Sierra County, CA

Sierra County Operational Area
Local Hazard Mitigation Plan (LHMP)

December 2012
P. O. Box 530, Downieville, CA 95936

Acknowledgements

Howell Consulting would like to thank the County of Sierra Departments who participated in the planning and development of this document. Those departments are as follows:

- Sierra County Office of Emergency Services
- Sierra County Department of Public Works
- Sierra County Planning Department
- Sierra County Public Health
- Sierra County Environmental Health
- Sierra County Sheriff

Additionally, Howell Consulting, would like to thank the Sierra County Office of Emergency Services staff including, Tim Beals, Lee Brown and Miriam Dines, for their support and efforts with this planning project. Without their supreme coordination and solid professional relationships in Sierra County, this project would not have been successful.

The official Sierra County Local Hazard Mitigation Planning Team provided the oversight and dedication to this project that was required and without their commitment; this project would not be possible.

As with any working plan, this document represents planning strategies and guidance as understood as of the date of this plan's release.

Formal Plan Adoption Documentation

Sierra County plans to submit this Sierra County Operational Area Local Hazard Mitigation Plan (LHMP) to the Sierra County Board of Supervisors upon successful completion of state and federal review and conditional approval. Sierra County wishes to receive approval pending adoption in order to minimize costs to the County. The plan will be submitted to the Board of Supervisors as a regularly scheduled agenda item with room for additional public and departmental comment.

Our approach to this final element is due to the need to remain cost effective in the planning process. By receiving state and federal approval of the plan prior to going to the Board of Supervisors, we are able to go to the Board on a single date to finalize promulgation of this document. Copies of the resolution adopting this plan, the relevant section of the minutes from the Board of Supervisors meeting and roster of attendees from meeting will be included in Appendix B of this plan. The resolution will be inserted immediately after this page and before the Table of Contents.

The Sierra County Office of Emergency Services (OES) staff will be prepared to give an overview of the plan and will answer any questions related to the document development process and its contents.

Due to the size and nature of Sierra County, the County will be the lead agency for all future grant application submissions under the Hazard Mitigation Grant Program. The County has sufficient staff, fiscal experience and emergency management personnel to effectively utilize the grant funds as necessary.

(Resolution from Sierra County adopting the LHMP inserted here)

Table of Contents

This Page Intentionally Blank

Introduction and County Overview

Scope

Hazard mitigation is defined as sustained action taken to reduce or eliminate long-term risk to human life and property from hazards. Hazard mitigation planning is the process through which hazards that threaten communities are identified; and, likely impacts are determined, prioritized and implemented. This plan outlines the natural hazard mitigation planning process for Sierra County, identifies natural hazards and risks within Sierra County, and identifies the hazard mitigation strategy to reduce vulnerability and to help make the communities of Sierra County more disaster resistant and sustainable. Information in this plan can be used to guide and coordinate mitigation activities and local land use decisions.

The goals of the Sierra County Local Hazard Mitigation Plan are:

1. Reduce the impacts of natural hazards to human life, property, and the environment of Sierra County and its communities.
2. Emphasize cost effective individual, family and community mitigation measures to provide for a more disaster resistant community.
3. Implement mitigation actions through community involvement, building collaborative relationships, and inventory available resources.

The Sierra County LHMP is an Operational Area (OA) Single jurisdictional plan that covers the un-incorporated area and all of the political subdivisions within Sierra County, including the City of Loyalton.

Purpose of Plan

Each year natural disasters affect thousands of people, and taxpayers pay billions of dollars to help communities recover from the effects of those disasters. More often than not, disasters are predictable and more are repetitive. Due to changes in technology and available funding programs, some of what is predictable is now preventable. The money spent in mitigation, when available, can prevent or limit the scope of many of the known consequences of a natural disaster. Hazard mitigation planning creates safer communities by reducing loss of life and property damage. For example, the rigorous building standards adopted by communities across the country are saving the nation more than $1.1 billion a year in prevented flood damages. Additionally, hazard mitigation planning lessens the financial impact on individuals, communities, and society as a whole. For example, a recent study by the Multi-hazard Mitigation Council shows that each dollar spent on mitigation saves society an average of four dollars.

Sierra County recognizes that state, tribal and local governments are required to develop a hazard mitigation plan as a condition for receiving certain types of non-emergency disaster assistance, including funding for mitigation projects. The Robert T. Stafford Disaster Relief and Emergency Assistance Act (Public Law 93-288), as amended by the Disaster Mitigation Act of 2000, provides the legal basis for state, tribal, and local governments to undertake a risk-based approach to reducing risks from natural hazards through mitigation planning. Despite the limited resources in Sierra County, the political and governmental leadership of the County has committed to this process.

Mitigation plans form the foundation for a community's long-term strategy to reduce disaster losses and break the cycle of disaster damage, reconstruction, and repeated damage. The planning process is as important as the plan itself. It creates a framework for risk-based decision making to reduce damages to lives, property, and the economy from future disasters. This is especially important in a small county such as Sierra where every program dollar must be applied to the greatest efficacy.

County Overview

History

From the period of statehood on September 9, 1850 to the County's establishment on April 16, 1852, the area remained a part of Yuba County.

Sierra County is 980 square miles in size and has a population of 3,240 (as of the 2010 Census Data) and is California's second least populated county. Sierra County is known for its rugged terrain that ranges in elevation from 2,200' to 8,900'. The western side of the county is known for its deep canyons and lush forests, while the eastern side of the county possesses the largest valley in the Sierra Nevada range, the Sierra Valley.

Sierra County shares common borders with Yuba County, Nevada County, Plumas County, Lassen County, as well as Washoe County, Nevada. Sierra County is considered a vacation destination with 70% of its national forest system lands administered by the Plumas, Tahoe, and Toiyabe National Forests.

Sierra County's history is tied to that of the California Gold Rush (1848-1955). While prior to the discovery of gold, the area was the home to both the Maidu and Washoe Indians. It was the discovery of gold and subsequent gold rush that saw some 16,000 miners settling within the area between 1848 and 1860.

Communities in the eastern side of the county, with agriculture as their base, grew to provide commodities to the growing gold camps. As the gold rush diminished and with discoveries elsewhere, such as the Comstock Lode (1859), Sierra County's population slowly decreased.

One of the most visible relics of the area’s rich history is the 1885 Sheriff's Gallows that remains standing adjacent to the County’s Courthouse. California Registered Historic Landmark #972, a structure built for the specific execution of 19-year-old murderer James O'Neill and used only once, remains standing as a reminder of the area's colorful past.

Geography

Sierra County is located in the heart of the northern section of the Sierra Nevada on Highway 49. There are 980 square miles of unparalleled beauty, heavily forested canyons, the largest alpine valley in North America, wild rivers, unspoiled mountain lakes and streams, charming gold rush towns, and century old ranching and logging communities within the area.

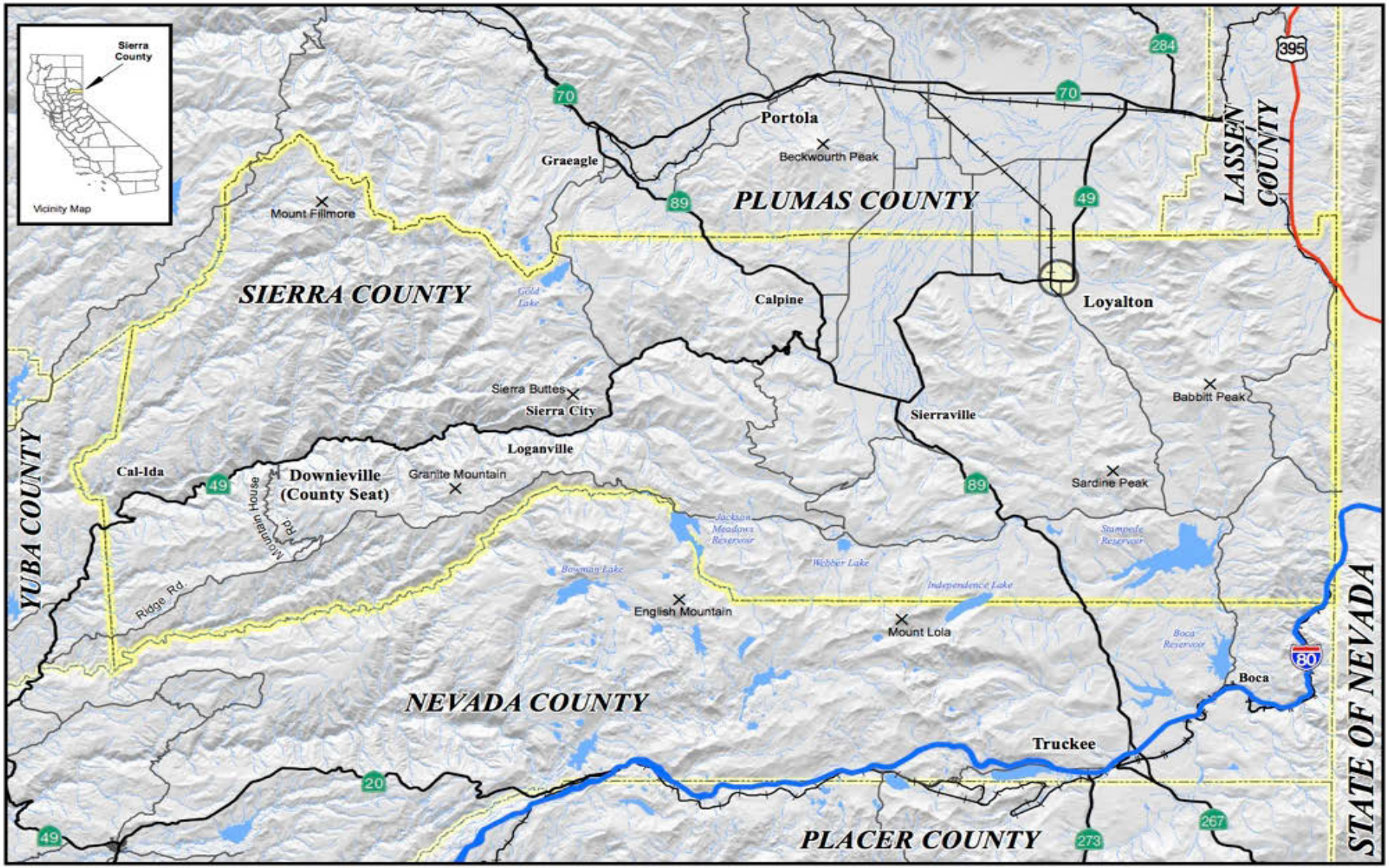
Green and heavily timbered, the western half of Sierra County and the county seat of Downieville, Goodyear’s Bar, Pike and Alleghany hold memories of the Gold Rush era. Historic buildings are abundant and there are many fine examples of rough-hewn 49er architecture. It remains much as it was over 100 years ago when the miners worked the rivers and mountains in

search of their fortune in gold. The majestic Sierra Buttes Mountains, a regional landmark overlooking Sierra City, reaches heights of 8,600 feet.

Sierra County claims more than 40 alpine lakes, most of them in the Sierra Buttes Lakes Basin Recreation area. Camping, fishing, hiking, mountain biking, kayaking, rafting, snowmobiling, cross-country skiing and other activities abound in a natural and tranquil setting.

Just across the 6,700-foot high Yuba Pass lays eastern Sierra County and the towns of Loyalton, Sierraville, Calpine and Sattley in the beautiful Sierra Valley. This 5000-foot elevation mountain valley reflects life as it used to be in much of the west. Herds of cattle graze amid century-old barns built by early ranchers.

Due to its extensive wetlands and location on a major flyway, the valley is a noted bird-watching location. Even rare bald eagles are seen here quite frequently. Sierra County shares the town of Verdi with Nevada in the southeastern corner of the county.



HOWELL CONSULTING

Print Date : April 14, 2012
Data Souces: Cal EMA

Sierra County Multi-Hazard Mitigation Plan
Planning Map

Highways Interstate
Highways State Route
Sierra County Boundary
Summits
Highways US Route
Roads Major & Minor
Railroads

0 2.5 5 10 Miles

Climate

Sierra County is easily accessible year round. During winter months, Highways 49 and 89 leading into the area are regularly maintained and the Yuba Pass rarely closes. A blanket of snow sparkles in the sunlight at the higher elevations. In spring and early summer, wildflowers are abundant in all areas of the county. Autumn colors are spectacular, and the mountain air is crisp and fresh.

Average Maximum Temperature

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
°C	9.2	10.6	12.0	15.7	20.7	25.6	29.9	29.6	26.5	21.1	12.5	9.0	18.5
°F	48.6	51.1	53.6	60.3	69.3	78.1	85.8	85.3	79.7	70.0	54.5	48.2	65.3

Soils and Geology

The soils are roughly divided into eastern and western sectors with the Yuba Pass drainage divide being the border between bedrock and alluvial soils. The great basin is an area of over 2000-foot thick dry lake basin that was filled in with alluvial soils for thousands of years. This has created an excellent agricultural area especially for grazing crops such as hay and grasses. However, this area also has an increased threat from earthquake shaking intensity for all manmade structures. The soils have also affected how drainage occurs once these alluvium soils become saturated. The basin floods due to the soil conditions creating rim land flooding, similar to an overflowing lake. Surrounding this basin and the western part of the county is a massive formation of granite bedrock. The soils on top of this bedrock tend to be thin based upon the weathering of the granite over time. The complexity of the topography has created an environment that encourages the growth of thick and productive forest. This bedrock area has been subject to incredible historic seismic forces but by its nature does not amplify shaking from fault ruptures. Conversely, flooding in this area can occur in almost any given year due to the lack of the soil's ability to absorb water, the steepness of the bedding plains, and the steepness of the drainages. Flooding in the western part of the county tends to be dramatic and is characterized by the rapid rises and falls of streams and rivers.

Population Trends and Demographics

As of the 2010 Census Bureau results, Sierra County has 3,240 residents. The area has an aging population with a median age as displayed in the table on the following page, near 51 years old. People ages 45-69 account for the majority of the population and there are more males within the area than females. The impact of this aging population in times of disaster increases the vulnerable effects of disasters which disrupt the day to day support structures in health and human services within Sierra County, thus the need for increased support from government at all levels.

Population by Age and Sex

Population by Age and Sex			
Age Composition	**Male**	**Female**	**Total**
TOTAL	1,646	1,594	3,240
Median Age	50.5	51.5	50.9
0-4 Years	69	78	147
5-9 Years	69	62	131
10-14 Years	92	64	156
15-19 Years	91	79	170
20-24 Years	64	54	118
25-29 Years	66	60	126
30-34 Years	58	59	117
35-39 Years	75	76	151
40-44 Years	91	93	184
45-49 Years	128	131	259
50-54 Years	155	157	312
55-59 Years	171	176	347
60-64 Years	177	169	346
65-69 Years	126	104	230
70-74 Years	76	90	166
75-79 Years	70	69	139
80-84 Years	33	35	68
85+	35	38	73

Source: 2010 U.S. Census Bureau Data

Household

According to 2010 U.S. Census data, Sierra County has 1,482 households as displayed in the table on the following page, where the average household size is 2.16 and the average family size is 2.67. Sierra County has more family households consisting of Husband-Wife families with children than single-person households.

Household Types

Household Types	
Household Types	**Number of Households**
Family households (families)	926
with children under 18 years	279
Husband-Wife Families	750
with children under 18 years	187
Male householder, no wife present	70
with children under 18 years	37
Female householder, no husband present	106
With children under 18 years	55
Nonfamily households	556
Living alone	463
Male	239
65 years or older	83
Female	224
65 years or older	113
Households with individual under 18 years	307
Households with individual 65 years and over	486

Source: 2010 U.S. Census Bureau Data

Housing Occupancy

The number of housing structures in Sierra County is 2,328 as of the 2010 U.S. Census and is noted in the table below.

Housing Occupancy

Housing Occupancy	
	2010
Total	**2,328**
Occupied housing units	1,482
Vacant housing units	846
For rent	50
Rented, not occupied	2
For sale only	33
Sold, not occupied	4
For seasonal, recreational or occasional use	648
All other vacant	109

Source: 2010 U.S. Census Bureau Data

Cultural Diversity
Sierra County exhibits slow growing diversity; its racial and ethnic characteristics experienced minimal shifting between the years 2000 and 2010 as displayed in the table below.

Population by Race and Hispanic Origin

Population by Race and Hispanic Origin									
Year	Total	White	Black	AIAN	Asian	NHOPI	Other Races	Two or More Races	Hispanic Origin
2000	3,555	3,348	7	67	6	3	37	87	213
2010	3,240	3,022	6	44	12	2	75	79	269

Source: 2000 and 2010 U.S. Census Bureau Data

AIAN: American Indian and Alaska Native;
NHOPI: Native Hawaiian and Other Pacific Islander.
Note: Persons of Hispanic Origin can be of any race.

Geopolitical Jurisdiction

Sierra County Government
Despite Sierra County's rural areas and sparse population, a fully functional government oversees a multitude of issues through fourteen departments. These departments undertake basic functions, such as the Department of Health and Human Services, to the more unique areas of planning with the Department of Planning and Transportation.

Cities and Towns
There is one incorporated city, which is the City of Loyalton. The following areas of Sierra County: Alleghany, Bassett's-Green Acres, Calpine, Downieville, Forest City, Goodyear's Bar, Indian Valley, Pike City, Sattley, Sierra Brooks, Sierra City, Sierraville and Verdi are identified as a *Census Designated Place* by the U.S. Census Bureau.

Incorporated City
City of Loyalton
Loyalton was originally known as Smith's Neck. The sentiment of loyalty to the Union Cause during the Civil War in 1863, led to changing the name to Loyalton. In 1901, Loyalton was incorporated as a dry town; the size was set at 50.6 square miles. At that time, it was California's second largest city after Los Angeles. Today, Loyalton is the only incorporated city in Sierra County.

Because Loyalton is Sierra County's most populous municipality and its only incorporated city, generally half of the meetings of the County's Board of Supervisors are held in Downieville (the county seat) and the other half are held in Loyalton.

Census Designated Areas

Alleghany

The community of Alleghany was named in 1859 for the Alleghany Tunnel mine that fueled the growth of the town when it struck gold four years earlier. The mine itself was named for the Allegheny River.

It is situated in the Gold Country and continues to be a significant locale for gold mining. The famous Sixteen-to-One Mine has been in operation since the days of the California Gold Rush. The town is 20 miles (32 km) from the nearest highway (California State Route 49) and consists largely of a single main street. The town is home to a post office, a bar (Casey's Place), and a mining museum.

Bassett's-Green Acres

Bassett's-Green Acres is a subdivision that is fully contained within the Sierra City zip code. Bassetts-Green Acres is an area with mostly private homes and local businesses. Green Acres is unique in that it is a Home Owner's Association (HOA) that maintains its own road and has very few year round residents.

Calpine

Calpine sits at an elevation of 5,689 feet (1,734 m). The town was founded to support the Davies-Johnson Lumber Mill around 1919. From 1921 until 1940, a branch of the Western Pacific Railroad served the town and the mill, working out of Portola, California. The timber stocks were gone by 1939 and the mill closed soon after.

Downieville

Downieville was settled in late 1849 during the California Gold Rush and was first known as "The Forks" for its geographical location; and, shortly thereafter was renamed after Major William Downie (1820-1893), a Scotsman who led the expedition up the North Fork of the Yuba River and who was the town's first mayor. Major Downie's travels are documented in his 1893 autobiography, "Hunting for Gold." Downieville reached a peak population of over 5,000 people in 1851 earning the distinction of being California's fifth-largest town; but the population sharply declined by 1865. Downieville is situated at the confluence of the Downie River and North Fork of the Yuba River.

Downieville was vying to become the State Capital of California along with fifteen other California communities in 1853 before the Capital was moved to Benicia, and then shortly thereafter to its current location in Sacramento. In July 1851, Downieville gained a distinction it may not have wanted when a mob lynched a Mexican woman, known as Juanita, for the murder of a white miner. It remains the only lynching of a female in California history.

The northern mines area was populated by a number of gold rush camps with colorful names, places like Brandy City, Whiskey Diggins, Poverty Hill, and Poker Flat. While many of these camps entirely disappeared after the gold rush, Downieville survived due both to its geographical location and status as the seat of Sierra County government.

Forest City
Forest City was established in 1852 and within two years had a population of over 1,000. The exceedingly rich and easily accessible gold claims continued to pay until the 1860s when much of the gold was worked out of the gravels. Like most early settlements, fires ravaged the town during its early years, but there are still many historic buildings and sites to see including a general store, a dance hall, a schoolhouse, and a church.

Goodyear's Bar
Goodyear's Bar was named for two brothers by the names of Miles and Andrew, who came looking for gold in 1849. In 1862, there were 3,000 to 5,000 people, and 51 businesses in town, with gold being the main economy. The town burned in 1864 and was never rebuilt, except for the post office, which is still in operation. Historic buildings remaining include the Helms' St. Charles Inn, a B&B, and the School House, now a community center that serves as a church.

Indian Valley
Indian Valley is a recreational area with a general store, multiple campgrounds and several homes. The population in Indian Valley varies greatly with the seasons, with peak season being the summer camping season.

Pike City
Pike City is an old town that has one fire station and several residences. Pike City is now a bedroom community with a small volunteer fire department. This community has extremely high wildfire dangers with high fuel loads.

Sattley
Sattley, formerly known as Church's Corners, is located on California State Route 49 and California State Route 89 southwest of Loyalton. Sattley was named after resident Harriet Sattley Church.

Sierra Brooks
Sierra Brooks is a subdivision outside the city limits of Loyalton. The community has one fire station and it's own water system.

Sierra City
Before the California Gold Rush, only Native Americans had ventured into the area, which lies northwest of Lake Tahoe on the western slope of the Sierra Nevada, and which lays between areas inhabited by Maidu, Nisenan, and Washoe peoples (Pre-Contact Tribal Map). The area is now part of the Tahoe National Forest.

A settlement of Sierra City was established in 1850 by Philo A. Haven and Joseph Zumwalt, who were also involved with the settling of Downieville (Sinnott). In the winter of 1852-53, however, an avalanche of snow destroyed the settlement, which was not rebuilt for several years. Ferdinand, Gustav, and Christian Reis purchased several mining claims near the Sierra Buttes and began to resettle Sierra City, which had a peak population of 3,000 during the decade after gold was discovered in California.

Sierraville
Sierraville is at the southern end of the huge Sierra Valley, which is used primarily as pasture and is also located at the junction of California State Route 49 and California State Route 89 southwest of Loyalton. The Sierraville post office opened under the name Sierra Valley in 1862 and became known as the Sierraville post office in 1899. It is the site of the only traffic signal (a flashing red light) in Sierra County.

Verdi
Verdi is on the California/Nevada state line, with less than 25% of Verdi resides in Sierra County. There is a gas station, residential area and a trailer park. Verdi is prone to wildland fires and flash flooding.

School Districts
There is one district, the Sierra Plumas Unified School District, within Sierra County. The District serves all of Sierra County and the eastern quarter of Plumas County. A five-person Board governs the school district and each member of which represents a defined geographical area of the District. The School District Board also serves as the Sierra County Board of Education.

There are five schools within the district that are referenced in the table below**:**

Sierra County Schools

Sierra County Schools	
School	Cities and Towns
Downieville Schools	Downieville, Sierra City, Goodyear's Bar, and surrounding rural areas
Loyalton Elementary School	Loyalton, rural areas of Sierra City and (Vinton and Chilcoot in Plumas Co.)
Loyalton Middle School	Loyalton, rural areas of Sierra City and (Vinton and Chilcoot in Plumas Co.)
Loyalton High School	Eastern section of Sierra and Plumas Counties
Sierra Pass Continuation High School	Sierra County

Source: Sierra County Schools

Fire Protection Districts
The Sierra Nevada Mountain Range bisects within the County of Sierra creating two distinct geographic areas with some topographic differences. These areas are referred to as the 'Westside' and the 'Eastside'. Both of these areas boast heavily forested and mountainous

lands and, for the most part, Sierra County's human population resides in these areas. An outline of the various fire response entities is provided on the following pages.

'Westside' Fire Protection

- **Downieville Fire District**
  - Two Stations
  - Serves from Goodyear's Bar in the West to the Sierra-Plumas County line to the North and to approximately half the distance between Downieville and Sierra City to the East.
- **Pliocene Ridge Service District**
  - Two Stations
    - One each in the communities of Pike and Alleghany
  - Serves communities of Pike and Alleghany along Pliocene Ridge Road and some outlying residents
- **Sierra City Fire Protection District**
  - One Station
  - Serves from just below Fournier Ranch to the West, Sierra-Plumas County line to the North, to Milton Reservoir to the South, and to Yuba Pass to the East. This area includes response to Bassetts, Green Acres, and many campgrounds and resorts that lay in the Sardine, Salmon, and Gold Lakes area along SR 49 and Gold Lakes Highway

'Eastside' Fire Protection

- **Sierra County Fire Protection District #1**
  - Stations 3
    - Sattley
    - Sierraville
    - Calpine
  - Service Area encompasses are the communities of Calpine, Sattley, Sierraville and the area of Verdi which is not in the State of Nevada. The entire area can be viewed on a detailed fire map found at the Sierra County OES.
- **City of Loyalton Fire Department**
  - Stations 2
  - City of Loyalton and Sierra Brooks subdivision

Public Hospitals

Sierra County has two medical clinics: 1) Eastern Plumas Healthcare – Loyalton Center, and 2) Western Sierra Medical Clinic - Downieville.

Sierra County Public Health Department operates clinics in both Downieville and Loyalton. They provide basic medical services such a flu shots and various testing services.

Utility Districts

There are several utility districts within Sierra County. Those are as follows:

- Downieville Public Utility District that supplies drinking water to the community.
- Sierra City has 11 independent water suppliers some serving as few as three or as many as 40 in that area.
- Pliocen Ridge Service District serves the community with street lighting, fire service and parks.
- Alleghany Water District provides water service to the community.

Other Special Districts

There is one wastewater treatment plant in the City of Loyalton. Also identified are other water and sewer districts that are responsible for managing wastewater needs of the community.

Calpine has one community services district.

Library System

The libraries that service Sierra County are in Plumas County. Additionally, there are some small county libraries located within Loyalton, Sierra City and Downieville.

Air Service

Sierraville-Dearwater Field Airport is a general aviation airport located southeast of Sierraville. The airport has one asphalt runway, 3,260 ft. (990 m) long by 50 ft. (15 m) wide.

Railroads and Rail Services

In the extreme northeastern part of Sierra County, a small portion of the Union Pacific Mainline transits Sierra County. There are no stations or routine freight service within the county.

Highway Infrastructure

Major Highways

- State Route 49 (Golden Chain Highway)
- State Route 89

County Routes and Roads

- County Route A23
- County Route A24 (Beckwith Road)
- Henness Pass Road – traverses entire county from west to east; links Graniteville in Nevada County with Verdi, Nevada
- Stampede Dam Road – links with Boca Reservoir near Truckee
- Gold Lake Road/Highway – links with SR 89 at Graeagle via Gold Lake

This Page Intentionally Blank

Element A: Planning Process

Requirement §201.6(b) An open public involvement process is essential to the development of an effective plan.

More often than not, communities are faced with having to deal with the aftermath of an unwanted hazard that can devastate areas of a community. While we cannot prevent disasters from happening, their effects can be reduced or eliminated through hazard mitigation planning, but only if a local government has the foresight to assess likely hazards and craft preventative measures before the next hazard event occurs. This chapter describes the planning process for the development of this plan in Sierra County.

The Sierra County OES recognized the need and importance of this plan and was responsible for its initiation and for securing funding through a Federal Emergency Management Agency (FEMA) Post Disaster Mitigation Grant. The County contracted with Howell Consulting in June 2011 to facilitate and develop a local, multi-hazard mitigation plan. Howell Consulting's role was to assist Sierra County in the following:

- Form a local hazard mitigation planning team to include key stakeholders and representatives;
- Follow FEMAs planning guidance and follow the requirements set forth in the Disaster Mitigation Act (DMA) of 2000;
- Facilitate the planning process and identify the data requirements;
- Facilitate the process for public involvement and input;
- Complete quarterly hazard mitigation grant reports in coordination with Sierra County OES;
- Work closely with the California Emergency Management Agency (Cal EMA) on the development and review of the plan, planning process and grant coordination;
- Ensure coordination with Cal EMA and FEMA Region on review, approval and formal adoption of the plan, by the Sierra County Board of Supervisors.

This plan is for the Sierra County Operational Area only; therefore, the only required resolution is from the Sierra County Board of Supervisors. Early on in the process it was determined by the planning team that due to the nature of the County and the commonality of threats faced throughout the area, this would be a single jurisdictional plan for the Sierra County Operational Area, which is comprised of all political subdivisions within Sierra County. The County has agreed to be the agent for any mitigation work completed within Sierra County, including the City of Loyalton.

Sierra County utilized many of FEMA's multi-hazard mitigation planning guidance documents including the *Planning How-To Guides* to structure the overall facilitation and development of the planning process. The following sections describe the planning process.

Element A.1. Planning Process

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.

The planning process officially began with a project introduction meeting in Downieville, California, on September 28, 2011 in coordination with the Sierra County Operational Area Council Meeting. The overall schedule for the project was discussed highlighting major project milestones and ending with the anticipated final draft plan submitted to FEMA for approval no later than December 1, 2012.

The process included a dynamic series of public workshops, geographically dispersed throughout the County to ease public involvement. The inclusion of the hazard mitigation planning process into various public meetings such as Board of Supervisors, Operational Area Council, Local and Regional Public Health, Fire Chief's, School Board, and the Transportation Commission meetings.

The Sierra County Operational Area Council is a regularly scheduled forum where emergency management issues are discussed, presented and recommended for approval by the Sierra County Board of Supervisors. At the conclusion of that meeting, the Sierra County OES staff distributed a formal invitation to key stakeholders, county, city, special districts, state and federal representatives to participate in the official planning team kickoff meeting in November 2011. Following the project introduction meeting, the first official kickoff meeting of the planning team occurred on November 8, 2011 in Loyalton, California. The planning team participants are listed below. Each member contributed to the planning process by attending meetings, providing facilities and information, collecting data for the plan, reviewing document drafts, assisted in managing administrative details and were always available to provide information and analysis during the planning process.

Sierra County Planning Team

Name	Title	Department	Jurisdiction
Tim Beals	Director	Office of Emergency Services	Sierra County
Miriam Dines	Administrative Staff	Office of Emergency Services	Sierra County
Lee Brown	OES Coordinator	Office of Emergency Services	Sierra County
Tim Beals	Director	Department of Public Works	Sierra County
Brian Davey	Deputy Director	Department of Public Works	Sierra County
Andrew Winberry	Director	Planning Department	Sierra County
LeTina Vanetti	Emergency Coordinator	Public Health	Sierra County
John Evans	Sheriff	Sheriff's Department	Sierra County
Elizabeth Morgan	Coordinator	Environmental Health	Sierra County
Lee Brown	Fire Chief	Downieville Fire District	Downieville
Bryan Davey	Fire Chief	Sierra City Fire Protection District	Sierra City
JeriLyn Anderson	Emergency Services Coordinator	Inland Region	California Emergency Management Agency

Name	Title	Department	Jurisdiction
Steve Folsom	Designated Representative		California Department of Transportation
Mike Frecshetti	Director	Sierra County Fire Safe and Watershed Council	Sierra County
Richard Ludke	Designated Representative		United States Forest Service

At the official kickoff meeting of the planning team held in Loyalton, information was presented on the purpose of the plan, the overall scope of the project, the schedule for the plan development, the planning process, public involvement and outreach, and the need for multi-jurisdictional coordination, participation and communication. The planning team meeting participants were lead through a series of discussions to gain data to support the plan such as historic hazards affecting Sierra County, risk, current capabilities and mitigation actions and strategies.

The next meeting held was the planning process update meeting held on March 5, 2012. This meeting discussed items such as the public survey and the flu shot clinic results, the hazard identification and risk assessment profiles and the proposed public meeting schedule. The next meeting of the official planning team occurred on May 8, 2012 and primarily focused on mitigation strategies, goals and objectives. This meeting was highly productive and a comprehensive list of strategies were developed on behalf of the planning team. After this meeting in June the plan draft was presented to the planning team and there were two public meetings held to preview that draft to the citizens, contiguous jurisdictions, business, non-governmental partners in both Downieville and Loyalton. The plan was submitted to the county for review at the end of June 2012. The plan then stayed under review with the county until December 2012 and then was submitted to Cal EMA for review and submission to FEMA by the consultant.

The draft plan was reviewed by the Director of Emergency Services, the Emergency Services Manager, the Public Health Emergency Services Coordinator, the Downieville Fire Chief and several other key county staff, such as the Planning Department head and the Sheriff. A presentation on the draft plan was provided at the final planning team meetings as part of the planning process.

The planning committee communicated during the planning process with a combination of in-person meetings, teleconference calls, email correspondence and an online documents/data sharing site. The meeting topics along with sign-in sheets and agendas are located in Appendix B.

Element A.2. Coordination with other Communities

Requirement §201.6(b)(2) An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other private and non-profit interests to be involved in the planning process.

Since the inception of this planning process there have been two major forums for sharing this planning process with adjacent jurisdictions and the Sierra County communities. The first is the Mutual Aid Regional Advisory Committee for California Mutual Aid Region III. Region III's members are contiguous counties to Sierra County. The value to this collaboration is that these counties share many of the same characteristics as Sierra County, such as similar threats, politics, geography and culture. Most of the representatives that attend this forum are Emergency Directors, Managers and Coordinators from the following counties: Siskiyou, Modoc, Trinity, Shasta, Lassen, Tehama, Plumas, Glenn, Butte, Colusa, Sutter, Yuba and Sierra. The second forum, and somewhat more specialized forum, is the Public Health Coordination in Region III. This coordinated process has been made possible by the support of many federal grant programs. This has allowed a multi-county, multi-agency approach to both prevention and mitigation issues in public health. Since many of the counties in Region III have already gone through the hazard mitigation planning process, their experience and advice has proven invaluable to Sierra County. Each of these meetings includes a local roundtable discussion where we have been able to freely and collaboratively share our local hazard mitigation planning process. Sierra County OES advertised this planning process in their local paper, on community bulletin boards and through other meeting forums as previously mentioned. In addition to those forums, the plan was shared with the following:

United State Forest Service – Richard Luke
California Emergency Management Agency – JeriLyn Anderson, Jamie Byers
California Department of Transportation – Steve Folsom
California Emergency Medical Services Authority – Pat Lynch
Nor-Cal EMS Agency – Patti Lima
Sierra County Firesafe Council – Mike Frecshetti
City of Loyalton – Public Works
City of Loyalton – City Council
County of Sierra – Department Directors, Board of Supervisors

For more on coordination with other communities see the planning process documents in Appendix B.

Element A.3. Public Involvement

Requirement §201.6(b)(1) An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval; 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.

At the beginning of the planning project it was decided by Sierra County OES that early public outreach in all stages of the plan development would be a high priority. Since Sierra County has a small population and is rural, the planning team invited members of the public to participate in the official planning team meetings. A notice was posted around the county such as public message boards at local grocery stores, post office locations, government building message boards and local coffee shops/restaurants, advertised in the local newspaper, the Mountain Messenger and passed out at the seasonal drive through flu shot clinics (pictured right) in Loyalton on October 8, 2011 and in Downieville on October 21, 2011. Copies of those advertisements are located in Appendix B. There were no members of the public that offered to participate on the official planning team or participated in the meeting, however almost all of the members of the official planning team are also county residents themselves. In addition to the solicitation for planning team support, there was a Public Survey that was developed and distributed through various means such as posted on the Sierra County website, posted on local message boards, and handed out to various members of the public at events in Sierra County. The survey provided an opportunity for the public to share their opinions and participate in the mitigation planning process. The information provided aided in helping the planning team better understand the hazard concerns and identified area policies and projects that could potentially help lessen the impact of future hazard events in Sierra County. Approximately 1% of the population responded to the survey. Copies of invitations to the public to participate in the planning process are located in Appendix B.

After the first draft of the local multi-hazard plan was developed, Sierra County made it available on their website at www.sierracounty.ws, hard copies were available at County Administration (Downieville), County Library Branches, various fire departments, Loyalton City Hall, and other locations in Sierra County. In addition, two educational workshops were held on June 12, 2012 to inform the public on not only the hazard mitigation plan, but also on individual and family mitigation and preparedness actions. These workshops partnered with the local emergency services and disaster preparedness material was distributed.

All public stakeholder comments were reviewed, compiled and distributed to the planning team for discussion. Appropriate responses were integrated into the final draft of the plan. A record of public input, surveys and remaining planning process documentation are on file with Sierra County OES and are located in Appendix B.

Element A.4. Review and Incorporation of Exiting Plans

Requirement §201.6(b)(3) Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.

There was extensive review of existing plans for the development of this document. The incorporation of the information gleaned from existing plans was a key piece of the planning process. A sampling of some of the existing plans, studies and technical information is as follows. The technical information on the hazards found within this plan is based on the Sierra

"Walker Lake Belt Region" by the United State Geological Survey (USGS). The flood information was provided in studies from the State Department of Water Resources, FEMA Flood Hazard guidance, and modeling using the Flood HAZUS module as developed by FEMA. The wildfire information was compiled from data provided by the US Forest Service, the California Fire Agency and local studies completed by the Fire Chief's Association. The weather data utilized was provided by the National Weather Service (NWS) and historical records for Sierra County. Demographic and population information was provided by the US Census Bureau, 2010 Census and the California Department of Finance. Local guidance on hazards was provided by the Sierra County Office of Emergency Services Emergency Operations Plan (EOP) and the Sierra County Planning Department's Safety Element of their General Plan. Much of the history of disasters in Sierra County, their physical, cultural and political impacts were extracted from the works of James J. Sinnot, who wrote a definitive history of Sierra County.

The global view of hazards in California was provided by the California Hazard Mitigation Plan and the statewide mapping studies created by the California Earthquake Projects, California Geological Survey and Cal EMA, Geographic Information Section. This information is especially relevant to this plans sections on threat and hazard analysis.

A number of state and local regulations and policies form the legal framework to implement Sierra County's hazard mitigation goals and projects. A list of these regulations and plans is presented in the references list at the end of this section. Additionally, this plan will be used during the revision and update of the County's General Plan to meet the AB 2140 requirements.

Element A.5. Plan Maintenance Process

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.

Sierra County is dedicated to involving the public directly in review and updates of the Sierra County Operational Area Hazard Mitigation Plan. Copies of the Plan will be catalogued and kept at all appropriate agencies in the County as well as at the Main Public Library, posted on official websites and be available as 'read only' files on CD-ROM.

Public meetings will be held as part of each annual review, as well as the required five-year update of the Plan. The meetings will provide a forum for public input to the Plan. In addition to public meetings, the OES office will provide an update to the Board of Supervisors (BOS) on the process of mitigation planning in Sierra County. This will allow the public to comment and Sierra County to capture any relevant comments into the public record.

Element A.6. Continued Public Involvement

Requirement §201.6(c)(4)(i) [The plan maintenance process shall include a] section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five year cycle.

The Sierra County Operational Area Hazard Mitigation Plan will be reviewed annually, or as deemed necessary by knowledge of new hazards, vulnerabilities, or other pertinent reasons. The review will determine whether a plan update is needed prior to the required five-year

update. The Plan review will identify new mitigation projects and evaluate the effectiveness of mitigation priorities and existing programs.

The County OES Operational Area Coordinator will be responsible for scheduling a meeting of the Sierra County Operational Area Disaster Council to review and update the plan. The meeting will be open to the public and advertised in the local newspaper to solicit public input. The public will have the opportunity to review the goals and mitigation projects in light of changing situations in the county and changes in state or federal policy to ensure that this plan is addressing current and expected needs. Consistent with current technology the approved existing plan will be available both in hard copy at the Office of Emergency Services throughout the county and posted on the official jurisdiction website. This will ensure public access to the plan.

The Disaster Council will also review with public input, the risk assessment portion of the plan to determine if this information should be updated or modified, given any newly available data and completion of major mitigation programs such as the Sierra County Flood Control project. The list of critical facilities will also be reviewed and enhanced with additional details.

The Disaster Council will give a status report detailing the success of various mitigation projects, difficulties encountered, success of coordination efforts and which strategies should be revised. The status report will be published on the Sierra County web sites and an executive summary will be published in the local newspaper to update the citizens of Sierra County at the conclusion of each plan review.

The Sierra County OES Operational Area OES Coordinator will be responsible for the five-year update of the Plan. At the end of the five-year period, the updated Plan will be submitted to the State Hazard Mitigation Officer and FEMA for acceptance.

This Page Intentionally Blank

Element B: Hazard Identification and Risk Assessment

Requirement §201.6(c)(2)(i) [The risk assessment shall include a] description of the type, 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.

§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. All plans approved after October 1, 2008 must also address NFIP insured structures that have been repetitively damaged by floods. The plan should describe vulnerability in terms of:

§201.6(c)(2)(ii)(A) (A) The types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas;

§201.6(c)(2)(ii)(B) (B) An estimate of the potential dollar losses to vulnerable structures identified in ... this section and a description of the methodology used to prepare the estimate.

§201.6(c)(2)(ii)(C) Providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.

Risk to natural hazards is a combination of hazard, vulnerability and capability. This section of the LHMP will look at both hazards and vulnerability. The risk assessment process identifies and profiles relevant hazards and assesses the exposure of lives, property, and infrastructure to these hazards. The goal of the risk assessment is to estimate the potential losses in Sierra County from a hazard event. This process also allows communities in Sierra County to better understand their potential risk to natural hazards and provides a framework for developing and prioritizing mitigation actions to reduce the risks from future hazard events in Sierra County.

In the early meetings with Sierra County and the planning team, data was reviewed from the following sources on hazards affecting the County: the Federal and State Disaster Declaration History, the State of California Hazard Mitigation Plan (2010), the State of California Hazard Mitigation Plan Draft (2013) the Safety Element of the Sierra County General Plan (1996), the James J. Sinnott books which describe a detailed history of events, including disasters in Sierra County and interviews of staff that live and work in Sierra County.

The planning team came to agreement on hazards affecting Sierra County. The planning team agreed not to address technological or human-caused hazards, which are addressed in emergency operations plans being developed and updated for the County at the time of the development of this plan. The table on the following page shows the hazards profiled and/or discussed in this planning effort.

Profiled Hazards in Sierra County

Hazard Type	Geographic Extent	Potential Magnitude	Probability of Future Occurrences	Significance
Avalanche	Limited	Negligible	Occasional	Low
Dam Failure	Limited	Negligible	Unlikely	Low
Drought	Extensive	Limited	Occasional	Medium
Earthquake	Extensive	Critical	Occasional	High
Flood	Significant	Critical	Likely	High
Severe Weather – Winter Storms	Extensive	Catastrophic	Likely	High
Wildland Fires	Extensive	Catastrophic	Highly Likely	High
Volcano				Low

Source: Sierra County Planning Team; FEMA, Cal EMA,

The planning process used the available FEMA tools to evaluate all the possible threats faced. Through the threat analysis process the most probable threats, the most devastating threats and the most significant threats to Sierra County were identified.

Mitigation of the significant hazards facing Sierra County has the side benefit of appreciably enhancing the overall disaster resistance in the community from related threats. For example, the clearing of roads of intrusive vegetation and eliminating a wildfire hazard will also speed the restoration of the road after an earthquake. The effect of mitigation actions carried out is recognized as a synergistic effect.

Hazard Description/Geographic Extent/Potential Magnitude
This section gives a description of the hazard and associated issues followed by details on the hazard specific to the Operational Area. Where known, this includes information on the hazard extent, seasonal patterns, speed of onset/duration, and magnitude and/or any secondary effects.

Geographic Extent is classified by the following:

Limited - Less than 10% of Sierra County
Significant - 10-50% of Sierra County
Extensive - 50-100% of Sierra County

Potential Magnitude is classified by the following:

Catastrophic - More than 50 % of property severely damaged; shutdown of shutdown of facilities for more than 30 days; and/or multiple deaths.
Critical - 25-50 %of property severely damaged; shutdown of facilities for at least two weeks; and/or injuries and/or illnesses result in permanent disability.
Limited - 10-25 % of property severely damaged; shutdown of facilities for more than a week; and/or injuries/illnesses treatable do not result in permanent disability.
Negligible - Less than 10 percent of property severely damaged, shutdown of facilities and services for less than 24 hours; and/or injuries/illnesses treatable with first aid.

Previous Occurrences
This section includes information on historic incidents, including impacts, if known. A

brainstorming session in the early planning team meetings was used to capture information from participating jurisdictions on past occurrences.

Probability of Future Occurrences
The frequency of past events is used to gauge the likelihood of future occurrences. Based on historical data, the probability of future occurrences is categorized into one of the following classifications:

> **Highly Likely -** Near 100 percent chance of occurrence next year or happens every year.
> **Likely -** Between 10 percent and 100 percent chance of occurrence in next year or has a recurrence interval of 10 years or less.
> **Occasional -** Between 1 percent and 10 percent chance of occurrence in the next year or has a recurrence interval of 11 to 100 years.
> **Unlikely** - Less than 1 percent chance of occurrence in next 100 years or has a recurrence interval of greater than every 100 years.

The probability, or chance of occurrence, was calculated where possible based on existing data. Probability was determined by dividing the number of events observed by the number of years and multiplying by 100. This gives the percent chance of the event happening in any given year. An example would be three droughts occurring over a 30-year period, which suggests a 10 percent chance of that hazard occurring in any given year.

The remainder of this section begins with an overview of the history of declared disasters in Sierra County followed by the profiles of identified hazards.

Disaster Declaration History
One method to identify hazards is to look at the events that have triggered a federal and/or state disaster declaration that included Sierra County. The following table lists the disaster declarations where Sierra County was designated in a federal and/or state disaster declaration from 1950 to the present.

Disaster Declaration History in Sierra County

Disaster Declaration History in Sierra County 1950-Present

Hazard Type	Disaster Number	State Proclamation/date	Federal Declaration/date	Public (PA)/Individual (IA) Assistance
Drought	EM-3023	Information not available	Emergency 01/20/77	PA only
Heavy Rains, Flooding	DR-183	Information not available	Major 12/24/1964	Both PA and IA
Severe Storms, Flooding	DR-253	Information not available	Major 01/26/69	Both PA and IA
Severe Storms, Flooding	DR-758	86-01 02/21/86	Major 02/21/86	Both PA and IA
Severe Storms, Winter Storm, Mud and Landslides, Flooding	DR-979	93-01 02/03/93	Major 02/03/93	Both PA and IA
Severe Storms, Flooding, Landslides, Mud Flows	DR-1046	95-03-N 03/12/95	Major 03/12/95	Both PA and IA
Severe Storms, Flooding	DR-1155	97-01 01/04/97	Major 01/04/97	Both PA and IA
Hurricane Katrina Evacuation	EM-3248	--	Emergency 09/13/2005	--
Severe Storms, Flooding, Mudslides, and Landslides	DR-1628	2006-01 02/03/2006	Major 02/03/2006	PA only

Source: FEMA Disaster Declaration History www.fema.gov
California Disaster Assistance Act Reference Table – Cal EMA Public Assistance Staff

B.1. Hazard Descriptions
B.2. Vulnerability Assessment

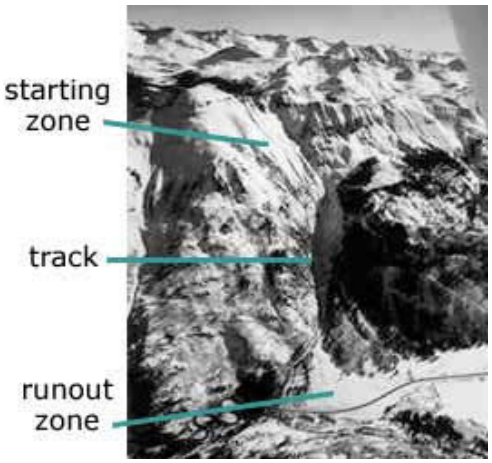
Avalanche Hazards

Hazard Description

An avalanche is a rapid flow of snow down a hill or mountainside. Although avalanches can occur on any slope given the right conditions, certain times of the year and certain locations are naturally more dangerous than others. Wintertime, particularly from December to April, is when most avalanches tend to happen. However, avalanche fatalities have been recorded for every month of the year.

Avalanches occur when loading of new snow increases stress at a rate faster than strength develops, and the slope fails. Critical stresses develop more quickly on steeper slopes and where deposition of wind-transported snow is common. The vast majority of avalanches occur during or shortly after storms. This hazard generally affects a small number of people, such as snowboarders, skiers, and hikers, who venture into backcountry areas during or after winter storms. Roads and highway closures, damaged structures, and destruction of forests are also a direct result of avalanches. The combination of steep slopes, abundant snow, weather, snowpack, and an impetus to cause movement creates avalanches. Areas prone to avalanche hazards include hard to access areas deep in the backcountry.

An avalanche has three main parts. The starting zone is the most volatile area of a slope, where unstable snow can fracture from the surrounding snow cover and begin to slide. Typical starting zones are higher up on slopes. However, given the right conditions, snow can fracture at any point on the slope.



The three parts of an avalanche path are the starting zone, avalanche track, and runout zone. (Larger image not available) —Credit: Betsy Armstrong

The avalanche track is the path or channel that an avalanche follows as it goes downhill. Large vertical swaths of trees missing from a slope or chute-like clearings are often signs that large avalanches run frequently there, creating their own tracks. There may also be a large pile-up of snow and debris at the bottom of the slope, indicating that avalanches have run.

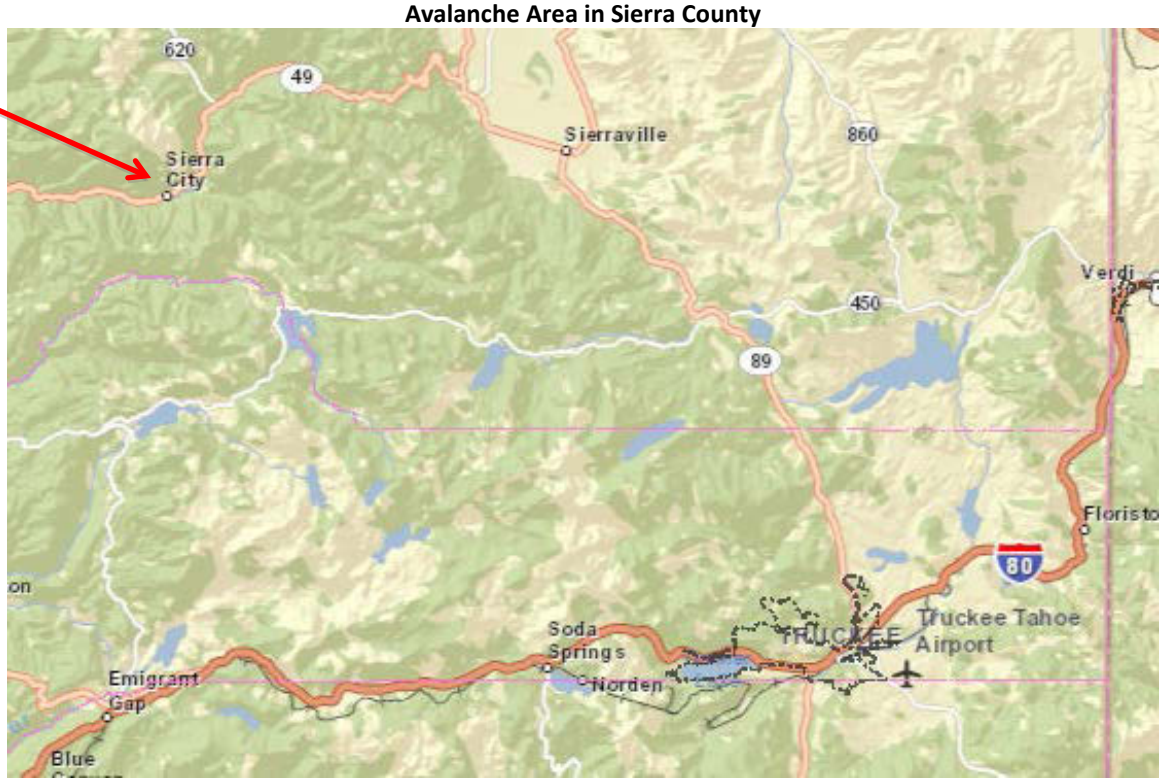
The runout zone is where the snow and debris finally come to a stop. Similarly, this is also the location of the deposition zone, where the snow and debris pile the highest.

Several factors may affect the likelihood of an avalanche, including weather, temperature, slope steepness, slope orientation (whether the slope is facing north or south), wind direction, terrain, vegetation, and general snowpack conditions. Different combinations of these factors can create low, moderate, or extreme avalanche conditions. Some of these conditions, such as temperature and snowpack, can change on a daily or hourly basis (American Avalanche Association.)

Geographic Extent and Potential Magnitude

The central drainage divide of Sierra County above 8,000 feet is a prime avalanche danger zone. The area North from Highway 80 to Highway 49 in Sierra County is prime avalanche country. The map below shows the mountain areas with the Highways noted above as the boundaries for the prime avalanche area in Sierra County. Avalanches usually occur above 7,500-8,000 feet in elevation, are due to three principle conditions/concerns and are usually an annual threat. The potential magnitude for this hazard is Negligible with approximately 10% or less of the Operational Area affected.

Avalanche Area in Sierra County



Source: Cal EMA My Plan Website Mapping Tool

The map on the following page shows the coverage area for the Sierra Avalanche Center, the monitoring point for Sierra County. Sierra Avalanche Center functions as a partnership between the US Forest Service and a 501(c)(3) not for profit organization known as Sierra Avalanche Center. These entities have partnered through a formal agreement to provide a quality product for the public and affected agencies. Truckee Ranger District on the Tahoe National Forest houses and runs the avalanche forecasting operations of the avalanche center.

Avalanche Concerns

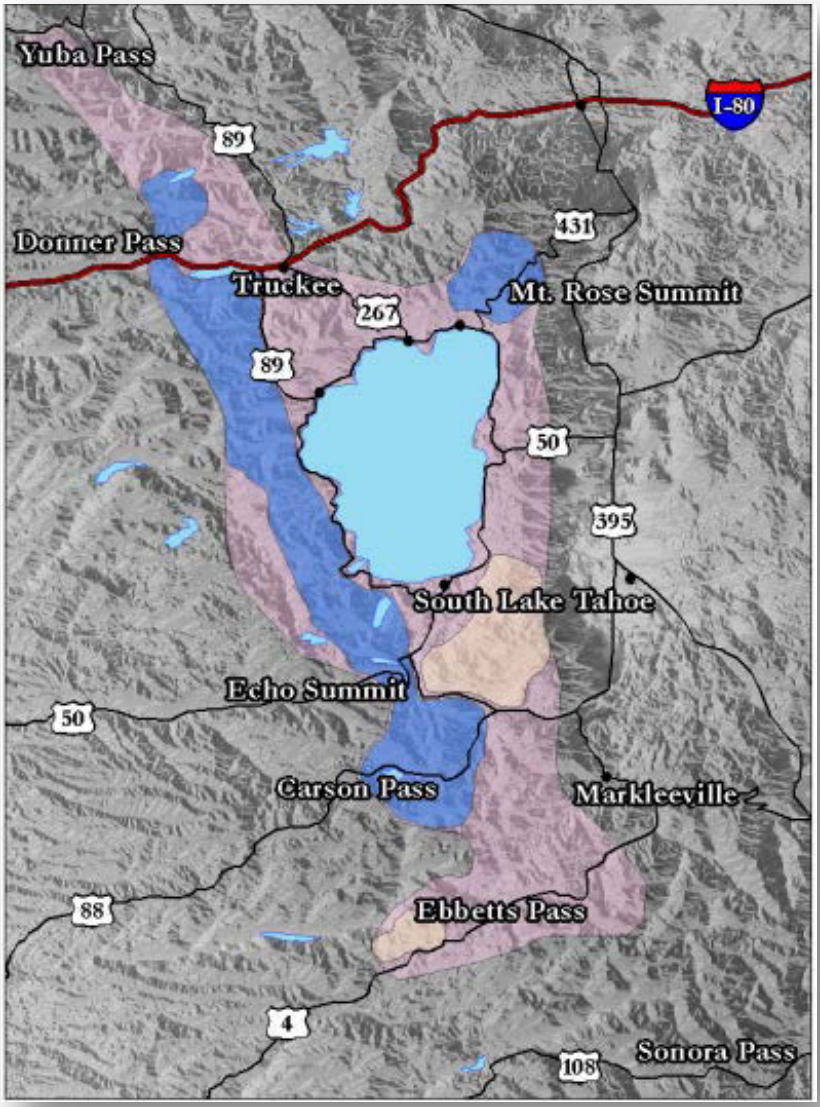
Annually there are three major avalanche concerns as described in the following for the late spring and into early summer. Those are as follows:

Avalanche Concern #1 Wet Snow Instabilities:

The first is near surface loose wet snow avalanche activity. Usually this type of instability forms in response to daytime warming. Cloudy skies overnight and air temperatures above freezing do not allow the snowpack to refreeze well. Under clear skies, the top few inches of the snowpack

will often refreeze despite near or slightly above freezing air temperatures. This light refreeze usually allows for a short period of good travel conditions during the early morning hours before surface wet snow instability becomes a concern.

Sierra Avalanche Center Coverage Area



Source: Sierra Avalanche Center

Avalanche Concern #2 Deep Wet Slabs:
Deep wet slab avalanches represent the second spring avalanche concern. A deeply buried persistent weak layer still exists on some NW-N-NE aspects. In some areas melt water may percolate through the snowpack and destroy this layer, and in other areas the melt water may simply weaken this layer and cause it to break. Across the forecast area, the variability of this weak layer and the variability associated with how a snowpack melts and how that melt water

moves through the snowpack makes predicting where and when and even if these kinds of avalanches will occur difficult at best. Due to this uncertainty and an insurmountable lack of information, naturally occurring deep wet slab avalanches cannot be ruled out. Slopes where free water has not yet percolated to this layer will hold the best potential for these avalanches. On the E-SE-S-SW-W aspects where a snowpack exists deep wet slabs could also become possible as the spring sun and warm air temperatures allow free water to percolate to the base of the snowpack. The time period when free water percolates into the deeper layers of the snowpack and drainage channels are not well established is when deep wet slab avalanches are most likely to occur. Areas where the snowpack rests on top of impermeable surfaces like granite slabs represent good places for this kind of slide to occur. However, they can occur anywhere that enough free water accumulates in the snowpack. These events are very difficult to predict and can result in large, destructive avalanches.

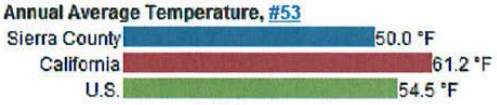
Avalanche Concern # 3: Storm Slabs and Wind Slabs:
The third major concern involves avalanche activity that may occur during and after any late season storms. Expect a period of snowpack instability during the storm itself, then a second cycle of avalanche activity as rapid warming occurs post storm. During the storm, watch for typical signs of mid winter instability such as recent avalanche activity, wind loading, collapse, audible whumpfing sounds and/or shooting cracks. Post storm, new snow will be very sensitive to rapid warming and direct sunlight. Pay close attention to layer bonding within the new snow and to the old snow surface beneath it. It can lose strength rapidly as the day progresses causing a significant increase in avalanche danger.

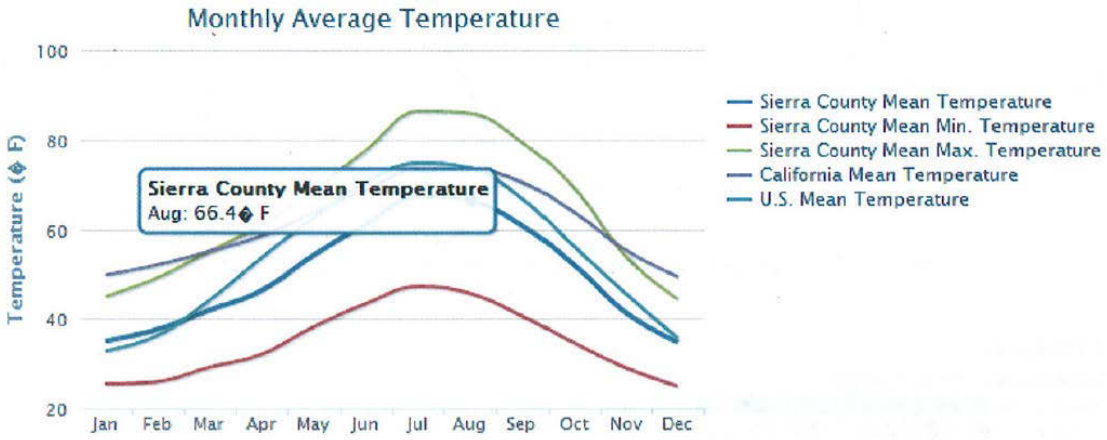
Other hazards such as cornice collapse, moats, glide cracks, and open creeks exist. Stay well back from abrupt edges along ridgelines, as human triggered cornice collapse will remain possible during the spring. Stay out from under cornice areas that are not well frozen, especially if you can see water dripping from the cornice. Areas of weak snow around rocks, vegetation and along the base of cliff bands exist.

As mentioned, avalanches can be triggered as a result of various conditions, such as weather, temperatures, snowfall and wind direction and speed amongst other factors. The following shows Sierra County's average temperature, precipitation, snowfall and wind speed as detailed from www.usa.com.

Average Temperature

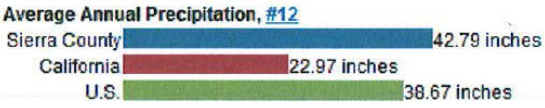
Annual Average Temperature, #53

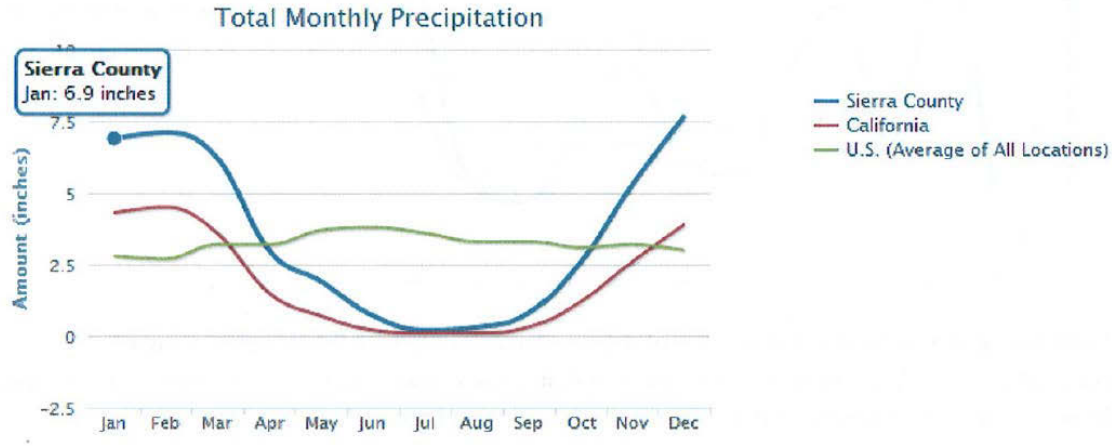




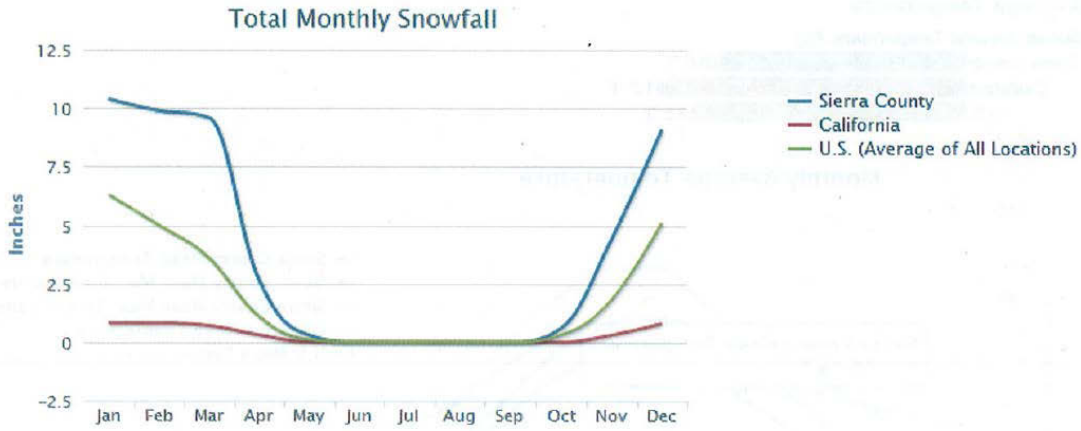
Precipitation

Average Annual Precipitation, #12

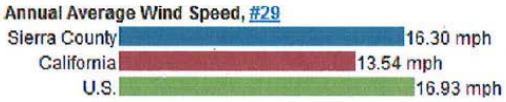


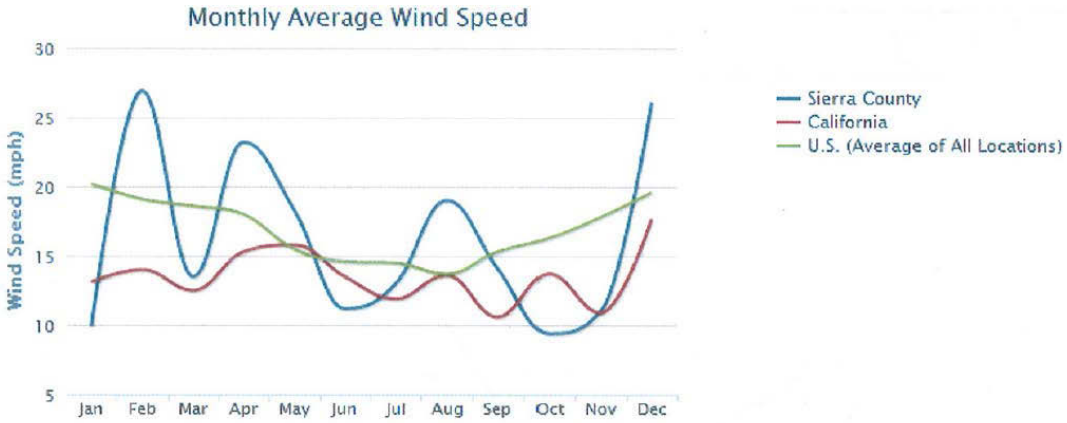


Snow



Wind Speed





Tracking this weather data, in addition to the slope steepness and orientation, terrain, vegetation and general snowpack conditions would assist in the identifying potential avalanche conditions. Several classification systems are used throughout the world to rate hazards and conditions associated with avalanches. A five-level scale is used in the United States to classify the size of an avalanche, show in the following table.

US Avalanche Size Classifications

United States Classification for Avalanche Size *(Source: www.avalanche.org)*	
Size	**Destructive Potential**
1	Sluff or snow that slides less than 50m (150 feet) of slope distance
2	Small, relative to path
3	Medium, relative to path
4	Large, relative to path
5	Major or Maximum, relative to path

Source: www.avalanche.org

Regional avalanche forecast centers in the United States us the North American avalanche danger scale to facilitate communication between forecasters and the public. The categories represent the probability of avalanche activity and recommend travel precautions. The North American public danger scale in shown below.

North American Public Danger Scale

Source: www.avalanche.org

Property damage associated with avalanches is a function of several factors. Large external loads can cause significant damage to structures and fatalities. Estimated potential damage for a given range of impact pressures is shown in the following table.

Avalanche Impact Pressures

Avalanche Impact Pressures Related to Damage *(Source: www.avalanche.org)*		
Impact Pressure		Potential Damages
kPa	lbs/ft^2	
2-4	40-80	Break Windows
3-6	60-100	Push in doors, damage walls, roofs
10	200	Severely damage wood-frame structures
20-30	400-600	Destroy wood-frame structures, break trees
50-100	1000-2000	Destroy mature forests
>300	>6000	Move large boulders

Source: www.avalanch.org

Previous Occurrences

In 1853, a major avalanche destroyed Sierra City. This event is unlikely to reoccur due to the regrowth of timber around the area. The approximate cause of this avalanche was record snowfalls coupled with the over harvesting of the forest in the immediate area of the community. Numerous small avalanches occur annually with the destruction of unoccupied homes and outbuildings as recent as the winter of 2011. No lives have been lost due to avalanche in Sierra County since 1853.

Probability of Future Occurrences

The probability of future avalanche occurrences in Sierra County is occasional or annually during average to above average snowpack years.

Dam Failure

Hazard Description

Dam failure is defined as the breach of a human-caused water retention structure. Failure can be caused by flood conditions leading to overtopping, mechanical failure, earthquake, or any combination of these factors. Two factors that influence the potential severity of a full or partial dam failure are the amount of water impounded and the density, type, and value of development and infrastructure located downstream. Other causes include:

- Inadequate spillway capacity
- Internal erosion
- Improper design
- Improper maintenance
- Negligent operation
- Failure of upstream dams

In general, speed of onset depends largely on the causal factors. Dam failure can occur in as little as a few minutes or more slowly over the course of many months. Thus, warning time can vary accordingly, but in the event of a catastrophic failure of a large dam, evacuation time for locations directly downstream would be extremely brief. Floodplain characteristics largely determine the available warning time for locations further downstream. With regard to duration of high water conditions that result from dam failure, this depends on the capacity and stage of the reservoir at time of breach as well as the severity of the breach.

In general, there are three types of dams: concrete arch or hydraulic fill, earth and rock fill, and

concrete gravity. Each type of dam has different failure characteristics. A concrete arch or hydraulic fill dam can fail almost instantaneously; the flood wave builds up rapidly to a peak then gradually declines. An earth-rock fill dam fails gradually due to erosion of the breach; a flood wave will build gradually to a peak and then decline until the reservoir is empty. And, a concrete gravity dam can fail instantaneously or gradually with a corresponding buildup and decline of the flood wave.

Dams and reservoirs have been built throughout California to supply water for agriculture and domestic use, to allow for flood control, as a source of hydroelectric power, and to serve as recreational facilities. The storage capacities of these reservoirs range from a few thousand-acre feet to five million acre-feet. The water from these reservoirs eventually makes its way to the Pacific Ocean by way of several river systems.

According to the Planning Team in Sierra County the Office of Emergency Services keeps track of and monitors more than 20 Dams within the County. In the listings on the following pages are the Dams located in Sierra County that are monitored. Within this listing, most of the dams have a mild impact should a failure occur.

Feature	Type	USGS Topo Map	Elevation	Lat	Long	Notes	Impacts
Snag Lake Dam [1] [2]	Dam	Gold Lake	6672 feet	39.671°N	120.627°W	Not a very tall dam, if it is a dam	Minimal
Stampede Dam	Dam	Boca	5950 feet	39.475°N	120.104°W	These are the same dam, if it should fail it would wipe out Verdi, and flood the Reno/Sparks area 20' deep	Severe
Stampede Dam	Dam	Boca	5717 feet	39.470°N	120.104°W		Severe
Stampede Dike Dam	Dam	Boca	5963 feet	39.468°N	120.111°W		Severe
Sunrise 1290 Dam	Dam	Dog Valley	4999 feet	39.517°N	120.008°W	it could affect Verdi and Interstate 80, but the height is only 10' - 20'	Minimal to Moderate
Upper Salmon Lake Dam [1] [2]	Dam	Gold Lake	6501 feet	39.655°N	120.650°W	Not a very tall dam	Minimal
Upper Sardine Lake Dam [1] [2]	Dam	Sierra City	5999 feet	39.612°N	120.632°W	Not a very tall dam	Minimal
Webber Lake Dam [1]	Dam		6787 feet	39.485°N	120.405°W	Not a very tall dam	Minimal

[0] These dams sit on the Sierra/Nevada County line, and would not affect any communities in Sierra County, but would affect any Fishing, Gold Mining, Camping, and Swimmers.

[1] These dams are not very high and may be in place to lessen any erosion.

[2] These dams (lakes) could raise the North Fork of the Yuba River level, affecting Sierra City, Downieville, Goodyears Bar, and Indian Valley.

[3] These are diversion dams for hydroelectric power plants with the creeks flowing over the top year round.

Geographic Extent/Potential Magnitude
The geographic extent of this hazard in Sierra County is Limited in that less than 10% of the County is affected. The flood plain or inundation path from the major dam that the Sierra County Planning Team considers an important dam to monitor is Stampede Dam, which leads east to the suburbs of Reno, Nevada and posses an across state threat to that area. The potential magnitude from dams in Sierra County is Negligible, with less than 10% of property being severely damaged.

The California Department of Water Resources Division of Safety of Dams assigns hazard ratings to large dams within the State. The following two factors are considered when assigning hazard ratings: existing land use and land use controls (zoning) downstream of the dam. Dams are classified in three categories that identify the potential hazard to life and property:

- High hazard indicates that a failure would most probably result in the loss of life
- Significant hazard indicates that a failure could result in appreciable property damage
- Low hazard indicates that failure would result in only minimal property damage and loss of life is unlikely

According to data provided by Division of Safety of Dams (listed below), there are 4 dams they monitor in Sierra County that were constructed for flood control, storage, electrical generation, and recreational purposes.

List of Dams in Sierra County from CA Dept. of Water Resources

Name of Dam	Stream	Type	Hazard Rating	Acre Feet (capacity)	Dam Height	Year Built	Owner
Hours House	Mfk Yuba River	VARA	LOW	285	68	1968	Yuba County Water Agency
Independence	Independence Creek	ERTH	LOW	18500	31	1939	Truckee Meadows Water Authority
Lake Buck	Long Valley	ERTH	LOW	40	37	1951	Wendy Baroli & Jill S. Heaton
Lower Sardine Lake	Sardine Creek	ERKK	LOW	280	17	1965	CA Dept. of Fish & Game

Source: CA Dept. of Water Resources, Dam Safety Division

Previous Occurrences
As in most of California, dams are constructed with a high degree of regulation and standards. There have been no occurrences of dam failure in Sierra County since 1883. There have been a total of 45 dam failures in California. Failures have occurred for a variety of reasons, the most common failure being overtopping. Other dams have failed due to specific shortcomings in the dam itself or an inadequate assessment of the surrounding geomorphologic characteristics.

Probability of Future Occurrence
Older Dams are seismically suspect, the possibility of a failure in a great earthquake, is a statewide potential. The greatest catastrophe relating to California dam failures was William Mulholland's infamous concrete gravity-arch St. Francis Dam, which failed in 1928 resulting in 426 deaths. Overall, there have been a least 460 deaths from dam failures in California. The probability of future occurrences for dam failure in Sierra County is unlikely.

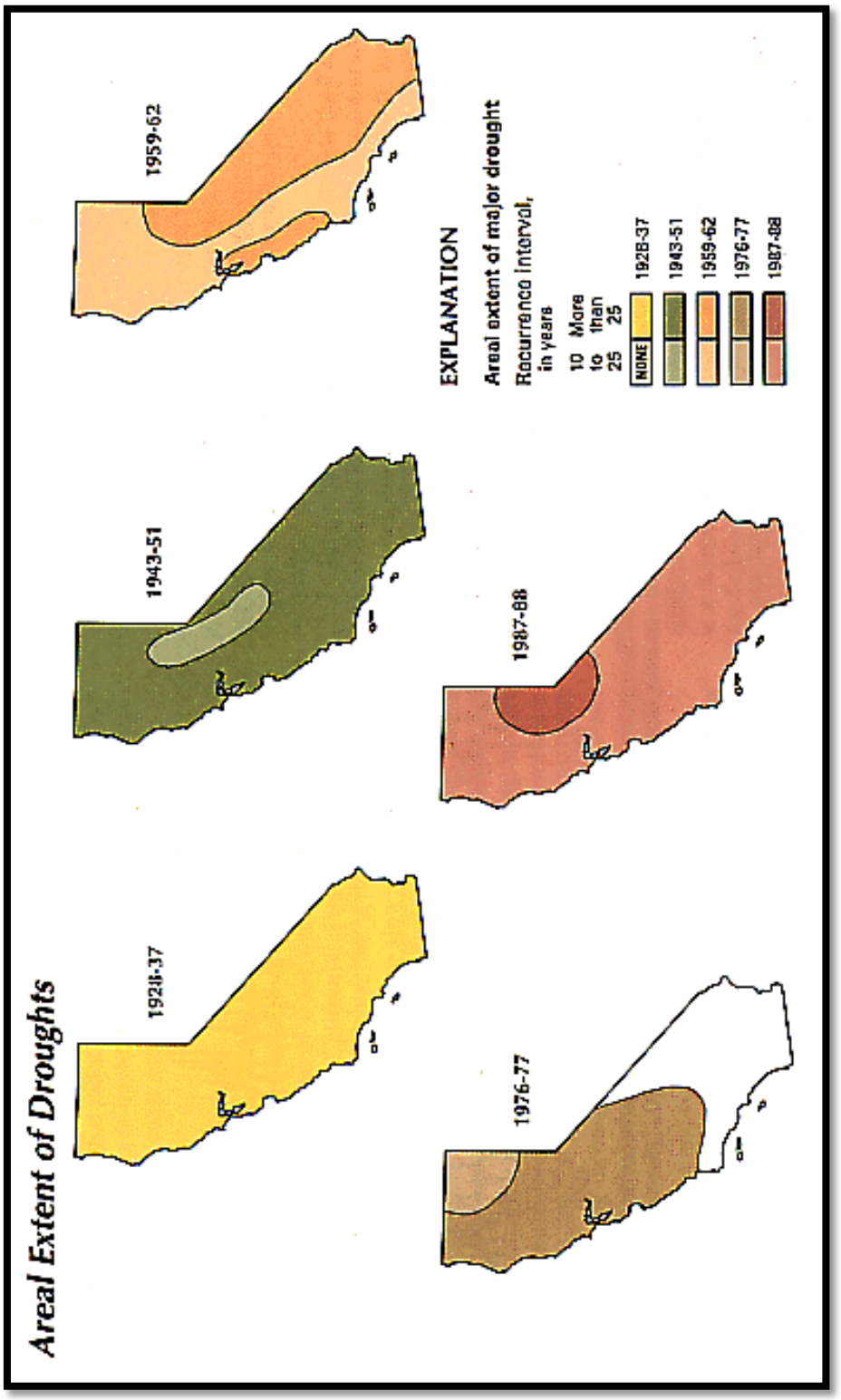
Drought

Drought is a gradual phenomenon that differs from typical emergency events. Many natural disasters, such as floods or earthquakes, occur relatively rapidly with little time to prepare for disaster response. Droughts occur slowly, often over a multiyear period, and it is hard to determine when a drought begins or ends. Impacts of drought are typically felt first by those most reliant on annual rainfall, such as ranchers engaged in dry land grazing, rural residents relying on wells in low-yield rock formations, or small water systems lacking a reliable source. Criteria used to identify statewide drought conditions do not address these localized impacts.

The drought issue is further compounded by water rights specific to any state or region. Water is a commodity possessed under a variety of legal doctrines. The prioritization of water rights between agriculture and federally protected fish habitat in the state is also at issue.

Drought is a complex issue that is best defined regionally based on its effects:

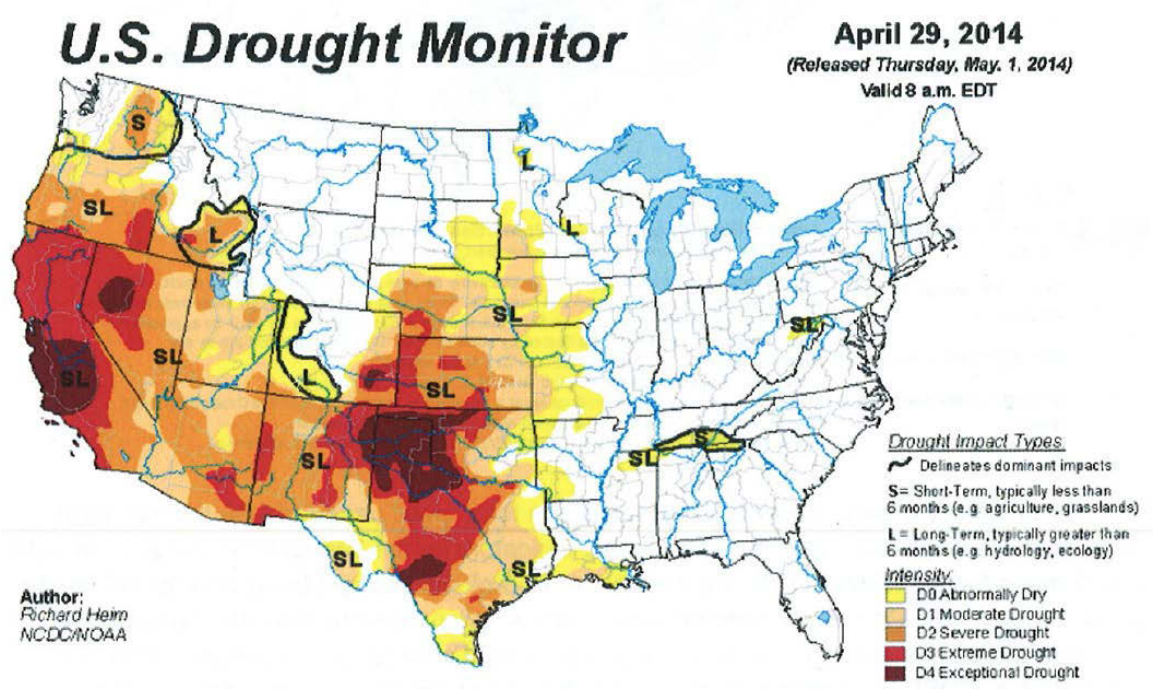
- **Meteorological—**a period of below average water supply
- **Agricultural—**inadequate water supply to meet the needs of the state's crops and other agricultural operations such as livestock
- **Hydrological—**deficiencies in surface and subsurface water supplies, generally measured as stream flow, snowpack, and lake, reservoir, and groundwater levels
- **Socioeconomic—**when drought affects health, wellbeing, and quality of life or when it starts to have an adverse economic impact on a region (National Drought Mitigation Center 2006)
- **Regulatory—**mandatory compliance with environmental protection laws (especially those pertaining to protection of endangered species), combined with low precipitation and runoff, create deficiencies in agricultural and/or urban water supplies


Areal Extent of Droughts
1928-37
1943-51
1959-62
1976-77
1987-88
EXPLANATION
Areal extent of major drought
Recurrence interval, in years
10 to 25
More than 25
NONE
1928-37
1943-51
1959-62
1976-77
1987-88

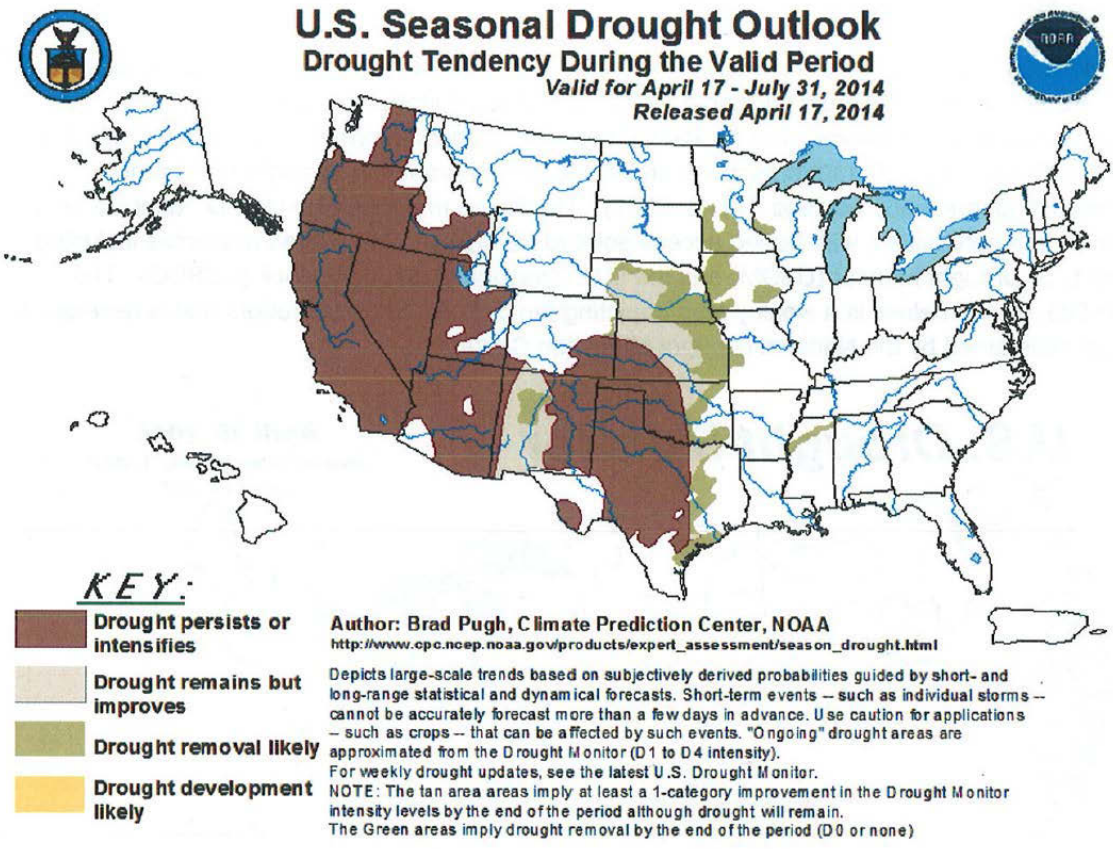
Geographic Extent and Potential Magnitude

Droughts are generally widespread events, they are classified as Extensive in that droughts can affect all of Sierra County particularly the eastern areas. The magnitude of a drought's impact is directly related to the length. Droughts can be a short-term event over several months or a long-term event that lasts for years or even decades. In Sierra, the onset of drought is often signaled by a lack of significant winter precipitation and snowfall in the Sierra Nevada Mountains. Hot and dry conditions that persist into spring, summer, and fall can aggravate drought conditions, making the effects of drought more pronounced as water demands increase during the growing season and summer months. Impacts increase with the length of a drought, as carry-over supplies in reservoirs are depleted and water levels in groundwater basins decline (California Department of Water Resources 2006).

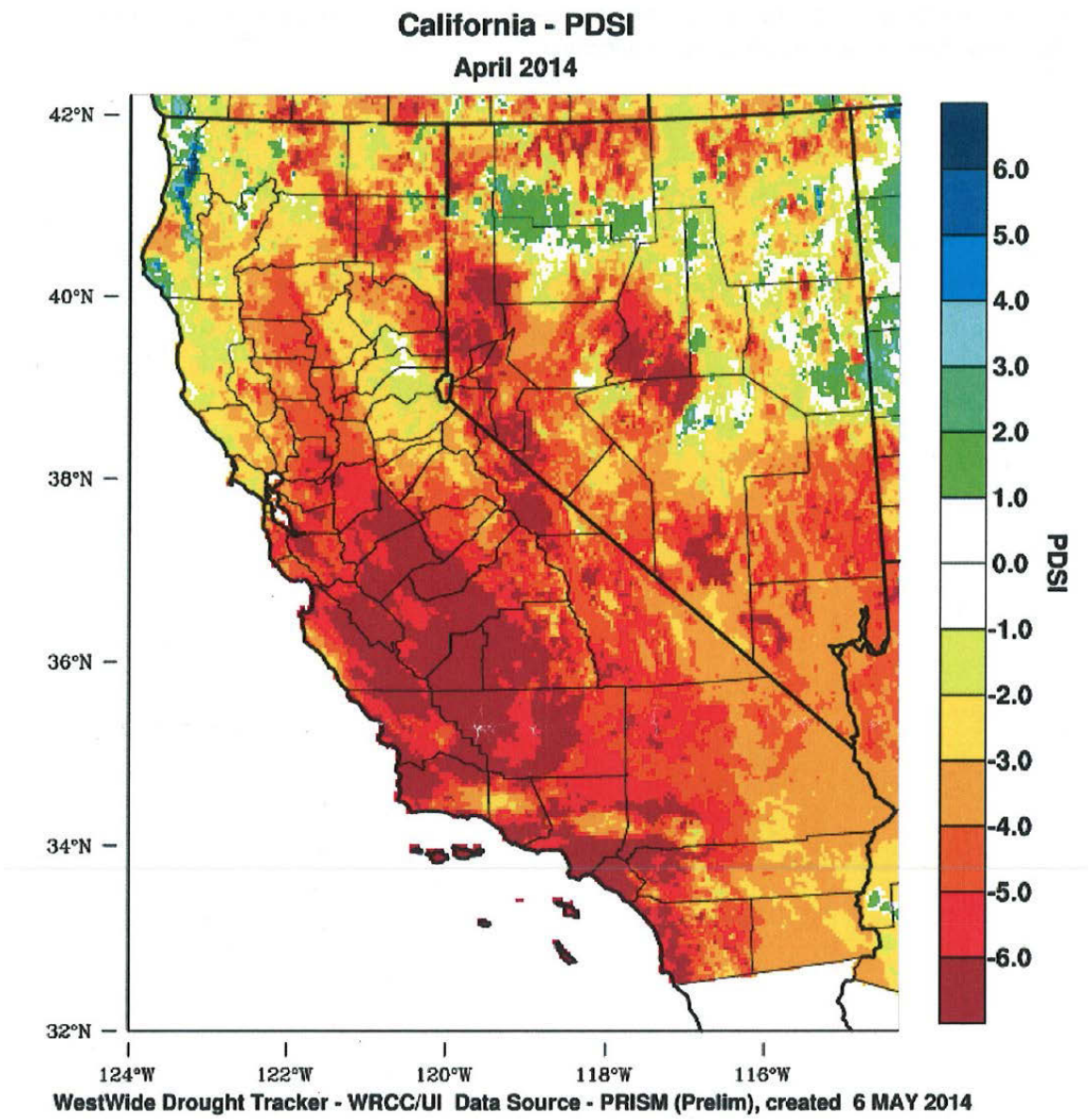
The magnitude of drought is usually measured in time and severity of the hydraulic deficit. There are several resources available to evaluate drought status and even project very near future expected conditions. The National Integrated Drought Information System (NIDIS) Act of 2006 (Public Law 109-430) prescribes and interagency approach for drought monitoring, forecasting and early warning according to the NIDIS. The NIDIS maintains the U.S. Drought Portal22, which is a centralized, web-based access point to several drought related resources including the U.S. Drought Monitor (USDM) and the U. S. Seasonal Drought Outlook (USSDO). The USDM, shown below is a weekly map depicting the current status of drought and is developed and maintained by the National Drought Mitigation Center.



The USSDO, shown on the following page is a six-month projection of potential drought conditions developed by the National Weather Service's Climate Prediction Center.



A number of indices measure how much precipitation for a given period of time has deviated from historically established norms. The primary indicators for the Drought Monitor and Drought outlook maps for the Western U.S. are the Palmer Hydraulic Drought Index and the 60-month Palmer Z-index. The Palmer Drought Severity index is widely used by the U.S. Department of Agriculture to determine when to grant emergency drought assistance. The Palmer Drought Severity Index (PDSI) is a commonly used index that measures the severity of drought for agriculture and water resources management. It is calculated from observed temperature and precipitation values and estimates soil moisture. The PDSI for California in April 2014 is shown on the following page.



However, the Palmer Index is not considered consistent enough to characterize the risk of drought on a nationwide basis (FEMA, 1997) and neither of the Palmer indices are well suited to the dry, mountainous western United States.

For Western States with mountainous terrain and complex regional microclimates, it is also useful to supplement the Palmer Drought Severity Index values with other indices such as Surface Water Supply Index, which takes snowpack and other unique conditions into account. The National Drought Mitigation Center uses the Standardized Precipitation Index, which identifies emerging drought months sooner than the Palmer Index and is computed on various time scales, to monitor moisture supply conditions.

The potential magnitude of drought in Sierra County is limited.

Previous Occurrences
Historically, California has experienced severe drought conditions. The State's available record for determining hydrologic risks is short, only going back about 100 years.

Recent droughts affecting Sierra County are summarized below using data from Cal EMA and from the USGS *Summary of Floods and Droughts in the Southwestern States* (2004). The bullets below show the history of multiyear droughts in California from 1850-1992.

- **1928-1937—**This drought affected the entire state and is the longest, most severe drought on record with a recurrence interval of greater than 100 years.

- **1947-1950—**Drought affected the entire state but was most extreme in Southern California. The drought in winter of 1950 affected the area from the Kern River basin north to the American River basin. The drought caused two deaths and $33 million in damages.

- **1976-1977—**The drought of 1976-1977 was most severe in the northern three-quarters of California, but the impact was experienced statewide because of the dependence of Southern California on water transfers from the north. The water year 1977 was the driest year of record at almost all gauging stations in the affected area in California, and the water year 1976 was among the five driest in the central and northern Sierra Nevada. The two-year deficiency in runoff accumulated during the drought is unequaled at gauging stations in the affected area; and this deficiency has a recurrence interval that exceeds 80 years. Crop damages statewide were $2.67 billion.

- **1987-1992—**From 1987 to 1992, California again experienced a serious drought due to low precipitation and run-off levels. The hardest-hit region was the central coast, roughly from San Jose to Ventura. For the central coast and central Sierra Nevada, 1987 to 1990 was the driest period on record. In 1988, 45 California counties experienced water shortages that adversely affected about 30 percent of the state's population, much of the dry-farmed agriculture, and over 40 percent of the irrigated agriculture. Fish and wildlife resources suffered, recreational use of lakes and rivers decreased, forestry losses and fires increased, and hydroelectric power production decreased.

  In February 1991, Department of Water Resources (DWR) and Cal OES surveyed drought conditions in all 58 California counties and found five main problems:

  - Extremely dry rangeland
  - Irrigated agriculture with severe surface water shortages and falling groundwater levels
  - Widespread rural areas where individual and community supplies were going dry
  - Urban area water rationing at 25 to 50 percent of normal usage
  - Environmental impacts

  After four drought years and three winter months of meager precipitation, California's water prospects looked bleak at the start of 1991. Storage in major reservoirs had

dropped to 54 percent of average, the lowest since 1977, a record dry year. Other supply systems were suffering more major shortages. The shortages led to stringent water rationing and severe cutbacks in agricultural production, including threats to survival of permanent crops such as trees and vines. Fish and wildlife resources were in critical shape as well. Not since the 1928-1934 drought had there been such a prolonged dry period. Water was so scarce that some suppliers doubted the State Water Project (SWP) and the Central Valley Project (CVP) would be able to provide minimum carryover storage as a hedge against yet another dry year. In February 1991, the Governor established the Drought Action Team. This team almost immediately created an emergency drought water bank to develop a supply for four critical needs:

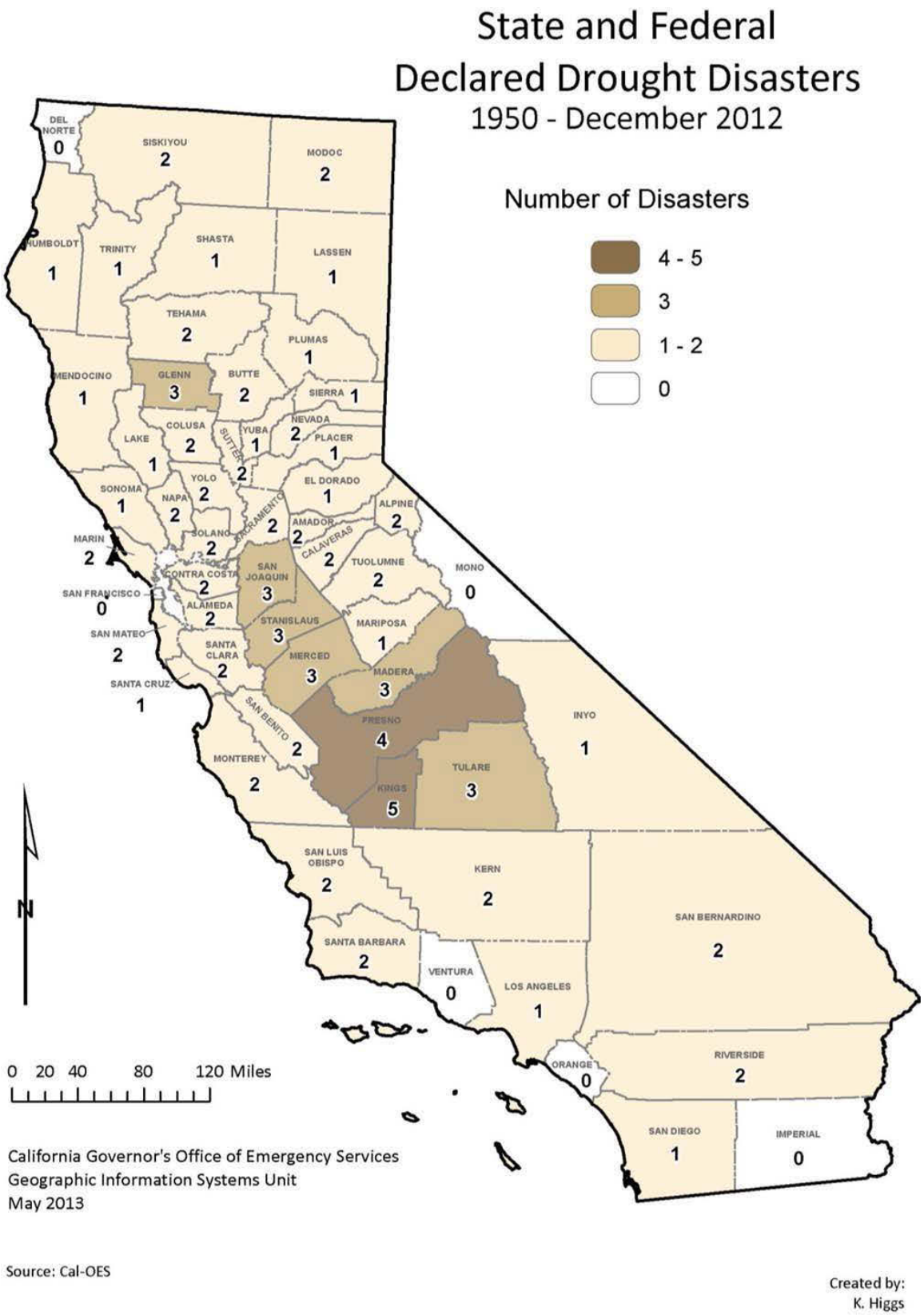
- Municipal and industrial uses
- Agricultural uses
- Protection of fish and wildlife
- Carryover storage for 1992

The large-scale transfer program, which involved over 800,000 acre-feet of water, was implemented in less than 100 days with the help and commitment of the entire water community and established important links between state agencies, local water interests, and local governments for future programs (DWR, "Preparing for California's Next Drought – Changes Since 1987-92," July 2000).

Note: At the time of completing the required revisions to this plan (February 2014) California was in another Governor's Proclaimed Drought emergency.

Probability of Future Occurrences

Based on the historical record, 14 droughts (multiyear events counted as one) have occurred in California since 1862 (143 years). This indicates that California experiences drought on average every 10 years, which is a 10 percent chance of occurring in any given year. In Sierra County, four-multiyear droughts are on record for the last 56 years, which averages to an event every 14 years, or about a 7 percent chance of occurrence in any given year. Based on these probabilities, drought will continue to occur occasionally in the future. The Colorado River Basin Climate Report (2005) discusses the 'perfect drought' that could occur in Southern California when a local drought increases water demand and decreases water supplies and storage at the same time that the Northern California and Colorado River Basin imported water sources are impacted by droughts, and these conditions persist for several years or longer. Instrumental climate and hydrological records for the past 100 years and tree-ring based data for the past 500 years indicate that multiyear perfect droughts simultaneously affecting Southern California, the Sierra-Sacramento system, and the Colorado River have occurred typically once or twice each century. Such 'perfect drought' episodes should be considered a normal part of the long-term climatic regime in California and Sierra County. The map on the next page shows the declared drought disasters in California from 1950 to 2012.



Declared Drought Disasters; Source: Cal OES

Earthquakes

Hazard Description

Earthquakes are considered to be one of the most potentially destructive threats to life and property in Sierra County. A moderate to severe seismic incident on any of several fault zones in relative close proximity to the County is expected to cause:

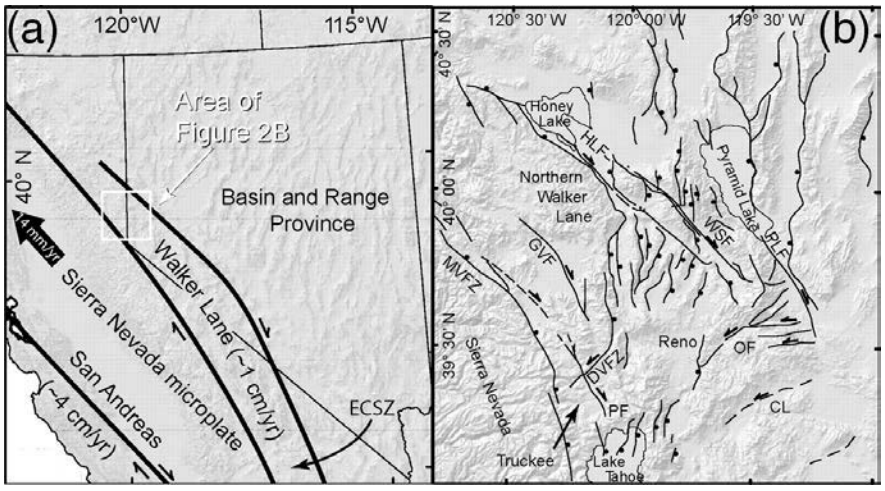
- Extensive property damage, particularly to pre-1930's unreinforced masonry structures and low code pre 1960 wood frame and masonry structures.
- Significant numbers of fatalities and injuries
- Damage to water and sewage systems
- Disruption of communications systems
- Disruption of transportation arteries
- Competing requests for scarce mutual aid response resources

Major faults that directly affect Sierra County include the most of the faults of what is known as the Sierra "Walker Lake Belt Region". A number of large historical earthquakes have occurred in the northern Walker Lane Belt region. There has been seven M > 6 earthquakes in this region recorded since 1852, the M6 1850 Pyramid Lake, M6 1875, M6 1914 M6.4 1914 and M6.3 1918 Reno, M6 1942 Verdi and M6 1966 North Truckee earthquake (Rogers et al, 1992).

Below is an excerpt from Hawkins and others (1986) USGS Study on this area:

"Faults in the northern part of the study area include the Mohawk Valley, Grizzly Valley, and Last Chance faults. The dominant trend of the northern faults is northwesterly to north northwesterly. The orientation of these faults may be the result of westward displacement of the Sierra Nevada structural block along northwest-trending, right lateral faults of the northern Walker Lane. A similar deflection, though in the Sierra Nevada block, where westward movement occurs along the left-lateral Garlock fault.

The physiography and structural relations in the northern part of the Tahoe-Truckee-Sierra Valley depression are considerably more complex such as the Walker Lane Fault (shown to the



left) than the relatively simple rhombohedra configuration of the Lake Tahoe basin. As in the southern area, the Sierra Nevada is a nearly monolithic westward-tilted fault block, though summit elevations and topographic relief are about 600m less. Sierra Valley is interpreted as a graben analogous to Lake Tahoe, but the bounding faults are not easily delineated and the graben form is not as ideal as that of Lake Tahoe. North of Sierra Valley and east of the Sierra

crest is a series of small valleys, collectively known as the Plumas trench, which is interpreted as an elongate, northwest-trending graben (Durrell, 1966). The remainder of the northern area is structurally and geologically complex, but it has been interpretive as a series of northwest-trending fault blocks, tilted southwestward and bounded by faults on their northeast sides (Turner, 1897). The Diamond and Grizzly Mountains are interpreted as tilted fault blocks, and the intervening alluviated valleys are seen as grabens (Turner, 1897; Durrell, 1966; Van Couvering, 1962). Although this interpretation is appealing in its simplicity, it does not account for all of the geological complexity evident even on regional geologic maps (Bernett and Jennings, 1962). In general, evidence for late quaternary faulting is much less apparent east of the Plumas trench than along the western margin of the trench or around Lake Tahoe. This may be due to an increased influence of warping in in the formation of the Tahoe-Truckee-Sierra Valley depression north of the Tahoe basin (Birkelnad, 1963)

Last Chance Fault

The Last Chance fault extends from near Verdi, NV, on the Truckee River, northwestward and northward along the east flank of the Verdi and Blad Mountain Ranges, across the eastern edge of Sierra Valley, and along the western base of the Diamond Mountains. The mapped length of the fault as compiled by Burnett and Jennings (1962) is about 54 km. The sense of displacement is unknown and cannot be inferred reasonably from geomorphic or lithological relations along the mapped trace of the fault. Van Couvering (1962) observed no strike-slip offset on faults near the north end of the Last Chance fault, but found that faults in that area dip steeply and have experienced several reversals of movement. These reversals of slip direction may be related to the transition from compressional to tensional stress conditions in the late Tertiary. The most recent movement appears to have been normal, with the west side down.

Despite the lack of Quaternary scarps and geomorphic features, the Last Chance fault appears to have contemporary seismicity associated with it although the epicentral pattern is not as linear as that associated with the Mohawk Valley fault. The cluster of activity a few kilometers east of the intersection of the Last Chance and Dog Valley faults is of interest because of its proximity to the epicenter of the 1948 Ml 6.0 earthquake. While these events may be aftershocks of the 1948 event, the uncertain location of that earthquake and the lack of local seismograph stations prior to 1973 make this difficult to prove.

Dog Valley Fault

The Dog Valley fault is a concealed but seismically active, northeast trending, strike-slip fault whose trace is inferred to extend from Dog Valley on the northeast to the vicinity of Donner Lake on the southwest. Because of its persistent recent seismic activity and its proximity to Stampede, Prosser Creek, and Boca Dams, the Dog Valley fault is potentially the most significant fault to these dams. For this reason, it was the subject of the most detailed field study. The fault is expressed on the surface as a series of roughly aligned, northwest-trending drainages. Other northeast-trending liniments exist in the central area, but the alignment described above represents the most uninterrupted, and therefore most probable trace of a continuous fault with this trend. Moreover, the fault trace shown on plate 1 best corresponds with the observed alignment of earthquake epicenters. The inferred length of the fault is about 31 kilometers.

Within the past 50 years, the Dog Valley fault has been the most seismically active fault in the study area (Ryall and VanWormer, 1980; VanWormer and Prestly, 1978). The existence of a Dog Valley fault was first suggested as a result of the 1966 Ml 6.0 Truckee earthquake. USBR

geologists (USBR, 1966a) identified an ostensibly fault-controlled lineament that corresponds in that part with the trace of the Dog Valley fault that we have inferred from geomorphic and seismological evidence.

The two largest historical earthquakes in the central fault area occurred near the inferred trace of the Dog Valley fault. The 1948 Ml 6.0 Verdi earthquake occurred near the northeastern end of the fault, in the vicinity of Dog Valley (Bell et al., 1982), and the Ml Truckee earthquake of 1966 occurred near the middle of the fault (Ryall et al., 1968). Neither earthquakes caused fault displacement of the ground surface, although some isolated ground failures die to seismic shaking occurred in and around the epicentral area of the 1966 shock (Kachadoorian et al., 1967)."

Geographic Extent and Potential Magnitude
These Tahoe Basin Fault Systems are the most serious known faults that threaten Sierra County. Up to a Richter scale 7.0 magnitude earthquake is possible on these faults with the most likely large event being in the range of Richter magnitude 6.7.

This scenario earthquake is for a magnitude 6.7 earthquake in the Tahoe Basin in Sierra County. An event along this fault would cause the most severe damage and therefor the potential magnitude is critical in Eastern Sierra County. Out of the total area uninhabitable units of 652, almost half (43%) would be in Sierra County. As is the case with previous events, the older housing stock would experience the most damage. In the more recently suburbanized areas of Sierra most of the damage would be experienced by mobile homes and older one-to-three story wood-frame buildings.

Sierra County is one of the hardest hit counties in both gross numbers and percentages. Over 40% of this event's displaced and peak shelter populations are expected to be from Sierra County.

Within Sierra County, 79% of the projected shelter population is a result of red-tagged dwelling units, and most (over 80% of the uninhabitable dwelling units) are either mobile homes or 1-2 story post-1939 single-family buildings. These relationships alone are not enough to prove a correlation between uninhabitable mobile homes, single-family dwelling units and the generation of shelter populations. However they do seem to suggest an association between certain housing types and the probability of going to a shelter in the event of a major earthquake."

According to the last Census data the vast majority of homes in Sierra County are low code, pre-1970 homes. The table on the following page illustrates these census findings.

Low Code Census Data

Year	Number of Units
Pre 1940	693 Low Code
1940-1950	201 Low Code
1951-1960	212 Low Code (1380 Low Code)
1961-1970	274 Low Code
1971-1980	466 Moderate Code
1981-1990	444 Moderate Code
1991-2000	275 High Code Current Standards
2001-2010	16“ (1201 Moderate/current standards)

In any earthquake, the primary consideration is saving lives. Time and effort must also be given to providing for people's mental health by reuniting families, providing shelter to the displaced persons and restoring basic needs and services. A major effort will be needed to remove debris and clear roadways, demolish unsafe structures, assist in reestablishing public services and utilities and provide continuing care and temporary housing for affected citizens.

Previous Occurrences

The Sierra Nevada Mountains were formed in large part by extremely violent seismic activity. This folding of the continental plate was in part responsible for the surfacing of deep heavy metal deposits, such as gold to the or near the surface where man was able to find, extract and excavate these materials in the mid 19th century**.** Although Sierra County’s historical earthquake activity is significantly below California’s state average, it is 631% greater than the overall U.S. average. Evidence for two surface-rupturing earthquakes occurring in the last 10,000 years was discovered in Antelope Valley. The most recent such temblor led to a surface rupture at least 14 miles (23 kilometers) long, caused perhaps by an earthquake of magnitude 7.5.

Radiocarbon dating of soil samples suggested the most recent earthquake occurred approximately 1,350 years ago. The one before it took place about 6,250 years before the present day. Communities all along the eastern flank of the Sierra Nevada are at risk for experiencing strong or major earthquakes, as well as smaller events. The big earthquakes are the ones that rupture the ground and build the mountains and can cause substantial structural damage, but smaller earthquakes are still capable of damaging some structures. Recent Seismic events include:

- On 9/12/1994 at 12:23:43, a magnitude 6.1 (5.4 MB, 5.7 MS, 6.1 MW, 6.0 MD, Depth: 8.7 mi, Class: Strong, Intensity: VII - IX) earthquake occurred 66.6 miles away from the county center

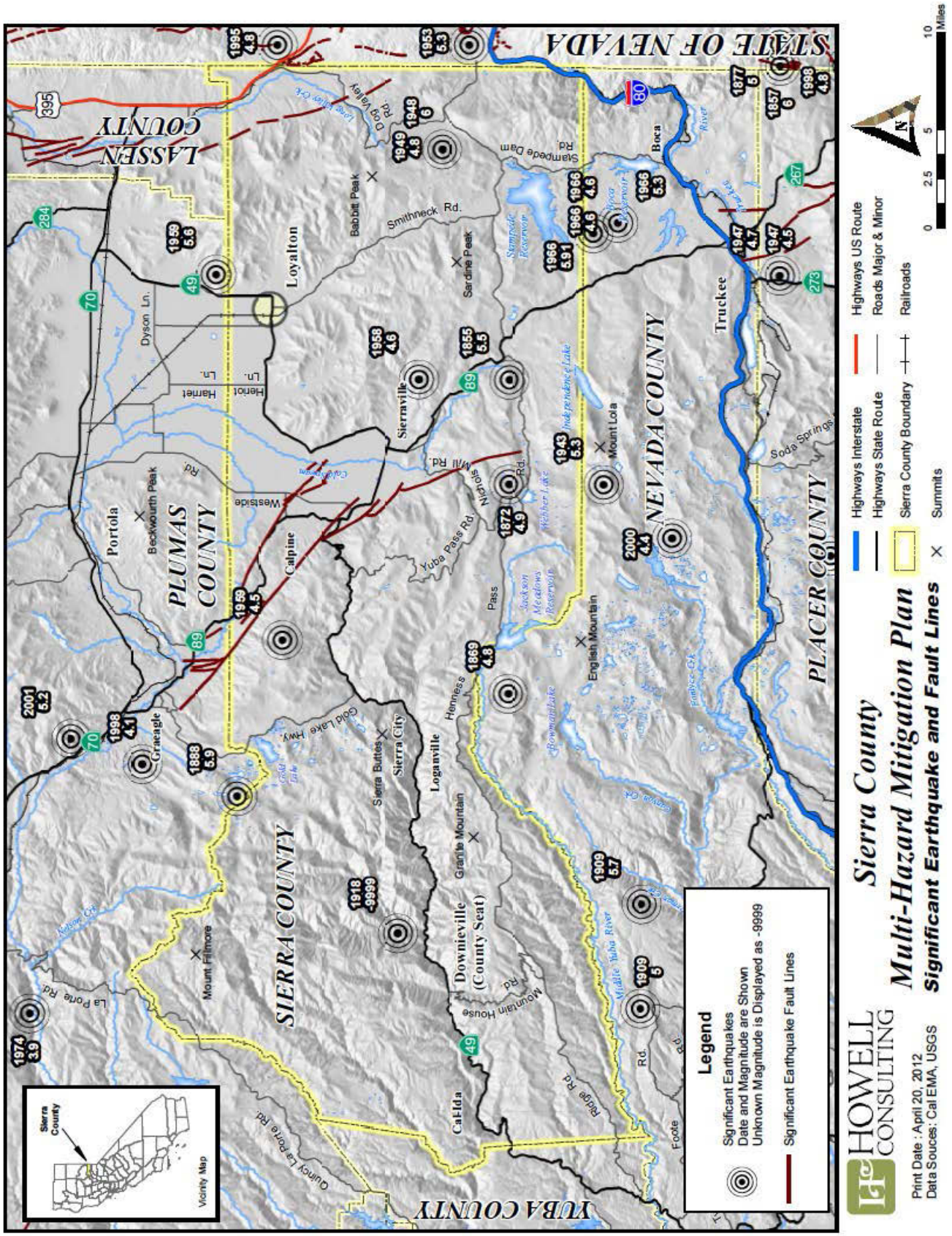
- On 8/1/1975 at 20:20:12, a magnitude 5.8 (5.8 MB, 5.6 MS, 5.8 MW, 5.7 ML, Class: Moderate, Intensity: VI - VII) earthquake occurred 46.4 miles away from the county center

- On 12/28/1995 at 18:27:59, a magnitude 5.5 (4.6 MB, 4.5 MS, 5.0 ML, 5.5 ML, Depth: 3.1 mi) earthquake occurred 76.7 miles away from the county center

- On 10/30/1998 at 09:53:30, a magnitude 5.3 (4.7 MB, 5.3 ML, 4.8 MW, Depth: 6.4 mi) earthquake occurred 35.4 miles away from Sierra County center
  On 8/10/2001 at 20:19:26, a magnitude 5.2 (4.8 MB, 4.9 MS, 5.2 MW, 5.1 MW, Depth: 11.1 mi) earthquake occurred 17.7 miles away from the county center

- On 9/12/1994 at 23:57:09, a magnitude 5.4 (4.9 MB, 5.3 ML, 5.4 ML, Depth: 0.3 mi) earthquake occurred 71.0 miles away from the county center

Magnitude types: body-wave magnitude (MB), duration magnitude (MD), local magnitude (ML), surface-wave magnitude (MS), moment magnitude (MW)


STATE OF NEVADA
LASSEN COUNTY
PLUMAS COUNTY
SIERRA COUNTY
NEVADA COUNTY
PLACER COUNTY
YUBA COUNTY
Loyalton
Sierraville
Truckee
Downieville (County Seat)
Portola
Calpine
Graeagle
Sierra City
Loganville
Mount Fillmore
Granite Mountain
English Mountain
Mount Lola
Babbitt Peak
Sardine Peak
Beckwourth Peak
Smithneck Rd.
Yuba Pass
Boca
Soda Springs
Legend
Significant Earthquakes
Date and Magnitude are Shown
Unknown Magnitude is Displayed as -9999
Significant Earthquake Fault Lines
Vicinity Map
Sierra County
Highways Interstate
Highways US Route
Highways State Route
Roads Major & Minor
Railroads
Sierra County Boundary
Summits
Miles
HOWELL CONSULTING
Sierra County
Multi-Hazard Mitigation Plan
Significant Earthquake and Fault Lines
Print Date : April 20, 2012
Data Souces: Cal EMA, USGS

RGJ.com

October 14, 2011

Swarm of 700-plus quakes in Sierra 30 miles west of Reno, but no one's feeling them

By Steve Timko
stimko@rgj.com

A swarm of more than 700 earthquakes have struck near the small Sierra County, Calif., community of Sierraville since August, although there's a good chance few if any of the quakes have been felt.

There have been more than 30 quakes of a magnitude 1 or more in the last week, the largest being about 1.8, said Ken Smith, seismic network manager for the Nevada Seismological Lab.

But the quakes are so deep — most are 18 miles below the surface or more — and so minor Smith thinks they have little chance of being felt at the surface. They are centered about 2 miles west of Sierraville and 31 miles west of Reno.

Seismologists can't say with certainty yet what is happening, but appears the quakes are being caused by moving magma. The earth is basically divided into layers of the crust, the mantle and the core with the temperature getting hotter the deeper the depth. Smith said the ground in this area is constantly in motion, moving about 14 millimeters a year. Because of that motion, it appears magma found a way to flow from the mantle, the middle area, to the crust, the upper area.

"The upper mantle in this region has a lot of magma in it," Smith said. "Sometimes it finds a way to work its way into the lower crust or the crustal-mantle plate. ... As everything is moving around, they have an opportunity to inject magma into places where it can."

These quakes appear similar to the swarm of quakes that struck under Lake Tahoe in 2003, which were later determined likely to be deep magma injection, Smith said.

This magma — called lava as soon as it reaches the earth's surface — is not associated with the Lassen Volcano to the north, he said. While it's not going to end up as a volcanic eruption, it could deform the earth's crust and set the stage for an earthquake — but not any time soon.

The first quake in this swarm happened Aug. 9. The lab put extra equipment out there to monitor it in the middle of September. The number of quakes increased significantly in the past two weeks, Smith said.

"The observations we have now are the result of better observation and better monitoring of these processes," Smith said. Seismologists may not have been able to detect this swarm as recently as 15 years to 20 years ago, but the equipment is better now, he said.

Article on EQ Swarm in Sierra County

Probability of Future Occurrences
Earthquakes in Sierra County are considered occasional to likely due to the seismically active nature of the region. There is an 80% plus probability of a 6.0 or greater earthquake. The probability approach is 90% within a 20-year time horizon. Larger 7.0 plus earthquakes are possible, but in the Sierra Complex tend to have long recurrence intervals between events. The probability of a 7.0 or greater earthquake in this area is a 25% over the next 20 years according to the USGS Report on the Walker Valley Complex.

Flood

Hazard Description
The primary types of flood events in Sierra County are riverine. Flooding could also occur as a result of dam failure as covered previously in this chapter. Regardless of the type of flood, the cause is often the result of severe weather and excessive rainfall, either in the flood area, upstream, or from winter snowmelt.

Riverine flooding is the most common type of flood event and occurs when a watercourse exceeds its "bank-full" capacity. Riverine flooding generally occurs as a result of prolonged rainfall, or rainfall that is combined with already saturated soils from previous rain events. The duration of riverine floods may vary from a few hours (flash flood) to many days (slow-rise flooding). Factors that directly affect the amount of flood runoff include precipitation amount, intensity and distribution, the amount of soil moisture, seasonal variation in vegetation, snow depth, and the water resistance of the surface due to urbanization. The warning time associated with slow-rise floods assists with life and property protection.

As the slope of the river flattens, the velocity slows and the material is deposited. As a result, the lower reaches of many streams pass through the sandy alluvial plains that they have formed. Flood flows can cause these streams to migrate, resulting in a higher and wider floodplain. Developed areas on land originally outside the defined floodplain can later flood.

The area adjacent to a river channel is the floodplain. Floodplains are illustrated on inundation maps, which show areas of potential flooding and water depths. In its common usage, the floodplain most often refers to that area that is inundated by the 100-year flood, the flood that has a one percent chance in any given year of being equaled or exceeded. The 100-year flood is the national minimum standard to which communities regulate their floodplains through the National Flood Insurance Program (NFIP).

Urban flooding can occur in any terrain. It is particularly aggravated where natural cover has been removed to construct buildings, roads, and parking lots. Streets become rivers, inundating vehicles and causing damage to residential and industrial properties situated along stream channels.

The potential for flooding can change and increase through various land use changes and changes to land surface, which result in changes to the floodplain. Environmental changes can create localized flooding problems in and outside of natural floodplains by altering or confining natural drainage channels. These changes are most often created by human activity.

Basin Boundaries and Hydrology
Sierra Valley is an irregularly shaped, complexly faulted valley in eastern Plumas and Sierra Counties. The basin is bounded to the north by Miocene pyroclastic rocks of Reconnaissance Peak, to the west by Miocene andesite of Beckwourth Peak, to the south and east by Tertiary andesite, and to the east by Mesozoic granitic rocks (Saucedo 1992). The Middle Fork Feather River heads in Sierra Valley is formed by the confluence of several streams draining the surrounding mountains. Most of the smaller tributaries flow north and northwest to join the Middle Fork Feather before it exits the valley at the northwest corner of the basin. Annual Precipitation ranges from 13 inches in the valley to 29 inches in the upland areas to the south and west. This basin with less than 5 feet of slope per mile behaves very differently to flood events than the western parts of the county.

Recharge Areas
Most of the upland recharge areas are composed of permeable materials occurring along the upper portions of the alluvial fans that border the valley. Recharge to groundwater is primarily by way of infiltration of surface water from the streams that drain the mountains and flow across the fans. During flood events in the eastern parts of the county these recharge areas become saturated. The limited number of streams and limited carry capacity, due to lack of slope, creates a slowly forming rim land style flood as the basin temporarily refills with water. This is very different from the high velocity flooding in the western parts of Sierra County.

The Eastern one-third to half of the county to the east of the Sierra drainage divide is a large basin **"**Sierra Valley". It is one of many wide, flat valleys in eastern California that formed as basins between uplifted and tilted ranges. This large lake basin was formed similarly to the Lake Tahoe Basin, however currently the lake is filled with over 2,000 feet of lake deposits forming a 400 plus square mile basin.

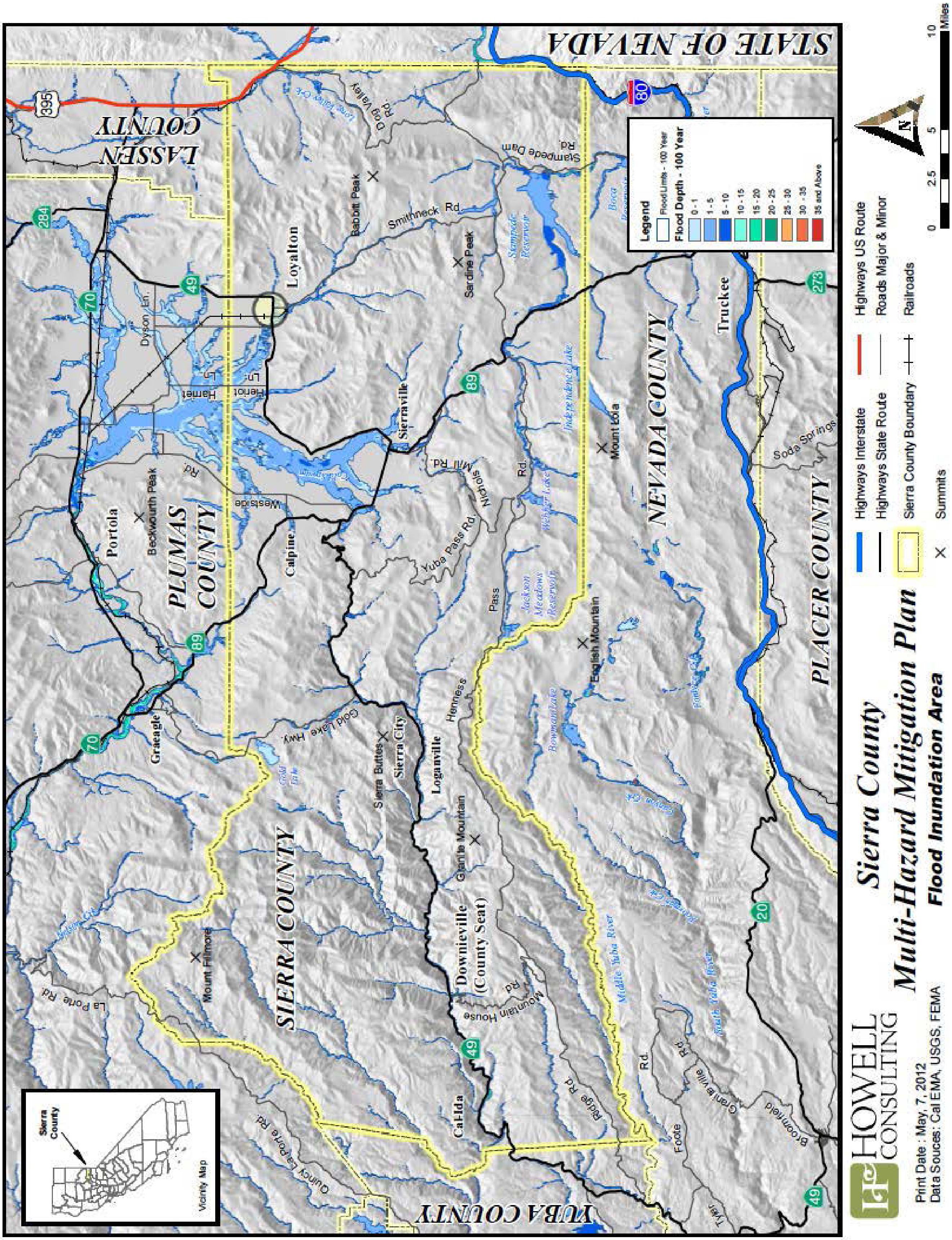
West Side Characteristics
The Yuba River drainage basin is located just north of Interstate 80's eastern edge of the California Central Valley and the Sierra Nevada Drainage Divide. The drainage basin is about 150 miles long on a generally East/West Axis and ranges from 25-30 miles in width and covers approximately 1,425 square miles.

The Yuba River Drainage is composed of numerous tributary rivers and streams that are highly compartmentalized by the mountainous terrain of the western half of the county. The mountainous terrain forces streams and rivers to drop rapidly through steep and congested valleys and canyon floors, with average drops of 20-50 feet of elevation per mile of channel. This steep slope, rugged bedrock comprising the streambeds and rocky banks of the streams and rivers create a very dynamic hydro system, capable of fast and furious stream rises during significant rain events. These floods are characterized by rapid rise, fast and powerful flows and when the source runoff subsides, rapid falling of water. The mechanism of damage from these floods is the speed, depth and mass of the water and is characterized by short and very intense flood events that can and have recurred several times during an extremely wet winter.

Geographic Extent and Potential Magnitude

Approximately 40% of the developed portions of Sierra County are subject to damage from catastrophic flooding. As in most of California, settlement was along river for resource extraction or transportation purposes, on alluvial fans due to the richness of the soil and ease of agriculture, or along historic flood plains for ease of construction due to lack of topographic relief.

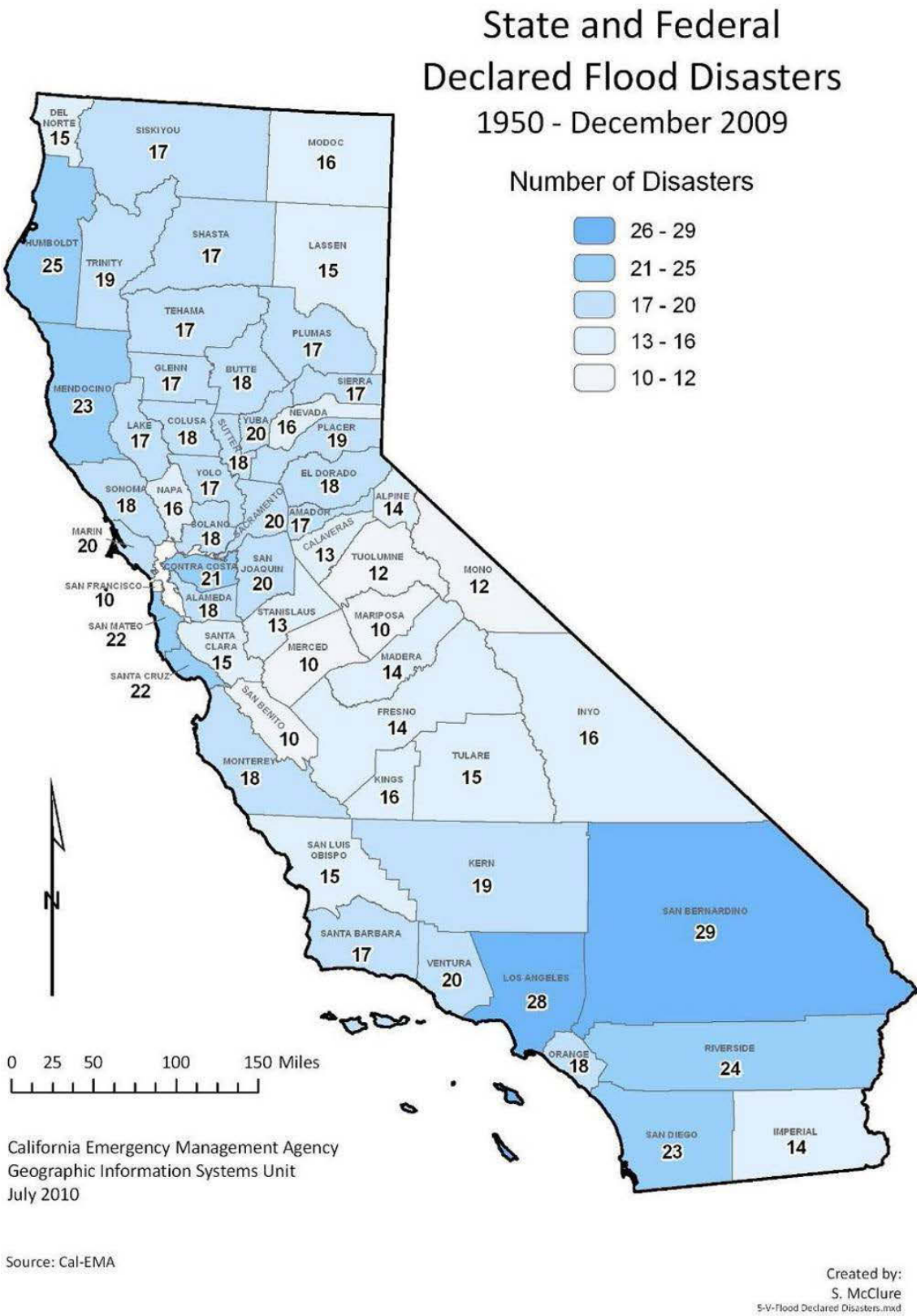
Although this represents a tiny proportion of the overall landmass of Sierra County it represents the most highly developed areas, such as the great eastern basin and the Yuba river historic mining communities. As noted in the disaster declaration table, floods are one of the most common declared emergency in Sierra County and the projects listed on the mitigation actions section reflect the seriousness of the threat and potential magnitude which is critical for flooding disasters in Sierra County.


Sierra County
Multi-Hazard Mitigation Plan
Flood Inundation Area
HOWELL CONSULTING
Print Date : May, 7, 2012
Data Souces: Cal EMA, USGS, FEMA
Legend
Flood Limits - 100 Year
Flood Depth - 100 Year
Highways Interstate
Highways State Route
Sierra County Boundary
Summits
Highways US Route
Roads Major & Minor
Railroads
Miles
Vicinity Map
Sierra County
SIERRA COUNTY
PLUMAS COUNTY
NEVADA COUNTY
PLACER COUNTY
LASSEN COUNTY
YUBA COUNTY
STATE OF NEVADA
Downieville (County Seat)
Loyalton
Sierraville
Calpine
Truckee
Portola
Graeagle
Loganville
Sierra City
Cal-Ida

Previous Occurrences
Sierra County has been a declared county for flooding 5 times in the last 25 years, with federal declarations in 1992, 1995 and 1997. Significant and damaging flooding has occurred in the winters of 1958, 1962, 1969, 1982, 1986, 1992, 1995, 1997 and 2005.

The map on the following page shows both the state and federally declared disasters in California from 1950 to 2009. Sierra County has had 17 state and/or federally declared disasters during that timeframe.

Probability of Future Occurrences
With the flood history of Sierra County, annual probability of flooding is 20% or likely in any given year. The factors that consistently lead to flooding are heavier than normal rainfall, greater concentration of rainfall events, greater intensity of individual storms and late season warm storms that melt the expansive snowpack. Any combination of three or more of these factors will lead to flooding.



State and Federal Declared Flood Disasters; Source: Cal EMA

Severe Weather - Winter Storms

Hazard Description

Winter storm includes snow, ice, blizzard conditions, and extreme cold. Heavy snow can immobilize a region, stranding commuters, stopping the flow of supplies, and disrupting emergency and medical services. Accumulations of snow can collapse roofs and knock down trees and power lines. The cost of snow removal, damage repair, and business losses can have a tremendous impact on cities and towns.

Heavy accumulations of ice can bring down trees, electrical wires, telephone poles and lines, and communication towers. Communications and power can be disrupted for days until damage can be repaired. Even small accumulations of ice may cause extreme hazards to motorists and pedestrians.

Some winter storms are accompanied by strong winds, creating blizzard conditions with blinding wind-driven snow, severe drifting, and dangerous wind chills. Strong winds with these intense storms and cold fronts can knock down trees, utility poles, and power lines. Blowing snow can reduce visibilities to only a few feet in areas where there are no trees or buildings. Serious vehicle accidents can result with injuries and deaths.

Extreme cold often accompanies a winter storm or is left in its wake. Prolonged exposure to the cold can cause frostbite or hypothermia and can become life threatening. Infants and the elderly are most susceptible. Pipes may freeze and burst in homes or buildings that are poorly insulated or without heat.

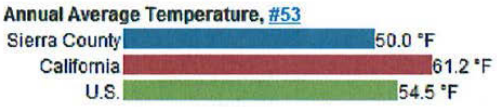
Nationally, winter storms cause more deaths per year than any other natural hazard. Wind can greatly amplify the impact of cold ambient air temperatures and thus the severity of winter storms. In 2001, the NWS implemented an updated Wind Chill Temperature index to describe the relative discomfort/danger resulting from the combination of wind and temperature. Wind chill is based on the rate of heat loss from exposed skin caused by wind and cold. As the wind increases, it draws heat from the body, driving down skin temperature and eventually the internal body temperature.

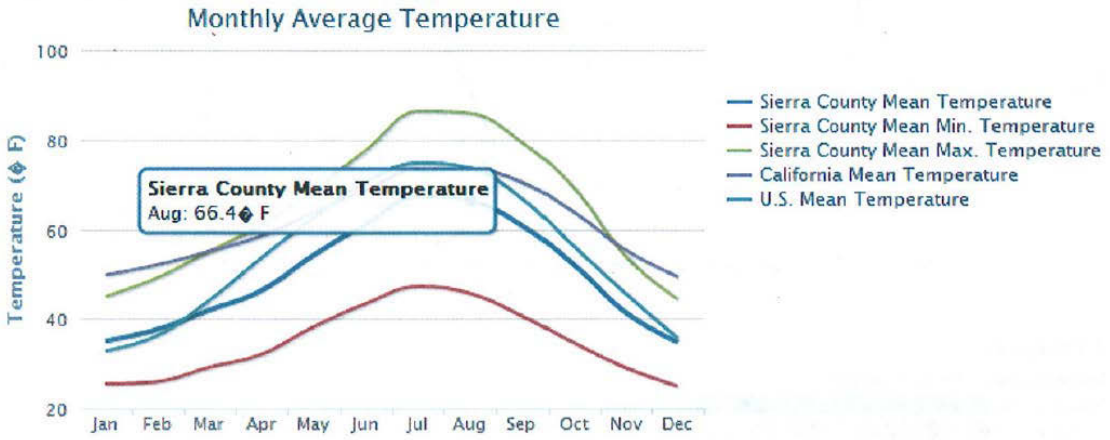
Geographic Extent and Potential Magnitude

The geographic extent of this hazard is Extensive, nearly 50-100% of the County is affected and the potential magnitude is catastrophic. All locations in the county can be affected by winter storms. The western part of the county is much more frequently impacted due to the higher elevations, as evidenced by record and average temperatures.

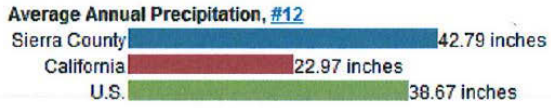
The following shows Sierra County's average temperature, precipitation, snowfall and wind speed according to www.usa.com.

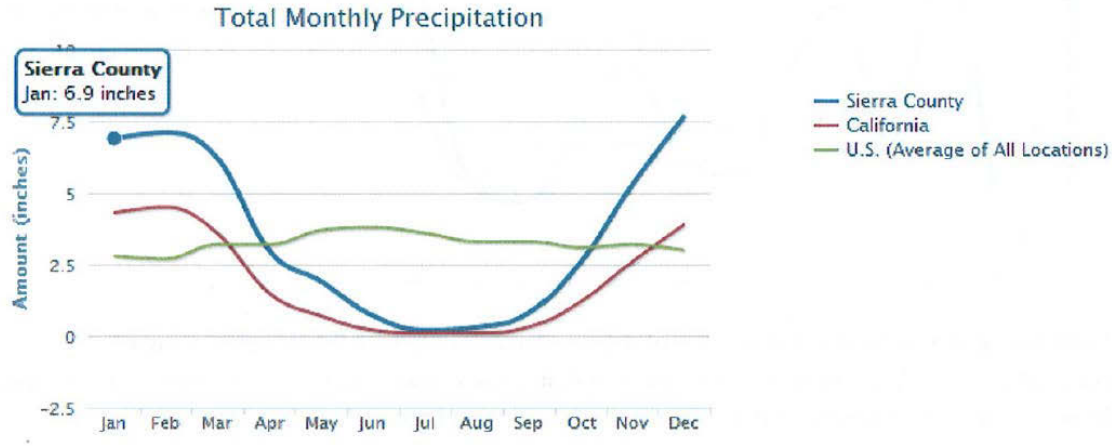
Average Temperature



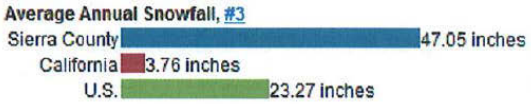


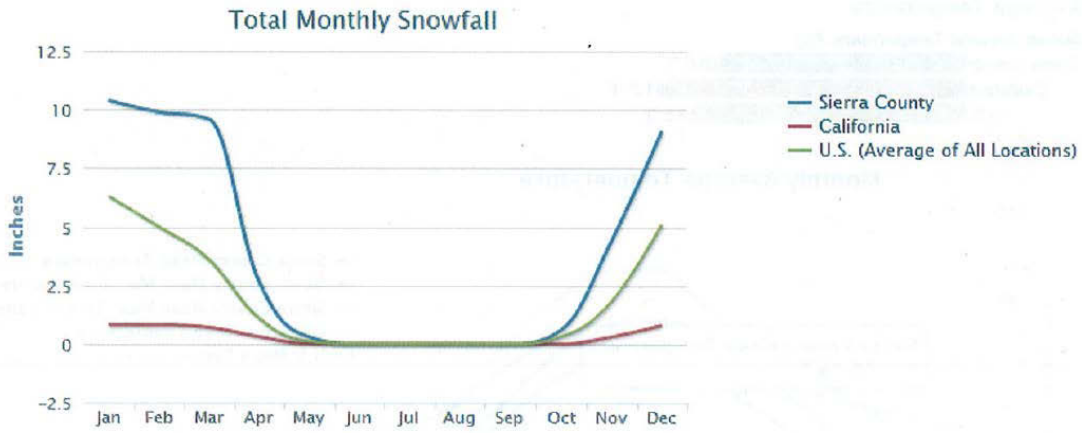
Precipitation



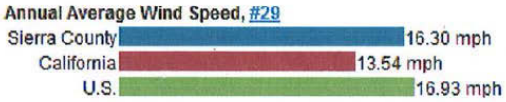


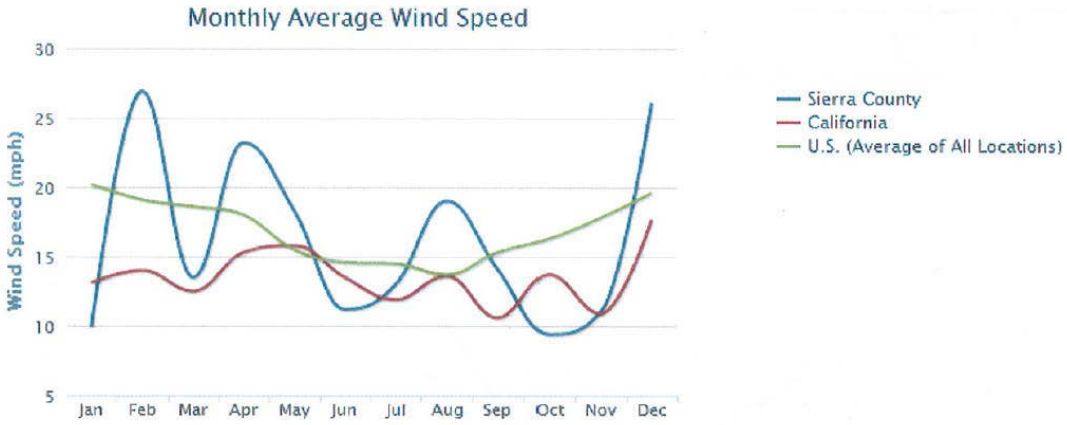
Snow



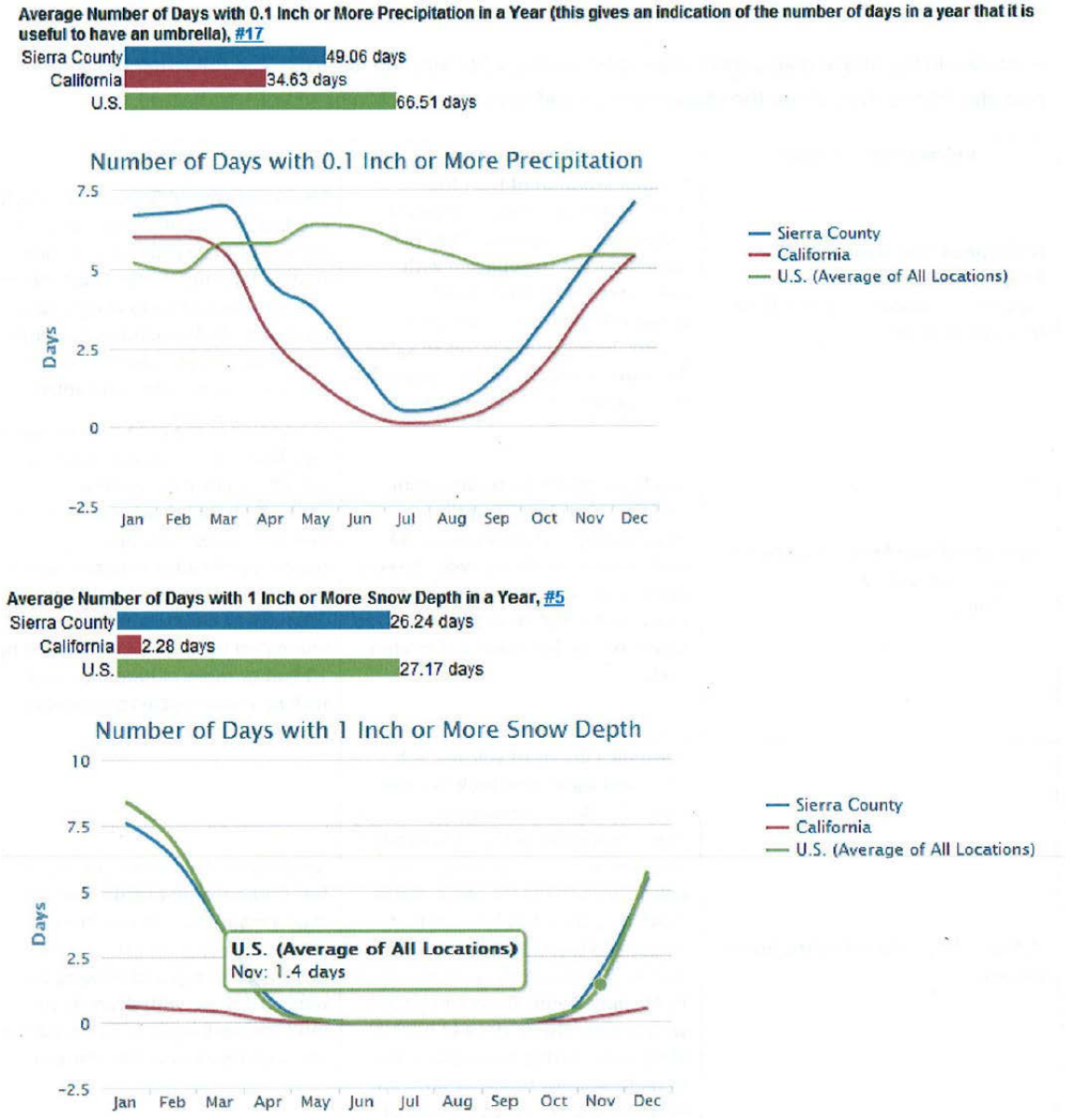


Wind Speed





The following shows the average number of days in Sierra County with 0.1 inches or more of precipitation, as well as 1 inch or more snow depth, in a given year. Compared to California in general, Sierra County experiences more days of both snow and precipitation.



The National Oceanic and Atmospheric Administration's (NOAA) National Climatic Data Center (NCDC) has been tracking severe weather since 1950. Their Storm Events Database contains data on all weather events, as entered by NOAA's NWS. Additionally, the Planning Team supplemented NCDC data with data from SHELDUS (Spatial Hazard Events and Losses Database for the United States). SHELDUS is a county-level data set for the United States that tracks 18 types of natural hazard events along with associated property and crop losses, injuries, and fatalities. Produced by the Hazards Research Lab at the University of South Carolina, this database combines information from several sources (including the NCDC).

The table on the following summarizes severe weather events that occurred in Sierra County. There were 12 events that were recorded from 1999 to 2013. It is interesting to note that different data sources capture different events during the same time period, and often display different information specific to the same events. The Planning Team recognized these

inconsistencies; they still thought the importance of the data is relevant as it provides supporting documentation of the hazard, its extent and magnitude.

Severe Weather for Sierra County from 1999 to Present

Type	Area	Date of Event	Deaths	Injuries	Property Damage*	Crop Damage*
Heavy Rain	Sierra County	07/13/1999	0	0	$0	$0
Heavy Rain	Sierra County	11/07/2002	0	0	$0	$0
Heavy Rain	Sierra County	12/13/2002	0	0	$0	$0
Thunderstorm Wind (Magnitude 70 kts. [estimated gusts])	Sierra County	07/31/2003			$0	$0
Heavy Rain	Sierra County	08/19/2004	0	0	$0	$0
Heavy Rain	Sierra County	05/18/2005	0	0	$0	$0
Heavy Rain	Sierra County	12/17/2005	0	0	$0	$0
Flood	Sierra County	12/30/2005	0	0	$1 mil	$0
Heavy Rain	Sierra County	02/27/2006	0	0	$0	$0
Heavy Rain	Sierra County	08/31/2007	0	0	$0	$0
Hail (0.88 in.)	Sierra County	05/28/2009	0	0	$0	$0
Hail (1.00 in.)	Sierra County	07/03/2013	0	0	$0	$0

Source: NCDC and SHELDUS, Planning Team *Losses are for all areas impacted by events

Heavy rains and severe storms occur in Sierra County throughout the year as evidenced in the table above. Damaging winds often accompany winter storm systems moving through the area. According to the Steering Committee, short-term, heavy storms can cause damage.

Previous Occurrences

Winter storms are the most common severe weather event on record in Sierra County. Refer to the Sierra County Disaster Declaration History chart below for a history of severe weather and winter storm previous occurrences.

Disaster Declaration History in Sierra County 1950-Present

Hazard Type	Disaster Number	State Proclamation/date	Federal Declaration/date	Public (PA)/Individual (IA) Assistance
Drought	EM-3023	Information not available	Emergency 01/20/77	PA only
Heavy Rains, Flooding	DR-183	Information not available	Major 12/24/1964	Both PA and IA
Severe Storms, Flooding	DR-253	Information not available	Major 01/26/69	Both PA and IA
Severe Storms, Flooding	DR-758	86-01 02/21/86	Major 02/21/86	Both PA and IA
Severe Storms, Winter Storm, Mud and Landslides, Flooding	DR-979	93-01 02/03/93	Major 02/03/93	Both PA and IA
Severe Storms, Flooding, Landslides, Mud Flows	DR-1046	95-03-N 03/12/95	Major 03/12/95	Both PA and IA
Severe Storms, Flooding	DR-1155	97-01 01/04/97	Major 01/04/97	Both PA and IA
Hurricane Katrina Evacuation	EM-3248	--	Emergency 09/13/2005	--
Severe Storms, Flooding, Mudslides, and Landslides	DR-1628	2006-01 02/03/2006	Major 02/03/2006	PA only

Source: FEMA Disaster Declaration History www.fema.gov
California Disaster Assistance Act Reference Table – Cal EMA Public Assistance Staff

Probability of Future Occurrence
The probability of future occurrence in Sierra County is likely due to the history of previous occurrences as documented above.

Wildland Fires

Hazard Description
Fire conditions arise from a combination of hot weather, an accumulation of vegetation, and low moisture content in the air, and fuel. These conditions, especially when combined with high winds and years of drought, increase the potential for wildfires to occur. The wildfire risk is predominantly associated with wildland-urban interface areas; areas where development is interspersed or adjacent to landscapes that support wildfire. A fire along this wildland-urban interface can result in major losses of property and structures.

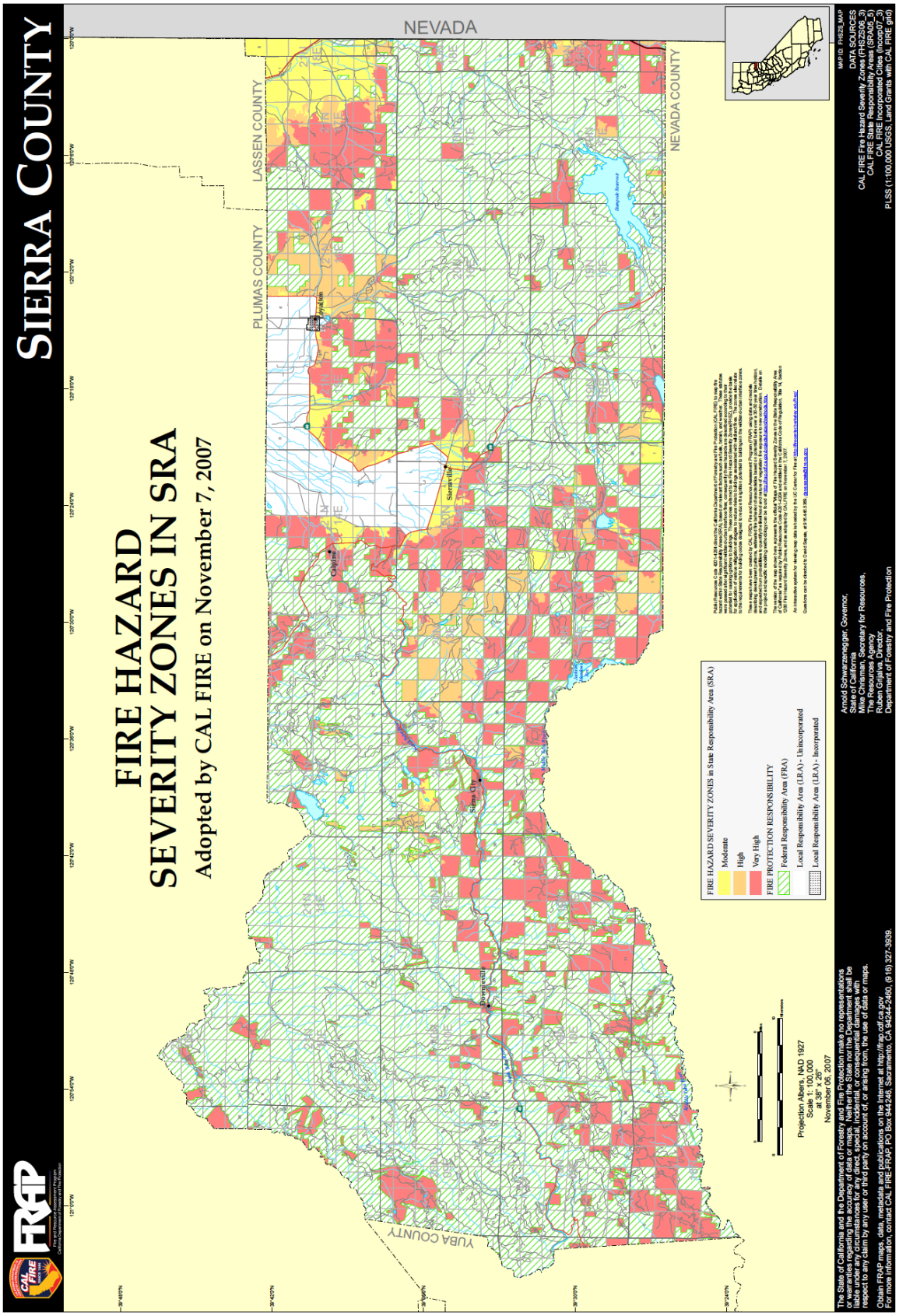
Generally, there are three major factors that sustain wildfires and predict a given area's potential to burn. These factors are fuel, topography, and weather.

- **Fuel**—Fuel is the material that feeds a fire and is a key factor in wildfire behavior. Fuel is generally classified by type and by volume. Fuel sources are diverse and include everything from dead tree needles and leaves, twigs, and branches to dead standing trees, live trees, brush, and cured grasses. Also to be considered as a fuel source are manmade structures, such as homes and associated combustibles. The type of prevalent fuel directly influences the behavior of wildfire. Light fuels such as grasses burn quickly and serve as a catalyst for fire spread. In addition, ladder fuels can spread a ground fire up through brush and into trees leading to a devastating crown fire that burns in the upper canopy and cannot be controlled. The volume of available fuel is described in terms of fuel loading.
- **Topography**—An area's terrain and land slopes affect its susceptibility to wildfire spread. Both fire intensity and rate of spread increase as slope increases due to the tendency of heat from a fire to rise via convection. The arrangement of vegetation throughout a hillside can also contribute to increased fire activity on slopes.
- **Weather**—Weather components such as temperature, relative humidity, wind, and lightning also affect the potential for wildfire. High temperatures and low relative humidity dry out the fuels that feed the wildfire creating a situation where fuel will more readily ignite and burn more intensely. Wind is the most treacherous weather factor. The greater the wind, the faster a fire will spread and the more intense it will be. In addition to wind speed, wind shifts can occur suddenly due to temperature changes or the interaction of wind with topographical features such as slopes or steep hillsides. Lightning also ignites wildfires, which are often in terrain that is difficult for firefighters to reach. Drought conditions contribute to concerns about wildfire vulnerability. During periods of drought, the threat of wildfire increases.

Warning times are usually adequate to ensure public safety, provided that evacuation recommendations and orders are heeded in a timely manner. While in most cases wildfires are contained within a week or two of outbreak, in certain cases, they have been known to burn for months, or until they are completely extinguished by fall rains.

Geographic Extent and Potential Magnitude
The geographic extent of this hazard in Sierra County is Extensive with more than 50 percent of the Operational Area being affected.

Generally, wildfire risk is highest across a broad section of the western, central and eastern sections of Sierra County. Areas of very high or high wildfire threat constitute at least 85 percent of the county. The potential magnitude of wildfire in Sierra County is Catastrophic. See the wildfire severity map on the following page.



Wildfire Severity Zones; Source: Cal Fire

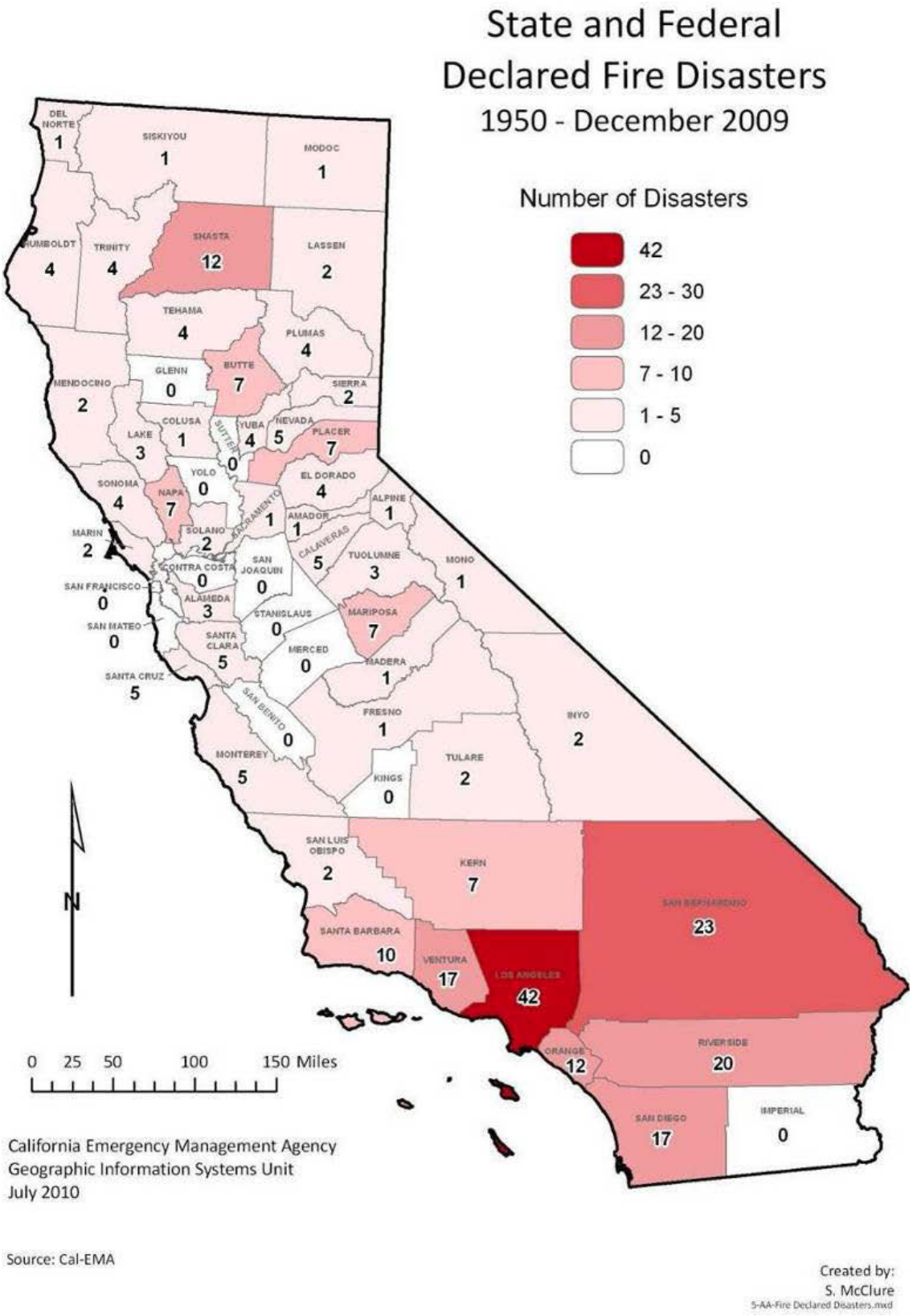
Previous Occurrences
Sierra County has a rich wildfire history. In the last thirty years the combination of firefighting technology and tactics, environmental restraints and developmental trends has led to increasing fuel loads, greater occupancy of high threat areas and greater potential for catastrophic wildfire. In the last thirty years Sierra County wildfires have burnt 232,000 acres in a county of approximately 1,482,000 acres.

Wildfires of varying scales occur on an annual basis in Sierra County. Sierra County has received disaster declarations for wildfires as shown in the map on the following page.

There were nine named fires noted in the Sierra County Fire Protection Plan from 1950-2002, and since 2002 three major fires have struck Sierra County burning in excess of 75,000 acres in total. The 2008 fire siege resulted in major disaster declarations for many counties in California including Sierra. However the greatest majority of fires are contained at less than 10 acres.

Probability of Future Occurrences
Highly Likely—Near 100 percent chance of occurrence in next year or has a recurrence interval of 10 years or less

The season when wildfire is most likely to occur generally runs from late June through October. This is due to hot, dry conditions during this time of year and an increase in population throughout the county in the summer months as vacation homes are visited and seasonal workers converge on the area.



Source: Cal EMA Hazard Mitigation Plan, 2009

Volcano

Hazard Description

Many of California's young volcanoes pose a threat to people and property. Volcanic eruptions occur in the State about as frequently as the largest San Andreas Fault Zone earthquakes; at least ten eruptions have occurred in California in the last 1,000 years. A new effort to identify, prepare for, and mitigate volcanic hazards within California is underway. Cal OES, in partnership with the United States Geological Survey (USGS) and California Geological Survey (CGS), is developing its first "State of California Volcanic Hazards Identification, Risk Analysis, and Concept of Operations Annex to the State Emergency Plan." In addition, in 2013 Cal OES, in partnership with NOAA, the port of Aviation" which addresses air operations issues related to volcanic ash.

Geographic Extent and Potential Magnitude

The Geographic extent of Volcanic Activity was rated as Extensive with 50 – 100% of the County affected and the potential magnitude was rated as Catastrophic with more than 50 percent of the operational area affected.

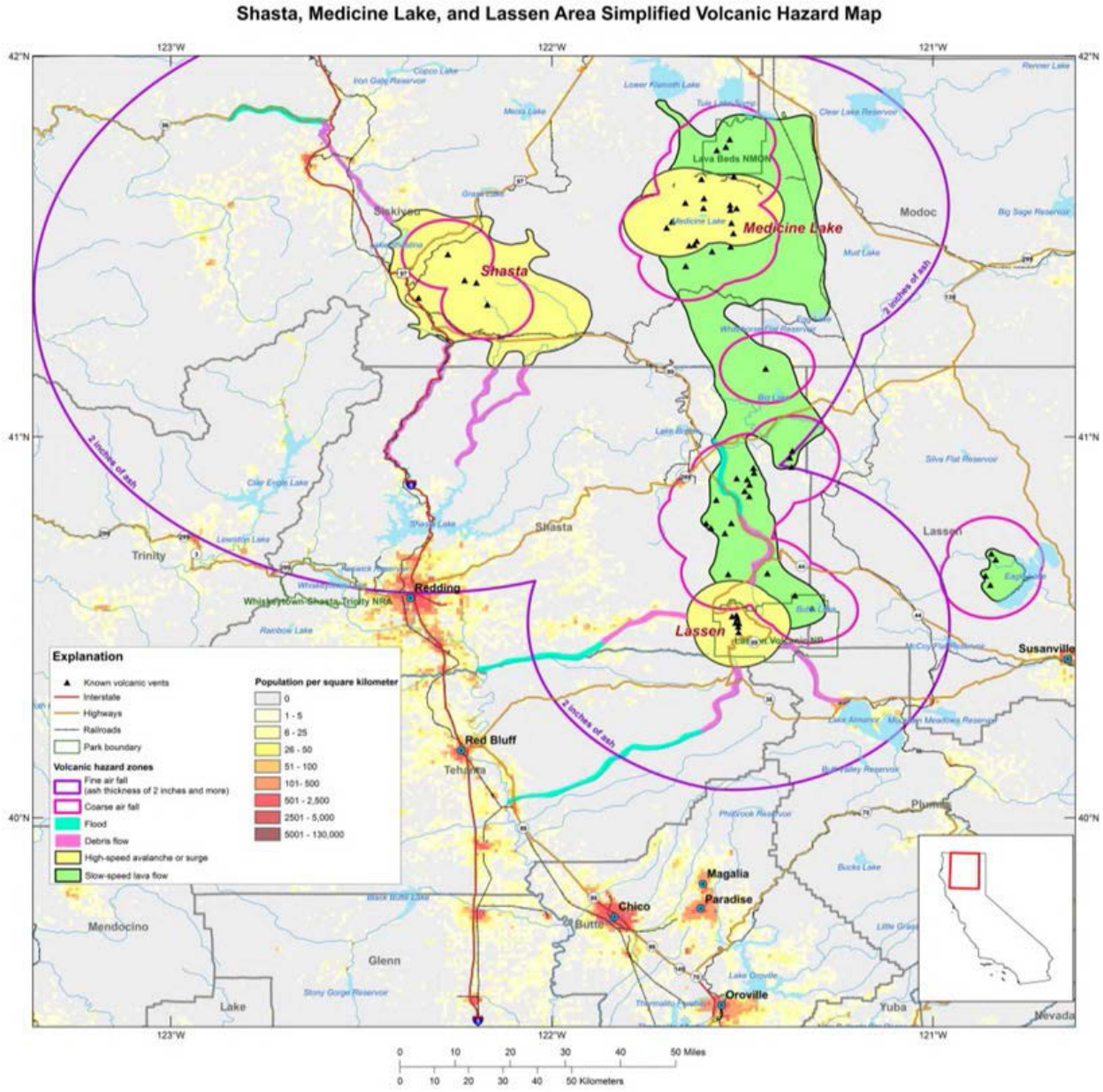
Volcanic eruptions are characterized by a number of different behaviors. Some eruptions involve the slow and non-violent release of molten lava from fissures in the ground over a hot spot in the earth's mantle. Other eruptions are more radical, resulting in the explosive release of molten rock (tephra), ash, and toxic gases. Additional eruptive traits include area seismic activity, lava bombs, landslides, subsidence, peculiar localized weather phenomenon, and plume dominated columns that can project debris for hundreds of miles.

As shown in the map on the following page, California's high- to- moderate threat volcanoes include Medicine Lake Volcano (Siskiyou, Modoc, and Shasta counties), Mt. Shasta (Siskiyou County), Lassen Volcanic Center (Shasta, Tehama, Lassen, and Plumas counties), Clear Lake Volcanic Field (Sonoma County), Long Valley Caldera/Mono- Inyo Craters (Mono County), Ubehebe Craters (Inyo County), Coso Volcanic Field (Inyo County) and Salton Buttes (Imperial County).

Potentially Hazardous Volcanoes of California

Source: Cal OES Hazard Mitigation Plan, 2013

Additionally the map below map defines zones of potential lava flow, ash fall, debris flow and flood hazards for the Shasta, Medicine Lake and Lassen Volcanoes.



Source: Cal OES Hazard Mitigation Plan, 2013

There are six different types of volcano hazards. The following table provides information about the characteristics and impacts of each type of volcano hazard.

Volcano Hazard Type	Characteristics	Impact
High Speed Lava Avalanches or Surges produced by high-energy explosive eruptions or steam blasts (pyroclastic flow)	Sudden eruption of hot (400-1300°F), gas-pressurized flows of ash and lava fragments that rush outward from the volcano with great force at ground speeds greater than 50 miles per hour (mph). Flows typically follow valleys but can overtop ridges and travel 30 miles or more from the volcano.	These high-speed flows travel much too fast for people to outrun, and are thus a main cause of eruption-related fatalities. Flows knock down, shatter, bury, or carry away nearly all objects and structures. Extreme temperatures burn forests, crops, buildings, furnishings, and vehicles.
Slow speed lava flows produced by a low-energy, effusive eruptions	Gradual inundation by lava from sustained low-level eruptions moving at speeds of less than 30 mph. Lava may pile up near the vent in thick mounds (lava dome), or move across the landscape for many kilometers as fluid rivers of molten rock.	Everything in the path of slow speed lava flows will be knocked down, buried, or burned. The flows generally travel slowly enough that people, possessions, and transportable infrastructure can be moved out of the way. The flows often ignite wildfires, and areas inundated by flows can be buried by 10 feet or more of hardened rock, making it impossible to rebuild or repair structures.
Volcanically produced **debris flows** (lahars)	Slurry-like floods of volcanic ash, rock, and water that look like wet concrete. Debris flows gain momentum during travel by eroding and entraining soil and loose rock debris from channels. Large debris flows may carry boulders 30 feet across and travel through valleys and stream channels at speeds of 20 to 40 mph. Debris flows can be hot, with temperatures close to boiling. They occur during an eruption due to melting snow or ice, or after an eruption due to remobilization of loose volcanic deposits during intense rainfall.	Most debris flows travel much too fast for people to outrun, and are thus a main cause of eruption-related fatalities. Debris flows can destroy buildings and bridges, and bury vast areas with deposits of mud and rock up to 160 feet thick as far as 65 miles from the volcano.
Volcanically-produced **floods**	Floods of surface water produced by sudden melting of snow/ice, and/or diversion of water by blocked drainages or breached embankments.	Impacts are similar those of non-volcanic floods, but the onset is usually sudden.
Fine ash fall from high-energy explosive eruptions	Fine fragments of lava, sand size and smaller, deposited from drifting ash clouds. Impact zone	Although generally non-lethal, fine ash fall is the most widespread and disruptive volcanic hazard. People

	may be many tens to a few hundreds of miles from the volcano.	exposed to fine ash commonly experience various eye, nose, and throat symptoms. Short-term exposures are not known to pose a significant health hazard. Long-term health effects have not been demonstrated conclusively. Ash deposited downwind of the volcano covers everything like a snowfall, but also infiltrates cracks and openings in machinery, buildings, and electronics. Falling ash can obscure sunlight, reducing visibility to zero. When wet, it can make paved surfaces slippery and impassable. Fine ash is abrasive, damaging surfaces and moving parts of machinery, vehicles, and aircraft. Life-threatening and costly damage can occur to aircraft that fly through fine ash clouds. Newly fallen volcanic ash may result in short-term physical and chemical changes in water quality. Close to the volcano, heavy ash fall may cause roofs to collapse, waste water systems to clog, and power systems to shut down. In agricultural areas, fine ash can damage crops, and sicken livestock. Resuspension of ash by human activity and wind cause continuing disruption to daily life.
Coarse air fall from low-energy effusive eruptions (scoria, tephra, pyroclast, pumice)	Ballistic ejection of coarse, hot fragments of lava from the volcanic vent. Impact zones are usually constrained to the flanks of the volcano. Fragments are usually softball size or smaller.	The impact of coarse air fall is limited to the immediate area of the volcanic vent. Structures may be damaged by accumulation of falling lava fragments or burnt by their high heat. Wildfires may be ignited.

Previous Occurrences

In the near vicinity of Sierra County, Lassen Volcano was the second most recent eruption in the Western Region. Explosions recurred at irregular intervals on Lassen Peak for most of 1914. Later, on May 19, 1915, a mass of lava rose in the summit crater and spilled 1,000ft (300m) down the western side of the volcano. Extensive lahars (mudflows) were created on the northeastern side as snow banks were melted. The resulting debris swept down the slope. Divided by Raker Peak, part of this mudflow raced down Lost Creek; the remaining flow passed over the 100ft (30m) rise east of the park road and rushed down Hat Creek. A wide barren swath was torn through the forest.

A great explosion blasted out a new crater three days later on May 22, 1915. A volcanic cloud rose 40,000ft (12,000m), but a portion of the explosive force was deflected downward. The resulting pyroclastic flow of super-heated gas, rocks and ash roared down the same path taken by the mudflow, resulting in further damage along the headwaters of Hat and Lost Creeks. Ash

from the eruption blew eastward with some fine ash falling at least as far as 200mi (320km) from the volcano.

The last major eruptions of Lassen Peak occurred in April through June 1917, when a new crater was created at the summit of the mountain. Less explosive activity continued through 1921. Some authorities, such as the Smithsonian, consider the eruption of Mount Lassen to have ended on June 29, 1917.

Probability of Future Occurrences
The probability of future occurrences is unlikely in Sierra County.

B.3. Estimating Potential Losses

44 CFR Requirement §201.6(c)(2)(ii): The risk assessment shall include (A) The types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas; (B) An estimate of the potential dollar losses to vulnerable structures...and a description of the methodology used to prepare the estimate; (C) A general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.

Methodology
The vulnerability assessment further defines and quantifies populations, buildings, critical facilities, and other community assets at risk to natural hazards. The vulnerability assessment for this plan followed the methodology described in the FEMA 386-2, *Understanding Your Risks – Identifying Hazards and Estimating Losses* (2002).

The vulnerability assessment was conducted based on the best available data and the significance of the hazard. Data to support the vulnerability assessment was collected from the following sources:

- County and jurisdictional GIS data (hazards, base layers, and other government data)
- Statewide GIS datasets compiled by Cal EMA to support mitigation planning
- FEMA's HAZUS loss estimation software
- Written descriptions of assets and risks provided by participating jurisdictions
- Existing plans and reports
- Personal interviews with planning team members and other stakeholders

The vulnerability assessment first describes the assets at risk in Sierra County, including the total exposure of people and property; critical facilities and infrastructure; natural, cultural, and historic resources; and economic assets. Secondly, the assessment considers the social vulnerability of the county to hazards, including characteristics of gender, age, race/ethnicity, and wealth and poverty.

Assets at Risk
This section assesses the population, structures, critical facilities and infrastructure, and other important assets in Sierra County at risk to natural hazards.

Critical Facilities and Infrastructure
A critical facility may be defined as one that is essential in providing utility or direction either

during the response to an emergency or during the recovery operation. FEMA's HAZUS-MH loss estimation software uses the following three categories of critical assets: Essential Facilities, High Potential Loss Facilities, and Transportation and Lifelines. Essential facilities are those that, if damaged, would have devastating impacts on disaster response and/or recovery. High potential loss facilities are those that would have a high loss or impact on the community. Transportation and lifeline facilities are a third category of critical assets.

Essential Facilities	High Potential Loss Facilities	Transportation and Lifelines
• Hospitals and other Medical Facilities • Police Stations • Fire Stations • Emergency Operation Centers	• Power Plants • Dams/levees • Military installations • Hazardous Material Sites • Schools • Shelters • Day Care Centers • Nursing Homes • Main Government Buildings	• Highways, Bridges and Tunnels • Railroads and Facilities • Bus Facilities • Airports • Water Treatment Facilities • Natural Gas Facilities and Pipelines • Oil Facilities and Pipelines

The table below displays the available data on critical facilities in Sierra County and their approximate values as provided by the County Office of Emergency Services and Public Works.

Approximate Sierra County Public Sector Facility Values

Public Sector Facilities	Approximate Value
Public Works Facilities	$6,000,000
Water Systems	$5,450,000
Firehouses (15) • Fire Equipment	$45,000,000 $12,450,000
County Buildings	$24,000,000
Medical Facilities	$17,000,000
Communications Facilities	$6,250,000
Correctional Facilities (incorporated into County Courthouse)	$875,000
Schools (Evacuation Sites)	$42,950,000
County Roads and Bridges	$29,000,000
Total	$188,975,000

In addition to the public sector detail of the critical facilities in Sierra County, noted below are the names and addresses of those critical facilities.

Government Buildings

Sierra County Courthouse:	100 Courthouse Sq. Downieville
Sheriff's Office:	100 County house Sq, Downieville
Sheriff Substation:	61050 Highway 49, Loyalton
County Offices:	101 Courthouse Sq, Downieville
Loyalton City Hall:	202/206 Front Street, Loyalton

Medical / Senior Centers

Western Sierra Medical Center:	209 Nevada St. Downieville
Western Sierra Residential Center:	749 Main St. Downieville
Eastern Plumas Health Care:	700/725 Third St., Loyalton
Loyalton Senior Center:	307 First St. Loyalton

PGE Generator Locations

Downieville generator	124 Lavezzola Rd, Downieville
Sierra City generator	500 Main St., Sierra City
Alleghany Substation	514 Miner St., Alleghany

Telephone Stations

Alleghany	124 Main St. Alleghany
Downieville	119 Pearl St. Downieville
Galloway Ridge Microwave site	no physical address
Loyalton	412 Main St. Loyalton
Sierraville	112 W. Main St. Sierraville

Fire Districts

Sierra County Fire District #1	no address available
Alleghany Fire Dept.	105 Plaza Court, Alleghany
Calpine Fire Dept.	104 Main Street, Calpine
Downieville Fire Dept.	327 Main St. Downieville
Loyalton	210 Front Street, Loyalton,
Pike Fire Dept.	100 Pike City Rd. Pike
Sierra Brooks Lodge-fire house	510/512 Longhorn Dr. Sierra Brooks
Sierra City	228 Main Street, Sierra City

Schools

Downieville School	130 School St. Downieville
Loyalton Schools	107/111 Beckwith Rd

Water Storage Tanks

Alleghany Pump House	109 Main St. Alleghany
Alleghany Storage tanks	Hells Half Acre, Alleghany
Downieville	112 Lavezzola Rd. Downieville & Oxford Mine Rd, Downieville

Green Acres	238 Edna Dr. Green Acres
Loyalton	Behind the SPI Mill –no address
Sewer Treatment Plant	403 Poole Lane, Loyalton

Other facilities in the county, such as locations that attract large numbers of people, may also be at higher risk due to concentrations of population. These include, but are not limited to, the Annual Mountain Biking and Cycling events in or around Downieville, the annual Folk Festival at the Yuba Pass, and the seasonal fluctuations in local populations due to the numerous campers in the various campgrounds around the county and the tourists visiting the historical areas within the county.

Natural Resources

Sierra County is known for its large forest, wild rivers and pristine grasslands. The following describes the natural resources at risk to hazards in Sierra County. The Tahoe National Forest has an abundance of wonderful places to explore including the following:

- Scenic vistas
- Hidden waterfalls
- Deeply incised canyons
- Wildflower laden meadows
- Rough and tumble rivers and
- Serene lakes and reservoirs

Granite Chief Wilderness straddles the Sierra Nevada crest and is especially scenic with rugged granite cliffs, alpine meadows, and dense pockets of fir. It includes the headwaters of the North Fork American Wild River. Snow is often found year round with elevations ranging from 6,000 to 9,000 ft. The Pacific Crest Trails bisects the Wilderness.

North Fork American Wild River was Congressionally designated in 1978 as a Wild river. Many non-motorized trails extend into the steep canyon from both the north and south rims. Often the western most trails are accessible during late fall or spring when much of the Forest is snow covered.

Placer Big Trees grove is the most northerly stand of naturally occurring Giant Sequoias, *Sequoiadendron giganteum,* and is found 22 miles east of Foresthill overlooking the Middle Fork American River. This area has been designated as a Botanical Special Interest Area by the Forest Service. The trees have been a popular tourist attraction since the 1800's and each bears the name of a prominent American.

Development of communities and recreation in Sierra County was the direct result of the discovery and search for gold in California. As the roads improved, travelers began to stop and enjoy the beauty and wildlife. Due to the elevation, Sierra County provides one of the longest seasons for wildflower viewing in

California.

In spring, dogwood blooms profusely along the banks of rivers and massive patches of monkey flowers invade the wet seeps of canyon walls. Scotch broom adds brilliant patches of yellow. Summer provides an abundance of flowers and in the fall the dogwood puts on a second display of fiery orange and deep pink. Fields of blue and orange flowers flow with the breeze during springtime in the valley. Along the waterways, many marshland plants and several species of buttercups paint a picture of color and serenity.

When the snow melts, the Lakes Basin area abounds in a variety of wildflowers. Orange masses of lilies bloom in the wet creek drainages and wild azaleas are scattered about the hillsides. At the summit of Yuba Pass, magenta penstemon and lacy white yampa decorate the landscape. In the marshy areas, marigolds, elephant heads, corn lilies, and several species of monkey flowers flourish in the spring sun.

In the river canyon, at dusk, bridges in Downieville are likely to produce bats and swallows foraging for food. Kingfishers and osprey also feed in the vicinity. If you're lucky you can spot river otter by the Downie or North Yuba rivers as they flow through Downieville.

The Empire Creek Trail near Downieville passes through large areas of older forests inhabited by pileated woodpeckers, northern goshawks, pine marten, and California spotted owl. In the spring, the Downieville deer herd moves to the higher elevations to fawn. Black bears, foxes, and raccoons are also present but not so visible.

The Carman Valley north of Calpine has 30 to 40 acres of vernal habitat during spring and early summer. This area is an excellent place to view nesting waterfowl, including wood ducks and shorebirds. Steel Bridge, located over the headwaters of the Feather River, provides an opportunity to view Canadian geese, great blue heron, sandhill cranes, numerous ducks, and songbirds. This is private property, so please do not explore on foot.

The Sierra Valley is a wonderland of wetlands. Smithneck Creek is a favorite among fishermen seeking the elusive brown trout. This area is also home to Nevada mule deer, grouse, chucker, and California mountain quail. Antelope Valley is an excellent place to observe deer fawning areas. If you see a lone fawn, please don't touch it. Its mother is nearby.

The Smithneck Creek area off Smithneck Road travels through extensive aspen groves with scenes of beaver activity—dams, stick lodges, and beaver-logged timber. Jackson Meadows Reservoir entertains broods of Canada geese, mergansers, mallards, and green-winged teal. Several meadows offer good evening views of mule deer and bald eagles visit in the late fall. Black bears, foxes, and raccoons are also present but not so visible.

Kyburz Marsh off Hwy 89, 10 miles north of Truckee, is approximately 200 acres and provides wildlife viewing for waterfowl, shorebirds, songbirds, numerous species of hawks, osprey, and bald eagles. Several waterfowl nesting islands are located within the area.

In the Lakes Basin, the Sand Pond Interpretive Trail features wheel chair accessible wooden boardwalks that follow fern-lined paths and cross stretches of shallow, clear water. This trail near Sardine Lake Campground is barrier-free and provides viewing opportunities of a wetland that has been enlarged by a family of beavers. The path also allows visitors to view trout and summer mallard broods close up.

Bald eagles and osprey fish on the many lakes, and pine martens forage in nearby meadows. Many of the meadows in this area such as Church and Howard meadows provide viewing of songbirds like the willow flycatcher and various types of warblers. The Yuba Pass area provides excellent bird-watching in addition to the wildflower viewing opportunities.

The San Francisco State Sierra Nevada Field Campus is located a short distance east of Bassetts. The Field Campus is dedicated to promoting an understanding and appreciation of geology and the ecological diversity of life through the study of the many Sierra Nevada ecosystems by means of education, research, and applied ecology. They provide a large number of summer classes open to the public spanning flora and fauna. Learn about fungi, birds, drawing, sketching & painting, natural history, ecology and much more.

Historical and Cultural Resources

There are numerous historical sites in Sierra County. Noteworthy among them are outlines in the following table.

Historical and Cultural Sites in Sierra County

Historical/Cultural Site Name	Location	Additional Site Information
Underground Gold Miners Museum	Alleghany	None available
Sixteen to One Mine	Alleghany	Original mine in operation for over 100 years.
Town of Forest City Museum	Forest City	Most buildings date from the 1800s. Old buildings are being renovated on an ongoing basis.
Downieville Museum	Downieville	The building dates back to 1852 when it was built as a store by Chinese emigrants
The Yuba Theatre	Downieville	The building was built in 1940 as a movie theater.
Main Street	Downieville	Downtown is narrow, full of character and lined with trees, wooden boardwalks and historic buildings. Downieville is considered the least changed of all the gold rush towns in California.

Historical/Cultural Site Name	Location	Additional Site Information
The Historic Gallows	Downieville	The Gallows were only used once but it remains as a reminder of justice in the gold rush era.
Goodyears Bar Schoolhouse	Goodyears Bar	Schoolhouse was built around 1872 and is still used as a community gathering place.
The Kentucky Mine, Stampmill and Museum	Sierra City	Stampmill is California's only remaining workable gold ore stamp mill. The museum depicts the gold rush era of Sierra County, life in a mining camp and the local American Indian culture.
Main Street	Sierra City	Town is narrow and lined with turn-of-the-century structures, complete with wooden boardwalks.
The Masonic Hall	Sierra City	Built in 1864, the oldest building in town and was at one point the first schoolhouse in town.
The Wells Fargo Building	Sierra City	1870s Federalist Style architecture, two-story brick structure was historically used as a mercantile store and Wells Fargo Express & Company stage coach stop in the 1870s.
Loyalton Museum	City of Loyalton	This historic building features displays on logging, agriculture, the Washoe Indians and fraternal organizations including the Rebekah Lodge. Outdoor exhibits include logging wagons, a donkey engine and farm equipment.
Brick building by the gas station; Old grocery store in Sierraville, Numerous historic barns and farm houses throughout Sierra Valley	Sierraville, Sierra Valley	Buildings were built around the turn of the 20th century; Both are two of the few remaining buildings constructed of Sierra Valley brick. Historic barns and farm houses date back to the 19th

Historical/Cultural Site Name	Location	Additional Site Information
		century, Many are still in use.

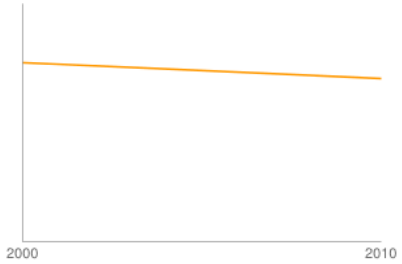
Economic Assets

Government is the primary employer in Sierra County and next to government is tourism. The information below is from the Sierra Economic Development Corporation and highlights the current economy in Sierra County.

Economic downturns over the last few decades have dramatically affected Sierra County. The decline in logging and the closure of the Sierra Pacific Industries mill in Loyalton, among other adverse effects, have left the County with an unemployment rate approximately twice that of the State of California. However, the County's small population translates to a need for only 300-400 jobs, a challenge addressable on a consumable scale. The County Board of Supervisors, Loyalton City Council and other County leadership are working diligently to relieve their plight. SEDCorp has assisted their efforts with the securing of several grants and completion of several planning efforts. SEDCorp shall continue to focus attention on the needs to grow existing businesses and attract new ones to the County.

Development Trends

As part of the planning process, the planning team looked at changes in growth and development and examined those changes in the context of hazard-prone areas. According to Sierra County Census 2010 results, the population of the Operational Area was approximately 3,240 people. From 2000 to 2010, the Sierra County population growth percentage was -8.9% (or from 3,555 people to 3,240 people). The graphic below illustrates the population growth.



Population Growth	
2000 Population	3,555
2010 Population	3,240
Population Growth	-8.9%

Future Development Trends

Long-term forecasts by the California Department of Finance project population growth in Sierra County continuing through 2060, adding approximately 20% to the 2010 county population by the year 2060. The population projections are for the County as a whole and are shown in the table below.

Population Projections in Sierra County 2010 to 2060

Jurisdiction	2010 Population	2060 Population	2010-2060	Total Growth

			Growth	
Sierra County	3,240	3,876	+636	20%

Source: California Department of Finance,
http://www.dof.ca.gov/research/demographic/reports/projections/P-1/

In terms of development of land use, the unincorporated area of the County is expected to grow at approximately 1.4% annually for the current General Planning period (through 2012). The City of Loyalton is expected to grow at a slower rate and is not expected to substantially increase its boundaries. The development of federal lands by federal or federally sponsored interests have impacts upon the County infrastructure and the extent of federal land will continue to limit private developable land in the County. The Sierra County residents continue to value a rural lifestyle and single-family development will continue to predominate residential construction with a high percentage of seasonal homes. Expansion and retention of existing economic and employment opportunities is highly anticipated. Agriculture, forestry, and mineral extraction land uses will continue to be important to the County economically and related to lifestyle concerns. Major new regional circulation improvements are not expected. Avoidance of residential sprawl is beneficial in reducing public facility costs, protecting natural resources, and ensuring a rural lifestyle. Attraction of major new industries and retail services is limited due to remoteness from major markets and transportation routes.

The table on the following page shows the General Plan Potential Build out Calculations in Sierra County as of 1996. No updated information was available to the planning team at the time of the development of this plan.

SIERRA COUNTY GENERAL PLAN POTENTIAL BUILDOUT CALCULATIONS
(Proposed + Existing Land Uses)
(7/96)

Land Use Designation	Acreage Total by Land Use Category	Existing Undeveloped Parcels Non-Residential	Dwelling Unit Count			
			Existing Undeveloped Parcels Avail. for Residential	Existing Dwelling Units	Potential New Splits for Residential	Maximum Total by Land Use Category
RR 1/2X	406.95		309	150	0	459
RR 1/2 or 1/2 -1	498.56		271	556	330	1157
R 1.5	599.12		35	47	257	339
R 2.5	400.43		N/A	0	136	136
R-2-5	493.95		43	65	145	253
R-5	146.01		15	33	11	59
R-5-10	1932.5		90	56	260	406
R-10-20	0		0	0	0	0
R-10	208.89		7	5	12	24
R-10 (SC)	0		0	0	0	0
R-20	89.56		0	0	5	5
R-20-40	903.86		22	12	49	103
R-20X	77.66		2	2	0	4
R-40	182.11		7	0	0	7
MUR (8-12 du/ac)	65.2		16	172	447	635
Second Units[7]	0				244	400
Total Residential	6,004.0	0	817	1,098	1,896	3,987
PS	505.86	10		1		1
I	444.59	3		0		0
PS/I	83.13	2		0		0
PD-VC- (Sec MUR)	449.84	0		2	58	60
CC	49.74	4		30	0	30
VC	199.78	1		16	0	16
OS	32704	9		5	0	5
OS20	141.59	0	0	0	7	7
OS160	806.25	0	0	0	5	5
REC	1298	4	0	0	0	0
AG / DEST. RESORT	56464	0	0	5	87	92
Forest	466828	304	623	593	0	1216
Total Non-Residential	579,973.0	337	623	652	157	1,710
Other Ac (Rds)	400					
UNINCORPORATED	586,377.0	337	1,440	1,750	2,053	5,677
LOYALTON	221	n/a	n/a	398	121	519
UNINCORPORATED + LOYALTON	586,598.0	n/a	1410	2,148	2,174	6,216

AG Parcels = No lot splits assumed
Built = Acreage already developed
DU = Dwelling Unit N/A = Not Available Vcnt = Vacant
Existing DUs = Based on 1992 Planning Department Land Use Survey Communities
Forest = No lot splits assumed.
Potential New Parcels + DUs = Potential new parcels and dwelling units calculated by determining area within each existing lot which could be split consistent with proposed land use designation
[1]1990 Census DUs unincorporated area – existing DUs in communities from Land Use Survey.
[2]Estimated by acreage.
[3] 1990 U.S. Census
[4]Loyalton Housing Element, 1988, p.19 + 7.5% Second Units = (113+8=121)
[5]Number of existing parcels estimated by: Existing Total County parcels - existing parcels in all other designations - Bassetts and Goodyears Bar USFS land (already tabulated in proposed land uses)
[6]Assumes 1 dwelling unit ea parcel except for 305 TPZ parcel lands where no units assumed.
[7]Approx. 7% of ultimate units based on current activity rate of 5/yr x 80 yrs = approx. 400 units in unincorp county.
[8]Clustering and transfer of developement rights encouraged to reduce impacts to and total in Sierra Valley.

COUNTY-WIDE TOTALS

Hazard Significance Vulnerability

The planning team ranked the significance of identified hazards for Sierra County. Significance is measured in general qualitative terms and is a summary of the potential impact of the hazard based on the geographical area affected, history of past occurrences, potential magnitude, probability of the event, and damage and casualty potential. Significance is classified as the following:

- **High:** Widespread potential impact. This ranking carries the highest threat to the general population and/or built environment. Hazards in this category may have already occurred in the past.
- **Medium:** Moderate potential impact. This ranking carries a moderate threat level to the general population and/or built environment. The potential of occurrence may be the same as the high ranking, but the potential damage is more isolated and less costly than a more widespread disaster.
- **Low:** Minimal potential impact. The occurrence and potential cost of damage to life and property is minimal.

The table below summarizes the hazard significance rankings and whether or not the hazard is priority hazard developed by the Planning Team in Sierra County. Only those hazards determined to be priority hazards are discussed further in this plan. The significance and priority of hazards for Sierra County is as follows:

Summary of Significance/Priority of Hazards in Sierra County

Hazard	Significance	Priority Hazard
Avalanche	Low	No
Dam Failure	Low	No
Drought	Medium	Yes
Earthquake	High	Yes
Flood	High	Yes
Severe Weather - Winter Storms	High	Yes
Volcano	Low	No
Wildfire	High	Yes

Source: Sierra County Planning Team, Hazard Profiles and Assessments

It is also important to be aware that hazard events that happen outside of the county boundaries also can have direct and indirect impacts to Sierra County. For instance, dam failures, volcanic eruptions and wildfires in watersheds outside the county that drain into Sierra County can result in flooding and other impacts related to watershed health.

The table below shows the total vulnerability for Sierra County. Geographic Information System (GIS) information was used based on data obtained from the Sierra County Assessor's Office to the Planning Team. Based on FEMA guidance, contents value is estimated at 50 percent of the improved value. Estimated losses assume that a disaster is unlikely to cause total destruction. Losses are related to a variety of factors, hazard type, building type and construction. Using FEMA's recommendations, average damage is estimated to be 20 percent of the total value.

Sierra County Loss Estimates Countywide

Parcel Count	Land Value	Improvement Value	Content Value	Total Value	Loss Estimate
5,067	$217,913,880	$227,004,409	$113,502,205	$558,420,494	$111,684,099

Source: Sierra County Assessor, Planning Team, GIS

Vulnerability by Hazard

Drought Vulnerability Assessment

Probability of Future Occurrences:	Occasional
Vulnerability:	Medium

The most significant impacts associated with drought in Sierra County are those related to water intensive activities such as wildfire protection, usage, commerce, tourism, recreation, and wildlife preservation. Voluntary conservation measures are typically implemented during extended droughts. A reduction of electric power generation and water quality deterioration are also potential problems. Drought conditions can also cause soil to compact and not absorb water well, potentially making an area more susceptible to flooding.

Summary of Potential Drought Impacts

- Impacts to natural resource habitats and other resources, such as agriculture or livestock
- Lack of water for Wildfire protection, usage, commerce, tourism, recreation, and wildlife preservation
- Loss of power which could affect people with disabilities and the elderly as well as people with access and functional needs
- Soil compaction/land subsidence issues
- Increased costs for water
- Poor water quality

Earthquake Vulnerability Assessment

Probability of Future Occurrences:	Occasional-Likely
Vulnerability:	High

Earthquake vulnerability is based primarily upon population and the built environment. To mitigate this hazard, building codes in California have been steadily improved over the past 80 years as understanding of seismic shaking has improved. Current California building codes include provisions for considering the potential shaking from earthquakes, including stronger shaking near faults and amplification by soft soils. The building code has been the main mitigation tool for seismic shaking in most buildings, although hospitals, schools, and other critical facilities are subject to additional mitigation measures (Cal EMA Hazard Mitigation Plan 2013).

HAZUS Modeling For Sierra County

The HAZUS modeling conducted to illustrate the earthquake threat to Sierra County demonstrated the vulnerability of the county to a major earthquake. The western part of the county is somewhat more earthquake resistant. It is farther from the major faults. It has predominately more earthquake resistant ground types, predominantly bedrocks with a slight alluvial overlay along the streams, and the Sierra Block mastiff dampening quake effects from east of the Sierra and the Tahoe basin. The weakness is in infrastructure. Homes, although wood frame, are predominately pre-1970 and have low building code standards. The roads are susceptible to debris flows and landslides, many of the commercial buildings date back to the 19th century and are primarily masonry.

The eastern parts of the county have somewhat newer construction, less population density and less threat from debris flows and landslides except for the access and egress corridors to the North, South, and West. However the eastern part of the county is dominated by Sierra Valley. As discussed in the flood section, this prehistoric lakebed has over 2000 feet of alluvial deposits and a modern clay alluvial layer of 100-200 feet on top of the prehistoric deposits. This creates a vast area of soils that will amplify shaking from a major earthquake. Moderate earthquake effects on the county are described in the following tables from the HAZUS modeling software.

Transportation Effects from HAZUS

System	Component	# Locations/ # Segments	Replacement value (millions of dollars)
Highway	Bridges	52	25.00
	Segments	14	589.70
	Tunnels	0	0.00
		Subtotal	**614.70**
Railways	Bridges	0	0.00
	Facilities	0	0.00
	Segments	7	12.80
	Tunnels	0	0.00
		Subtotal	**12.80**
Light Rail	Bridges	0	0.00
	Facilities	0	0.00
	Segments	0	0.00
	Tunnels	0	0.00
		Subtotal	**0.00**
Bus	Facilities	0	0.00
		Subtotal	**0.00**
Ferry	Facilities	0	0.00
		Subtotal	**0.00**
Port	Facilities	0	0.00
		Subtotal	**0.00**
Airport	Facilities	0	0.00
	Runways	0	0.00
		Subtotal	**0.00**
		Total	**627.50**

Transportation effects of the earthquake are significant in the modeled event. Damage estimates of $627M to the State's highway system is probably an overstatement. This study included segments on the periphery of Sierra County. The major impact of these damages to segments would be the isolation of the highly dependent highway communities in the western portions of the county. Just in time resupply of commodities, propane, motor fuels, mail, medicine, etc., would be greatly disrupted in the aftermath of a major quake. The critical nature of the roadways makes emergency repairs to them the highest and costliest priority in the quakes aftermath. Even if the models estimate were off by 300% the resulting emergency repairs to roadways, viaducts and bridges would be beyond immediately available state and local resources and require massive federal assistance.

The tables following reflect that although few buildings are fully lost in the model earthquake, extensive numbers of buildings require significant repair. Even slight to moderately damaged residential structures usually require $20-$35,000 in repairs. Assuming an average of $25k in damages, the 500 residences in this category represent a repair cost of $1.25M in uninsured loss. Even if a property had earthquake insurance, the large deductibles in these policies would offer the homeowner little or no relief.

This event would be an extreme hardship on this county, with average repair cost representing 50% of a family's median income after taxes. It is unlikely that without significant assistance from FEMA and the SBA the county could ever repair and recover from this event.

Expected Building Damage by Occupancy (HAZUS)

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	8	0.40	2	0.41	1	0.79	0	1.42	0	1.36
Commercial	66	3.12	12	3.05	6	6.41	1	9.93	0	7.51
Education	5	0.23	1	0.20	0	0.35	0	0.48	0	0.29
Government	7	0.33	1	0.31	1	0.67	0	1.04	0	0.73
Industrial	20	0.95	4	1.03	2	2.52	0	4.70	0	3.92
Other Residential	422	19.99	94	24.28	43	45.17	7	69.80	0	40.90
Religion	9	0.45	2	0.42	1	0.80	0	1.25	0	1.04
Single Family	1,574	74.52	273	70.30	42	43.29	1	11.38	0	44.24
Total	**2,112**		**388**		**96**		**10**		**1**	

Expected Building Damage by Building Type (All Design Levels)

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Wood	1,827	86.49	319	82.01	48	49.91	1	11.70	0	51.41
Steel	38	1.80	7	1.86	5	4.94	1	8.02	0	6.79
Concrete	40	1.88	8	2.05	4	4.23	1	7.75	0	3.03
Precast	20	0.97	4	0.99	3	2.86	1	5.48	0	3.63
RM	63	2.98	7	1.85	5	4.92	1	8.36	0	1.25
URM	11	0.51	3	0.72	2	1.58	0	3.37	0	6.27
MH	113	5.36	41	10.52	30	31.57	5	55.33	0	27.62
Total	**2,112**		**388**		**96**		**10**		**1**	

The table on the following page demonstrates the impact on utilities in the aftermath of the earthquake. Hardest hit are potable water and electrical generations and distribution systems. Again the model appears to be high in its estimates however the impacts will be far reaching within the county. The ample number of rivers and streams and filled expedient water treatment at the consumer level is likely to meet the immediate life sustaining need for water after an earthquake, however restoring the water system for daily sanitation uses, consumption, firefighting, agricultural and industrial uses is imperative. Even if the model over estimates the impact by 300-400%, the $70 million or so in emergency repairs is far beyond the local government and private industry to rapidly restore.

Utility Effects (HAZUS)

System	Component	# Locations/ # Segments	Replacement value (millions of dollars)
Potable Water	Distribution Lines	NA	64.30
	Facilities	0	0.00
	Pipelines	0	0.00
		Subtotal	**64.30**
Waste Water	Distribution Lines	NA	38.60
	Facilities	0	0.00
	Pipelines	0	0.00
		Subtotal	**38.60**
Natural Gas	Distribution Lines	NA	25.70
	Facilities	0	0.00
	Pipelines	0	0.00
		Subtotal	**25.70**
Oil Systems	Facilities	0	0.00
	Pipelines	0	0.00
		Subtotal	**0.00**
Electrical Power	Facilities	1	129.80
		Subtotal	**129.80**
Communication	Facilities	0	0.00
		Subtotal	**0.00**
		Total	**258.50**

The total economic loss estimated for the earthquake is $6.22M, which includes building and lifeline related losses based on the region's available inventory.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the earthquake. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the earthquake. See the building related losses in the table on the following page. These losses were derived from HAZUS.

Building Related Economic Loss Estimates

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses							
	Wage	0.00	0.05	0.09	0.00	0.02	0.17
	Capital-Related	0.00	0.02	0.09	0.00	0.01	0.12
	Rental	0.05	0.07	0.04	0.00	0.01	0.19
	Relocation	0.18	0.07	0.06	0.01	0.08	0.40
	Subtotal	**0.24**	**0.22**	**0.28**	**0.02**	**0.12**	**0.88**
Capital Stock Losses							
	Structural	0.40	0.09	0.07	0.04	0.08	0.68
	Nonstructural	2.18	0.45	0.29	0.15	0.32	3.39
	Content	0.70	0.10	0.15	0.10	0.17	1.23
	Inventory	0.00	0.00	0.00	0.01	0.00	0.02
	Subtotal	**3.28**	**0.64**	**0.52**	**0.30**	**0.57**	**5.33**
	Total	**3.52**	**0.86**	**0.81**	**0.33**	**0.69**	**6.20**

The total building-related losses were $6.20M; 14% of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies, which made up over 71% of the total loss. The table above provides a summary of the losses associated with the building damage.

Although on the scale of the potential from a Bay Area, North Coast or Southern California earthquake, the Tahoe Basin earthquake effect on Sierra County is relatively less significant. However the potential per capita losses are equivalent. The above table illustrates the need for mitigation as one-third of the economic loss to residential and commercial businesses are from non-structural causes. The retrofitting of older low standard building code housing, the tying down of mobile homes on a FEMA approved counter wind, counter shaking foundation tie down system, educating the general public on the seismic threat, and training the public on how to minimize the earthquake's impact on themselves, their homes and their livelihoods are all worthy mitigation endeavors to meet this threat.

As the preceding studies demonstrate even a "moderate" earthquake occurring in or near this area could result in potential casualties, property and environmental damage, disruption of normal government, disruption of community services and activities, and even deaths. The effects could be aggravated by collateral emergencies such as fires, flooding, hazardous material

spills, utility disruptions, landslides, transportation emergencies, and possible failure of the Sierra County dams.

In this type of disaster, the community needs would exceed the response capability of the County's emergency management organization, requiring mutual assistance from volunteer and private agencies, Cal EMA, and the Federal Emergency Support Functions.

FEMA's HAZUS-MH loss estimation software was utilized to estimate potential losses for both flooding and earthquakes. The data obtained from the software runs for the flooding scenario indicated the software was pulling data from surrounding counties due to the rural nature of Sierra County and therefore none of the data from the HAZUS flood runs was beneficial to estimating losses for Sierra County. At the time of the development of this plan, FEMA was in the process of releasing new versions of the HAZUS-MH loss estimation software.

Summary of Potential Earthquake Impacts
According to the HAZUS model, Sierra County is susceptible to earthquake losses in the millions of dollars. The overall impact of earthquakes to Sierra County includes:

- Potential for injury and loss of life
- Widespread structural slight to moderately damaged residential structures
- Loss of water, power, roads, phones, and transportation, which can be particularly dangerous for those with certain medical conditions
- Power loss complicating response and recovery efforts
- Business interruption losses
- Damage to electrical facilities and equipment

Flood Vulnerability Assessment

Probability of Future Occurrences:	Likely
Vulnerability:	High

Flood Losses

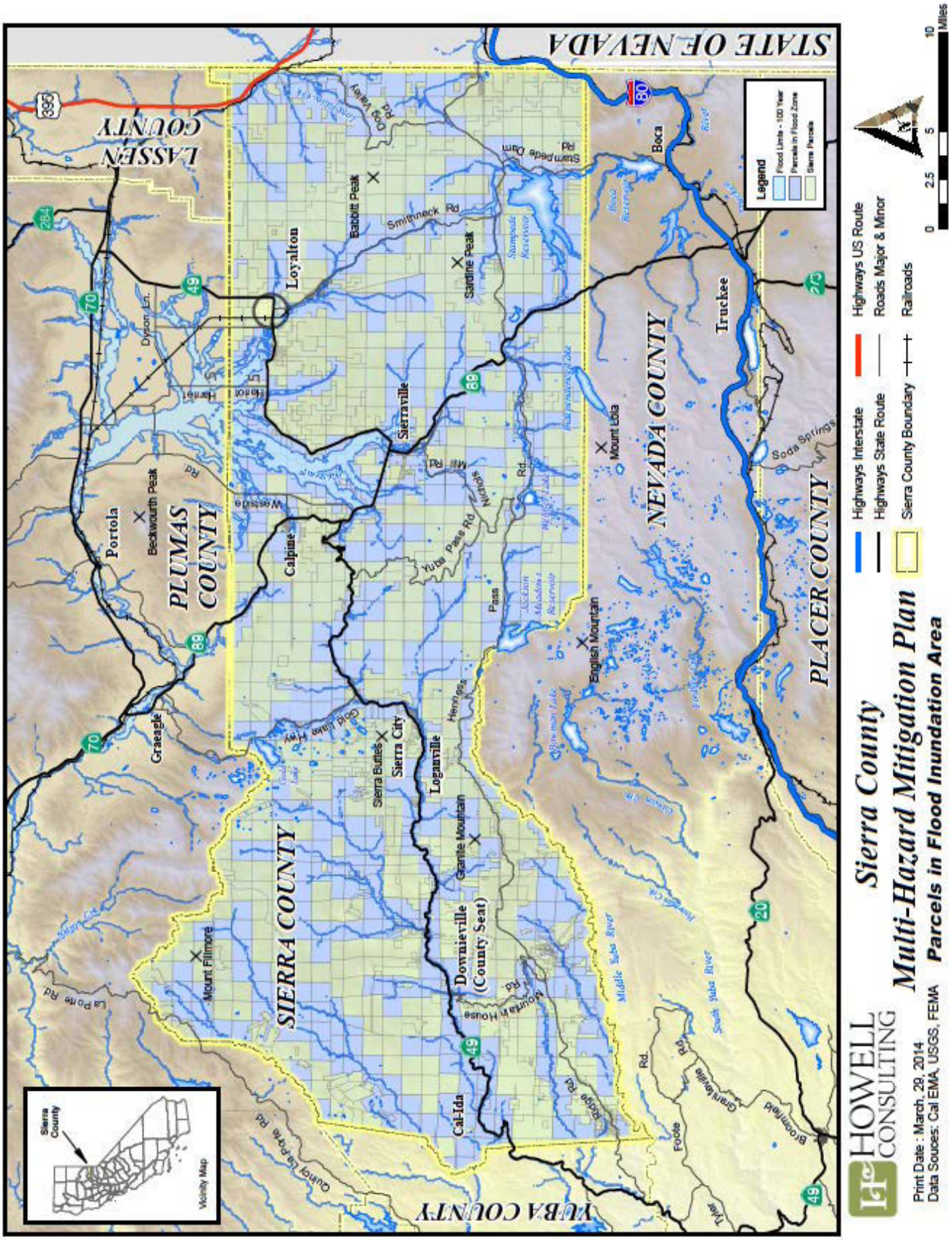
Based on FEMA guidance, contents value is estimated at 50 percent of the improved value. Estimated losses assume that a flood is unlikely to cause total destruction. Losses are related to a variety of factors, including flood depth, flood velocity, building type and construction. Using FEMA's recommendations, average damage is estimated to be 20 percent of the total value.

The loss estimates for this assessment should be used for flood risk mitigation, emergency preparedness, and response and recovery only. Uncertainties are inherent in any loss estimation methodology and losses will vary depending on the magnitude of the flood event. Other limitations may include incomplete or inaccurate inventories of the built environment. The assessed values, for example, are well below the actual market values; thus, the actual value of assets at risk may be significantly higher than those included therein. Also, this loss estimation assumes no mitigation and does not account for buildings that may have been elevated above the 1% annual chance event according to local floodplain management regulations. The table below shows the Sierra County Flood Loss Estimates for a 100 year flood event in the entire county. Additionally, the map on the following page shows the parcels that are located within the flood inundation area.

Sierra County Flood Loss Estimates 100 year Flood Event

Flood Event	Parcel Count	Land Value	Improvement Value	Content Value	Total Value	Loss Estimate
100-Year Flood	1,819	$103,492,590	$85,262,052	$42,631,026	$231,285,668	$46,257,134

Source: Sierra County Assessor, Planning Team, GIS


STATE OF NEVADA
LASSEN COUNTY
PLUMAS COUNTY
NEVADA COUNTY
PLACER COUNTY
SIERRA COUNTY
YUBA COUNTY
Loyalton
Sierraville
Calpine
Portola
Beckwourth Peak
Babbitt Peak
Sardine Peak
Smithneck Rd
Dyson Ln.
Truckee
Boca
Mount Lola
English Mountain
Soda Springs
Graeagle
Sierra Buttes
Sierra City
Loganville
Granite Mountain
Downieville
(County Seat)
Mount Fillmore
Cal-Ida
Yuba Pass Rd
Nichols
Legend
Flood Limits - 100 Year
Parcels in Flood Zone
Sierra Parcels
Highways Interstate
Highways State Route
Sierra County Boundary
Highways US Route
Roads Major & Minor
Railroads
0
2.5
5
10
Miles
Sierra County
Vicinity Map
HOWELL CONSULTING
Sierra County
Multi-Hazard Mitigation Plan
Parcels in Flood Inundation Area
Print Date : March, 29, 2014
Data Souces: Cal EMA, USGS, FEMA

Summary of Potential Flood Impacts

Most of the flooding in Sierra County Flooding can be characterized as riverine, stream and waterway overflow and drainage events. These types of flooding often result in property damage, road washouts, and transportation disruptions. Other general impacts of these events may include the following:

- Potential for injury and loss of life
- Commercial and residential structural damage
- Loss of water, power, roads, phones, and transportation, which can be particularly dangerous for those with certain medical conditions
- Economic impacts (jobs, sales, tax revenue) due to loss of structures
- Decline in commercial and residential property values

Severe Weather Vulnerability Assessment

Probability of Future Occurrences:	Highly Likely
Vulnerability:	High

According to historical hazard data, severe weather is an annual occurrence in Sierra County. Damage and disaster declarations related to severe weather have occurred and will continue to occur in the future. Heavy rain and thunderstorms are the most frequent type of severe weather occurrences in the County. Wind and lightning often accompany these storms and have caused damage in the past.

Summary of Potential Impacts

As discussed the results of severe weather can produce other hazards such as flooding, fires and thunderstorm wind, which can result in property damage, road washouts, and transportation disruptions. Strong winds and blizzard conditions can result in property damage, localized power and phone outages, and closures of streets, highways, schools, businesses, and nonessential government operations. People can also become isolated from essential services in their homes and vehicles. Severe weather can escalate, creating life-threatening situations when emergency response is limited by severe conditions. Extreme cold may cause pipes to break or leak.

Other general impacts of these events may include the following:

- Potential for injury and loss of life
- Commercial and residential structural damage
- Loss of water, power, roads, phones, and transportation, which can be particularly dangerous for those with certain medical conditions
- Economic impacts (jobs, sales, tax revenue) due to loss of commercial structures
- Decline in commercial and residential property values

Wildland Fire Vulnerability Assessment

Probability of Future Occurrences:	Highly Likely
Vulnerability:	High

To assess the property at risk in moderate, high and very high fire threat areas, Sierra County used Cal Fire's fire threat data and the County's Assessor parcel information to determine the vulnerability. The table below shows the results of this analysis by for the County. There are structures located in moderate, high and very high fire threat areas countywide, which covers approximately 75% of the total parcels in the County. Based on FEMA guidance, contents value is estimated at 50 percent of the improved value. Estimated losses assume that a wildland fire is likely to cause major losses. Losses are related to a variety of factors, including heavy fuels, fuel type, size, weather, wind speed, building type and construction and other factors. Using FEMA's recommendations, average damage is estimated to be 20 percent of the total value.

Parcel Count and Land Value within Moderate, High & Very High Fire Threat Zones

Fire Severity	Parcel Count	Land Value	Improvement Value	Content Value	Total Value	Loss Estimate
Sierra County	3,817	$191,316,349	$195,212,450	$97,606,225	$484,135,0249	$96,827,005

Source: Cal Fire, Sierra County Assessor, Planning Team, GIS

Sierra County has substantial cultural and natural resources located throughout the County as previously described. In addition, there are other natural resources at risk when wildland fires occur. One is the watershed and ecosystem losses that occur from wildland fires. This includes impacts to water supplies and water quality as well as air quality. Another is the aesthetic value of the area. Major fires that result in visible damage detract from that value. Other assets at risk include wildland recreation areas, wildlife and habitat areas, rangeland, and timber resources. The loss to these natural resources would be significant. Tourism is a major economic force in Sierra County. Because many Sierra County communities lie within the Tahoe National Forest, the issues of watershed, forest products, wildlife, and recreation tourism are all critical elements to the County and surrounding areas and are all at risk from wildfire hazards.

Summary of Potential Wildfire Impacts

The overall potential impacts from wildfire include:

- Potential for injury and loss of life
- Commercial and residential structural damage
- Impacts to water quality and watershed health
- Impacts to natural resource habitats and other resources, such as agriculture
- Loss of water, power, roads, phones, and transportation
- Significant economic impacts (jobs, tourism, sales, tax revenue) with the loss of commercial, historical and recreational structures
- Decline in commercial and residential property values
- Forest product losses
- Declines in Recreation and Tourism
- Loss of wildlife and natural habitats

B.4. Repetitive Loss and Severe Repetitive Loss Properties

§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. All plans approved after October 1, 2008 must also address NFIP insured structures that have been repetitively damaged by floods.

Throughout the planning process the Sierra County Planning Department has maintained contact with the FEMA Region IX representative assigned to Sierra County. There are no repetitive loss and severe repetitive loss properties within the county per the FEMA Region IX representative.

Under Element C of this document, the properties subject to the NFIP are addressed. As of this plan publication, there have been no repetitive claims under the NFIP.

Element C: Mitigation Strategy

Requirement §201.6(c)(3) [The plan shall include the following:] A mitigation strategy that provides the jurisdiction's blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs, resources, and its ability to expand on and improve these existing tools.

Specific mitigation objectives and action items were developed for Sierra County in conjunction with the public meetings held in the locations, as cited in the documentation of the Planning Process, Element A. The list of action items identifies mitigation projects and includes a project ranking based upon time horizon, cost, risk, benefit and input from local stakeholders. The action items were developed to provide public policy makers with a list of potential mitigation actions as time, equipment and funding become available for the selected projects. Later in this section, is a description of goals and objectives used to generate this mitigation strategy. In general terms, these are building blocks in our efforts to mitigate potential natural and human-caused hazards, which could build on the community's existing capabilities. Project implementation and legal framework are discussed at the conclusion of this section.

Element C.1. Existing Authorities, Policies, Programs and Resources

Requirement §201.6(c)(3) [The plan shall include the following:] A mitigation strategy that provides the jurisdiction's blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs, and resources, and its ability to expand on and improve these existing tools.

Sierra County has an EOP, a General Plan, which includes a Safety Element, an Emergency Services Ordinance that clearly defines roles and responsibilities in accordance with state and federal guidelines. The County Administrative Officer (CAO) serves as the Director of Emergency Services by law and ordinance and the Board of Supervisors serves as the administering agency and the promulgation authority for all plans, policies and procedures within Sierra County. The County recognizes the enhanced Hazard Mitigation Plan of the State of California, the California Emergency Services Act, and the appropriate Federal Regulations including 44 CFR 201. Sierra County is subject to the State of California Uniformed Building Code (UBC), which dictates standards on all current and future construction within Sierra County.

Regulatory Capability

The regulatory and planning capabilities table lists planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in Sierra County.

Sierra County—Regulatory and Planning Capabilities

Regulatory Tool	Yes/No	Comments
General plan	Yes	
Zoning ordinance	Yes	Part 15 Zoning
Subdivision ordinance	Yes	Part 23 Subdivision Regulations
Site plan review requirements	Yes	Part 15 Zoning, Chapter 15.24
Growth management ordinance		
Floodplain ordinance	Yes	Part 32 Floodplain Management

Regulatory Tool	Yes/No	Comments
Other special purpose ordinance (stormwater, steep slope, wildfire)	Yes	Fire Prevention and Protection Ordinance
Building code	Yes	
Fire department ISO rating		
Erosion or sediment control program		
Capital improvements plan		
Economic development plan	Yes	Sierra County Economic Development Corporation
Local emergency operations plan	Yes	

Administrative and Technical Capability

The table below identifies the county personnel responsible for activities related to mitigation and loss prevention in Sierra County. Many positions are full time and/or filled by the same person. A summary of resources follows.

Sierra County —Personnel Capabilities

Personnel Resources	Department/Position
Planner/engineer with knowledge of land development/land management practices	County Planning
Engineer/professional trained in construction practices related to buildings and/or infrastructure	County Planning
Full time building official	County Planning
Floodplain manager	County Planning
Emergency manager	County Emergency Services Coordinator
Grant writer	YES various departments
Other	Office of Administration, Sheriff's Office, and Public Works Department

Fiscal Capability

The following table identifies financial tools or resources that the county could potentially use to help fund mitigation activities. There are currently no specific funding sources for hazard mitigation.

Sierra County —Available Financial Tools and Resources

Financial Resources	Accessible/ Eligible to Use	Comments
Community Development Block Grants	Yes	
Capital improvements project funding	Yes	
Authority to levy taxes for specific purposes	unk	Must be approved by voters
Fees for water, sewer, gas, or	unk	

Financial Resources	Accessible/ Eligible to Use	Comments
electric services		
Impact fees for new development	Yes	
Incur debt through general obligation bonds	Yes	
Incur debt through special tax bonds	Yes	
Incur debt through private activities	Yes	Do not have any in place
Federal Grant Programs (Hazard Mitigation Grant Program)	Yes	Various Departments, OES

Element C.2. Participation in the NFIP

§201.6(c)(3)(ii) [The hazard 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. All plans approved by FEMA after October 1, 2008, must also address the jurisdiction's participation in the NFIP, and continued compliance with NFIP requirements, as appropriate.

Sierra County has extremely limited flood zones that have been identified by FEMA's NFIP program; the majority of these are in the eastern part of the county, in the basin, that includes both Loyalton and Sierraville. Although there is few residences within the FEMA identified floodplains within Sierra County, the Sierra County Planning Department continues to enforce the compliance with the NFIP through their Flood Plain Management Ordinance of the Sierra County code Part 32. However, as in much of California, FEMA is working with local governments to refine and remap the floodplains. These changes to flood mapping and zoning in Sierra County may result in additional properties needing to be insured and evaluated in future plans. This information is the best available data at the time of the development of this plan. The County has worked with FEMA in three broad areas of the NFIP: 1) actively working with FEMA to revise floodplain identification; 2) working with local governments to manage development in the floodplain; and 3) as part of the emergency services and NFIP public education process - the encouragement of residents to purchase flood insurance. Sierra County OES has assisted in public education programs to encourage all residents of the basin area to purchase flood insurance under the NFIP program as part of their personal preparedness programs. The planning department has worked collectively with FEMA to update the flood zone hazard maps for Sierra County to benefit the County and the residents therein. This process has resulted in refining the flood zones within Sierra County identifying properties that were omitted through original studies and removing properties that were clearly out of the floodplain from maintaining required NFIP insurance.

Element C.3. Mitigation Goals

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

The mitigation goals describe the overall direction that Sierra County agencies, organizations, and citizens propose to take toward mitigating risk from natural hazards. Goals and objectives of the Hazard Mitigation Plan were developed during interviews and meetings with public officials and at public meetings. Sierra County hazard mitigation goals are identified below. The following mitigation goals tie into the first overall goal at the beginning of this plan, and are:

- Promote a flood safer community
- Promote an earthquake safer community
- Promote a fire safer community

The broad range of potential mitigation activities were considered, below is a list of top actions identified by the County. Although some of these projects may not be eligible for FEMA funding, the county may secure alternate funding sources to implement these projects in the future.

Summary of Top Mitigation Projects in Sierra County

3.3.1 Community Education Neighborhood Preparedness Programs - Fire
4.2.3 County Wide Digital Communications – Multi-Hazard
2.3.4 Rebuild Firehouses in County to Essential Services Standards – Multi-Hazard
1.2.3 Relocation of up to 10 homes in Loyalton - Flood

For all new construction in Sierra County plans and permits are issued based upon the Uniform Building Code as adopted by the State of California. This code ensures that all new buildings are built to current seismic standards, current fire resistant standards and based upon lot analysis, whether or not the new structure is within a flood risk area.

On both new and existing buildings these projects envision the most cost effective and high return hardening of essential facilities to assist in creating a disaster resistant community.

Element C.4. Mitigation Actions and Projects

OVERVIEW OF HAZARD MITIGATION PROPOSALS BY THREAT						
FLOOD						
Project #	**Description of Project**	**Priority**	**Time Horizon**	**Approximate Project Cost**	**Requires BOS Regulatory Action?**	**Subject to CEQA/EIR**
1.1.1	County Storm Watch Program	1	Near	$100,000	No	No
1.1.2	Small Stream Warning System	1	Long	$250,000	Yes	Yes
1.1.3	Storm Early Warning NOAA Weather Radio Distribution	3	Long	$10,000	Yes	No
1.1.4	Community Flood Fighting Education	1	Near	$5,000	No	No
1.2.1	Stream Bed Vegetation Management Plan	3	Long	$1,000,000	Yes	No
1.2.2	Levee, Streambed and Bank Management	3	Mid	$500,000	Yes	Yes
1.2.3	Housing Elevation / Relocation of Houses (10)	2	Long	$500,000	Yes	Yes
1.2.4	Stream Culvert Capacity Improvement Program	3	Long	$15,000,000	Yes	Yes
1.2.5	Elevation of Secondary Bridges	1.2.4	Elevation of secondary bridges	1.2.4	Elevation of secondary bridges	1.2.4

OVERVIEW OF HAZARD MITIGATION PROPOSALS BY THREAT						
EARTHQUAKE						
Project #	**Description of Project**	**Priority**	**Time Horizon**	**Approximate Project Cost**	**Requires BOS Regulatory Action?**	**Subject to CEQA/EIR**
2.1.1	CERT Training	2	Near	$25,000 Per annum	No	No
2.1.2	Earthquake Insurance Campaign	2	Near	$15,000	Yes	No
2.2.1	Building Microwave System	1	Mid	$5,000,000	Yes	No
2.2.2	Manual Transfer Switches for all Public Buildings	1	Mid	$1,000,000	Yes	No
2.3.1	Surface Fire Water System with Pumps	1	Long	$2,500,000	Yes	No
2.3.2	Non –Structural Hazmit Model Home (10)	3	Mid	$25,000	Yes	No
2.3.3	Mobile Home Tie-down Program (50)	1	Mid	$650,000	Yes	Yes
2.3.4	Hardening PSAPs and Retrofitting Fire and Police stations	1	Mid	$30,000,000	Yes	No

OVERVIEW OF HAZARD MITIGATION PROPOSALS BY THREAT						
WILDLAND FIRE						
Project #	**Description of Project**	**Priority**	**Time Horizon**	**Approximate Project Cost**	**Requires BOS Regulatory Action?**	**Subject to CEQA/EIR**
3.1.1	Community Education Program on Defensible space	1	Near	$10,000	No	No
3.1.2	Develop Defensible Space Enforcement and Compliance Programs	2	Mid	$100,000	Yes	No
3.1.3	Voluntary Defensible Space Inspection Program	1	*Near*	$40,000	No	No
3.1.4	GIS Vegetation Management Layer	1	*Near*	$15,000	No	No
3.2.1	Elected Official Education Program	1	Near	$10,000	No	No
3.2.2	Defensible Space Grant Application Program	1	Near	$5,000 Per annum	Yes	Yes
3.2.3	Revise General Plan with Firewise Data	1	Mid	$50,000	Yes	No

OVERVIEW OF HAZARD MITIGATION PROPOSALS BY THREAT						
WILDLAND FIRE						
	Description of Project	**Priority**	**Time Horizon**	**Approximate Project Cost**	**Requires BOS Regulatory Action?**	**Subject to CEQA/EIR**
3.3.1	Develop Fuel Reduction Programs	1	Mid		Yes	Yes
	a. Roadside collection and chipping			$100,000		
	b. Mechanical fuel reduction			$500,000		
	c. Vegetative management/ harvesting			$500,000		
	d. Organic fuel reduction (Goats etc.,)			$250,000		
	e. Controlled burn program			$250,000		
3.3.2	Conduct Fuel Reduction Program Annually	2	Mid	$250,000 Per annum	Yes	Yes
3.3.3	Implement Public Road Clearance and Improvement Program	1	Long	$500,000	Yes	Yes
3.3.4	Implement defensible space into all WUI building permit processing	2	Long	$40,000	Yes	No
3.3.5	Develop insurance incentive program with insurance agencies	2	Long	$50,000	No	No
3.4.1	Fire Fuels Imaging and Residential Evolution Project	3	Mid	$1,600,000	No	No
3.4.2	Forester Tec Spec Advisory Program (combine with other fire education programs)	2	Long	$600,000	No	No

OVERVIEW OF HAZARD MITIGATION PROPOSALS BY THREAT						
ALL HAZARDS						
Project #	**Description of Project**	**Priority**	**Time Horizon**	**Approximate Program Cost**	**Requires BOS Regulatory Action?**	**Subject to CEQA/EIR**
4.1.1	Vulnerability Survey	1	*Completed*	$10,000	No	No
4.2.2	Community Info 2-1-1 system	2	Long	$500,000 Per year	Yes	No
4.2.3	Digital Radio System Countywide	2	Long	$2,000,000	Yes	No
4.2.4	Portable Remote Area Satellite Wireless Net Access Points (2 one for each side of county)	2	Long	$1,000,000	Yes	Yes
4.3.1	School CERT Training	2	Mid	$100,000 Per annum	Yes	No
4.3.2	Shelter-In-Place Training	3	Near	$50,000	Yes	No

Element C.5. Mitigation Strategy Action Plan

§201.6(c)(3)(iii) [The hazard mitigation strategy shall include an] action plan, describing how the action identified in paragraph (c)(3)(ii) of this section 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. §201.6(c)(3)(iv) For multi-jurisdictional plans, there must be identifiable action items specific to the jurisdiction requesting FEMA approval or credit of the plan.

Tables were developed to rank the mitigation projects using the following criteria: each project was assigned a priority rank, an approximate cost, a time horizon, whether the project requires Board of Supervisors regulatory action, and an assumption as to whether or not the project would be subject to CEQA or Federal EIR requirements.

On May 8th, 2012, the OES Coordinator, consulting with the Sierra County planning team, ranked each mitigation project as Priority 1, Priority 2 and Priority 3 based on community needs and concerns. Projects identified by Sierra County as top priorities are outlined in the following pages by threat and a more detailed explanation follows the tables.

The cost benefit review process will be completed for each project that will be submitted during a given fiscal year. The general priorities of the cost benefit risk analysis will focus on projects that are life saving, life safety, property protection and lastly environmental protection. A ratio of at least three dollars of benefit for each dollar invested will be considered the minimum cost benefit ratio for any projects submitted within Sierra County. The county recognizes that all of the following may not be accomplished in the five year planning cycle. This list will also serve as documentation for the county.

Mitigation Action Items

Goal 1: Promote a Flood Safer Community

Objective 1.1: Develop and improve the countywide flood surveillance and early warning system.

Action 1.1.1:	**County Storm Watch Program**
Program Description:	Create an automated system of rain and flood gauges on the major tributaries and storm approach path to the River Drainage system. The system is web enabled and accessible from both the flood operation centers and the County's web site. The tool will be constantly used for surveillance during the rainy season.
Funding Required:	$100,000 per annum
Timeframe:	1 – 3 years
Staff:	County Public Works Department
Jurisdictions Involved:	County, Loyalton

Action 1.1.2:	**Small Stream Warning System**
Program Description:	Increase coverage of storm watch sensors to include ten more small streams that due to land use changes have demonstrated impact on small stream and urban flooding.
Funding Required:	$250,000
Timeframe:	5 – 10 years
Staff:	County Public Works Department
Jurisdictions Involved:	County, Loyalton

Action 1.1.3:	**Storm early warning enhancements**
Program description:	Distribution of NOAA weather radios to high risk, limited income families living in flood zones. Developing program of free or at cost NOAA radios for families in the various flood zones in Sierra County.
Funding Required:	$25,000
Timeframe:	5 – 10 years
Staff:	County Disaster Education Task Force
Jurisdictions Involved:	Countywide

Action 1.1.4:	**Community education flood fighting techniques**
Program description:	Work with California Department of Water Resources to offer an annual training on flood fighting techniques for the Public

	Works Department and the general public. This will increase citizens' exposure to self-help protection and mitigation actions.
Funding required:	$5,000 per annum
Timeframe:	1-3 years
Staff:	Public Works Department
Jurisdictions Involved:	Countywide

Objective 1.2: **Support the Completion of the Flood Control Project**

Action 1.2.1:	**Streambed Vegetation Management Plan**
Program Description:	To balance the need for the smooth out flow of storm waters versus the need to maintain wildfire habitat a comprehensive streambed vegetation management plan needs to be developed to ensure the efficacy of the flood control efforts and maintain the viability of the living river vision.
Funding required:	$1,000,000
Timeframe:	3 - 5 years
Staff:	County Planning and Public Works
Jurisdictions Involved:	County

Action 1.2.2:	**Levee, streambed and bank Vegetation Management Plan**
Program Description:	Develop an approved approach of repairing and upgrading the existing historic flood control structures in Sierra County. Approach will include using rip rap and streambed depth management and upgrading the 19th century levee protection near Downieville.
Funding required:	$1,500,000
Timeframe:	3-5 years
Staff:	County Planning and Public Works Department
Jurisdictions Involved:	County

Action 1.2.3:	**Housing elevation or relocation project**
Program Description:	Apply for pre-disaster mitigation grant to elevate 10 most flood prone houses along areas not receiving direct protection from the Control Project. This program would reduce reoccurring losses due to repetitive flooding and minimize the expense for the property owner.
Funding required:	$2,000,000
Timeframe:	3 - 5 years
Staff:	County Planning Department
Jurisdictions Involved:	County and Loyalton

Action 1.2.4:	**Replacing older culverts with modern box culverts with up and downstream reinforcement.**
Program Description:	Program would involve increasing stream carrying capacity by replacing older culverts with larger box culverts with the culvert

	entrances and exits reinforced. This minimizes the ability of water borne debris to jam the culvert and create uncontrolled bank, bridge and road erosion. While this increased capacity will not eliminate flooding by itself, it is part of a systems approach to making Sierra County more flood resistant.
Funding required:	$5,000,000
Timeframe:	5 - 10 years
Staff:	County Planning & Public Works Departments
Jurisdictions Involved:	County and Loyalton

Action 1.2.5:	**Elevation of Secondary Bridges Plan and Program**
Program Description:	This measure would elevate (10) primary bridges affected by flooding. This program would elevate or replace critical second tier bridges on secondary and feeder streams to increase stream flow and maintain critical access and egress routes.
Funding required:	$10,000,000
Timeframe:	5 - 10 years
Staff:	County Planning & Public Works Departments
Jurisdictions Involved:	Countywide

Goal 2: Promote an Earthquake Safer Community

Objective 2.1: **Train communities to be earthquake ready**

Action 2.1.1: **Develop a CERT Training Program**
Program Description: CERT is a 20-hour free program that trains citizens in basic skills to mitigate, prepare and respond to local disasters whether natural or technological.
Funding required: $5,000 per annum
Timeframe: 1 - 3 years
Staff: County Fire Chiefs, CERT Cadre
Jurisdictions Involved: Countywide

Action 2.1.2: **Earthquake Insurance Education Campaign**
Program Description: Develop a public education campaign on the cost, risk and benefits of earthquake insurance.
Funding required: $15,000
Timeframe: 1 - 3 years
Staff: County OES
Jurisdictions Involved: Countywide

Objective 2.2: **Ensure the ability of emergency response units to communicate in a post-quake environment.**

Action 2.2.1: **Replacing and hardening county microwave and simulcast system**
Program Description: Replace old system with state of the art web controlled microwave and simulcast equipment, new repeaters and uninterruptible and sustainable power supplies to provide a secure and survivable backbone for all public safety post earthquake communications
Funding required: $5,000,000
Timeframe: 1 - 3 years
Staff: County Public Safety Communications
Jurisdictions Involved: County

Action 2.2.2: **Emergency power and automatic transfer switches for all public buildings**
Program description: Pre-position emergency power generation capability in all public buildings for use in the post earthquake or energy crises in environment to maintain continuity of government and services for the public.
Funding required: $500,000
Timeframe: 1 - 3 years
Staff: County Public Works Department
Jurisdictions Involved: County and Loyalton

Objective 2.3: **Improve post earthquake survivability of public and private assets.**

Action 2.3.1: **Ensure a viable fire fighting water supply**
Program Description: Purchase and maintain for each Fire District an emergency water pumping system including surface lines and hydrant system to pump water from existing sources, and transport and provide pressurized portable surface lines to temporarily replace damaged water mains and hydrants.
Funding required: $2,500,000
Timeframe: 5 – 10 years
Staff: County Fire Districts and Public Works Departments
Jurisdictions Involved: Countywide

Action 2.3.2: **Hazard Mitigation Model Home Project**
Program Description: Conduct 10 demonstration projects on existing housing types; one in each community. Demonstrating structural and non-structural mitigation techniques, as community open house models of mitigation.
Funding required: $250,000
Timeframe: 3 - 5 years
Staff: County OES
Jurisdictions Involved: County and Loyalton

Action 2.3.3: **Conduct a mobile home tie down program**
Program description: Identify, contract and tie down 50 mobile homes used as year round permanent residences using a cost sharing basis, 75% grant, 25% mobile home owner cost sharing basis.
Funding required: $750,000
Timeframe: 3 – 5 years
Staff: County Public Works
Jurisdictions Involved: Countywide

Action 2.3.4: **Retrofit Critical Public Safety Infrastructure**
Program description: Identify, contract and retrofit two 1950's vintage fire stations and the Medical Clinic Building in Downieville.
Funding required: $1,250,000
Timeframe: 3 – 5 years
Staff: County Fire Districts and Public Works Departments
Jurisdictions Involved: Countywide

Goal 3: Promote a Fire Safer Community

Objective 3.1: **Develop a defensible space program to minimize impact of wildland-urban interface fires.**

Action 3.1.1: **Develop & conduct a defensible space community education program**

Project Description: Produce a jurisdiction specific workbook for homeowners on how to apply defensible space, publish and distribute to homeowners.

Funding required: $10,000

Timeframe: 1 – 3 years

Staff: County Fire Districts, Fire Safe Council

Jurisdictions Involved: Countywide

Action 3.1.2: **Develop defensible space enforcement and compliance program**

Project description: Project would tie the public education and ordinance pieces into a field program of enforcement, modeled on county weed abatement and building code enforcement programs. Funding would include expenses for a FTE position to assist the County Fire Districts in enforcing the program by educating staff and also doing field enforcement and arbitration.

Funding required: $100,000

Timeframe: 1 – 3 years

Staff: County Fire Districts and County OES

Jurisdictions Involved: Countywide

Action 3.1.3: **Develop voluntary defensible space inspection program**

Program Description: As an augmentation/alternative to an enforcement program, this program would create an incentive program for defensible space in our community, emphasizing enlightened self interest in creating defensible space for homeowners in the Interface Zone.

Funding required: $40,000

Timeframe: 1 – 3 years

Staff: County Fire Districts

Jurisdictions Involved: County

Action 3.1.4 **Develop GIS Vegetation Layer Maps**

Program description: Develop comprehensive Ortho/Topo map layers, which demonstrate natural and agricultural vegetation countywide.

Funding required: $10,000

Timeframe: Near term

Staff: County Fire Districts, Fire Safe Council and GIS

Objective 3.2: **Create a sustainable public private partnership on building a safer community in the interface zone**

Action 3.2.1: **Develop elected official Firewise education program**
Program Description: Conduct a Firewise workshop for all elected officials with constituents that live in the interface zone. The workshop goal would be to educate the officials on the critical need for these programs in mitigating the Wild Land Urban Interface Fire threat.

Funding required: $10,000
Timeframe: 1 – 3 years
Staff: County Fire Districts
Jurisdictions Involved: County

Action 3.2.2: **Develop Defensible Space Grant application program for homeowners (Model Defensible space landscaping projects)**
Program Description: An incentive program to defer some of the burden on homeowners for the creation of defensible space. Homeowners would apply for the grant to be a 'model home' in a given area. Five $1,000 annual grants would be awarded as incentive to be a model property for their neighborhood.
Funding required: $5,000 per annum
Timeframe: 1 – 3 years
Staff: County Fire Districts
Jurisdictions Involved: County

Action 3.2.3: **Revise General Plan with lessons learned from Firewise programs and analysis**
Program Description: Sierra County is rewriting its General Plan. The Safety Element will be greatly enhanced by the recognition of the Interface Fire threat, and the inclusion of the scientific state of the art fire mitigation strategies included in the Firewise approach to fire mitigation planning.
Funding required: $10,000
Timeframe: 3 – 5 years
Staff: County Planning Staff
Jurisdictions Involved: County

Objective 3.3: **Develop a program to reduce shared threat in the interface zone**

Action 3.3.1: **Develop Fuel Reduction Program**
Program Description: Program will include 5 approaches to managing the fuel load in Sierra County. To assist homeowners in developing defensible space this program would include roadside collection and chipping. Mechanical fuel reduction equipment will be integrated into the program where terrain is compatible for its

	use. Vegetation management and harvesting programs would be reviewed, adopted and applied. Use of organic methods of fuel reduction, i.e. the use of goats, and the use of controlled burning to reduce the threat of fuel overload and maintain forest health.
Funding required:	$1,600,000 to fully initiate
Timeframe:	3 - 5 years
Staff:	County Fire Districts and Planning Department Staff
Jurisdictions Involved:	County

Action 3.3.2:	**Conduct Fuel Reduction Program annually**
Program Description:	With the annualized loss from fire, approximately 5-10 properties valued at approximately $1,000,000 would produce a cost benefit ratio (1 to 5) of conducting a Fuel Reduction Program.
Funding required:	$200,000 per annum
Timeframe:	3 - 5 years
Staff:	County Fire Districts and Planning Department Staff
Jurisdictions Involved:	County

Action 3.3.3:	**Implement Public Road Clearance and Improvement Program**
Program description:	Ensure all publicly maintained roads have a minimum of ten feet fire clearance on each shoulder; all dead end segments have at least a “T” intersection turn around sufficient for typical wild land fire equipment.
Funding required:	$600,000 to fully initiate
Timeframe:	5 – 10 years
Staff:	County Fire Districts and Planning Department Staff
Jurisdictions Involved:	County

Action 3.3.4:	**Implement defensible space measures into all Interface Zone building permit processes**
Program Description:	Add a defensible space overlay and plan requirement for all new construction in the Interface Zone. Require measurable defensible space improvements in accordance with current practices for the issuance of improvement permits on any property in the Interface Zone. This program is designed to institutionalize best practices for construction and defensible space on all new construction and improvement/remodeling of existing construction.
Funding required:	$40,000 to fully initiate
Timeframe:	5 – 10 years
Staff:	County Fire Districts and Planning Department Staff
Jurisdictions Involved:	County

Action 3.3.5:	**Develop an Insurance Incentive Program with Insurance Agencies**

Program description:	Create a public/private partnership with insurance companies to give a discount on fire insurance premiums to "Forester Certified" Firewise landscaping and fire resistant building materials.
Funding required:	$50,000
Timeframe:	5 – 10 years
Staff:	County Fire Districts and Insurance Companies
Jurisdictions Involved:	County

Objective 3.4:	**Maintain quality of watershed by managing fuel and fire as part of the water quality environment**
Action 3.4.1:	**Fire and Fuel Imaging and Residential Evolution Program Project**
Program Description:	An integrated GIS based planning approach for Fire and Fuel Imaging. County Fire Districts, OES, GIS and ESRI as partners will develop a planning tool for constant evaluation of status of fire fuel surveillance and defensible space progress countywide.
Funding required:	$1,000,000 to fully initiate
Timeframe:	3 - 5 years
Staff:	County Fire Districts and Planning Department Staff
Jurisdictions Involved:	County

Action 3.4.2:	**Forester Technical Specialist Advisory Program**
Program Description:	Due to the decrease in the logging industry and the State's budget crises, the career field of Forester is finding it very difficult to maintain employment. Defensible space planning and consulting, and watershed management are two areas statewide where the re-training of foresters would meet the needs of the clients as well as the needs to utilize their existing skills in their chosen career field. Sierra County would serve as a local government advocate for a statewide program to revitalize the Forester career field as a principle planner and consultant for forest fire mitigation and watershed management issues.
Funding required:	$600,000
Timeframe:	5 - 10 years
Staff:	***CDF OSFM***
Jurisdictions Involved:	County

Goal 4: Promote an All-Hazards Safe Community

Objective 4.1: Increase survivability from technological hazards including terrorism

Action 4.1.1	**Conduct a Vulnerability Study**
Program description:	Conduct a countywide study in partnership with Cal EMA, subject-matter experts to examine the county, identifying resources, targets and capability shortfalls.
Funding required:	$10,000
Timeframe:	*1 year*
Staff:	County OES
Jurisdictions Involved:	County

Action 4.1.2	**Community alert and services network, 2-1-1 system**
Program description:	Contract a 24/7/365 staffed services information system using the national 2-1-1 system model, integrating all service call numbers for non-emergency services into one system.
Funding required:	$500,000 per annum
Timeframe:	5 – 10 years
Staff:	County NGO's, OES
Jurisdictions Involved:	County and Loyalton

Action 4.1.3	**Secure, digital radio countywide**
Program description:	Develop a new microwave system, including digitally encrypted programmable radios to ensure secure disaster and counter terrorist communications.
Funding required:	$2,000,000
Timeframe:	5 – 10 years
Staff:	County Communications
Jurisdictions Involved:	County

Action 4.1.4	**Remote Area Satellite Wireless Internet Hubs**
Program Description:	Develop 10 satellite to ground wireless internet hubs to give relatively high-speed internet access to all public and private buildings in Sierra County. This would provide connectivity to the internet for emergency communications, email warnings, and public information distribution during disasters as well as daily life.
Funding required:	$2,500,000
Timeframe:	3 - 5 years
Staff:	County Planning and Public Works
Jurisdictions Involved:	Countywide

Objective 4.2:	**Train and educate the public to increase individual and household readiness**
Action 4.2.1	**Institute School CERT Training**
Program Description:	Train all middle school or high school students in Sierra County in the basic 20-hour CERT Course. This would build a cadre of disaster savvy youth who could assist their school, family and neighborhood in disaster preparedness and response. Adding CERT to the basic science or civics curriculum would provide a captive audience for training and help empower youth with a sense of volunteerism and civic responsibility.
Funding required:	$10,000 per annum
Time Frame:	3 - 5 years
Staff:	County School District and Fire District staff
Jurisdictions Involved:	Countywide

Action 4.2.2	**Conduct Shelter-in-Place community workshops**
Program Description:	Conduct countywide workshops on how to shelter-in-place at home, school or business, using simple supplies, techniques and equipment.
Funding required:	$15,000 per annum for 10 workshops
Time Frame:	1 - 3 years
Staff:	County OES and Fire Districts
Jurisdictions Involved:	County

Element C.6. Project Implementation

§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 improvements, when appropriate.

Some projects are currently budgeted or completed by Sierra County without recourse to the grant process. Projects requiring grant funds will be conducted as time, staff, priority and funding allow. The Sierra County Operational Area will seek mitigation funding from numerous sources such as the Hazard Mitigation Grant Program being recognized as only one of several potential sources.

The Sierra County Operational Area Council will be the coordination body for the day to day tracking of projects within the county. The association of governments will represent the opportunity to address the political issues of project prioritization and implementation in a forum that represents all the governmental stakeholders. In all projects, Sierra County recognizes that they will be responsible for 25% of the cost either in cash or in kind. The Board of Supervisors, based upon the budgetary condition of Sierra County, will be responsible for setting aside funding for projects that cannot be met by in kind contributions.

The Sierra County Operational Area Hazard Mitigation Plan will be used to focus project prioritization. Mitigation projects will be considered for funding through federal and state grant programs, the Capital Improvement Project Budget, which is developed based on current and

future funding availability. The Capital Improvement Project budget and projects are reviewed, evaluated and modified when necessary annually. The Capital Improvement Project Budget was presented in open public forum and available for comment at the Sierra County Board of Supervisor's meeting via Resolution 2012-088, Adopted September 4, 2012.

The Sierra County Operational Area Disaster Council will be the coordinating agency for project implementation. Individual jurisdictions have the capacity to organize resources, prepare grant applications, and oversee project implementation, monitoring, and evaluation. Coordinating organizations may include local, county, or regional agencies that are capable of, or responsible for, implementing activities and programs. The Sierra County OES Operational Area Coordinator (County OES Manager) will be responsible for mitigation project administration.

This Page Intentionally Blank

Element D: Plan Review, Evaluation and Implementation

§201.6(d)(3) A local jurisdiction must review and revise its plan to reflect changes in development, progress in local mitigation efforts, changes in priorities, and resubmit it for approval within 5 years in order to continue to be eligible for mitigation project grant funding.

Element D.1 Changes in Development

§201.6(d)(3) 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 5 years in order to continue to be eligible for mitigation project grant funding.

This is a new plan and the elements in this section do not apply.

Element D.2 Progress in Local Mitigation Efforts

§201.6(d)(3) 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 5 years in order to continue to be eligible for mitigation project grant funding.

This plan has been created as a living document with significant input from within Sierra County. However, this is a new plan and requirements D2 and D3 do not apply to this version but will in future updates.

This Page Intentionally Blank

Element E: Plan Adoption

Requirement §201.6(c)(5) [The 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 E.1. Formal Adoption Documentation

Requirement §201.6(c)(5) [The 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).

Sierra County plans to submit this plan to the Sierra County BOS upon successful completion of state and federal review. Sierra County wishes to receive approval pending adoption in order to minimize cost to the County. The plan will be submitted to the Board as a regularly scheduled agenda item with room for additional public and departmental comment. Our approach to this final element is due to the need to remain cost effective in the planning process. By receiving state and federal approval of the plan prior to going to the Board, we are able to go to the Board on a single date to finalize promulgation of this document. The plan will be in its final format, notification of the public will only have to be done once and copies of the resolution adopting this plan, the relevant section of the minutes of the BOS meeting and roster of attendees of this meeting will be included in Appendix B of this plan. The resolution will be inserted before the Table of Contents. As part of the agenda report the basic requirements for the plan, the scope of the document and the need to revise every five years will be clearly stated. The OES staff will be prepared to give an overview of the plan and be prepared to answer any questions related to the document development process and its contents.

Element E.2. Sierra County Operational Area Hazard Mitigation Plan

This plan is for the Sierra County Operational Area only. Therefore the only required resolution is from the Sierra County Board of Supervisors. Early on in the process it was determined by the Planning Team that due to the nature of the area and the commonality of threats faced throughout the county, this would be a single jurisdictional plan for the Sierra County Operational Area, which is comprised of all political subdivisions within Sierra County. The County has agreed to be the agent for any mitigation work completed within Sierra County.

This Page Intentionally Blank

Appendices

This Page Intentionally Blank

Appendix A: References

State of California Hazard Mitigation Plan (2010 & 2013)

Sierra County General Plan (1996)

Sierra County General Plan, Safety Element (1996)

Sierra County Emergency Operations Plan (1993)

Sierra County Flood Management Ordinance Part 32

Sierra County Fire Protection Plan

Sierra Economic Development Corporation, Five-year Plan, 2013-2017

Department of Finance Data, Sierra County 2012

Paulson, R.W., Chase, E.B., Roberts, R.S., and Moody, D.W., Compilers, National Water Summary 1988-89-- Hydrologic Events and Floods and Droughts: *U.S. Geological Survey Water-Supply Paper 2375, 591 p.*

U.S. Geological Survey (USGS) *Summary of Floods and Droughts in the Southwestern States*

The Colorado River Basin Climate Report

The Colorado Avalanche Information Center

History of Sierra County, James J. Sinnot (1972)

Origins and Development: A Chronology of Disasters in California, California Governor's office of Emergency Services

City-Data.com

American Avalanche Association

Local Mitigation Plan Review Guide, Federal Emergency Management Agency, (2011)

Multi-Hazard Mitigation Planning Guidance under the Disaster Mitigation Act of 2000

FEMA How To Guide #1, Getting Starting: Building Support for Mitigation Planning

FEMA How-To Guide #2, Understanding Your Risks: Identifying Hazards and Estimating Losses

FEMA How-To Guide #3, Developing the Mitigation Plan: Identifying Mitigation Actions and Implementation Strategies

FEMA How-To Guide #4, Bringing the Plan To Life: Implementing the Hazard Mitigation Plan

FEMA How-To Guide #5, Using Benefit-Cost Review in Mitigation Planning

FEMA How-To Guide #6, Integrating Historic Property and Cultural Resource Considerations into Hazard Mitigation Planning

FEMA How-To Guide #7, Integrating Manmade Hazards into Mitigation Planning

FEMA How-To Guide #8, Multi-Jurisdictional Mitigation Planning

FEMA How-To Guide #9, Using the Hazard Mitigation Plan to Prepare Successful Mitigation Projects

Disaster Recovery and Mitigation Handbook, California Emergency Management Agency

Appendix B: Documentation of the Planning Process

SIERRA COUNTY
Office of Emergency Services
P.O. Box 530
Downieville, California 95936
(530)289-3251 FAX (530) 289-2828

Tim H. Beals
Director

September 23, 2011

Notice and Agenda for
Operational Area Emergency Council Meeting

TO: Operational Area Emergency Council and Interested Parties

FR: Lee Brown, OES Coordinator

Please be advised that a meeting of the Operational Area Emergency Council will be conducted on **Wednesday, September 28, 2011** commencing at **1:00 p.m.** at the **Board of Supervisors Chambers, Sierra County Courthouse, Downieville, California.**

AGENDA

1. Call to Order, Introductions And Announcements
2. State Activity Report – State of California Office of Emergency Services
3. Grants Status
   - Review on 08, 09, 10 Homeland Security Grants
   - Review and Affirm FY 11 Homeland Security Grant Expenditure Recommendations
   - Hazard Mitigation Plan
   - Emergency Management Performance Grant
4. Reports
5. Open Discussion
6. Schedule Next Meeting
7. Adjourn

Sierra County
Hazard Mitigation Plan Kick-off Meeting

September 28, 2011
10:00 a.m.
Sierra County Board of Supervisors Chambers

Agenda

1) Introductions
2) Overall Project Scope
3) Roles and Responsibilities
4) Mitigation Planning Committee and Meetings Commitment
5) Information Gathering
6) Next Steps (Formal Countywide Project Kick-off Meeting)

Sierra County
Office of Emergency Services
Tim Beals, Director
P. O. Box 530
Downieville, CA. 95936
530-289-2850
scoes@sierracounty.ws

Sierra Is a Community At-Risk.

Sierra County is in the process of updating its Local Hazard Mitigation Plan. The plan will assess the likelihood of various natural hazards, including flooding, fires, snow, earthquakes, and severe weather. A critical component of the plan is **YOU**.

We need the participation of people living in the community to help us assess the likelihood of natural hazards and to identify measures to minimize impacts. Together, we will set goals, prioritize mitigation measures, and identify potential projects to reduce the impacts of natural disasters on residents and property in the County.

Nationwide, taxpayers pay billions of dollars annually helping communities, organizations, businesses, and individuals recover from disaster. Some natural disasters are predictable, and in many cases much of the damage can be reduced or even eliminated. The Federal Emergency Management Agency (FEMA) has targeted natural disaster loss reduction as one of its primary goals. The federal Disaster Mitigation Act of 2000 requires local governments to maintain a FEMA-approved Hazard Mitigation Plan in order to maintain eligibility for certain federal disaster assistance and hazard mitigation funding programs.

If you are interested in participating in the planning process to develop a Local Hazard Mitigation Plan, please respond by email to, Lee Brown, Coordinator, Sierra County Office of Emergency Services at lbrown@sierracounty.ws or (530) 289-2850.

This flier was distributed on 10/08/11 at the Seasonal Flu Shot Clinics. Additionally this flier was posted throughout the communities in Sierra County directly to the public at grocery stores and post offices and was also posted on public message boards.

Human Services
COUNTY OF SIERRA

Health Department
P. O. Box 7
202 Front Street
Loyalton, CA 96118
Phone: (530) 993-6700
Fax: (530) 993-6790
Email: health@sierracounty.ws
Website: www.sierracounty.ws

Carol Roberts, PhD
Director

SIERRA COUNTY SEASONAL FLU SHOT CLINICS

COST: $2.00 PER PERSON
$5.00 PER FAMILY

LOYALTON: DRIVE-THRU CLINIC
LOYALTON HIGH SCHOOL
SATURDAY, OCTOBER 8, 2011
10:00 AM – 1:00 PM

DOWNIEVILLE: DRIVE-THRU CLINIC
OFF MAIN STREET NEAR THE SCHOOL
FRIDAY, OCTOBER 21, 2011
10:00 - 1:00 PM

CLINICS ARE FOR PERSONS SIX-MONTHS AND OLDER. IF YOU ARE UNABLE TO ATTEND THE ABOVE CINICS PLEASE CALL THE HEALTH DEPARTMENT 993-6700 FOR AN APPOINTMENT.

The previous announcement was also distributed with the above flier at the Seasonal Flu Shot clinics as a way to advertise the LHMP process to the public.

0563

The Mountain Messenger
P.O. DRAWER A
DOWNIEVILLE, CA 95936

OES-276

001-5550-5174

Invoice

Invoice #: 00011551
Date: 10/28/11
Ship Via:
Page: 1

Bill To:

Sierra Co. Dept of Public Wks
P.O. Box 98
Downieville

Ship To:

Sierra Co. Dept of Public Wks
P.O. Box 98
Downieville

	Description	Amount	Tx
October 27	Hazard Mitigation Plan notice (2 col X 3.25")	$48.75	

RECEIVED
BY _____
NOV 01 2011
SIERRA COUNTY
DEPT. OF PUBLIC WORKS

	Freight:	$0.00
	Sales Tax:	$0.00
	Total Amount:	$48.75
	Amount Applied:	$0.00
Your Order #:		
Shipping Date:	Balance Due:	$48.75
Terms: 2% 10 Net 30		

PUBLIC NOTICE • PUBLIC NOTICE

Sierra County is in the process of updating its Local Hazard Mitigation Plan. The plan will assess the likelihood of various natural hazards, including flooding, fires, snow earthquakes, and severe weather. A critical component of the plan is YOU.

We need the participation of people living in the community to help us assess the likelihood of natural hazards and to identify measures to minimize impacts. Together, we will set goals, prioritize mitigation measures, and identify potential projects to reduce the impacts of natural disasters on residents and property in the County.

Nationwide, taxpayers pay billions of dollars annually helping communities, organizations, businesses, and individuals recover from disaster. Some natural disasters are predictable, and in many cases much of the damage can be reduced or even eliminated. The Federal Emergency Management Agency (FEMA) has targeted natural disaster loss reduction as one of its primary goals. The federal Disaster Mitigation Act of 2000 requires local governments to maintain a FEMA-approved Hazard Mitigation Plan in order to maintain eligibility for certain federal disaster assistance and hazard mitigation funding programs.

If you are interested in participating in the planning process to develop a Local Hazard Mitigation Plan, please respond by email to, Lee Brown, Coordinator, Sierra County Office of Emergency Services at scoes@sierracounty.ws or (530) 289-2850.

Published in The Mountain Messenger October 27, 2011

Publication

In the Superior Court
State of California } **ss**
County of Sierra

Exhibit "A"

The undersigned, being the Publisher or his representative, of the *Mountain Messenger,* a newspaper of general circulation, as defined by Section 6000 of the Government Code of the State of California, published weekly in the town of Downieville, County of Sierra, State of California, states, that:

The printed advertisement hereto annexed, marked Exhibit A, was published in the said *Mountain Messenger*, in the issues of the following named dates: 10/27/11

I certify, under penalty of perjury, that the foregoing is true and correct:

Executed at Downieville, CA, this 1 day of November, 2011.

RECEIVED
BY _____
2011
SIERRA COUNTY
DEPT. OF PUBLIC WORKS

Sierra County
Hazard Mitigation Planning Team Kick-off Meeting
Loyalton Social Hall
Loyalton, California

November 8, 2011
2:00 pm

Agenda

7) Introductions
8) Hazard Mitigation Planning Overview
9) Roles and Responsibilities of Planning Team Members
10) Public Participation and Survey
11) Next Steps

2:00 – 4:00 pm

Sierra County
Local Hazard Mitigation Plan (LHMP) Project
Planning Team Meeting
Sierra County Board of Supervisors Chambers — Loyalton location
November 8, 2011 2:00 pm

	NAME	AGENCY/FUNCTION	PHONE (cell, pager, home)	EMAIL
1	Miriam Diner	Dept of Public Works	530 289 3201	Mdiner@Sierracounty.ws
2	BRYAN ORVEY	" "	" " "	BORVEY@SIERRACOUNTY.WS
3	LEE BROWN	OES	530-289-2850	LBROWN@SIERRACOUNTY.WS
4	LETINA VANETTI	PUBLIC HEALTH	530-993-6737	lvanetti@plumas-county.ws
5	Richard Ludke	USFS	~~993-4118~~ 530-~~993-4118~~ 994-3401	
6	Ken Cutler	SCHD	530-448-1798	kcutler@sierracounty.ws.
7	MIKE FROESCHI	SCFSWC	530-251-7189	Mike@scfswc.com
8	Elizabeth Morgan	SCHD - Environmental Health	530-993-6716 desk 530-~~993~~ 251-6920 cell	emorgan@sierracounty.ws
9	JOHN I. EVANS	SIERRA CO. SHERIFF	530-289-3700	JOHNEVANS@SIERRACOUNTY.WS
10		Cal OMA	916 616-1401	

Sierra County Local Hazard Mitigation Plan

The Sierra County and its respective municipalities are working together to prepare a Local All-Hazard Mitigation Plan. The purpose of this plan is to identify and assess our community's disaster risks and determine how to best minimize or mitigate against those risks. Upon completion, the plan will be presented to each local governing body for adoption and then submitted to the California Emergency Management Agency (Cal EMA) and the Federal Emergency Management Agency (FEMA) for review and approval.

This fill-in survey questionnaire provides an opportunity for you to share your opinions and participate in the mitigation planning process. The information you provide will help us better understand your hazard concerns and identify area policies and projects that can help lessen the impact of future hazard events.

The survey consists of 22 questions including an opportunity for any additional comments at the end. Please respond to all questions. The survey should take less than 5 minutes to complete and is anonymous. When you have completed the survey, please email it to SierraCountyLHMP@gmail.com or mail it to the Office of Emergency Services, 100 Courthouse Sq., Ste 15, P.O. Box 530 Downieville, CA 95936.

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

1. Do you own property in Sierra County? (Check one)

- ☐ Yes
- ☐ No
- ☐ Other (Please specify): _____

2. Where do you live in Sierra County? (Check one)

- ☐ Alleghany
- ☐ Bassett's-Green Acres
- ☐ Calpine
- ☐ Downieville
- ☐ Forest City
- ☐ Goodyears Bar
- ☐ Indian Valley

Public Participation Survey distributed Countywide to solicit public input.

- ☐ Loyalton
- ☐ Pike City
- ☐ Sattley
- ☐ Sierra Brooks
- ☐ Sierra City
- ☐ Sierraville
- ☐ Verdi
- ☐ Other (Please specify): _____

2a. Are you a full-time or part-time resident? (Check one)

- ☐ Full-time
- ☐ Part-time
- ☐ If part-time (Please specify): _____

3. Do you work in Sierra County?

- ☐ Yes
- ☐ No
- ☐ Other (Please specify): _____

4. Which of the following natural hazards have you or anyone in your household experienced in the last 20 years within Sierra County? (Check all that apply)

- ☐ Avalanche/Snow Event
- ☐ Dam/Levee Failure
- ☐ Drought
- ☐ Earthquake
- ☐ Erosion
- ☐ Flood
- ☐ Hazardous Materials
- ☐ Household Fire
- ☐ Land/Rockslide
- ☐ Mine Accident
- ☐ Pipeline Failure
- ☐ Severe Weather (wind, lightening, winter storms, extreme heat, etc.)
- ☐ Volcanic Eruption (lahar, ash fall)
- ☐ Wildland/Urban Area Fire

- ☐ None
- ☐ Other (Please specify): _____

5. How prepared is your household for a natural hazard event?

- ☐ Not at all prepared
- ☐ Somewhat prepared
- ☐ Adequately prepared
- ☐ Well prepared
- ☐ Very well prepared

6. How concerned are you about the possibility of our community being impacted by a natural hazard event?

- ☐ Not concerned
- ☐ Somewhat concerned
- ☐ Extremely concerned

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

- ☐ First Aid/CPR training
- ☐ Made a home evacuation/escape plan
- ☐ Designated a family meeting place
- ☐ Identify utility shutoffs
- ☐ Prepared a disaster preparedness kit(s)
- ☐ Installed smoke and carbon monoxide detectors
- ☐ Cleared debris, trees and foliage around home for a defensible space
- ☐ Natural hazards insurance (Flood, Fire, Earthquake, etc.)
- ☐ Fire Extinguisher
- ☐ None
- ☐ Other (Please specify): _____

8. How concerned are you about the following natural hazards affecting Sierra County? (Check a response for each hazard?

	Not Concerned	Somewhat Concerned	Concerned	Very Concerned	Extremely Concerned
Avalanche	☐	☐	☐	☐	☐
Dam/Levee Failure	☐	☐	☐	☐	☐
Drought	☐	☐	☐	☐	☐
Earthquake	☐	☐	☐	☐	☐
Erosion	☐	☐	☐	☐	☐
Flood	☐	☐	☐	☐	☐
Hazardous Materials	☐	☐	☐	☐	☐
Land/Rockslide	☐	☐	☐	☐	☐
Mine Event	☐	☐	☐	☐	☐
Pipeline Failure	☐	☐	☐	☐	☐
Severe Weather	☐	☐	☐	☐	☐
Volcanic Eruption	☐	☐	☐	☐	☐
Wildland Fire	☐	☐	☐	☐	☐
Other (Please specify):					

9. Which of the following methods do you feel are the most effective in providing hazard and disaster information?

- ☐ Newspaper
- ☐ Informational Brochure
- ☐ Local Civic Groups (Rotary Club, Lion's Club, etc.)
- ☐ Faith-Based groups/organizations (Church)
- ☐ Community Bulletin Board
- ☐ Public workshop/meeting
- ☐ Public Library
- ☐ Local TV News
- ☐ Cable Access Channels
- ☐ Local Radio Stations
- ☐ Post Office
- ☐ Public Safety department (Fire, Police, etc.)
- ☐ Schools

Sierra County LHMP Community Survey 4

- ☐ County/Local Fairs
- ☐ Internet
- ☐ Social Media sites (Facebook, Twitter, etc.)
- ☐ American Red Cross
- ☐ Public Health department
- ☐ Local Business community
- ☐ Formal Public Awareness Campaign (Nat'l Preparedness Month, Fire Safety Week, Flood Preparedness Month)
- ☐ Word of Mouth
- ☐ Community Safety Event
- ☐ Local Paper/Newsletters

10. Is your property located in or near a floodplain?

- ☐ Yes
- ☐ No
- ☐ Not sure

11. Do you have flood insurance?

- ☐ Yes
- ☐ No
- ☐ Not sure

12. Is your property located in an area at risk for wildfires?

- ☐ Yes
- ☐ No
- ☐ Not sure

13. How much money would you be willing to spend to retrofit your home to reduce risks associated with natural disasters (elevating a home above flood level, performing seismic upgrades, or clearing debris/foliage from around home to create defensible space)?

- ☐ $10,000 or above
- ☐ $5,000 to $9,999
- ☐ $1,000 to $4,999
- ☐ Less than $1,000
- ☐ Nothing/Not Sure

14. Which of the following incentives would encourage you to spend money to retrofit your home to protect against natural disasters? (Check all that apply)

- ☐ Building permit fee waiver
- ☐ Insurance premium discount
- ☐ Mortgage discount
- ☐ Property tax break or incentive
- ☐ Low interest rate loan
- ☐ None
- ☐ Other (Please specify): _____

The following demographic information will aid in evaluating the responses to this questionnaire. The answers will be used only for the preparation of this plan and will not be provided to any other group or interest.

15. Please indicate your age range:

- ☐ Under 18
- ☐ 18 to 30
- ☐ 31 to 40
- ☐ 41 to 50
- ☐ 51 to 60
- ☐ 61 to 70
- ☐ 71 to 80
- ☐ 80 or older

16. Please indicate the primary language spoken in your household:

- ☐ English
- ☐ Spanish
- ☐ Asian and Pacific Island language
- ☐ Other Indo-European language
- ☐ Other (Please specify): _____

17. Please indicate your gender:

- ☐ Female
- ☐ Male

18. How long have you lived in Sierra County?

- ☐ Less than 1 year
- ☐ 1 to 5 years
- ☐ 6 to 10 years
- ☐ 11 to 20 years
- ☐ More than 20 years

19. Do you have regular access to the Internet?

- ☐ Yes
- ☐ No
- ☐ Not sure

20. Are there any other issues regarding the reduction of risk and loss associated with hazards or disasters in the community that you think are important?

21. Are there any additional comments that you would like to have addressed that were not included in the survey?

THANK YOU FOR YOUR TIME AND PARTICIPATION!!

Sierra County
Hazard Mitigation Plan Meeting # 2
Downieville, California

March 5, 2012
2:00 pm

Agenda

1) Introductions

2) Progress on Planning

    a. Community Public Survey Results
    b. Continued Public Outreach

3) Disaster Declaration History

4) Hazard Identification

5) Mitigation Strategies
    a. Goals
    b. Mitigation Actions

6) Next Steps

March 5, 2012 Sign-in sheet

Sierra County
Local Hazard Mitigation Plan (LHMP) Project
Planning Team Meeting
Sierra County Board of Supervisors Chambers
March 5, 2012 2:00 pm

	NAME	AGENCY/FUNCTION	PHONE (cell, pager, home)	EMAIL
1	Brenna Howell	Howell Consulting	916 202-2635 530-521-5810	brenna@brennahowell.com elideb1@msn.com
2	Debra Gibbs	tourism	↓	↓
3	Neal O'Haire	Howell Consulting	707 227 0257 530 623 1153	ohairen@ix.netcom.com
4	BRYAN DAVEY	Sierra County	530-28[illegible]-3201	BDAVEY@SIERRACOUNTY.WS
5	LEE BROWN	SIERRA COUNTY OES	530-289-2850	LBROWN@SIERRACOUNTY.WS
6	ANDREW WINBERRY	SIERRA COUNTY PLANNING	530-289-3251	awinberry@sierracounty.ws
7	BRANDON PANGMAN	SIERRA COUNTY PLANNING	530-289-3251	bpangman@sierracounty.ws
8	Miriam Dines	Public Works + Transportation	530-289-3201	mdines@sierracounty.ws
9	LETINA VANETTI	Sierra County Public Health	530-993-6737 530-249-2311 cell	lvanetti@sierracounty.ws
10	[illegible]	Cal EMA	916 616 1401	

Public Participation Survey
Summary of Results

Prepared for:

Lee Brown, Director
Sierra County Office of Emergency Services
101 Courthouse Square
P.O. Box 530
Downieville, CA 95936

March 2012

Prepared by:

Brenna Howell
Project Manager
Howell Consulting
12820 Rimfire Drive
Wilton, CA 95693

Sierra County, California: Public Participation Survey Results

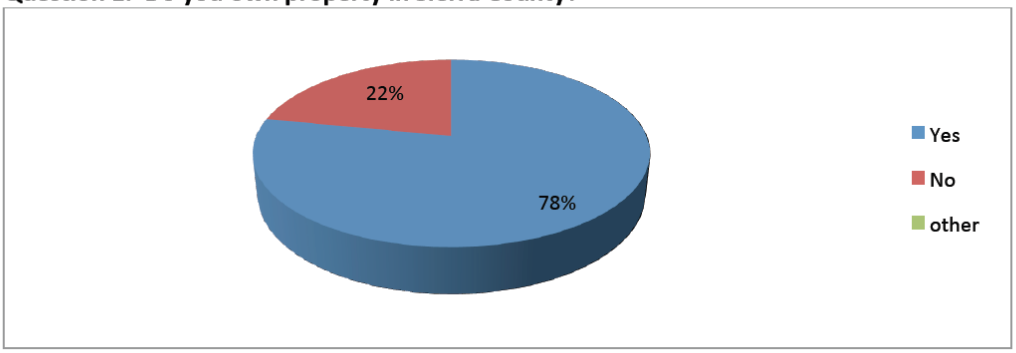
Pursuant to the distribution of the Sierra County Local Hazard Mitigation Plan survey from October 2011 – February 2012 to county residents, the summary of findings is based upon a comprehensive assessment of all of the survey responses (total of 35 received) during that period.

The following diagrams are a graphic representation of our findings based on each question addressed in the Public Participation Survey. They provide a snapshot of the overall concerns that the residents have regarding emergency preparedness in general and mitigation planning specifically.

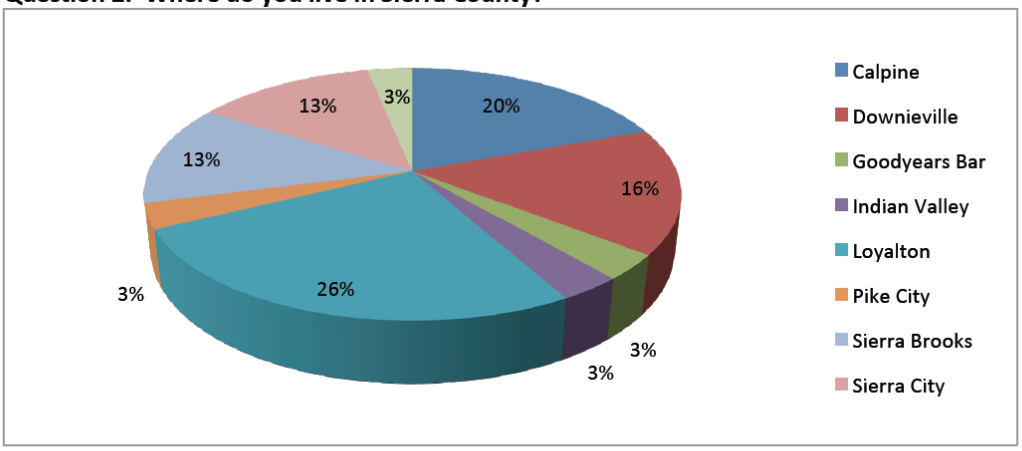
The information surmised in this report could serve as a vehicle for the Sierra County Office of Emergency Services to continue to enhance the overall strengthening of each phase of the Emergency Management program.

Survey Findings:

Question 1: Do you own property in Sierra County?

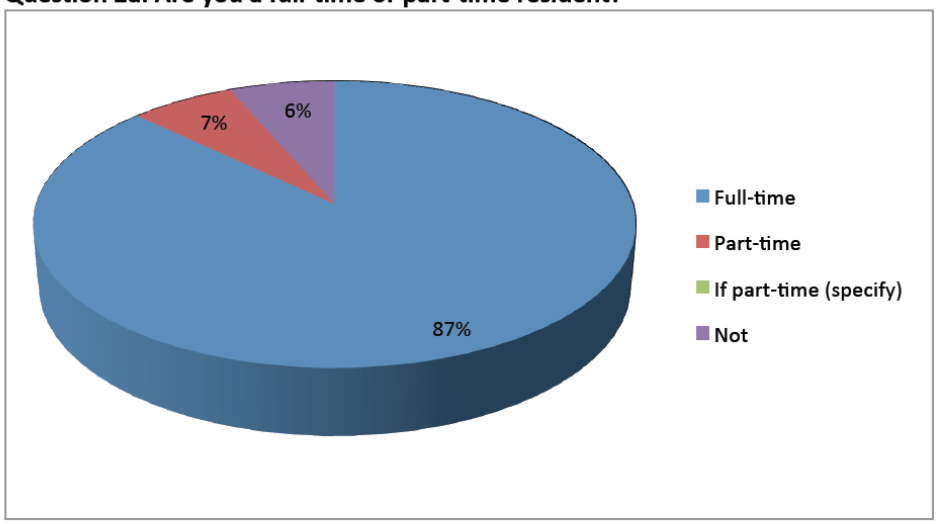


Question 2: Where do you live in Sierra County?

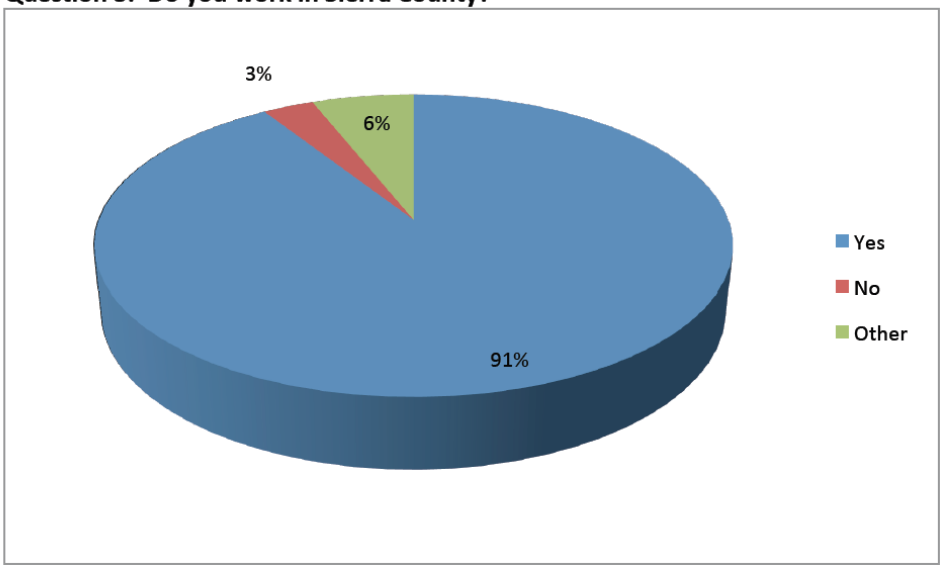


Sierra County, California: Public Participation Survey Results

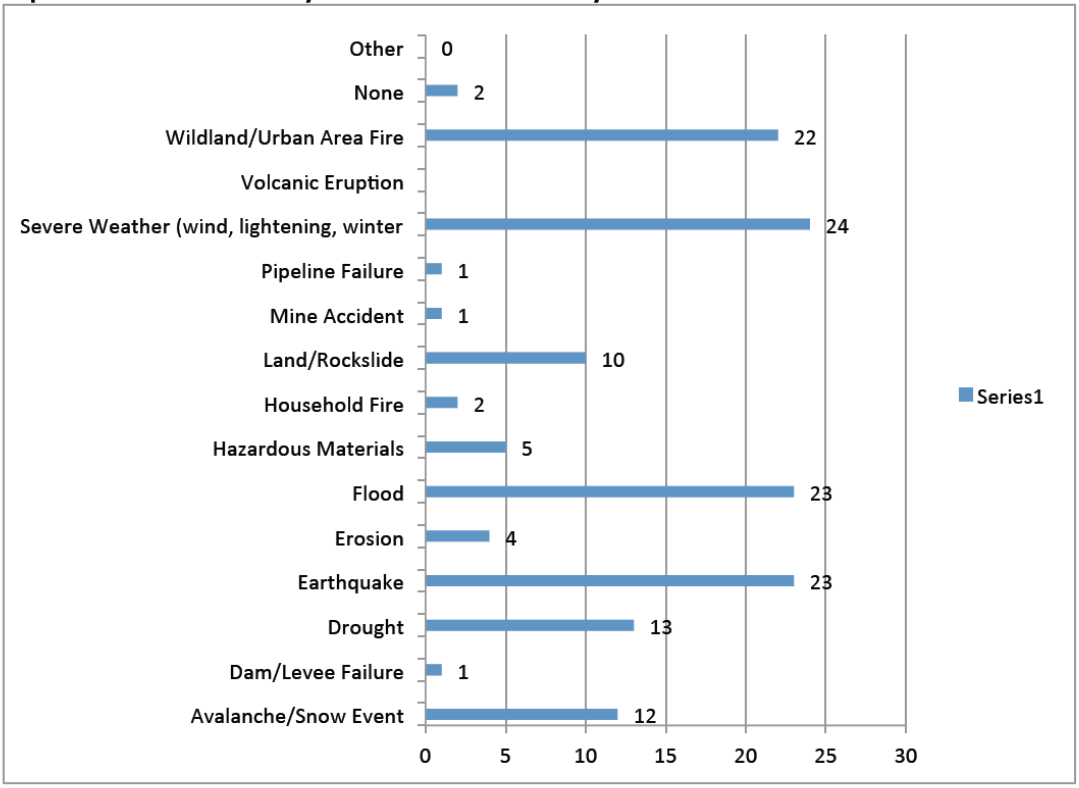
Question 2a: Are you a full-time or part-time resident?



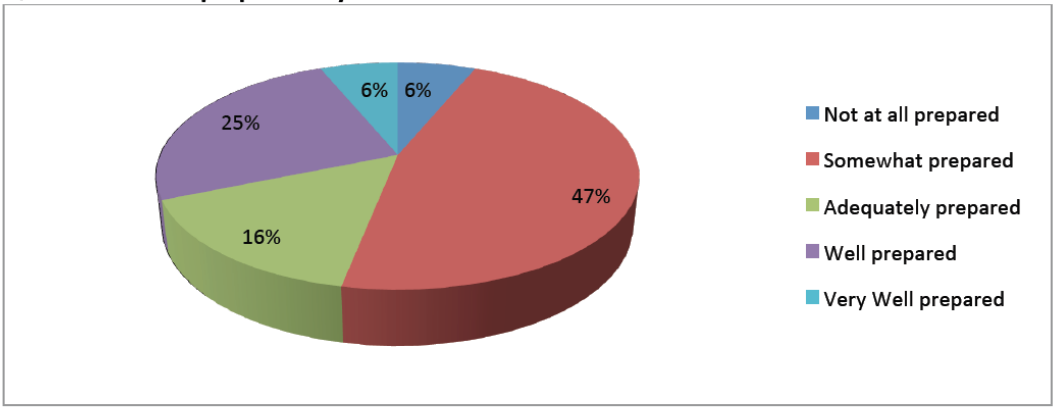
Question 3: Do you work in Sierra County?



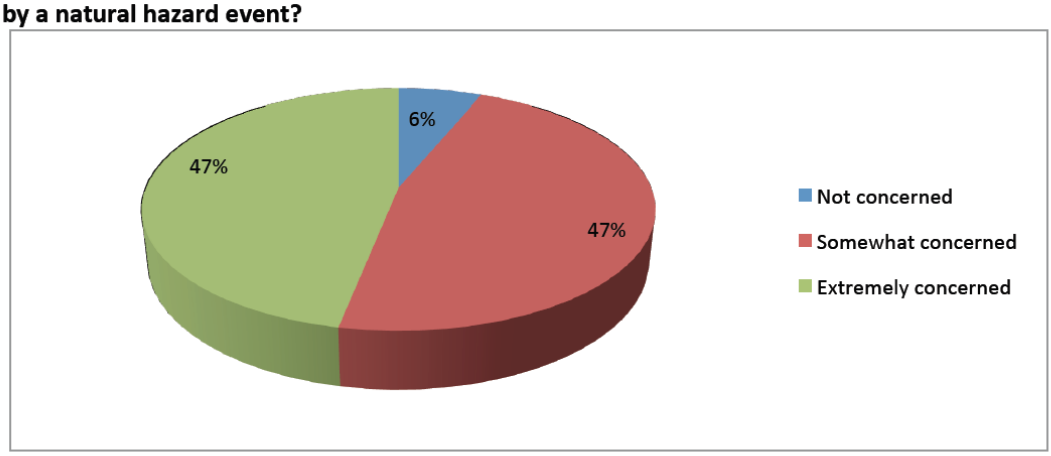
Question 4: Which of the following natural hazards have you or anyone in your household experienced in the last 20 years within Sierra County?



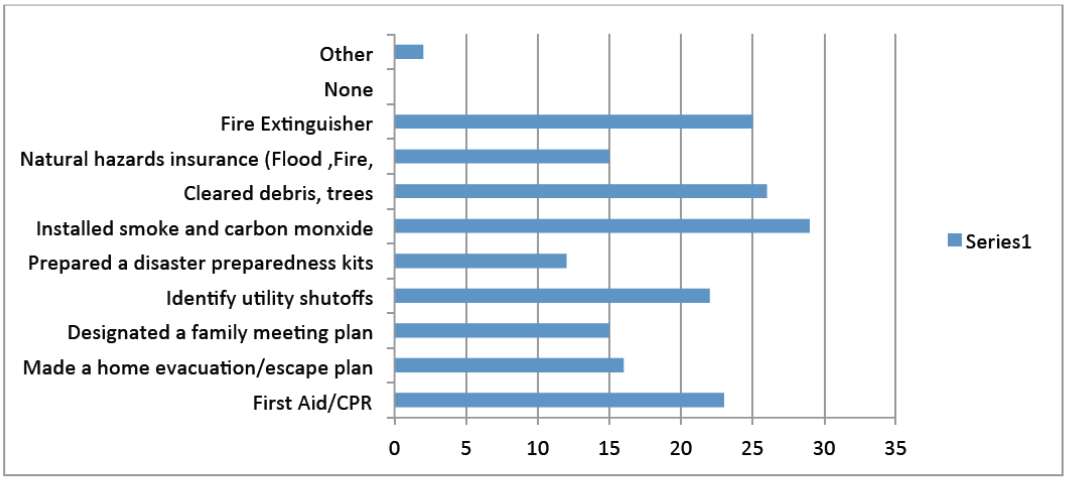
Question 5: How prepared is your household for a natural hazard event?



Question 6: How concerned are you about the possibility of our community being impacted by a natural hazard event?

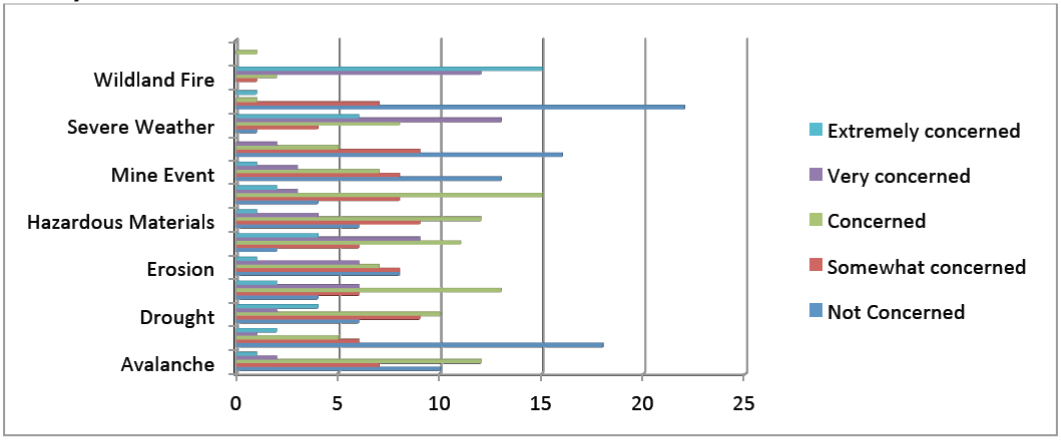


Question 7: Which of the following steps has your household taken to prepare for a natural hazard event?

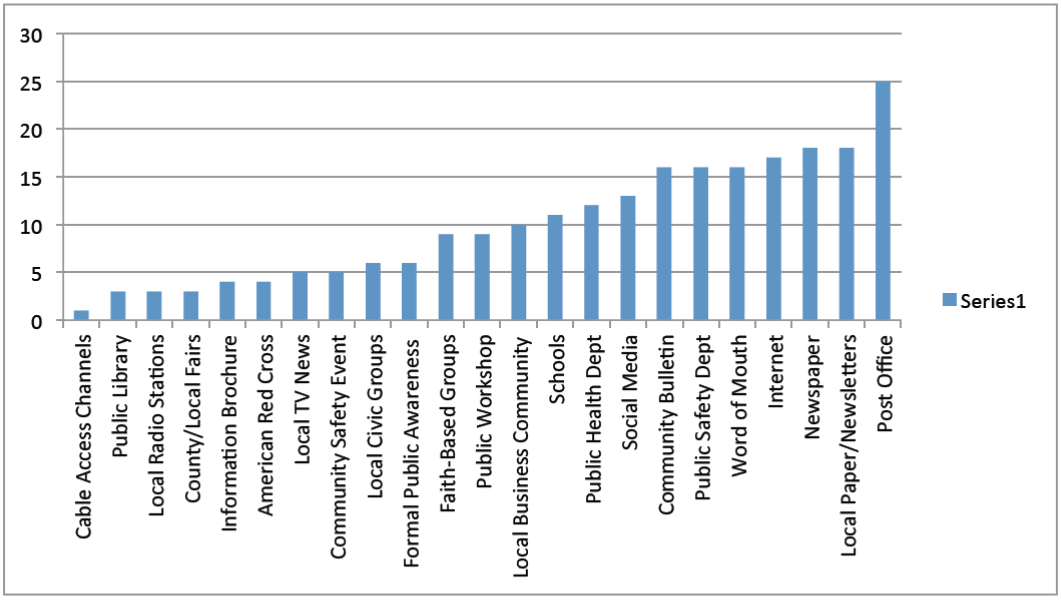


Sierra County, California: Public Participation Survey Results

Question 8: How concerned are you about the following natural hazards affecting Sierra County?

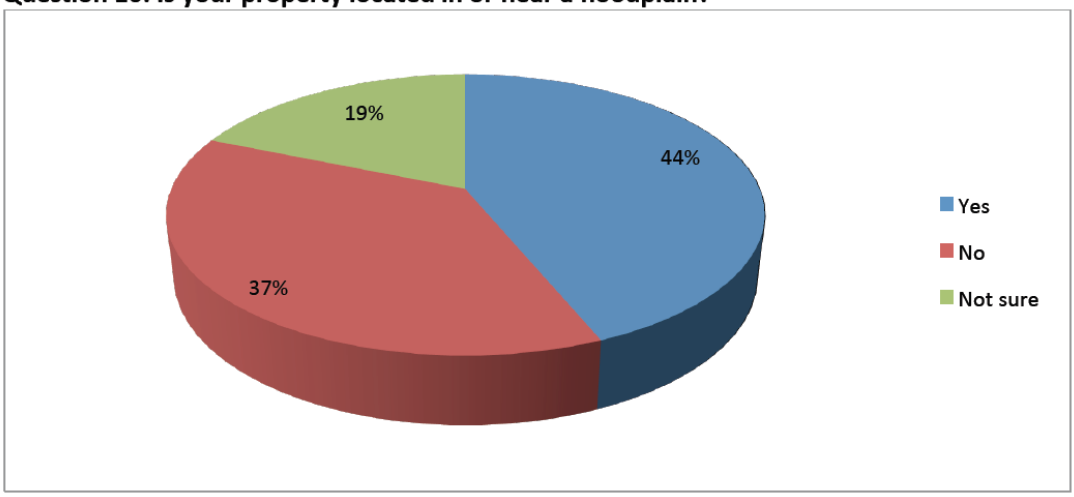


Question 9: Which of the following methods do you feel are the most effective in providing hazard and disaster information?

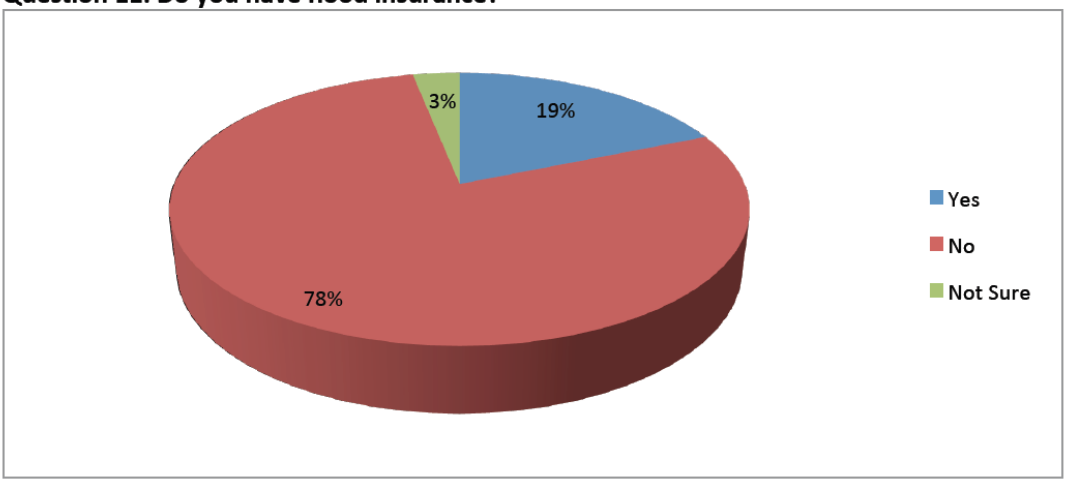


Sierra County, California: Public Participation Survey Results

Question 10: Is your property located in or near a floodplain?

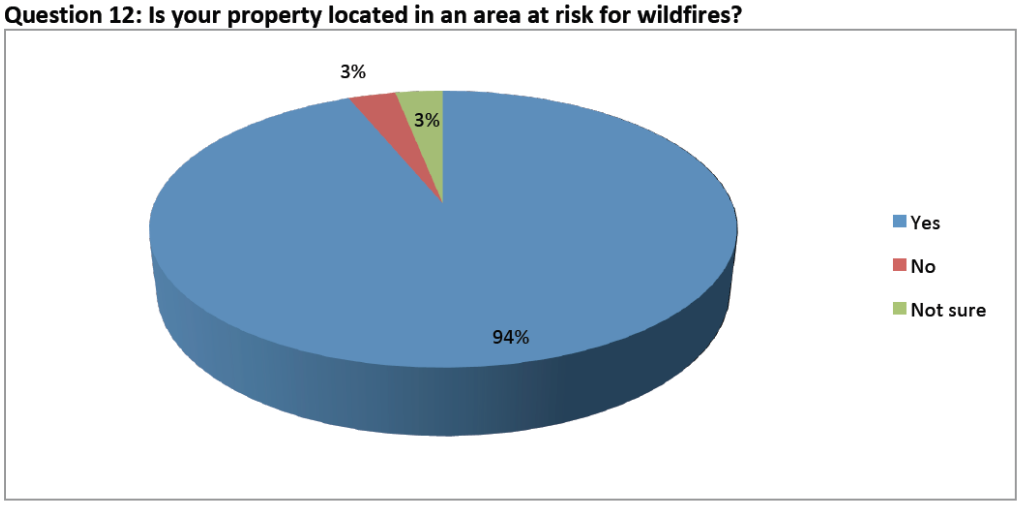


Question 11: Do you have flood insurance?

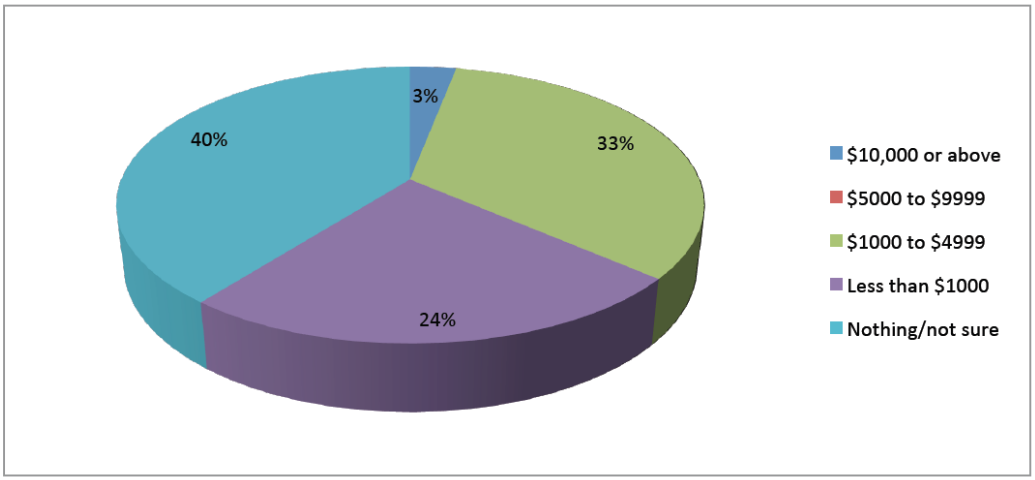


Sierra County, California: Public Participation Survey Results

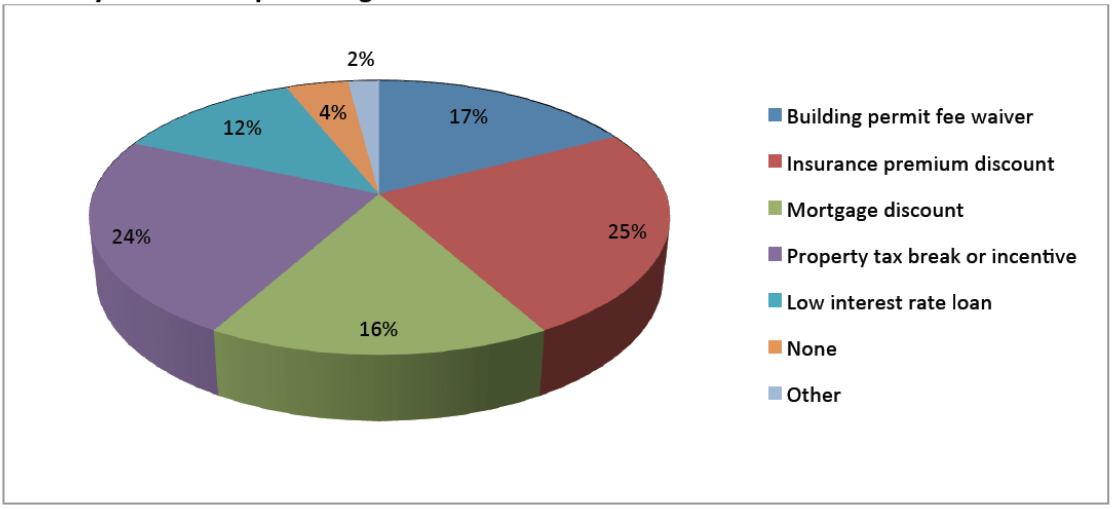
Question 12: Is your property located in an area at risk for wildfires?



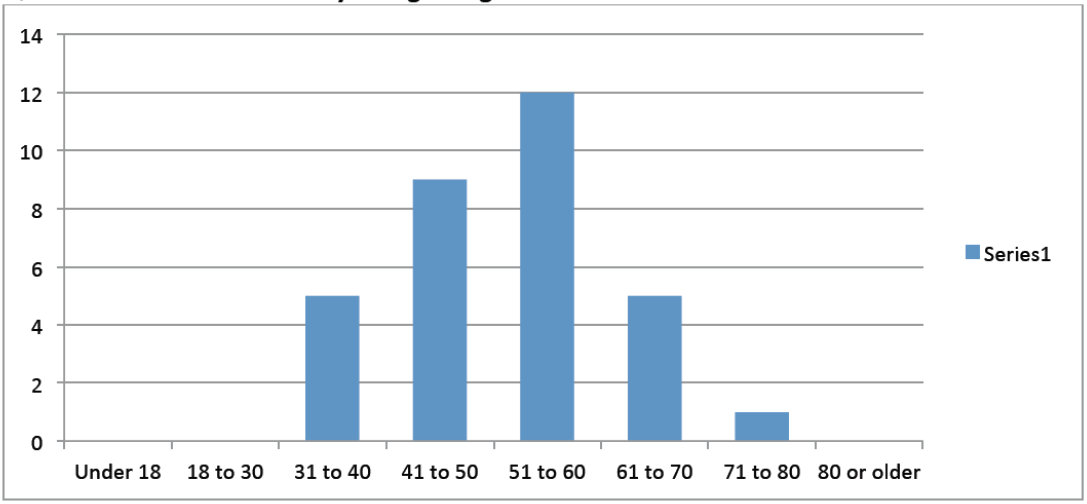
Question 13: How much money would you be willing to spend to retrofit your home to reduce risks associated with natural disasters?



Question 14: Which of the following incentives would encourage you to spend money to retrofit your home to protect against natural disasters?

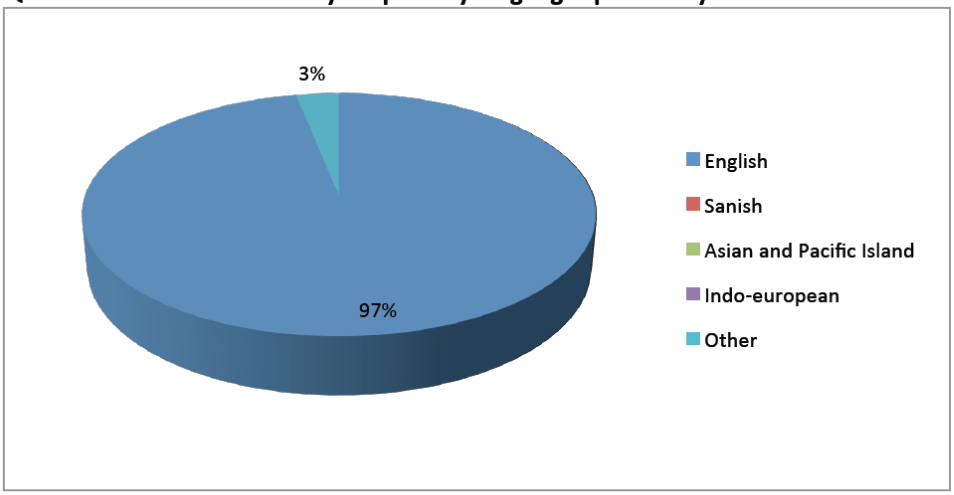


Question 15: Please indicate your age range:

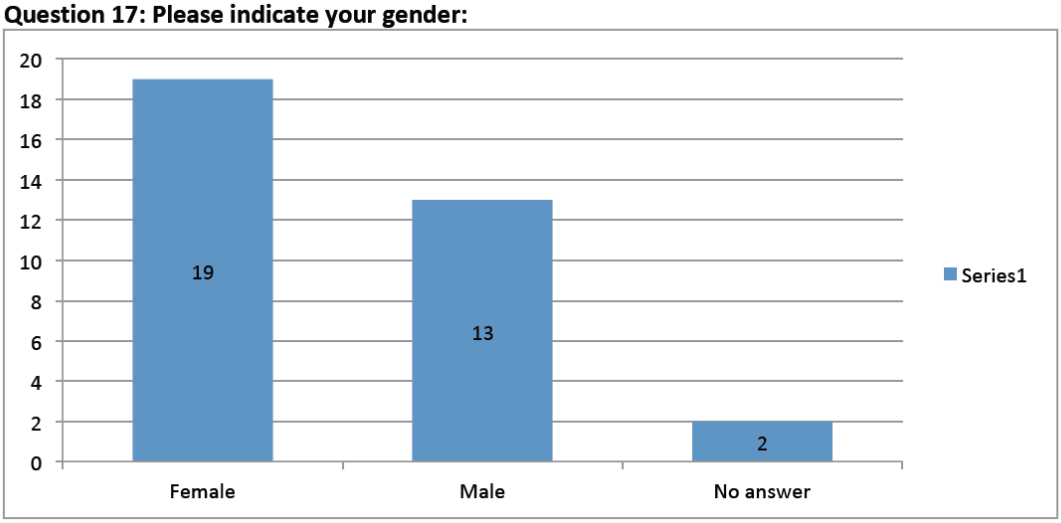


Sierra County, California: Public Participation Survey Results

Question 16: Please indicate your primary language spoken in your household:



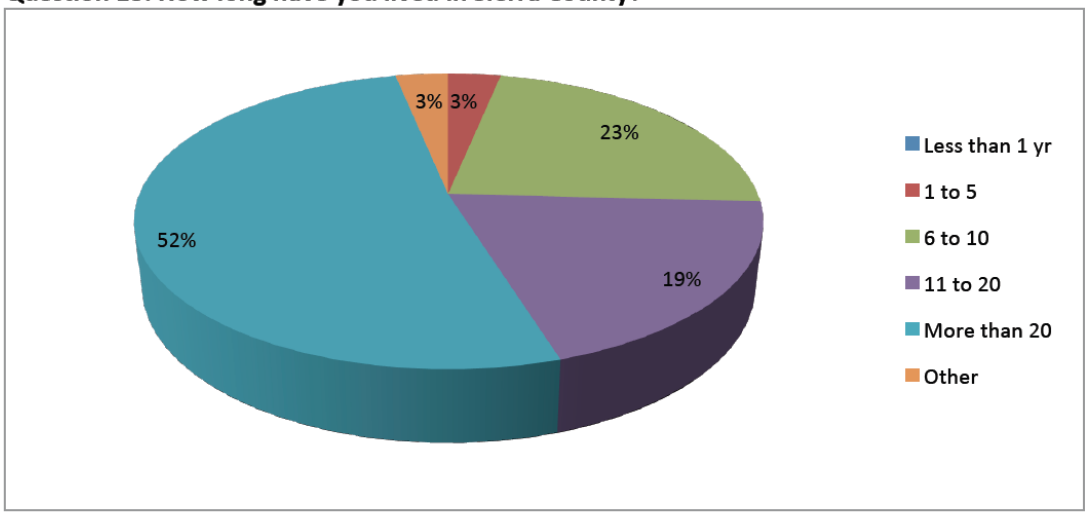
Question 17: Please indicate your gender:



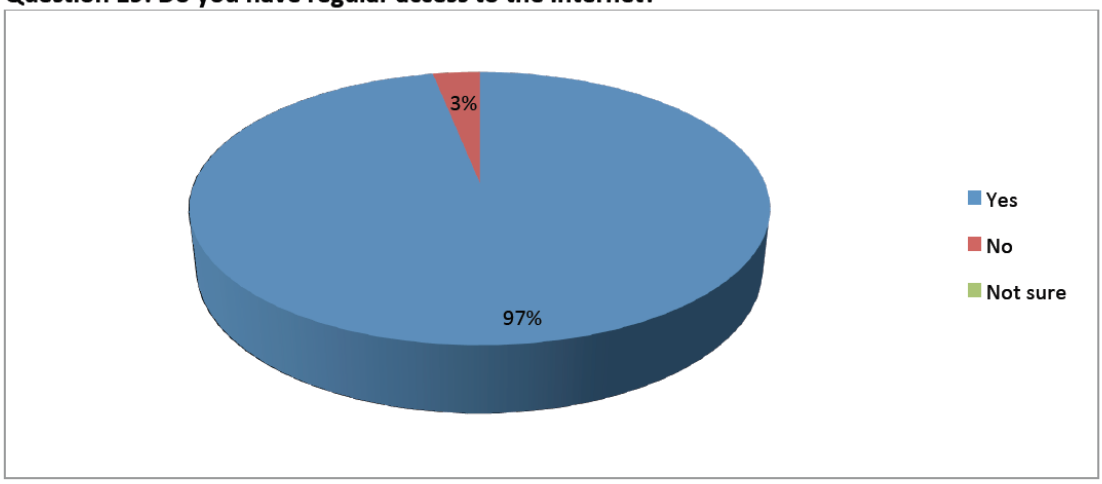
10

Sierra County, California: Public Participation Survey Results

Question 18: How long have you lived in Sierra County?



Question 19: Do you have regular access to the Internet?



The final two questions of the survey were open and allowed the respondent to answer in their own words. The following responses were provided for Questions 20 and 21:

20. Are there any other issues regarding the reduction of risk and loss associated with hazards or disasters in the community that you think are important?

- Lack of enforcement of permits.
- Wildfire prevention and management is needed; Water availability in my neighborhood.
- Our #1 hazard is fire. Preparing areas to fight, to stop back burn for fires is a priority.
- Lack of enforcement by local fire districts on vegetation clearances (defensible space), LPG installations, storage of hazardous/flammable materials.
- A need for community education and Town hall meetings on local hazards and corrections (mitigation). Identify resources available.

21. Are there any additional comments that you would like to have addressed that were not included in the survey?

- In the event of a hazard, where do animals go? People and animals could be separated from one another similar to the events during the flood of 1997.
- What plan is in place for food, shelter, and clothing for Downieville and Sierra City?
- We should pave the road to the Pike City PG&E substation to reduce the time spent restoring power outages to Pike City during severe weather events and wildland fires. (*Maybe PG&E could provide matching funds. This action would also help AT&T fiber optic cable route to Downieville*.)

March 14, 2012 Coordination with other departments and Agencies

Coordination w/ other Depts. + Agencies

Wednesday, March 28, 2012 4:10:53 PM Pacific Daylight Time

Subject: FW: Region III Quarterly Meeting Agenda
Date: Wednesday, March 14, 2012 1:20:58 PM Pacific Daylight Time
From: LeTina Vanetti
To: Brenna Howell, Lee Brown
Priority: High

Brenna and Lee,
I will discuss the Hazard Mitigation Plan progress and ask for input at this meeting tomorrow.
LeTina

From: Todd Frandsen [mailto:Todd.Frandsen@ssvems.com]
Sent: Friday, February 24, 2012 11:05 AM
To: Amerjit Bhattal (abhattal@co.sutter.ca.us); Amy Travis(atravis@glenncountyhealth.net); Angela Miller (anmiller@buttecounty.net); Angelo Banos(msas@snowcrest.net); Anne Bybee; Barnar M R(BarnarMR@ah.org); Bethony Boom(bboom@calhospital.org); Bill Goodwin(bgoodwin@tehamacountyadmin.org); Bill Smith(bsmith@co.yuba.ca.us); Bob Hall(bob@firstresponder.com); Bob Kiuttu (bob.kiuttu@enloe.org); Bonnie Davies (bdavies@colusadhhs.org); Brian Gray(bgray@mtnlf.com); Bruce Hasek(bhasek@townofparadise.com); Capt Darrick Duran (darrick.duran@beale.af.mil); Capt. Daniel Townsend (daniel.townsend@beale.af.mil); Carol Huang, PHN/Director; Carol Roberts; Carolyn Ceccon(cceccon@glenncountyhealth.net); Cheri Hummel(chummel@calhealth.org); Chris Alexander; Chris Steinhoff (csteinhoff@colusadhhs.org); Christi Myers, RN(cmyers@co.lassen.ca.us); Constance Mitchell, PHN; Dan Bouse(dbouse@hdo.net); Dan Nichols(dan.nichols@cdph.ca.gov); Dan Spiess(dpiess@norcalems.org); Dave Maron (dmaron@co.shasta.ca.us); David Brown(david.brown@reachair.com); Dean Herzberg(hherzberg@ci.redding.ca.us); Dennis Garton(dgarton@tehamacountyadmin.org); Devin Olio; Diane Rieke; Dunsmoor, Cindi(cdunsmoor@buttecounty.net); E. Petersen(epetersen@co.siskiyou.ca.us); Edward R. Richert, M.D. (edrichert@pol.net; ENP Joy Willis (joy@shascom911.com); Erik Moyer; Garrison, Jared MD (jgarrison@glennmed.org); Gene Azparren (GAzparren@buttecounty.net); Glen Hayward(ghayward@primehealthcare.com); Gloria Newton (gnewton@co.shasta.ca.us); Grinnell Norton, PHN; Heidi A. Vert(hvert@co.shasta.ca.us); James Alexander; James Corona, MD; James Mackay (lihcdirector@lihc.org); Jason Spencer; Jason Swann(jswann@phihelico.com); Jay Nickell; Jayme Bottke(bottkej@tcha.net); Jeff Kennedy(Jeff_Kennedy@reachair.com); Jennifer Broussard (jbroussard@co.sutter.ca.us); Jim Ferguson(jim.ferguson@fire.ca.gov); Jim Tilford (jtilford@greenvillerancheria.com); Joanna Zimmermann, PHN; Jody Durden(jody.durden@emsa.ca.gov); Joe Watkins(jwatkins@co.lassen.ca.us); John Anderson; John Gulserian(jgulserian@buttecounty.net); John Poland; Jon Bennett(jbennett@rbfd.org); Jon truelove(JTruelove@primehealthcare.com); Joseph Cassady (joecassady@co.yuba.ca.us); Karl Pedroni; Kathy Galey(kathy@shascom911.com); Kelly Crosby (kellycrosby@co.modoc.ca.us); Kelly Graham; Ken Korver MD (kkorver@co.lassen.ca.us); Kim Howard(kim.howard@enloe.org); Kiyomi Bird (KBird@buttecounty.net); Larry Masterman(lmasterman@trinitycounty.org); Laurie Sowder(laurie@shascom911.com); Lee Sapaden; LeTina Vanetti; Linda Henrich, RN, BSN(linda.henrich@chw.edu); Lisa Bennett(Lisa.Bennett@CHW.EDU); Lynn Corliss, PHN; M Houser(mhouser@bgmh.us); M. D. ValArmisen (drvalarmisen@countyofplumas.com); Mallet Tuekpe, MBBS, PhD; Mark Belden, EMT-P(mark.belden@amr.net); Mark Lundberg, MD (mlundberg@buttecounty.net); Markell Pierce (markell.pierce@emsa.ca.gov); Martha Mitchell(mmitchell@it-email.com); Marty Marshall (marty.marshall@enloe.org); Matt Hansen (mchansen@cuschico.edu); Matt Moser; Michael Frenn; Mikey Huber(Mhuber@firstresponder.com); Mimi Hall (mimihall@countyofplumas.com); MPH Andrew Deckert MD (adeckert@co.shasta.ca.us); MPH Donnell Ewert (dewert@co.shasta.ca.us); Ken Cutler; MPH Lou Anne Cummings MD (lacummings@colusadhhs.org); MPH Lou Anne Cummings MD(lcummings@co.sutter.ca.us); Richard Wickenheiser MD (rwickenheiser@lassenmedical.com); Steve Perlman MD (sperlman@co.siskiyou.ca.us); Thomas Donald(dthomas@tehamaso.org); Kara Davis(kdavis@norcalems.org); LyRae Sullivan(lsullivan@primehealthcare.com); Nicole Bonkrude(nbonkrude@co.shasta.ca.us); Patricia Lima (plima@norcalems.org); Patrick Lynch; Peggy Amaral(pamaral@fairchildmed.org); Peggy Wheeler(pwheeler@calhealth.org); Penny Costa(Penny.Costa@CHW.EDU); Penny Holland; Phillip R. Anzo(phillip.anzo@fire.ca.gov); PHN Grinnel Norton (gnorthon@glenncountyhealth.net); PHN Jennifer Slinkard (jenniferslinkard@co.modoc.ca.us); Phyllis Murdock (pmurdock@buttecounty.net); Randy

Moore(randy.moore@bannerhealth.com); Rhonda Grandi; Rich Lemon; Ron Rowley(rrowley@co.siskiyou.ca.us); Ron Welch(ron.welch@bicountyambulance.com); Ruth Ann Rowan(rrowen@chw.edu); Sheila Martin; Sherron Prosser (sherron.prosser@frth.org); Stephanie Taylor(smtaylor@co.shasta.ca.us); Steve Tolen(stolen@pdh.org); Susan Murphy(murphys@tcha.net); Sydnei Wilby (wilbys@tcha.net); Terry Barber (tbarber@co.siskiyou.ca.us); Tina Venable(tinavenable@countyofplumas.com); Tony Richno(trichno@modocsheriff.us); Traci Niemela(tbaptista@co.shasta.ca.us); Traci Niemela(tniemela@co.shasta.ca.us); Traci Torres(ttorres@glennmed.org); Tracy Studer; Vickie Pinette; Wayne Peabody(wpeabody@cityofwillows.org); Wendy VanCot, RNt (vancotwg@ah.org)
Cc: Amy Boryczko; Diana Nolasco; doug@disasterdoug.com; Geoffrey Peabody, II; John Lord; Karen Crain-Riddle; Kristy Harlan; Linda M. Combs; Shawn Joyce
Subject: Region III Quarterly Meeting Agenda
Importance: High

Good Morning Everyone,

Here is the Agenda for the Regional Meeting on March 15th from 10am-2pm. Looking forward to meeting all of you and hope you all can attend. This meeting should bring a lot of good information to us all and give all counties an opportunity to really talk. Have a great weekend!

Todd Frandsen
Regional Disaster Medical Health Specialist, Region III
Sierra-Sacramento Valley EMS Agency
Serving the Counties of: Placer, Yuba, Yolo, Nevada, Sutter, Butte, Colusa, Shasta, Tehama & Siskiyou

Main: 530.410.6008 | Direct: 530.722.6615 | Facsimile: 530.222.3007 | Mobile: 530.204.7049
2775 Bechelli Lane, Redding, CA 96002
www.ssvems.com

REGION III RDMHS QUARTERLY MEETING

MARCH 15, 2012, 10AM – 2PM

AGENDA

Sign-In / Welcome / Introduction • Order Lunches • Round Table Intro	1000am – 1015am	John Lord / Todd Frandsen
RDMHS Region III Update • Trainings • CDPH Items • EMSA Items • RDMHS Activities	1015am – 11am	Todd Frandsen
S-SV EMS Agency Region Update	11am – 1130am	John Lord
Nor-Cal EMS Agency Region Update	1130am – 12pm	Patti Lima
Lunch / County Informational Round Table (Open Discussion for all Counties)	12pm – 1pm	Group (Open Forum)
EMSA Update • MRC/DHV • DMSUs • ASTL • Other Topics	1pm – 150pm	Guest Speakers: Markell Pierce, Patrick Lynch or guest, and Michael Frenn (EMSA)
Closing Comments / Group Discussion • Future Meeting Dates • Regional Contact List Update	150pm – 2pm	Todd Frandsen / John Lord / Group

** Lunches will be order at 10am sign-in from Dill's Deli. Please bring cash or check if you wish to eat in. **

Sierra County
Hazard Mitigation Plan Meeting # 3
Downieville, California

May 8, 2012
2:00 pm

Agenda

1) Introductions

2) Mitigation Strategies
   a. Goals
   b. Mitigation Actions

3) Public Meeting Notice on Final Draft of LHMP

4) Next Steps

Sierra County
Local Hazard Mitigation Plan (LHMP) Project
Planning Team Meeting
Sierra County Board of Supervisors Chambers
May 8, 2012 2:00 pm

	NAME	AGENCY/FUNCTION	PHONE (cell, pager, home)	EMAIL
1	STEVE FOLSOM	CALTRANS DOWNIEVILLE FIRE	530 289-3214 WORK 530 289-3676 HOME	steve_folsom@dot.ca.gov
2	LEE BROWN	SIERRA COUNTY OES	530-289-2850	LBROWN@SIERRACOUNTY.US
3	LETINA VANETTI	Sierra Co Health Dept - EMERGENCY PREPAREDNESS	530-993-6763	lvanetti@sierracounty.
4	Jacie Epperson	Downieville FPD EMS Supervisor	530-289-3134	deltajacie@hotmail.co.
5	Jen Tyn Anderson	CalEMA	916-616-1401	Jenilyn.Anderson@CalEMA.CA.GOV
6	ANDREW WINBERRY	SIERRA COUNTY PLANNING	530) 289-3251	awinberry@sierracounty.ws
7	TIM BEALS	11	11	tbeals@sierracounty.ws
8				
9				
10				

Your Input is Needed!

Sierra County is in the process of updating its Local Hazard Mitigation Plan. The plan will assess the likelihood of various natural hazards such as flooding, fires, earthquakes, severe weather and more. A critical component of the planning process is **YOU**.

We are seeking the participation of people living in the community review the final draft of the plan and provide comment.

Nationwide, taxpayers pay billions of dollars annually helping communities, organizations, businesses, and individuals recover from disaster. Some natural disasters are predictable, and in many cases much of the damage can be reduced or even eliminated. The Federal Emergency Management Agency (FEMA) has targeted natural disaster loss reduction as one of its primary goals. The federal Disaster Mitigation Act of 2000 requires local governments to maintain a FEMA-approved Hazard Mitigation Plan in order to maintain eligibility for certain federal disaster assistance and hazard mitigation funding programs.

Your comments and ideas are invited to attend one of the upcoming public meetings on:

Tuesday, June 12, 2012
Loyalton Social Hall
105 Beckwith Street, Loyalton
12:00 pm – 2:00 pm

Tuesday, June 12, 2012
Downieville Community Hall
321 Main Street, Downieville
6:00 pm – 8:00 pm

The overall purpose of these meetings are to inform the public on the draft local hazard mitigation plan, present the types of hazards in or possibly affecting Sierra County, and seek input from the public on the draft document.

If you have any questions or would like to leave a comment please email us at scoes@sierracounty.ws or call the Office of Emergency Services at (530) 289-2850.

Sierra County
Local Hazard Mitigation Plan (LHMP) Project
Planning Team Meeting
Loyalton Social Hall
June 12, 2012 12:00 pm

	NAME	AGENCY/FUNCTION	PHONE (cell, pager, home)	EMAIL
1	Tom Ketchum	Resident Loyalton Public Works	530-993-0220	Ketchum@psln.com
2	FABIAN PLAZOLA	C of L MAINTENANCE Resident	530 993 6750	
3	JoAnn Goodwin	Interested Visitor	916 955-0671	Jogoodwin23@gmail.com
4	Neal O'Haire	Contractor	707-227-0257	
5	Brenna Harrell	contractor	916 702-7635	brenna@brennaharrell.com
6	LEE BROWN	SIERRA COUNTY OES	530-289-2850	LBROWN@SIERRACOUNTY.WS
7	JOHN I. EVANS	SIERRA CO. SHERIFF	(530) 289-3700	JOHNEVANS@SIERRACOUNTY.WS
8				
9				
10				

Sierra County
Local Hazard Mitigation Plan (LHMP) Project
Planning Team Meeting
Downieville Community Hall
June 12, 2012 6:00 pm

	NAME	AGENCY/FUNCTION	PHONE (cell, pager, home)	EMAIL
1	Brenna Thorell	Consultant	916 202-2635	brenna@brennathorell.com
2	LEE BROWN	DOWNIEVILLE FIRE/CHIEF	530-289-3333	DVLFIRE73@YAHOO.COM
3	PHIL CAMMACK	RESIDENT	" 862-1511	PHILCAMMACK@ATT.NET
4	Lou Foxworthy	Resident	530 289 3341	JIM58-1999@YAHOO.C
5				
6				
7				
8				
9				
10				

SIERRA COUNTY
Office of Emergency Services
P.O. Box 530
Downieville, California 95936
(530)289-3251 FAX (530) 289-2828

Tim H. Beals
Director

June 7, 2012

Notice and Agenda for
Operational Area Emergency Council Meeting

TO: Operational Area Emergency Council and Interested Parties

FR: Lee Brown, OES Coordinator

Please be advised that a meeting of the Operational Area Emergency Council will be conducted on **Wednesday, June 13, 2012** commencing at **10:00 a.m.** at the **Carl Scholberg Conference Room at the USFS Ranger Station in Sierraville, California.**

AGENDA

1. Call to Order, Introductions And Announcements
2. State Activity Report – State of California Office of Emergency Services
3. Grants Status
   - Review on Homeland Security Grants (FY08 through FY12)
   - Review and Affirm FY 11 and 12 Homeland Security Grant Expenditure Recommendations
   - Hazard Mitigation Plan
   - Emergency Management Performance Grant
4. Hazardous Materials Area Plan – Elizabeth Morgan
5. Discussion on radio issues including potential county policy for use of county radios by other agencies and interoperability
6. Discussion on implementation of Oregon Peak Repeater Project
7. Discussion on 211 Information Line
8. Reports and Open Discussion
9. Schedule Next Meeting
10. Adjourn

Appendix C: Acronyms

BOS	Board of Supervisors
Cal EMA	California Emergency Management Agency
CAO	County Administrative Officer
CVP	Central Valley Project
DMA	Disaster Mitigation Act
DWR	Department of Water Resources
EOP	Emergency Operations Plan
FEMA	Federal Emergency Mitigation Agency
GIS	Geographic Informative System
HOA	Home Owner's Association
LHMP	Local Hazard Mitigation Plan
MB	Body – Wave Magnitude
MD	Duration Magnitude
ML	Local Magnitude
MS	Surface – Wave Magnitude
MW	Moment Magnitude
NCDC	National Climatic Data Center
NFIP	National Flood Insurance Program
NIDIS	National Integrated Drought Information System
NOAA	National Oceanic and Atmospheric Administration
NWS	National Weather Service
OA	Operational Area
OES	Office of Emergency Services
PDSI	Palmer Drought Severity Index
SHELDUS	Spatial Hazard Events and Losses Database for the U.S.
SWP	State Water Project
UBC	Uniformed Building Code
USDM	U.S. Drought Monitor
USGS	U.S. Geological Survey
USSDO	U.S. Seasonal Drought Outlook