetermined fatalities, ➢ Undetermined injuries, ➢ Undetermined financial damage
2006 April-June	Entire Humboldt River Basin	Upper and Lower Humboldt River Basins, received more than double their average amounts of precipitation.	➢ Undetermined fatalities, ➢ Undetermined injuries, ➢ Undetermined financial damage. High flows along the Humboldt River and its tributaries produced scattered flooding, closed roads and isolated homes in rural areas
2017 February	Entire Humboldt River Basin	Wet Fall, Cold Winter, Above-normal snowpack, Ground thaw, Atmospheric river)	➢ Undetermined fatalities, ➢ Undetermined injuries, ➢ Over 4 million dollars in damage
Pershing County			
1910 February-April	Entire Humboldt River Basin	Worst documented flooding on Humboldt River Basin	➢ Undetermined fatalities, ➢ Undetermined injuries, ➢ Undetermined financial damage. Flooding in Lovelock destroyed most of the canal and diversion system and flooded agricultural land.
1914 January-April	Lovelock	Rain on melting snow	➢ Undetermined fatalities, ➢ Undetermined injuries, ➢ Over 1 million dollars in damage. Damage to roads and bridges. Big Five reservoir in Lovelock breeched causing damage to farmland below.
1942 April-May	Lovelock	Snowmelt	➢ Undetermined fatalities, ➢ Undetermined injuries,

Time Period	Location	Flooding Event	Impacts
			➢ Undetermined financial damage. The Young and Rodgers Dams were destroyed.
1952 February-June	Entire Humboldt River Basin	Rapid melting of deep snowpack	➢ Undetermined fatalities, ➢ Undetermined injuries, ➢ Over 1 million dollars in damage, including to head gates on Pitt-Taylor Dams and Big Five levees in Lovelock.
1962 February-June	Entire Humboldt River Basin	Six (6) days of intermittent mixed precipitation	➢ Undetermined fatalities, ➢ Undetermined injuries, ➢ Over 1.5 million dollars in damage to roads, railroads, bridges, crops.
1984 April-June	Entire Humboldt River Basin	Greatest snowmelt flood. In addition to the magnitude of the floods, Damage to bridges, highways, and agriculture was the most severe in history.	➢ Undetermined fatalities, ➢ Undetermined injuries, ➢ Over 1.5 million dollars in damage. The airport at Lovelock was not usable for several months because of water on the runway.
2005 April-June	Entire Humboldt River Basin	Above-normal snowpack followed by a wet April	➢ Undetermined fatalities, ➢ Undetermined injuries, ➢ Undetermined financial damage
2006 April-June	Entire Humboldt River Basin	Upper and Lower Humboldt River Basins, received more than double their average amounts of precipitation.	➢ Undetermined fatalities, ➢ Undetermined injuries, ➢ Undetermined financial damage. High flows along the Humboldt River and its tributaries produced scattered flooding, closed roads and isolated homes in rural areas
2017 February	Entire Humboldt River Basin	Wet Fall, Cold Winter, Above-normal snowpack, Ground thaw, Atmospheric river)	➢ Undetermined fatalities, ➢ Undetermined injuries, ➢ Over 4 million dollars in damage

There are two principal rivers in the Tri-County area, the Humboldt and the Quinn. The rivers and their tributaries are shown in Table 28.

Table 28: Rivers in the Tri-County Area

Humboldt		Quinn	
Tributary Rivers	**Location (County)**	**Tributary Rivers**	**Location (County)**
Little Humboldt	Humboldt	Kings	Humboldt
Reese	Lander	-	-
South Fork, Humboldt	Elko, White Pine	-	-
North Fork, Humboldt	Elko	-	-
Marys	Elko	-	-

Memorable floods on the Humboldt date from 1861-62; however, no well-detailed documentation of floods prior to the turn of the century exists. The flood of February 1910 flooded the upper Humboldt River beyond the highest stages known and was caused by a rapid melt of low-elevation snowpack overlying frozen ground. Damages were extensive and rai1road grades, roadways, and bridges were washed out. The Humboldt River flood of 1910 has been estimated to have a recurrence interval of approximately 140 years, based on flood frequency relationships developed by the U.S. Army Corps of Engineers and work done by the USGS at the Palisades gaging site. Floods of a lesser extent and magnitude occurred in April 1942, January 1943, and May 1952 (a spring snowmelt flood).

The flood of February 1962 was considered major and was due to prolonged, low-intensity rainfall on moderate amounts of snow generating serious flooding in Winnemucca and Battle Mountain. Flooding in Battle Mountain was the worst. On February 12, the Reese River overflowed and sent three feet of water into the town. As business owners stacked sandbags, citizens complained that the Southern Pacific's raised track bed was keeping the floodwaters from draining.

Along the Humboldt River, the snowmelt floods in 1983 and 1984 were among the second (1984) and third (1983) highest in the period of record. Flooding was caused by snowmelt over the entire basin. The total volume of snowmelt for 1984 was more than twice as great as in any year prior to 1983 (FEMA, Flood Insurance Study, Humboldt County).

In 2017 northern Nevada experienced high snowmelt runoff accompanied with significant precipitation events which caused widespread flooding. In January 2017, the National Weather Service issued a flood watch for the greater Lake Tahoe area and western Nevada. Which was followed by a warm storm (Atmospheric River) resulting in high snow levels and rain. The rain, along with melting snow, could not be absorbed because the ground was already saturated from previous storms. The resulting runoff caused flooding throughout the Lake Tahoe basin and western Nevada. Storms moving through northern Nevada during February caused rivers and creeks to rise to flood stage again.

Historically, the most extensive flood damage in the Tri-County area has occurred in the Humboldt River Basin between Battle Mountain and Lovelock. Battle Mountain, Winnemucca, and Lovelock have all experienced loss of crops, and livestock as well as damage to roads, railroads, and irrigation canals and structures. Most of the flooding has been wet-mantle in nature, occurring in the late winter and early spring. This type of flooding is mainly due to rain on snow during a time of year when the soil is already saturated and unable to absorb additional moisture.

Flooding in the Battle Mountain area can potentially threaten commercial and residential structures due to the fact that those types of structures have been built within the flood zone. In Winnemucca and Lovelock, flooding tends to affect agriculturally related structures including diversion dams and canals.

Canal and Dam Failure

Since 1900 there have been a number of canal and dam failures in the Tri-County area. Certain structures in the Lovelock area, such as the Rodgers Dam, have failed multiple times. During the flood of 1942, unregulated dams were destroyed to relieve flood pressure along the river.

Most of the more costly dam or canal structure failures have occurred in the Lovelock area. The Rodgers Dam, which diverts irrigation water for approximately 2/3 of the 37,000 acres of irrigable land in Lovelock, has failed twice; most recently in 2006. At that time the replacement cost for the Rodgers Dam was approximately $5,000,000. However, the Nevada Division of Water Resources (NDWR) has recently categorized Rodgers Dam as a low hazard dam.

Since the construction of the Rye Patch Reservoir Dam in 1936, the structures downstream of the dam in the Lovelock area have been less susceptible to flooding. However, the earthen dam at the end of the Humboldt near the Big Five Dam continues to be a weak point in the system. Like the Rodgers Dam, it has failed multiple times over the years. Failure at that location has repeatedly caused flood damage to approximately 22% of the agricultural land in Lovelock. Improvements to Rye Path Dam were made in 2017 and included Supervisory Control and Data Acquisition (SCADA) installation and a hydropower plant. Rye Patch Dam continues to be a high hazard dam as designated by NDWR.

6.5.3 Location, Extent, and Probability of Future Events

The major source of riverine flooding in the Tri-County planning area is the Humboldt River. The Humboldt River starts in the northern tip of the East Humboldt Range, just outside of the city of Wells, and flows west-southwest through Elko County by the cities of Elko and Carlin and into Eureka County. The Humboldt River then moves into Lander County, the town of Battle Mountain, with the Reese River tributary flowing south in Lander County toward the city of Austin. The Humboldt River then flows into Humboldt County near the town of Winnemucca, into Pershing County toward the towns of Imlay and Lovelock.

Figure 24: Image of The Humboldt River and Its Major Tributaries

Approximately 300 miles from its source, the Humboldt River empties into Rye Patch Reservoir, through its dam, and then into the Humboldt Sink on the border between Pershing and Churchill counties, approximately 20 miles southwest of Lovelock.

Snowmelt floods produce peak discharges generally from March to June. The Humboldt River is highly variable in flow, generally decreasing in volume downstream to the west, in part due to the removal of water from the river for irrigation. Based on previous occurrences, a major flood along the Humboldt River is statistically possible to occur every 20 years. However, significant winter storms are statistically possible, and therefore contribute to an increase in flooding, every 7-8 years during moderate to strong El Nino events.

Other types of flooding include flash floods and areal floods. Flash floods typically occur when heavy thunderstorm rain falls in steep or urbanized areas in a short time period. Areal floods typically occur in urbanized or more flat terrain and are mainly due to prolonged moderate rains or slower snowmelt. They take longer to develop than flash floods but can cover a larger area. Flash floods normally pose a serious threat to life and property. Areal floods typically do not pose a threat to life, but can cause serious property damage. Both types of flooding can occur in northern and central Nevada.

Table 29 shows the statistical likelihood for Winnemucca of various rainfall amounts for specific time periods. Additional data for Paradise Valley, Golconda, Battle Mountain, Austin, Imlay, Lovelock are shown in Table 30 through Table 35. In the following tables “Average recurrence interval (years)” is the probability of recurrence, NOT a guarantee of interruption. Floods happen irregularly. Terms quantified as a "100-year flood" can cause confusion. The U.S. Geological Survey encourages the use of the annual exceedance probability (AEP). Because a 1-percent AEP flood has a 1 in 100 chance of being equaled or exceeded in any 1 year, and it has an average recurrence interval of 100 years, it often is referred to as a

"100-year flood". Yet, a 1-percent AEP flood (”100 year flood”) has a 1-percent chance of occurring in any given year. The "500-year flood" corresponds to an AEP of 0.2-percent, which means a flood of that size or greater has a 0.2-percent chance (or 1 in 500 chance) of occurring in a given year.

Table 29: Statistical Likelihood of Various Rainfall for Winnemucca for Specific Time Periods

PDS-based precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.086** (0.076-0.099)	**0.110** (0.095-0.128)	**0.152** (0.132-0.176)	**0.190** (0.163-0.221)	**0.249** (0.209-0.290)	**0.302** (0.252-0.356)	**0.363** (0.295-0.433)	**0.430** (0.342-0.521)	**0.538** (0.409-0.662)	**0.635** (0.468-0.793)
10-min	**0.130** (0.115-0.151)	**0.167** (0.145-0.195)	**0.232** (0.200-0.269)	**0.290** (0.249-0.336)	**0.379** (0.318-0.441)	**0.460** (0.383-0.542)	**0.552** (0.449-0.659)	**0.655** (0.520-0.793)	**0.818** (0.622-1.01)	**0.966** (0.712-1.21)
15-min	**0.161** (0.143-0.187)	**0.207** (0.179-0.242)	**0.287** (0.248-0.333)	**0.359** (0.308-0.416)	**0.470** (0.394-0.547)	**0.570** (0.475-0.672)	**0.684** (0.556-0.817)	**0.812** (0.645-0.983)	**1.01** (0.771-1.25)	**1.20** (0.883-1.50)
30-min	**0.217** (0.192-0.252)	**0.279** (0.242-0.326)	**0.387** (0.335-0.448)	**0.483** (0.415-0.561)	**0.633** (0.531-0.736)	**0.768** (0.639-0.904)	**0.921** (0.749-1.10)	**1.09** (0.868-1.32)	**1.37** (1.04-1.68)	**1.61** (1.19-2.01)
60-min	**0.269** (0.238-0.312)	**0.345** (0.299-0.403)	**0.479** (0.414-0.555)	**0.598** (0.514-0.694)	**0.783** (0.657-0.911)	**0.950** (0.791-1.12)	**1.14** (0.927-1.36)	**1.35** (1.07-1.64)	**1.69** (1.29-2.08)	**2.00** (1.47-2.49)
2-hr	**0.317** (0.284-0.362)	**0.399** (0.362-0.450)	**0.543** (0.487-0.611)	**0.663** (0.586-0.751)	**0.850** (0.741-0.970)	**1.01** (0.867-1.16)	**1.20** (1.00-1.39)	**1.41** (1.15-1.66)	**1.74** (1.37-2.10)	**2.03** (1.54-2.52)
3-hr	**0.369** (0.337-0.415)	**0.458** (0.421-0.509)	**0.608** (0.552-0.679)	**0.727** (0.661-0.801)	**0.914** (0.814-1.02)	**1.08** (0.948-1.21)	**1.26** (1.09-1.42)	**1.46** (1.23-1.68)	**1.77** (1.44-2.12)	**2.04** (1.61-2.54)
6-hr	**0.476** (0.442-0.522)	**0.599** (0.549-0.652)	**0.763** (0.696-0.835)	**0.912** (0.833-0.995)	**1.12** (1.01-1.24)	**1.30** (1.15-1.44)	**1.49** (1.30-1.66)	**1.69** (1.45-1.92)	**2.00** (1.65-2.30)	**2.26** (1.82-2.65)
12-hr	**0.592** (0.547-0.649)	**0.740** (0.680-0.805)	**0.938** (0.860-1.02)	**1.10** (1.01-1.19)	**1.33** (1.21-1.45)	**1.51** (1.37-1.65)	**1.71** (1.52-1.88)	**1.92** (1.68-2.13)	**2.20** (1.88-2.49)	**2.44** (2.04-2.80)
24-hr	**0.751** (0.697-0.809)	**0.940** (0.868-1.01)	**1.18** (1.09-1.26)	**1.36** (1.26-1.47)	**1.63** (1.49-1.75)	**1.83** (1.68-1.97)	**2.05** (1.87-2.20)	**2.28** (2.05-2.46)	**2.58** (2.31-2.79)	**2.82** (2.49-3.05)
2-day	**0.879** (0.813-0.944)	**1.10** (1.02-1.19)	**1.36** (1.26-1.47)	**1.57** (1.45-1.69)	**1.85** (1.70-1.98)	**2.06** (1.89-2.22)	**2.28** (2.09-2.46)	**2.51** (2.28-2.70)	**2.81** (2.52-3.04)	**3.03** (2.70-3.29)
3-day	**0.955** (0.885-1.03)	**1.19** (1.11-1.28)	**1.47** (1.36-1.58)	**1.69** (1.57-1.81)	**1.98** (1.83-2.13)	**2.21** (2.03-2.38)	**2.43** (2.24-2.63)	**2.67** (2.43-2.88)	**2.98** (2.69-3.23)	**3.21** (2.88-3.49)
4-day	**1.03** (0.958-1.11)	**1.28** (1.19-1.38)	**1.57** (1.47-1.70)	**1.80** (1.69-1.94)	**2.12** (1.97-2.28)	**2.35** (2.18-2.53)	**2.59** (2.39-2.79)	**2.83** (2.59-3.05)	**3.15** (2.86-3.42)	**3.39** (3.05-3.69)
7-day	**1.20** (1.12-1.29)	**1.50** (1.40-1.61)	**1.84** (1.72-1.97)	**2.11** (1.97-2.26)	**2.46** (2.29-2.64)	**2.72** (2.53-2.92)	**2.98** (2.76-3.20)	**3.24** (2.98-3.49)	**3.58** (3.27-3.86)	**3.83** (3.47-4.16)
10-day	**1.35** (1.26-1.44)	**1.67** (1.57-1.79)	**2.06** (1.93-2.19)	**2.36** (2.21-2.51)	**2.75** (2.57-2.92)	**3.05** (2.83-3.24)	**3.34** (3.09-3.55)	**3.62** (3.34-3.87)	**4.00** (3.65-4.30)	**4.29** (3.88-4.63)
20-day	**1.70** (1.60-1.82)	**2.13** (1.99-2.27)	**2.63** (2.46-2.80)	**3.00** (2.81-3.20)	**3.50** (3.26-3.73)	**3.87** (3.60-4.12)	**4.22** (3.92-4.51)	**4.58** (4.22-4.90)	**5.04** (4.61-5.40)	**5.38** (4.88-5.79)
30-day	**1.99** (1.86-2.12)	**2.48** (2.32-2.65)	**3.07** (2.88-3.28)	**3.52** (3.29-3.76)	**4.12** (3.84-4.39)	**4.57** (4.25-4.87)	**5.03** (4.64-5.37)	**5.48** (5.03-5.86)	**6.07** (5.53-6.52)	**6.52** (5.89-7.04)
45-day	**2.42** (2.26-2.58)	**3.01** (2.82-3.22)	**3.71** (3.48-3.95)	**4.25** (3.98-4.52)	**4.95** (4.61-5.26)	**5.47** (5.09-5.82)	**5.99** (5.55-6.38)	**6.50** (5.99-6.95)	**7.16** (6.54-7.68)	**7.64** (6.93-8.24)
60-day	**2.78** (2.60-2.97)	**3.47** (3.25-3.70)	**4.28** (4.01-4.57)	**4.90** (4.58-5.22)	**5.72** (5.31-6.09)	**6.32** (5.86-6.73)	**6.92** (6.39-7.36)	**7.51** (6.89-8.02)	**8.27** (7.51-8.87)	**8.83** (7.97-9.53)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

Table 30: Statistical Likelihood of Various Rainfall Amounts for Paradise Valley for Specific Time Periods

PDS-based precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.088** (0.077-0.104)	**0.113** (0.098-0.134)	**0.156** (0.134-0.184)	**0.195** (0.166-0.229)	**0.255** (0.212-0.301)	**0.309** (0.252-0.368)	**0.373** (0.295-0.448)	**0.446** (0.342-0.542)	**0.560** (0.410-0.696)	**0.664** (0.468-0.841)
10-min	**0.135** (0.117-0.158)	**0.171** (0.149-0.203)	**0.237** (0.204-0.280)	**0.296** (0.253-0.348)	**0.388** (0.322-0.457)	**0.471** (0.383-0.560)	**0.568** (0.449-0.682)	**0.678** (0.520-0.825)	**0.853** (0.623-1.06)	**1.01** (0.712-1.28)
15-min	**0.167** (0.145-0.196)	**0.212** (0.185-0.252)	**0.294** (0.253-0.347)	**0.367** (0.313-0.432)	**0.481** (0.399-0.567)	**0.584** (0.475-0.694)	**0.704** (0.557-0.846)	**0.841** (0.645-1.02)	**1.06** (0.772-1.31)	**1.25** (0.883-1.59)
30-min	**0.225** (0.196-0.264)	**0.286** (0.249-0.339)	**0.396** (0.341-0.467)	**0.494** (0.421-0.582)	**0.647** (0.538-0.763)	**0.786** (0.640-0.935)	**0.948** (0.750-1.14)	**1.13** (0.868-1.38)	**1.42** (1.04-1.77)	**1.69** (1.19-2.14)
60-min	**0.278** (0.242-0.327)	**0.354** (0.308-0.420)	**0.490** (0.422-0.578)	**0.612** (0.521-0.720)	**0.801** (0.666-0.945)	**0.973** (0.792-1.16)	**1.17** (0.928-1.41)	**1.40** (1.08-1.70)	**1.76** (1.29-2.19)	**2.09** (1.47-2.65)
2-hr	**0.358** (0.319-0.410)	**0.453** (0.404-0.518)	**0.604** (0.535-0.688)	**0.733** (0.642-0.834)	**0.935** (0.803-1.07)	**1.11** (0.933-1.27)	**1.31** (1.08-1.52)	**1.54** (1.23-1.81)	**1.89** (1.46-2.28)	**2.21** (1.65-2.71)
3-hr	**0.424** (0.382-0.481)	**0.533** (0.477-0.600)	**0.692** (0.619-0.782)	**0.828** (0.735-0.935)	**1.03** (0.900-1.17)	**1.21** (1.03-1.38)	**1.40** (1.18-1.62)	**1.63** (1.34-1.90)	**1.98** (1.56-2.35)	**2.29** (1.76-2.77)
6-hr	**0.562** (0.508-0.628)	**0.702** (0.632-0.787)	**0.894** (0.805-1.00)	**1.06** (0.946-1.18)	**1.29** (1.14-1.45)	**1.48** (1.29-1.67)	**1.68** (1.45-1.92)	**1.91** (1.61-2.20)	**2.25** (1.84-2.65)	**2.55** (2.04-3.06)
12-hr	**0.708** (0.640-0.788)	**0.889** (0.805-0.990)	**1.13** (1.02-1.25)	**1.32** (1.19-1.47)	**1.59** (1.42-1.78)	**1.81** (1.59-2.03)	**2.04** (1.77-2.30)	**2.28** (1.95-2.60)	**2.63** (2.19-3.04)	**2.90** (2.38-3.42)
24-hr	**0.880** (0.815-0.959)	**1.10** (1.02-1.19)	**1.37** (1.27-1.48)	**1.59** (1.47-1.72)	**1.90** (1.74-2.05)	**2.13** (1.95-2.31)	**2.38** (2.17-2.57)	**2.64** (2.38-2.86)	**2.99** (2.68-3.25)	**3.27** (2.90-3.56)
2-day	**1.04** (0.963-1.12)	**1.29** (1.19-1.40)	**1.59** (1.47-1.71)	**1.82** (1.69-1.97)	**2.14** (1.98-2.31)	**2.38** (2.19-2.57)	**2.63** (2.41-2.84)	**2.88** (2.63-3.11)	**3.21** (2.90-3.46)	**3.47** (3.10-3.74)
3-day	**1.14** (1.06-1.24)	**1.42** (1.31-1.54)	**1.74** (1.61-1.88)	**1.99** (1.84-2.15)	**2.33** (2.15-2.52)	**2.58** (2.38-2.79)	**2.84** (2.61-3.07)	**3.10** (2.83-3.36)	**3.45** (3.11-3.73)	**3.71** (3.32-4.02)
4-day	**1.25** (1.15-1.36)	**1.55** (1.43-1.68)	**1.89** (1.75-2.05)	**2.16** (1.99-2.33)	**2.52** (2.32-2.72)	**2.78** (2.56-3.02)	**3.06** (2.80-3.31)	**3.33** (3.03-3.61)	**3.68** (3.33-4.00)	**3.95** (3.54-4.30)
7-day	**1.48** (1.37-1.61)	**1.84** (1.70-2.00)	**2.24** (2.08-2.42)	**2.54** (2.35-2.75)	**2.95** (2.73-3.19)	**3.25** (3.00-3.51)	**3.55** (3.26-3.83)	**3.84** (3.51-4.15)	**4.21** (3.83-4.56)	**4.48** (4.05-4.86)
10-day	**1.67** (1.54-1.81)	**2.07** (1.91-2.25)	**2.52** (2.33-2.73)	**2.88** (2.65-3.11)	**3.33** (3.07-3.59)	**3.68** (3.37-3.97)	**4.02** (3.67-4.34)	**4.35** (3.95-4.70)	**4.77** (4.31-5.17)	**5.09** (4.57-5.53)
20-day	**2.09** (1.95-2.25)	**2.60** (2.42-2.80)	**3.19** (2.96-3.43)	**3.63** (3.38-3.91)	**4.21** (3.91-4.54)	**4.64** (4.29-4.99)	**5.06** (4.65-5.45)	**5.46** (5.00-5.89)	**5.98** (5.45-6.47)	**6.35** (5.77-6.89)
30-day	**2.50** (2.33-2.70)	**3.11** (2.89-3.36)	**3.81** (3.55-4.12)	**4.36** (4.05-4.70)	**5.08** (4.72-5.47)	**5.62** (5.19-6.04)	**6.15** (5.66-6.63)	**6.68** (6.11-7.20)	**7.36** (6.69-7.99)	**7.87** (7.11-8.58)
45-day	**3.09** (2.86-3.34)	**3.84** (3.56-4.17)	**4.70** (4.36-5.09)	**5.37** (4.96-5.80)	**6.22** (5.73-6.71)	**6.85** (6.29-7.39)	**7.46** (6.84-8.05)	**8.06** (7.35-8.71)	**8.81** (7.99-9.54)	**9.36** (8.44-10.1)
60-day	**3.55** (3.29-3.84)	**4.41** (4.09-4.79)	**5.42** (5.02-5.85)	**6.18** (5.73-6.67)	**7.17** (6.63-7.73)	**7.90** (7.30-8.52)	**8.62** (7.94-9.30)	**9.31** (8.54-10.1)	**10.2** (9.28-11.0)	**10.8** (9.80-11.8)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

Table 31: Statistical Likelihood of Various Rainfall Amounts for Golconda for Specific Time Periods

PDS-based precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.084** (0.073-0.099)	**0.107** (0.093-0.127)	**0.149** (0.128-0.175)	**0.186** (0.159-0.219)	**0.245** (0.203-0.289)	**0.299** (0.243-0.355)	**0.361** (0.285-0.433)	**0.432** (0.332-0.523)	**0.543** (0.399-0.669)	**0.644** (0.456-0.804)
10-min	**0.127** (0.111-0.151)	**0.163** (0.141-0.193)	**0.227** (0.195-0.266)	**0.284** (0.242-0.333)	**0.373** (0.309-0.440)	**0.454** (0.370-0.540)	**0.549** (0.434-0.659)	**0.657** (0.505-0.796)	**0.827** (0.607-1.02)	**0.980** (0.695-1.22)
15-min	**0.158** (0.138-0.187)	**0.202** (0.175-0.239)	**0.281** (0.241-0.330)	**0.352** (0.299-0.414)	**0.463** (0.383-0.545)	**0.564** (0.459-0.670)	**0.680** (0.538-0.817)	**0.814** (0.626-0.986)	**1.02** (0.753-1.26)	**1.22** (0.861-1.52)
30-min	**0.213** (0.186-0.252)	**0.272** (0.235-0.322)	**0.378** (0.325-0.445)	**0.474** (0.403-0.557)	**0.623** (0.516-0.734)	**0.759** (0.618-0.902)	**0.916** (0.725-1.10)	**1.10** (0.843-1.33)	**1.38** (1.01-1.70)	**1.64** (1.16-2.04)
60-min	**0.263** (0.230-0.312)	**0.337** (0.291-0.399)	**0.468** (0.402-0.550)	**0.586** (0.499-0.689)	**0.771** (0.638-0.909)	**0.939** (0.764-1.12)	**1.13** (0.897-1.36)	**1.36** (1.04-1.64)	**1.71** (1.25-2.11)	**2.03** (1.44-2.53)
2-hr	**0.320** (0.286-0.368)	**0.404** (0.362-0.462)	**0.543** (0.483-0.619)	**0.662** (0.582-0.756)	**0.850** (0.732-0.975)	**1.01** (0.855-1.17)	**1.20** (0.988-1.40)	**1.42** (1.14-1.67)	**1.75** (1.35-2.11)	**2.05** (1.53-2.56)
3-hr	**0.365** (0.329-0.414)	**0.457** (0.412-0.517)	**0.602** (0.541-0.683)	**0.723** (0.645-0.814)	**0.907** (0.793-1.03)	**1.07** (0.918-1.22)	**1.25** (1.05-1.44)	**1.45** (1.20-1.70)	**1.78** (1.40-2.12)	**2.06** (1.58-2.58)
6-hr	**0.470** (0.429-0.526)	**0.589** (0.532-0.660)	**0.758** (0.684-0.848)	**0.904** (0.812-1.01)	**1.11** (0.982-1.25)	**1.29** (1.12-1.45)	**1.47** (1.26-1.68)	**1.68** (1.41-1.94)	**1.99** (1.61-2.34)	**2.27** (1.79-2.71)
12-hr	**0.572** (0.521-0.635)	**0.720** (0.654-0.798)	**0.923** (0.835-1.02)	**1.09** (0.980-1.20)	**1.32** (1.18-1.46)	**1.50** (1.33-1.66)	**1.69** (1.48-1.89)	**1.90** (1.63-2.14)	**2.19** (1.83-2.51)	**2.42** (1.98-2.83)
24-hr	**0.733** (0.681-0.797)	**0.917** (0.848-0.989)	**1.16** (1.06-1.24)	**1.34** (1.23-1.44)	**1.60** (1.47-1.72)	**1.80** (1.64-1.93)	**2.01** (1.82-2.15)	**2.23** (2.00-2.40)	**2.53** (2.25-2.73)	**2.76** (2.43-2.99)
2-day	**0.850** (0.790-0.911)	**1.06** (0.986-1.13)	**1.31** (1.22-1.40)	**1.50** (1.40-1.60)	**1.77** (1.64-1.88)	**1.97** (1.82-2.10)	**2.18** (2.01-2.33)	**2.40** (2.18-2.56)	**2.68** (2.43-2.89)	**2.89** (2.59-3.11)
3-day	**0.919** (0.855-0.991)	**1.14** (1.07-1.23)	**1.41** (1.31-1.51)	**1.62** (1.50-1.73)	**1.89** (1.75-2.03)	**2.11** (1.94-2.26)	**2.33** (2.13-2.49)	**2.54** (2.32-2.73)	**2.84** (2.56-3.06)	**3.05** (2.73-3.30)
4-day	**0.989** (0.921-1.07)	**1.23** (1.14-1.33)	**1.51** (1.40-1.62)	**1.73** (1.60-1.86)	**2.02** (1.87-2.17)	**2.24** (2.07-2.41)	**2.47** (2.26-2.65)	**2.69** (2.45-2.89)	**2.99** (2.70-3.23)	**3.21** (2.88-3.48)
7-day	**1.13** (1.06-1.21)	**1.41** (1.32-1.52)	**1.73** (1.61-1.85)	**1.97** (1.84-2.11)	**2.29** (2.13-2.46)	**2.53** (2.34-2.71)	**2.77** (2.55-2.98)	**3.00** (2.75-3.24)	**3.31** (3.00-3.59)	**3.53** (3.20-3.85)
10-day	**1.25** (1.16-1.34)	**1.55** (1.45-1.67)	**1.91** (1.77-2.04)	**2.17** (2.02-2.33)	**2.52** (2.34-2.70)	**2.79** (2.58-2.99)	**3.06** (2.81-3.30)	**3.32** (3.03-3.59)	**3.65** (3.31-3.97)	**3.91** (3.52-4.25)
20-day	**1.52** (1.42-1.64)	**1.90** (1.77-2.05)	**2.34** (2.18-2.51)	**2.67** (2.49-2.87)	**3.10** (2.88-3.33)	**3.42** (3.16-3.67)	**3.74** (3.44-4.01)	**4.04** (3.70-4.35)	**4.44** (4.04-4.80)	**4.72** (4.28-5.12)
30-day	**1.74** (1.62-1.87)	**2.17** (2.02-2.33)	**2.67** (2.49-2.87)	**3.06** (2.84-3.27)	**3.58** (3.31-3.83)	**3.96** (3.65-4.23)	**4.34** (3.98-4.66)	**4.72** (4.32-5.07)	**5.21** (4.74-5.63)	**5.59** (5.04-6.05)
45-day	**2.10** (1.96-2.25)	**2.62** (2.44-2.81)	**3.22** (3.00-3.44)	**3.67** (3.42-3.93)	**4.26** (3.97-4.56)	**4.70** (4.36-5.02)	**5.13** (4.74-5.51)	**5.55** (5.11-5.95)	**6.09** (5.56-6.55)	**6.48** (5.87-7.00)
60-day	**2.40** (2.24-2.58)	**3.00** (2.80-3.22)	**3.70** (3.43-3.95)	**4.22** (3.93-4.51)	**4.92** (4.55-5.25)	**5.42** (5.01-5.80)	**5.92** (5.44-6.34)	**6.42** (5.86-6.89)	**7.04** (6.39-7.58)	**7.49** (6.75-8.10)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

Table 32: Statistical Likelihood of Various Rainfall Amounts for Battle Mountain for Specific Time Periods

PDS-based precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.078 (0.070-0.091)	0.099 (0.089-0.114)	0.139 (0.123-0.162)	0.176 (0.156-0.203)	0.234 (0.199-0.269)	0.286 (0.238-0.331)	0.348 (0.282-0.406)	0.421 (0.330-0.496)	0.537 (0.401-0.640)	0.641 (0.461-0.773)
10-min	0.119 (0.106-0.138)	0.151 (0.135-0.174)	0.212 (0.188-0.246)	0.268 (0.237-0.309)	0.356 (0.303-0.410)	0.435 (0.362-0.503)	0.530 (0.429-0.618)	0.640 (0.502-0.755)	0.816 (0.611-0.974)	0.975 (0.702-1.18)
15-min	0.148 (0.131-0.172)	0.187 (0.167-0.215)	0.263 (0.233-0.305)	0.332 (0.293-0.383)	0.441 (0.376-0.508)	0.539 (0.448-0.624)	0.657 (0.532-0.766)	0.794 (0.623-0.936)	1.01 (0.757-1.21)	1.21 (0.870-1.46)
30-min	0.199 (0.177-0.231)	0.251 (0.225-0.290)	0.354 (0.314-0.410)	0.447 (0.395-0.516)	0.594 (0.507-0.685)	0.726 (0.604-0.840)	0.885 (0.717-1.03)	1.07 (0.839-1.26)	1.36 (1.02-1.63)	1.63 (1.17-1.97)
60-min	0.246 (0.219-0.286)	0.311 (0.279-0.359)	0.438 (0.388-0.508)	0.553 (0.489-0.638)	0.735 (0.627-0.847)	0.899 (0.747-1.04)	1.10 (0.887-1.28)	1.32 (1.04-1.56)	1.69 (1.26-2.01)	2.02 (1.45-2.43)
2-hr	0.327 (0.299-0.368)	0.411 (0.378-0.460)	0.547 (0.502-0.610)	0.669 (0.601-0.745)	0.861 (0.756-0.962)	1.02 (0.884-1.15)	1.22 (1.02-1.38)	1.44 (1.18-1.66)	1.79 (1.40-2.09)	2.10 (1.58-2.50)
3-hr	0.378 (0.349-0.421)	0.476 (0.434-0.527)	0.618 (0.563-0.690)	0.740 (0.672-0.820)	0.929 (0.826-1.03)	1.10 (0.959-1.24)	1.28 (1.10-1.45)	1.49 (1.24-1.71)	1.82 (1.46-2.12)	2.13 (1.65-2.52)
6-hr	0.516 (0.477-0.569)	0.642 (0.589-0.706)	0.820 (0.755-0.898)	0.969 (0.883-1.06)	1.19 (1.07-1.31)	1.37 (1.22-1.52)	1.57 (1.37-1.76)	1.79 (1.53-2.02)	2.11 (1.75-2.43)	2.38 (1.93-2.79)
12-hr	0.656 (0.593-0.733)	0.825 (0.748-0.911)	1.05 (0.949-1.16)	1.24 (1.11-1.37)	1.51 (1.34-1.67)	1.71 (1.50-1.90)	1.94 (1.68-2.16)	2.17 (1.85-2.44)	2.51 (2.08-2.86)	2.78 (2.27-3.21)
24-hr	0.767 (0.706-0.833)	0.967 (0.887-1.05)	1.22 (1.13-1.33)	1.44 (1.31-1.56)	1.73 (1.57-1.87)	1.95 (1.78-2.11)	2.19 (1.98-2.37)	2.44 (2.19-2.64)	2.79 (2.47-3.01)	3.06 (2.69-3.31)
2-day	0.876 (0.811-0.947)	1.10 (1.02-1.18)	1.38 (1.28-1.49)	1.61 (1.49-1.73)	1.93 (1.78-2.08)	2.17 (1.99-2.34)	2.43 (2.22-2.61)	2.69 (2.44-2.90)	3.05 (2.74-3.30)	3.33 (2.97-3.61)
3-day	0.939 (0.872-1.01)	1.18 (1.09-1.27)	1.48 (1.37-1.59)	1.72 (1.59-1.85)	2.05 (1.89-2.20)	2.31 (2.12-2.48)	2.58 (2.35-2.77)	2.85 (2.59-3.07)	3.23 (2.90-3.48)	3.52 (3.14-3.80)
4-day	1.00 (0.934-1.08)	1.26 (1.17-1.35)	1.57 (1.46-1.69)	1.83 (1.69-1.96)	2.18 (2.00-2.33)	2.45 (2.25-2.62)	2.73 (2.49-2.92)	3.02 (2.73-3.24)	3.40 (3.05-3.66)	3.70 (3.31-4.00)
7-day	1.15 (1.07-1.24)	1.44 (1.34-1.55)	1.80 (1.68-1.93)	2.09 (1.94-2.24)	2.47 (2.29-2.65)	2.77 (2.55-2.96)	3.07 (2.81-3.28)	3.37 (3.07-3.61)	3.77 (3.41-4.05)	4.08 (3.66-4.39)
10-day	1.26 (1.17-1.35)	1.58 (1.47-1.71)	1.99 (1.85-2.14)	2.31 (2.14-2.48)	2.73 (2.52-2.93)	3.06 (2.81-3.28)	3.39 (3.10-3.64)	3.73 (3.39-4.00)	4.17 (3.77-4.49)	4.51 (4.05-4.87)
20-day	1.59 (1.48-1.72)	2.00 (1.85-2.16)	2.53 (2.34-2.72)	2.93 (2.70-3.15)	3.45 (3.17-3.71)	3.85 (3.53-4.13)	4.25 (3.88-4.57)	4.65 (4.23-5.00)	5.17 (4.67-5.57)	5.55 (4.99-6.00)
30-day	1.85 (1.72-1.99)	2.32 (2.16-2.49)	2.90 (2.70-3.11)	3.34 (3.10-3.58)	3.91 (3.62-4.19)	4.33 (4.00-4.64)	4.75 (4.37-5.10)	5.16 (4.73-5.55)	5.69 (5.18-6.13)	6.08 (5.51-6.57)
45-day	2.23 (2.07-2.39)	2.79 (2.59-2.99)	3.47 (3.22-3.72)	3.97 (3.69-4.25)	4.62 (4.28-4.93)	5.09 (4.70-5.43)	5.54 (5.11-5.92)	5.97 (5.49-6.39)	6.51 (5.97-6.98)	6.90 (6.30-7.40)
60-day	2.57 (2.40-2.76)	3.22 (3.00-3.45)	4.01 (3.73-4.29)	4.60 (4.28-4.91)	5.35 (4.97-5.71)	5.91 (5.47-6.30)	6.45 (5.95-6.87)	6.97 (6.42-7.43)	7.62 (6.99-8.14)	8.09 (7.38-8.66)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

Table 33: Statistical Likelihood for Austin of Various Rainfall Amounts for Specific Time Periods

PDS-based precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.101** (0.090-0.116)	**0.130** (0.117-0.147)	**0.180** (0.161-0.204)	**0.228** (0.202-0.256)	**0.300** (0.259-0.334)	**0.366** (0.309-0.410)	**0.444** (0.364-0.503)	**0.535** (0.423-0.610)	**0.679** (0.512-0.789)	**0.811** (0.586-0.960)
10-min	**0.154** (0.137-0.176)	**0.198** (0.178-0.224)	**0.274** (0.244-0.310)	**0.348** (0.307-0.390)	**0.456** (0.395-0.508)	**0.557** (0.470-0.625)	**0.676** (0.554-0.766)	**0.814** (0.644-0.928)	**1.03** (0.780-1.20)	**1.24** (0.892-1.46)
15-min	**0.191** (0.170-0.218)	**0.245** (0.221-0.277)	**0.339** (0.303-0.384)	**0.431** (0.381-0.483)	**0.566** (0.490-0.630)	**0.690** (0.582-0.774)	**0.838** (0.686-0.949)	**1.01** (0.798-1.15)	**1.28** (0.966-1.49)	**1.53** (1.11-1.81)
30-min	**0.257** (0.228-0.294)	**0.330** (0.297-0.374)	**0.457** (0.408-0.517)	**0.580** (0.513-0.650)	**0.762** (0.659-0.848)	**0.929** (0.784-1.04)	**1.13** (0.924-1.28)	**1.36** (1.08-1.55)	**1.73** (1.30-2.01)	**2.06** (1.49-2.44)
60-min	**0.318** (0.283-0.363)	**0.409** (0.368-0.462)	**0.565** (0.505-0.640)	**0.718** (0.635-0.805)	**0.943** (0.816-1.05)	**1.15** (0.970-1.29)	**1.40** (1.14-1.58)	**1.68** (1.33-1.92)	**2.14** (1.61-2.48)	**2.55** (1.84-3.02)
2-hr	**0.378** (0.343-0.424)	**0.477** (0.437-0.530)	**0.630** (0.581-0.695)	**0.766** (0.695-0.844)	**0.985** (0.874-1.09)	**1.18** (1.02-1.31)	**1.42** (1.21-1.60)	**1.71** (1.41-1.94)	**2.15** (1.71-2.50)	**2.57** (1.97-3.04)
3-hr	**0.458** (0.422-0.505)	**0.569** (0.528-0.624)	**0.741** (0.680-0.806)	**0.889** (0.806-0.973)	**1.11** (0.989-1.22)	**1.31** (1.14-1.44)	**1.53** (1.30-1.70)	**1.82** (1.52-2.06)	**2.28** (1.83-2.61)	**2.69** (2.10-3.14)
6-hr	**0.593** (0.541-0.659)	**0.740** (0.680-0.825)	**0.939** (0.861-1.04)	**1.11** (0.998-1.23)	**1.36** (1.21-1.51)	**1.57** (1.38-1.76)	**1.79** (1.55-2.02)	**2.04** (1.73-2.32)	**2.41** (1.98-2.80)	**2.81** (2.26-3.33)
12-hr	**0.782** (0.710-0.871)	**0.986** (0.891-1.09)	**1.26** (1.14-1.40)	**1.48** (1.33-1.65)	**1.80** (1.60-2.00)	**2.05** (1.81-2.28)	**2.32** (2.02-2.60)	**2.59** (2.22-2.95)	**2.99** (2.50-3.45)	**3.32** (2.73-3.87)
24-hr	**1.05** (0.966-1.13)	**1.32** (1.22-1.43)	**1.69** (1.56-1.83)	**1.99** (1.83-2.15)	**2.39** (2.20-2.59)	**2.72** (2.48-2.95)	**3.07** (2.78-3.32)	**3.42** (3.08-3.71)	**3.91** (3.48-4.26)	**4.30** (3.79-4.70)
2-day	**1.22** (1.13-1.32)	**1.54** (1.42-1.66)	**1.96** (1.81-2.12)	**2.31** (2.13-2.49)	**2.79** (2.56-3.00)	**3.17** (2.89-3.41)	**3.57** (3.23-3.84)	**3.98** (3.57-4.29)	**4.55** (4.04-4.94)	**5.01** (4.39-5.45)
3-day	**1.32** (1.23-1.43)	**1.67** (1.55-1.80)	**2.12** (1.97-2.29)	**2.49** (2.31-2.68)	**3.00** (2.77-3.23)	**3.40** (3.12-3.66)	**3.82** (3.48-4.11)	**4.26** (3.85-4.59)	**4.86** (4.34-5.26)	**5.34** (4.72-5.80)
4-day	**1.43** (1.32-1.53)	**1.80** (1.67-1.93)	**2.28** (2.13-2.45)	**2.67** (2.49-2.87)	**3.21** (2.98-3.45)	**3.64** (3.35-3.91)	**4.08** (3.73-4.38)	**4.55** (4.12-4.89)	**5.17** (4.64-5.58)	**5.67** (5.05-6.14)
7-day	**1.68** (1.56-1.81)	**2.11** (1.97-2.28)	**2.69** (2.49-2.89)	**3.13** (2.90-3.37)	**3.76** (3.47-4.03)	**4.24** (3.90-4.55)	**4.74** (4.32-5.08)	**5.25** (4.76-5.64)	**5.94** (5.33-6.40)	**6.48** (5.77-7.01)
10-day	**1.89** (1.75-2.04)	**2.38** (2.21-2.57)	**3.05** (2.82-3.28)	**3.56** (3.28-3.83)	**4.27** (3.92-4.57)	**4.81** (4.40-5.15)	**5.37** (4.89-5.76)	**5.95** (5.39-6.38)	**6.72** (6.04-7.24)	**7.33** (6.52-7.92)
20-day	**2.50** (2.31-2.68)	**3.17** (2.93-3.41)	**4.05** (3.74-4.35)	**4.72** (4.35-5.06)	**5.62** (5.16-6.02)	**6.30** (5.77-6.76)	**7.00** (6.38-7.52)	**7.71** (6.99-8.28)	**8.64** (7.77-9.32)	**9.36** (8.37-10.1)
30-day	**3.02** (2.82-3.24)	**3.81** (3.56-4.10)	**4.83** (4.50-5.18)	**5.59** (5.21-5.99)	**6.59** (6.13-7.06)	**7.35** (6.79-7.87)	**8.10** (7.47-8.69)	**8.86** (8.11-9.51)	**9.84** (8.94-10.6)	**10.6** (9.55-11.4)
45-day	**3.71** (3.47-3.98)	**4.69** (4.39-5.03)	**5.90** (5.51-6.32)	**6.80** (6.35-7.28)	**7.98** (7.43-8.54)	**8.86** (8.22-9.49)	**9.73** (8.99-10.4)	**10.6** (9.73-11.4)	**11.7** (10.7-12.6)	**12.5** (11.4-13.5)
60-day	**4.30** (4.03-4.61)	**5.43** (5.08-5.82)	**6.83** (6.39-7.30)	**7.87** (7.35-8.41)	**9.23** (8.59-9.87)	**10.2** (9.52-10.9)	**11.2** (10.4-12.0)	**12.2** (11.3-13.1)	**13.5** (12.4-14.5)	**14.5** (13.2-15.5)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

Table 34: Statistical Likelihood for Imlay of Various Rainfall Amounts for Specific Time Periods

PDS-based precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.087** (0.076-0.101)	**0.111** (0.096-0.130)	**0.151** (0.130-0.178)	**0.189** (0.159-0.222)	**0.245** (0.202-0.289)	**0.295** (0.237-0.351)	**0.354** (0.275-0.424)	**0.422** (0.317-0.513)	**0.529** (0.377-0.657)	**0.623** (0.427-0.785)
10-min	**0.133** (0.116-0.153)	**0.169** (0.146-0.197)	**0.230** (0.198-0.270)	**0.287** (0.242-0.337)	**0.373** (0.307-0.440)	**0.450** (0.360-0.533)	**0.538** (0.419-0.645)	**0.642** (0.482-0.780)	**0.804** (0.573-1.00)	**0.947** (0.650-1.20)
15-min	**0.164** (0.143-0.190)	**0.210** (0.181-0.245)	**0.285** (0.245-0.335)	**0.356** (0.300-0.418)	**0.462** (0.381-0.545)	**0.558** (0.447-0.661)	**0.667** (0.519-0.799)	**0.796** (0.598-0.967)	**0.997** (0.711-1.24)	**1.17** (0.806-1.48)
30-min	**0.221** (0.193-0.256)	**0.282** (0.243-0.329)	**0.384** (0.329-0.451)	**0.480** (0.404-0.564)	**0.622** (0.513-0.734)	**0.751** (0.601-0.891)	**0.899** (0.699-1.08)	**1.07** (0.805-1.30)	**1.34** (0.957-1.67)	**1.58** (1.09-2.00)
60-min	**0.273** (0.239-0.316)	**0.349** (0.301-0.407)	**0.475** (0.408-0.558)	**0.593** (0.499-0.697)	**0.770** (0.634-0.908)	**0.929** (0.744-1.10)	**1.11** (0.865-1.33)	**1.33** (0.996-1.61)	**1.66** (1.19-2.07)	**1.96** (1.34-2.47)
2-hr	**0.360** (0.319-0.412)	**0.455** (0.400-0.523)	**0.601** (0.528-0.694)	**0.721** (0.626-0.832)	**0.911** (0.777-1.06)	**1.07** (0.894-1.25)	**1.25** (1.01-1.47)	**1.45** (1.15-1.74)	**1.77** (1.34-2.15)	**2.05** (1.50-2.54)
3-hr	**0.408** (0.366-0.463)	**0.519** (0.463-0.590)	**0.673** (0.599-0.770)	**0.807** (0.706-0.929)	**0.998** (0.852-1.15)	**1.15** (0.974-1.35)	**1.34** (1.10-1.57)	**1.53** (1.24-1.81)	**1.83** (1.42-2.21)	**2.09** (1.57-2.55)
6-hr	**0.532** (0.480-0.603)	**0.663** (0.594-0.756)	**0.860** (0.766-0.978)	**1.02** (0.904-1.17)	**1.26** (1.09-1.44)	**1.44** (1.22-1.66)	**1.65** (1.37-1.91)	**1.86** (1.52-2.19)	**2.19** (1.73-2.65)	**2.47** (1.89-3.05)
12-hr	**0.657** (0.590-0.733)	**0.836** (0.750-0.933)	**1.09** (0.978-1.22)	**1.29** (1.15-1.44)	**1.57** (1.37-1.76)	**1.79** (1.55-2.02)	**2.02** (1.72-2.30)	**2.26** (1.89-2.60)	**2.59** (2.10-3.04)	**2.86** (2.27-3.41)
24-hr	**0.781** (0.720-0.854)	**1.01** (0.921-1.09)	**1.32** (1.20-1.43)	**1.56** (1.42-1.70)	**1.90** (1.72-2.07)	**2.16** (1.95-2.36)	**2.44** (2.19-2.66)	**2.73** (2.43-2.98)	**3.13** (2.75-3.44)	**3.44** (2.98-3.81)
2-day	**0.905** (0.833-0.987)	**1.16** (1.07-1.26)	**1.52** (1.40-1.67)	**1.81** (1.65-1.97)	**2.20** (2.01-2.40)	**2.51** (2.27-2.74)	**2.83** (2.54-3.11)	**3.17** (2.82-3.49)	**3.63** (3.18-4.02)	**3.99** (3.46-4.45)
3-day	**0.982** (0.908-1.07)	**1.26** (1.17-1.37)	**1.66** (1.53-1.81)	**1.98** (1.82-2.15)	**2.41** (2.20-2.62)	**2.75** (2.49-2.99)	**3.10** (2.79-3.39)	**3.47** (3.09-3.80)	**3.97** (3.48-4.38)	**4.37** (3.79-4.85)
4-day	**1.06** (0.983-1.15)	**1.37** (1.26-1.48)	**1.80** (1.67-1.95)	**2.15** (1.99-2.32)	**2.62** (2.40-2.84)	**2.99** (2.72-3.24)	**3.37** (3.04-3.67)	**3.77** (3.36-4.12)	**4.32** (3.79-4.74)	**4.75** (4.12-5.25)
7-day	**1.26** (1.16-1.37)	**1.62** (1.50-1.77)	**2.15** (1.98-2.35)	**2.56** (2.35-2.79)	**3.11** (2.83-3.39)	**3.54** (3.20-3.86)	**3.98** (3.58-4.36)	**4.45** (3.95-4.88)	**5.07** (4.45-5.61)	**5.57** (4.83-6.19)
10-day	**1.41** (1.30-1.53)	**1.81** (1.68-1.98)	**2.40** (2.21-2.61)	**2.86** (2.62-3.11)	**3.47** (3.17-3.78)	**3.95** (3.58-4.31)	**4.45** (4.00-4.86)	**4.95** (4.41-5.43)	**5.64** (4.94-6.23)	**6.18** (5.35-6.85)
20-day	**1.73** (1.60-1.88)	**2.24** (2.07-2.43)	**2.95** (2.71-3.19)	**3.47** (3.19-3.76)	**4.18** (3.81-4.53)	**4.71** (4.28-5.12)	**5.25** (4.74-5.71)	**5.79** (5.18-6.32)	**6.52** (5.78-7.15)	**7.08** (6.22-7.80)
30-day	**2.05** (1.89-2.22)	**2.65** (2.44-2.88)	**3.49** (3.20-3.79)	**4.12** (3.77-4.46)	**4.94** (4.50-5.37)	**5.57** (5.04-6.06)	**6.21** (5.59-6.77)	**6.85** (6.13-7.50)	**7.70** (6.81-8.48)	**8.35** (7.31-9.24)
45-day	**2.48** (2.28-2.70)	**3.22** (2.95-3.50)	**4.26** (3.90-4.64)	**5.03** (4.59-5.47)	**6.05** (5.48-6.58)	**6.82** (6.16-7.44)	**7.61** (6.83-8.33)	**8.41** (7.48-9.24)	**9.48** (8.34-10.5)	**10.3** (8.97-11.5)
60-day	**2.84** (2.60-3.10)	**3.69** (3.38-4.02)	**4.89** (4.47-5.33)	**5.77** (5.26-6.29)	**6.91** (6.28-7.55)	**7.78** (7.03-8.52)	**8.65** (7.77-9.50)	**9.54** (8.51-10.5)	**10.7** (9.43-11.9)	**11.6** (10.1-12.9)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

Table 35: Statistical Likelihood for Lovelock of Various Rainfall Amounts for Specific Time Periods

PDS-based precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.081 (0.070-0.094)	0.104 (0.092-0.120)	0.141 (0.122-0.162)	0.175 (0.150-0.202)	0.228 (0.192-0.262)	0.277 (0.228-0.321)	0.331 (0.263-0.388)	0.396 (0.304-0.468)	0.496 (0.360-0.603)	0.584 (0.409-0.721)
10-min	0.124 (0.107-0.144)	0.158 (0.139-0.182)	0.214 (0.185-0.247)	0.267 (0.228-0.306)	0.347 (0.292-0.400)	0.422 (0.347-0.489)	0.505 (0.401-0.591)	0.603 (0.463-0.712)	0.754 (0.549-0.918)	0.888 (0.622-1.10)
15-min	0.154 (0.133-0.178)	0.196 (0.173-0.226)	0.265 (0.230-0.307)	0.330 (0.283-0.380)	0.429 (0.362-0.495)	0.523 (0.430-0.607)	0.626 (0.497-0.733)	0.747 (0.574-0.883)	0.935 (0.680-1.14)	1.10 (0.772-1.36)
30-min	0.207 (0.179-0.240)	0.264 (0.233-0.305)	0.357 (0.309-0.413)	0.445 (0.381-0.512)	0.578 (0.488-0.667)	0.704 (0.579-0.817)	0.843 (0.668-0.987)	1.01 (0.772-1.19)	1.26 (0.916-1.53)	1.48 (1.04-1.83)
60-min	0.256 (0.221-0.297)	0.327 (0.288-0.377)	0.441 (0.383-0.511)	0.550 (0.472-0.633)	0.716 (0.604-0.826)	0.872 (0.717-1.01)	1.04 (0.827-1.22)	1.25 (0.956-1.47)	1.56 (1.13-1.90)	1.84 (1.29-2.27)
2-hr	0.326 (0.292-0.371)	0.408 (0.361-0.463)	0.546 (0.487-0.620)	0.654 (0.575-0.741)	0.828 (0.708-0.941)	0.982 (0.828-1.12)	1.15 (0.937-1.31)	1.33 (1.06-1.55)	1.62 (1.24-1.92)	1.88 (1.38-2.29)
3-hr	0.364 (0.329-0.412)	0.453 (0.412-0.508)	0.600 (0.541-0.674)	0.719 (0.638-0.806)	0.885 (0.779-0.988)	1.03 (0.885-1.16)	1.19 (1.00-1.36)	1.37 (1.12-1.59)	1.66 (1.30-1.96)	1.91 (1.45-2.30)
6-hr	0.466 (0.430-0.518)	0.587 (0.535-0.656)	0.759 (0.696-0.847)	0.905 (0.820-0.998)	1.12 (0.989-1.24)	1.28 (1.11-1.43)	1.47 (1.25-1.66)	1.67 (1.39-1.91)	1.97 (1.57-2.32)	2.22 (1.72-2.66)
12-hr	0.558 (0.508-0.615)	0.711 (0.645-0.787)	0.928 (0.842-1.02)	1.10 (0.996-1.21)	1.34 (1.20-1.48)	1.53 (1.34-1.70)	1.73 (1.49-1.93)	1.94 (1.64-2.19)	2.22 (1.83-2.56)	2.46 (1.98-2.89)
24-hr	0.668 (0.620-0.722)	0.856 (0.788-0.924)	1.12 (1.04-1.21)	1.33 (1.22-1.43)	1.62 (1.48-1.74)	1.84 (1.68-1.98)	2.07 (1.88-2.24)	2.31 (2.07-2.51)	2.65 (2.34-2.88)	2.91 (2.55-3.19)
2-day	0.742 (0.689-0.803)	0.953 (0.885-1.03)	1.25 (1.17-1.36)	1.48 (1.37-1.60)	1.80 (1.66-1.94)	2.04 (1.88-2.20)	2.30 (2.09-2.49)	2.56 (2.32-2.79)	2.92 (2.60-3.20)	3.19 (2.82-3.52)
3-day	0.793 (0.737-0.858)	1.02 (0.946-1.10)	1.34 (1.24-1.45)	1.59 (1.47-1.71)	1.93 (1.77-2.08)	2.19 (2.00-2.36)	2.46 (2.23-2.67)	2.74 (2.47-2.98)	3.13 (2.77-3.43)	3.43 (3.00-3.77)
4-day	0.843 (0.784-0.914)	1.08 (1.01-1.17)	1.42 (1.32-1.54)	1.69 (1.56-1.82)	2.06 (1.88-2.22)	2.34 (2.13-2.53)	2.63 (2.37-2.84)	2.93 (2.62-3.18)	3.34 (2.94-3.65)	3.66 (3.18-4.02)
7-day	0.961 (0.889-1.04)	1.24 (1.15-1.34)	1.63 (1.51-1.76)	1.92 (1.78-2.08)	2.32 (2.14-2.51)	2.64 (2.41-2.85)	2.95 (2.67-3.19)	3.27 (2.94-3.55)	3.70 (3.28-4.06)	4.04 (3.54-4.45)
10-day	1.05 (0.968-1.14)	1.35 (1.25-1.46)	1.78 (1.65-1.93)	2.11 (1.94-2.28)	2.56 (2.34-2.76)	2.89 (2.63-3.13)	3.24 (2.93-3.51)	3.59 (3.21-3.90)	4.06 (3.59-4.44)	4.42 (3.86-4.86)
20-day	1.23 (1.14-1.33)	1.58 (1.47-1.71)	2.07 (1.93-2.23)	2.43 (2.25-2.61)	2.91 (2.69-3.13)	3.27 (3.00-3.53)	3.62 (3.31-3.91)	3.97 (3.60-4.31)	4.43 (3.97-4.83)	4.79 (4.25-5.24)
30-day	1.40 (1.30-1.52)	1.81 (1.68-1.96)	2.37 (2.19-2.55)	2.77 (2.56-2.99)	3.31 (3.04-3.57)	3.70 (3.39-4.01)	4.10 (3.73-4.45)	4.49 (4.06-4.89)	4.99 (4.47-5.46)	5.38 (4.78-5.91)
45-day	1.65 (1.52-1.79)	2.13 (1.96-2.31)	2.80 (2.58-3.03)	3.28 (3.03-3.55)	3.91 (3.59-4.24)	4.38 (4.01-4.75)	4.84 (4.41-5.26)	5.28 (4.78-5.76)	5.86 (5.26-6.42)	6.28 (5.61-6.91)
60-day	1.86 (1.71-2.03)	2.40 (2.21-2.61)	3.16 (2.90-3.43)	3.71 (3.41-4.02)	4.42 (4.04-4.78)	4.95 (4.51-5.35)	5.46 (4.96-5.92)	5.96 (5.39-6.50)	6.62 (5.93-7.24)	7.08 (6.32-7.79)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

Floods are described in terms of their extent (including the horizontal area affected and the vertical depth of floodwaters) and the related probability of occurrence. Flood studies often use historical records, such as stream flow gages, to determine the probability of occurrence for floods of different magnitudes. The probability of occurrence is expressed as a percentage for the chance of a flood of a specific extent occurring in any given year.

Factors contributing to the frequency and severity of flooding include the following:

- Rainfall intensity and duration (or warm snow in a pineapple express storm)
- Antecedent moisture conditions
- Single event, warm rain on snowy slopes, resulting in premature and rapid melting of the snowpack
- Watershed conditions, including steepness of terrain, soil types, amount and type of vegetation, and density of development

- The existence of attenuating features in the watershed, including natural features such as swamps and lakes and human-built features such as dams
- The existence of flood control features, such as levees and flood control channels
- Velocity of flow
- Availability of sediment for transport, and the erodibility of the bed and banks of the watercourse

These factors are evaluated using (1) a hydrologic analysis to determine the probability that a discharge of a certain size will occur, and (2) a hydraulic analysis to determine the characteristics and depth of the flood that results from that discharge.

The magnitude of flood used as the standard for floodplain management in the United States is a flood having a 1 percent probability of occurrence in any given year. This flood is also known as the 100-year flood or base flood. The most readily available source of information regarding the 100-year flood is the system of Flood Insurance Rate Maps (FIRMs) prepared by FEMA. These maps are used to support the National Flood Insurance Program (NFIP). The FIRMs show 100-year floodplain boundaries for identified flood hazards. These areas are also referred to as Special Flood Hazard Areas (SFHAs) and are the basis for flood insurance and floodplain management requirements. The FIRMs also show floodplain boundaries for the 500-year flood, which is the flood having a 0.2 percent chance of occurrence in any given year.

FEMA has created FIRMs for Humboldt, Lander, and Pershing Counties, dated 2010, 2013 and 2009 respectively. The FIRMs show that the Cities of Lovelock and Winnemucca are mostly located outside of the 100-year flood zone. However, a significant portion of the Town of Battle Mountain is located within the 100-year flood zone.

There has been at least one significant flood in the Humboldt River Basin during every decade since 1900. It is therefore reasonable to assume this established flood frequency pattern will continue. Battle Mountain is the most susceptible to residential and commercial property damage while Winnemucca and Lovelock are likely to sustain damage to agricultural facilities. Bridges and railroads have the potential for damage at various locations along the Humboldt.

Canal and Dam Failure

The goal of the Nevada Division of Dam Safety program is to avoid dam failure and thus prevent loss of life and destruction of property. This is accomplished by regulation of new dam construction and periodic visual inspections of existing dams. The Division has created a data base of dams throughout the State that classifies the dams in accordance with the FEMA standards. Table 36 includes the dams in the Tri-County area that are classified as High or Significant hazard dams as of July 2020. High hazard dams are in bold.

Table 36: Significant and High Hazard Dams Within the Tri-County Area (NDWR July 2020)

National ID	State ID	Name	County	Stream	Hazard Ranking
NV00197	**J-152**	**Soldier Meadow Dam**	**Humboldt**	**Soldier Creek**	**H**
NV10267	**XJ-126**	**Fort McDermitt Dam**	**Humboldt**	**East Fork Quinn River**	**H**
NV10864	**XJ-001**	**Battle Creek Dam**	**Humboldt**	**Battle Creek**	**H**
NV00004	J-330	Knott Creek Res	Humboldt	Knott Creek	S
NV00005	J-016	Onion Dam	Humboldt	East Fork Alder Creek	S
NV00006	J-041	Little Onion Dam	Humboldt	Alder Creek	S
NV01139	J-707	Juniper Tailings Dam	Humboldt	Rabbit Creek-Os	S
NV01151	J-134	Chimney Dam	Humboldt	Little Humboldt River	S
NV10272	J-546	Lone Tree Section 23 Tails	Humboldt	Humboldt River-Os	S
NV10493	XNV10493	Pasquale Dam	Humboldt	Goughs Creek-Tr	S
NV10496	XJ-440	Lone Tree Holding Pond	Humboldt	Humboldt River-Os	S
NV10843	J-683	Brimstone Leach Event Pond	Humboldt	None	S
NV10848	J-692	Hycroft South Tails	Humboldt	N/A	S
NV00100		**Smith Creek Dam**	**Lander**	**Smith Creek**	**H**
NV00127	**J-114**	**Kingston Canyon Dam**	**Lander**	**Kingston Creek**	**H**
NV10307	**XJ-113**	**Kingston Canyon Lower Dam**	**Lander**	**Kingston Creek**	**H**
NV10869	**XJ-108**	**Kingston Canyon Dam**	**Lander**	**Kingston Canyon Creek**	**H**
NV00057	J-118	Iowa Creek Dam	Lander	Iowa Creek	S
NV00058		Izzenhood Dam	Lander	Humboldt River-Os	S
NV00178	J-369	Argenta Tailings Dam	Lander	Humboldt River-Os	S
NV10290	XJ-224	Copper Canyon Tailings	Lander	None	S
NV10299	XJ-112	Hunt Field Dam	Lander	Callaghan Creek-Os	S
NV10409	J-290	Bmg Mine Willow Creek Dam	Lander	Willow Creek	S
NV10460	J-430	Callaghan Creek Dam	Lander	Callaghan Creek	S
NV10124	**J-706**	**Rye Patch**	**Pershing**	**Humboldt River**	**H**
NV00064	XNV00064	Pumpernickel Dam	Pershing	Pumpernickel Creek	S
NV00061	XJ-032	Mud Springs Dam	Pershing	Pollard Creek-Os	S

In addition to the significant and high hazard dams listed, there are a substantial number of low-hazard dams within the Tri-County area. Failure of these low-hazard dams is unlikely to cause loss of life but could cause damage to structures. Table 37 shows the total number of dams in the Tri-County area.

Table 37: Total Number of Dams in Tri-County Area (NDWR)

	Hazard Classification			
County	High	Significant	Low	Total
Humboldt	3	10	73	86
Lander	4	25	30	59
Pershing	1	19	17	37

Of the eight high-hazard dams in the Tri-County area, failure of the Rye Patch Dam would potentially cause the most damage. Rye Patch Reservoir, located on the Humboldt River east of Lovelock, Nevada in Pershing County, covers 10,280 surface acres, stores 196,000 AF, and has a maximum depth of 61 feet when full. The water in the reservoir is controlled by the Pershing County Water Conservation District (PCWCD) for irrigation of crops downstream in Lovelock Valley. The reservoir is located within the Rye Patch State Recreation Area managed by Nevada Division of State Parks.

Canal failure is also a concern throughout the Tri-County area. Failure of canal levees and undermining of diversion structures have nearly always accompanied historic floods. Canal and diversion structure failure results when the canal capacity is exceeded, and water overtops the bank. This usually occurs when water releases from dams upstream are above normal. Abnormally high releases are necessary when the capacity of the reservoirs upstream of the dams is exceeded. For example, the maximum amount that can be released from Rye Patch Dam exceeds the capacity of several of the structures downstream of the dam. Oftentimes, a wet winter will allow the manager of the dam, the PCWCD, to fill the Rye Patch Reservoir to capacity. However, two consecutive wet winters may produce too much storage water, endangering the dam and making a release of the excess water necessary. Since the overtopping of the Rye Patch Dam could cause a catastrophic failure, the PCWCD is sometimes forced to release water in quantities that can potentially damage facilities downstream. When dam, canals, and/or canal structures fail, the ability to control flood waters becomes limited. Historically, dam and canal failures have accompanied every significant flood of the Humboldt River. The location of the facility failure is dependent upon the extent and location of the flood.

NFIP

All three of the Counties participate in the National Flood Insurance Program (NFIP) and do not permit building in the floodway. According to each of the Counties codes, critical flood zones are protected from encroachment and development.

Severe Repetitive Loss

FEMA's Severe Repetitive Loss (SRL) Program was designed in 2004 to provide funding to reduce or eliminate the long-term risk of flood damage to SRL structures insured under the NFIP. FEMA designates Severe Repetitive Loss (SRL) as "any NFIP-insured single family or multi-family residential building:

1. That has incurred flood-related damage for which four or more separate claims payments have been made, with the amount of each claim (including building and contents payments) exceeding $5,000, and with the cumulative amount of such claims payments exceeding $20,000; or
2. For which at least two separate claims payments (building payments only) have been made under such coverage, with the cumulative amount of such claims exceeding the market value of the building."

The Tri-Counties have no SRL or repetitive loss properties at this time.

6.6 HAZARDOUS MATERIALS EVENT

Planning Significance	Humboldt- High, Pershing- Moderate, Lander-High

6.6.1 Description

Hazardous materials may include hundreds of substances that pose a significant risk to humans. These substances may be highly toxic, reactive, corrosive, flammable, radioactive, or infectious. Hazard materials are regulated by numerous Federal, State, and local agencies including the U.S. Environmental Protection Agency (EPA), U.S. Department of Transportation (DOT), National Fire Protection Association, FEMA, the U.S. Army, and the International Maritime Organization.

Hazardous material releases may occur from any of the following:

- Fixed site facilities (such as refineries, chemical plants, storage facilities, manufacturing, warehouses, wastewater treatment plants, swimming pools, dry cleaners, automotive sales/repair, and gas stations)
- Highway and rail transportation (such as tanker trucks, chemical trucks, and railroad tankers)
- Air transportation (such as cargo packages)
- Pipeline transportation (liquid petroleum, natural gas, and other chemicals)

Unless exempted, facilities that use, manufacture, or store hazardous materials in the United States fall under the regulatory requirements of the Emergency Planning and Community Right to Know Act (EPCRA) of 1986, enacted as Title III of the Federal Superfund Amendments and Reauthorization Act (42 USC 11001–11050; 1988). Under EPCRA regulations, hazardous materials that pose the greatest risk for causing catastrophic emergencies are identified as Extremely Hazardous Substances (EHSs). These chemicals are identified by the EPA in the List of Lists – Consolidated List of Chemicals Subject to the Emergency Planning and Community Right-to-Know Act (EPCRA) and Section 112 of the Clean Air Act. Releases of EHSs can occur during transport to and from fixed site facilities. Transportation-related releases are generally more troublesome because they may occur anywhere, including close to human populations, critical facilities, or sensitive environmental areas. Transportation-related EHS releases are also more difficult to mitigate due to the variability of locations and distance from response resources.

In addition to accidental human-caused hazardous material events, natural hazards may cause the release of hazardous materials and complicate response activities. The impact of earthquakes on fixed facilities may be particularly serious due to the impairment or failure of the physical integrity of containment facilities. The threat of any hazardous material event may be magnified due to restricted access, reduced fire suppression and spill containment, and even complete cut-off of response personnel and equipment. In addition, the risk of terrorism involving hazardous materials is considered a major threat due to the location of hazardous material facilities and transport routes throughout communities and the frequently limited antiterrorism security at these facilities.

Regulation

The National Response Center (NRC) serves as the sole national point of contact for reporting all oil, chemical, radiological, biological, and etiological discharges into the environment anywhere in the United States and its territories. The National Response Center (NRC) is not a response agency. It serves as an emergency call center that fields initial reports for pollution and railroad incidents and forwards that information to appropriate federal/state agencies for response. The spreadsheets posted to the NRC website contain initial incident data that has not been validated or investigated by a federal/state response agency.

In addition to gathering and distributing spill data for Federal On-Scene Coordinators and serving as the communications and operations center for the U.S. National Response Team (an organization of 15 Federal departments and agencies responsible for coordinating emergency preparedness and response to oil and hazardous substance pollution incidents), the NRC maintains agreements with a variety of federal entities to make additional notifications regarding incidents meeting established trigger criteria. The NRC also takes Terrorist/Suspicious Activity Reports and Maritime Security Breach Reports.

The State of Nevada Bureau of Corrective Action oversees cleanup of releases of regulated substances using a multi-media (air, water, soil, and ecological resources) approach. The Bureau also administers the environmental response program. There is some overlap on cases reported to the NRC and BCA.

6.6.2 History

Both the NRC and the Nevada Bureau of Corrective Actions (BCA) maintain databases of hazardous spills. The Bureau of Corrective Actions database consists primarily of oil and chemical spills whereas the NRC database includes essentially all hazardous spills. **Table 38** shows the number of spills reported in the Tri-County area between 1990 and December 2019.

Table 38: Reported Hazardous Spill Incidents (1990-2019, NRC, BCA)

County	National Response Center	Bureau of Corrective Actions
Humboldt	252	130
Lander	81	66
Pershing	35	58

6.6.3 Location, Extent, Probability of Future Events

The industries that consistently report spills in the Tri-County area are mining and transportation. Mining related spills make up a significant part of those reported to the NRC. Nevada Gold Mines, operators of several mines in the Tri -County area and is an active participant in hazardous materials management and response, particularly in Lander County. Nevada Gold Mines is international cyanide code compliant and performs a cyanide release drill to comply with code requirements. Nevada Gold Mines is also ISO14001 certified and are audited annually and recertified every other year, and is driving to ISO145001 certification.

Other common spills reported to the NRC are railroad and trucking company related. Hazardous materials are routinely shipped by means of Interstate 80 and the railroad and the potential for spills is always present.

Comprehensive information on the probability and magnitude of hazardous material events from all types of sources (such as fixed facilities or transport vehicles) is not available. Wide variations among the characteristics of hazardous material sources and among the materials themselves make such an evaluation difficult. While it is beyond the scope of this HMP to evaluate the probability and magnitude of hazardous material events in the County in detail, it is possible to determine the exposure of population, buildings, and critical facilities should such an event occur. Areas at risk for hazardous material events include any area within a 1-mile radius of Interstate 80, Highway 50, and the railroad including Winnemucca, Lovelock, Battle Mountain, Golconda, and Austin (see Appendix B).

6.7 INFESTATION

Planning Significance	Humboldt- Low, Pershing- Low, Lander-Very Low

6.7.1 Description

An "invasive species" is defined as a species that is:

1) Non-native (or alien) to the ecosystem under consideration, and
2) Whose introduction causes or is likely to cause economic or environmental harm or harm to human health.

Invasive species can be plants, animals (including aquatic species) and other organisms (e.g., microbes). (USDA 2020) Infestations impact Nevada's economy through the destruction of crops and natural resources which also impacts tourism. Some of the plant infestations are highly flammable and assist in the spread of Wildland fires. Human actions are the primary means of introduction and spread of invasive species.

6.7.2 History

Weeds

Noxious weeds are designated per NRS 555.130 and 555.010.

The Nevada Department of Agriculture monitors the introduction and spread of noxious weeds in the state. They have developed the following categorization scheme for control of noxious weeds with Category "C" being the most widespread and subject to active eradication.

- **Category A weeds** are generally not found in or limited in distribution throughout the State. Such weeds are subject to active exclusion from the State and active eradication wherever found and active eradication from the premises of a dealer of nursery stock.
- **Category B weeds** are generally established in scattered populations in some counties of the State. Such weeds are subject to active exclusion where possible and active eradication from the premises of a dealer of nursery stock.
- **Category C weeds** are generally established and widespread in many counties of the State and are subject to active eradication from the premises of a dealer of nursery stock.

Table 39 shows noxious weeds that are included on the Nevada Department of Agriculture's Nevada Noxious Weed List and are known to occur in the Tri-County area according to the Nevada Noxious Weed Field Guide.

Table 39: Noxious Weeds Known to Occur in the Tri-County Area

Category A Weeds	
Weed	**County where it occurs**
African rue (*Peganum harmala*)	Pershing
Austrian fieldcress (*Rorippa austriaca*)	Humboldt, Lander, Pershing
Black henbane (*Hyoscyamus niger*)	Humboldt, Lander
Camelthorn (*Alhagi pseudalhagi*)	Lander
Giant reed (*Arundo donax*)	Humboldt
Houndstongue (*Cynoglossum officinale*)	Humboldt
Mayweed chamomile (*Anthemis cotula*)	Humboldt
Mediterranean sage (*Salvia aethiopis*)	Humboldt
Perennial sowthistle (*Sonchus arvensis*)	Humboldt
Purple starthistle (*Centaurea calcitrapa*)	Pershing
Spotted knapweed (*Centaurea maculosa*)	Humboldt, Lander
Sulfur cinquefoil (*Potentilla recta*)	Humboldt

Yellow starthistle (*Centaurea solstitialis*)	Humboldt, Lander, Pershing
Yellow toadflax (*Linaria vulgaris*)	Humboldt
Category B Weeds	
Diffuse knapweed (*Centaurea diffusa*)	Lander
Leafy spurge (*Euphorbia esula*)	Humboldt, Lander
Medusahead (*Taeniatherum caput-medusae*)	Humboldt, Pershing
Musk thistle (*Carduus nutans*)	Humboldt, Lander
Russian knapweed (*Acroptilon repens*)	Humboldt, Lander, Pershing
Scotch thistle (*Onopordum acanthium*)	Humboldt, Lander, Pershing
Category C Weeds	
Canada thistle (*Cirsium arvense*)	Humboldt, Lander, Pershing
Hoary cress (*Cardaria draba*)	Humboldt, Lander, Pershing
Perennial pepperweed (*Lepidium latifolium*)	Humboldt, Lander, Pershing
Poison-hemlock (*Conium maculatum*)	Humboldt
Puncturevine (*Tribulus terrestris*)	Humboldt, Lander, Pershing
Salt cedar (tamarisk) (*Tamarix* spp.)	Humboldt, Lander, Pershing
Spotted waterhemlock (*Cicuta maculata*)	Humboldt, Lander

Other invasive plants that are too widely distributed in Nevada to be included in the noxious weed list but present problems in Nevada are listed below:

- *cheatgrass (*bromus tectorum l.) Is an annual grass that forms tufts up to 2 feet tall. The leaves and sheathes are covered in short soft hairs. The flowers occur as drooping, open, terminal clusters that can have a greenish, red, or purple hue. These annual plants will germinate in fall or spring (fall is more common) and senescence usually occurs in summer. Cheatgrass invades rangelands, pastures, prairies, and other open areas. Cheatgrass has the potential to completely alter the ecosystems it invades. It can completely replace native vegetation and change fire regimes. It occurs throughout the United States and Canada, but is most problematic in areas of the western United States with lower precipitation levels such as Nevada. Cheatgrass is native to Europe and parts of Africa and Asia. It was first introduced into the United States accidentally in the mid-1800s.
- *red brome* (bromus rubens l.*):* in the North American region red brome is reported to be invasive because it faces low herbaceous competition. Once established, it has the potential to compete with other grasses. The accumulation of litter and necromass has the potential to increase fire frequency in the desert. Red brome-fueled fires result in the loss of native perennial species in invaded areas, resulting in disturbed areas that are ideal for increased growth of red brome.

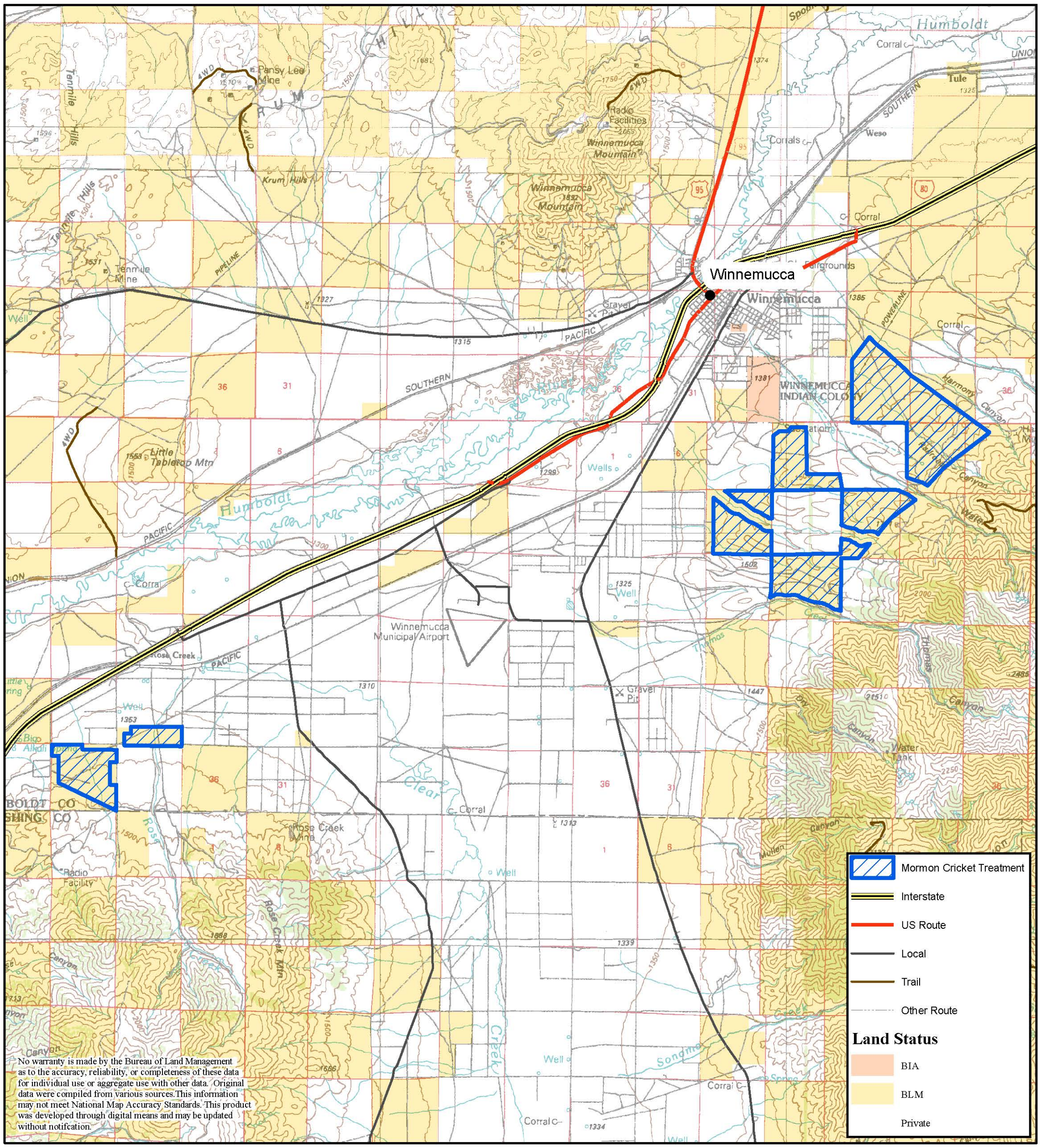
Insects

Within the Tri-County area, Mormon Crickets are the insect most likely to cause substantial damage and economic loss. Mormon Crickets are flightless, ground dwelling insects native to the western United States. They eat native, herbaceous perennials (forbs), grasses, shrubs, and cultivated forage crops, reducing feed for grazing wildlife and livestock. In large numbers, their feeding can contribute to soil erosion, poor water quality, nutrient depleted soils, and potentially cause damage to range and cropland ecosystems. Drought encourages outbreaks, which may last several years (historically 5 to 21 years) and cause losses to rangeland, cropland, and home gardens. Additional insects occurring in Nevada but not currently present or of concern in the Tri-County area include Africanized honeybees, bark beetles, and fire ants.

Mormon Crickets infestations have increased in recent years. The Bureau of Land Management Winnemucca office has established a treatment program for rangeland in that area. In 2020, the U.S. Department of Agriculture, Animal and Plant Health Inspection Service (APHIS) prepared several environmental assessments (EA) that analyze alternatives for suppressing grasshopper and Mormon Cricket outbreaks on rangeland in Humboldt, Pershing, Lander and other Counties in Nevada (USDA 2020).

The EAs include an analysis of the potential impacts insecticide applications at conventional rates or reduced agent area with adaptive management strategy. The alternative methods analyzed included chemical control by malathion, carbaryl and diflubenzuron sprays, carbaryl ground and aerial bait and no action. The environmental impacts of each method and potential mitigation measures are described in detail in the EA. The operational procedures and mitigation measures identified in the EA ensure that no significant adverse environmental impacts other than those identified in the APHIS EIS 2019 would occur to the human environment. Insecticide Applications at Conventional Rates or Reduced Agent Area Treatments (RAATs) with Adaptive Management Strategy was the proposed action alternative. (USDA 2020) Figure 25 is a treatment map for Mormon Cricket in Humboldt County in 2019.

Rangeland Mormon Cricket Treatment



Winnemucca District
Bureau of Land Management
5100 E. Winnemucca Blvd
Winnemucca, NV. 89445

Aerial Application of Dimilin 2L
1 oz/acre
50% coverage (every other band sprayed)

0 1.25 2.5 5
Miles

N
1:130,000
Date: 5/31/2019

Figure 25: Rangeland Mormon Cricket Treatment Plan 2019

Aquatic Species

Aquatic nuisance species (ANS) are defined as any non-indigenous aquatic species of plant or animal that has a negative effect on native species or the ecological stability of waters. Negative effects may lead to a decrease in sport fish and native species numbers or other negative impacts on desirable aquatic life which can lead to commercial and/or recreational loss as well as the possible complete elimination of native species. At times, health issues might also be an area of concern.

Aquatic species that have become a particular concern in Nevada in recent years are zebra mussels, quagga mussels, Asian clams, and New Zealand mud snails. Currently the quagga mussel is the only species present in the Tri-County area.

Quagga mussels were first found in Lake Mead in 2007. The mussels are nuisance invasive species that reproducing quickly and in large numbers. They are biofoulers that obstruct pipes in municipal and industrial raw-water systems, requiring millions of dollars annually to maintain. They produce microscopic larvae that float freely in the water column, and thus can pass by screens installed to exclude them. Monitoring and control of these mussels cost millions of dollars annually. As filter feeders, zebra and quagga mussels remove suspended material from the habitat in which they live. This includes the planktonic algae that are the primary base of the food web. Thus, these mussels may completely alter the ecology of water bodies in which they invade.

There has been a preliminary discovery by the Nevada Department of Wildlife of quagga mussels in Rye Patch Reservoir. The mussels were found during routine quagga mussel sampling. No other infestations have been discovered, but NDOW has sent teams of biologists to test other waterways across the state to make sure no other lakes are affected, a practice NDOW has done routinely since the first outbreak was discovered in Lake Mead. Even in the event of infestation, there is no way to determine the effects quagga mussels will have on any particular body of water. Quagga mussels are most often spread by trailers, boats and equipment that travel between waterways (NDOW, 2017).

In the fall and winter of 2015, a fish die-off occurred at Rye Patch Reservoir that was caused by a bloom of toxic golden algae. The loss to the fishery was significant, but increased fish stocking started in 2016 and continued in 2017 to rebuild the fishery. It is still unknown if the golden algae is endemic to the area or an invasive species.

6.7.3 Location, Extent, Probability of Future Events

The Nevada Division of Forestry assisted in the creation of a Geographic Information System (GIS) data set and mapping application with the Nevada Department of Agriculture and the weed management program to provide noxious weed mapping for all of Nevada. The result is EDD Maps, an online mapping database where anyone with a free account can contribute to invasive species data collection which can be accessed through the Nevada Department of Agriculture’s website (http://agri.nv.gov/Plant/Noxious_Weeds). A user can add their findings to this website and compile reports about specific species into a collective database for the public to see after verification. The free EDD Maps can be accessed via a smartphone app to easily add data. Many invasive species distribution maps are available on the EDD Maps website (https://www.eddmaps.org/distribution). Figure 26 shows the distribution of Class C noxious weed Canada Thistle.

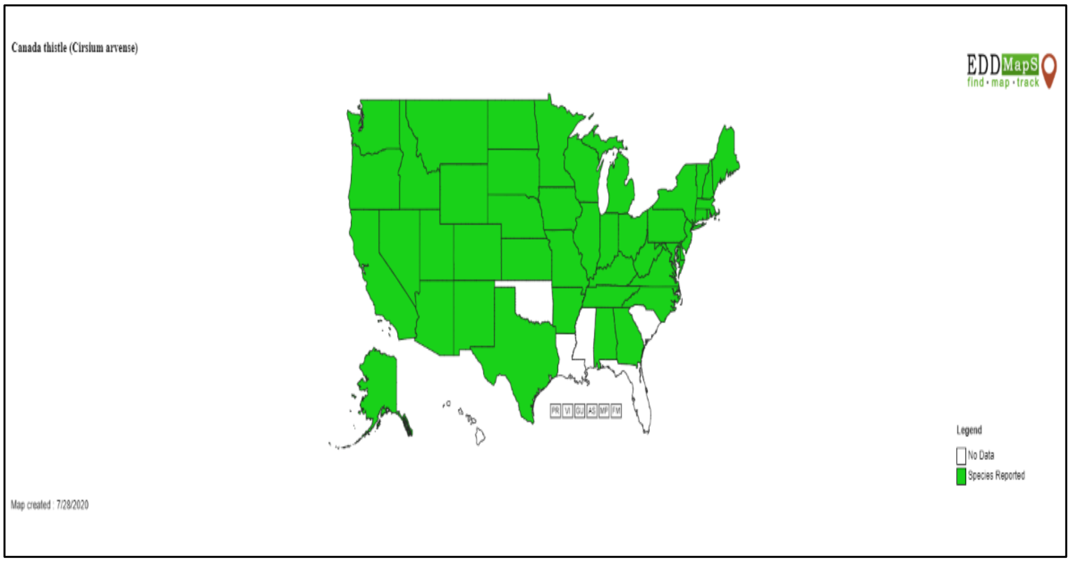


Figure 26: Canada Thistle Distribution (EDD Maps)

The Nevada Natural Heritage program has developed limited maps for the state that show the locations where various noxious weeds listed previously in Table 39 occur. The program has also created a map showing the location and cover percentage for cheatgrass, shown in Figure 27 Transport of weed seeds in areas adjacent to the I-80 corridor is a concern since there is agricultural land and water near I-80 in all of the counties. Noxious weed infestations are continuously monitored by the state Department of Agriculture.

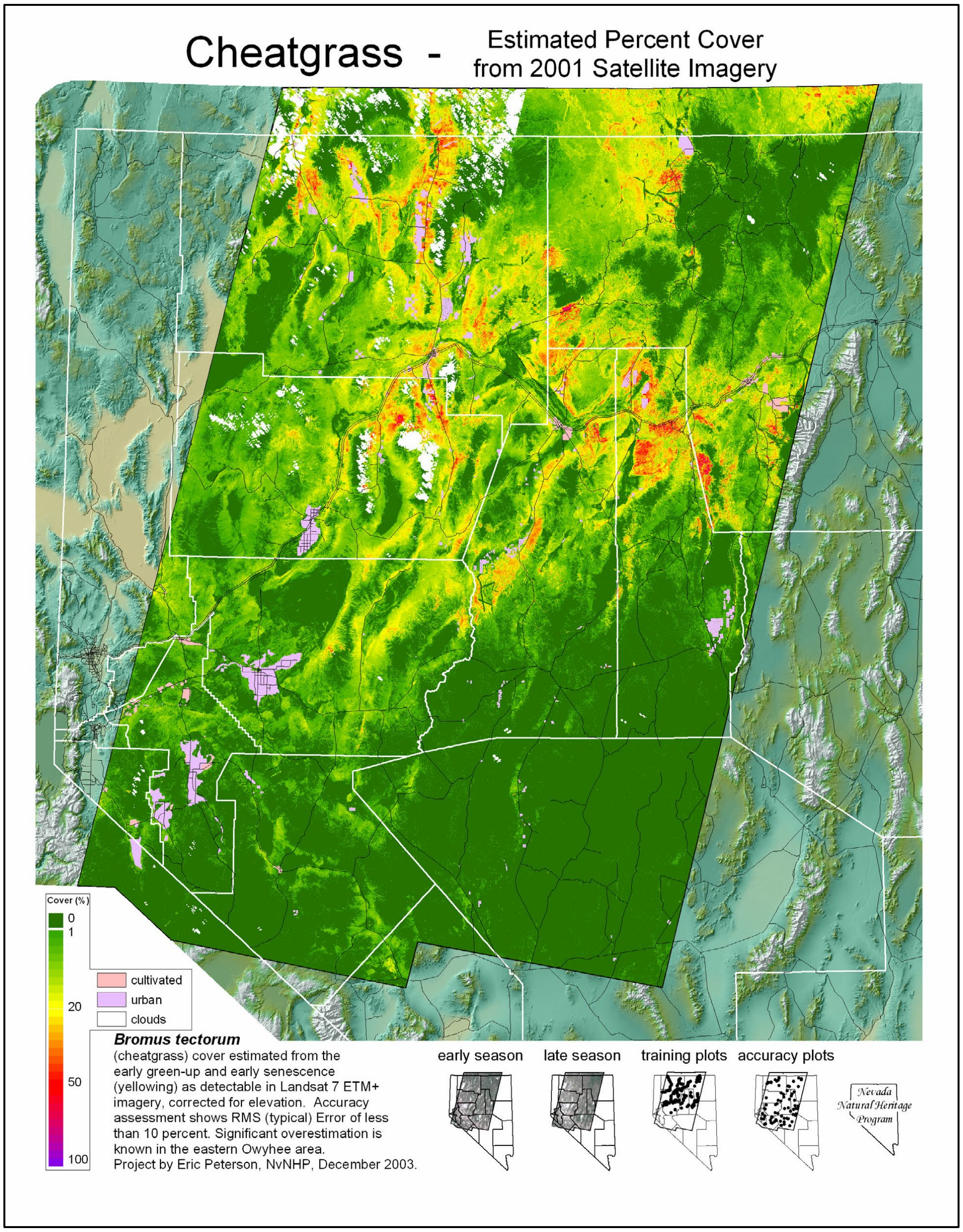


Figure 27: Cheatgrass Estimated Coverage (NNHP)

Currently there are no known infestations of insects or aquatic species in the Tri-County area. However, there is a potential threat of quagga mussels in Rye Patch Reservoir and potential for increased invasive insect populations, including Mormon Crickets.

The Nevada State Hazard Mitigation Planning Subcommittee agreed that plant, insect, and aquatic organism infestations will continue to occur throughout the state as recreation and commerce continue to move people and property across state lines.

6.8 RADON

In this Plan update, Radon was not included in the LEPC's hazard screenings establishing planning significance. Radon may be included in the survey to determine planning significance in future HMP updates. A profile of radon hazards is included in this section but is not subject to additional assessment in this plan update. Future Plan updates may assess the significance of radon hazards for the Tri-Counties.

6.8.1 Description

University of Reno, Nevada Bureau of Mines and Geology (UNR NBMG) has compiled an overview of Radon in Nevada. Radon, specifically radon isotope-222, is a colorless, odorless, tasteless radioactive gas that is produced as a natural decay product of uranium. Uranium and radon occur in varying amounts in all rocks and soils, and radon gradually seeps from the Earth into the atmosphere and may find its way into buildings. Radon can build up indoors, especially in lower levels of the home. The U.S. Environmental Protection Agency (EPA) recommends that the lowest living area (basement or ground floor) of all homes and other buildings with frequent human occupation should be tested for radon. Radon is present in outdoor air as well, but the concentrations outdoors are usually substantially less than those found indoors (UNR NBMG).

According to EPA, radon is responsible for up to 20,000 lung cancer deaths per year in the United States. EPA recommends that remedial action be taken if radon concentration exceeds 4 picocuries of radon per liter of air (4 pCi/L). Studies indicate that radon will cause between one and five lung cancer deaths per 100 people living for 70 years in homes with this concentration. The radon concentration of outside air is generally less than 0.5 pCi/L.

In 1990, NBMG in conjunction with the Nevada Division of Health and the EPA, conducted a yearlong survey of radon in the indoor air of homes in Nevada. The results from over 2,000 measurements were compiled and published by NBMG.

Radon potential and averages were compiled as part of the Nevada Radon Education Program and results are based on independently tested homes from 1989 through 2015, not scientific sampling. Site specific testing is the only way to determine local radon concentrations.

The UNR Extension office is home to the Nevada Radon Education Program which is a partnership with the Nevada Division of Public and Behavioral Health to educate Nevadans about the health risk posed by elevated levels of radon in the home. The Extension program offers literature, educational presentations and low cost radon test kits in many county Extension and partner offices.

6.8.2 History

Radon levels are shown by the UNR study to be, on average, higher than the EPA's recommended remediation level of 4 picocuries of radon per liter of air (4 pCi/L) in areas of each of the Tri-Counties. **Figure 28** shows radon averages in Nevada by zip code. (MyHazards- Nevada https://gisweb.unr.edu/MyHAZARDS/)

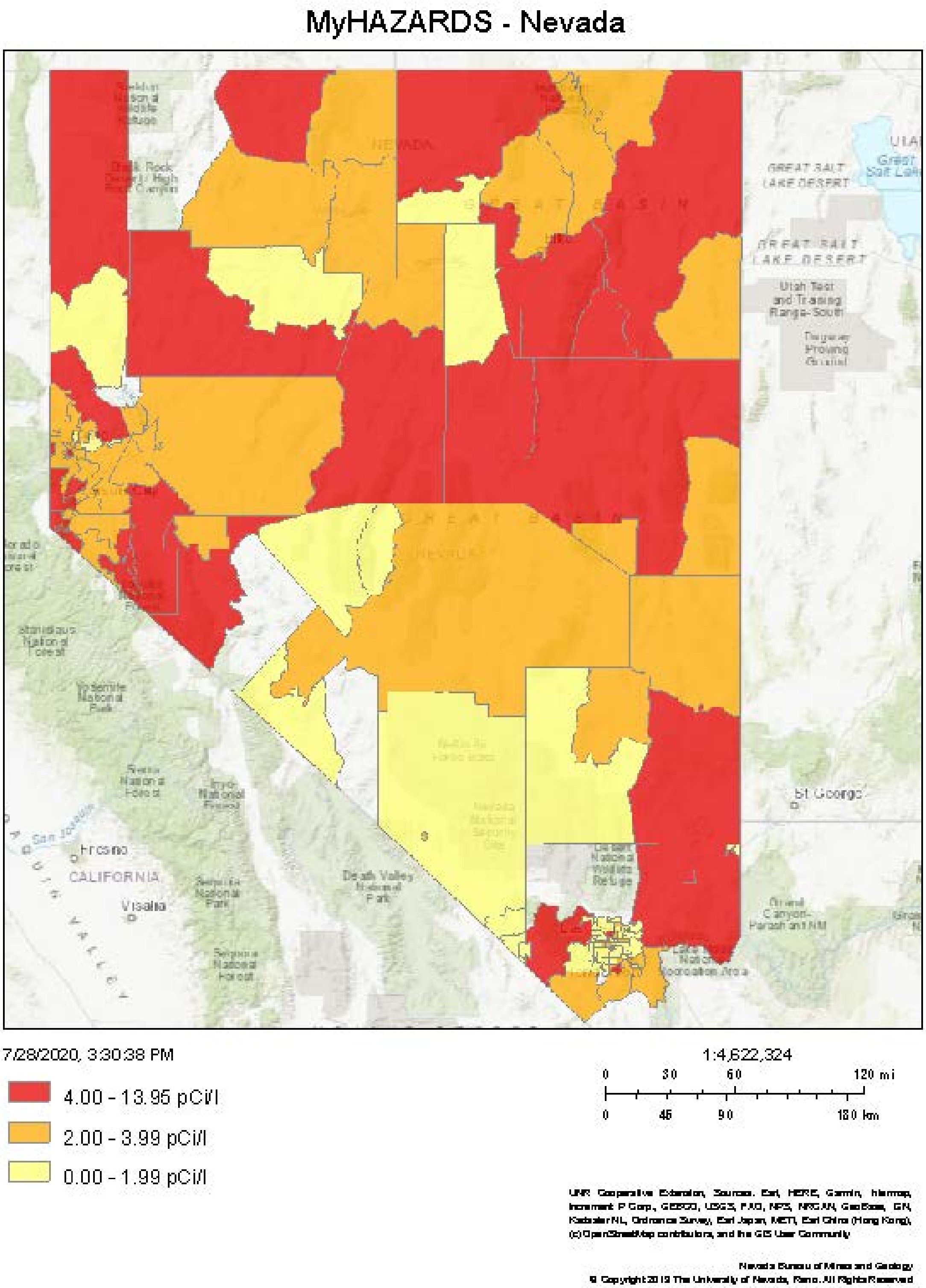


Figure 28: Radon Averages in Nevada by Zip Code

6.8.3 Location, Extent, Probability of Future Events

Potential Radon levels shown by UNR's GIS mapping indicates a potential of over 20% in areas of each of the Tri-County areas. **Figure 29** shows radon potential in Nevada by zip code. (MyHazards- Nevada https://gisweb.unr.edu/MyHAZARDS/)

Radon tests for homes are available from the University of Reno Extension office, in addition to education materials. https://extension.unr.edu/radon/Default.aspx

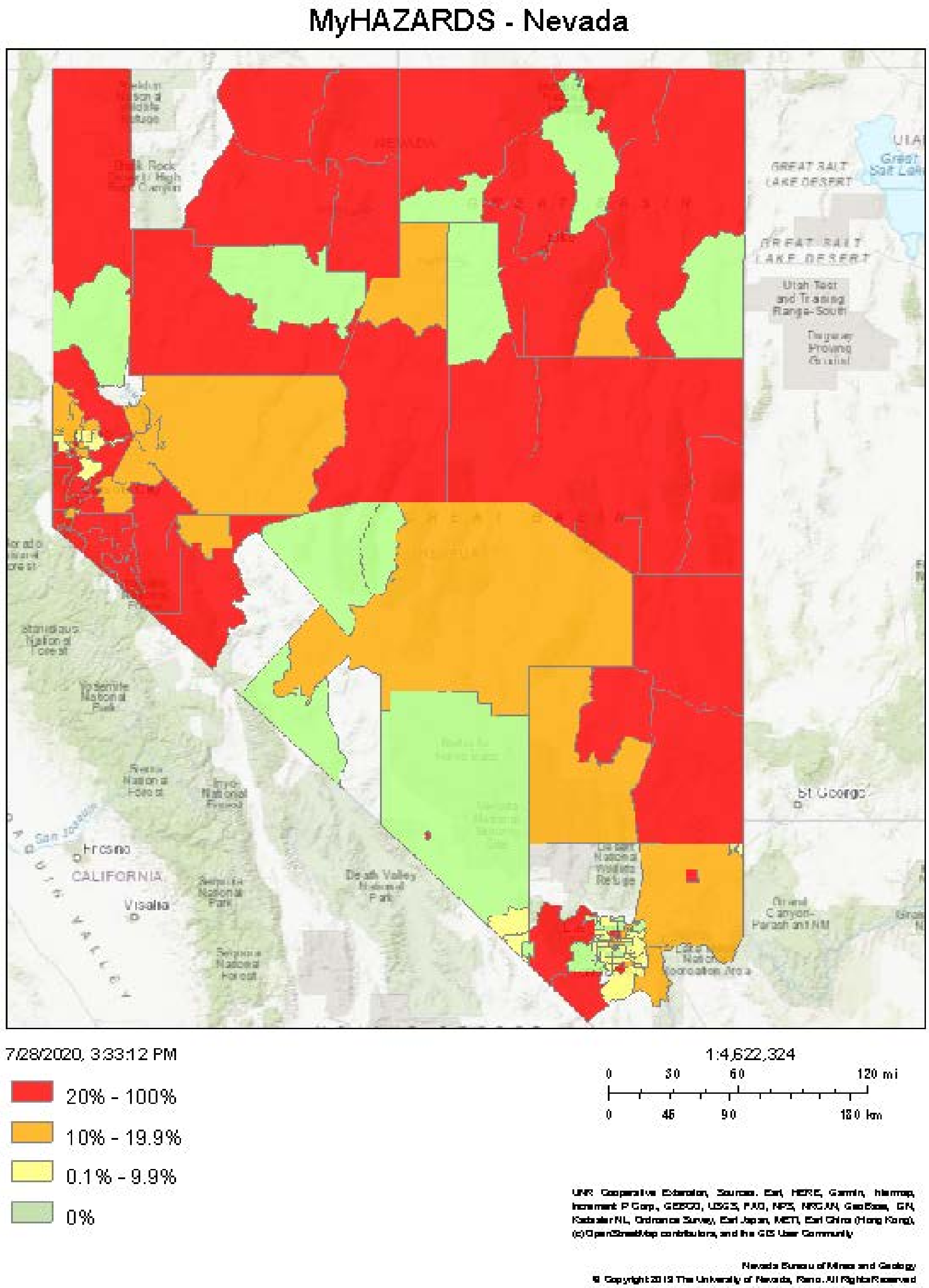


Figure 29: Radon Potential in Nevada by Zip Code

6.9 SEVERE WEATHER

Planning Significance	Humboldt- Low, Pershing- Low, Lander-Moderate/High

Much of the information contained in this section was kindly provided courtesy of the National Weather Service regional office.

6.9.1 Description

Thunderstorms, hailstorms, tornadoes, windstorms, and winter storms were combined into the category of severe weather. Thunderstorms are further defined due to the numerous threats associated with them.

Thunderstorms

Thunderstorms are formed from a combination of moisture, rapidly rising warm air, and a force capable of lifting the air, such as warm and cold fronts or mountainous terrain. A thunderstorm produces lightning, thunder, and rainfall and can develop in just minutes. Thunderstorms may occur singly, in clusters, or in lines. As a result, it is possible for several thunderstorms to affect one location in the course of a few hours. The main threats from thunderstorms are hail, wildland fires, deadly lightning, tornadoes, flash floods, and downburst winds.

Hailstorms

Hail is a form of solid precipitation which consists of balls or irregular lumps of ice, that are individually called hail stones. Hail stones consist mainly of water ice and measure between 0.20" and 6.00" (5 and 150 millimeters) in diameter, with the larger stones coming from severe and dangerous thunderstorms. Hail is possible with most thunderstorms as strong rising air currents in the thundercloud transport moisture laden air well above the freezing level converting super-cooled water vapor into hail stones. The stronger the updraft into the thunderstorm, the longer these initially small hails stones stay suspended in the storm, allowing them to grow in size to the point where they eventually become too heavy for the updraft to keep them aloft, and they fall to the surface.

Table 40: Hail Diameter Chart below (Courtesy NOAA NWS)

HAIL DIAMETER	SIZE DESCRIPTION
1/4"	Pea Size
1/2"	Mothball Size
3/4"	Penny Size
7/8"	Nickel Size
1" (Severe Criteria)	Quarter Size
1 1/4"	Half Dollar Size
1 1/2"	Walnut or Ping Pong Ball Size
1 3/4"	Golf Ball Size
2"	Hen Egg Size
2 1/2"	Tennis Ball Size
2 3/4"	Baseball Size
3"	Teacup Size
4"	Grapefruit Size
4 1/2"	Softball Size

Tornadoes

A tornado is a violent, rotating column of air which is in contact with both the surface of the earth and a thunderstorm cloud. Tornadoes come in many sizes but are typically in the form of a visible condensation funnel, whose narrow end touches the earth and is often encircled by a cloud of debris. Most tornadoes have wind speeds between 65 mph and 110 mph, are approximately 250 feet across, and travel less than a mile before dissipating. Some attain wind speeds of more than 300 mph, stretch more than a mile across, and stay on the ground for dozens of miles. Tornados are measured using the Fujita Scale, which measures tornados according to their intensity and area. The scale is divided into six categories:

- EF0 (Light)
- EF1 (Moderate)
- EF2 (Considerable)
- EF3 (Severe)
- EF4 (Devastating)
- EF5 (Incredible)

Downburst Winds

A downburst wind is created by an area of significantly rain-cooled air that, after hitting ground level, spreads out in all directions producing strong winds. Unlike winds in a tornado, winds in a downburst are directed outwards from the point where it hits land or water. Dry downbursts are associated with thunderstorms with very little rain, while wet downbursts are created by thunderstorms with high amounts of rainfall. Downburst winds are often termed microbursts, macrobursts, or outflow thunderstorm winds. Most downburst winds that impact the County occur as dry downbursts due to the high cloud bases of the associated thunderstorms, which allows for much of the rainfall to evaporate before reaching the ground. They are also usually microbursts compared to macrobursts since the area affected is typically less than 2.5 miles. Macrobursts occur when individual thunderstorm cells organize into a line or cluster, but are less common. Downburst winds are typically 35 to 75 mph, but can exceed over 100 mph in rare cases.

Downburst winds typically damage fences, roofs, weakened structures, trees, and power lines. Downbursts do pose a significant risk to aviation, especially to aircraft taking off and landing due to strong winds that change direction over very short distances. In addition, small aircraft on the ground can incur damage if not secured. Downburst winds do pose a significant risk to new lightning induced wildland fire starts, allowing small fires to grow quickly. During periods of drought, dust storms result from downburst winds and cause visibilities to drop below ½ mile, creating hazardous driving conditions. Downburst winds from thunderstorms are common from late spring through early fall.

Down-slope Windstorms

Down-slope windstorms are horizontal flows of air that blow from areas of high pressure to areas of low pressure. Wind strength depends on the difference between the high- and low-pressure systems and the distance between them. Therefore, a strong pressure gradient results from a large pressure difference over short distance between places and causes strong winds. Strong and/or severe winds often precede or follow frontal activity, including cold fronts, warm fronts, and dry lines. Down-slope windstorms are common during the winter months when winter storms approach the Sierra. Strong winds ahead of a cold front are ducted down to the surface due to mountain waves, enhancing wind speeds that are often stronger than Down-slope windstorms seen in the rest of the United States. Down-slope winds in the lee of the Sierra Nevada Mountains typically produce sustained southwest winds of 30 to 50 mph with gusts to 70 mph. During the strongest down slope windstorms, winds can exceed over 100 mph and last several hours.

Down-slope windstorms and can overturn mobile homes, tear roofs off of houses, down fences, topple trees, snap power lines, shatter windows, and sandblast paint from cars. Other associated hazards include utility outages, arcing power lines, and dust storms.

In addition to strong and/or severe winds caused by large regional frontal systems, locally strong winds caused from the funneling of winds through mountain peaks or drainages do occur. Areas impacted by these local winds are much smaller in scale, although wind speeds can be equally as strong as those caused by large scale weather systems. See the table below for wind speed/damage comparisons.

Table 41: Comparison Between Wind Speeds and Damages (Courtesy: NOAA NWS)

WIND SPEED ESTIMATE	DESCRIPTION
25-31 mph	Large branches in motion; whistling heard in telephone wires
32-38 mph	Whole trees in motion; inconvenience felt walking against the wind
39-54 mph	Twigs break off trees; wind generally impedes progress
55-72 mph	Damage to chimneys and TV antennas; pushes over shallow rooted trees
73-112 mph	Peels surfaces off roofs; windows broken; light mobile homes pushed or overturned; moving cars pushed off road
113-157 mph	Roofs torn off houses; cars lifted off ground

Winter Storms

Winter storms can bring heavy rain, snow, high winds, extreme cold, and freezing rain to the region. In Nevada, winter storms are massive low-pressure weather systems originating in the North Pacific Ocean that sweep across the western states. Winter storms can also plunge southward from Arctic regions and drop heavy amounts of snow and ice. The severity of winter storms is generally minor. However, a heavy accumulation of snow or ice can create hazardous conditions. Additionally, a large winter storm event can also cause exceptionally high rainfall that persists for days, resulting in heavy flooding. Winter storms that are able to tap into subtropical moisture are the ones most likely to lead to flooding due to heavy warm rain. Flooding is exacerbated by warm heavy rains falling on low and mid-elevation snowpack.

6.9.2 History

The National Oceanic and Atmospheric Administration (NOAA) National Centers for Environmental Information (NCEI), formerly the National Climatic Data Center, provides information regarding storm events (www.ncdc.noaa.gov/stormevents). Data for each County is provided in this report. The NCEI will be updating the 30 year climate normals soon, and future updates of this plan should include the updated data.

Storm Events

Table 42 shows storm events that occurred within the Tri-County area from 2012 to April of 2020. The storm events shown resulted in two injuries, one death and $4,792,100 in damage. The largest costs of damage were due to two thunderstorm events which included high winds that knocked down a total of 26 power poles and started a fire. A single flooding event caused approximately $3,000,000 in damage in Humboldt County. Residents of Paradise Valley were inundated on at least two separate occasions as water poured off the Santa Rosa Mountains through the various creeks surrounding the town. Humboldt County reported over 68 rural roads that were damaged by the flooding.

Not all storm events are reported so **Table 42** does not account for all weather events. However, those shown demonstrate that all types of storms occur in the Tri-County area; thunderstorms, high wind, and heavy snow being the most common occurrences since 2012.

Table 42: Past Storm Events in the Tri-County Area (2012-2020) NOAA

	Number of Event by County		
Storm Event	**Humboldt**	**Lander**	**Pershing**
Dust Storm	1	0	0
High Wind	18	3	0
Heavy Snow	11	44	0
Heavy Rain	0	0	4
Thunderstorm	14	12	6
Flood/Flash Flood	5	7	1
Hail	5	2	0
Tornado	1	2	0
Winter Storm	0	5	0

Thunderstorms

Thunderstorms in the Tri-County area occur almost exclusively during the summer. Historically, many rangeland fires have been attributed to lighting from thunderstorms. Cloudbursts associated with thunderstorms have also caused flash floods. Flash flooding has occurred in normally dry washes as well as in creek beds and rivers.

Tornadoes

Tornados have been recorded in Humboldt and Lander Counties. **Table 43** includes these tornadoes as measured according to the Fujita Scale.

Table 43: Tornado History for Tri-County Area

County	Date	Time	Magnitude (F scale)
Humboldt	July 24, 1931	Not recorded	F0
Humboldt	August 14, 1979	13:00	F0
Lander	May 5, 1994	15:30	F1
Humboldt	August 29, 2003	12:40	F0
Humboldt	June 25, 2004	16:15	F0
Humboldt	June 27, 2004	13:15	F0
Humboldt	April 24, 2011	9:55	EF0
Lander	5/21/2014	15:30	EF0
Humboldt	5/11/218	10:05	EF0
Lander	10/3/2018	15:06	EFO

Winter Storms

Table 44 shows the annual precipitation and average snowfall amounts that have occurred in the Tri-County area. Average annual snowfall data is provided by the National Weather Service. Annual precipitation is based on 30 year normal data compiled by NOAA (1981-2010). Climate normals are NCDC's latest three-decade averages of climatological variables, including temperature and precipitation (https://www.ncdc.noaa.gov/cdo-web/datatools/normals).

Table 44: Snowfall and Precipitation in the Tri-County Area (NOAA NCEI)

Humboldt County	Average Annual Snowfall (in.)	Annual Precipitation (in)
Denio	20.6	9.49
KingsRiver Valley	18.0	8.80
Orovada	16.7	10.51
Winnemucca	20.9	8.28
Golconda	8.5	7.36
Lander County	**Average Annual Snowfall (in.)**	**Annual Precipitation (in)**
Austin	68.1	13.1
Battle Mountain	19.96	8.97
Pershing County	**Average Annual Snowfall (in.)**	**Annual Precipitation (in)**
Lovelock	11.6	6.09
Imlay	8.6	8.78

High winds in the Tri-County area are most common during the months of January through April. Wind speeds recorded in the Tri-County area have reached as high as 70 mph with gusts exceeding 80 mph. In the past, the effects of high winds have included dust storms. Most dust storms last about 4 hours and have been known to reduce visibility on local roads including I-80. For example, there was an "apocalyptic" dust storm that created zero visibility and a 27-car pileup on I-80 near Winnemucca on June 10, 2013. It left one dead and dozens injured.

6.9.3 Location, Extent, Probability of Future Events

Thunderstorms that produce hail and downburst winds occur in the Tri-County area every year. An active thunderstorm pattern, resulting from subtropical moisture over the Southwestern U.S. being transported into Nevada, can lead to thunderstorm development. In addition, weak weather systems moving over Nevada after a period of hot weather often leads to dry thunderstorms with strong downburst winds.

Hailstorms are relatively infrequent and occur in the Tri-County during the late spring through early fall months, often accompanying thunderstorms. Hail size generally ranges between pea and marble size, but can get larger than golf balls during the strongest storms that impact the area. A Severe Thunderstorm for hail, as defined by the National Weather Service, is a thunderstorm capable of producing hail stones greater than 1" in diameter, which usually occurs once every decade.

Tornadoes are rare in the Tri-County area. Historically, tornadoes in the region are categorized as EF0 (65-85 mph) or EF1 (86-110 mph) on the Enhanced Fujita scale. Sufficient moisture, an unstable atmosphere, and wind shear are required for tornado development in the Tri-Counties. The frequency of tornado occurrence is 1 in 21 years with most being categorized as EF0 or EF1.

High Wind events are common in the Tri-County area, occurring every year. The winds are the result of two weather events known as the "Nevada Low" and the North American Monsoon (also known as the Southwest Monsoon Flow). The Nevada Low is a local name given to a low or deep trough that develops over California and Nevada between February and April in advance of an associated cold front moving down from the north. A well-developed Nevada Low system can sustain 17-23 mph winds with 34-46 mph gusts through the area. However, wind speeds of nearly 70 mph have been recorded. The Southwest Monsoon Flow can impact areas in Nevada between June and September. Moisture is transported from the Pacific Ocean, the Gulf of California and the Gulf of Mexico into the Southwest U.S. including portions of Nevada. There can be considerable variability in the day to day precipitation, separated by drier, less active tropical system “breaks".

Winter storms occur every year in the Tri-County area. More severe storms can deposit 6 to 10 inches of snow during a 24 hour period and can make travel treacherous. Low temperatures can also create icy driving conditions. Heavy snowfall is generally associated with a strong low-pressure system dropping out of the Gulf of Alaska with the higher elevations receiving the greatest amount of snow. Warm temperatures with rain during winter months can cause wet-mantle flooding, melting snowpack, and causing an increase in stream flows.

6.10 WILDFIRE

Planning Significance	Humboldt- High, Pershing- Moderate, Lander-High

Much of the information contained in this section was kindly provided courtesy of the National Weather Service regional office.

6.10.1 Description

A wildfire is an uncontrolled fire spreading through vegetative fuels, exposing and possibly consuming structures. They can begin unnoticed and spread quickly depending on fuel moisture, low relative humidity, and strong winds. For the Tri-County area, the majority of wildfires are due to lightning, with a lesser percentage being started by humans. Wildfires can be categorized into four types:

1) Wildland fires occur mainly in areas under federal control, such as national forests and federally managed lands, and are fueled primarily by natural vegetation. Generally, development in these areas is nonexistent, except for roads, railroads, power lines, and similar features.
2) Interface or intermix fires occur in areas where both vegetation and structures provide fuel. These are also referred to as Wildland/Urban Interface (WUI) fires.
3) Rapidly moving wildfires are likely within certain weather regimes (e.g., high temperatures, low humidity, and high winds) and can burn with such intensity that fire suppression is virtually impossible. These events typically burn until the conditions change or the fuel is exhausted. A recent event is the Martin Fire, which began near Martin Creek. Several days of very strong winds, low humidity, and an abundance of dry fine fuels caused the rapid eastward progression of the fire (sometimes spreading as fast as 12 mph).
4) Prescribed fires are intentionally set, controlled and are allowed to burn for beneficial purposes that are listed in the prescription.

The following three factors contribute significantly to wildland fire behavior and can be used to identify wildland fire hazard areas.

1) *Topography:* Although it generally remains unchanged, unlike fuel or weather, topography can either aid or hinder wildfire progression. The most important topographical factor is slope.
2) *Fuel:* Wildfire spread based on the type and quantity of available flammable material, referred to as the fuel load. The basic characteristics of fuel include size and shape, arrangement and moisture content.
3) *Weather:* The most variable factor affecting wildfire behavior is weather. Important weather variables are temperature, humidity, wind, and lightning with limited or no accompanying

precipitation. Weather events ranging in scale from localized thunderstorms to large weather systems can have major effects on wildfire occurrence and behavior. High temperatures in the 90s combined with low humidity, can be expected from mid-June to September. This kind of weather can lead to extreme wildfire activity, especially if accompanied by dry thunderstorms and strong winds. By contrast, cooling temperatures and higher humidity often signals reduced wildfire occurrence and easier containment. Wind has probably the largest impact on a wildfire's behavior, and is also the most unpredictable. Winds supply the fire with additional oxygen, further drying out potential fuel, and pushing fire across the land at a quicker pace.

The frequency and severity of wildfires is also dependent upon other hazards, such as lightning, drought, and infestations (e.g., Piñon Ips bark beetle). In Nevada, these hazards combine with the three other wildfire contributors noted above (topography, fuel, weather) to present an ongoing and significant hazard across much of Nevada.

The indirect effects of wildfires can also be catastrophic. In addition to stripping the land of vegetation and destroying forest resources, large, intense fires can harm the soil, waterways and the land itself. Soil exposed to intense heat may lose its capability to absorb moisture. This can have a significant impact on rangeland grazing and the economy. Finally, wildfires can cause local soils to become more hydrophobic, thus increasing the danger for flash flooding and debris flows.

6.10.2 History

The figures below show the wildfire history from 2000 to 2018 in Pershing Humboldt and Lander County (Figures provided courtesy of: **https://www.arcgis.com/home/webmap/viewer.html?layers=9c407d9f46624e98aa4fca1520a3a8f7).**

Table 45 shows the largest wildfires in the Tri-County area within the last 20 years. The table was provided courtesy of the National Weather Service, data for the table was retrieved from https://www.nifc.gov/fireInfo/fireInfo_stats_lgFires.html.

Humboldt County has the highest incidence of wildland fire in Nevada (BLM Nevada State Office 2002). In fact, between 1980 and 2019, Humboldt County fires have consumed 14,833,291 acres which is more than eight times the acreage consumed in fires in Pershing County and more than three times the acreage consumed in Lander County. All three Counties suffered wildfire outbreaks from 2016 to 2018, following years of drought.

A moderate number of wildland fires occurred between 1980 and 2003 in Lander County, with some fires of extensive acreage during the last decade. In 2017 Lander County had the greatest wildfire since these records began being kept in 1980, which burned 2,258,117 acres.

Pershing County experienced large wildland fires in the late 1990's and during the last decade. The severe nature of previous fires in Pershing County has heightened the awareness of some communities to become more proactive in their fire hazard reduction efforts.

Table 45: Last 20 Years of Large Wildfire Acreages (Greater Than 100,000 Acres) Tri-Counties

Year	Acres	Larger fires
		Humboldt County Fires
1999	123,480	Jungo Complex
1999	171,600	Corridor Complex
2006	238,458	Winters Fire
2012	460,850	Holloway Fire
2018	435,569	Martin
		Lander County Fires
1999	156,958	Battle Mountain Complex
2007	136,778	Antelope Complex
2011	110,827	Indian Creek
2017	218,380	Roosters Comb
		Pershing County Fires
1999	123,480	Dun Glen Complex (6 fires)

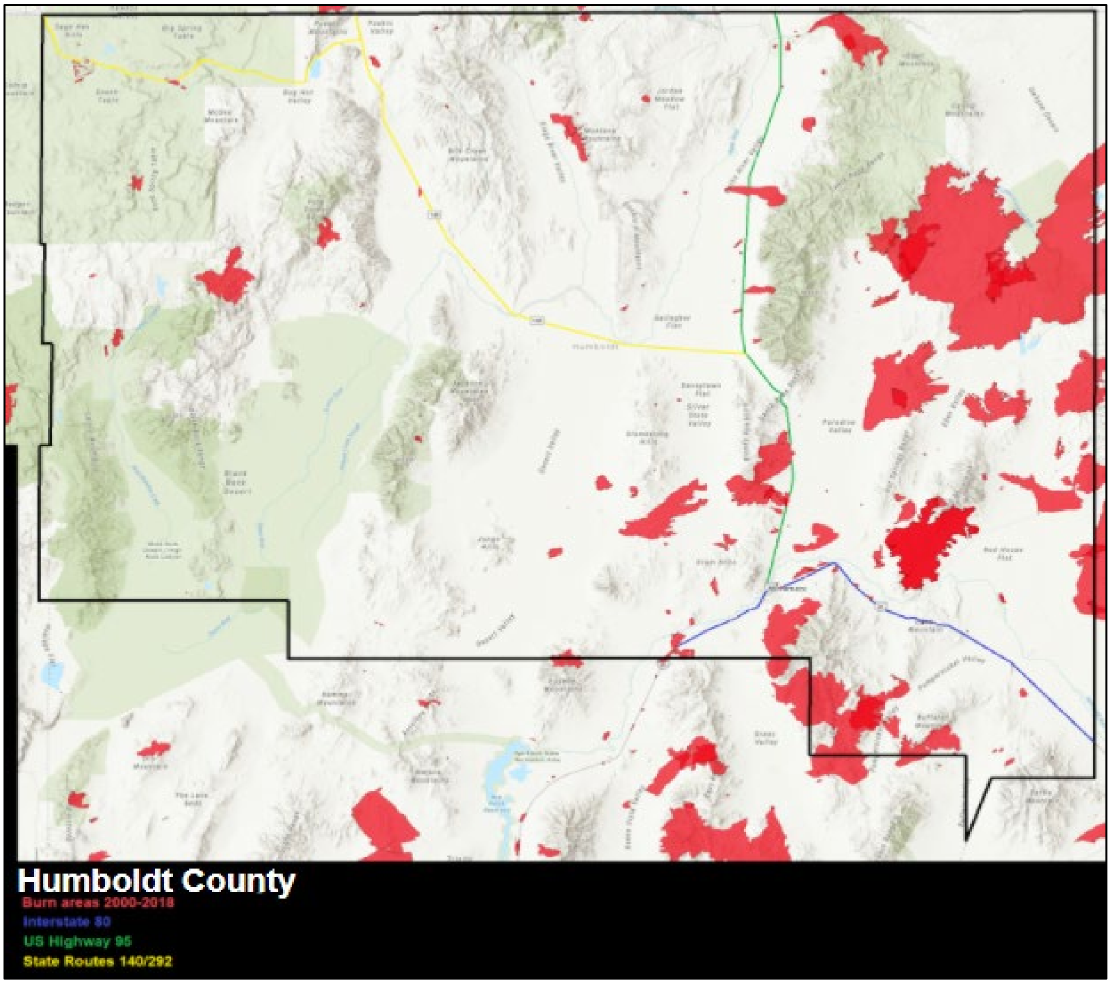


Figure 30: Wildfires that Occurred in Humboldt County from 2000-2018

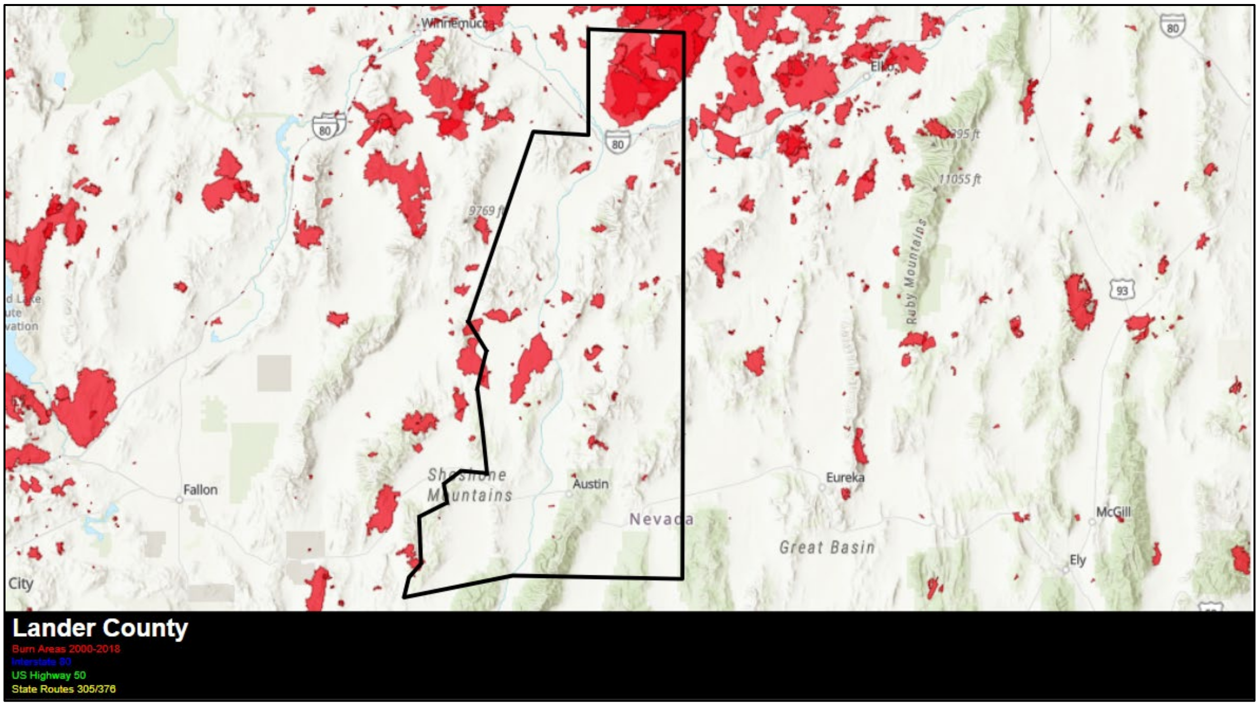


Figure 31: Wildfires that Occurred in Lander County from 2000-2018

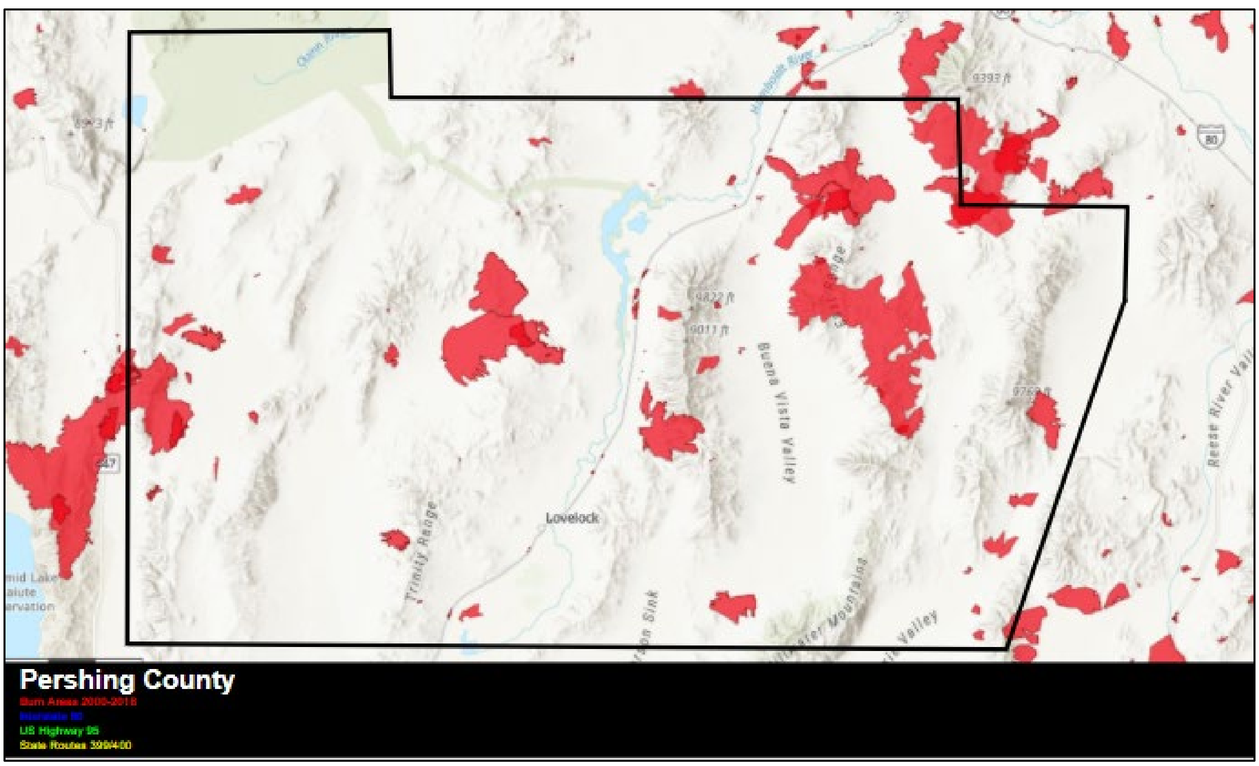


Figure 32: Wildfires that Occurred in Pershing County from 2000-2018

Table 46 includes the fire history in the Tri-County area from 1980 to 2019. In July 2012, the US Department of Agriculture listed all counties in Nevada under drought emergency declaration. The Governor accepted the declaration and instructed the Chief of Nevada Division of Emergency Management (NDEM) to activate the State Emergency Operations Center in accordance with the Nevada Drought Plan.

There have been major wildfires in the Tri Counties within the last decade. In 2012, Humboldt County had a reported 13 wildfires burning a total of 5,548,048 acres, Lander County reported 10 wildfires burning a total of 54,901 acres. In 2017, Humboldt County had 37 wildfires which burned a total of 89,923 acres. Lander County reported 24 fires in 2017 which burned 2,258,117 acres. More acres burned in Lander County in 2017 than all other years combined since 1980. Pershing County also saw a record number of wildfires in 2017 with 51 wildfires reportedly burning a total of 859,820 acres, which is also more acreage burned than all other years combined since 1980.

Table 46: Summary of Fire History Data for the Tri-County Area 1980-2019

Year	HUMBOLDT		LANDER		PERSHING	
	Number of Fires	Total Reported Fire Acreage	Number of Fires	Total Reported Fire Acreage	Number of Fires	Total Reported Fire Acreage
1980	27	973	15	1,136	NA	2,531
1981	14	1,983	18	121	NA	853
1982	11	3,230	22	84	NA	2,423
1983	22	5,441	11	4	NA	261
1984	44	73,170	35	2,516	NA	11,287
1985	65	383,342	41	35,622	5	69,170
1986	42	43,775	30	6,361	6	8,118
1987	87	34,269	11	7	1	16,917
1988	48	22,007	18	156	NA	4,962
1989	27	9,372	20	1,901	1	4,042
1990	44	4,411	18	114	NA	1,380
1991	44	11,778	20	823	1	419
1992	47	11,956	16	691	NA	84
1993	38	2,777	19	1,248	NA	2
1994	44	32,152	11	123	NA	1,030
1995	68	19,642	8	23,921	3	15,934
1996	107	300,599	33	45,884	5	10,020
1997	56	17,372	20	42	NA	830
1998	42	5,272	11	7,834	8	22,029

Year	HUMBOLDT		LANDER		PERSHING	
	Number of Fires	Total Reported Fire Acreage	Number of Fires	Total Reported Fire Acreage	Number of Fires	Total Reported Fire Acreage
1999	92	288,884	47	229,332	73	364,721
2000	40	531,033	26	12,036	21	54,046
2001	62	507,745	34	85,923	20	148,744
2002	6	11,434	14	275	2	1,182
2003	15	1,453	24	351	NA	3
2004	5	432	N/A	N/A	NA	NA
2005	19	113,630	2	33	NA	NA
2006	18	274,341	7	23,073	4	25,655
2007	7	48,550	6	109,522	6	80,279
2008	2	1,145	2	1,493	1	132
2009	0	0	1	322	1	478
2010	2	1,145	0	0	3	5,726
2011	6	97,887	2	3,041	2	1,752
2012	13	5,548,048	10	54,901	1	7,393
2013	N/A	N/A	2	3,247	N/A	N/A
2014	1	2,439	N/A	N/A	N/A	N/A
2015	6	353	3	4,930	2	195
2016	6	367,500	14	779,354	13	77,548
2017	37	89,923	24	2,258,117	51	859,820
2018	77	6,510,011	26	365,704	35	8,436
2019	N/A	N/A	1	266	N/A	N/A
Totals		14,833,291		4,014,657		1,696,842

Source: Fire ignition and base acreage data provided by the National Interagency Fire Center, Boise, Idaho. Additional fire history information provided by BLM Nevada State Office and USFS Supervisor's Office.

Figure 33 is a graphic representation of the acreage burned by wildfires in each County since 1980. Figures in Appendix B show the location of fires between 1980 and 2019.

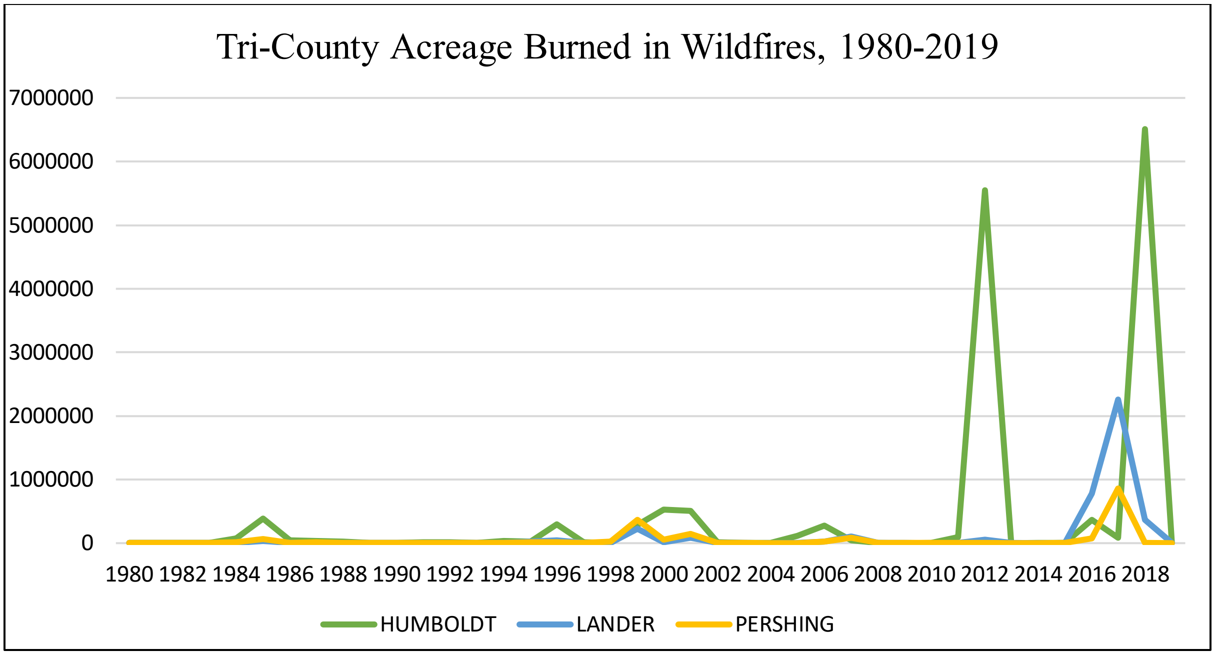


Figure 33: Tri County Acreage Burned in Wildfire 1980-2019 (NIF, BLM, USFS)

6.10.3 Location, Extent, Probability of Future Events

More acres burned in Nevada during the 1990s than in the previous 40 years combined. Since 2012 the number and total acreages of fires has skyrocketed, particularly in Humboldt County which continues to account for a high percentage of wildfires in the State.

During 2004, assessment teams from Resource Concepts, Inc. (RCI) visited communities within the Tri-County area. Selected communities were evaluated for fire risk using criteria that included community design, existing building materials, utilities, defensible space, fire protection, and fire behavior. The assessment results are included in Table 47, and should be updated with future plan updates.

Table 47: Tri-County Wildland Fire Risk/Hazard Ratings (2005 RCI)

	Community	Hazard Rating
HUMBOLDT	Denio	Moderate
	Denio Junction	Low
	Golconda	Moderate
	Grass Valley	Moderate
	McDermitt	Low
	Orovada	Low
	Paradise Ranchos	Moderate
	Paradise Valley	Moderate
	Valmy	Moderate
	Winnemucca	Moderate
	Fort McDermitt	High
LANDE	Austin	High
	Battle Mountain	Low
	Battle Mountain Colony	Low
	Gilman Springs	Moderate

	Hilltop	Low
	Kingston	High
PERSHING	Grass Valley	Moderate
	Humboldt	High
	Imlay	Moderate
	Lovelock	Moderate
	Mill City	Moderate
	Oreana	Moderate
	Rye Patch	Moderate
	Unionville	Extreme

On average, risk/hazard ratings for the communities in the Tri-County area are in the moderate range. However, wildland fires across the U.S. during the 2017-2019 fire seasons have proven that communities in environments susceptible to wildland fire are always at risk and potential for structure damage can be high. Additionally, historical data shows an increase in the number of wildland fires and a general trend toward higher acreage burned as shown in **Table 47**. See Appendix B for maps of areas showing where wildland fire potential is high.

Extensive drought in the western united states is associated with higher wildfire risks and may intensify with increasing temperatures and more variable precipitation as climate changes (Crockett and Westerling, 2018).

6.11 VOLCANIC ACTIVITY

Planning Significance	Humboldt- Low, Pershing- Low, Lander-Low

6.11.1 Description

A volcano is an opening, or rupture, in a planet's surface or crust, which allows hot, molten rock, ash and gases to escape from below the surface. Volcanic activity involving the extrusion of rock tends to form mountains or features like mountains over a period of time.

Volcanoes are generally found where tectonic plates pull apart or come together. By contrast, volcanoes are usually not created where two tectonic plates slide past one another. Volcanoes can also form where there is stretching and thinning of the earth's crust (called "non-hotspot intra plate volcanism"), such as in the Rio Grande Rift in North America.

6.11.2 History

There is a history of ancient volcanic action in the State of Nevada; however, the risk is not considered significant within the State's geographic area. Volcanic activity surrounding the State of Nevada could potentially cause some ash fall over portions of the State. However, this is predicted to cause little or no damage or significant disruptions. There is no immediate indication of renewed volcanic activity in State of Nevada. (U.S. Geological Survey)

6.11.3 Location, Extent, and Probability of Future Events

Volcanic activity that produces ash could potentially impact the Tri-County area for a short period of time. Volcanic ash and coarser debris also can induce respiratory problems, cause hazardous driving conditions, interfere with communications, short out power lines, contaminate feed for livestock, and damage electronic or motorized equipment. Once dry, volcanic ash deposits can be remobilized by wind and remain troublesome long after an eruption ceases. The ash could also temporarily contaminate surface water sources.

Despite the potential hazards associated with volcanic activity, the probability of an event occurring is low. The following Forum Report, on volcanic hazard risks in Nevada, was made available to the Hazard Mitigation Planning Committee from the Nevada Bureau of Mines and Geology.

Volcanic Hazards

Volcanoes most likely to affect the Tri-County area include Mount Lassen, Mount Shasta, Medicine Lake and the Long Valley Caldera in California. Volcanoes in the Cascade Mountains in Oregon could also have a minor effect.

The USGS volcano threat ranking system includes five levels: very high, high, moderate, low, very low. Threat rankings are based on a number of hazard and exposure factors common to most volcanoes. Mount Lassen, Mount Shasta, the Long Valley Caldera and several volcanoes in the Cascade Range are considered "very high" threat volcanoes. The Medicine Lake Volcano is considered a "high" threat volcano.

The main effect on Nevada from an eruption of any of these volcanoes would be the deposition of ash. The primary hazard associated with the ash would be damage to flying aircraft. However, ash from eruptions in California or Oregon is not likely to cause long-term problems in Nevada, because the ash deposits are likely to be thin, typically only a few inches thick at most.

A massive eruption from the Long Valley Caldera near Mammoth Lakes, California over 700,000 years ago devastated a considerable area in Owens Valley when thick, hot flows of ash were deposited as far south as Bishop. Air-fall ash from these eruptions did collect as thick piles of ash in parts of Nevada, and some of the ash may have been hot enough or thick enough to devastate the landscape locally. Today, scientists would expect to see strong indications from seismographs before another eruption of this magnitude. The USGS has an ongoing monitoring program and will issue warnings prior to any subsurface changes that could precede a major eruption." **Figure 34: Volcanoes that Could Potentially Affect the Tri-County Area** shows the locations of active volcanoes in the western U.S. Note the location of volcanoes in northern California (Medicine Lake, Mount Shasta, and Lassen Peak (circled)). Volcanoes in this area are those most likely to produce ash that could affect the Tri-County area.

Figure 34: Volcanoes that Could Potentially Affect the Tri-County Area

Eruptions within Nevada are unlikely in the near future. Currently, Steamboat Hot Springs is the only volcano in Nevada that is included on the USGS threat ranking list (rank: "Moderate"). However, volcanic activity in this area has not occurred for some time. There are two volcanic fields located within the Tri-County area that are not included in threat ranking list: Buffalo Valley and the Sheldon Antelope Range. The location of both of these fields is shown in **Figure 35**.

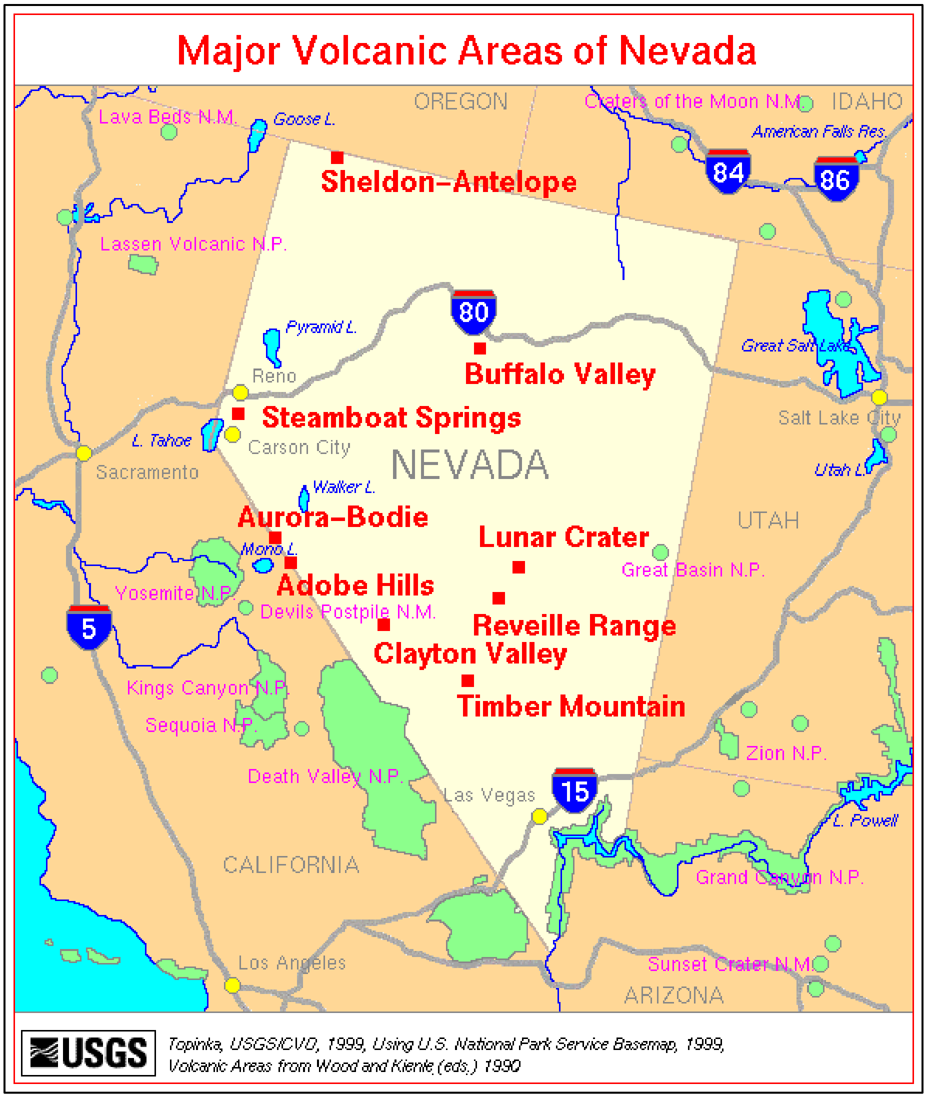


Figure 35: Volcanic Fields of Nevada

The lava flows in the Charles Sheldon National Antelope Range straddle the Nevada-Oregon border in an area relatively remote from other young volcanism. The flows (20-35 kilometers long) issued from small shield volcanoes. The Range is crossed by Highways 140, 34A, and 8A.

The Buffalo Valley volcanic field is located along the eastern margin of Buffalo Valley just north of the Fish Creek Mountains caldera (around 2.4 million years old). The field is comprised of 14 vents and associated flows which form a northeast-trending zone, approximately 5 kilometers wide and 15 kilometers long, along the northwest flank and piedmont of the Fish Creek Mountains. Both cones and flows are relatively small. Most of the vents are surmounted by breached cinder cones of highly variable size and shape. Several of these cones occur as contiguous pairs or triplets with north to northeast alignments that generally parallel the overall trend of the field. Cone heights range from approximately 50 to 100 meters and cone diameters from 150 to 500 meters. Flow areas are each less than 0.5 square kilometers, and the combined area of all the cones and flows is approximately 10 square kilometers. The Buffalo Valley volcanic field is situated along the southeast margin of Buffalo Valley in north-central Nevada. The field is located approximately 235 kilometers east-northeast of Reno, Nevada, and about 5 kilometers southwest of Battle Mountain, Nevada.

7.0 ASSET INVENTORY

Assets within each community that may be affected by hazard events include population, residential and non-residential buildings, and critical facilities and infrastructure. Assets and insured values throughout the Tri-County area are identified and discussed in detail in the sections below. Figures showing the location of critical assets are included in the hazard maps in Appendix B.

7.1 POPULATION AND BUILDING STOCK

DMA 2000 Recommendations: Risk Assessment, Assessing Vulnerability, Identifying Structures
Assessing Vulnerability: Identifying Structures
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.
Element

- Does the new or updated plan describe vulnerability in terms of the types and numbers of existing buildings, infrastructure, and critical facilities located in the identified hazard areas?
- Does the new or updated plan describe vulnerability in terms of the types and numbers of future buildings, infrastructure, and critical facilities located in the identified hazard areas?

Source: FEMA 2008.

Population data, shown in **Table 48**, for the Counties and Cities was obtained from the U.S. Census and American Community Survey (ACS) data. Estimated numbers and replacement values for residential and non-residential buildings, as shown in **Table 48**, were derived from information obtained from the County Assessor's office(s) and were verified by parcel data. The assessor's office(s) provided the assessed value for the structures. In Nevada, the assessed value is equal to 35 percent of the taxable value. According to the Nevada Department of Taxation, the taxable value equals the sum of the full cash value of the land plus the replacement cost new, less depreciation, of the improvement. (NRS 361.227) Full cash value is defined as "the most probable price which property would bring in a competitive and open market under all conditions requisite for a fair sale." (NRS 361.025). (Nevada Department of Taxation, *Nevada Property Tax: Elements and Application*, *Updated March 12, 2019*).

Because of extreme market variations caused by fluctuating economic conditions and changing population growth in the Tri-County area, it is difficult to estimate the cost of structures lost to hazards. For this reason, although it is not precise, using the taxable value may be the most consistent way to estimate the value of the damaged structures over time. For this reason, it is the method used in this plan. Because no assessor data could be obtained for Lander County, HAZUS values were used throughout this report for Lander County.

The residential buildings considered in this analysis include single-family dwellings, mobile homes, multi-family dwellings, temporary lodgings, and nursing homes. Nonresidential buildings were also analyzed and include commercial, industrial, agricultural, government, educational, and religious centers. The HAZUS-MH 2014 run for earthquakes by the Nevada Bureau of Mines & Geology, UNR, was reviewed. New earthquake and flood HAZUS-MH events were run for all three counties.

The HAZUS-MH software has a data limitation whereby the software identifies nonresidential buildings by square footage resulting in a failure to count some nonresidential buildings. Additionally, the County's Assessor Office supplied residential and non-residential costs which were lower than the HAZUS-MH Hazard Data databases. Therefore, Assessor's values were used as a representation of the County's actual property tax base. In cases where both Assessor data and HAZUS-MH estimates were available, both values are shown. Un-reinforced masonry (URM) building information was obtained from the Nevada Insurance Pool and Advanced Data Systems, Inc. who have compiled a statewide inventory. This data has not been updated since the previous report update.

Although the building count or value may not be precise, whether residential or nonresidential, this analysis meets the intention of DMA 2000 by providing County and City residents with an accurate visual representation of their community's risk by hazard. This data is the most complete dataset available at the time and will be updated in a future version of the HMP.

Table 48: Estimated Population and Building Inventory for Tri County Area

		Residential[3]		Non-Residential[3]	
Entity	**Population[1]**	**Total No. of Buildings**	**Total Value of all Buildings**	**Total No. of Buildings**	**Total Value of all Buildings**
Humboldt Co.	16,904	7,518	$1,090,000,000 (HAZUS) $611,208,580 (Taxable)	10,702	$435,000,000 (HAZUS) $657,705,904 (Taxable)
Lander Co.[2]	5,746	2,500	$406,560,000	188	$121,440,000
Pershing Co.	6,611	2,268	$389,825,000 (HAZUS) $161,399,424 (Taxable)	4,357	$113,175,000 (HAZUS) $187,420,244 (Taxable)

[1]2018 American Community Survey Estimates
[2] Lander County Building counts and values from HAZUS-MH 4.2.

[3] Humboldt and Pershing County building counts and taxable value from Assessor's data.

7.2 CRITICAL FACILITIES AND INFRASTRUCTURE

A critical facility is defined as a public or private facility that provides essential products and services to the general public, such as preserving the quality of life in the County and City and fulfilling important public safety, emergency response, and disaster recovery functions. Critical Facilities in the Tri-Counties are identified in **Table 49**.

Critical infrastructure is defined as infrastructure that is essential to preserve the quality of life and safety in the County. Existing County and City roads were not identified as critical to evacuation or response. Critical infrastructure for the Tri-Counties is identified in **Table 49**.

The resource value information in **Table 49** was derived from the assessed values of structures provided by the Counties and estimated infrastructure values found in the HAZUS-MH Earthquake Event Reports printed in May or June 2020 for each County.

Table 49: Tri-County Critical Facilities and Infrastructure

	Category	Type	Number	Estimated Value of Resource
Humboldt Co.	Critical Facilities	Sheriff Stations/Jail	5	$5,396,893
		Fire Stations	8	$1,577,818
		EOC and County Admin.	1	$920,886
		Public Primary and Secondary Schools	16	$53,276,826
		Hospital/Urgent Care/Ambulance	1	$31,869,369
		Communication Centers	3	$128,640
	Infrastructure	Federal and State Highways	391 (miles)	$3.8 billion
		Bridges (number from HAZUS)	53	$141.6 million
		Airport Facilities	4	$107 million
		Utilities (Water, Wastewater, Gas, Electricity)	6	$2.4 billion
Lander Co.	Critical Facilities (HAZUS Values)	Sheriff Stations/Jail	2	$5,313,407
		Fire Stations	4	$10,626,814
		EOC and County Admin.	1	$2,656,703
		Public Primary and Secondary Schools	8	$97,454,886
		Hospital/Urgent Care/Ambulance	1	$904,782
		Communication Centers	0	0
	Infrastructure	Federal and State Highways	425 (miles)	$4.2 billion
		Bridges	21	$25 million
		Airport Facilities	3	$302 million
		Utilities (Water, Wastewater, Gas, Electricity)	6	$1.7 billion
Pershing Co.	Critical Facilities	Sheriff Stations/Jail	3	$838,943 (Taxable)
		Fire Stations	4	$1,133,794 (Taxable)
		EOC and County Admin.	2	$1,025,126 (Taxable)
		Public Primary and Secondary Schools	5	$52,444,197 (Taxable)
		Hospital/Urgent Care/Ambulance	1	$4,911,680 (HAZUS) $1,502,283 (Taxable)
		Communication Centers	N/A	n/a
	Infrastructure	Federal and State Highways	266 (miles)	$2.85 billion
		Bridges	52	$186 million
		Airport Facilities	3	$77 million
		Utilities (Water, Wastewater, Gas, Electricity)	7	$849 million

Sources: FEMA HAZUS-MH 4.2; Humboldt and Pershing County Assessors

8.0 VULNERABILITY ASSESSMENT

A vulnerability assessment predicts the extent of exposure that may result from a hazard event of a certain intensity in a given area. The analysis provides quantitative data that may be used to identify and prioritize potential mitigation measures by allowing communities to focus attention on areas with the greatest risk of damage.

DMA 2000 Recommendations: Risk Assessment, Assessing Vulnerability, Estimating Potential Losses Assessing Vulnerability: Estimating Potential Losses Requirement §201.6(c)(2)(ii)(B): [The plan should describe vulnerability in terms of an] estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(i)(A) of this section and a description of the methodology used to prepare the estimate. Element Does the new or updated plan estimate potential dollar losses to vulnerable structures? Does the new or updated plan reflect changes in development in loss estimates? Does the new or updated plan describe the methodology used to prepare the estimate? Source: FEMA 2008.

8.1 METHODOLOGY

A conservative exposure-level analysis was conducted to assess the risks of the identified hazards. Hazard areas were determined using information provided by the U.S. Seasonal Drought Monitor, U.S. Geological Survey, HAZUS-MH, and the Oregon Department of Forestry. This analysis is a simplified assessment of the potential effects of hazards on asset values without consideration of probability or level of damage.

Using Geographic Information Systems (GIS), the building footprints of critical facilities were compared to locations where hazards are likely to occur. If any portion of the critical facility fell within a hazard area, it was included in the count of impacted buildings. Using census block level information, a spatial proportion was used to determine the percentage of the population and residential and nonresidential structures located where hazards are likely to occur. Census blocks that are completely within the boundary of the hazard area were determined to be vulnerable and were totaled by count. A spatial proportion was also used to determine the amount of linear assets, such as highways and pipelines, within a hazard area. The exposure analysis for linear assets was measured in miles. For drought and epidemic/pandemic, population was the only asset analyzed, as drought mainly affects people and agricultural lands, and epidemic mainly affects people and the economy.

Replacement values for insurance coverage were developed for physical assets. These values were obtained from the County Assessor Offices, HAZUS-MH 4.2 General Building Stock database, and HAZUS-MH 4.2 Event results. For facilities that did not have specific values per building in a multi-building scenario (e.g., schools), the buildings were grouped together and assigned one value. For each physical asset located within a hazard area, exposure was calculated by assuming the worst-case scenario (that is, the asset would be completely destroyed and would have to be replaced). Finally, the aggregate exposure, in terms of replacement value or insurance coverage, for each category of structure or facility was calculated. A similar analysis was used to evaluate the proportion of the population at risk. However, the analysis simply represents the number of people at risk; no estimate of the number of potential injuries or deaths was prepared except for earthquake (HAZUS-MH 4.2).

8.1.1 Data Limitations and Future Development

8.1.1.1 Data limitations

The vulnerability estimates provided herein use the best data currently available, and the methodologies applied result in an approximation of risk. These estimates may be used to understand relative risk from hazards and potential losses. However, uncertainties are inherent in any loss estimation methodology, arising in part from incomplete scientific knowledge concerning hazards and their effects on the built environment, as well as approximations and simplifications that are necessary for a comprehensive analysis.

The resulting analysis was compiled to the highest degree possible with the hardware, software and data availability limitations discovered during plan preparation. HAZUS was able to determine the population and critical facilities within a given hazard area; from there a limited assessment was derived. For hazards where structures would not usually be affected (epidemic, infestation, and volcanic eruptions), the hazard was not included in the table but was referenced in the footnotes.

When assessor data could not be obtained, resource values were used from the HAZUS-MH 4.2 Building Stock database. The datasets for this data are aggregated at the census block level, primarily from data from 2000-2001, and specific modifiers applied to approximate updated values. Values may vary from assessor data when direct comparison data is available. This introduces a measure of uncertainty in areas where assessor data cannot be obtained.

HAZUS-MH 4.2 has a known limitation in rural areas where "The distribution pipelines data for potable water, waste water and natural gas, which is aggregated at the census tract level, was developed based on the assumption that the number of distribution lines is correlated to the number of local streets. This approximation is considered fairly accurate in urban areas, but less so in rural areas because of the use of onsite components such as water wells, septic tanks and propane gas tanks. This data was updated using the 2010 Census." (Summary of Databases in HAZUS-MH 4.2)

It is also important to note that the quantitative vulnerability assessment results are limited to the hazard exposure of people, buildings, and critical facilities and infrastructure. It was beyond the scope of this HMP to develop a more detailed or comprehensive assessment of risk (including annualized losses, people injured or killed, shelter requirements, loss of facility/system function, and economic losses). These impacts may be addressed with future updates of the HMP.

8.1.1.2 Future Development and Trends

Humboldt, Lander, and Pershing Counties have historically low growth. Between 2000 and 2013 Lander and Pershing experienced an average negative population growth while Humboldt County had an average positive growth rate of only 0.06% (Nevada State Demographer). The State Demographer also estimated in 2019 that Lander and Pershing Counties would continue to experience negative growth through 2032.

Although there is a substantial amount of land in the Tri-County area, the economic growth is expected to be stable in these counties. There are a number of renewable energy projects, in particular, geothermal production, that are currently in various stages of implementation. Although a significant number of people can be employed during construction of a renewable energy plant, permanent positions created are relatively few. All development will incorporate existing or future building codes and regulations that include mitigation measures and will not pose a significant vulnerability.

Population growth for the State is down, along with high unemployment rates for the State which affect all Counties. The population decline and economic issues for the State of Nevada are having enormous impacts on residential and non-residential growth. For the purposes of this plan significant growth over the next five years is not expected and growth from 2019 to 2038 in the Tri-Counites is anticipated to be flat or negative. During the Plan maintenance activities this should be reviewed and during the next Plan update, growth can be revisited.

The 2019 Nevada State Demographers report provides information on probable mining projects for Elko, Eureka, Humboldt, Lander, Pershing and White Pine Counties. The employment from these projects appeared to be accounted for by the assumption of mining employment would not be falling below historic averages. The exception was Humboldt County where 350 jobs were added in above the baseline forecast to account for potential employment from the Barrick, Hycroft and Lithium Nevada projects. Employment was also added for the Cyanco facility and an expansion of the Humboldt General Hospital. (NV Demographer 2019)

It is important to note that during the 2020 update of this report the world experienced a worldwide Pandemic of coronavirus. The resulting economic downturn showed Nevada to be the hardest hit state in the nation for unemployment. (Bureau of Labor Statistics). Long term economic impacts due to COVID-19 should be addressed in future plan updates.

The vulnerability assessment includes hazards ranked by the Planning Committees as “Moderate”, “High” or “Very High” priority including Drought (Moderate), Earthquakes (High/Moderate), Flood (Moderate), Wildfire (High/Moderate) HAZMAT events (High/Moderate) and Epidemic/Pandemic (Moderate). Data for the analysis included FEMA HAZUS runs, County Assessor’s information and other sources listed in each of the individual hazard discussions. The assessment results were affected by the software and data availability limitations. The results of the assessment are summarized in **Table 50** and in the discussion in this section.

Appendix B includes maps showing areas affected by the various hazards. These maps were used to determine effects on population and structures.

Table 50: Potential Hazard Vulnerability Assessment – Population and Buildings

		AFFECTED STRUCTURES			
		Residential		Non-Residential	
Hazard[1]	**Population [2]**	**Number[3,4]**	**Value[3,4]**	**Number[3,4]**	**Value[3,4]**
COUNTY TOTALS					
Humboldt Co.	16,904	7,518	$611,208,580	10,702	$657,705,904
Lander Co.	5,746	2,500	$406,560,000	188	$121,400,000
Pershing Co.	6,611	2,268	$161,399,424	4,357	$187,420,244
DROUGHT					
Humboldt Co.	16,904	N/A	N/A	N/A	N/A
Lander Co.	5,746	N/A	N/A	N/A	N/A
Pershing Co.	6,611	N/A	N/A	N/A	N/A
EARTHQUAKE, MAGNITUDE 6.0 [5,6]					
Humboldt Co.	2,357	886	$43,000,000	122	$38,681,000
Lander Co.	22	8	$791,000	N/A	$31,200
Pershing Co.	472	195	$3,980,000	12	$2,220,000
FLOOD – 100 YEAR FLOOD ZONE[7]					
Humboldt Co.	1,011	380	$21,980,492	497	$33,742,743
Lander Co.	115	42	$5,170,000	1	$1,680,000
Pershing Co.	549	227	$23,016,014	679	$23,866,491
FLOOD – 500 YEAR FLOOD ZONE[7]					
Humboldt Co.	1,112	418	$23,350,423	545	$37,219,376
Lander Co.	207	76	$12,810,000	N/A	$3,730,000
Pershing Co.	806	333	$34,144,502	908	$34,653,348
HAZMAT EVENT – 1 MILE RADIUS AROUND HAZARDOUS FACILITIES					
Humboldt Co.	3	1	$52,161	43	$4,339,090
Lander Co.	0	0	$0	0	$0
Pershing Co.	2	1	$72,077	1	$72,077
HAZMAT EVENT – 1 MILE BUFFER FOR HIGHWAY CORRIDOR					
Humboldt Co.	16,572	6,230	$451,662,300	8,113	$554,535,130
Lander Co.	0	N/A	N/A	N/A	$432,767,944
Pershing Co.	3,807	1,573	$109,370,229	2,860	$135,324,893
HAZMAT EVENT – 1 MILE BUFFER FOR RAIL CORRIDOR					
Humboldt Co.	12,983	4,881	$319,738,836	5,382	$445,038,795
Lander Co.	5,775	N/A	N/A	N/A	$482,243,077
Pershing Co.	3,274	1,353	$87,560,697	2,314	$117,650,334
SEVERE WEATHER – HIGH = 100% OF POPULATION, 0% OF BUILDINGS					
Humboldt Co.	16,904	0	0	0	0
Lander Co.	5,746	0	0	0	0
Pershing Co.	6,611	0	0	0	0

		AFFECTED STRUCTURES			
		Residential		Non-Residential	
Hazard[1]	**Population [2]**	**Number[3,4]**	**Value[3,4]**	**Number[3,4]**	**Value[3,4]**
FIRE[8]					
Humboldt Co.	8,246	3,100	$315,503,733	5,555	$307,519,782
Lander Co.	0	N/A	N/A	N/A	$130,365,584
Pershing Co.	1,116	461	$28,894,406	771	$26,192,309

[1] Drought and Epidemic, could potentially affect the entire populations.
[2] 2018 American Community Survey Estimates. Population estimates for residential structures affected by hazards assume persons per household average of Counties.
[3] Humboldt and Pershing County Assessor's Data
[4] Lander County Data acquired from HAZUS-MH 4.2 General Building Stock values
[5] Pershing 10-20% chance, Humboldt 15-20% chance, Lander 18-20% chance in 50 years. Data acquired from NBMG Report OF2014-05.
[6] Includes structures suffering moderate, extensive and complete damage.
[7] Includes structures suffering damage levels 11 to >50. Information can be found in the HAZUS Flood Technical Manual.
[8] Wildland Fire Risk of Moderate-High to Extreme
N/A = Not Applicable or Not Available

Table 51: Potential Hazard Vulnerability Assessment – Critical Facilities- Humboldt County

Humboldt Co.	EOC & Admin.Offices		Sheriff, Stations/Jail		Fire Stations		Schools		Communication Facilities		Hospital Facilities		Water/Sewer Facilities	
Hazard	**No.**	**Value[1]**	**No.**	**Value[1]**	**No.**	**Value[1]**	**No.**	**Value[1]**	**No.**	**Value[1]**	**No.**	**Value[1]**	**No.**	**Value[3,4]**
Drought	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
Earthquake - Magnitude 6.0[2]	0	$0	0	$0	0	$0	0	$0	3	$95,000	0	$0	0	$692,700
Epidemic/Pandemic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Flood - 100-Year Flood Zone	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
Flood – 500 – Year Flood Zone	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
HAZMAT Event – 1-mile radius hazardous facilities	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
Hazardous Materials Event – 1-mile buffer Highway Segment	1	$920,886	5	$5,396,893	8	$1,577,818	16	$53,276,826	1	$81,356	1	$31,869,369	2	$261,251
Hazardous Materials Event – 1-mile buffer Rail Segment	1	$920,886	4	$5,396,893	4	$568,277	7	$36,831,469	1	$81,356	1	$31,869,369	0	$0
Infestation	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
Severe Weather[5]	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
Wildland Fire[6]	0	$0	1	N/A	4	$766,811	7	$32,885,049	2	$47,284	0	$0	1	$243,312
Volcano/Ash	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0

[1] Humboldt and Pershing County Assessor Data
[2] Includes structures suffering moderate, extensive, and complete damage.
[3] Data acquired from HAZUS-MH 4.2, Earthquake Event Reports.
[4] Water / Sewer may have costs even if facility count is zero due to pipeline breaks.
[5] Since these structures are generally well constructed, it is assumed that they are among the 99.5% of structures not damaged
[6] Wildland Fire Risk of Moderate-High to Extreme
[7] Data acquired from Hazus-MH 4.2 General Building Stock values
N/A = Not Available or Not Applicable

Table 52: Potential Hazard Vulnerability Assessment – Critical Facilities- Lander County

Lander Co.	EOC & Admin.Offices		Sheriff Stations/Jail		Fire Stations		Schools		Communication Facilities		Hospital Facilities		Water/Sewer Facilities		Total
Hazard	**No.**	**Value[7]**	**No.**	**Value[7]**	**No.**	**Value[7]**	**No.**	**Value[7]**	**No.**	**Value[7]**	**No.**	**Value[7]**	**No.**	**Value[3,4]**	**Value**
Drought	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$0
Earthquake - Magnitude 6.0[2]	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$28,858,300	$28,858,300
Epidemic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	$0
Flood - 100-Year Flood Zone	1	N/A	2	N/A	1	N/A	0	N/A	0	N/A	0	N/A	0	N/A	$0
Flood – 500 – Year Flood Zone	1	N/A	2	N/A	0	N/A	2	N/A	0	N/A	0	N/A	1	N/A	$0
HAZMAT Event – 1-mile radius hazardous facilities	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$0
Hazardous Materials Event – 1-mile buffer Highway Segment	1	$2,656,700	2	$5,313,400	2	$5,313,400	8	$97,454,890	0	$0	1	$904,782	1	$13,871,000	$125,514,172
Hazardous Materials Event – 1-mile buffer Rail Segment	0	$0	0	$0	2	$5,313,400	7	$97,099,153	0	$0	1	$904,782	1	$13,871,000	$117,188,335
Infestation	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$0
Severe Weather[5]	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$0
Wildland Fire[6]	1	$2,656,700	1	$2,656,700	1	$2,656,700	4	$36,433,007	0	N/A	0	N/A	0	N/A	$44,403,107
Volcano/Ash	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	$0

[1] Humboldt and Pershing County Assessor Data
[2] Includes structures suffering moderate, extensive, and complete damage.
[3] Data acquired from HAZUS-MH 4.2, Earthquake Event Reports.
[4] Water / Sewer may have costs even if facility count is zero due to pipeline breaks.
[5] Since these structures are generally well constructed, it is assumed that they are among the 99.5% of structures not damaged
[6] Wildland Fire Risk of Moderate-High to Extreme
[7] Data acquired from Hazus-MH 4.2 General Building Stock values
N/A = Not Available or Not Applicable

Table 53: Potential Hazard Vulnerability Assessment – Critical Facilities Pershing County

Pershing Co.	EOC & Admin.Offices		Sheriff Stations/Jail		Fire Stations		Schools		Communication Facilities		Hospital Facilities		Water/Sewer Facilities	
Hazard	**No.**	**Value[7]**	**No.**	**Value[7]**	**No.**	**Value[7]**	**No.**	**Value[8]**	**No.**	**Value[7]**	**No.**	**Value[7]**	**No.**	**Value[3,4]**
Drought	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
Earthquake - Magnitude 6.0[2]	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$2,821,700
Epidemic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Flood - 100-Year Flood Zone	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
Flood – 500 – Year Flood Zone	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
HAZMAT Event – 1-mile radius	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
Hazardous Materials Event – 1-mile buffer Highway Segment	2	$1,025,126	3	$838,943	2	$755,149	5	$52,444,197	0	$0	1	$1,502,283	0	$0
Hazardous Materials Event – 1-mile buffer Rail Segment	2	$1,025,126	3	$838,943	2	$755,149	4	$13,893,611	0	$0	1	$1,502,283	0	$0
Infestation	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
Severe Weather[5]	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
Wildland Fire[6]	0	$0	0	$0	3	$626,880	1	$568,683	0	$0	0	$0	0	$0
Volcano/Ash	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0
Epidemic/Pandemic	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0	0	$0

[1] Humboldt and Pershing County Assessor Data
[2] Includes structures suffering moderate, extensive, and complete damage.
[3] Data acquired from HAZUS-MH 4.2, Earthquake Event Reports.
[4] Water / Sewer may have costs even if facility count is zero due to pipeline breaks.
[5] Since these structures are generally well constructed, it is assumed that they are among the 99.5% of structures not damaged
[6] Wildland Fire Risk of Moderate-High to Extreme
[7] Data acquired from Hazus-MH 4.2 General Building Stock values
N/A = Not Available or Not Applicable

See Appendix B for maps showing areas where hazards affect population and structures.

8.2 DROUGHT

According to the U.S. Seasonal Drought Monitor, the entire Tri-County area is at risk for drought. Although drought is not likely to affect critical facilities and services, the intensity and length of the recent droughts and the increase in population in recent decades have led to questions about the vulnerability of all of the state's municipal water systems (DRI 2016). Drought is likely to cause financial impacts and increased risk of fire hazards for all three of the counties in this HMP.

Drought has the potential to affect a number of industries and activities that rely on ground and/or surface water. Tri-County agriculture yielding a wide variety of crops and livestock on land totaling approximately 1.3 million acres is seriously affected by drought. In 2018, Humboldt and Pershing County producers who suffered losses due to two separate drought designations were eligible for U.S. Department of Agriculture (USDA) Farm Service Agency (FSA) loans.

In 2020, impacts from drought included wildfires resulting in hazardous air quality conditions which led to closures of schools, cancellations of outdoor events, and respiratory health impacts.

Hydroelectric and geothermal power generation would also be adversely affected by drought. The Nevada State Office of Energy has compiled a list of hydroelectric and geothermal power plants throughout the State. Currently there are 3 geothermal plants and no hydroelectric plants in the Tri-County area. However, there are 27 potential geothermal sites and a hydroelectric project on the Rye Patch Dam. See **Table 18** for LEPC rankings.

8.3 EARTHQUAKES

HAZUS-MH 4.2 was used to create earthquake models for each County. All models featured a 6.0 magnitude event. According to the Nevada Bureau of Mines and Geology (NBMG) Open-File Report 2014-05, the probability of a 6.0 magnitude or larger event occurring within 50 years in Pershing County is 10-20%, in Humboldt County a 15-20% chance, and in Lander County a 18-20% chance. The loss estimates included in the models are based on the following specific parameters for each County.

Table 54: HAZUS-MH 4.2 Earthquake Modeling Parameters (2020)

		Location of Epicenter				
County	**Type**	**Long**	**Lat**	**Magnitude**	**Depth (Km)**	**Rupture Length (Km)**
Humboldt	Arbitrary	-117.74	41.0	6.0	10.0	7.76
Lander	Arbitrary	-116.88	40.58	6.0	10.0	3.31
Pershing	Arbitrary	-118.39	40.18	6.0	10.0	7.76

See Table 18 for LEPC rankings for each County. See Appendix B for hazard mapping.

8.3.1 Humboldt Potential Losses

According to HAZUS, about 14% of the buildings in Humboldt County will be at least moderately damaged by an earthquake with a magnitude of 6.0; the extent of the damage ranging from moderate to complete. Potential damage includes approximately 886 residential structures (valued at $43 million) and 122 non-residential structures (valued at $38.6 million).

HAZUS-MH indicated that one week after the earthquake the hospital will have 62% of the beds back in service and by 30 days, 94% of the beds will be operational. On the day of the earthquake, 88% of police stations, 44% of schools, and 17% of police stations will have functionality greater than 50%. The Emergency Operations Center (EOC) will not have will have functionality greater than 50% on the day of the earthquake. See **Table 51** and **Table 55** for estimated damages to affected structures.

Table 55: Humboldt County Earthquake Vulnerability

		AFFECTED STRUCTURES				Total	
		Residential		Non-Residential			
Hazard	**Population Affected**	**Number**	**Value**	**Number**	**Value**	**Number**	**Value**
EARTHQUAKE, MAGNITUDE 6.0[5,6]							
Humboldt Co.	2,357	886	$43,000,000	122	$38,681,000	$1,008	$81,681,000

The entire population of Humboldt County (16,904) could be impacted by an earthquake due to the potential for infrastructure damage in addition to structure damage. The HAZUS model estimated the number of casualties that may result from the quake. HAZUS estimates casualties for three times of the day: 2:00 AM, 2:00 PM, and 5:00 PM. For Humboldt County the worst time was 2:00 PM. A 6.0 magnitude earthquake occurring at this time could result in 48 injuries requiring medical attention, 15 hospitalizations, and 4 deaths.

The 14% building damage estimate was obtained from the Earthquake Event Report run through HAZUS-MH on May 22, 2020. The building inventories, including quantity and values, were taken from HAZUS-MH 4.2 General Building Stock database. The affected population was calculated using U.S. Census and American Community Survey data.

NBMG worked with Advanced Data Solutions to inventory the un-reinforced masonry (URM) buildings within the State. Inventory results showed that 184 residential buildings (306,000 sq ft) and 186 non-residential buildings (1.2 million sq ft) were constructed of un-reinforced masonry. It is anticipated that these buildings would sustain more damage than other buildings during an earthquake. The estimated value of these buildings is $16 million (residential) and $10 million (non-residential). The value of the URM structures was estimated using the percentage of URM's compared with the total number of buildings in the County and the equivalent taxable value. The data from the inventory can be used by the County to identify structures qualified for reinforcement retrofits. NBMG data has not been updated since the last version of this report. If updated URM data becomes available, it can be incorporated into future plan updates.

8.3.2 Lander Potential Losses

According to HAZUS-MH, less than 1% of the buildings in Lander County will be at least moderately damaged by an earthquake event with a magnitude of 6.0; the extent of the damage ranging from moderate to complete. Potential damage includes approximately 8 residential structures (valued at $790k) and several partially damaged non-residential structures (valued at $31k).

HAZUS-MH indicated that one week after the earthquake the hospital will have 94% of the beds back in service and by 30 days, 100% of the beds will be operational. The schools, EOC, and police and fire stations would all have functionality greater than 50% on the day of the earthquake.

See **Table 52** and **Table 56** for estimated damages to affected structures and infrastructure.

Table 56: Lander County Earthquake Vulnerability

		AFFECTED STRUCTURES				Total	
		Residential		Non-Residential			
Hazard	Population Affected	Number	Value	Number	Value	Number	Value
EARTHQUAKE, MAGNITUDE 6.0							
Lander Co.	22	8	$791,000	0	$31,200	8	$822,200

The entire population of the County (5,746) could be impacted by an earthquake due to the potential for infrastructure damage in addition to damaged structures. The HAZUS-MH model estimated the number of casualties that may result from the quake. HAZUS estimates casualties for three times of the day: 2:00 AM, 2:00 PM, and 5:00 PM. For Lander County no casualties are anticipated.

The less than 1% building damage estimate was obtained from the Earthquake Event Report run in HAZUS-MH on May 26, 2020. The building inventories, including quantity and values, were taken from HAZUS-MH 4.2 General Building Stock database. The affected population was calculated using U.S. Census and American Community Survey data.

NBMG worked with Advanced Data Solutions to inventory the un-reinforced masonry (URM) buildings within the State. Inventory results showed that 168 residential buildings (130,000 sq ft) and 80 non-residential Buildings (292,000 sq ft) were constructed of un-reinforced masonry. It is anticipated that these buildings would sustain more damage than other buildings during an earthquake. The estimated value of these buildings is $11 million (residential) and $6 million (non-residential). The value of the URM structures was estimated using the percentage of URM's compared with the total number of buildings in the County and the equivalent taxable value. The data from the inventory can be used by the County to identify structures qualified for reinforcement retrofits. NBMG data has not been updated since the last version of this report. If updated URM data becomes available, it can be incorporated into future plan updates.

8.3.3 Pershing Potential Losses

According to HAZUS-MH, about 8% of the buildings in Pershing County will be damaged by an earthquake event with a magnitude 6.0; the extent of the damage ranging from moderate to complete. Potential damage includes approximately 195 residential structures (valued at $3.98 million) and 12 non-residential structures (valued at $2.22 million).

HAZUS-MH indicated that one week after the earthquake the hospital will have 91% of the beds back in service and by 30 days, 100% of the beds will be operational. None of the schools, EOC, or police stations would have functionality greater than 50% on the day of the earthquake, and only 1 of 4 fire stations would have >50% functionality on day 1. See **Table 53** and **Table 57** for estimated damages to affected structures and infrastructure.

Table 57: Pershing County Earthquake Vulnerability

		AFFECTED STRUCTURES				Total	
		Residential		Non-Residential			
Hazard	**Population Affected**	**Number**	**Value**	**Number**	**Value**	**Number**	**Value**
EARTHQUAKE, MAGNITUDE 6.0							
Pershing Co.	472	195	$3,980,000	12	$2,220,000	207	$2,220,000

The entire population of the County (6,611) could be impacted by an earthquake due to the potential for infrastructure damage in addition to damaged structures. The HAZUS-MH model estimated the number of casualties that may result from the quake. HAZUS-MH estimates casualties for three times of the day: 2:00 AM, 2:00 PM, and 5:00 PM. For Pershing County, the worst time was 5:00 PM. A 6.0 magnitude earthquake occurring at this time could result in 2 injuries requiring medical attention, and 3 hospitalizations.

The 8% building damage estimate was obtained from the Earthquake Event Report run in HAZUS-MH on May 21, 2020. The building inventories, including quantity and values, were taken from HAZUS-MH 4.2 General Building Stock database. The affected population was calculated using U.S. Census / American Community Survey data.

NBMG worked with Advanced Data Solutions to inventory the un-reinforced masonry (URM) buildings within the State. Inventory results showed that 31 residential buildings (59,000 sq ft) and 37 non-residential buildings (215,000 sq ft) were constructed of un-reinforced masonry. It is anticipated that these buildings would sustain more damage than other buildings during an earthquake. The estimated value of these buildings is $2 million (residential) and $1 million (non-residential). The value of the URM structures was estimated using the percentage of URM's compared with the total number of buildings in the County and the equivalent taxable value. The data from the inventory can be used by the County to identify structures qualified for reinforcement retrofits. NBMG data has not been updated since the last version of this report. If updated URM data becomes available, it can be incorporated into future plan updates.

8.4 EPIDEMIC/PANDEMIC

Epidemic illness could affect the entire population of the Tri-Counties with resulting quarantines that temporarily limit use of buildings and critical facilities. However, an epidemic would not damage structures and facilities and they could return to normal use once the epidemic has subsided. The main impacts due to epidemic/pandemic are loss of life and fiscal impacts. At this time, the Tri Counties have experienced a relatively low rate of COVID19 infection and death rates, however the economic impact has been widespread.

Preliminary economic impacts of the COVID-19 Pandemic for the Tri-County area is presented in this section. At the time of this report the pandemic is ongoing. These impacts may be revisited with future updates of the HMP.

In May of 2020, the National Association of Counties (NACo) released a report "Analysis of the Fiscal impact of COVID-19 on Counties." In the report, NACo discusses the differing impacts on large and small size counties. It is estimated that there will be an impact of over $144 Billion on County budgets nationwide through fiscal year 2021. These impacts are categorized as lost revenue and response costs. Humboldt Lander and Pershing counties are estimated to have expended over 30% of their total county expenditures on health and human services including increasing services for vulnerable populations. (NACo, 2020) Small and medium-sized counties, such as the Tri-Counties, may struggle to handle unexpected COVID-19 response expenditures.

Key findings of the NACo report include:

- Major county revenue streams that support critical local services are at risk, yet most counties have limited authority to raise additional funds to make up this deficit.
- Charges and fees, sales tax and gross receipts, income taxes and licenses fees – which comprise 42 percent of all county-generated revenue – are most at risk because of the COVID-19 pandemic.
- Counties are also seeing an unprecedented rise in expenditures related to the COVID-19 pandemic, investing billions of dollars to save lives and keep American communities safe and healthy.
- County expenditures are increasing dramatically as we pour additional funding into health and hospital systems, justice and public safety services, human services, technology infrastructure and education.
- COVID-19 is having a severe fiscal impact on counties of all sizes.
- More populous counties may face greater caseloads, while smaller counties may operate within tighter budgets - but counties of all sizes are likely to see severe fiscal impacts from the COVID-19 pandemic.

As of August 2020, the State of Nevada continued to have the highest unemployment rate in the country, 13.2 % (Bureau of Labor Statistics, U.S. Department of Labor) The Nevada Department of Employment Training and Rehabilitation (DETR) keeps records of Local Area Unemployment Statistics (LAUS) for the state's cities and counties. Unemployment rates for the Tri Counties for August 2020 are compared with August 2019 in **Table 58**.

Table 58: Unemployment Rates in the Tri-Counties, August 2019 and 2020 (DETR)

County	Unemployment Rate August 2020	Unemployment Rate August 2019	Percent change
Humboldt	4.8%	3.1%	1.7%
Lander	4.3%	3.0%	1.3%
Pershing	4.8%	3.5%	1.3%

See **Table 18** for LEPC rankings for each County.

8.5 FLOODS

USGS 1 arc-second Digital Elevation Models (DEMs) were used with HAZUS-MH 4.2 to estimate the structures and value at risk within flood areas. See **Table 59** for estimated effect on percentage of population of each of the Tri-Counties during a 100-year or 500-year flood event. HAZUS-MH was the only source of data for Lander County structures and values. For Humboldt and Pershing Counties, the building inventories, including quantity and values, provided by the Assessor's offices were used instead of HAZUS-MH estimates. The affected population was calculated using U.S. Census American Community Survey data.

The potential for flooding from the 100-year floodplain is slightly higher in Pershing County than both Humboldt and Lander County. In Humboldt County 6% of the population and 5% of the structures would be affected by a 100-year flood. In Lander County only 2% of the population and 2% of the structures would be affected. This is in contrast to 8% of the population and 14% of the structures in Pershing County lying within 100-year flood hazard areas.

The 500-year floodplain risks are slightly larger, with Humboldt County seeing 7% of the population and slightly over 5% of the structures affected, while in Lander County 3% of the population and 3% of structures would be affected. Pershing County sees a rise to 12% of the population affected and 19% of structures affected. See **Table 59** for percentage of population affected by flooding events by County.

Table 59: Percentage of Population and Structures Affected by 100 and 500-Year Floods

	100 Year Flood	500 Year Flood
Humboldt County		
Residential Population Affected	6.0%	6.6%
Residential Buildings Affected	5.1%	5.6%
Total Structures Affected	877	963
% Structures Affected	4.8%	5.3%
Lander County		
Residential Population Affected	2.0%	3.6%
Residential Buildings Affected	1.7%	3.0%
Total Structures Affected	43	76
% Structures Affected	2%	3%
Pershing County		
Residential Population Affected	8%	12%
Residential Buildings Affected	10%	15%
Total Structures Affected	906	1241
% Structures Affected	14%	19%

8.5.1 Humboldt Potential Loses

Social Impacts

HAZUS-MH estimates the number of households that are expected to be displaced from their homes due to a 100-year flood and the associated potential evacuation. HAZUS-MH also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 203 households (or 608 people) will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 4 people (out of a total population of 16,528) will seek temporary shelter in public shelters.

Economic Impacts

The total economic loss estimated for the flood is $96.67 million, which represents 29.98% of the total replacement value of the scenario buildings.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were $51.56 million. 47% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 42.02% of the total loss. **Table 50** provides a summary of the losses associated with the building damage.

8.5.2 Lander Potential Losses

Social Impacts

HAZUS-MH estimates the number of households that are expected to be displaced from their homes due to a 100-year flood and the associated potential evacuation. HAZUS-MH also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 267 households (or 802 people) will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 21 people (out of a total population of 5,775) will seek temporary shelter in public shelters.

Economic Losses

The total economic loss estimated for a 100-year flood is $24.49 million, which represents 14.68% of the total replacement value of the scenario buildings.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood. The total building-related losses were estimated at $6.85 million. 72% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 38.80% of the total loss.

8.5.3 Pershing Potential losses

Social Impacts

HAZUS-MH estimates the number of households that are expected to be displaced from their homes due to a 100-year flood and the associated potential evacuation. HAZUS-MH also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 137 households, or 410 people will be displaced due to the flood, out of a total population of 6,753. Displacement includes households evacuated from within or very near to the inundated area. Of these 410 people, 9 will seek temporary shelter in public shelters.

Economic losses

The total economic loss estimated for the flood is $16.82 million, which represents 11.59% of the total replacement value of the buildings evaluated in the scenario.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood. The total building-related losses were $10.36 million. 38% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 68.08% of the total loss. **Table 50** provides a summary of the losses associated with building damage.

8.5.4 Dams

The Nevada Division of Water Resources (NDWR) flood mitigation assistance program provides an overview of Nevada dams, related hazards and remedial maintenance measures**.** The following is a description of the program and possible remedial actions for dams in Nevada. (NDWR 2020).

There are approximately 600 documented dams in the State of Nevada. Of those, 130 are high hazard, 120 are significant hazard and 350 are low hazard dams. All high hazard dams are inspected annually. Significant hazard dams should be inspected once in every three years and low hazard dams once in every 5 years. A dam inspection can be requested of the State Engineer's office at any time. The owner should also perform visual inspections on a regular basis and after storm and seismic events.

"The following is a brief list of items an owner can look for as part of a visual inspection and possible remedial actions:

- Heavy vegetation: Root systems for some vegetation can be quite extensive and actually provide a path for seep water. Also, as the plant, tree, etc. dies, the roots will rot, leaving a conduit for seep water. Large trees can blow over and cause a breach in an earth embankment. Vegetation also provides cover and forage for rodents. Vegetation can be burned off, sprayed with herbicide, trimmed, etc.
- Rodent action: Burrowing by rodents (beaver, mole, mouse, squirrel, badger, vole, etc.) can provide conduits for seepage. If rodent holes become serious, rodents must be eradicated, their burrows broken down and the holes backfilled with suitable compacted material.
- Outlet controls: The outlet works should be exercised from full closed to full open at least once a year to insure operability at high reservoir levels. Access to the outlet works is also important. It may be necessary to access the outlet works at high spillway flows to assist in the draining of the reservoir to prevent overtopping.
- Debris: The outlet conduit, spillway and outlet and spillway channels should be kept clear of debris and vegetation so that they aren't choked closed during high flows, thus causing overtopping, or other damage to the dam. Fences should not be allowed in those areas as debris can accumulate on the fence and cause clogging of the channels/conduits.
- Seeps: Look for wet spots along the toe of the dam, on the downstream face, on the ground downstream of the dam and along the abutments. You may not see wet spots but there may be an incongruous line or spot of vegetation. Any seeps that can be seen should be measured (gallons per minute) and the turbidity of the seep water should be noted. If the seep water is turbid with signs of embankment material mixed in it, there is a possibility of a piping problem. A piping problem can cause a dam failure very quickly.
- Cracks, slumps and settlement: Obviously any movement of the embankment after construction can be serious. A number of reasons could be responsible for embankment movement such as weak foundation conditions, poor compaction in areas, ice lenses during construction, earthquakes, excessive seeping etc. The condition should be monitored closely.
- Erosion protection: If the upstream face has riprap or some other type of armoring, it should be monitored. If the armoring is displaced, wave action will cause erosion of the embankment material.
- Beaching/Benching: Wave action on an unprotected embankment can erode the face of the dam causing a vertical face to form. This diminishes the ability of the dam to hold maximum storage and may lead directly to failure in a storm or even under good weather conditions. Benching should

be avoided by armoring the upstream face with appropriately sized riprap. When the reservoir ices over, movement of the ice can displace riprap and lead to erosion or benching."

In the Tri-County area, eight dams are currently categorized by NDWR as high hazard dams. Humboldt County has 3, Pershing County has 1, and Lander County has 4 high hazard dams. Of the eight high-hazard dams in the Tri-County area, failure of the Rye Patch Dam in Humboldt County would potentially cause the most damage. Rye Patch Reservoir, located on the Humboldt River east of Lovelock, Nevada covers 10,280 surface acres, stores 196,000 acre-feet (AF), and has a maximum depth of 61 feet when full. **Table 36** for high hazard dams located in each of the Tri-Counties. See **Table 18** for LEPC hazard rankings for each County.

8.6 HAZARDOUS MATERIALS EVENTS

A one mile radius around hazardous facilities and buffer zones of one mile on each side for both I-80 and the Union Pacific Railway were created using GIS mapping. The maps were used to determine the population and number of structures within those boundaries would be exposed in a HAZMAT event. See Appendix B for mapping.

8.6.1 Potential losses

Table 60 shows the percentage of population and structures that would be impacted by a HAZMAT event. In all three Counties very little of the population and very few structures were within the one-mile radius of hazardous materials facilities. However, population centers including Lovelock, Battle Mountain, Winnemucca, and others straddle the interstate and the rail line. Because of this, a substantial number of the population and structures in each County would be affected by a HAZMAT event.

The fact that a high percentage of the population and structures lie within these buffer zones does not necessarily indicate that the potential for exposure to a HAZMAT event is also high. The segments of road and rail passing through these towns are relatively short, so the possibility of a HAZMAT event occurring in a remote, less populated area may be more likely. See **Table 18** for LEPC hazard rankings for each County.

Table 60: Percentage of Population and Structures Affected by a HAZMAT Event

	HAZMAT Event on I-80			HAZMAT Event on Rail Line		
County	Population (%)	Residential (%)	Non-Res. (%)	Population (%)	Residential (%)	Non-Res. (%)
Humboldt	98	83	76	77	65	50
Lander	N/A	N/A	N/A	N/A	N/A	N/A
Pershing	58	69	66	50	60	53

N/A – Not Available

8.7 INFESTATION

Buildings and infrastructure in the Tri-County area are not at risk to infestation. Agriculture related jobs would be at risk to a significant infestation however there are too many variables relating to infestation to adequately estimate the financial loss to the Counties.

The greatest potential for infestation is by an insect grasshopper species. The U.S. Department of Agriculture (USDA) has proposed a plan to combat a potential for infestation. The program is described by the USDA, Animal and Plant Health Inspection Service (APHIS) in an Environmental Assessment (EA) and FONSI published in May of 2020. (USDA 2020) The report states that an infestation of grasshoppers or Mormon Crickets may occur in Nevada, specifically Churchill, Humboldt, Pershing, and Washoe counties. Researchers determined that during typical grasshopper infestation years, approximately 20% of forage rangeland is removed, valued at a dollar adjusted amount of $900 million. Local communities could see adverse economic impacts to the entire area. Grasshoppers that infest rangeland could move to surrounding croplands. Farmers could incur economic losses from attempts to chemically control grasshopper populations or due to the loss of their crops. The general public could see an increase in the cost of meat, crops, and their byproducts

Because the planning committees did not rank this hazard as moderate or high in priority, no additional detailed analysis was completed for this plan update. See **Table 18** for all County's LEPC rankings.

8.8 SEVERE WEATHER

Although all the population and buildings are occasionally subjected to severe winter storms, building codes for Humboldt, Lander and Pershing Counties take into account excessive snow and wind loading. Thus homes and buildings within the area are built sufficiently well to withstand severe weather. Road closures due to weather areas for extended periods are rare in these Counties. I-80 runs through all of them and is cleared of snow immediately due to its importance as an interstate artery. During above average snowfall events other County roads are generally cleared within a day. Another possible effect on the population includes power outages but historically they have not lasted more than a day. LEPC committee members from the three Counties rated this hazard low to moderate. Because the planning committees did not rank this hazard as moderate or high in priority, no additional detailed analysis was completed for this plan update. See **Table 18** for all County's LEPC rankings.

8.9 WILDFIRE

Over the past several years, wildland fires have increased in number and size the Tri-County area. The potential for larger more numerous fires has increased due to continuing drought conditions. Active fire seasons have always followed droughts. Because of the fact that droughts have been increasing in severity and duration, it can be expected that wildland fires will as well.

The assessments made by RCI in 2004 were included in the previous version of this plan, completed in 2014. They are incorporated by reference into this Plan update. RCI's report identifies four towns were identified as having a "high" rating for wildfire; Fort McDermitt (Humboldt), Lander County (Austin and Kingston), and Humboldt (Pershing). One town, Unionville in east central Pershing County has the highest rating of "extreme". The rating scale includes ratings of "low", "moderate", "high", and "extreme". See **Table 18** for LEPC hazard rankings.

8.9.1 Potential Losses

Since 2012, Humboldt County has experienced 2 separate years where wildfires burned more than 5 million acres. In Lander county in one particularly devastating wildfire year, more than 2.2 million acres burned. Pershing County has had similar impacts with a single year total of 859,000 acres burned.

Wildfires pose moderate to extreme risks to a number of essential facilities in each of the Tri-Counties. Humboldt County's essential facilities at risk are one police and four fire stations, seven schools, two communications facilities, and one water/sewer facility. Lander County's at-risk essential facilities are four schools and one fire station. Pershing County's at-risk essential facilities include three fire stations and one school.

The increase in wildfires over the last five years also raises a question of hazards related to wildfire due in part to power lines and ageing power grid infrastructure. A great deal of the electrical system in the West was built in the 60's and 70's and is prone to failure during high wind or icing events. A critical need in case of power failure is reliable electricity to communication sites including emergency response personnel, police, public safety and emergency services dispatch. Other agencies rely on these communications sites during large wildfires and other disasters.

8.10 VOLCANO

The volcano risk is mainly due to the potential for ash fallout from volcanoes located in northern California. Although the total population of the Tri-County area is at risk to illness from ash in the air, the damage to buildings is limited to ventilation systems which may be contaminated from the ash. The critical facilities potentially affected by fallout include the hospitals and schools, which may have damage to their HVAC systems. Infrastructure affected by the fallout includes the sewer and water facilities. Due to the potential for contamination, water facilities would be an important concern. Regarding the costs associated with the damage, most of the cost would be attributable to debris removal. Because the planning committees did not rank this hazard as moderate or high in priority, no additional detailed analysis was completed for this plan update. See **Table 18** for all County's LEPC hazard rankings.

9.0 CAPABILITY ASSESSMENT

An important component of a hazard mitigation plan is a review of the Tri-County resources to identify, evaluate, and enhance the capacity of those resources to mitigate the effects of hazards. This section evaluates Tri-County resources in three areas—legal and regulatory, administrative and technical, and financial—and assesses capabilities to implement current and future hazard mitigation actions.

9.1 LEGAL AND REGULATORY CAPABILITIES

The Counties and Cities in the Tri-County area currently support hazard mitigation through their regulations, plans, and programs. County Building Codes outline hazard mitigation-related ordinances. County Master Plans identify goals, objectives, and actions for natural hazards, including floods, drought, and earthquakes. In addition to policies and regulations, the Counties carry out hazard mitigation activities by participating in the National Flood Insurance Program (NFIP) see Section 9.4.1.

The following table, **Table 61**, summarizes the hazard mitigation legal and regulatory capabilities within the Tri-County area

Table 61: Legal and Regulatory Resources Available for Hazard Mitigation

Regulatory Tool	Title	Effect on Hazard Mitigation
Plans	Master Plans (All Counties)	Lander updated 2010 and Humboldt Updated 2012, Pershing 2012. Lists goals for coordination, neighborhood design, public awareness, floodplain & hazard area development, and geologic hazards to guide land use planning, economic development
	Community Wildland fire Protection Plan (All Counties)	Provides Wildland fire hazards. Enables Counties to mitigate fuel loads.
	HAZMAT Plan (All Counties)	Provides emergency response to reduce impact of HAZMAT spill.
	Emergency Operations Plan (Lander, Lovelock, Winnemucca and Humboldt)	Provide directives to reduce future hazard impact
	Water System Water Conservation Plans (All Counties and Cities)	Include drought plans to mitigate the effects of droughts.
	Mining -Emergency Response Plan and Evacuation Drills Procedures	Provides emergency responses to reduce impact of HAZMAT spill, various chemical spills and other emergencies
Programs	National Flood Insurance Program (All Counties)	Humboldt, Lander, and Pershing Counties adopt and enforce floodplain management ordinances to reduce future flood damage. In exchange, the NFIP makes Federally backed flood insurance available to homeowners, renters, and business owners

Regulatory Tool	Title	Effect on Hazard Mitigation
Ordinances and Policies	2018 International Building Code, 2018 International Residential Code, 2018 International Fire Code, 2006 International Energy Conservation Code, 2005 National Electric Code, 2006 Uniform Plumbing Code, 2006 Uniform Mechanical Code, Nevada Revised Statue Chapter 489 (Mobile Homes and Similar Vehicles; Manufactured Homes)	Master Plan, Land Use Plan Element, Building, Fire and Zoning codes and ordinances. Provides regulations to reduce hazard impact.
	Special purpose ordinances	Floodplain management, storm water management, Wildland fire ordinances, hazard set back requirements

The programs, plans, policies and regulations listed in **Table 61** provide a basic framework for mitigation projects. These programs cover the different County's infrastructure and program needs and are effective. However, funding for hazard related mitigation projects is not always available.

The small populations in the Tri-County area require that the Counties and Cities work together to provide all the services needed by their citizens. In some cases, individual local government workers must serve in multiple positions to ensure important services can be provided. For example, Lovelock and Winnemucca both have police departments in addition to a County sheriff. However, Battle Mountain does not have a police department and relies on the Lander County Sheriff's Department for its law enforcement needs.

Despite population limitations, all of the Counties are able to enforce building and fire codes and ordinances, including those that limit or restrict construction within flood zones. In addition to building code enforcement, all of the Counties have programs for public safety, health and human services, public works and school districts. These programs are run by trained staffs that are provided the resources to implement and promote the programs.

9.2 ADMINISTRATIVE AND TECHNICAL CAPABILITIES

The administrative and technical capability assessment identifies the staff and personnel resources available within the Tri-County area to engage in mitigation planning and carry out mitigation projects. The administrative and technical capabilities of the Counties and Cities are listed in Table 62.

Table 62: Administrative and Technical Resources for Hazard Mitigation

Staff/Personnel Resources	Department / Agency
Humboldt, Lander, and Pershing Counties	
Planner(s) or engineer(s) with knowledge of land development and land management practices	Building, Planning & County Engineer
Engineer(s) or professional(s) trained in construction practices related to buildings and/or infrastructure	Building & County Engineer
Planner(s) or engineer(s) with an understanding of manmade or natural hazards	Building, Planning, Fire Dept.

Staff with education or expertise to assess the community’s vulnerability to hazards	Building, Fire, County Engineer, Emergency Manager
Floodplain manager	County Planning
Personnel skilled in GIS and/or HAZUS-MH	County Planning
Scientist familiar with the hazards of the community	UNR, Bureau of Mines & Geology for Earthquakes
Emergency Services	Fire Department, Emergency Management, Sherriff
Finance (purchasing) – Fiscal Management	Comptroller
Public Information Officers, Planner(s)	Sheriff’s Office, Fire Dept, Executive Staff
Mass Shelter locations, requirements, and capabilities	American Red Cross
Mining related emergencies including HAZMAT, Chemical spills, and emergency response and evacuation	Nevada Gold Mines, Cortez District
Winnemucca, Battle Mountain, and Lovelock	
Planner(s) or engineer(s) with knowledge of land development and land management practices	Building, Planning & Public Works
Engineer(s) or professional(s) trained in construction practices related to buildings and/or infrastructure	Building & Public Works
Planner(s) or engineer(s) with an understanding of manmade or natural hazards	Building, Planning, Fire Dept., Emergency Mgmt., Police Dept.
Staff with education or expertise to assess the community’s vulnerability to hazards	Building, Emergency Management, Public Works
Floodplain manager	County Planning
Personnel skilled in GIS and/or HAZUS-MH	Building/Planning
Scientist familiar with the hazards of the community	UNR, Bureau of Mines & Geology for Earthquakes
Emergency Services	Fire Department, Emergency Management, Police
Finance (purchasing) – Fiscal Management	City Clerk
Public Information Officers, Planner(s)	Police, Mayor’s Office

9.3 FINANCIAL CAPABILITIES

The fiscal capability assessment lists the specific financial and budgetary tools that are available to the Counties and Cities for hazard mitigation activities. These capabilities, which are listed below include local and Federal entitlements.

Financial Resources	Effect on Hazard Mitigation
Local (Counties & Cities)	
Authority to levy taxes for specific purposes	Yes. Upon approval of the County Board of Commissioners and staying within the stipulations set forth in the Nevada Revised Statues.
Capital Improvement Plans and Impact Fees	Assigns impact development fees to finance fire and flood control capital improvement programs.
Community Development Block Grants	Yes. Subject to grant from Fed/State.
Incur debt through general obligation bonds	Yes. Staying within the stipulations set forth in the Nevada Revised Statues.
Incur debt through special tax and revenue bonds	Yes. Upon voter approval, staying within the stipulations set forth in the Nevada Revised Statues.
Incur debt through private activity bonds	Yes. Upon voter approval, staying within the stipulations set forth in the Nevada Revised Statues.
Withhold spending in hazard-prone areas	Yes.
State	
Question #1 State Bond	Funding for Parks which can include re-vegetation.
Federal	
FEMA Hazard Mitigation Project Grants (HMPG) and Pre-Disaster Mitigation (PDM) grants	Provides technical and financial assistance for cost-effective pre-disaster and post-disaster mitigation activities that reduce injuries, loss of life, and damage and destruction of property.
FEMA Flood Mitigation Grant Program (FMA)	Mitigate repetitively flooded structures and infrastructure.
USFA Assistance to Firefighters Grant (AFG) Program	Provide equipment, protective gear, emergency vehicles, training, and other resources needed to protect the public and emergency personnel from fire.
FEMA/DHA Homeland Security Preparedness Technical Assistance Program (HSPTAP)	Build and sustain preparedness technical assistance activities in support of the four homeland security mission areas (prevention, protection, response, recovery) and homeland security program management.
US HUD Community Block Grant Program Entitlement Communities Grants	Acquisition of real property, relocation and demolition, rehabilitation of residential and non-residential structures, construction of public facilities and improvements, such as water and sewer facilities, streets, neighborhood centers, and the conversion of school buildings for eligible purposes.
EPA Community Action for a Renewed Environment (CARE)	Through financial and technical assistance offers an innovative way for a community to organize and take action to reduce toxic pollution (i.e., storm water) in its local environment. Through CARE, a community creates a partnership that implements solutions to reduce releases of toxic pollutants and minimize people's exposure to them.

Financial Resources	Effect on Hazard Mitigation
EPA Clean Water State Revolving Fund (CWSRF)	A loan program that provides low-cost financing to eligible entities within state and tribal lands for water quality projects, including all types of non-point source, watershed protection or restoration, estuary management projects, and more traditional municipal wastewater treatment projects
CDC Public Health Emergency Preparedness (PHEP) Cooperative Agreement.	Funds are intended to upgrade state and local public health jurisdictions' preparedness and response to bioterrorism, outbreaks of infectious diseases, and other public health threats and emergencies.

9.4 CURRENT MITIGATION CAPABILITIES AND ANALYSIS

The Tri-County area's current mitigation programs, projects, plans, and/or practices, are shown below in Table 63.

Table 63: Humboldt County Mitigation Capability Assessment

HUMBOLDT COUNTY						
Agency Name (Mission/ Function)	**Programs, Plans Policies, Regulations, Funding, or Practices**	**Point of Contact Name and Phone**	**Effect on Loss Reduction**			**Comments**
			Support	**Facilitate**	**Hinder**	
Building and Safety	Code Enforcement, Permitting, Flood Plain Mgmt.	Karen Johnson (775) 623-6322	✓	✓		Engineering and Flood Management
Planning Dept.	Economic Development	Betty Lawrence (775) 623-6393	✓	✓		Planning support
Public Works Dept.	Infrastructure and Roads	Don Kalkoske (775) 623-6416	✓	✓		Roads and Culverts
Emergency Management	Emergency Management, Mitigation Plan	Sean Wilkin (775) 623-6419	✓	✓		Familiar w/mitigation grants, knowledge of vulnerability
School District	Identify and implement mitigation actions for school property	Dave Jensen (775) 623-8100	✓	✓		Familiar w/school district infrastructure
Sherriff's Office	Public Safety	Mike Allen (775) 623-6419	✓	✓		Familiar w/terrorist mitigation
Health/Human Services	Public Health Nurse	Marsha Foreman, RN. (775) 623-6575	✓	✓		Familiar w/ epidemic and CDC grants, health capability
Health/Human Services	Public Health	Niki Linn (775) 623-6342	✓	✓		Human services and community resources
American Red Cross	Disaster Relief	Northern Nevada Office (775) 856-1000	✓	✓		Disaster and Community Services

Table 64: Winnemucca Mitigation Capability Assessment

WINNEMUCCA						
Agency Name (Mission/ Function)	**Programs, Plans Policies, Regulations, Funding, or Practices**	**Point of Contact Name and Phone**	**Effect on Loss Reduction**			**Comments**
			Support	**Facilitate**	**Hinder**	
Building and Safety	Code Enforcement, Permitting, Flood Plain Mgmt.	Sam Duggan (775) 623-6319	✓	✓		Engineering and Flood Management
Planning Dept.	Economic Development	Betty Lawrence (775) 623-6392	✓	✓		Planning support
Public Works	Streets, Water and Sewer, Maintenance, Parks	Ken Howard (775) 623-6381	✓	✓		Engineering, detailed knowledge of infrastructure
Police Dept.	Public Safety	Dave Garrison (775) 623-6396	✓	✓		Familiar w/terrorist mitigation
State Fire Marshall, Volunteer FD	Fuels Mitigation, public education	Joe Dendary (775) 623-6329	✓	✓		Detailed knowledge of Vulnerability

Table 65: Lander County Mitigation Capability Assessment

LANDER COUNTY						
Agency Name (Mission/ Function)	**Programs, Plans Policies, Regulations, Funding, or Practices**	**Point of Contact Name and Phone**	**Effect on Loss Reduction**			**Comments**
			Support	**Facilitate**	**Hinder**	
Building and Safety	Code Enforcement, Permitting, Flood Plain Mgmt.	Anna Penola (775) 635-2810	✓	✓		Engineering and Flood Management
Planning Dept.	Economic Development	Gina Little (775) 635-2860	✓	✓		Planning support
Public Works	Water and Sewer, Pool	Brad Olsen (775) 635-2190	✓	✓		Engineering, Detailed knowledge of infrastructure
Emergency Management	Emergency Management, Mitigation Plan	Bert Ramos (775)-635-5595	✓	✓		Familiar w/mitigation grants, knowledge of vulnerability
School District	Identify and implement mitigation actions for school property	Russell Klein (775) 635-2886	✓	✓		Familiar w/school district infrastructure
Sherriff's Office	Public Safety	Ron Unger (775) 635-1100	✓	✓		Familiar w/terrorist mitigation
State Fire Marshall, VFD	Fuels Mitigation, public education	Battle Mountain VFD (775) 635-5102	✓	✓		Detailed knowledge of Vulnerability
Health/Human Services	Public Health Nurse	Brandy Bengoa (775)-635-2386	✓	✓		Familiar w/ epidemic and CDC grants, health capability
Nevada Gold Mines	Safety and Health Specialist	Victor Ortiz (775) 468-4695	✓	✓		Familiar with mining related health and safety, HAZMAT and emergency response

Table 66: Pershing County Mitigation Capability Assessment

PERSHING COUNTY						
Agency Name (Mission/ Function)	**Programs, Plans Policies, Regulations, Funding, or Practices**	**Point of Contact Name and Phone**	**Effect on Loss Reduction**			**Comments**
			Support	**Facilitate**	**Hinder**	
Building and Safety and Planning Department	Code Enforcement, Permitting, Flood Plain Mgmt.	James Evans (775) 273-2700	✓	✓		Engineering and Flood Management
Pershing County Economic Development Authority	Economic Development	Heidi E. Lusby-Angvick 775-273-4909	✓	✓		Planning support, loan programs, redevelopment programs, Brownfields programs
Road Dept.	Roads	Dan Hill (775) 273-7334	✓	✓		Roads and Culverts
Emergency Management	Emergency Management, Mitigation Plan	Sean Burke (703) 999-3901	✓	✓		Familiar w/mitigation grants, knowledge of vulnerability
School District	Identify and implement mitigation actions for school property	Russell Fecht (775) 273-7819	✓	✓		Familiar w/school district infrastructure
Sherriff's Office	Public Safety	Jerry Allen (775) 273-2641	✓	✓		Familiar w/terrorist mitigation
Health/Human Services	Public Health Nurse	Pershing County Community Health Nurse (775) 273-2041	✓	✓		Familiar w/ epidemic and CDC grants, health capability
Pershing County Department of Health	Health Officer	Dr. Kamin VanGuilder, MD (775) 273-2981	✓	✓		Familiar w/ epidemic and public health and medical emergencies
PCWCD	Director	Ryan Collins	✓	✓		Rya Patch Reservoir, drought, flooding and irrigation

Table 67: Lovelock Mitigation Capability Assessment

LOVELOCK						
Agency Name (Mission/ Function)	**Programs, Plans Policies, Regulations, Funding, or Practices**	**Point of Contact Name and Phone**	**Effect on Loss Reduction**			**Comments**
			Support	**Facilitate**	**Hinder**	
Building and Safety	Code Enforcement, Permitting, Flood Plain Mgmt.	James Evans (775) 273-2700	✓	✓		Engineering and Flood Management
Pershing County Economic Development Authority	Economic Development	Heidi E. Lusby-Angvick 775-273-4909	✓	✓		Planning support, workforce development, loan programs, redevelopment programs, Brownfields programs,
Water District	Water	Rusty Kiehl (775) 273-2387	✓	✓		Engineering, detailed knowledge of infrastructure
Police Dept.	Public Safety	Mike Mancebo (775) 273-2256	✓	✓		Familiar w/terrorist mitigation
State Fire Marshall, Fire Department	Fuels Mitigation, public education	Rodney Wilcox 775-273-2423	✓	✓		Detailed knowledge of Vulnerability
Department of Public Works	Water, sewer, roads	Steve Peters 775 (273) 2356				Detailed knowledge of public works and infrastructure

9.4.1 National Flood Insurance Program

DMA 2000 Requirements: Mitigation Strategy – National Flood Insurance Program
National Flood Insurance Program (NFIP) Compliance Requirement: §201.6(c)(3)(iii): [The mitigation strategy] must also address the jurisdiction's participation in the National Flood Insurance Program (NFIP), and continued compliance with NFIP requirements, as appropriate. **Element** ▪ Does the updated plan document how the planning team reviewed and analyzed this section of the plan and whether this section was revised as part of the update process? ▪ Does the new or updated plan describe the jurisdiction(s) participation in the NFIP?) ▪ Does the mitigation strategy identify, analyze and prioritize actions related to continued compliance with the NFIP? *Source: FEMA, March 2008.*

The Counties and Winnemucca have identified special flood-hazard areas. They entered the NFIP on the following dates:

- Humboldt – May 4, 1987
- Winnemucca – August 15, 1990
- Lander – April 5, 1983
- Pershing – June 17, 1991

Only Lander County participates in the Community Rating System (CRS). The CRS is a voluntary program for the NFIP-participating communities. The goals of the CRS are to reduce flood losses, to facilitate accurate insurance rating, and to promote the awareness of flood insurance. Currently Lander County is considered a CRS Class 8 community. Mitigation actions for flood in Lander County are detailed in Table 71, Mitigation Goals and Related Actions. There is one repetitive loss property and no severe repetitive loss properties (as defined by the NFIP) within the County or City. Current building code within the County and City restricts future building within a floodway.

10.0 MITIGATION STRATEGY

The following provides an overview of the four-step process for preparing a mitigation strategy: developing mitigation goals, identifying and analyzing potential actions, prioritizing mitigation actions, and implementing an action plan.

10.1 MITIGATION GOALS AND OBJECTIVES

The requirements for the local hazard mitigation goals, as stipulated in the DMA 2000 and its implementing regulations, are described below.

DMA 2000 Requirements: Mitigation Strategy – Local Hazard Mitigation Goals

Local Hazard Mitigation Goals

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

Element

- Does the new or updated plan include a description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards?

Source: FEMA, March 2008.

Mitigation goals are defined as general guidelines that explain what a community wants to achieve in terms of hazard and loss prevention. Goal statements are typically long-range, policy-oriented statements representing community-wide visions. The Planning Teams from each County developed 7 goals to reduce or avoid long-term vulnerabilities to the identified hazards. Goals are listed in Table 68.

Table 68: Mitigation Goals

Goal Number	Goal Description
1	Build and support local capacity to enable the public to prepare for, respond to, and recover from disasters
2	Reduce the possibility of damage and losses due to drought
3	Reduce the possibility of damage and losses due to earthquakes
4	Reduce the possibility of damage and losses due to floods
5	Reduce the possibility of damage and losses due to wildfires
6	Reduce the possibility of damage and losses due to a HAZMAT event
7	Reduce the possibility of damage and losses due to epidemic/pandemic

10.2 IDENTIFYING MITIGATION ACTIONS

The requirements for the identification and analysis of mitigation actions, as stipulated in the DMA 2000 and its implementing regulations, are described below.

DMA 2000 Requirements: Mitigation Strategy

Identification and Analysis of Mitigation Actions

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

Element

- Does the plan identify and analyze a comprehensive range of specific mitigation actions and projects for each hazard?
- Do the identified actions and projects address reducing the effects of hazards on new buildings and infrastructure?
- Do the identified actions and projects address reducing the effects of hazards on existing buildings and infrastructure?
- Does the mitigation strategy identify actions related to the participation in and continued compliance with the NFIP?

Source: FEMA, March 2008.

Mitigation actions are usually grouped into six broad categories: prevention, property protection, public education and awareness, natural resource protection, emergency services, and structural projects. Individual members of the Planning Committee were tasked to provide mitigation actions. Table 69 through Table 71 "*Mitigation Goals and Actions*" list the goals and associated actions selected for this HMP.

Table 69: Humboldt County Mitigation Goals and Actions

Goals	Action	New or Existing Infrastructure and Buildings	Description
#1. Build and support local capacity to enable the public to prepare for, respond to, and recover from disasters	1.1	E	Incorporating risk assessment and hazard mitigation principles into comprehensive planning efforts.
	1.2	E	Incorporating a stand-alone element for hazard mitigation into the local comprehensive (land use) plan.
	1.3	N & E	Incorporating hazard mitigation into broader growth management (i.e., Smart Growth) initiatives.
	1.4	N	Incorporating a hazard risk assessment into the local development and subdivision review process.
	1.5	E	Adding hazard mitigation measures to existing adequate public facilities (APF) tests and programs.
#2 Reduce the possibility of damage and losses due to drought	2.1	E	Increase drought awareness in schools
	2.2	N & E	Improved transmission lines and more efficient irrigation
	2.3	N & E	Developing a drought communication plan and early warning system to facilitate timely Communication of relevant information to officials, decision makers, emergency mangers and the general public
	2.4	N	Developing agreements for secondary water sources that may be used during drought conditions

#3 Reduce the possibility of damage and losses due to earthquakes	3.1	N & E	Increased training, planning and code enforcement
	3.2	E	Retrofit of historic buildings including courthouse as well as Winnemucca grammar school and Paradise valley school
	3.3	E	Continue to participate in Great NV Shake Out program in schools
#4 Reduce the possibility of damage and losses due to floods	4.1	E	Identify improvements to Rye Patch Dam which is classified as a High Hazard Dam by NDWR
	4.2	N	Developing a floodplain management or Storm Drain Master plan including modeling and mapping and updating it regularly
#5 Reduce the possibility of damage and losses due to wildfires	5.1	N & E	Fuel reduction and fire breaks in areas with increased population
	5.2	N	Purchase defensible space machinery
	5.3	N	Setup and enforce a defensible space and vulnerable vegetation control system around homes, facilities and utility lines
#6 Reduce the possibility of damage and losses due to a HAZMAT event	6.1	E	Additional training exercises to build HAZMAT response capability of local emergency responders
	6.2	N	Additional equipment to build HAZMAT response capability of local emergency responders
#7 Reduce the possibility of damage and losses due to epidemic/pandemic	7.1	N & E	Develop policy to improve response to epidemic and health emergencies
	7.2	N & E	Develop and improve existing testing and vaccination programs and staffing for those programs
	7.3	E	Provide public information
	7.4	N & E	Increase PPE stockpiles

Table 70: Pershing County Mitigation Goals and Actions

Goals	Action	New (N) or Existing (E) Infrastructure and Buildings	Description
#1. Build and support local capacity to enable the public to prepare for, respond to, and recover from disasters	1.1	N & E	Develop redundant communication infrastructure
	1.2/3.4	N	Adopt and enforce building codes and development standards- International Building Code (IBC) and International Residential Code (IRC) in both the City and County Offices. Copies of code made available in public library.
#2 Reduce the possibility of damage and losses due to drought	2.1	N & E	Improve monitoring equipment along Humboldt River to identify factors that affect severity of drought and identify available water supplies (Rose Creek Gauge)
	2.2	E	Make waterways and canals of Lovelock Irrigation System Impermeable, concrete or fully lined
	2.3	E	Educate and enforce water conservation methods for leak detection and benefits of gray water systems

Goals	Action	New (N) or Existing (E) Infrastructure and Buildings	Description
	2.4	E	Notify Public of drought conditions with local TV, advertise water saving tips
#3 Reduce the possibility of damage and losses due to earthquakes	3.1	E	Additional equipment and training to conduct search and rescue in earthquake damage debris for local emergency responders
	3.2	N	Additional training on building code enforcement for the building department
	3.3	N & E	Educating homeowners about structural and non-structural retrofitting of vulnerable homes and encouraging retrofit
#4 Reduce the possibility of damage and losses due to floods	4.1	N & E	Improve storm water management planning - rainwater and snowmelt can cause flooding and erosion. Prepare and adopt a stormwater drainage plan and ordinance
	4.2	N	Encouraging the use of permeable driveways and surfaces to reduce runoff and increase groundwater recharge
	4.3	N & E	Adopting erosion and sedimentation control regulations for construction and farming
	4.4	E	Improve stormwater drainage system capacity- conduct regular maintenance for drainage systems and flood control Structures
	4.5	E	Protect Critical Facilities from flooding
	4.6	E	Increase awareness of flood risk and safety
	4.7	E	Educate property owners about Flood Mitigation techniques
#5 Reduce the possibility of damage and losses due to wildfires	5.1	E	Wildfire-Setup and enforce a defensible space and vulnerable vegetation control system around homes, facilities, and utility lines
	5.2	E	Wildfire-Focus on fuels reduction projects particularly in higher population areas
#6 Reduce the possibility of damage and losses due to a HAZMAT event	6.1	N & E	Additional training exercises to build HAZMAT response capability of local emergency responders
	6.2	N	Additional equipment to build HAZMAT response capability of local emergency responders
#7 Reduce the possibility of damage and losses due to epidemic/pandemic	7.1	E	Pandemic- develop policy to improve response to epidemic and health emergencies
	7.2	N	Pandemic- develop and improve existing testing and vaccination programs and staffing for those programs
	7.3	E	Pandemic- Provide public information
	7.4	N & E	Pandemic- Increase PPE stockpiles

Table 71: Lander County Mitigation Goals and Actions

Goals	Action	New or Existing Infrastructure and Buildings	Description
#1 Build and support local capacity to enable the public to prepare for, respond to, and recover from disasters	1.1	E	Incorporating risk assessment and hazard mitigation principles into comprehensive planning efforts.
	1.2	E	Incorporating a stand-alone element for hazard mitigation into the local comprehensive (land use) plan
	1.3	E	Involving citizens in comprehensive planning activities that identify and mitigate hazards.
#2 Reduce the possibility of damage and losses due to drought	2.1	E	Drought Conservation Plan
	2.2	E	Development of a plan for public outreach and education for drought and water conservation
#3 Reduce the possibility of damage and losses due to earthquakes	3.1	N & E	Seismic retrofit of the County Courthouse including strengthening of brick facade
	3.2	N & E	Seismic retrofit of historical buildings in Austin including strengthening of brick facade
	3.3	E	Participation in "Great Nevada Shake Out" for the purpose of public outreach and education
#4 Reduce the possibility of damage and losses due to floods	4.1	N & E	Reconstruct the Battle Mountain levees
	4.2	E	Flash flood study
#5 Reduce the possibility of damage and losses due to wildfires	5.1	N & E	Defensible space project for Austin and Kingston
#6 Reduce the possibility of damage and losses due to a HAZMAT event	6.1	E	Complete additional training and mock emergency
	6.2	E	Review and update Emergency Operations Plan
#7 Reduce the possibility of damage and losses due to epidemic/pandemic	7.1	N & E	Improve response capabilities
	7.2	N & E	Improve testing and vaccination capabilities and staffing
	7.3	E	Provide additional public information
	7.4	N & E	PPE stockpiles

10.3 EVALUATING AND PRIORITIZING MITIGATION ACTIONS

The requirements for the evaluation and implementation of mitigation actions, as stipulated in DMA 2000 and its implementing regulations, are described below.

DMA 2000 Requirements: Mitigation Strategy - Implementation of Mitigation Actions

Implementation of Mitigation Actions

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

DMA 2000 Requirements: Mitigation Strategy - Implementation of Mitigation Actions
Element ▪ Does the mitigation strategy include how the actions are prioritized? (For example, is there a discussion of the process and criteria used?) ▪ Does the mitigation strategy address how the actions will be implemented and administered? (For example, does it identify the responsible department, existing and potential resources, and timeframe?) ▪ Does the prioritization process include an emphasis on the use of a cost-benefit review (see page 3-36 of *Multi-Hazard Mitigation Planning Guidance*) to maximize benefits?
Source: FEMA, March 2008.

The mitigation actions were finalized during the County Planning Committee meetings. At this time the Planning Committees evaluated and prioritized each of the actions. To complete this task, the Planning Committees completed the STAPLE+E evaluation criteria using rankings of one for lowest and five for highest priority, acceptance, feasibility etc. The rankings for each action were totaled and the actions with the highest number of points were evaluated by the committee. See Table 72 for the evaluation criteria.

Table 72 STAPLE+E Evaluation Criteria for Mitigation Actions

Evaluation Category	Discussion "It is important to consider..."	Considerations
Social	The public Support for the overall mitigation strategy and specific mitigation actions	Community acceptance; adversely affects population
Technical	If the mitigation action is technically feasible and if it is the whole or partial solution	Technical feasibility; Long-term solutions; Secondary impacts
Administrative	If the community has the personnel and administrative capabilities necessary to implement the action or whether outside help will be necessary	Staffing: Funding allocation; Maintenance/operations
Political	What the community and its members feel about issues related to the environment, economic development, safety, and emergency management	Political support; Local champion; Public support
Legal	Whether the community has the legal authority to implement the action, or whether the community must pass new regulations	Local, State, and Federal authority; Potential legal challenge
Economic	If the action can be funded with current or future internal and external sources, if the costs seem reasonable for the size of the project, and if enough information is available to complete a FEMA Benefit Cost Analysis	Benefit/cost of action; Contributes to other economic goals; Outside funding required; FEMA Benefit Cost Analysis
Environmental	The impact on the environment because of public desire for a sustainable and environmentally healthy community	Effect on local flora and fauna; Consistent with community environmental goals; Consistent with local, State and Federal laws

Mitigation actions were selected that best fulfill the goals of the HMP and were appropriate and feasible to implement during the 5-year lifespan of this version of the HMP. Actions were selected based on the following criteria:

- Actions that strengthen, elevate, relocate, or otherwise improve buildings, infrastructure, or other facilities to enhance their ability to withstand the damaging impacts of future disasters
- Actions in which the benefits (which are the reduction in expected future damages and losses) are greater than the costs considered as necessary to implement the specific action
- Actions that either address multi-hazard scenarios or address a hazard that present the greatest risk to the jurisdiction

The selected actions are shown in **Table 73** through **Table 75**.

10.4 IMPLEMENTING THE MITIGATION ACTION PLAN

A Mitigation Action Plan Matrix was prepared for the Counties detailing the priority of the mitigation actions, how the overall benefit-cost were taken into consideration, and how each mitigation action will be implemented and administered. Mitigation priorities established through the Staple+E worksheet activity and corresponding committee discussion are incorporated into the Mitigation Action Plan Matrix. Actions were categorized by the committees into Low, Moderate and High priority levels. Implementation timelines have been extended somewhat to allow for emergency response to the continuing Covid-19 emergency at the time of this Plan Update.

Table 73: Humboldt County Mitigation Action Planning Matrix

Action No.	Action Item	Department/Division	Potential Funding Source	Implementation timeline	Economic Justification	Priority Level
1.1	Incorporating risk assessment and hazard mitigation principles into comprehensive planning efforts.	County and City Planning, Engineering	Local funding, NEHRP, BRIC	24-36 months	Protection of lives and property	High
1.2	Incorporating a stand-alone element for hazard mitigation into the local comprehensive (land use) plan.	County and City Planning, Engineering	Local funding, NEHRP, BRIC	24-36 months	Protection of lives and property	High
1.3	Incorporating hazard mitigation into broader growth management (i.e., Smart Growth) initiatives.	County and City Planning, Engineering	Local funding, NEHRP, BRIC	24-36 months	Protection of lives and property	High
1.4	Incorporating a hazard risk assessment into the local development and subdivision review process.	County and City Planning, Engineering	Local funding, NEHRP, BRIC	24-36 months	Protection of lives and property	High
1.5	Adding hazard mitigation measures to existing adequate public facilities (APF) tests and programs.	County and City Planning and Engineering	Local funding, NEHRP, BRIC	24-36 months	Protection of lives and property	High
2.1	Increase drought awareness in schools	County and City Planning, Humboldt County School District	NDEP, Local Funding	12-36 months	Protection of lives and property	Moderate
2.2	Improved transmission lines and more efficient irrigation	County and City Planning and Engineering, Public Works	NDEP, Local Funding BLM, USDA, NDEP, HUD	24-48 months	Protection of lives and property	High
2.3	Developing a drought communication plan and early warning system to facilitate timely Communication of relevant information to officials, decision makers, emergency mangers and the general public	County and City Planning and Engineering, Public Works, emergency Manager, LEPC	NDEP, Local Funding, USDA	12-24 months	Protection of lives and property	High
2.4	Developing agreements for secondary water sources that may be used during drought conditions	County and City Planning and Engineering	NDEP, Local Funding, USDA	12-48 months	Protection of lives and property	High
3.1	Increased training, planning and code enforcement	County and City Planning, Engineering	Local funding, NEHRP, BRIC	24-36 months	Protection of lives and property	High

Action No.	Action Item	Department/Division	Potential Funding Source	Implementation timeline	Economic Justification	Priority Level
3.2	Retrofit of historic buildings including courthouse as well as Winnemucca grammar school and Paradise valley school	County Engineer	USDA, HUD, PDM	24-48 months	Protection of lives and property	High
3.3	Continue to participate in Great NV Shake Out program in schools	County and City Planning, LEPC, Emergency Manager, Fire Dept., Sheriffs and Police Department	Local	Annual event	Protection of lives and property	Moderate
4.1	Identify improvements to Rye Patch Dam which is classified as a High Hazard Dam by NDWR	County and City Planning, County and City Engineering	USDA, USACE, NDEP	24-48 months	Protection of lives and property	Moderate
4.2	Developing a floodplain management or Storm Drain Master plan including modeling and mapping and updating it regularly	County and City Planning, County and City Engineering	USDA, USACE, NDEP	24-48 months	Protection of lives and property	High
5.1	Fuel reduction and fire breaks in areas with increased population	County and City Planning, LEPC, Emergency Manager, Fire Dept.	Local funding, USDA, BLM, US Fire Service	12 months	Protection of lives and property	High
5.2	Purchase defensible space machinery	County and City Planning, LEPC, Emergency Manager, Fire Dept.	USDA, BLM, US Fire Service	12 -36 months	Protection of lives and property	High
5.3	Setup and enforce a defensible space and vulnerable vegetation control system around homes, facilities, and utility lines	County and City Planning, LEPC, Emergency Manager, Fire Dept.	USDA, BLM, US Fire Service	12 -36 months	Protection of lives and property	High
6.1	Additional training exercises to build HAZMAT response capability of local emergency responders	NDOT, County Planning and Engineering, Fire Dept., Sheriffs Dept., Police Dept.	Hazardous Materials Grants Program (US DOT)	24-36 months	Protection of lives and property	High

Action No.	Action Item	Department/Division	Potential Funding Source	Implementation timeline	Economic Justification	Priority Level
6.2	Additional equipment to build HAZMAT response capability of local emergency responders	NDOT, County Planning and Engineering, Fire Dept., Sheriffs Dept., Police Dept.	Hazardous Materials Grants Program (US DOT)	24-36 months	Protection of lives and property	Moderate
7.1	Develop policy to improve response to epidemic and health emergencies	County Planning and Engineering, Fire Dept., Sheriffs Dept., Police Dept., Hospital	FEMA, and Extensive listings at: https://grant.nv.gov/covid_19_grants/	12-24 months	Protection of lives and property	High
7.2	Develop and improve existing testing and vaccination programs and staffing for those programs	County Planning and Engineering, Fire Dept., Sheriffs Dept., Police Dept., Hospital	FEMA, and Extensive listings at: https://grant.nv.gov/covid_19_grants/	12-24 months	Protection of lives and property	High
7.3	Provide public information	County Planning and Engineering, Fire Dept., Sheriffs Dept., Police Dept., Hospital	FEMA, and Extensive listings at: https://grant.nv.gov/covid_19_grants/	12-24 months	Protection of lives and property	High
7.4	Increase PPE stockpiles	County Planning and Engineering, Fire Dept., Sheriffs Dept., Police Dept., Hospital	FEMA, and Extensive listings at: https://grant.nv.gov/covid_19_grants/	12-24 months	Protection of lives and property	High

Table 74: Lander County Mitigation Action Planning Matrix

Action No.	Action Item	Department or Division	Potential Funding Source	Implementation timeline	Economic Justification	Priority Level
1.1	Incorporating risk assessment and hazard mitigation principles into comprehensive planning efforts.	County and City Planning, Engineering	Local funding, NEHRP, BRIC	24-36 months	Protection of lives and property	Moderate
1.2	Incorporating a stand-alone element for hazard mitigation into the local comprehensive (land use) plan	County and City Planning, Engineering	Local funding, NEHRP, BRIC	24-36 months	Protection of lives and property	Moderate
1.3	Involving citizens in comprehensive planning activities that identify and mitigate hazards.	County and City Planning, Engineering	Local funding, NEHRP, BRIC	24-36 months	Protection of lives and property	Moderate
2.1	Drought Conservation Plan	County and City Planning and Engineering, Public Works, emergency Manager, LEPC	NDEP, Local Funding, BRIC, FMA	12-24 months	Protection of lives and property	Moderate
2.2	Development of a plan for public outreach and education for drought and water conservation	County and City Planning and Engineering, Public Works, emergency Manager, LEPC	NDEP, Local Funding, BRIC, FMA	12-24 months	Protection of lives and property	Moderate
3.1	Seismic retrofit of the historic County Courthouse building including strengthening of brick facade	County and City Planning, Engineering, Community Groups, SHPO, NNHP	Local funding, NEHRP, BRIC	12-48 months	Protection of lives and property	Moderate
3.2	Seismic retrofit of historical buildings in Austin including strengthening of brick facade	County and City Planning, Engineering, Community Groups, SHPO, NNHP	Local funding, NEHRP, BRIC	12-48 months	Protection of lives and property	Moderate
3.3	Participation in “Great Nevada Shake Out” for the purpose of public outreach and education	County and City Planning, LEPC, Emergency Manager, Fire Dept., Sheriffs and Police Department	Local	Annual event	Protection of lives and property	Moderate

Action No.	Action Item	Department or Division	Potential Funding Source	Implementation timeline	Economic Justification	Priority Level
4.1	Reconstruct the Battle Mountain levees	County and City Planning, County and City Engineering	USDA, USACE, NDEP	24-48 months	Protection of lives and property	Moderate
4.2	Flash flood study	County and City Planning, County and City Engineering	USDA, USACE, NDEP	24-48 months	Protection of lives and property	Low
5.1	Defensible space project for Austin and Kingston	County and City Planning, LEPC, Emergency Manager, Fire Dept.	Local funding	12 months	Protection of lives and property	Moderate
6.1	Complete additional training and mock emergency trainings	NDOT, County Planning and Engineering, Fire Dept., Sheriffs Dept., Police Dept.	Hazardous Materials Grants Program (US DOT)	24-36 months	Protection of lives and property	Moderate
6.2	Review and update Emergency Operations Plan	County Planning and Engineering, Fire Dept., Sheriffs Dept., Police Dept.	FEMA, local funding	12-24 months	Protection of lives and property	Moderate
7.1	Improve response capabilities	County Planning and Engineering, Fire Dept., Sheriffs Dept., Police Dept., Hospital	FEMA, and Extensive listings at: https://grant.nv.gov/covid_19_grants/	12-24 months	Protection of lives and property	Moderate
7.2	Improve testing and vaccination capabilities and staffing	County Planning and Engineering, Fire Dept., Sheriffs Dept., Police Dept., Hospital	FEMA, and Extensive listings at: https://grant.nv.gov/covid_19_grants/	12-24 months	Protection of lives and property	Moderate
7.3	Provide additional public information	County Planning and Engineering, Fire Dept., Sheriffs Dept., Police Dept., Hospital	FEMA, and Extensive listings at: https://grant.nv.gov/covid_19_grants/	12-24 months	Protection of lives and property	Moderate

Action No.	Action Item	Department or Division	Potential Funding Source	Implementation timeline	Economic Justification	Priority Level
7.4	PPE stockpiles	County Planning and Engineering, Fire Dept., Sheriffs Dept., Police Dept., Hospital	FEMA, and Extensive listings at: https://grant.nv.gov/covid_19_grants/	12-24 months	Protection of lives and property	Moderate

Table 75: Pershing County Mitigation Action Planning Matrix

Action No.	Action Item	Department or Division	Potential Funding Sources	Implementation timeline	Economic Justification	Priority Level
1.1	Develop redundant communication infrastructure	Fire Department, Sherriff's Dept. Police Dept	SERC, NTIA, SLIGP, BRIC, local funding	12-60 months	Protection of lives and property	High
1.2/3.4	Adopt and enforce building codes and development standards- International Building Code (IBC) and International Residential Code (IRC) in both the City and County Offices.	County and City Planning and Engineering	Local Funding	12-24 months	Protection of lives and property	Moderate
2.1	Improve monitoring equipment along Humboldt River to identify factors that affect severity of drought and identify available water supplies	County and City Planning, Pershing County Water Conservation District (PCWCD)	EMPG, HMPG, BRIC	24-48 months	Protection of lives and property	Moderate
2.2	Make waterways and canals of Lovelock Irrigation System Impermeable, concrete or fully lined	PCWCD	USDA, USACE, NDEP	24-48 months	Protection of lives and property	High
2.3	Educate and enforce water conservation methods for leak detection and benefits of gray water systems	County and City Planning, Lovelock Meadows Water District	NDEP, Local Funding	12-36 months	Protection of lives and property	Moderate
2.4	Notify Public of drought conditions with local TV, advertise water saving tips	County and City Planning, Lovelock Meadows Water District, PCWCD	NDEP, Local Funding	12-36 months	Protection of lives and property	Low to Moderate
3.1	Additional equipment and training for local emergency responders to conduct search and rescue in earthquake damage debris	Fire Dept., Sheriffs Dept., Police Dept., County and County Planning, Pershing County Search and Rescue (SAR)	EMPG, HMPG, BRIC, NEHRP, local funding	24-36 months	Protection of lives and property	High
3.2	Additional training on building code enforcement for the building department	County and City Planning, Engineering	Local funding, NEHRP, BRIC	24-36 months	Protection of lives and property	High
3.3	Educating homeowners about structural and non-structural retrofitting of vulnerable homes and encouraging retrofit	County and City Planning, Engineering	Local funding, NEHRP, BRIC	24-36 months	Protection of lives and property	Moderate

Action No.	Action Item	Department or Division	Potential Funding Sources	Implementation timeline	Economic Justification	Priority Level
4.1	Improve storm water management planning. Prepare and adopt a stormwater drainage plan and ordinance	County and City Planning, Engineering	Local funding, HMGP, BRIC, FMA, CGBG	24-36 months	Protection of lives and property	Moderate
4.2	Encouraging the use of permeable driveways and surfaces to reduce runoff and increase groundwater recharge	County and City Planning	Local Funding, NDEP	12-36 months	Protection of lives and property	Moderate
4.3	Adopting erosion and sedimentation control regulations for construction and farming	County and City Planning, Engineering, PCWCD	Local Funding, NDEP, BRIC, FMA	24-36 months	Protection of lives and property	High
4.4	Improve stormwater drainage system capacity-conduct regular maintenance for drainage systems and flood control structures	County and City Planning, Engineering, PCWCD	Local Funding, NDEP, NRCS	12-48 months	Protection of lives and property	High
4.5	Protect Critical Facilities from flooding	County and City Planning, Engineering	Local Funding, NDEP, BRIC, FMA	24-36 months	Protection of lives and property	High
4.6	Increase awareness of flood risk and safety	County and City Planning	Local Funding, NDEP, BRIC, FMA	12-36 months	Protection of lives and property	High
4.7	Educate property owners about Flood Mitigation techniques	County and City Planning	Local Funding, NDEP, BRIC, FMA	12-36 months	Protection of lives and property	Moderate
5.1	Wildfire-Setup and enforce a defensible space and vulnerable vegetation control system around homes, facilities, and utility lines	City and County Planning, Fire Dept.	USFA, BLM, HMPG, BRIC, Local funding	24-36 months	Protection of lives and property	High
5.2	Wildfire-Focus on fuels reduction projects particularly in higher population areas	City and County Planning, Fire Dept.	USFA, BLM, HMPG, BRIC, Local funding	24-36 months	Protection of lives and property	High
6.1	Additional training exercises to build HAZMAT response capability of local emergency responders	NDOT, County Planning and Engineering, Fire Dept., Sheriffs Dept., Police Dept.	Hazardous Materials Grants Program (US DOT)	24-36 months	Protection of lives and property	High
6.2	Additional equipment to build HAZMAT response capability of local emergency responders	NDOT, County Planning and Engineering, Fire Dept.,	Hazardous Materials Grants Program (US DOT)	24-36 months	Protection of lives and property	High

Action No.	Action Item	Department or Division	Potential Funding Sources	Implementation timeline	Economic Justification	Priority Level
		Sheriffs Dept., Police Dept.				
7.1	Epidemic/Pandemic- develop policy to improve response to epidemic and health emergencies	County Planning and Engineering, Fire Dept., Sheriffs Dept., Police Dept., Hospital	FEMA, and Extensive listings at: https://grant.nv.gov/covid_19_grants/	12-24 months	Protection of lives and property	Moderate
7.2	Epidemic/Pandemic- develop and improve existing testing and vaccination programs and staffing for those programs	County Planning and Engineering, Fire Dept., Sheriffs Dept., Police Dept., Hospital	FEMA, and Extensive listings at: https://grant.nv.gov/covid_19_grants/	12-24 months	Protection of lives and property	Moderate
7.3	Epidemic/Pandemic- Provide public information	County Planning and Engineering, Fire Dept., Sheriffs Dept., Police Dept., Hospital	FEMA, and Extensive listings at: https://grant.nv.gov/covid_19_grants/	12-24 months	Protection of lives and property	Moderate
7.4	Epidemic/Pandemic- Increase PPE stockpiles	County Planning and Engineering, Fire Dept., Sheriffs Dept., Police Dept., Hospital	FEMA, and Extensive listings at: https://grant.nv.gov/covid_19_grants/	12-24 months	Protection of lives and property	High

SERC- State Emergency Response Commission	BRIC- Building Resilient Infrastructure and Communities Grant	NEHRP- National Earthquake Hazard Reduction Program- Earthquake State Assistance Program
NTIA- National telecommunications and Information Administration	USDA- United States Department of Agriculture	CDBG-Community Development Block Grant
SLIGP- State and Local Implementation Grant Program	USACE- U.S. Army Corps of Engineers	USFA = U.S. Fire Administration
HMGP- Hazard Mitigation Grant Program	NDEP- Nevada Division of Environmental Protection	BLM-Bureau of Land Management
EMPG- Emergency Management Performance Grant	FMA- Flood Mitigation Assistance Program	USDOT- U.S. Department of Transportation

11.0 PLAN MAINTENANCE

This section describes a formal plan maintenance process to ensure that the HMP remains an active and applicable document. It includes an explanation of how the various Counties and LEPC's intend to organize their efforts to ensure that improvements and revisions to the HMP occur in a well-managed, efficient, and coordinated manner.

The following three process steps are addressed in detail below:

- Monitoring, evaluating, and updating the HMP
- Implementation through existing planning mechanisms
- Continued outreach for public involvement

11.1 MONITORING, EVALUATING AND UPDATING THE PLAN

The requirements for monitoring, evaluating, and updating the HMP, as stipulated in the DMA 2000 and its implementing regulations, are described below.

DMA 2000 Requirements: Plan Maintenance Process - Monitoring, Evaluating, and Updating the Plan
Monitoring, Evaluating and Updating the 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.
Element
Does the new or updated plan describe the method and schedule for monitoring the plan? (For example, does it identify the party responsible for monitoring and include a schedule for reports, site visits, phone calls, and meetings?)
Does the new or updated plan describe the method and schedule for evaluating the plan? (For example, does it identify the party responsible for evaluating the plan and include the criteria used to evaluate the plan?)
Does the new or updated plan describe the method and schedule for updating the plan within the five-year cycle?
Source: FEMA 2008.

The County and City Emergency Managers recognize the need for plan maintenance and wanted to include tools into the plan for maintenance. The HMP was prepared as a collaborative effort between the County and City Emergency Management, the County Planning Departments, the Local Emergency Management Committees (LEPC) and the County Engineers. To maintain momentum and build upon this hazard mitigation planning effort, the Planning Committee will monitor, evaluate, and update the HMP. The Planning Committee will be responsible for implementing the Mitigation Action Plan. The County Emergency Manager along with the City Emergency Manager will serve as the primary points of contact and will coordinate all local efforts to monitor, evaluate, and revise the HMP.

The LEPC will conduct an annual review of the progress in implementing the HMP, particularly the Mitigation Action Plan. As shown in Appendix F, the Annual Review Questionnaire and Mitigation Action Progress Report will provide the basis for possible changes in the overall Mitigation Action Plan by refocusing on new or more threatening hazards, adjusting to changes to or increases in resource allocations, and engaging additional support for the HMP implementation. The County Emergency Manager will initiate the annual review one month prior to the month of date of adoption. The findings from this review will be presented annually to the County and City Managers. The review will include an evaluation of the following:

- Participation of County and City agencies and others in the HMP implementation.
- Notable changes in the County and City's risk of natural or human-caused hazards.
- Impacts of land development activities and related programs on hazard mitigation.
- Progress made implementing the Mitigation Action Plan (identify problems and suggest improvements as necessary).
- The adequacy of resources for implementation of the HMP.

The achievement of mitigation goals and the implementation of Mitigation Action Plan activities and projects will be evaluated during annual reviews. During each annual review, a Mitigation Action Progress Report will be submitted to the Planning Committee to provide a brief overview of mitigation projects completed or in progress since the last review. As shown in Appendix E, the report will include the current status of the mitigation project, including any changes made to the project, the identification of implementation problems and appropriate strategies to overcome them, and whether or not the project has helped achieve the appropriate goals identified in the plan.

In addition to the annual review, the Planning Committee will update the HMP every five years. To ensure that this occurs, in the third year following adoption of the HMP, the Planning Committee will undertake the following activities:

- Thoroughly analyze and update the County's and City's risk of natural and man-made hazards.
- Provide a new annual review (as noted above), plus a review of the three previous annual reports.
- Provide a detailed review and revision of the mitigation strategy.
- Prepare a new action plan with prioritized actions, responsible parties, and resources.
- Prepare a new draft HMP and submit it to the County and City Board for adoption.
- Submit an updated HMP to the Nevada State Hazard Mitigation Officer and FEMA for approval.

11.2 IMPLEMENTATION THROUGH EXISTING PLANNING MECHANISMS

The requirements for implementation through existing planning mechanisms, as stipulated in the DMA 2000 and its implementing regulations, are described below.

DMA 2000 Requirements: Plan Maintenance Process - Incorporation into Existing Planning Mechanisms
Incorporation into Existing Planning Mechanisms 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.
Element Does the new or updated plan identify other local planning mechanisms available for incorporating the requirements of the mitigation plan? Does the new or updated plan include a process by which the local government will incorporate the requirements in other plans, when appropriate?

DMA 2000 Requirements: Plan Maintenance Process - Incorporation into Existing Planning Mechanisms
Source: FEMA 2008.

After the adoption of the HMP, the Committee will continue to ensure that the HMP, in particular the Mitigation Action Plan, is incorporated into existing planning mechanisms. Each member of the Planning Committee will achieve this incorporation by undertaking the following activities:

- Conduct a review of the community-specific regulatory tools to assess the integration of the mitigation strategy. These regulatory tools are identified in Table **61**.
- Work with pertinent divisions and departments to increase awareness of the HMP and provide assistance in integrating the mitigation strategy (including the action plan) into relevant planning mechanisms. Implementation of these requirements may require updating or amending specific planning mechanisms.

11.3 CONTINUED PUBLIC INVOLVEMENT

The requirements for continued public involvement, as stipulated in the DMA 2000 and its implementing regulations, are described below.

DMA 2000 Requirements: Plan Maintenance Process - Continued Public Involvement
Continued Public Involvement 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.
Element Does the new or updated plan explain how **continued public participation** will be obtained? (For example, will there be public notices, an ongoing mitigation plan committee, or annual review meetings with stakeholders?)
Source: FEMA 2008.

The Counties are dedicated to involving the public directly in future revisions of the HMP. Hard copies of the HMP will be provided to each department. In addition, a downloadable copy of the plan and any proposed changes will be posted on the various County websites. The sites will also contain an e-mail address and phone number to which interested parties may direct their comments or concerns.

The Planning Committee will also identify opportunities to raise community awareness about the HMP and the County's and City's hazards. This could include attendance and provision of materials at sponsored events. Any public comments received regarding the HMP will be collected by the County and City Emergency Managers, included in the annual report to the County and City Manager, and considered during future HMP updates. A press release and public notice by the County and City will be issued each year before the annual maintenance meeting inviting the public to participate.

11.4 MONITORING PROGRESS OF MITIGATION ACTIVITIES

When the LEPC conducts the annual review of the progress in implementing the HMP, particularly the Mitigation Action Plan, progress on all mitigation activities will be assessed. As shown in Appendix F, the Annual Review Questionnaire and Mitigation Action Progress Report will provide the basis for possible changes in the overall Mitigation Action Plan by refocusing on new or more threatening hazards, adjusting to changes to or increases in resource allocations, and engaging additional support for the HMP implementation.

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APPENDIX A –ADOPTION RESOLUTIONS

Appendix A includes:

1. Pershing County Commissioners resolution
2. Lander County Commissioners resolution
3. Humboldt County Commissioners resolution
4. Pershing LEPC resolution
5. Humboldt LEPC resolution
6. Lander LEPC resolution

APPENDIX B – MAPS

Appendix B includes:

1. Humboldt County 100 Year Flood Map
2. Humboldt County 500 Year Flood Map
3. Humboldt County Earthquake Map
4. Humboldt County Fire Map
5. Humboldt County One Mile Radius Hazmat Facility Buffer
6. Humboldt County One Mile Wide Hazmat Highway Buffer
7. Humboldt County One Mile Wide Hazmat Railroad Buffer
8. Lander County 100 Year Flood Map
9. Lander County 500 Year Flood Map
10. Lander County Earthquake Map
11. Lander County Fire Map
12. Lander County One Mile Radius Hazmat Facility Buffer
13. Lander County One Mile Wide Hazmat Highway Buffer
14. Lander County One Mile Wide Hazmat Railroad Buffer
15. Pershing County 100 Year Flood Map
16. Pershing County 500 Year Flood Map
17. Pershing County Earthquake Map
18. Pershing County Fire Map
19. Pershing County One Mile Radius Hazmat Facility Buffer
20. Pershing County One Mile Wide Hazmat Highway Buffer
21. Pershing County One Mile Wide Hazmat Railroad Buffer

APPENDIX C – PLANNING PROCESS DOCUMENTATION: AGENDAS AND MINUTES

Appendix C Includes:

1. Humboldt County
    - Agenda and Sign-in 1-13-2020
    - Agenda and Minutes 8-24-2020
    - Agenda and Minutes 11-2-2020
    - Agenda 1-20-2021
    - County Commissioner's Meeting
2. Lander County
    - Meeting Minutes 3-10-2020
    - Sign in and Minutes 9-8-2020
    - Agenda 10-13-2020 (cancelled) /11-10-2020
    - Agenda 1-12-2021 (no quorum)/ Agenda 1-26-2021
    - County Commissioner's Meeting
3. Pershing County
    - Agenda, Sign-in and Minutes 5-28-20
    - Agenda 8-20-20
    - Agenda and Sign-in 10-21-2020
    - Agenda 1-13-2021
    - County Commissioner's Meeting 2-3-2021

APPENDIX D – PUBLIC PARTICIPATION

Appendix D includes:

1. Lovelock Miner Review Public Notices
2. Battle Mountain Bugle Public Notices
3. Humboldt Sun Public Notices
4. Pershing County Social Media Notices
5. Tri-County Hazard Mitigation Questionnaire
6. Tri-County Hazard Mitigation Questionnaire Results
7. Letters to neighboring Counties
8. Letter to Tri-County Public and Stakeholders

APPENDIX E – MEETING MATERIALS

Appendix E includes:

1. Hazard Profiling Worksheet
2. Mitigation Profiling Criteria
3. Hazard Mitigation Planning Overview
4. Meeting presentations and handout examples
5. Staple-E Evaluation Worksheet

APPENDIX F – PLAN MAINTENANCE DOCUMENTS

Appendix F includes:

1. Sample Press Releases for Annual Plan Maintenance Meeting
2. Mitigation Action Progress Report
3. Hazard Mitigation Plan Annual Review Questionnaire

Sample Press Releases for Annual Plan Maintenance Meeting

Humboldt County, Nevada will be meeting to review its Hazard Mitigation Plan. The plan assesses risks posed by natural and manmade disasters and identifies ways to reduce those risks. The plan is required under the Federal Disaster Mitigation Act of 2000 as a prerequisite for receiving certain forms of Federal disaster assistance. It can be found on the County's website at http://www.hcnv.us/

The purpose for the review is to determine if all elements of the plan meet the current hazard mitigation requirements of the County.

Public comments and participation are welcomed. For additional information or to request to participate, or to submit comments, please contact _______________, at (775) ___________ .

Lander County, Nevada will be meeting to review its Hazard Mitigation Plan. The plan assesses risks posed by natural and manmade disasters and identifies ways to reduce those risks. The plan is required under the Federal Disaster Mitigation Act of 2000 as a prerequisite for receiving certain forms of Federal disaster assistance. It can be found on the County's website at http://landercountynv.org/

The purpose for the review is to determine if all elements of the plan meet the current hazard mitigation requirements of the County.

Public comments and participation are welcomed. For additional information or to request to participate, or to submit comments, please contact _______________, at (775) ___________ .

Pershing County, Nevada will be meeting to review its Hazard Mitigation Plan. The plan assesses risks posed by natural and manmade disasters and identifies ways to reduce those risks. The plan is required under the Federal Disaster Mitigation Act of 2000 as a prerequisite for receiving certain forms of Federal disaster assistance. It can be found on the County's website at http://pershingcounty.net/

The purpose for the review is to determine if all elements of the plan meet the current hazard mitigation requirements of the County.

Public comments and participation are welcomed. For additional information or to request to participate, or to submit comments, please contact _______________, at (775) ___________ .

Mitigation Action Progress Report

Progress Report Period: ______________________ To: ______________________
Date Date

Project Title: ______________________ Project ID#: ______________________

Responsible Agency:

Address: ______________________

City: ______________________

Contact Person: ______________________

Phone #(s): ______________________ Email: ______________________

List Supporting Agencies and Contacts:

____

____

Total Project Cost: ______________________

Anticipated Cost Overrun/Underrun: ______________________

Date of Project Approval: ______________________ **Project Start Date:** ______________________

Anticipated Completion Date: ______________________

Description of the project (include a description of each phase, if applicable, and the time frame for completing each phase: ______________________

____

____

Milestones	Completed	Projected Date of Completion

Mitigation Action Progress Report (cont.)

Project Status:

- ☐ Project on schedule
- ☐ Project completed
- ☐ Project cancelled
- ☐ Project delayed*

*Explain ______________________________

____

Project on Schedule:

- ☐ Cost Unchanged
- ☐ Cost overrun**
- ☐ Cost underrun**

**Explain ______________________________

____

Summary of Progress for this Report:

A. What was accomplished during this reporting period?

____

____

____

B. What obstacles, problems, or delays did you encounter, if any?

____

____

____

C. How was each problem solved?

____

____

____

What are the next steps to be accomplished during the next reporting period?

____

____

____

____

Hazard Mitigation Plan Annual Review Questionnaire

Section	Questions	Yes	No	Comments
Planning Process	Are there internal or external organizations and agencies that have been invaluable to the planning process or to mitigation action?			
	Are there procedures (e.g., meeting announcement, plan updates) that can be done more efficiently?			
	Has the Steering committee undertaken any public outreach activities regarding the HMP or implementation of mitigation actions?			
Hazard Profiles	Has a natural and/or human-caused disaster occurred in this reporting period?			
	Are there natural and/or human-caused hazards that have not been addressed in this HMP and should be?			
	Are additional maps or new hazards studies available? If so, what have they revealed?			
Vulnerability Analysis	Do any new critical facilities or infrastructure need to be added to the asset lists?			
	Have there been changes in development patterns that could influence the effects of hazards or create additional risks?			
Mitigation Strategies	Are there different or additional resources (financial, technical, and human) that are now available for mitigation planning?			
	Are the goals still applicable?			
	Should new mitigation actions be added to a community's Mitigation Action Plan?			
	Do existing mitigation actions listed in a community's Mitigation Action Plan need to be reprioritized?			
	Are the mitigation actions listed in a community's Mitigation Action Plan appropriate for available resources?			