

Multi-Hazard Mitigation Plan (MHMP)

2013 Update

Plumas County, CA

HMP Planning Committee Meeting #2

February 8, 2013





Agenda

10:00 am –
11:00 am

Part I

- **Welcome and Introductions**
- **Brief Project Overview**
- **Overview of Existing Hazards**
- **Question and Answer Session**

5 Min Break

11:00 am –
12:00 pm

Part II

- **Complete a hazard Risk Factor Matrix**
- **Establish priority and focus resources**
- **Establish, refine and edit the Goals and Objectives**
- **Next Steps and Wrap Up**



Part I

- **Welcome and Introductions**
- **Brief Project Overview**
- **Overview of Existing Hazard**
- **Question and Answer Session**



Welcome and Introductions

Plumas County Department of Health and Office Emergency Services

County Project Manager
County Outreach
MHMP Planning Committee

Jerry Sipe, OES Director
Lori Pini, Public Health
Joint Plumas County Staff

Michael Baker Jr., Inc.

Project Manager
Hazard Mitigation Senior Planner
Hazard Mitigation Planner
Hazard Mitigation QA/QC
Public Outreach Specialist
GIS /Hazus Specialist
Senior Technical Advisor

Ethan Mobley, AICP
Jason Farrell, CFM
Desirea Hoffman
Wynne Kwan, AICP
Jack Eldridge
Nate Mirin, GISP
Carver Struve, CFM



Project Overview

- **What is Hazard Mitigation?**

Hazard mitigation is any sustained action taken to reduce or eliminate long-term risk to life and property resulting from natural hazards.

- **What is a Mitigation Plan?**

The plan is an official statement of Plumas County's hazards, vulnerability analysis, and mitigation strategy. The result of a collaborative multi-agency and county citizen planning process. As a living document, it guides implementation activities to achieve the greatest reduction of vulnerability, which results in saved lives, reduced injuries, reduced property damages, and protection for the environment.

- **Why have a Mitigation Plan?**

To ensure public consensus through a planning process on mitigation actions that best suit the community. Allows communities to focus efforts and limited resources on the most highly desirable mitigation projects. Plumas County also must have a State and federally approved plan to apply for and receive mitigation grants. These grants can augment local mitigation activities already done and planned activities too. Ultimately, these actions reduce vulnerability and communities are able to recover more quickly from disasters.



Project Overview

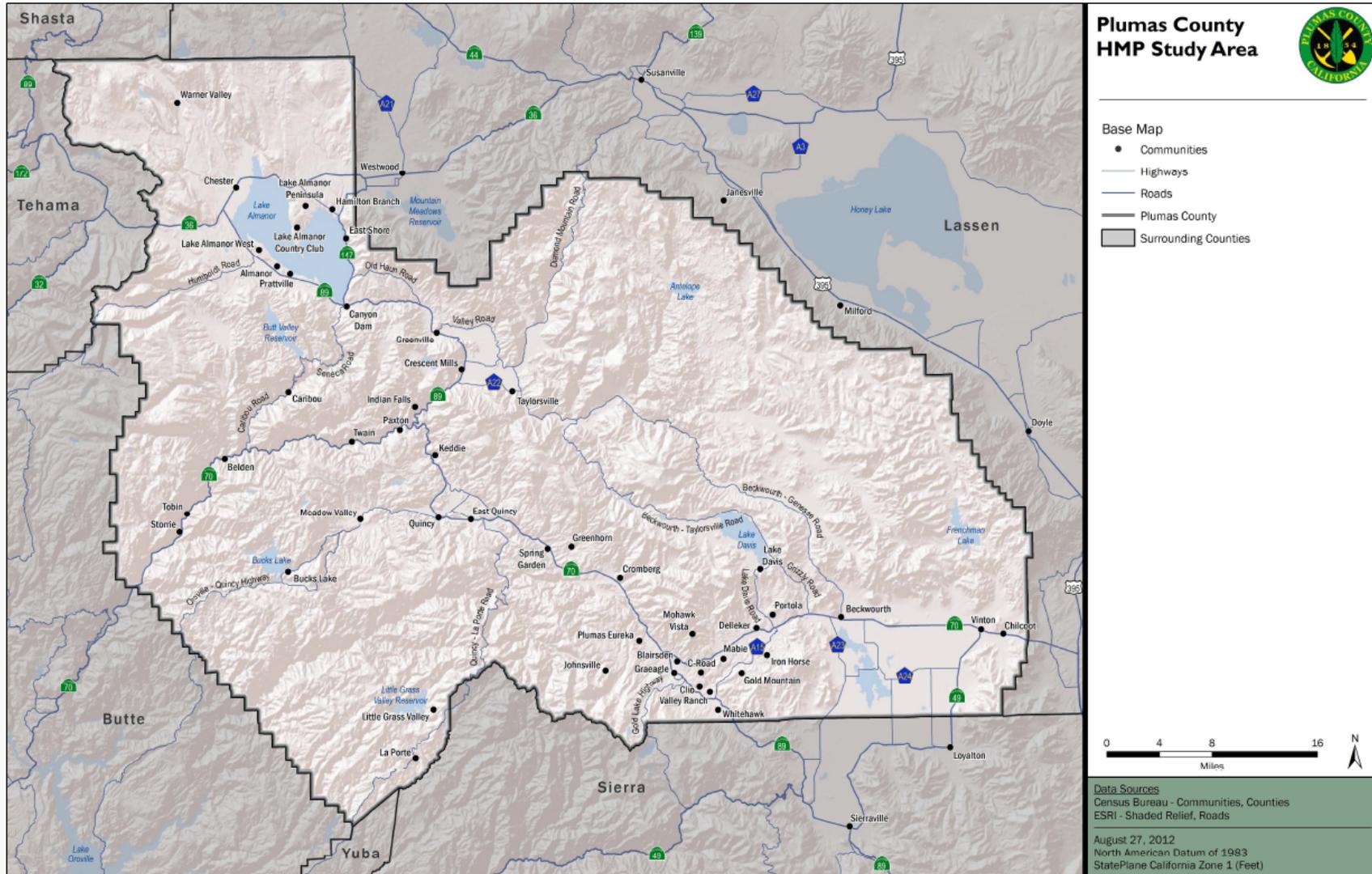
Background

- Disaster Mitigation Act (DMA) 2000 (Public Law 106-390) provides the legal basis for FEMA mitigation planning requirements for State, local and Indian Tribal governments as a condition of mitigation grant assistance.
- Plumas County developed the 2006 Hazard Mitigation Plan (HMP).
- FEMA requires an update every 5 years.
- Plumas County receives Disaster Recovery Initiative (DRI) grant funding, which was made available after Statewide fires in 2008.
- DRI grant funding in Plumas County was awarded / allocated for Public Improvements and Planning.
- Under the DRI planning element, the 2012 MHMP Update is to address hazard mitigation planning in unincorporated areas of Plumas County. The updated plan will address new concerns, and rework goals, objectives and mitigation actions.



Project Overview

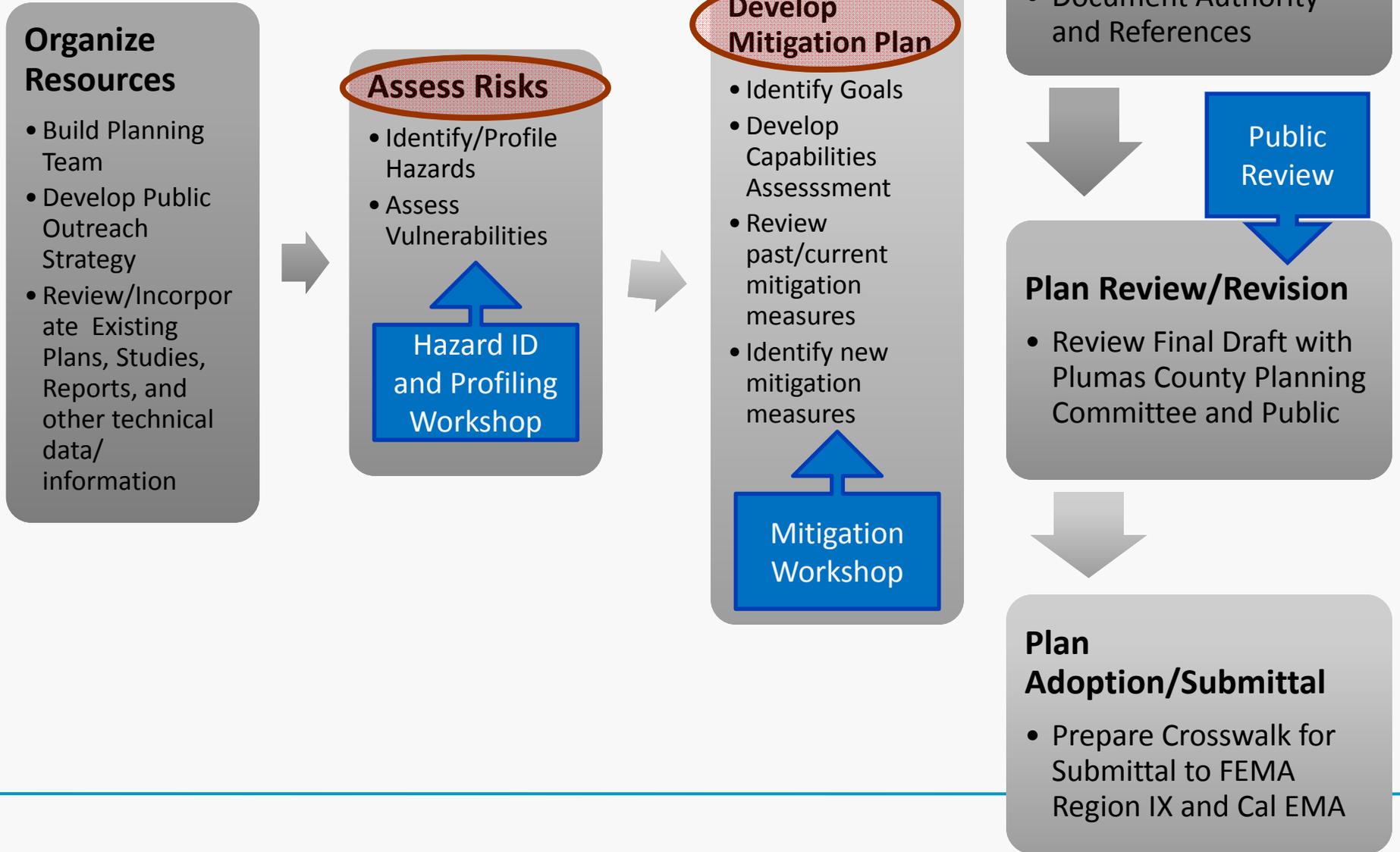
Planning Area





MHP Process and Components

Planning Process





Existing HMP Overview

Hazards and Participants

- Possible Hazards Identified in 2006 PCHMP:
 1. Flooding
 2. Winter Storms
 3. Wildfire
 4. Drought
 - ~~5. Hazardous Materials~~
 6. Dam Failure
 7. Earthquake
 - ~~8. Terrorism~~



MHP Process and Components

Step 2: Identify / Profile the Hazard 2013



-Wildfire



-Drought



-Flooding



-Dam Failure



-Geologic Hazards



-Climate Change



-Severe Weather

Identify/Profile Hazards:

Description

Regulatory Environment

Previous Occurrences

Location/ Geographic Extent

Magnitude/Severity

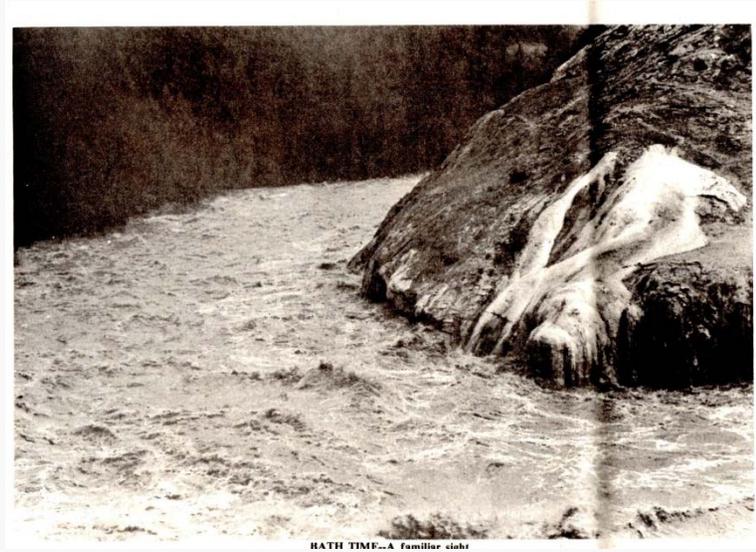
Probability of Future Occurrences



MHMP Update

Step 2: Assess Risk

- County-specific Hazard Data Development
- Develop Population Profiles / Data
- Develop Critical Infrastructure Inventory / Summarize Vulnerable Assets
- Develop Risk Factor for Profiled Hazards
- Estimate Losses
 - Possible Hazus Loss Estimation
 - GIS layering technique for other hazards
- Assess Vulnerabilities



BATH TIME--A Familiar sight





MHP Process and Components

Identify / Profile the Hazard

- Declared Events in Plumas County
- Covers 1950 to Present

Data Sources:

FEMA:

Plumas County Disaster History

CAL EMA:

Emergency & Disaster Proclamations and Executive Orders

Federal Declarations and State Proclamations							
Disaster Name	Disaster Type	Disaster Cause	Disaster#	Year	Deaths	Injuries	Cost of Damage*
Mid-Year Fires	Fire	Fire	EM-3287	2008			N/A
Winter Storms	Flood	Storms	DR-1628	2005- 06			\$ 128,964,501
August Fires	Fire	Fire	EM-3140	1999			\$ 1,154,573
January Floods	Flood	Storms	DR-1155	1997	8		\$ 194,352,509
Torrential Winds and Rain	Flood	Storms	GP96-01	1996			N/A
Severe Winter Storms	Flood	Storms	DR-1044	1995	11		\$ 221,948,347
Late Winter Storms	Flood	Storms	DR-979	1992	20	10	\$ 226,018,111
Wildland Fires	Fire	Fire	GP	1987	3	76	\$ 18,000,000
Storms	Flood	Storms	DR-758	1986	13	67	\$ 407,538,904
April Storms	Flood	Storms	80-01 -80-25	1980			N/A
Northern California Flooding	Flood	Flood	DR-283	1970			\$ 27,657,478
Storms	Flood	Storms	DR-253	1969			N/A
Late Winter Storms	Flood	Storms	DR-183	1964			\$ 213,149,000
Floods and Rains	Flood	Storms	N/A	1963			N/A
Widespread Fires	Fire	Fire	N/A	1960			\$ 3,075,000

**Note: Emergency & Disaster Proclamations cost of damage is for total event. Event may be spread over multiple jurisdictions.*



Flood Hazards

- Description*
- Regulatory Environment*
- Previous Occurrences*
- Location/Extent*
- Magnitude/Severity*
- Probability of Future Occurrences*



Flood Hazards

Description



- Riverine and Valley Floor Flooding
- 99% Feather River Watershed
- Starts with very little velocity and slope in upper watershed, flooding issues compound lower elevation valleys.
- Primary Areas Discussed in Flood hazard Profile
 - Sierra Valley
 - Chester
 - Indian Valley
 - American Valley
 - North Fork Feather River



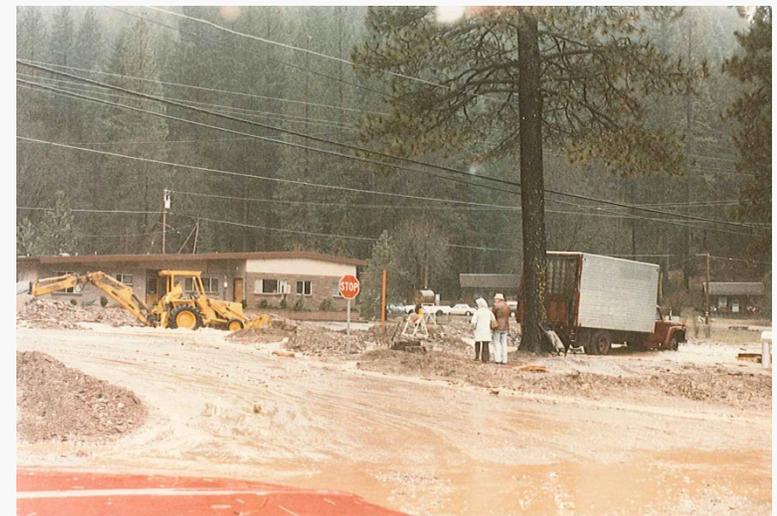
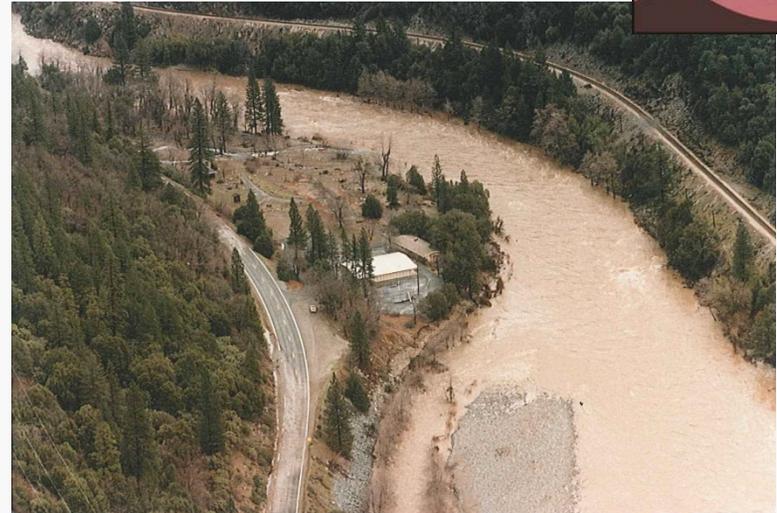


Flood Hazards

Previous Occurrences



- Major Disaster Declarations at the Federal level have occurred 9 times in Plumas County
- State Emergency Disaster Proclamations for flood damage as result of severe storms and heavy rains have been declared 10 times from 1950 to present.
- A total of 11 flood events have received a Federal or State disaster declaration.
- Events of Significant Impact: 1986 and 1997





Flood Hazards

Previous Occurrences



Figure 5-6: 1893 flooding in Quincy taken from the old Courthouse roof looking north.



Flood Hazards

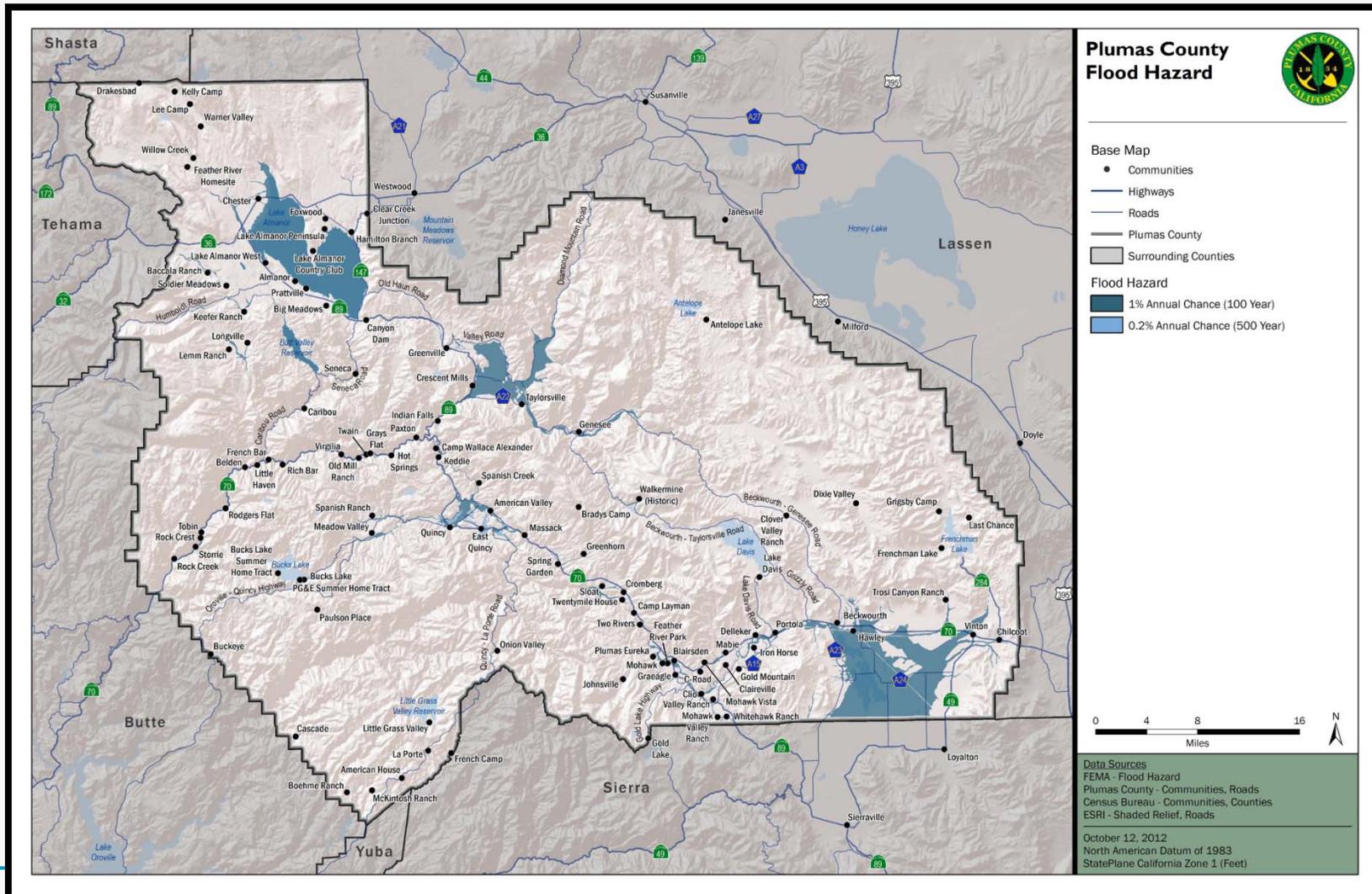
Previous Occurrences





Flood Hazards

Location and Geographic Extent





Flood Hazards

The Problem



- Valley Flooding
 - Repetitive Loss Areas in Indian Valley
 - Critical Infrastructure in American Valley (One School, and One Hospital as Risk)
 - Residual Risk beyond Identified FEMA Floodplains.
- Stream channelization and bank erosion
- Drainage Maintenance
- Critical Infrastructure Crossings





Flood Hazards

Sierra Valley

Chester / Lake Almanor

Indian Valley

American Valley

Feather River Canyon



Flood Hazards

Sierra Valley

- The Sierra Valley is a large intermountain valley on the eastern edge of Plumas County.
- 120,000 acres and is primarily located in Plumas County, but also extends southward into Sierra County.
- Average elevation of 4,850 feet and serves as the headwaters for the Middle Fork Feather River.
- The Sierra Valley has minimal topographic relief and flooding is generally shallow and low velocity.
- During large storms, such as those in 1986 and 1997, the entire valley will fill with several feet of water





Flood Hazards

Sierra Valley



- **Dyson Lane**
 - **Sheet flow issues across road,**
 - **shallow flooding, flooded with whole valley in 1992,**
 - **1/10 mile low spot across valley drainage area**
 - **Serves local population and as a bypass.**





Flood Hazards

Sierra Valley

- **Marble Hot Springs Road –**
 - **floods every year due to rain and irrigation,**
 - **closed in winter due to snow,**
 - **0.7 mile section has repeated flooding,**
 - **historic bridge needs upgrade. Designated evacuation route.**
 - **Culverts have been damaged and clogged**





Flood Hazards

Sierra Valley

- Rocky Point Road (Old Highway 70)
 - Experiences shoulder and bank erosion and repeated flooding
 - Will flood nearly up to road centerline during major events
 - One or two homes have been damaged





Flood Hazards

Sierra Valley

- Harriet Lane
 - Sheet flow across roadway consistent issue
 - repeated flooding around Island Ranch area.
 - Road has sub-layer integrity issues,
 - Contains clay road base,
 - Road requires constant repair.
 - Major corridor for Hay transportation to Loyalton





Flood Hazards

Chester / Lake Almanor

- Lake Almanor is a higher elevation alpine lake located at 4,505 feet in the northwestern portion of Plumas County.
- Chester is the largest community of several that surround the lake and is located at the inlet of the North Fork Feather River. The outflow of the North Fork Feather River is controlled by Canyon Dam at the southern edge of the lake.
- Flooding issues in this region are minimal due to the construction of the Chester Flood Control Channel. The diversion channel allows river water to enter once it reaches a certain height and directs it around Chester into Lake Almanor.
- The bypass also has a secondary set-back levee system outside of the channel for extreme flooding events.





Flood Hazards

Indian Valley

- Indian Valley is a medium sized valley located in the north-central portion of Plumas County at an average elevation of 3,500 feet. It contains several developed communities and is also utilized for farming. Indian Valley is the meeting place of four creeks: Wolf Creek, Cooks Creek, Lights Creek, and Indian Creek. Indian Creek is the dominant stream reach as the other three creeks confluence with it, and then exits the valley past Arlington Bridge.
- Indian Valley exhibits a number of flooding issues due to its flat topography and hydrography. Much of the water that flows through the Upper Feather River watershed makes its way through Indian Valley on its journey into the Feather River Canyon.
- Infrastructure Washout Hazard
- Residential structure flooded repeatedly





Flood Hazards

Indian Valley

- Hough Creek.
 - Sedimentation Issues
 - Floodwaters and gravel deposits made there way into homes south of Arlington Rd.
 - Improvements made after localized flooding occurred during 1986 and 1997
 - Made improvements to banks, wing walls at box culvert.
 - Removed sedimentation on upper and lower reaches of Hough Creek
 - Maintenance will need to be on-going to prevent similar flood occurrences.





Flood Hazards

Indian Valley

- Indian Creek.
 - Drains entire Genesse Valley
 - Choke points near tributary confluences.
 - Historic flooding issues, however, natural stream meandering common occurrence in slity deposits on valley floor.
 - Watch where you build your home! Creeks are a nice sounding but can cause homes to float away.
 - FEMA floodplain mapping has not been conducted in the area. The 100 YR- Zone was probably near the property.





Flood Hazards

Indian Valley

- **Valley Floor Infrastructure.**
 - **Series roads and bridges on the Indian Valley floor have seen flood hazards .**
 - **Arlington Bridge and Hough Bridge provide access to Diamond Mountain Road and Taylorsville.**
 - **Stampfli Lane in low lying portion of Indian Valley. Two bridges on Stampfli have similar flow through capacity issues.**
 - **Nelson Bridge, stream meandering**
 - **Hough Bridge, channelized stream**
 - **Arlington Bridge is the last bridge crossing before valley outlet. Floodwaters back up at this location and flood valley floor.**





Flood Hazards

American Valley

- American Valley is located in the geographic center of Plumas County and sits at an average elevation of 3,500 feet.
- Greenhorn Creek confluences with Spanish Creek upstream of Quincy. A majority of the flooding issues are caused by localized drainage as opposed to valley-flooding events.
- The water in Spanish Creek that passes through American Valley confluences with Indian Creek flowing out of Indian Valley into the Feather River Canyon.





Flood Hazards

American Valley

- **Henchels (change Name)**
 - **Grate at edge of property needs to be more accessible and much safer.**
 - **Experiences repeated flooding**
 - **Floods school and adjacent buildings**
 - **Floodwaters continue across downtown area and affect other structures**

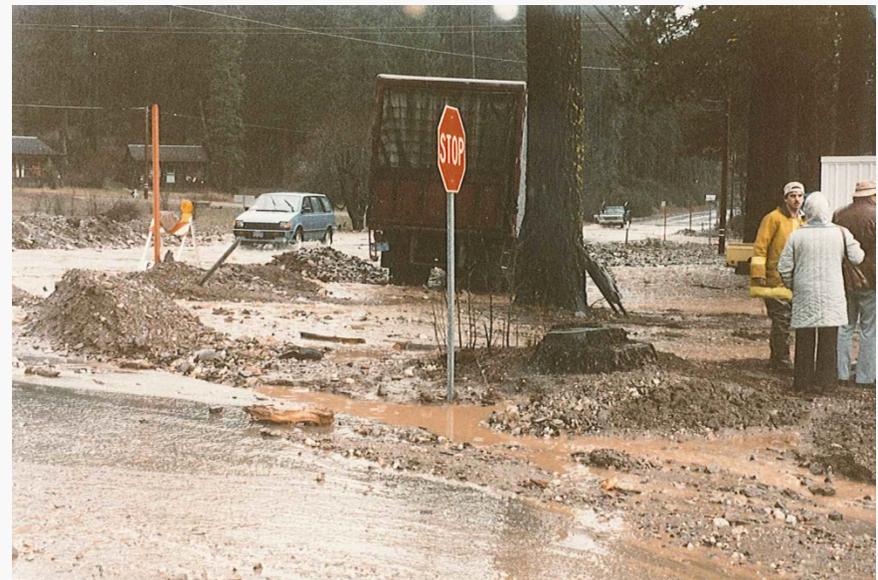
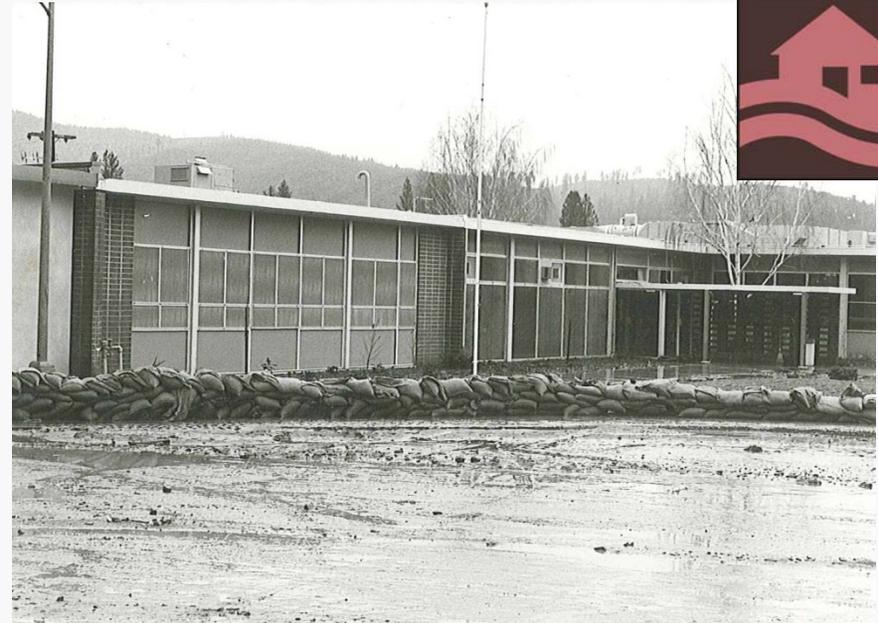




Flood Hazards

American Valley

- Gansner Creek
 - Stream bank overtopping floods hospital
 - Drainage culverts may not be sized large enough to handle higher flows
 - Plumas District hospital complex at risk to flooding.





Flood Hazards

American Valley



■ Les Schawb

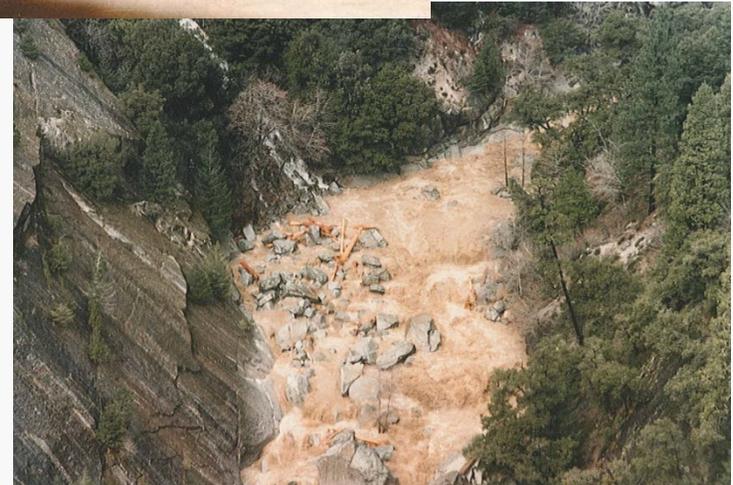
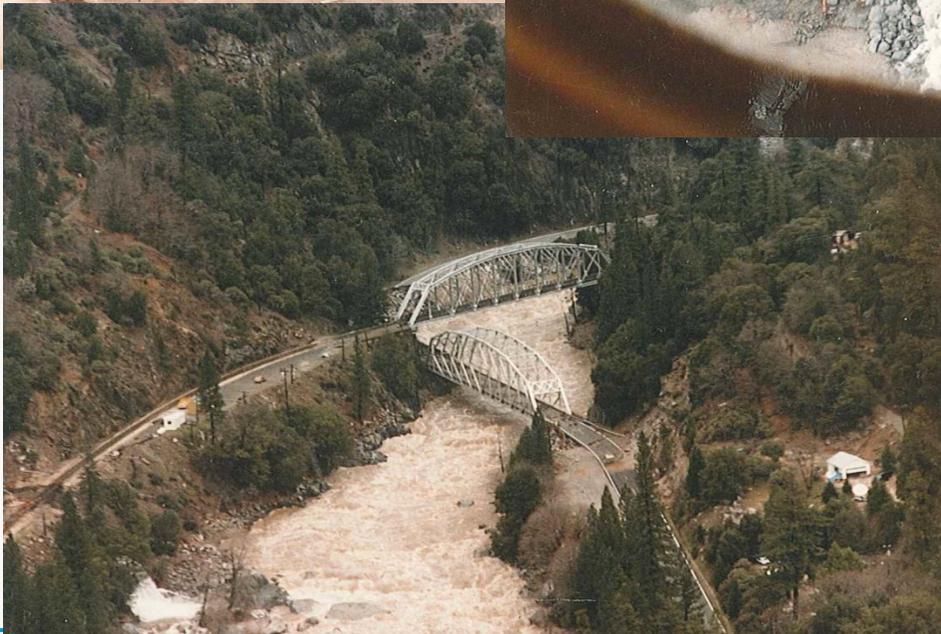
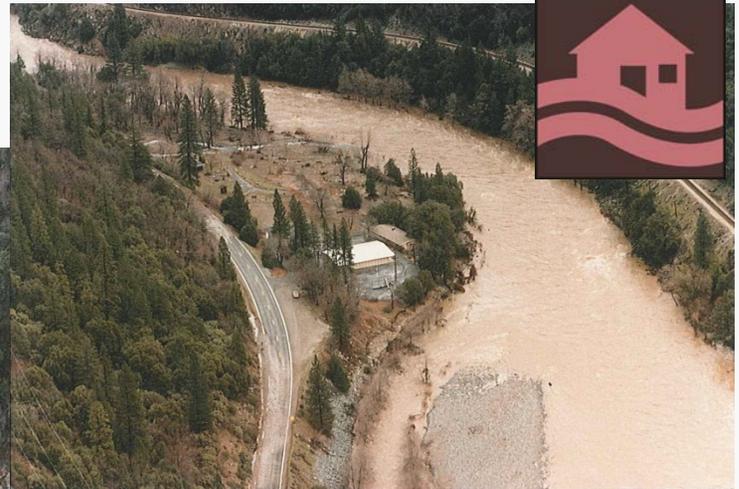
- Drainage ditch behind old Les Schawb has vegetation overgrowth.
- Problem with transition from creek to underground piping.
- The ditch should be cleared of debris and the grate on the pipe needs to be modified to allow better/safer access.
- Flooding has occurred multiple times in shopping center.
- Pipe was relined in 2000





Flood Hazards Feather River Canyon

- Need we say more???





Wildfire Hazard

- ✓ ***Description***
- ✓ ***Regulatory Environment***
- ✓ ***Previous Occurrences***
- ✓ ***Location/Extent***
- ✓ ***Magnitude/Severity***
- ✓ ***Probability of Future Occurrences***



Fire Hazards

Description

- **Wildland fires affect grass, forest, and brushlands, as well as any structures located within them.**
- **Where there is human access to wildland areas, such as large extents of forest land, the risk of fire increases due to a greater chance for human carelessness and historical forest management practices.**
- **With exception to a few low lying meadow valleys such as the Sierra, American, and Indian Valleys, wildfire danger is a predominate feature across the mountainous and fuel rich areas of Plumas County.**

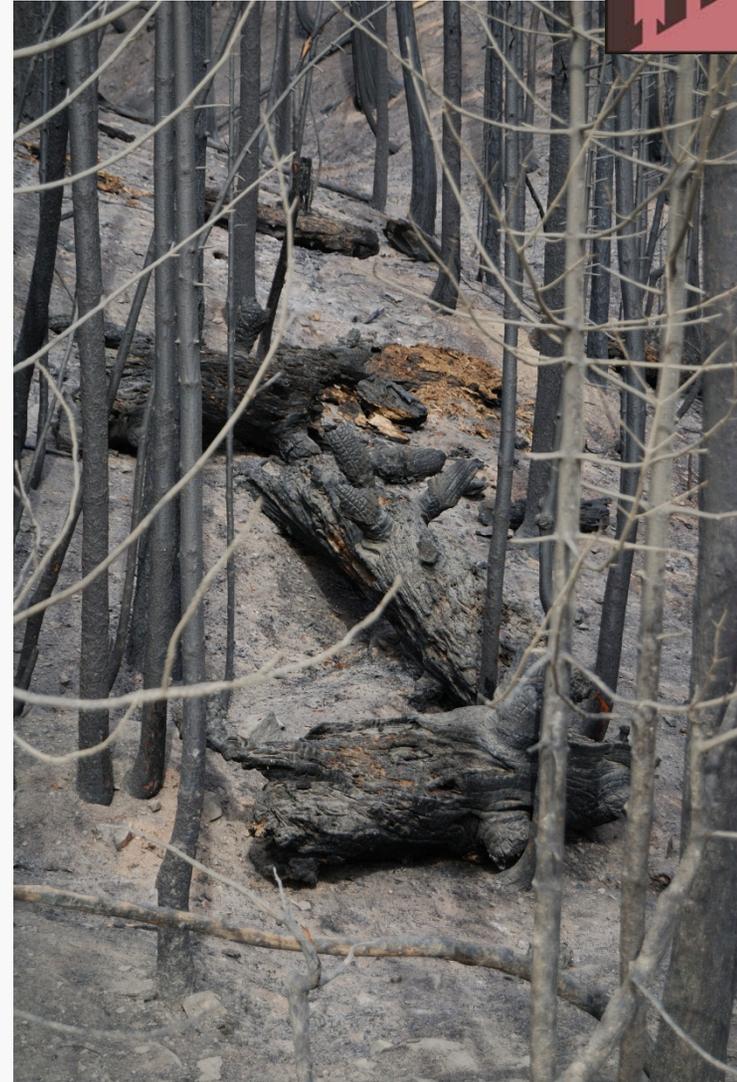




Wildfire Hazards

Previous Occurrences

- In Plumas County there are approximately 170 ignitions per year, with over half being caused by lightning.
- Since 1900, 340 significant wildland fire events, 11 had a perimeter greater than 10,000 acres
- The majority of fires, 87%, occur from May through September.
- Major Disaster Declarations at the Federal level have occurred 4 times in Plumas County.
- Events of Significant Impact: Chips, Moonlight, Storrie.....and many more.



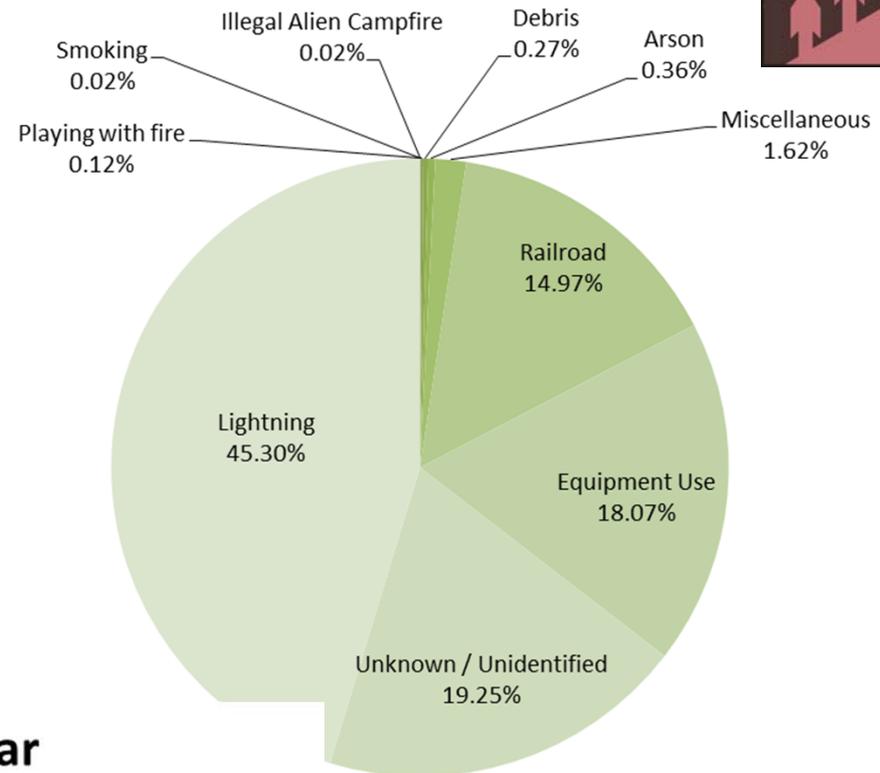


Wildfire

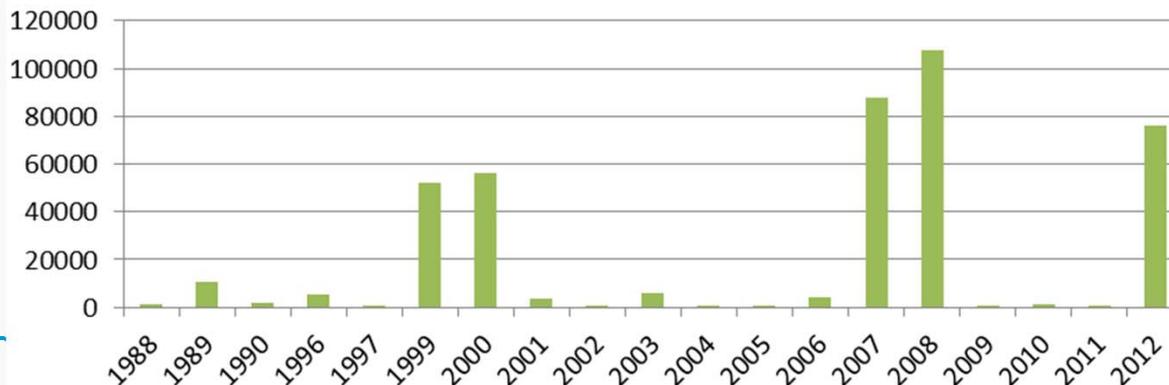
Previous Occurrences

- 2008 worst year on record over a 25 year period. 14 fires totaling more than 100,000 acres
- Largest causes of acres burned is Lighting, Unidentified Cause, Equipment Use, and Railroad Related.

% of Acres Burned by Ignition Cause



Total Acres Burnt by Year





Fire Hazards

Regulatory Environment



- **Federal and State and Local Response Authority**
 - USFS
 - Cal Fire
 - Local Responsibility Area
- **Plumas County Codes**
 - Parts 5 and 6 of the Health and Safety Code address abatement of hazardous weeds and rubbish for the prevention of fires.
 - Part 2 of the Public Resources Code addresses the protection of forest, range and forage lands.
 - (State adopted) Section 4290; implements fire safety standards related to defensible space
 - (State adopted) Section 4291; outlines the requirements for maintaining adjacent landscapes near structures



Fire Hazards

Regulatory Environment



- **Sec 8-14.01 – 8-14.03 Plumas County, California, Code of Ordinances; Title 8 – Building Regulations**
 - **Disposal of flammable vegetation and fuels**
 - **Driveways and egress**
 - **Signage**
- **Local Community Codes.**
 - **Plumas Eureka Community Services District**
 - **Greenhorn Community Services District**
 - **Covenants, Conditions and Restrictions of West Almanor Community Club**



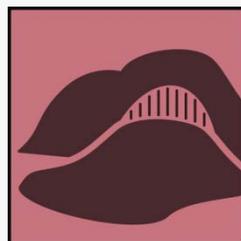
Wildfire Hazards

The Problem



- Regulatory Environment for LRAs
- Local Enforcement / Mitigation Activities
- Access / Egress to Communities
- LE 100 Certified Enforcement Officers
- Funding
 - Mostly all Volunteer Fire Departments
 - Code Enforcement Staff
- Coordinating Hazard Mitigation Activities with other efforts, PCFSC, USFS, CAL FIRE and PG&E.
- Railroad and Equipment Use in high hazard areas?





Geological Hazard

- ✓ ***Description***
- ✓ ***Regulatory Environment***
- ✓ ***Previous Occurrences***
- ✓ ***Location/Extent***
- ✓ ***Magnitude/Severity***
- ✓ ***Probability of Future Occurrences***



Geologic Hazards

Description



- **Earthquake-** refers to the vibration of the Earth's surface caused by movement along a fault, by a volcanic eruption, or even by manmade explosions. The vibration can be violent and cause widespread damage and injury, or may be barely felt.
- **Most destructive earthquakes** are caused by movements along faults.
- **Slope Failure -** A landslide is the movement of soil, rock, or other earth materials, downhill in response to gravity. Landslides include rock falls and topples, debris flows and avalanches, earthflows, mudflows, creep, and lateral spread of rock or soil.
- **Slope failure can be activated by seismic activity and or precipitation**





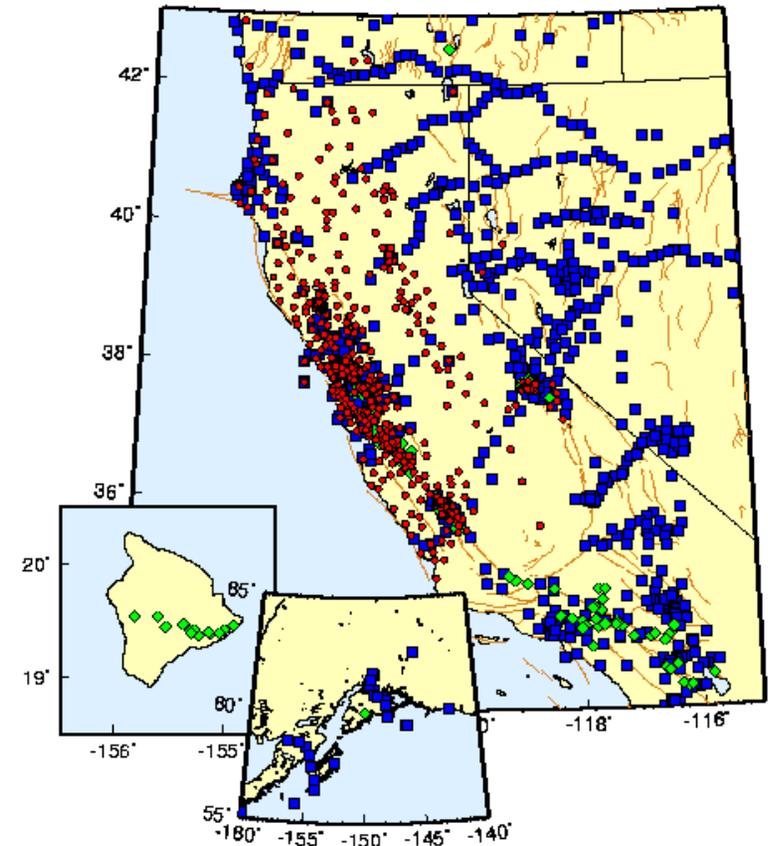
Geological Hazards

Previous Occurrences



- 10 Earthquakes > Magnitude 5 in last 140 Years.
- 2 Active Faults within or near Plumas County
 - Fort Sage Fault (Near Honey Lake)
 - Indian Valley Fault

Year	Magnitude	Closest Community	Distance from Community (Miles)
1875	5.8	Antelope Lake	4.0
1885	5.7	Antelope Lake	16.1
1888	5.9	Gold Lake	2.2
1889	5.9	Clear Creek Junction	24.0
1948	6	Chilcoot	17.4
1950	5.5	Drakesbad	3.5
1950	5.6	Last Chance	11.4
1959	5.6	Vinton	5.9
1979	5.2	Last Chance	7.4
2001	5.2	Two Rivers	1.2

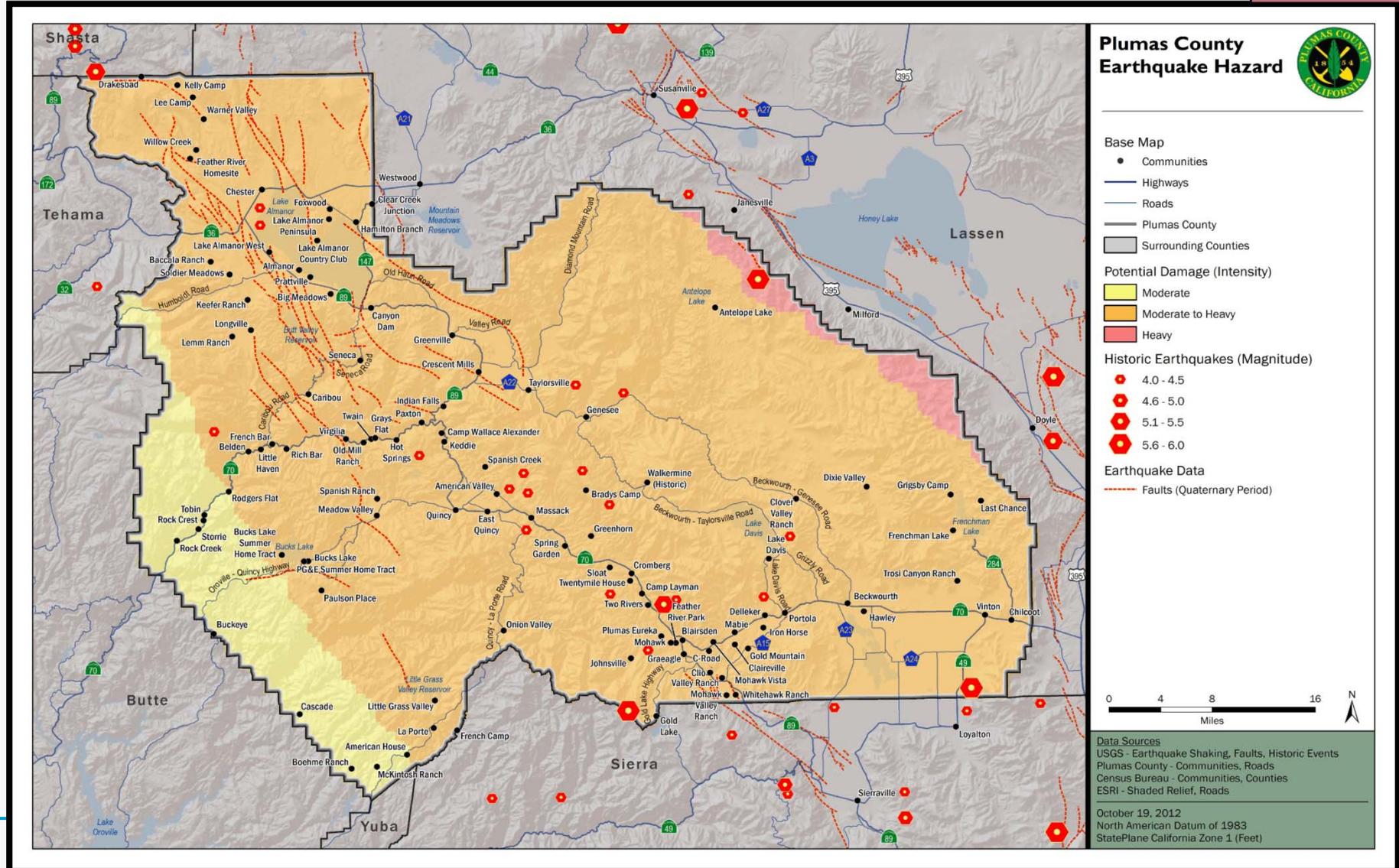
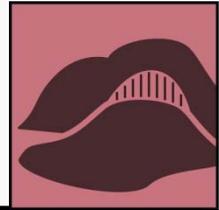


Red circles are [seismic sites](#); blue squares are [GPS sites \(both continuous and campaign\)](#)



Geological Hazards

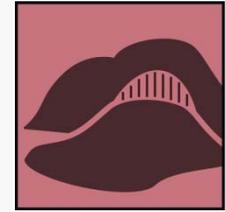
Location and Geographic Extent



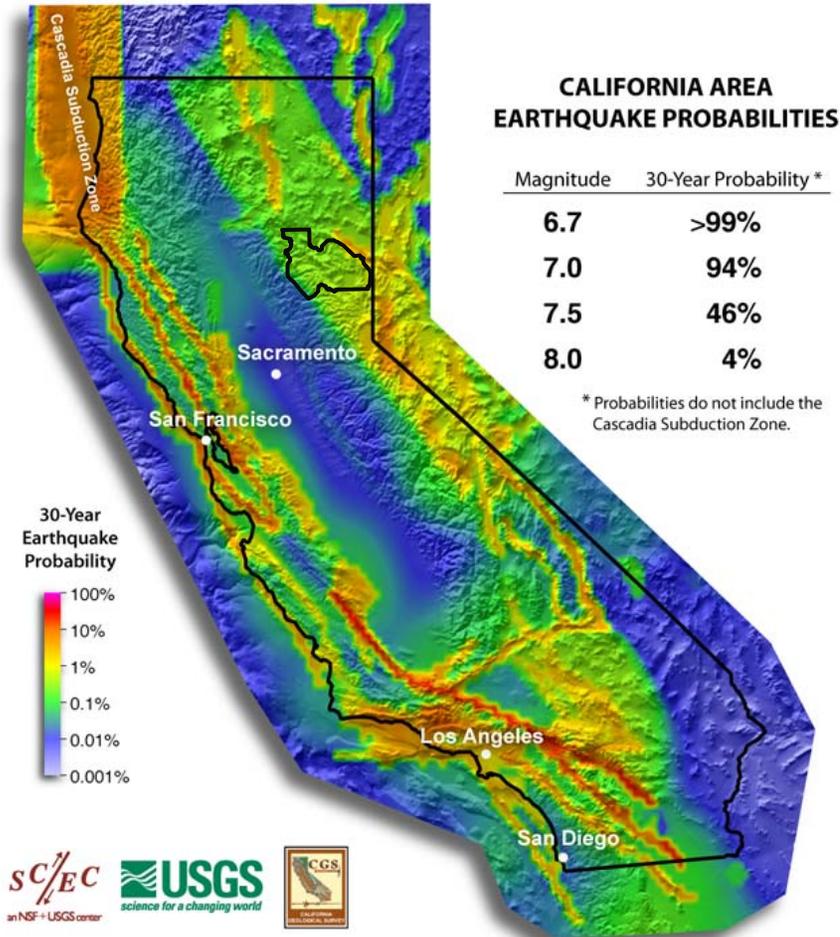


Geological Hazards

Probability of Future Occurrences



- According to the new forecast, California has a 99.7% chance of having a magnitude 6.7 or larger earthquake during the next 30 years. The likelihood of an even more powerful quake of magnitude 7.5 or greater in the next 30 years is 46%. Such a quake is more likely to occur in the southern half of the state (37% chance in 30 years) than in the northern half (15% chance in 30 years).
- Most of Plumas county has a .1 % -1% chance of having a earthquake greater than 6.7 Magnitude over the next 30 Years.





Geological Hazards

Previous Occurrences



Landslide and Rock Falls

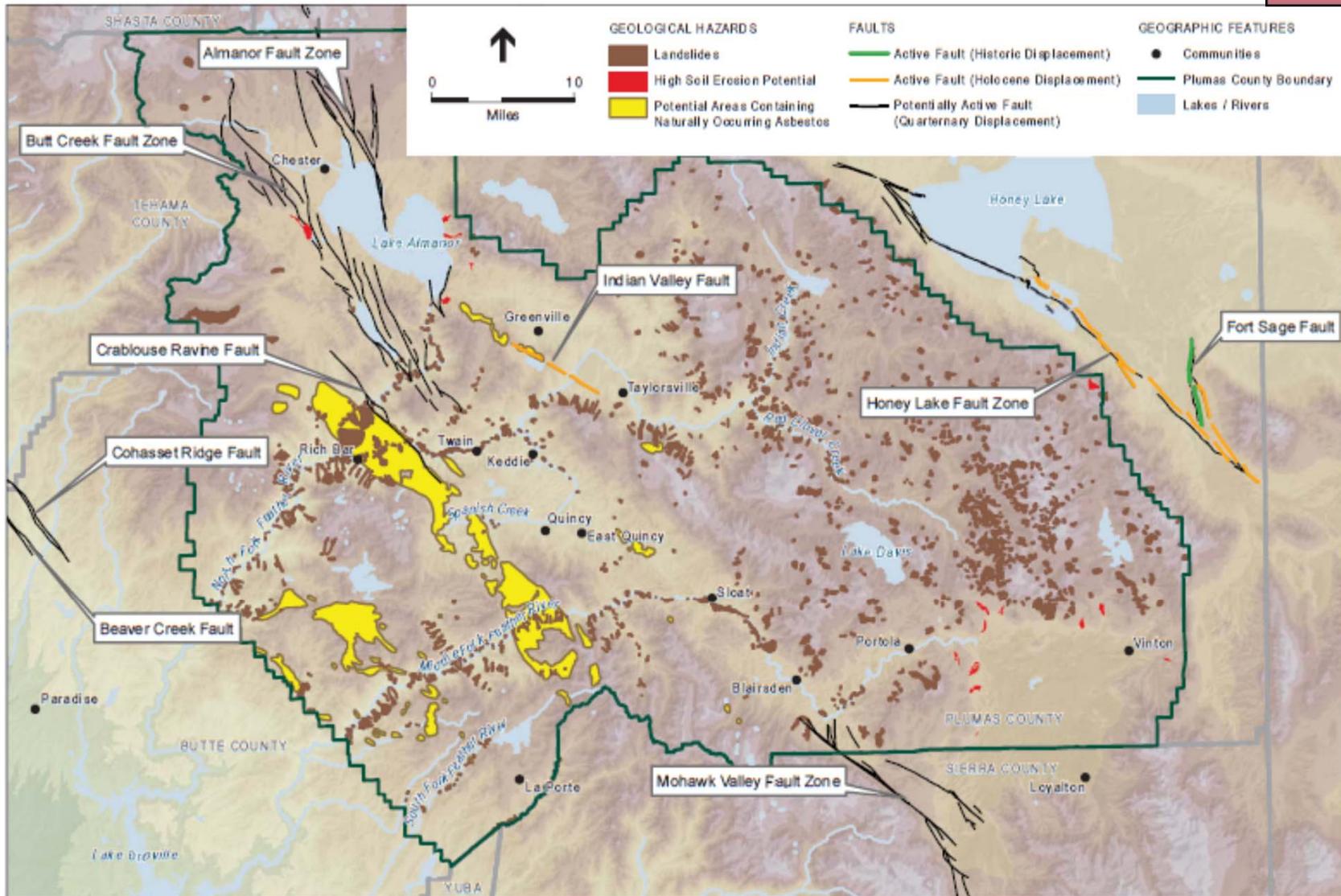
Year	Type	Damage	Injury or Death	Area
2006	Rockslide	State Route 70	No	1.5 miles west of Pulga
2007	Rock Fall	Rail Cars and Environment	No	MP 251 on State Highway 70, between Tobin and Rock Creek
2007	Rock Fall	Rail Cars and Environment	No	Storrie Resort on the Feather River
2009	Rock Slide	State Route 70	Yes	Rich Bar
2010	Landslide	USFS Road (Scales Road)	No	Scales Road
2010	Rockslide	State Route 70	No	Between Greenville Wye and Elephant Butte Tunnel
2012	Avalanche	Timber Loss	No	Sloat
2013	Rock Fall	BNSF Locomotive damage	No	Between Rich Bar and Twain on the Feather River
Present	Slope Erosion	To Co Hwy A14	No	Johnsville





Geological Hazards

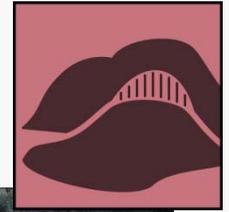
Location and Geographic Extent





Geological Hazards

The Problem



- Unknown location of hazard
- Hazard is spread across entire county
- Compounded Hazard Risk
 - Landslides can be activated by seismic activity
 - Wildfire can cause higher risk of landslides, mudslides and or debris flows.
- Transportation Infrastructure at Risk
 - Highway 70
 - Rail Road
- Human development can exacerbate speed of erosion





Severe Weather

- ✓ ***Description***
- ✓ ***Regulatory Environment***
- ✓ ***Previous Occurrences***
- ✓ ***Location/Extent***
- ✓ ***Magnitude/Severity***
- ✓ ***Probability of Future Occurrences***



Severe Weather Hazard *Description*

- Severe weather can be defined as any destructive weather event that has the potential to damage property or cause loss of life.
- Severe summer weather usually occurs as localized storms that bring heavy rain, lightning, strong winds, and microbursts.
- A severe winter storm in Plumas County would typically result in heavy snowfall or hail.
- Divided into two subsections:
 - Summer
 - Winter



2002

Special News Supplement

Bulletin, Progressive, Record, Reporter

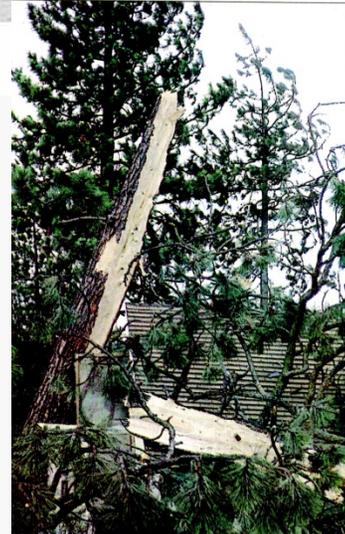


Photo by Victoria Metcalf

A pine was split in two as it hit the corner of an East Auburn house.



Photo by Kevin Mallory

The utility room of the Lariat Lodge was knocked out when this tree hit. Losing the "brains" of the motel forced its closure.



Photo by Kevin Mallory

The shallow root system of this tree on South Street would stand about 200 feet from the street.

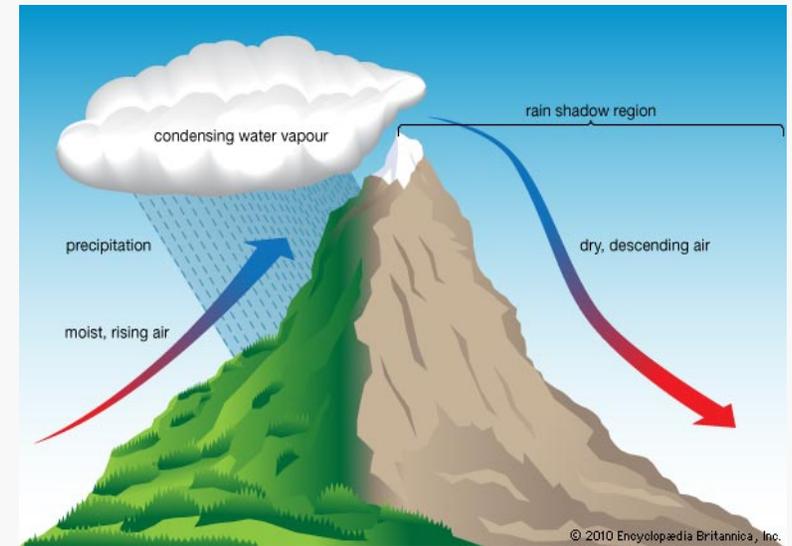


Severe Weather Hazard

Previous Occurrences



- Since 1964, nine federally or state declared severe weather events have occurred in Plumas County
- According to FEMA Declarations and Cal EMA Emergency and Disaster Proclamations (November 1964 to present), these events include: severe winter and summer storms causing.. flooding, landslides, and heavy rain.
- Important to understand perception and orographic lift to understand severe storms and weather patterns in Sierras and Plumas County.
- According to National Climatic Data Center (NCDC) i.e. Weather Watchers in Plumas County has six documented extreme individual events recorded since 2006. Extreme Hail, wind etc...





Severe Storms

Documented Occurrences

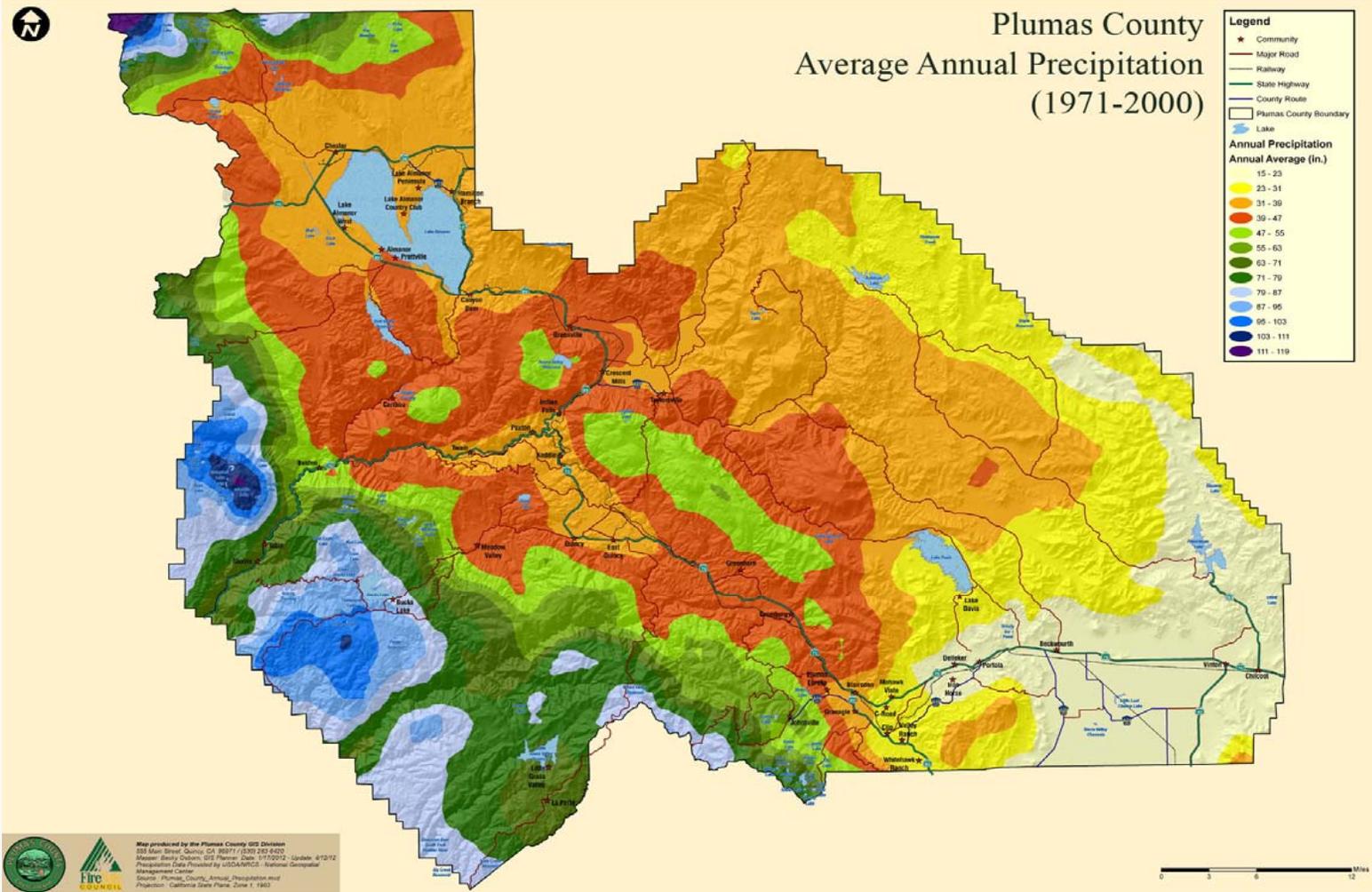


Past Disasters in Plumas County							
Disaster Number	Declaration Date	Disaster Type	Incident Type	Explanation	Deaths	Injuries	Cost*
Federal and State Declarations							
183	12/24/1964	DR	Severe Storm(s)	HEAVY RAINS & FLOODING			\$213,149,000
253	1/26/1969	DR	Severe Storm(s)	SEVERE STORMS & FLOODING			Unknown
283	2/16/1970	DR	Severe Storm(s)	SEVERE STORMS & FLOODING			
758	2/21/1986	DR	Severe Storm(s)	SEVERE STORMS & FLOODING	13	67	\$407,538,904
979	2/3/1993	DR	Severe Storm(s)	SEVERE WINTER STORM, MUD & LAND SLIDES, & FLOODING	20	10	\$226,018,111
1044	1/10/1995	DR	Severe Storm(s)	SEVERE WINTER STORMS, FLOODING, LANDSLIDES, MUD FLOWS	11		\$221,948,347
1046	3/12/1995	DR	Severe Storm(s)	SEVERE WINTER STORMS, FLOODING LANDSLIDES, MUD FLOW			Unknown
1155	1/4/1997	DR	Severe Storm(s)	SEVERE STORMS, FLOODING, MUD AND LANDSLIDES	8		\$194,352,509
1628	2/3/2006	DR	Severe Storm(s)	SEVERE STORMS, FLOODING, MUDSLIDES, AND LANDSLIDES			\$128,964,501



Severe Weather Hazard

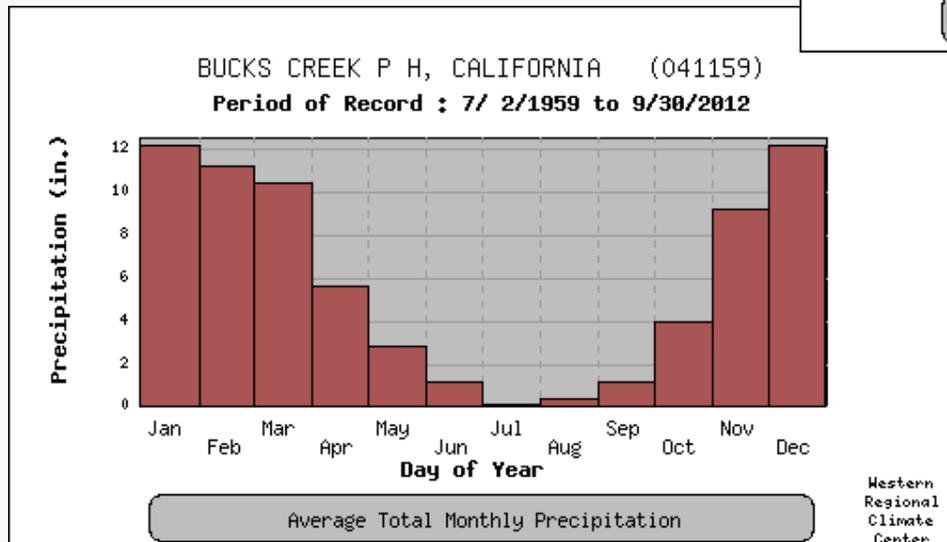
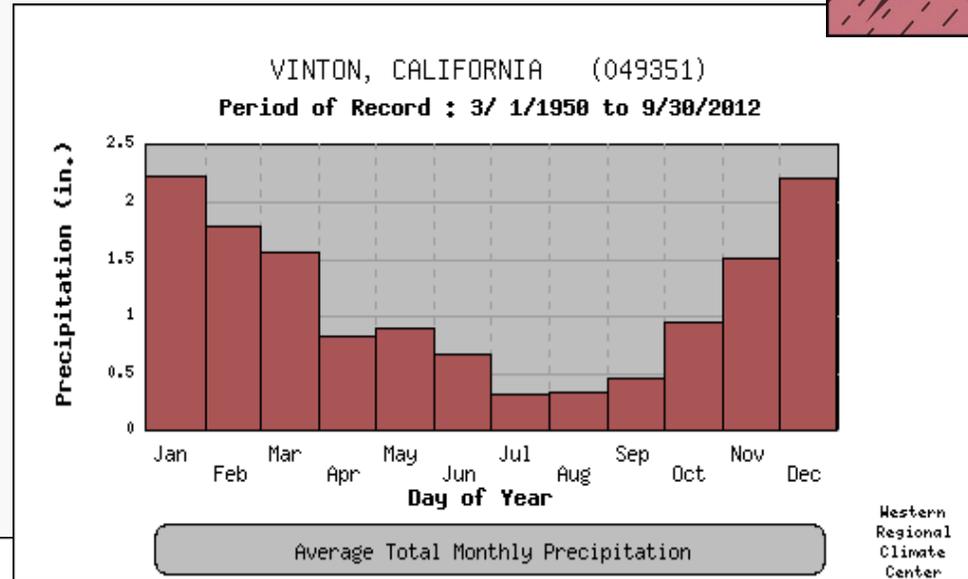
Location and Extent





Severe Weather Hazard

Location and Extent



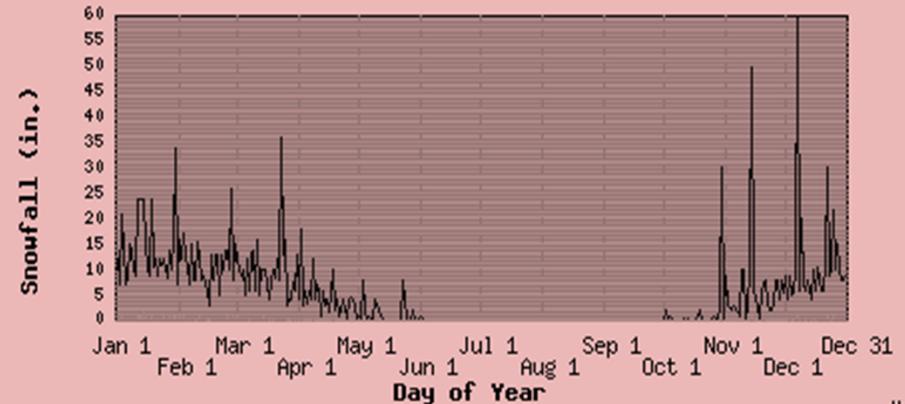


Severe Weather Hazard

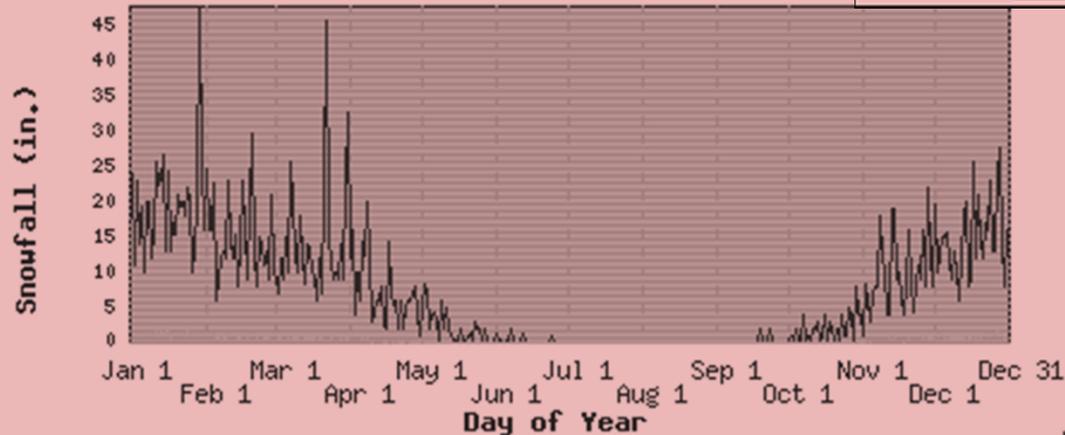
Location and Extent



QUINCY, CALIFORNIA (047195)
Period of Record : 4/ 1/1895 to 9/30/2012



CHESTER, CALIFORNIA (041700)
Period of Record : 10/1/1909 to 9/30/2012



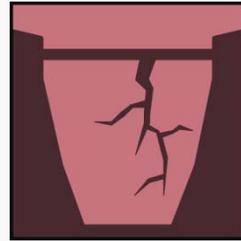


Severe Weather Hazards

The Problem

- Very little mitigation against large weather patterns that will overwhelm resources and infrastructure within hours.
- Short periods of extreme events.
- Long Periods of Winter Rains / Snow
- Secondary Hazards:
 - Landslides
 - Debris
 - Flash Flood
 - Lighting Strikes
 - Snow Load
- Power Outages





Dam Failure

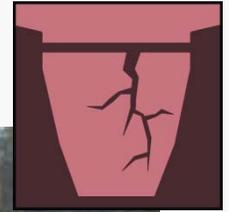
- Description***
- Regulatory Environment***
- Previous Occurrences***
- Location/Extent***
- Magnitude/Severity***
- Probability of Future Occurrences***



Dam Failure Hazards

Description

- A dam failure is usually the result of neglect, poor design, and/or structural damage caused by a major event such as an earthquake. When a dam failure occurs, an enormous quantity of water is suddenly released, destroying infrastructure and flooding the area downstream of the dam.
- State of California (Cal EMA) passed a law requiring dam owners to develop maps depicting areas that might be inundated due to dam failure.
- Cal EMA approves the dam inundation maps and distributes them to local governmental agencies, who in turn adopt emergency procedures for the evacuation and control of areas in the event of a dam failure.
- This law requires that each map be produced only once, without any requirements for updating.

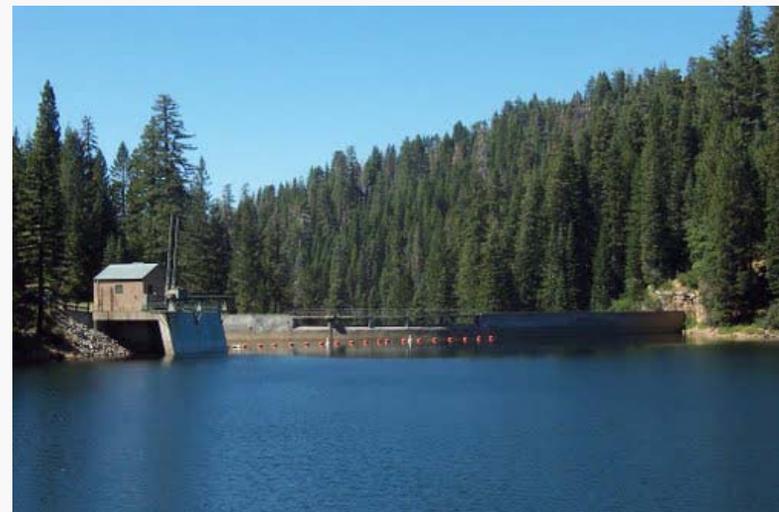




Dam Failure Hazards

Hazard Definition

- The USACE maintains the National Inventory of Dams (NID), Dams included in the NID are either greater than 25 feet high, hold more than 50 acre-feet of water, or are considered a significant hazard if they were to fail. Dams are classified based on the severity or magnitude of the potential devastation and losses of human life, economic, and environmental resources. Dam hazard classifications are defined as follows:
- High Hazard - loss of one human life is likely if a dam failure should occur.
- Significant Hazard - possible loss of human life and likely significant property or environmental destruction if a dam failure should occur.
- Low Hazard - no probable loss of human life and low economic, and/or environmental losses if a dam failure should occur.

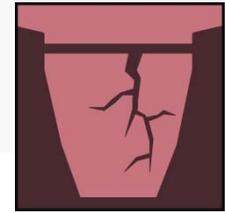




Dam Failure Hazard

Previous Occurrences

- **Dam failure has never occurred in Plumas County.**
- **There have been 4 dam failures in surrounding counties, and 11 dam failures in California.**
- **Dam failure occurred in Placer County on the Lower Hell Hole Dam on December 22, 1964**
- **The 30,000 acre foot flood from the dam failure destroyed two suspension bridges and one steel girder State Highway bridge.**
- **Lava Cap Mine tailings dam failed near Nevada City, California in the winter of 1997. The failure was caused by a rotted log in the dam which released 10,000 cubic yards of arsenic-tainted tailings into Little Clipper Creek and Lost Lake.**



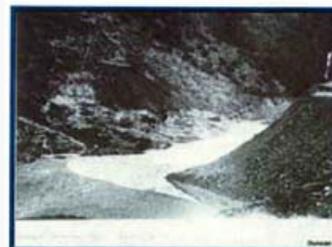
This photo shows the water emerging from the toe of the downstream rockfill shell at 3 PM on December 22, 1964. Some rock has been eroded.



By 7 AM on December 23rd, the flow had increased as the reservoir rose behind the dam, and a considerable portion of the downstream slope had been eroded away.



At 9:30 AM on December 23rd, a gully had been eroded across the crest of the dam, and the reservoir began to spill over the top of the fill. When this happened the velocity of flow and the rate of erosion increased rapidly, and soon a major portion of the embankment was washed away and the reservoir was emptied.

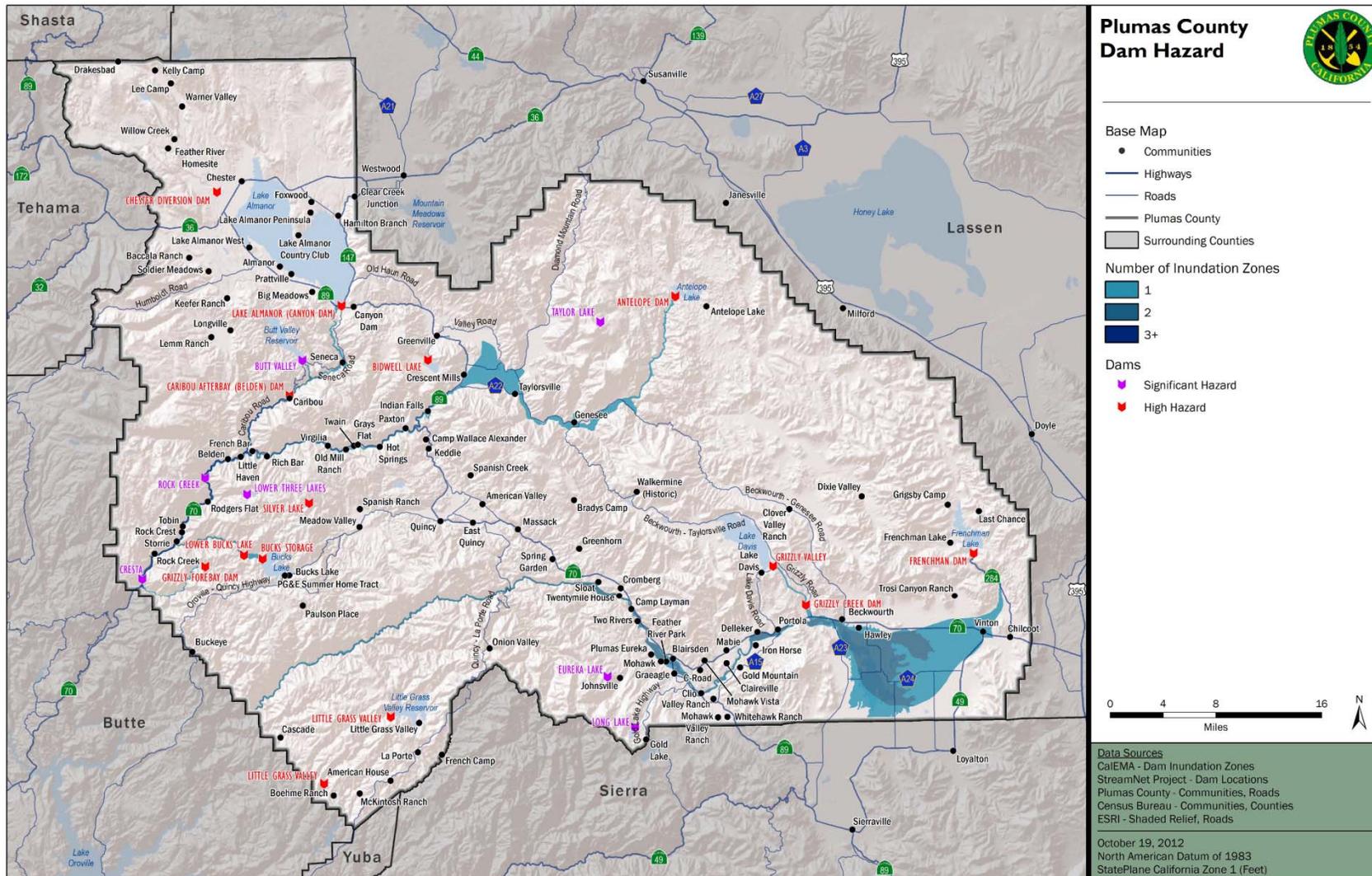
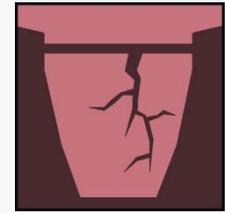


At 3:30 PM on December 23rd, there was a gaping hole in the dam, and very little water in the reservoir.



Dam Failure Hazard

Location and Geographic Extent





Dam Failure Hazard

Location and Extent



- 50 Dams in Plumas County
- 13 High Hazard Dams
- 10 Significant Hazard

Owner	Count of High Hazard Dams
Reclamation Board Sacramento – San Joaquin	1
(blank)	1
Soper Wheeler Co	1
Oroville-Wyandotte Irrigation District	1
State Department of Water Resources	1
Private landowner(s)	2
California Department of Water Resources	2
PG&E	4
Grand Total	13

High Hazard Dam Ownership

California Department of Water Resources

Antelope
Frenchman

Oroville-Wyandotte Irrigation District

Little Grass Valley

PG&E

Bucks Storage
Canyon
Grizzly Forebay
Lower Bucks Lake

Private landowner(s)

Bidwell Lake
Grizzly Creek

Reclamation Board Sacramento – San Joaquin

Chester Diversion

Soper Wheeler Co

Silver Lake

State Department of Water Resources

Grizzly Valley

Unknown Owner

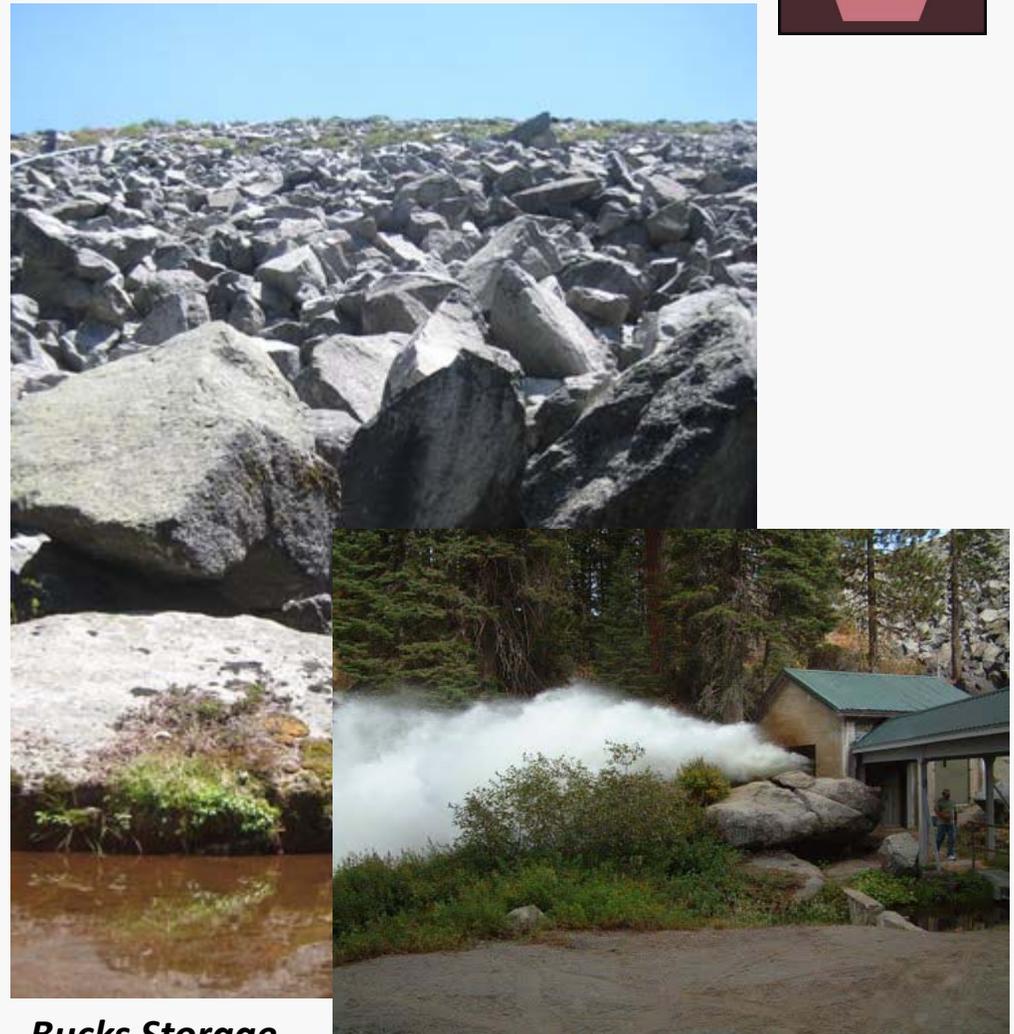
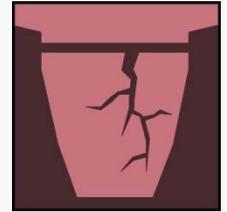
Caribou Afterbay (Belden)



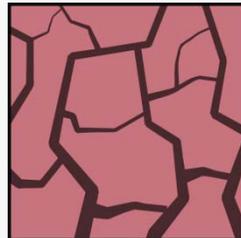
Dam Failure Hazard

The Problem

- Multiple Owners of Dams
- Dam Inundation Zones Information Distribution and Quality
- Emergency Action Plans responsibility of Cal EMA and DsoD
- County does not have jurisdictional authority for Dam Safety
- Communication of Hazard
- Warning Times for Sunny Day Event
- Maintenance on older dams



Bucks Storage



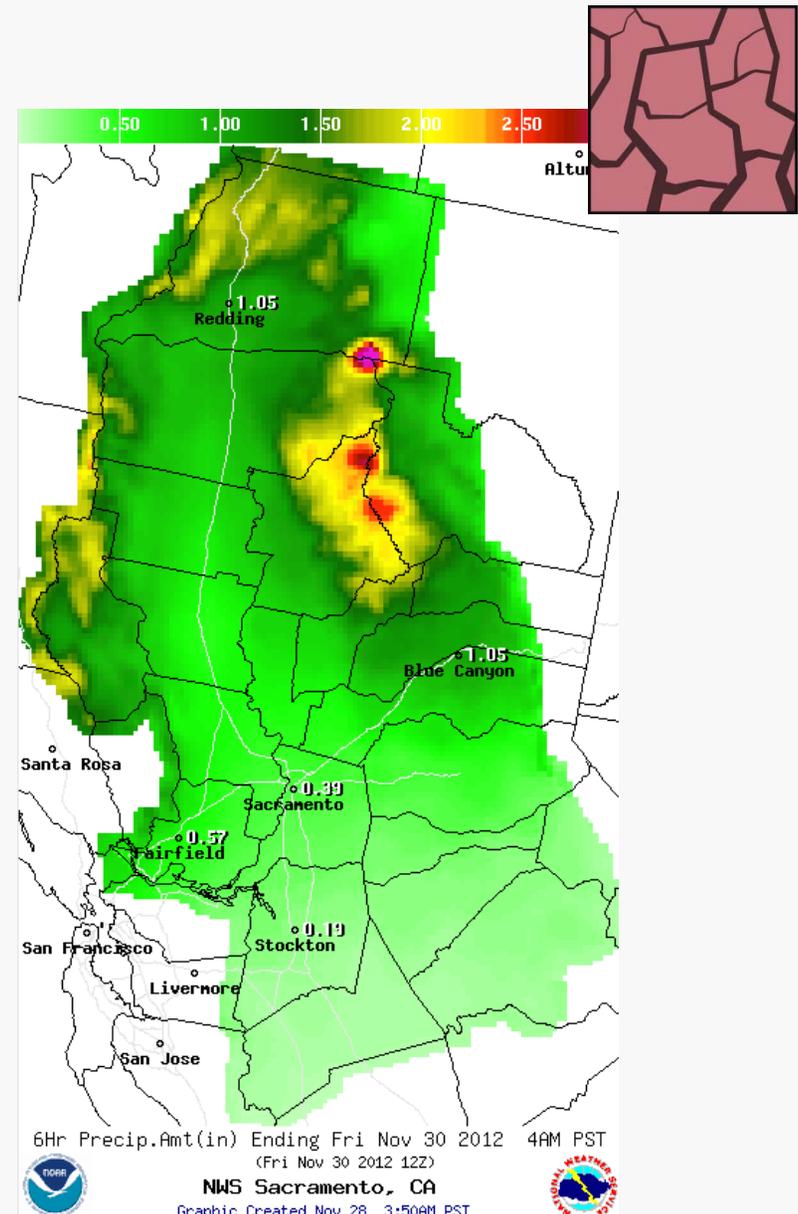
Drought

- Description***
- Regulatory Environment***
- Previous Occurrences***
- Location/Extent***
- Magnitude/Severity***
- Probability of Future Occurrences***



Drought Hazard *Description*

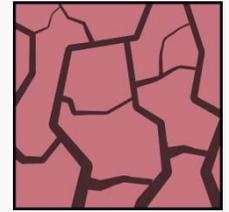
- Drought is a complex natural hazard, which is reflected in the following four definitions commonly used to describe it:
- Agricultural – drought is defined principally in terms of naturally occurring soil moisture deficiencies relative to water demands of plant life, usually arid crops.
- Hydrological – drought is related to the effects of precipitation shortfalls on stream flows and reservoir, lake, and groundwater levels.
- Meteorological – expressed as a departure of actual precipitation from an expected average or normal amount based on monthly, seasonal, or annual time scales.
- Socioeconomic – occurs when the demand for water exceeds the supply as a result of weather-related supply shortfall.





Drought Hazard

Previous Occurrences



- The 2010 State Hazard Mitigation Plan (SHMP) states that from 1950 to 2009, there have been 8 drought State Emergency Proclamations in California.
- Through 2007, Cal EMA's administered costs due to drought total \$2,686,858,480.
- Specifically for Plumas County, there have been five drought incidences since 1972, however none of the incidences were considered a state or federally declared drought disaster.
- County rarely experiences long periods of extremely low precipitation due to its geographic location in the Sierra Nevada region.

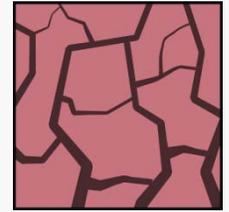


Photo by: Shannon Morrow



Drought Hazard

Previous Occurrences



- Several resources available to evaluate drought status and estimate future expected conditions
 - National Integrated Drought Information System (NIDIS)
 - NIDIS maintains the U.S. Drought Portal (www.drought.gov)
 - Resources include the U.S. Drought Monitor (USDM)
 - U.S. Seasonal Drought Outlook (USSDO)

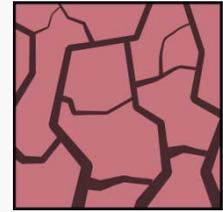


Photo By: Tim Gavin



Drought Hazard

Location and Geographic Extent



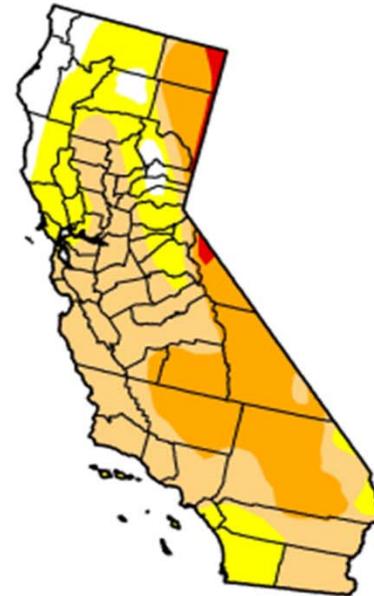
U.S. Drought Monitor

California

November 27, 2012
Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	6.77	93.23	70.47	28.16	1.14	0.00
Last Week (11/20/2012 map)	4.82	95.18	67.67	21.61	1.14	0.00
3 Months Ago (08/28/2012 map)	11.74	88.26	69.44	23.05	1.14	0.00
Start of Calendar Year (12/27/2011 map)	33.91	66.09	5.41	0.00	0.00	0.00
Start of Water Year (09/25/2012 map)	11.95	88.05	69.41	22.27	1.14	0.00
One Year Ago (11/22/2011 map)	88.42	11.58	0.00	0.00	0.00	0.00



Intensity:

- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

<http://droughtmonitor.unl.edu>

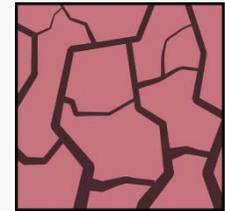


Released Thursday, November 29, 2012
National Drought Mitigation Center,



Drought Hazard

Location and Geographic Extent



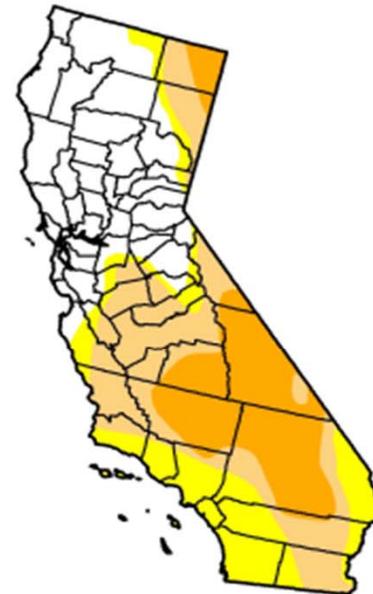
U.S. Drought Monitor

California

February 5, 2013
Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	34.20	65.80	47.18	21.57	0.00	0.00
Last Week (01/29/2013 map)	34.20	65.80	47.18	21.57	0.00	0.00
3 Months Ago (11/06/2012 map)	7.19	92.81	67.75	19.10	1.14	0.00
Start of Calendar Year (01/01/2013 map)	31.75	68.25	55.32	22.50	0.00	0.00
Start of Water Year (09/25/2012 map)	11.95	88.05	69.41	22.27	1.14	0.00
One Year Ago (01/31/2012 map)	11.09	88.91	57.33	0.00	0.00	0.00



Intensity:

- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

<http://droughtmonitor.unl.edu>

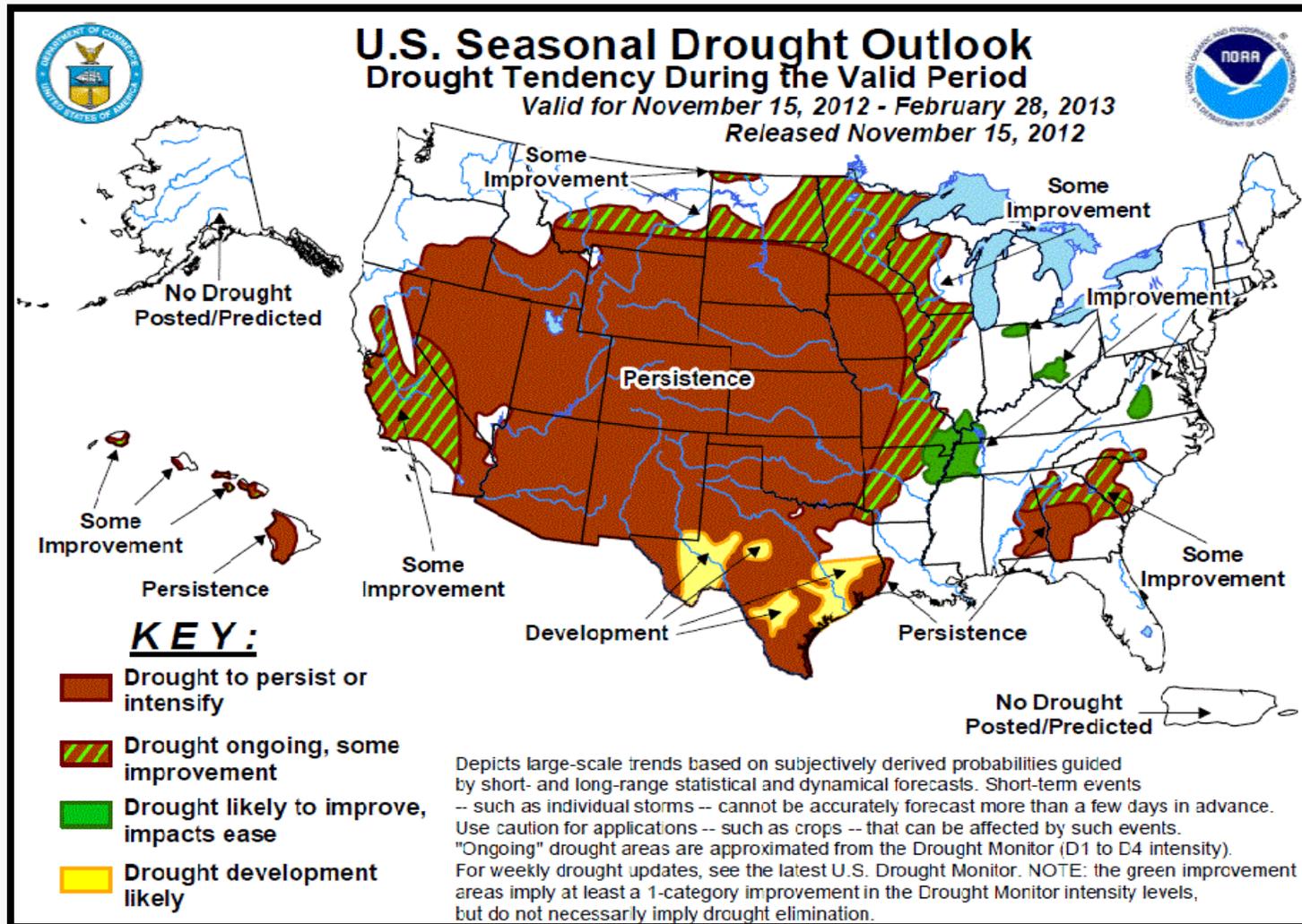
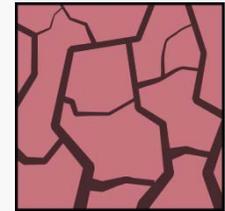


Released Thursday, February 7, 2013
Michael Brewer, National Climatic Data Center, NOAA



Drought Hazard

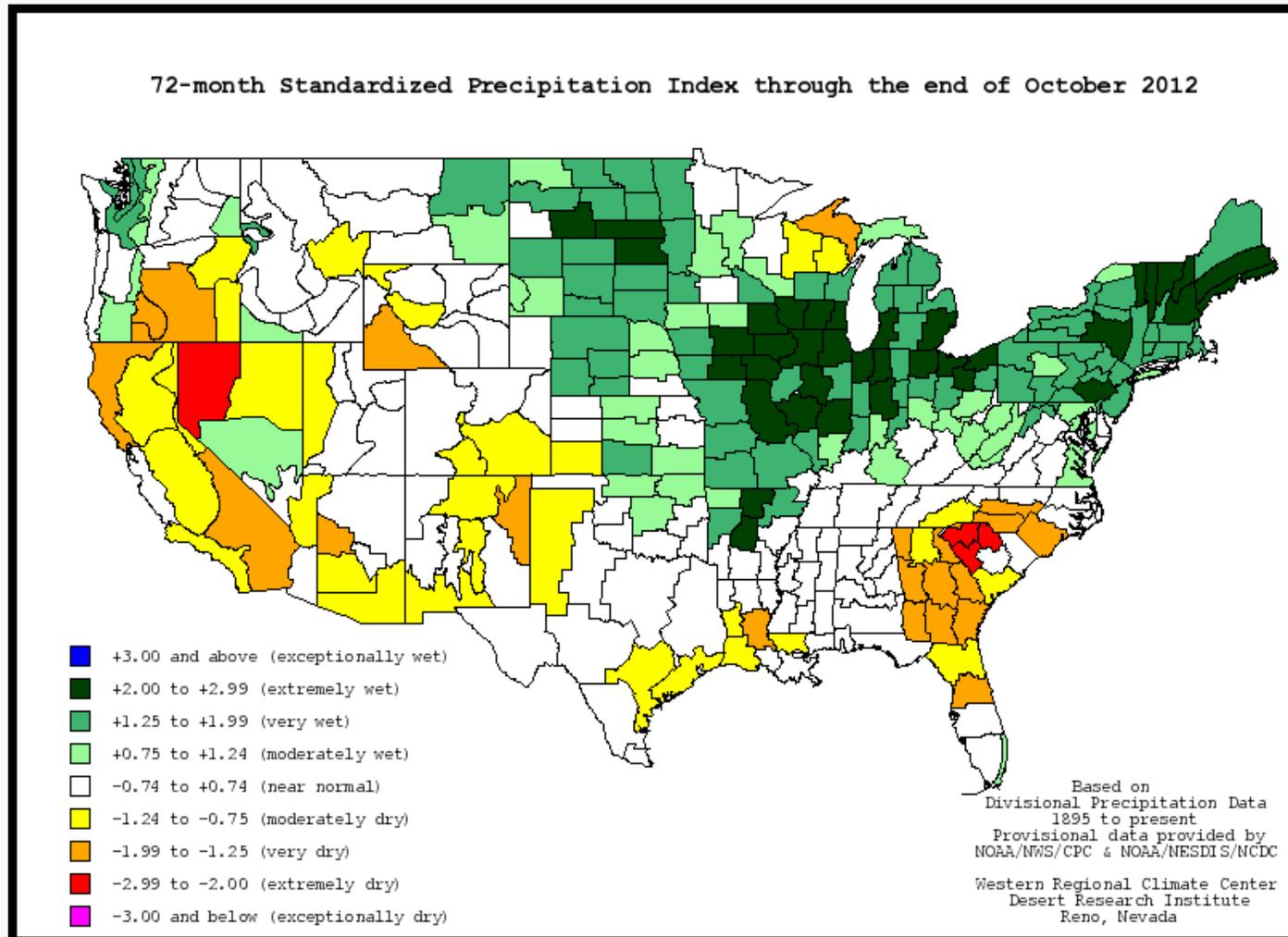
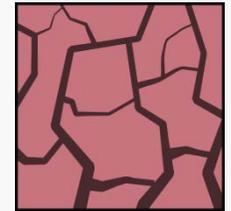
Location and Geographic Extent





Drought Hazard

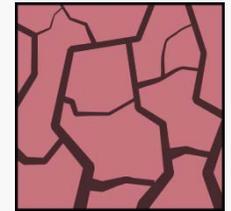
Location and Geographic Extent





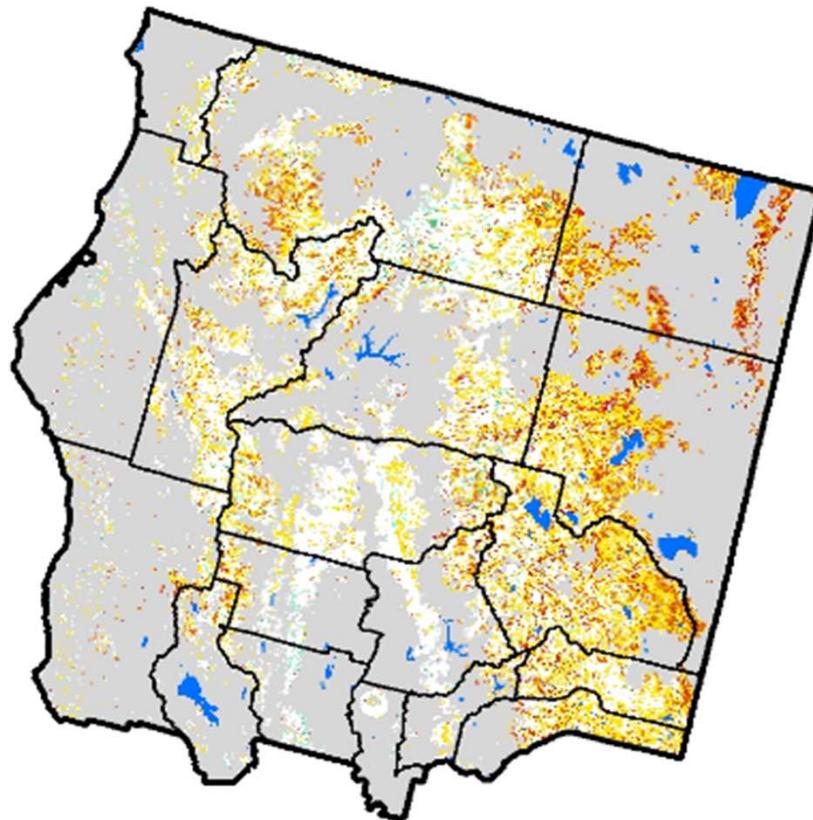
Drought Hazard

Location and Geographic Extent



Vegetation Drought Response Index
Complete: California, Quad 1

November 26, 2012



Vegetation Condition

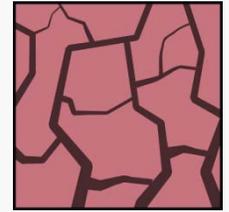
- Extreme Drought
- Severe Drought
- Moderate Drought
- Pre-Drought
- Near Normal
- Unusually Moist
- Very Moist
- Extremely Moist
- Out of Season
- Water





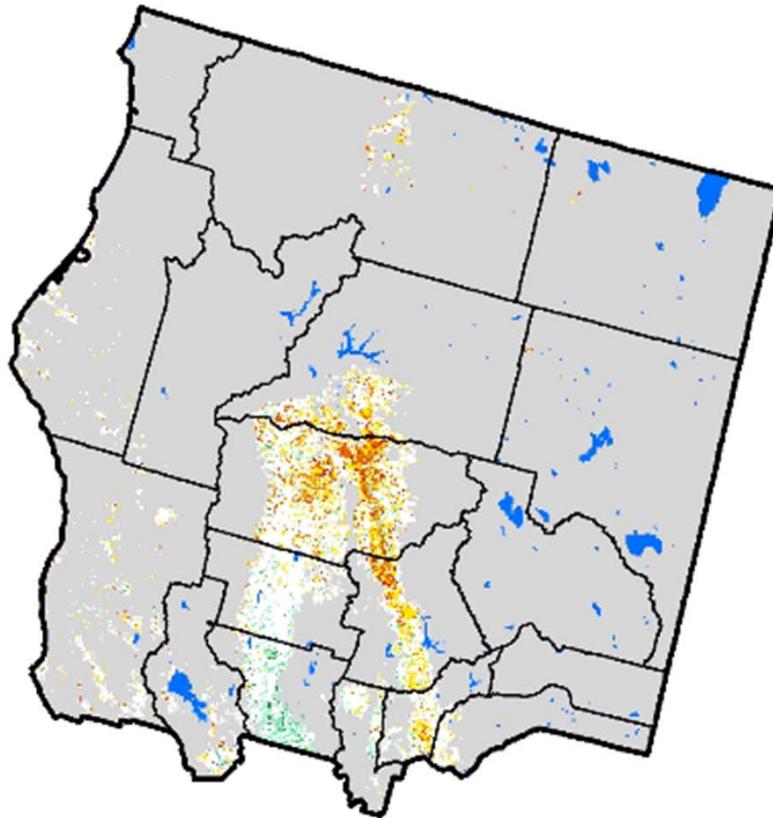
Drought Hazard

Location and Geographic Extent



Vegetation Drought Response Index
Complete: California, Quad 1

January 28, 2013



Vegetation Condition

- Extreme Drought
- Severe Drought
- Moderate Drought
- Pre-Drought
- Near Normal
- Unusually Moist
- Very Moist
- Extremely Moist
- Out of Season
- Water





Drought Hazard

The Problem

- **Poor retention of precipitation and depletion of deep groundwater systems as a result of continued extraction and reduced recharge during dry periods.**
- **Loss of water tables and depletion of shallow aquifers is a typical consequence of head cutting (not all drought related) throughout the watershed.**
- **Groundwater depletion high valley deserts such as Sierra Valley indicator of local drought.**
- **Agricultural Loss?**

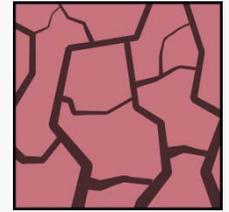


Photo By: Marcel Holyoak



Climate Change

- ✓ ***Description***
- ✓ ***Regulatory Environment***
- ✓ ***Previous Occurrences***
- ✓ ***Location/Extent***
- ✓ ***Magnitude/Severity***
- ✓ ***Probability of Future Occurrences***



Climate Change Hazard

Description

- Climate change refers to any distinct change in measures of climate lasting for a long period of time, more specifically major changes in temperature, rainfall, snow, or wind patterns. Climate change may be limited to a specific region or may occur across the whole Earth. Climate change may result from:
 - Natural factors (e.g., changes in the Sun's energy or slow changes in the Earth's orbit around the Sun);
 - Natural processes within the climate system (e.g., changes in ocean circulation); and
 - Human activities that change the atmosphere's make-up (e.g., burning fossil fuels) and the land surface (e.g., cutting down forests, planting trees, building developments in cities and suburbs).

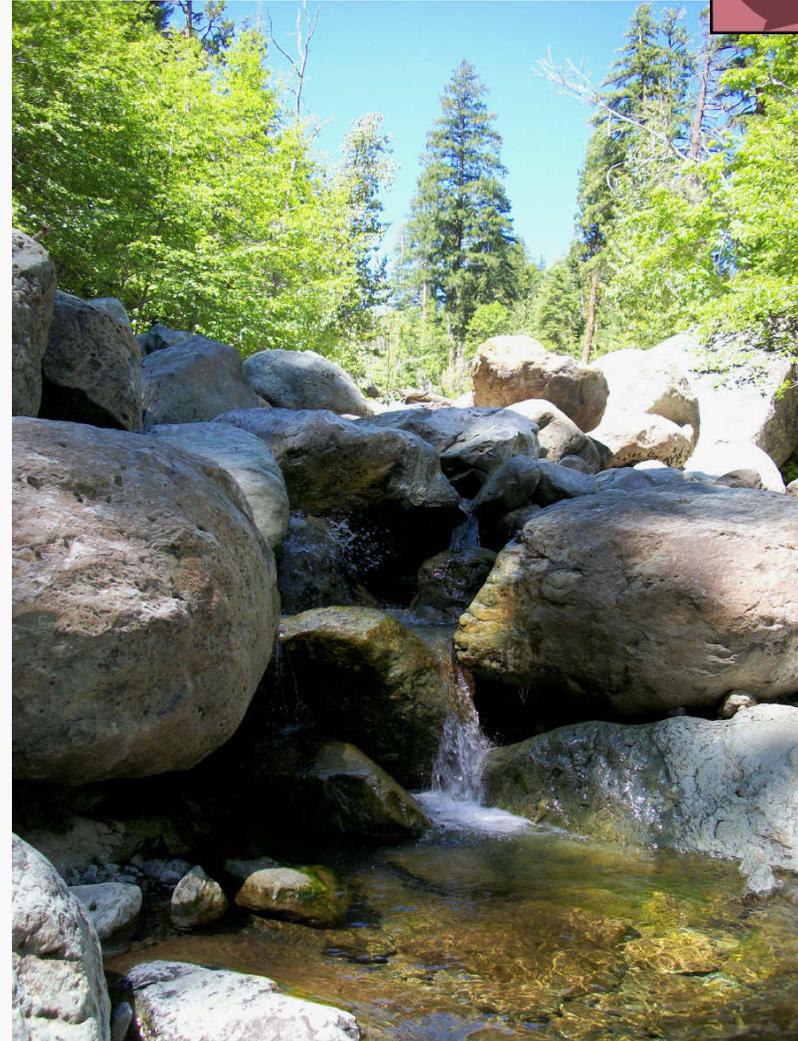




Climate Change Hazard

Previous Occurrences

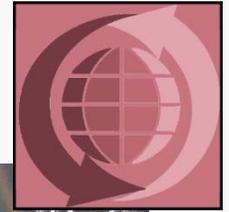
- Climate change has never been directly responsible for any declared disasters.
- Past flooding, wildfire, and drought disasters may have been exacerbated by climate change, but it is impossible to make direct connections to individual events.
- Unlike earthquakes and floods that occur over a finite time period climate change is an on-going hazard, the effects of which are already being experienced.
- Other effects may not be apparent for decades or may be avoided altogether by mitigation actions taken today.





Climate Change Hazard

Location and Geographic Extent



- It is expected that California coastal areas will be vulnerable to different hazards (e.g. sea level rise or more severe tropical storms) than inland areas, which will experience increased wildfire, drought, flooding from precipitation events, or other.
- The Feather River watershed can be at risk due to winter temperature lows which are typically at or near freezing. Small warming trends (1-2 degrees F) can cause precipitation to shift from snow to rain which will decrease snow pack and exacerbate drought conditions in summer, creating the conditions for increased wildfires.
- These observed trends could also increase flooding as more rainfall will contribute to larger runoff rates.

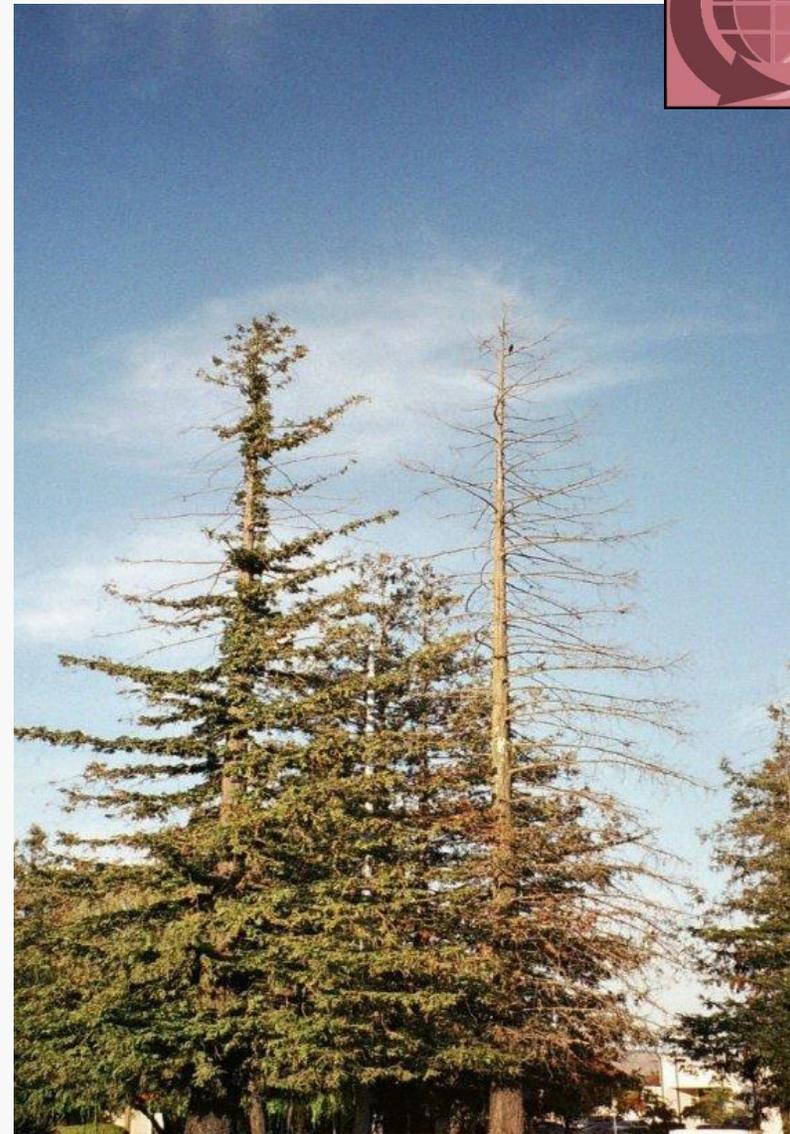
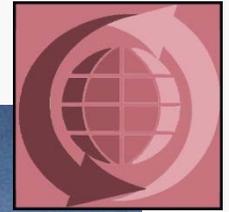




Climate Change Hazard

The Problem

- Increased Precipitation in during winter rainy season.
- Increased wildfire risk due to decreased snowpack
- Changes in variability and the frequency/severity of hazard events.
- Other natural disaster such as drought, severe weather, flood, and wildfire occurrence intervals can change.
- Probability of occurrence is influenced by human action?
- Intergovernmental Panel on Climate Change (IPCC) predicts a warming of about 0.2 degree Celsius per decade





The Problem

Hazard	Weaknesses Identified/Needing to be Addressed
Multi-Hazard	<ul style="list-style-type: none"> ▪ Agency Coordination for mitigation planning ▪ Incorporation of mitigation planning into other County planning activities (general plan, natural resource management/preservation) ▪ Maintenance of technical skills, databases, and systems related to hazard mitigation planning
Flood	<ul style="list-style-type: none"> ▪ Repetitive Loss Areas in Indian Valley ▪ Critical Infrastructure in American Valley (One School, and One Hospital as Risk) ▪ Residual Risk beyond Identified FEMA Floodplains ▪ Feather River Canyon wash-outs. (Cal Trans Problem)
Wildfire	<ul style="list-style-type: none"> ▪ Code Enforcement ▪ Maintenance of and access to High Hazard Areas ▪ Property maintenance ▪ Funding
Geo Hazards	<ul style="list-style-type: none"> ▪ Unknown location of hazard ▪ Hazard is spread across entire county ▪ Compounded Hazard Risk ▪ Landslides can be activated by seismic activity ▪ Wildfire can cause higher risk of landslides or mudslides ▪ Transportation Infrastructure at Risk ▪ Highway 70 ▪ Rail Road ▪ Human development can exacerbate speed of erosion



The Problem

Hazard	Weaknesses Identified/Needing to be Addressed
Severe Weather	<ul style="list-style-type: none"> ▪ Short periods of extreme events. ▪ Long Periods of Winter Rains ▪ Secondary Hazards: Landslides, Storm Debris, Flash Flood, Lighting Strike, Snow Load ▪ Power Outages
Drought	<ul style="list-style-type: none"> ▪ Poor retention of precipitation and depletion of deep groundwater systems as a result of continued extraction and reduced recharge during dry periods. ▪ Loss of water tables and depletion of shallow aquifers is a typical consequence of head cutting (not all drought related) throughout the watershed. ▪ Groundwater depletion high valley deserts such as Sierra Valley indicator of local drought.
Dam Failure	<ul style="list-style-type: none"> ▪ Multiple Owners of Dams ▪ Dam Inundation Zones Information Distribution and Quality ▪ Emergency Action Plans responsibility of Cal EMA and DsoD ▪ County does not have jurisdictional authority for Dam Safety ▪ Communication of Hazard ▪ Warning Times for Sunny Day Event ▪ Maintenance on older dams
Climate Change	<ul style="list-style-type: none"> ▪ Increased Precipitation in during winter rainy season. ▪ Increased wildfire risk due to decreased snowpack ▪ Changes in variability and the frequency/severity of hazard events. ▪ Other natural disaster such as drought, severe weather, flood, and wildfire occurrence intervals can change. ▪ Probability of occurrence is influenced by human action. ▪ Intergovernmental Panel on Climate Change (IPCC) predicts a warming of about 0.2 degree Celsius per decade



Questions?



Session Break



Part II

- **Hazard Risk Factor Matrix**
- **Establish priority and focus resources**
- **Establish, refine and edit the Goals and Objectives**
- **Next Steps and Wrap Up**



Existing HMP Overview

Section Two: Goals and Objectives

- **Goal 1.** The County will strive to minimize the threat from a hazard event in order to protect the health, safety and welfare of the county's residents and visitors.
- **Goal 2.** The County Government will strive to have the capability to initiate and sustain emergency response operations during and after a hazard event.
- **Goal 3.** The availability and functioning of the community's infrastructure will not be significantly disrupted by a hazard event.
- **Goal 4.** The County will strive to educate the members of the communities to understand the hazards threatening local areas and the techniques to minimize vulnerability to those hazards.
- **Goal 5.** The continuity of local government administration and services will not be significantly disrupted by a hazard event.



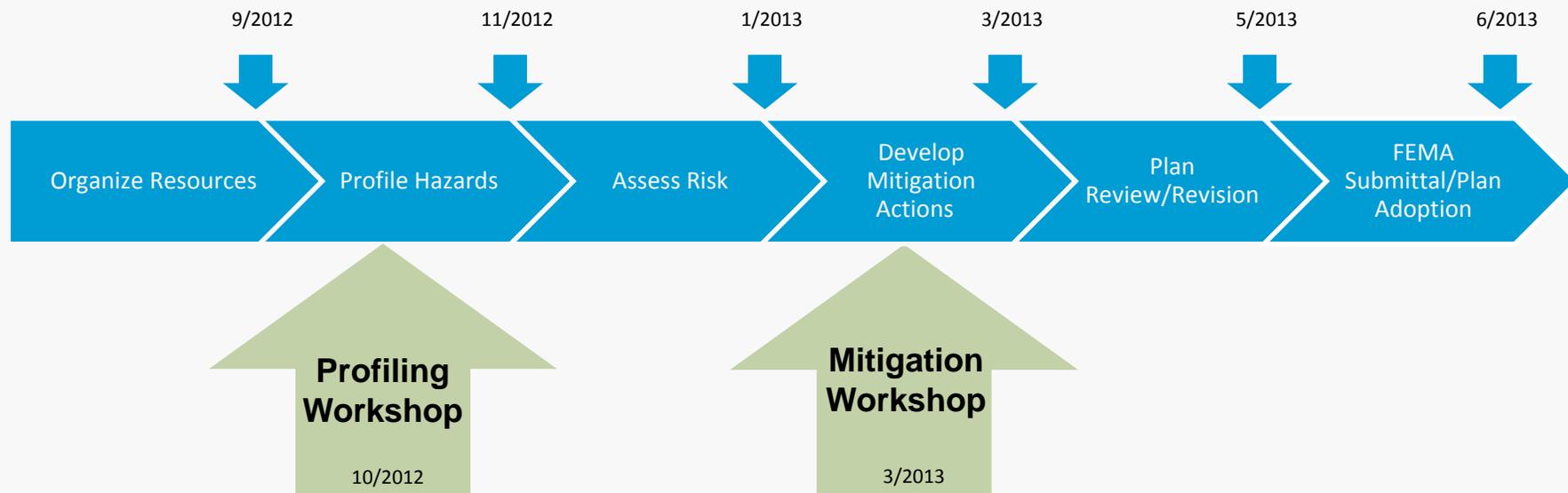
MHMP Update

Section Two: Goals and Objectives

- **Goal 6. Local government will have the capability to develop, implement and maintain effective hazard loss reduction programs.**
- **Goal 7. The County will strive to minimize the vulnerability of homes, institutions and places of business and employment to hazard events.**
- **Goal 8. The policies and regulations of local government will support effective hazard mitigation programming throughout the County.**
- **Goal 9. The County will strive to reduce the impact of a hazard event on the economic stability of the County.**
- **Goal 10. All sectors of the communities will work together to create a disaster resistant region.**
- **Goal 11. The County will strive to reduce the impact of a hazard event on the natural and cultural resources of the County in order to protect the quality of life.**



Project Timeline





Thank You for Your Participation

Check out the Project website:

<http://www.countyofplumas.com/index.aspx?NID=2214>

Contact: JerrySipe@countyofplumas.com