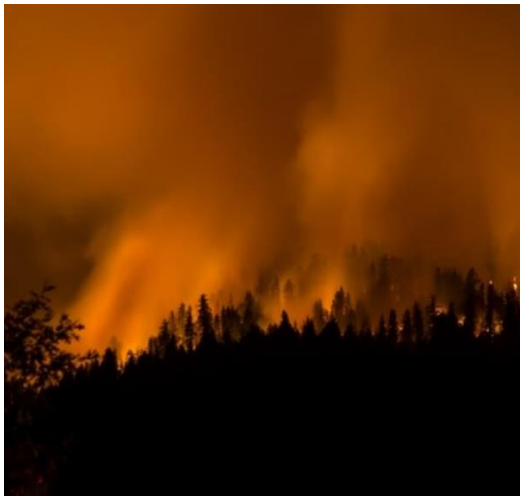
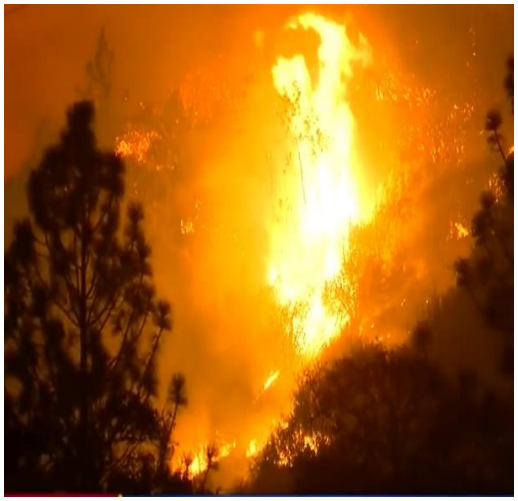
Plumas County Fire Safe Council

Plumas County
Communities Wildfire Protection Plan

July 2019



Quincy – Minerva Fire 2017



Paradise - Camp Fire 2018

www.plumasfiresafe.org

Signatory Page

The Plumas CWPP's original Certification was approved in April 2005:

Community Wildfire Protection Plan
Certification and Agreement

The Community Wildfire Protection Plan developed by the Plumas County Fire Safe Council:

- Was collaboratively developed. Interested parties and federal land management agencies managing land in the vicinity of the City of Portola and County of Plumas have been consulted.
- This plan identifies and prioritizes areas for hazardous fuel reduction and treatments and recommends the types and methods of treatment that will protect the City of Portola and unincorporated communities within Plumas County.
- This plan recommends measures to reduce the ignitability of structures throughout the area addressed by the plan.

The following entities attest that the standards listed above have been met and mutually agree with the contents of this Community Wildfire Protection Plan.

William N Dennison

Bill Dennison, Chairman Plumas County Board of Supervisors

Andy Anderson, County Fire Warden

Henri Brachais, Butte Unit Chief
California Department of Forestry & Fire Protection

The 2013 Plumas County CWPP update was approved by:

Plumas County Fire Safe Council Chair — Date 9/23/13

Plumas County Office of Emergency Services — Date 9-5-13

This 2019 Plumas County CWPP update was approved by:

Plumas County Fire Safe Council Chair — Date 9-12-19

Plumas County Office of Emergency Services — Date 9/25/19

Preface

In 2005, as part of its basic mission, the Plumas County Fire Safe Council (PC FSC) initiated a Community Wildfire Protection Plan to help residents, neighborhoods, and communities mitigate potential threats from wildfire, so they may survive the inevitable event. The PC FSC has reviewed and updated this plan in 2013 and again in 2019.

The purpose of this plan it to outline the risks and hazards associated with a wildland fire threat to Plumas County communities and to identify potential mitigation measures. Implementation of this plan will further the Fire safe Council's Mission: *To reduce the loss of natural and human made resources caused by wildfire through Firewise community programs and pre-fire activities." The Fire Safe Council has a* specific goal relating to*: "Implement and amend as necessary the Plumas County Community Wildfire Protection Plan"*

The Plumas County Communities Wildfire Protection Plan is intended to provide documentation of implementing actions designed to reduce wildfire risk to homes and communities through education and outreach programs, the development of partnerships, and implementation of preventative activities such as hazardous fuel reduction, defensible space, land use, or building codes. The emphasis of this plan is to work from the home outward into the forest.

The 2013 update included efforts to create a more streamlined plan and a complete review the mitigation recommendations to remove those that may no longer be relevant and modify or add those where law changes have occurred. Two examples of these are changes resulting from California Code Revisions: 1) synthetic decking materials that failed new testing rules starting 2008 caused problematic products to be taken off of the market; and 2) in 2005 defensible space requirements were increased from 30 to 100 feet.

This 2019 plan update includes new information and renewed emphasis on the role of embers in community wildfire spread and potentials of climate change. It documents the rapid spread of new Firewise Communities within Plumas County. This plan also updates information on historic large fire starts in Plumas, weather data, and Plumas National Forest fire ignition sources. This plan also includes new community evacuation plans, and updates fire district boundaries and staffing. Mitigation measures of key risk conditions were newly reviewed and revised by Plumas County Building, Planning, and Office of Emergency Service staffs.

The Bureau of Land Management provided initial funding for development of this plan in 2005; through their Community-Based Wildfire Prevention Grants Program, as part of funding for Plumas County's Fire Safe Council coordination. The Plumas County Board of Supervisors provided funds for reviewing and updating the plan in 2012 with Title III funds from the Secure Rural Schools and Community Self Determination Act (HR 2389). The successful development of this plan was possible only with the active support and assistance of many people who devoted countless hours to the project. These included citizens, County employees and supervisors, local fire chiefs, US Forest Service employees, and California Department of Forestry and Fire Protection employees.

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Purpose

The purpose of this plan is to outline the risks and hazards associated with a wildland fire threat to Plumas County communities and to identify potential mitigation measures. The Plumas County Communities Wildfire Protection Plan (CWPP) is intended to provide documentation of implementing actions designed to reduce risk to homes and communities from wildfire through education and outreach programs, the development of partnerships, and implementation of preventative activities such as hazardous fuel reduction, defensible space, land use, or building codes. The emphasis of this plan is to work from the home outward into the Wildland Urban Interface, so that man-made and natural resources survive the eventual intrusion of a wildfire.

This plan is intended to: 1) meet the requirements of the Healthy Forest Restoration Act (HFRA) of 2003, 2) make the County eligible for National Fire Plan (NFP) funding assistance from the Departments of Agriculture and Interior (by meeting the requirements of HFRA), 3) provide information to assist communities in developing fuel reduction projects on private and public lands, 4) continue to serve as the Wildfire Hazard Mitigation portion of Plumas County's Multi-Hazard Mitigation Plan, which is required after November 1, 2004, for counties to be eligible to receive FEMA disaster assistance funding, and 5) provide direction in implementing the Plumas County Fire Safe Council's Mission: ***To reduce the loss of natural and human made resources caused by wildfire through Firewise community programs and pre-fire activities."***

This Community Wildfire Protection Plan is a collaborative effort by the Plumas County Fire Safe Council, County of Plumas, Plumas County Fire Chiefs Association, Plumas County Office of Emergency Services, California Department of Forestry and Fire Protection, US Forest Service, Plumas Firewise Communities and residents who are engaged in fire prevention. The original project was funded in part by the United States Department of the Interior, Bureau of Land Management, as part of the National Fire Plan from the Community- Based Wildfire Prevention Grants Program of the Sacramento Regional Foundation. The Plumas County Board of Supervisors provided funds for reviewing and updating the plan in 2012 with Title III funds from the Secure Rural Schools and Community Self Determination Act (HR 2389).

Background

Wildfire Threat - Fire Frequency and History

Wildfire is a frequent and often natural process throughout much of the Sierra and for thousands of years fire has been used as a management tool by Native Americans. Suppression of fires and past resource management practices, along with urbanization of forests, has created a situation quite different from what existed before European settlement. Prior to European settlement, forests in our area experienced regular fires of varying intensity and fire return intervals depending on species, composition, elevation, and topography. Primarily fires burned with low severity and at an interval of 10-15 years. Many of the ecosystems and plant species in the area evolved and depended on fire to sustain them. These fires were limited in size by fuel availability, not by suppression efforts. Starting in the early 20th century aggressive fire suppression efforts began in an attempt to protect the commercial value of timber from wildland fires.

Fire exclusion efforts have created forests that look quite different than those 200 years ago. Where today forests are densely stocked and have less fire-resistant species, in pre- settlement times the trees were larger, forests more open, and stands of timber more fire- resilient. Where fires once frequently and lightly burned the forest floor, they now become catastrophic stand-replacing events, often threatening communities.

Wildland fires have previously occurred between June and October, a period of time commonly referred to as "fire season". The state of California now regularly experiences wildfires year-round. "Fire season" no longer refers to a limited period in the summer. The current listing of California's all time most destructive wildfires shows that 3 of the 10 most destructive wildfires have occurred since 2017 in either November or December.

Fire occurs naturally and from human activity. Lightning currently accounts for over 50% of Plumas County's ignitions per year. Records show that Plumas County averages some of the highest incidence of lighting fires in California. Over time human caused fires usually increase as increased population and visitation of forested lands lead to development and habituation. The leading causes of human ignitions are debris burning campfires, vehicles, outdoor equipment use and arson. A significant number of wildfires have undetermined ignitions and can come from firewood cutting, discarded ashes, construction, railroads and powerlines.

Wildfire Threat - To Communities

While wildland fire is a component of the ecosystem, urbanization of forested lands has placed people, communities, and natural resources at risk. California continues to experience extreme fire behavior. California's wildfire activity is exacerbated by the continual spread of homes and communities into the wildland, often referred to as the "Wildland Urban Interface". In many cases, these communities become part of the fuel load and add complexity for the fire agencies attempting to provide for their protection. Plumas County is no exception, and there have been numerous fires, small and large, that have threatened county residents and communities in the recent past.

Wildland fire is considered a threat to almost every community in Plumas County. In the initial listing in the Federal Register for "Communities at Risk", 22 were listed for Plumas County. Through a collaborative effort, almost every community in the county is now identified and mapped as such. There are about 116,000 acres of private lands within the County's "Communities at Risk", of which approximately 40% are of parcels with improvements. Many of these communities were established and developed well before the evolution and widespread

recognition of fire codes and fire-adapted community concepts. As such, these legacy communities are often in need of improvements to home structures, community infrastructure, emergency notification systems, and ingress/egress evacuation routes.

Over 60% of the land area in Plumas County is federal land managed by the **Plumas National Forest**. As a result, federal land management and wildfire activity has an impact on Plumas County communities. From 2008 to 2018 the Plumas National Forest experienced 1,083 fires. Of these, human caused ignitions and natural caused ignitions (lightning) are about equal in number:

2008-18 Plumas Ignition Causes	# Fires
Arson	49
Campfire	64
Children	10
Debris Burning	86
Equipment Use	56
Misc. & Undetermined	241
Railroad	21
Smoking	11
Total Human Caused	**538**
Lightning Caused	**545**
Total Fires	**1083**

Recent large fires that have threatened homes and recognized Communities-At-Risk within Plumas County include:

Minerva Fire 2017 (4300 acres just south of Quincy)
Tobin Fire 2016 (243 acres in the Plumas NF Feather River Canyon)
Chips Fire 2012 (75,431 acres near Lake Almanor)
Moonlight Fire 2007 (64,007 acres near Greenville)

The 1988 Powerline Fire burned to the edge of the City of Portola. Numerous small fires have threatened residences in the early stages of initial attack. Fires in Plumas County have initiated evacuation preparation by residents, and on rare occasions, prompted an evacuation. Statewide, 7 of the 10 most destructive wildfires in California history have taken place since 2015.

Plumas communities have responded to these threats; Plumas County has over 15 nationally recognized **Firewise Communities**, with more seeking recognition. The Firewise USA® program provides a collaborative framework for neighbors to reduce wildfire risks at the local level. The national recognition program's annual criteria are designed to empower and engage residents living in wildfire prone areas with a plan and actions that can increase their home's chances of surviving a wildfire, while also making it safer for firefighters. For a current list of recognized and engaged Firewise Communities within Plumas County see: https://www.plumasfiresafe.org/firewise-usa.html

Wildfire Threat - To Homes

Most homes are lost in wildfires for one of three reasons:

1) **Burning embers** (burning needles, leaves, branches & cones that are carried by the wind during a wildfire) landing on combustible roofs, entering attics and crawl spaces, or landing on combustible material adjacent to the structure. Embers are by far the main cause of home ignitions during wildfires.
2) **Radiated heat** from burning vegetation, structures, or materials on the property that cause ignition of the structure's siding or breaking of the windows and ignition to the interior.
3) **Combustible fuels** (e.g. grass, pine needles, woodpiles, rubbish, furniture, propane tanks, and mats) immediately adjacent or attached to the structure allowing fire to spread directly to siding, fences, and decks.

Embers and a lack of defensible space has been identified as the most critical factor to home loss in many of California's most destructive wildfires. Two recent and destructive wildfires confirm this relationship between homes destroyed and their construction and immediate surrounding vegetation. They were the Tubbs Fire in Santa Rosa (2017) and the Camp Fire in Paradise (2019). The Tubbs fire destroyed 4,636 homes causing 22 deaths. The Camp Fire (in Paradise, Butte County just miles from Plumas) destroyed 13,972 homes causing 85 deaths.

Extensive wildland fire research by Jack Cohen, a US Forest Service Researcher, and others, indicates from fire modeling, crown fire experiments, and case studies that the characteristics of a home and its immediate surroundings determine a home's ignition potential during wildland fires. Roofing material and the presence of defensible space plays a key role in determining whether or not a structure will survive the passing of a wildfire. Defensible space can also affect firefighter safety and thus their decision on whether or not to commit resources to protect a structure.

The International Business and Home Safety (IBHS) research center simulates wildfire conditions to understand what makes structures vulnerable to wildfire, and to evaluate existing code requirements, products, and test standards. Resulting research and insights will influence codes and standards, leading to better adoption, better products, and more wildfire-resistant structures. IBHS research data sheets on specific home components that are most susceptible to loss by wildfire are available here: https://www.plumasfiresafe.org/home-safety-fact-sheets.html IBHS also collaborates with partners to conduct post-wildfire investigations to propose effective mitigation strategies, and to conduct experiments to better understand defensible space and the nature of embers, which continue to lead to better guidance for property owners.

Many homes in Plumas County were built decades ago and do not conform to modern fire-code standards, particularly with the evolution of codes driven by fires in the early 21st century. This includes inadequacies in fire-resistant design, materials, home-siting, and property/development planning. Consequently, there is a need, particularly in the older developments and disadvantaged communities, to provide homeowner education and assistance surrounding fire-centric retrofitting and structure upgrades.

Wildland Fire Behavior Factors, Influences, and Elements Affecting Property and Resource Damage

In order to have an open environment fire, the elements of *Heat, Fuel,* and *Oxygen* are necessary. These three elements are referred to as the fire triangle. By removing any one, the fire goes out.

Factors that influence wildland fire behavior are: *Fuel, Weather,* and *Topography*. These factors are referred to as the fire behavior triangle. Interaction of these three factors affects how fast a fire spreads, how intensely it burns, and, consequently, how much effort it takes to control it and how much damage it creates.

Topography is the shape of the land and the most static, obvious, and predictable, though not easily changed component of the fire behavior triangle. Topographic features that affect wildland fire are slope, aspect, elevation and terrain features such as canyons, drainages, and ridges.

Weather*,* while a somewhat predictable force, isn't easily modified. Consequently, wildland fire managers make their strategic and tactical suppression decisions based on what the weather presents them. There are a number of weather factors, such as temperature, relative humidity, precipitation, cloud cover, and wind which affect fire behavior. **Wind, driving embers**, has been the largest factor in several of the most destructive wildfires in California state history. As a result of climate change, seasonal weather fluctuations are becoming less predictable and are contributing to significant drying/drought conditions.

Fuel includes grasses, needles, brush, trees, dead limbs, fallen trees, stored lumber, propane tanks, structures and vehicles. The availability of natural fuels to burn is influenced by the amount/volume, surface area to volume, moisture content, species, and arrangement (both horizontal and vertical). When a wildfire enters a neighborhood of closely built homes, the **ignited homes** themselves can become a high-intensity fuel. House to house ignition from embers can carry the fire in subdivisions and cities.

Fuel is the common denominator between the fire and fire behavior triangles. **It is the only element humans can manage**. **Unfortunately**, the fuel in and around our communities continues to increase. **Fortunately,** with effort we can strategically remove these fuels from around our homes and reduce the risk from wildfire.

Wildfire moves in three ways: **horizontally** (across the surface), **vertically** (into the tree canopy), and **spotting** of new fires via flying firebrands and embers.

Horizontal fire spread is across the forest floor. The more fuel available to burn on the ground increases the intensity at which a fire will burn. The rate of fire spread across the surface can be measured or modeled in feet per minute. Hazardous fuel reduction efforts for surface fuels can include piling and burning of material (or chipping and removing from the site), as well as under-burning and managed fire.

Vertical fire spread of a fire is into the crowns of the trees, usually through a laddering process. Where ground fuels and aerial fuels are intermixed without separation, they are referred to as ladder fuels. The elevation of a fire occurs when a surface fire is sufficiently intense, and where brush and small trees grow into the branches of larger trees, creating conditions for the fire to "torch" into the crown of a tree. When tree canopies are dense enough or when wind carries the fire from tree to tree, a crown fire is established. Crown fires are more likely to occur when there are sufficient surface fuels to generate enough intensity to ignite ladder fuels and/or lower branches of overstory trees. **Crown fires then become excellent generators of embers that spot into new ignitions**. Separating surface and canopy fuels will lessen the ability of a fire to get into tree crowns and reduce torching and crowning. Wildland fire managers consider the "crown to base height" a critical factor in assessing the potential for crown fires. "Crown to base height" is an estimation of how many feet of separation exist between the surface fuels and the base of the live tree crown. In forested stands, it is desirable to have a crown to base height of at least 15-20 feet (where the size of the tree allows), depending on the type and amount of surface fuels. Hazardous fuel reduction efforts to reduce vertical spread of a fire and ember

generation usually focus on removing smaller trees and brush (ladder fuels), plus increasing tree spacing and pruning branches of the trees to be left. Forests with more open canopies (space between larger trees) have reduced scorching and an increased chance of survival following a wildfire.

Spotting is when **firebrands or embers** are produced when brush and trees burn rapidly, lofting burning particles such as needles, leaves, bark, cones, and small branches into the convection column. Burning embers are transported by the wind and start new ignitions in receptive fuel beds, including forests and homes in front of the main fire. Spotting up to ¼ mile is common but under extreme conditions spotting can occur a number of miles ahead of the fire front. Spotting can have a significant effect on suppression effectiveness and fire size, as new ignitions can start well in advance of the main fire and across fire lines being constructed. Spotting by embers is one reason many homes perish before the main fire actually arrives.

Like in a fireplace, adding more fuel increases the intensity. In wildland fire **intensity can be correlated to flame length"**. Flame lengths are used in planning for suppression resource capability and can be related to firebrand production or spotting. Flame lengths are also used to project expected post-fire effects, including timber stand mortality. Wildland fire managers consider four-foot flame lengths the upper end of the scale for fire suppression success by hand crews. Flame lengths above four feet are expected to require heavy equipment and/or air support. Flame lengths above eight feet are expected to require substantial suppression efforts with fire behavior that includes torching, crowning, and spotting. Additionally, fuel profiles that generate flame lengths greater than eight feet usually create the more severe post-fire effects. Trees often die from scorching, even if the needles do not catch fire.

Wildland Fire Fuel Treatments

Successful fuels management to reduce fire intensity, extent, and consequently, damage requires efforts be spent on decreasing the volume and increasing the separation (horizontal and vertical) of forest fuel available to burn. This is usually best accomplished by thinning and treating surface fuels. There is a substantial amount of research on the effectiveness of treating forest fuels to modify fire behavior.

The following list of effective treatments types are commonly used to reduce hazardous fuels:

Mechanical (biomass) thin
Hand thin
Hand/machine pile
Mechanical mastication
Under-burning /prescribed fire
Biological

For a complete description of fuel treatment methods in forested lands refer to: ***Plumas County Hazardous Fuel Assessment and Strategy****,* developed for the Plumas County Fire Safe Council By Barry Callenberger, WILDLAND Rx; Zeke Lunder, North Tree Fire International; Aaron Stafford and Kent Lundberg, which is referenced in **Appendix C** of this plan.

Starting around 2005, numerous studies of the damage done to communities after wildfire events have consistently validated the effectiveness of hazardous fuel reduction treatments which were done previous to these fires. Some of the findings of these **studies of wildfires occurring on land that had previously had fuel treatments** demonstrated that these fuels treatments:

- Reduced decreased tree mortality by as much as 56% due to reduced tree canopy

continuity. (Angora Fire).
- Reduced fire intensity from 32 feet in untreated areas to 7.5 feet in treated areas. (Angora Fire)
- Changed fire behavior to reduce damage to ecosystem and at the same time lower fire intensity as it entered a nearby community. (Tahoe Fire, Camp Fire)
- Reduced embers and smoke in an urban environment which allowed firefighters to be more effective. (Angora Fire)
- Treated areas of a community that burned had reduced damage compared to untreated areas which burned while suppression resources were limited. (Wheeler Fire)
- During suppression efforts, treated areas were used by dozers and hand crews and allowed for the direct attack of the fire. (Wheeler Fire)
- Units where ladder fuels had been thinned and followed with a prescribed fire treatment, allowed a subsequent wildfire to drop to the ground. Nearby untreated units suffered total tree kill and canopy consumption. (Cone Fire)

Hazardous fuels management projects must be deployed across the landscape if they are to change wildfire intensity and spread, and thereby protect watersheds. Clearance around structures, as required by law (PRC 4291) is highly effective in reducing fire damage and destruction to structures. However, that same fire burning through untreated forests will lead to increased ember production and spread severe damage to nearby watersheds. Larger **landscape level treatments**, such as shaded fuel breaks or area treatments, complement the effectiveness of structure clearance treatments. These treatments slow the rate of fire spread and lower fire intensity which helps lower damage to watersheds and other natural resource damage.

Wildfire Priorities for Resource Commitment

In wildland fire suppression resources are allocated on a priority basis. **In order of priority** they are usually:

1. **Public and firefighter safety;**
2. **Protection of developed resources such as homes, and public & business buildings;**
3. **Protection of natural resources such as watersheds, trees, views and habitats.**

Of critical concern relative to natural resources is the protection from wildfire of key California watersheds within Plumas County.

Society generally accepts these priorities; however, some argue that without the aesthetic value, especially in rural areas, the value of the developed property is diminished. This hierarchy of resource commitment obligates sometimes**-**limited suppression resources to protect structures rather than stopping a fire's growth. In wildfire's aftermath, communities can often be left with standing homes and blackened forests.

There are numerous examples where homes and forests have survived the intrusion of a wildfire when proper construction methods, defensible space, and sound vegetation management practices were employed prior to the fire.

Values At Risk

Natural resources, man-made improvements, heritage resources, habitat, and anything considered of value by the community.

A. PC FSC Communities at Risk (CAR)

In the Federal Register / Vol. 66, No. 160 / Friday, August 17, 2001 / Notices is a listing of urban wildland interface communities within the vicinity of federal lands that are at high risk from wildfire. The Plumas County Fire Safe Council, in collaboration with local, state, and federal fire agencies, proposed amending Plumas County's listing of urban wildland interface communities within the vicinity of federal lands that are at high risk from wildfire, also referred to as "at-risk communities" or "Communities at Risk".

Due to the number of small communities spread through the county and the fact that naming all of them could be difficult, the council chose to define them geographically and also attach a general name, one that in many cases was already listed in the federal register. The map and listing of names were presented to the Board of Supervisors who approved the amended list and map on April 10, 2004.

B. PC FSC Wildland Urban Interface (WUI)

The wildland-urban interface (WUI) is commonly described as the zone where structures and other human development meet and intermingle with undeveloped wildland or vegetative fuels.

In 2004-2005 when the first Plumas County WUI map was developed the concept was to have two WUI boundaries, an "Adjacent WUI" and an Extended WUI", (0-.75 and.75 to 1.5 mile respectively). Consequently, the GIS program generated WUI's with circles around the CAR's, using the above criteria.

In 2010, the WUI boundaries were expanded to better link communities and the WUI. While implementing the CWPP since 2005, it became apparent to PC FSC during collaborative project outreach & development that the earlier computer generated WUI boundaries should be more contiguous with respect to connecting communities and logical in terms of watersheds, ridges, valleys or roads. Earlier WUI circle maps weren't well suited to watershed scale and larger community project planning. On November 2, 2010 the Plumas County Board of Supervisors approved the updated "Wildland Urban Interface" Map.

Appendix A Map #1: Plumas Communities at Risk and Wildland Urban Interface Map displays the defined boundaries.

C. Plumas County Fire Departments and Boundaries

In assessing risk, the identification of VFD District Boundaries and fire station locations are important. It is also important to understand what types of staffing levels exist in each district. Fire stations are coded on the map as to whether they are staffed with full-time personnel available to respond 24/7; volunteer, where volunteers will respond from their homes to the station to get the equipment; or seasonal, such as state and federal wildland fire agencies with staffing during fire season. Wherever possible all Fire Agencies participate with each other via mutual aid agreements. **See: Plumas Fire Department Boundaries and Stations Map in Appendix A Map #2**

D. Plumas County Communities Wildfire Evacuation Preparedness

Often critical to public safety is the ability of communities to rapidly evacuate. The Plumas County Office of Emergency Services has completed 28 wildfire evacuation route maps. The maps show suggested primary and secondary evacuation routes out of the community. Depending on the type of emergency, there may be more than one route out of the area. Direction of travel is dependent on the direction the wildfire is coming from and weather conditions. The Plumas County Sheriff is responsible for all evacuation notices. Plumas County utilizes CODE RED as the Emergency Alert Notification System for cell phone users. Plumas County Communities Wildfire Evacuation Plans and Maps are available at: https://www.plumascounty.us/2414/Wildfire-Evacuation-Maps

Risk

Risk is considered the potential for wildfires to start and threaten communities. Inherent to that is a display of where those communities are, including a buffer around them defined as "**Wildland Urban Interface**" (WUI).

A. PNF/LNF & CDF Ignitions Occurrence - Fire occurrence both natural and person- caused are frequent and spaced fairly uniform across the county, with concentration of person-caused fires closer to population centers, recreational areas, and travel corridors. Lightning accounts for over 50% of all fires in Plumas County. Human caused fire is most prevalent in and around communities. Ignition risk in Plumas County is displayed on the **Lightning and Human Ignition Occurrence by point source - 1984-2009 map. See: Appendix A Map #8**

B. PNF/LNF & CDF Large Fire Occurrence - Large fire history data for Plumas County shows that almost half of the county's acreage has been burned in large wildfires between 1900 and 2009; some of that acreage and large fire areas have been burned over more than once by subsequent fires. This historic data shows that Plumas County has had a history of large fires and frequent natural ignitions that have played a major role in the development of the present stand structure and vegetation found in Plumas County. These events is displayed on **the Plumas County Fire History Map 1900 to 2018. See: Appendix A Map #3**

Hazard

Defined as the amount of fuel available to burn at any given time in a given area.

The quantity of the fuel and the moisture of that fuel represent the availability of the fuel to burn. Fuels are represented by the surface, ladder and the canopy fuel loads. Fuel loading contributes to how fast and intensely a fire burns. Fire Behavior models are used to predict how fast a fire will burn, how intensively it will burn, and its potential for crowning and spotting.

A key fire behavior output is flame length. Flame length correlations are used in planning for suppression resource capability and can be related to firebrand production, spotting, and resource damage. The Plumas County Fire Safe Council has set a target flame length of 1-4 feet in stands where hazardous fuels are treated. While 4 feet is the upper limit, every effort should be made to reduce it to 2 feet, especially closer into structures and communities. Flame lengths less than 4 feet contribute to fire resilient stands.

A. Vegetation Types of Plumas County

Vegetation types play a key role in how intense a fire can become. Grass, brush, and timber are the three common types. Each has its own burning characteristics based on several inherent factors. Where grass is a light fuel which will burn fast and produce flame lengths which could be fatal, the duration is short and spotting limited. Timber, on the other end of the spectrum, can spread as a low intense surface fire when it has been treated, or burn in multiple layers as a catastrophic stand-replacing fire, generating the most intensity, spotting, and damage.

Vegetation types are displayed in **Appendix A Map #4: Vegetation Type Map for Plumas County**

B. Fuel Hazard Ranking

Fuel Hazard is ranked based on fire behavior considering the unique combinations of fuels and topography under severe weather conditions (temperature, relative humidity & wind).

Fuel Hazard Ranking is displayed in **Appendix A Map #5: Fuel Hazard Ranking Map**, created by Cal Fire's Fire and Resource Assessment Program (FRAP).

C. Plumas County Hazardous Fuel Reduction (HFR) Base Map

Extensive HFR activities have occurred across Plumas County scope of HFR activities countywide on public lands, (USFS, BLM, NPS, & CA State Parks), industrial & commercial landowners, NRCS activities on private lands and PC FSC community HFR projects.

Countywide HFR activities are displayed in **Appendix A Map #6: PC FSC Countywide Hazardous Fuel Reduction Base Map.** PCFSC projects from 2001 to present are archived at: www.plumasfiresafe.org/fire-and-fuels-reduction.html

D. Fire Return Interval Departure

Fire is a natural component of the ecosystem. Historically fires burned at differing intervals and intensities that contributed to a given ecosystem. With suppression of fires, there may be a deviation of that natural frequency and consequently a difference in how intensely it will burn in the future. in many parts of Plumas County fire was a frequent visitor and because the amount of fuel buildup between fires dictated the intensity at which it burned, many of the fires burned at low intensity. **See: Appendix A Maps #7**

Fire return interval information can be displayed in differing fashions:

a. **Mean Reference Fire return interval –** How frequently fire burned in the 3-4 centuries before European settlement.
b. **Time Since last Fire –** How many years since last recorded fire back to 1909.
c. **Mean Condition Class –** The frequency of departure of a pre-settlement fire regime using three Condition Classes to assess how far out of balance an ecosystem is based on its historical fire frequency and fire history since 1909.

Topography

Topography is the lay of the land to include slopes, aspect, elevation and other land features. Topography can affect not only the types of fuel, fuel moisture, fire behavior, suppression effectiveness and weather.

A. PLUMAS COUNTY'S GENERAL TOPOGRAPHY

The Cascades end in the northern part of the County where they merge into the Sierra Nevada. The Cascades range generally from 5,000 to 10,000 feet in height, with spectacular Mt. Lassen rising to 10,457 feet. The Sierra Nevada's rise from 1600 feet in the North fork of the Feather River to over 8,000 feet at Mt. Ingalls and Dixie Mountain. Plumas County sits mostly in the Sierra Nevada Range and lies between the Central Valley and Great Basin. There are about 30 mountain peaks over 7,000 feet in elevation. Most of the population centers are over 3,400 feet.

Almost all streams drain into the Feather Rivers, then into the Sacramento River and into San Francisco Bay. Streams are of varying size with a host of lesser creeks that drain small watersheds. Most of the major streams are fed by melting snow from the high slopes of the Sierra Nevada. Stream flow continues well into or throughout the arid summer months. Many of the streams have been dammed to hold the water supply in reservoirs for power generation, irrigation, and domestic uses throughout the dry part of the year, and to provide flood control during the winter and spring. As a result, less and less water from these streams flows directly to the ocean. Most of it is being used at least once before being drained to the sea or percolated into underground storage.

B. TOPOGRAPHY EFFECTS ON CLIMATE

Wide ranges of elevation (1,600- 8,000+ feet) are responsible in part for the variety of climates and vegetation found in the County. Another significant factor is the continuous interaction of maritime air masses with those of continental origin. The combination of these influences results in pronounced climatic changes within short distances.

Precipitation from fall and winter Pacific storms is heavy on western side of the Sierra Nevada and lighter on the eastern slopes. Precipitation is also slightly reduced at the highest elevations of the Sierra Nevada because the range extends above the level of maximum transport of the moisture laden winds from the Pacific.

Climate

Climate factors have an effect on weather factors that contribute to fire behavior. Specific weather factors affecting fire behavior are temperature, relative humidity, and wind.

A. EFFECT OF GENERAL CIRCULATION ON CLIMATE

A dominating factor in the weather of California is the semi-permanent high-pressure area of the North Pacific Ocean. This pressure center moves northward in summer, holding storm tracks well to the north, and as a result California receives little or no precipitation from this source during that period. In winter, the Pacific high retreats southward permitting storm centers to swing into and across California. These storms bring widespread, moderate precipitation to the State. When changes in the circulation pattern permit storm centers to approach the California coast from a southwesterly direction, copious amounts of moisture

are carried by the northeastward streaming air. This results in heavy rains and often produces widespread flooding during the winter months.

B. PRECIPITATION

Annual precipitation ranges from 82 inches, in Strawberry on the westside, to 22 inches in Portola, on the eastside. Summer is a dry period over most of the area. With the northward migration of the semi-permanent Pacific high during summer, most storm tracks are deflected far to the north. California seldom receives precipitation from Pacific storms during this time of year. Occasionally, however, moist monsoon air drifts northward during the warm months from the Gulf of Mexico or the Gulf of California. At such times, scattered, locally heavy thunder showers, usually with lightning, occur.

Snowfall in the Sierra Nevada, snow in moderate amounts is reported nearly every winter at elevations as low as 2,000 feet. Amounts and intensities increase with elevation to around 7,000 or 8,000 feet. Above 4,000 feet elevation snow remains on the ground for appreciable lengths of time each winter. Highways are closed for periods of a few hours to two or three days at a time by blowing and drifting snow. Cloud seeding in some areas of the County occurs to increase snow pack, for increased water quantity and runoffs, during the peak snow season.

C. THUNDERSTORMS

Over the interior mountain areas storms are more intense, and they may become unusually severe on occasion at intermediate and high elevations of the Sierra Nevada. In these mountain areas, thunderstorms, observed by radar at one point of another, average 50 to 60 days per year. They usually occur when cool, moist air moves in to break a prolonged hot spell. Thunderstorms can also produce some very strong and erratic winds as they dissipate.

D. TEMPERATURE

A large number of people come to Plumas County in order to enjoy the benefits of the four-season climate. Temperatures range from an average low in January of 19 degrees in Portola to an average high of 90 degrees in Quincy in July.

E. RELATIVE HUMIDITY

Inland humidity are high during the winter and low during the summer. Since the ocean is the source of the cool, humid, maritime air of summer, it follows that with increasing distance from the ocean, relative humidity tends to decrease. Where mountain barriers prevent the free flow of marine air inland, humidity's decrease rapidly.

Many thunderstorms produce little or isolated precipitation and forest fires often result from the lightning strikes, although pockets of heavy precipitation occasionally result. Some flash flooding has been reported as a result of thunderstorms. Hail up to one-half inch in diameter is sometimes reported, but serious hail damage is infrequent.

F. WINDS

California lies within the zone of prevailing westerlies and on the east side of the semi-permanent high-pressure area of the northeast Pacific Ocean. The basic flow in the free air above the State, therefore, is from the west or northwest during most of the year. The major canyons within the County, however, are responsible for deflecting these winds and, surface wind direction is likely to be as much of a product of local terrain as it is of prevailing circulation.

Since 1970, most of the acres burned have been under southwest and north wind conditions. Critical fire weather patterns vary within the County, but mostly a southwest flow, which occurs across Plumas County due to the general wind flow associated with air moving from sea to land and California lying in the "Belt of the Westerlies" global circulation pattern. In addition to the general southwesterly flow, topography and local up canyon flow from diurnal heating of the Sacramento Valley compliment this air movement, usually increasing speeds. The strongest southwest winds are associated with frontal system or low-pressure trough. These winds tend to cause most of the large fires in the county to burn from the southwest to the northeast.

On the western slopes of the County, before the crest of the Sierras, most large fires are driven from east to west by north and east winds, when a high-pressure form over the Great Basin and reversing normal air flows from land to sea. These conditions are magnified at night and in the early morning hours when down canyon winds are accelerated by the local diurnal process, the general flow and channeled topographically. These north and east wind events usually occur in the spring and fall, and have the largest impacts in the Feather River Canyons. In these events, relative humidity is also lower as the air mass originates on land versus sea, and as the air moves downslope it compresses, creating additional lowering. This is similar to what occurs in Southern California during Santa Ana conditions. Meteorologists with the US Forest Service conducted a study of these wind events. They found that while these patterns only occurred about 25% of the time in fire season, that 90% of large fires, on the western slopes, burned during those events.

G. WEATHER AND DROUGHT CYCLES

Weather and drought cycles greatly influence fire patterns and severity in the area. Researchers concluded that recent drought years during which many large, severe fires burned appear to be relatively common viewed on a time scale of centuries.

H. CLIMATE CHANGE

Forests help capture and store carbon dioxide (CO2) emissions. Forests absorb up to a third of carbon dioxide, the main greenhouse gas responsible for the planet's warming. The burning and removal of forests, coupled with the far-larger impact – petroleum usage – has increased atmospheric carbon beyond what has been seen for millions of years.

The majority of scientific research concerning climate trends indicates that climate has been changing since the mid-twentieth century. Trends suggest that the northern Sierra Nevada may become generally warmer and wetter, with longer periods of prolonged summer drought[1]. While warmer and wetter weather patterns may increase forest growth and carbon sequestration, warmer temperatures – in combination with longer periods of prolonged summer drought – will likely increase forest insect and disease outbreaks and the occurrence of high severity fire – disturbances which may result in increased carbon losses[2 & 3]. Such high severity disturbances could result in type-conversion to shrublands in forested ecosystems that are not adapted to such disturbance patterns – which could drastically

1 Merriam, K.E, Safford, H.D., and S. Sawyer. A summary of current trends and probable future trends in climate and climate-driven processes in the Sierra Cascade Province, including the Lassen, Modoc, and Plumas National Forests. USDA Forest Service Ecology Program.

2 Battles, J J, Robards, T, Das, A, Waring, K, Gilless, J K, Biging, G, and Schurr, F. 2008. Climate change impacts on forest growth and tree mortality: a data-driven modeling study in the mixed-conifer forest of the Sierra Nevada, California. Climate Change(2008) 87 (Suppl 1): S193-S213.

3 Westerling, A. L., H. G. Hidalgo, D. R. Cayan, and T. W. Swetnam. 2006. Warming and earlier spring increase western U. S. forest wildfire activity. Science 313(5789)940–943.

alter carbon cycles in the short and long term[4]. High-intensity wildfires, drought, and declining forest health are some effects of climate change that are worsening the threats to forests and reducing forest productivity.

Hotter and drier weather alter forest hydrology and water balance available to forest communities. Increased temperatures alter the timing of snowmelt, affecting the seasonal availability of water with earlier dry conditions which then provides fuel to earlier and hotter fires from stressed trees and shrubs1. Drought also reduces trees' ability to produce sap, which protects them from destructive insects and diseases. Research[5] [6]has found that large trees may be most susceptible to climate driven mortality – which the authors suggested can also be compounded by high stand densities of small trees due to fire suppression. Others[7] suggest that "regional warming and consequent increases in water deficits are likely contributors to the increase in mortality rates," and suggest that exogenous warming trends may be more of a driver of mortality, particularly in large diameter trees, than increasing stand density. Nonetheless, research indicates that warming climate is driving changes in forest structure.

Battles et al. (2008)[2] evaluated the impacts of climate change on the mixed-conifer region in California and provide insight to forest health concerns and management implications for forest managers. This study and others[8] found that changes in climate could "exacerbate forest health concerns" by increasing weakened tree susceptibility to mortality as a result of fire, disease epidemics and insect outbreaks and potentially enabling forest insects and disease to expand ranges or increase potential for widespread damage [2 & 8]. These predictions were realized the following decade in the central and southern Sierra Nevada wherein vast stretches of ponderosa pine forest were decimated in a drought driven epidemic. Other research[9] suggest that landscape level tree mortality may drive extreme fire behavior and high severity of future fire events in these forests.

In the State of California, the wildfires that have burned the most acres, caused the most destruction, and ended with the greatest loss of life have been in the last decade, with most of these dubious records set in the last five years. The past five seasons have substantiated the increase in fire behavior that was predicted by climate and fire scientists.[10] [11] Not only have these fires burned more of everything, but firefighters have agreed that

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4 Tepley, Alan & R. Thompson, Jonathan & Epstein, H & Anderson-Teixeira, Kristina. (2017). Vulnerability to forest loss through altered postfire recovery dynamics in a warming climate in the Klamath Mountains. Global Change Biology. 23. 10.1111/gcb.13704.

5 Fellows, A.W., and M.L. Goulden. 2008. Has fire suppression increased the amount of carbon stored in western U.S. forests? Geophysical Research Letters, Vol 35, L12404, doi:10.1029/2008GL033965.

6 Lutz, J.A., van Wagtendonk, J.W., and J.F. Franklin. 2009. Twentieth-century decline of large-diameter trees in Yosemite National Park, California, USA. Forest Ecology and Management 257 (2009) 2296-2307

7 Van Mantgem, P. J., et al. (10 co-authors). 2009. Widespread increase of tree mortality rates in the western United States. Science 323: 521-524.

8 Allen, C.D., D.D. Breshears, and N.G. McDowell. 2015. On underestimation of global vulnerability to tree mortality and forest die-off from hotter drought in the Anthropocene. Ecosphere 6(8): art129. doi: 10.1890/ES15-00203.1

9 Stephens, Scott L, Millar, C.I., and Collins, B.C. 2010. Operational approaches to managing forests of the future in Mediterranean regions within a context of changing climates. Environmental Research Letters 5 (2010) 024003

10 Miller, J. D., H. D. Safford, M. Crimmins, and A. E. Thode. 2009. Quantitative evidence for increasing forest fire severity in the Sierra Nevada and southern Cascade Mountains, California and Nevada, USA. Ecosystems 12: 16-32

11 Westerling, A. L., and B. Bryant. 2006. Climate change and wildfire in and around California: fire modeling and loss modeling. Report from the California Climate Change Center to the California Energy Commission. CEC-500-2006-190-SF.

wildfire behavior has become more erratic and uncontrollable. Fire rate of spread is a function of dry fuels and dry environment, and when coupled with wind the results have become a run-for-your-life situation. A 'firenado' with a 1000' diameter was confirmed in the Carr Fire in Redding in 2017.

Following massive wildfire, California forested counties further to the south are seeing widespread movement of forests upslope from their present locations. Elimination of Douglas-fir from lowlands is showing due to loss of winter chill conditions needed for germination and growth. Following a wildfire with little remnant seed source, shrubs and oaks are filling in the void left by the millions of dead ponderosa pine. These effects are also being realized in Plumas County. Studies of both the 2000 Storrie Fire and subsequent 2012 Chips Fire indicate that high severity fire can drive negative feedback loops that perpetuate future high severity fire thereby shifting forest communities to those dominated by shrubs.

Fire agencies realize that 'fire season' is no longer an easily defined period of time and recognize that wildfires can happen year-round. Dry fuels, wind, and ignition are all that is needed to convince us that wildfire threat is now. Winters with heavy snow and extended wet season have become fewer, and the trend of earlier drying is followed by earlier runoff, with subsequent warmer ground and fuel temperatures. The recent decade of terrible fires has been the result. The more 'normal' wet winter in 2019 has been a hope for return to climate that we can endure, but climate change will likely exacerbate the variability in year to year weather patterns. As such, the Plumas County CWPP should address climate change's worst-case scenario and prepare to respond to longer periods of drought and prolonged fire seasons, and prepare communities for more extreme fire behavior and the resulting effects.

The implications of climate change suggest useful strategies for communities and land managers can employ include: 1) creating resistant forest structures, 2) creating resilient forest landscapes, and 3) consider re-aligning vegetation communities to be more adapted to climate change. [12] [13]

Forest management strategies that increase species diversity, promote heterogeneity, and create lower density stands would be effective in providing "structures that are more resilient to catastrophic events like fire and (insect) epidemics"[14]. Prescribed fire, and its potential repeated use may help reduce stand densities which promote increased resilience to climate change driven drought conditions[15].

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12 Millar, C.I., N.L. Stephenson, and S.L. Stephens. 2007. Climate change and forests of the future: managing in the face of uncertainty. Ecological Applications 17: 2145-2151. doi:10.1890/06-1715.1

13 Stephens, Scott L, Millar, C.I., and Collins, B.C. 2010. Operational approaches to managing forests of the future in Mediterranean regions within a context of changing climates. Environmental Research Letters 5 (2010) 024003

14 Battles, J J, Robards, T, Das, A, Waring, K, Gilless, J K, Biging, G, and Schurr, F. 2008. Climate change impacts on forest growth and tree mortality: a data-driven modeling study in the mixed-conifer forest of the Sierra Nevada, California. Climate Change(2008) 87 (Suppl 1): S193-S213.

15 Van Mantgem, P. J., et al. (10 co-authors). 2009. Widespread increase of tree mortality rates in the western United States. Science 323: 521-524.

I. PLUMAS COUNTY TEMPERATURE & PRECIPITATION

Summary Tables: Average weather data **from 1981 to 2010** from four Plumas weather stations in Plumas County is displayed in the following Tables:

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
CHESTER													
Average Max. Temperature	41	45	51	58	67	77	85	84	77	66	48	41	61.8
Average Min. Temperature	21	23	26	30	36	42	46	45	39	33	26	22	32.4
Avg. Precipitation Inches	6.1	5.8	4.7	2.5	1.7	0.7	0.4	0.3	0.7	2	4.2	5.6	34.7
PORTOLA													
Average Max. Temperature	42	45	52	58	67	77	85	84	77	66	50	42	62.1
Average Min. Temperature	19	22	26	29	35	39	43	42	37	30	24	20	30.5
Avg. Precipitation Inches	3.7	4	3.2	1.6	1	0.5	0.3	0.3	0.6	1.2	2.7	3.8	22.9
QUINCY													
Average Max. Temperature	47	52	59	65	75	84	91	90	84	72	54	46	68.4
Average Min. Temperature	27	28	31	33	39	43	46	44	39	33	29	27	35.1
Avg. Precipitation Inches	7.4	7.3	6.2	3.1	1.8	0.7	0.2	0.2	0.7	2.5	5.6	7.8	43.4
STRAWBERRY VALLEY													
Average Max. Temperature	50	51	54	59	67	76	83	83	78	68	53	50	64.3
Average Min. Temperature	30	30	32	35	40	46	51	50	47	40	32	30	38.7
Avg. Precipitation Inches	15	15	12	6.1	3.2	1.2	0.3	0.4	1.5	4.3	11	12	81.3

Weather Data was obtained from: Western Regional Climate Center, wrcc@dri.edu

Fire Risk and Mitigation Strategies

This section is divided into **five areas of focus.** Mitigation strategies are prioritized by zone, with the highest priority being the structure ignition zone and working outward to the Extended Wildland Urban Interface (WUI). There are numerous factors which contribute to homes and communities being at risk to loss from wildfires, including hazardous fuel conditions. Many factors are under the control of the resident, property owner, community, or County.

Mitigation strategies areas of focus:

A. Information, Education, and Planning
B. Reducing Structure Ignitability
C. Enhancing Suppression Capabilities and Public Safety
D. Hazardous Fuel Reduction
E. Long Term Forest Health

Mitigation strategies prioritization by area:

1. **Home Ignition Zone: Zero to 100 feet (minimum)**
    - 0-30 foot Lean, Clean, Green Zone
    - 30-100 foot Reduced Fuel Zone
2. **Community-at-Risk (CAR)**
    - Urban Wildland Interface Communities within the vicinity of federal lands that are at high risk from wildfire originating on public lands.
    - Final designation was published in the Federal Register/Vol. 66, No. 160/Friday, August 17, 2001/Notices.
    - Communities were added in the CWPP development process of 2005.
    - Boundaries are displayed on the Plumas County Communities-at- Risk/ Wildland Urban Interface map.
3. **Wildland Urban Interface (WUI)**
    - The zone commonly described as where structures and other human development meet and intermingle with undeveloped wildland or vegetative fuels. Usually 1.5 mile around Community- at-Risk boundary.
    - Initially 2 zones (adjacent & extended) established in the 2005 CWPP, Modification to improve planning integration made in 2010.
    - Boundaries are displayed on the Plumas County Communities-at- Risk/ WUI map

The goal of this section is to identify situations and factors which place residences or communities at risk from wildfire, and suggest appropriate mitigation measure(s) to reduce that risk.

The objectives of this section are to:

- Identify mitigation measures by focus area. Focus is on public safety, firefighter safety, reducing structure ignitability, and reducing damage to other manmade and natural resources.
- Identify areas where collaborative efforts of local, state, and federal agencies can mitigate risks of structure ignitability, reduce hazardous fuels, and wildfire threats to communities.
- Support efforts of landowners, communities, Plumas County Departments, county fire chiefs, Firewise Communities, community fire safe councils, California Department of Forestry & Fire Protection (CAL FIRE), US Forest Service, and other agencies to collaboratively implement mitigation measures and obtain funding assistance.

Mitigation Measures by Focus Areas

Focus areas are broken down into elements which contribute to the risk of homes and communities being lost to wildfire. A statement of the situation or issue has been presented, followed with mitigation recommendations.

A	Risk Condition: **Information, Education, and Planning**
	Plumas County residents and communities have benefited from activities of Fire Safe Councils, local Fire Districts, and County, Municipal, State, and Federal agencies. The National Fire Plan, the Secure Rural Schools and Community Self-Determination Act, Title II and Title III and the Sierra Nevada Conservancy have provided funding for the councils. With this funding there have been a number of successful programs to the benefit of county residents. Some examples are:
	· Homeowner consultations · Emergency Preparedness and Wildfire Evacuation Planning · Senior and disabled defensible space creation and maintenance · Educational information and displays · Wildfire safety information provided and community meetings · Assist interested communities in becoming recognized Firewise USA Communities. · Hazardous fuel reduction projects · Maintain PC FSC Website for information
	Mitigation Measures:
A 1	**Fire Safe Council (FSC) growth -** Continue to seek participation and funding to support fire safe council growth in Plumas County
A2	**Continue to expand information & education to residents** from Fire Safe Councils, Firewise Communities, County of Plumas, Fire Districts, and State and Federal agencies should continue to provide and expand informational and educational programs for residents, property owners, and communities on ember awareness and what causes homes to ignite and burn in a wildland fire. Programs should also address: the need for safe access and signage, the importance of available water, adequate fire protection, and the critical role vegetation plays in wildland fire.
A 3	**Expand information & education through** Fire Safe Councils, Firewise Communities, County of Plumas, Fire Districts, and state and federal agencies should provide educational information for developers, realtors, contractors, home builders, and building inspectors on methods to ensure structural and forest survival following a wildfire. Educational programs should focus on PRC 4290 and the State Fire Marshall WUI Standards, with focus on what causes homes to ignite and burn in a wildland fire. Programs should also address: the need for good home site location, safe access, and signage; and the importance of available water, adequate fire protection, and the critical role vegetation plays in wildland fire including how to make forests fire-resilient.
A 4	**Evacuation planning -** Many of the County's communities have individualized suggested wildfire evacuation route maps. Efforts by the County and fire safe councils should continue to work towards providing plans to those communities without one. Work with landowners and federal agencies, adjacent to communities, to explore opportunities to develop alternative evacuation routes for communities. CAL FIRE's Ready, Set Go! Wildfire Evacuation plan is available to accompany local suggested evacuation route maps

A 5	Enhancing realtor and new homeowner understanding of structure fire protection and disclosure of High Fire Hazard information from Cal Fire – Due to the fragmentation of structural fire protection in Plumas County and the ever-lingering threat of wildfire, the County should continue current education outreach efforts to assist current residents, realtors, and those persons moving into the County. These efforts must include both the disclosure of the wildfire hazard, and whether or not the home resides within a fire protection district.
A 6	**Periodic updating of fire plan -** Completion of the Community Wildfire Protection Plan is only the first step in planning mitigation for wildland fire threat to homes and communities. This plan is a starting, not ending point. This plan should be considered a living document to be collaboratively reviewed and amended. Strive to provide an annual update of hazardous fuel reduction activities.
A7	**Provide education on use of prescribed fire** - Engage landowners and public in order to educate, promote and plan prescribed fire on private land in Plumas County. Prescribed underburns will help return landscapes surrounding and within Plumas communities to become more fire resilient.

B	Risk Condition**:** **Structure Ignitability**	
	The first priority for mitigation actions are immediately around structures, the home ignition zone, usually up to 100 (minimum) feet from the building. Research shows roofing, defensible space, and fire prevention measures within the home ignition zone play the largest roll in home survival. This zone critical to firefighter safety, as suppression resources may provide structure protection to a residence in a wildland fire. The level of attention given to a residence in terms of its vulnerability to ignitions is controlled by the owners, often days, weeks, months & years before a fire event. Information & technology is available to keep homes in the wildland urban interface from igniting, burning up, and placing firefighters at risk. There is no need to wait until the fire occurs. In fact, history has shown that those who wait will lose. Wildland Urban Interface building construction standards in California have lessened the risk for construction.	
B1	**Existing structures & attachments -** Strengthen building standards for construction, replacement activities, and enforcement of compliance for existing residences and properties to make them less prone to loss from a wildfire due to embers, radiated heat, or surface fire spread.	
	Risk Condition:	**Mitigation Measures:**
B1a	**Roofing** - Efforts should be made to eliminate wood shake roofs in Plumas County. **Shake roofs are a leading cause of home loss in wildfires.** Research shows that homes with non-combustible roofs and clearance of at least 30-60 feet have a 95% chance of survival in a wildfire. Currently county codes do not allow wood shake roof for new construction.	1. Continue **educating residents on importance of replacing wood shake roofs** - to eliminate shake roofing. Refer to IBHS roof data sheets: https://www.plumasfiresafe.org/home-safety-fact-sheets.html 2. **Seek financial assistance programs for wood shake roof replacement for qualifying individuals**.

B1b	**Decks –** Provide that adequate defensible space is maintained around and under decks. Provide maintenance of flammable vegetation debris and flammable furnishings on decks. The next greatest threat from decks is to firefighter safety. Some newer deck surfaces (synthetics) can ignite with direct flame more easily than wood but won't stay lit once the flame is removed. They do have a more rapid collapse when subjected to high heat loads.	1. **Educate residents** on importance of safe deck construction and maintenance. Refer residents to IBHS fact sheets concerning decks and fire spread on ember ignite decks: https://www.plumasfiresafe.org/home-safety-fact-sheets.html
B1c	**Vent openings** - Provided adequate defensible space is maintained, screening of vent openings with steel screens will prevent embers (during the ember blizzard that comes with a wildfire) from entering into attics and crawl spaces. Currently standards exist in the county for new construction, but not older structures.	1. Create owner awareness of the critical **importance of steel vent screening** - of all vent openings and promote screen **standard of a maximum 1/8 inch steel screen mesh**. 2. Create owner awareness of importance of remediating **flammable surfaces and objects inside and adjacent to vent** openings. 3. Promote the protection of roof vents in eaves and cornices with baffles where possible. 4. Refer residents to IBHS data sheets on Attic & Crawl Space Vents: https://www.plumasfiresafe.org/home-safety-fact-sheets.html
B1d	**Outbuildings** - Structures (e.g. storage, wood & tool sheds) with less than 30- feet separation from outbuildings place homes at a high risk of loss.	1. Continue educating residents on need for separation of heat loads from their residence. 2. Consider developing enforcement clearance requirements around all structures, a requirement of PRC 4291.
B1e	**Woodpiles** with less than 30 feet separation from outbuildings often place homes at a high risk of loss.	Continue educating residents to have 30 feet separation between firewood piles and their residence and not stored against homes, or on porches during fire season.
B1f	**Propane tanks** with less than 10 feet of vegetative clearance to bare mineral soil and no vegetation (per 14 CCR 1299.03 (c 1) may place homes at a risk of loss.	Continue educating residents on need for separation of heat loads - t**o have vegetative & flammable material clearance** around propane tanks and placed **at least 10 feet from any building**.
B1fg	**Propane tank regulators** – Propane Tank Regulators exposed to falling snow, ice or branches may place homes at a risk of loss from propane explosions in the winter months.	Continue educating residents on **need for snow protectors over regulators** - to protect them from being severed by snow, ice or branches.

B1h	**Defensible Space- Lean, Clean, Green Zone - (0-30') & Reduced Fuel Zone - (30-100')** Eliminating flammable vegetation within the 0-30' zone can significantly increase the chances of home survival during a wildfire threat. Reducing flammable vegetation within the 30-100' zone to comply with recommended California Defensible Space Guidelines can significantly increase the chances of home survival.	1. **Continue to provide information and education on methods to create defensible space and fire safe landscaping (0-30')** - Starting with the flammable free first 5 feet from the structure the emphasis should be on vegetation and landscaping materials that do not readily accept embers and perpetuate fire spread; along with keeping roofs and gutters free of leaves and needles. 2. **Continue to provide information and education on methods to create defensible space in the "Reduced Fuel Zone" (30-100')** – emphasis on reducing fuel ladders and increasing spacing between bushes and trees, so that flames and embers are reduced lessening the perpetuation of fire spread 3. **Continue to implement & seek additional funding assistance programs for PC FSC Defensible Space Assistance program - for qualifying senior & disabled citizens.**
B1i	**Defensible Space Enforcement** required by PRC 4291 in communities and the county is often difficult to obtain. While Public Resources Code 4291 requires that residents maintain at least 100 feet of defensible space, there are no mechanisms in place for uniform inspection obtaining compliance.	1. Continue to work with CAL FIRE to have their teams make annual seasonal team visits to supporting enforcement of PRC 4291 within Plumas County. 2. Continue to work within Firewise Communities to train volunteers to survey homes and encourage work to be done on residences that are non-compliant with PRC 4291.

C	Risk Condition**: Suppression Capabilities & Public Safety**	
	For new construction, updates to California Public Resources Code 4290 continue to address minimum fire safety standards related to defensible space that are applicable to state responsibility area lands under the authority of the department, and to lands classified and designated as very high fire hazard severity zones. Fire safety standards include: 1) Road standards for fire equipment access. 2) Standards for signs identifying streets, roads, and buildings. 3) Minimum private water supply reserves for emergency fire use. 4) Fuel breaks and greenbelts. Updated standards are good education tools for existing landowners and homeowners to strive for to have their property prepared for wildfire and emergency response access. Plumas County Building and Zoning codes have been updated to incorporate these standards.	
	Risk Condition:	Mitigation Measures:
C1	**Fire protection availability - a significant number** of the privately held parcels in the county are outside of a fire district. For those communities that are within a fire district, most are having severe budget problems.	1) **Continue current efforts on educating the public and expanding structural fire protection** - Plumas County should continue efforts in developing a fire district for **all** communities and proposed subdivisions presently without local fire protection.

C2	**Signage** is critical to agencies providing emergency services, not only for wildland fire purposes, but all emergency vehicle access. Plumas County should strive to have all residences and communities meet CA Fire Safe Standards (PRC 4290) for road and address signage. Plumas County Code 9-8.403 requires addresses to be posted on all buildings.	1) Continue to explore homeowner incentives for fire safe house signing - to meet CA Fire Safe Standards (PRC 4290) for signing of their homes. 2) Consider educating homeowners to measures which may include, but not be limited to, requiring proper signage upon sale. 3) Continue to support VFDs who are making signs for their communities.
C3	**Driveways and private roads** are critical to agencies providing emergency services, not only for wildland fire purposes, but all emergency vehicle access.	1) Educate existing property owners of current Fire Safe standards in place. For new private roads and driveways the County enforces the local ordinance certified by the Board of Forestry in lieu of PRC 4290. County codes are more restrictive than PRC 4290.
C3a	**Driveway length** - Many existing driveways are less than 150 feet of line sight distance from a road, however, the driving distance exceeds 150 feet with no way to turn apparatus around or allow for passing of vehicles.	1) Educate existing homeowners who built before Plumas County's 2018 SRA Fire Safe ordinance driveway standards within County Code on the importance of providing turn-outs and improved turn arounds.
C3b	**Gates** - Emergency responders have come across either narrow gates, or gates that do not open during power outages.	1) Continue educating residents on importance of emergency access through gates – so that gates conform to Plumas County Code Section 8-14.02(f) and can open during power outages. 2) Explore homeowner incentives for fire safe gates - to insure gates conform to Plumas County Code Section 8-14.02(f).
C3c	**Vegetative clearances** - Emergency responders have come across existing private roads and driveways too overgrown for their apparatus. CA Fire Safe Standards (PRC 4290) currently require that **vegetation be cleared for 14 feet horizontally and 15 feet vertically along driveways**.	1) Encourage enforcement of vegetative clearance requirements for CA Fire Safe Standards (PRC 4290). 2) Explore homeowner incentives for fire safe driveway vegetation clearances - to make driveways conform to CA Fire Safe Standards (PRC 4290) for vegetation clearances.
C3d	**Excessive slopes** - Emergency responders have come across driveways too steep for their apparatus.	Educate current residents to consider improving existing steep driveways to meet current Fire Safe regulations for safe access for emergency responders.
C3e	**Exempted turnarounds** - Emergency responders have come across private roads with limited space for turning around their apparatus.	1) Educate current residents to consider improving existing turnarounds to get the same practical effect as regulations.
C3f	**Bridges** - Emergency responders have often had to make decisions on whether or not their apparatus could squeeze through an allowed single lane bridge.	1) Consider placing signs identifying "one lane bridge ahead" for emergency responders as per Plumas County Code Section 9-4.907. 2) Post maximum GVW limits on all bridges as per Plumas County Code Section 9-4.907

C4	**Access for evacuations in and out of the community in the wildland urban interface (WUI)** - A number of existing "at risk" communities in Plumas County presently only have "one way" in and out of their community.	**Explore development of alternate community escape routes** - in the Wildland Urban Interface. Communities, industrial landowners, along with local, state, and federal agencies should work collaboratively to identify and pursue funding to improve access for evacuations
C5	**Water systems** - Water is a premium commodity in the suppression of both structural and wildland fires.	
C5a	**Existing communities** - Many existing Plumas County communities lack sufficient water storage, handling, or delivery systems, placing properties at a higher risk for loss to fire.	1) **Consider enhancing storage and delivery of water** - to increase water storage and delivery capacity in all Plumas County communities. 2) **Explore homeowner incentives** for enhancing water storage & delivery - to meet Plumas County Code 9-4.1002 for water for fire suppression on their properties. 3) Explore options to **collaboratively increase community storage & delivery** – and to obtain funding for enhancement of water storage and delivery systems.
C5b	**Proposed residential developments** - Communities may be allowed to develop in the county which have unacceptable water flow and/or storage for firefighting, once they achieve their full development (housing density).	Today Plumas County Code 9-4.1002 provides for modification to require less dense zones have an acceptable firefighting water supply/system as a requirement of new developments with projected high housing density.
C5c	**Development in the WUI** - Lack of accessible water sources for wild fire suppression in Plumas County.	Consider enhancing storage of water in WUI - Communities and local agencies should work collaboratively at the local, state, and federal level to identify opportunities to improve water storage, access, signage and development for firefighting on public and private lands.

D	Risk Condition: **Hazardous Fuel Reduction**	
	Risk Condition:	Mitigation Measures:
D1	**Vegetation on developed lots -** An excess of hazardous fuel around structures places many homes at risk. Structures are required to have at least 100 feet of defensible space (PRC 4291). More clearance may be necessary depending on fuels, slope aspect, and a property's position on the slope. Obtaining compliance with PRC 4291 is currently mostly voluntary and often difficult to obtain.	1) **Continue to educate residents** on the need for creating structure survivable space - by complying with PRC 4291 by removing vegetation around their residence. 2) **Explore homeowner incentives** to increase compliance with PRC 4291 - to meet CA Fire Safe Standards for defensible space on their properties. 3) **Continue to work with CAL FIRE for their inspection and enforcement of PRC 4291 regulations**.

D2	**Vegetation on adjacent vacant lots**. Presently in Plumas County, many parcels adjacent to homes are undeveloped with extensive fuel loading, placing neighboring homes at risk.	1) Continue to educate residents on the need for reducing hazardous fuels on vacant lots -to help protect the community and neighboring structures to the "Reduced Fuel Zone Standard of PRC 4291. 2) Explore property owner incentives to increase vacant lot cleanup. 3) Established communities may want to consider development of codes or HOA enforcement requiring vacant lots to conform to the reduced fuel standards. 4) Explore options to collaboratively to increase fuel reduction on vacant lots – Property owners, Plumas County Fire Safe Council, special districts, and Plumas County should work collaboratively to obtain funding for hazardous fuel reduction.
D3	**Vegetation in and around Communities-at-Risk.** While many communities have begun to develop Hazardous Fuel Reduction (HFR) projects, there is much untreated land between structures and in common areas and open spaces throughout the county. Projects include fuel breaks around, and/or fuel reduction within, the community	1) **Continue to encourage collaborative community based HFR projects** - Encourage property owners, homeowner associations, community services districts, and communities to identify through collaborative efforts strategic areas to perform hazardous fuel reduction (HFR) to eliminate catastrophic stand-replacing fire in their communities. 2) Review and implement recommended HFR projects - within and around communities that are **described by community in Appendix B of the Plumas County Hazardous Fuel Assessment and Strategy, produced for PC FSC by Wildland Rx in 2005**. 3) Continue to collaboratively **pursue funding for community HFR projects**. 4) **Explore incentives for landowners to reduce hazardous fuels** - to meet fire resilient conditions on their properties. 5) **Explore incentives and opportunities for large landowners adjacent to communities to reduce hazardous fuels**
D4a	**Treating hazardous fuels in planned subdivisions -** Many proposed subdivisions in Plumas County have hazardous fuel conditions before and after their division. Upon parcel sale, it transfers the problem to multiple landowners.	Consider modification of county codes to require HFR on proposed developments prior to recordation of final map, to treat fuels in an economy of scale, and ensure completion it may be prudent to require hazardous fuel reduction that is compatible with other environmental attributes on all forested lands to create fire-resilient stands.

D4B	**Maintenance of treated hazardous fuels in planned subdivisions** – Hazardous fuel treatment must be part of an on-going strategy in order to maintain a fire-resistant condition into the future. Once planned subdivisions are treated to a fire resilient condition, there need to be a written strategy to maintain that condition and an assignment of responsibility should be required,	Consider modification of county codes to **require a plan for the maintenance of treated fuelbeds on proposed developments prior to recordation of final map.** To fund and maintain the investment, desired fuel condition, and provide for community safety, in upcoming developments. Requiring a **hazardous fuel reduction maintenance plan** by either the Homeowners Association or Communities Service District will provide for future **fiscal and enforcement responsibilities** to maintain communities in a fire resilient condition.
D5	**Treating hazardous fuels on public lands within communities at risk** - There are approximately 30,000 acres of public lands within the boundaries of Plumas County's communities at risk.	S**trive to treat all public lands within community at risk boundary** - Through collaborative efforts, all public lands within communities at risk should be assessed for treatment. Available lands should be to a standard which will create a fire-resilient stand, which would not contribute to initiating or sustaining a crown fire, and potential surface fuel flame lengths would be 4 feet or less.
D6	**Treating hazardous fuels in the WUI** - "Community At Risk" boundary to the outer edge of the WUI is the area where collaborative community based hazardous fuel reduction efforts should occur so that fires approaching or leaving a community will be less intense, generate fewer embers for spot fires, and provide for defensible actions by suppression resources. These fuel reduction projects would focus on reductions in surface, ladder, and canopy fuels on public and private lands.	**1) Continue to work towards completing the QLG network and other HFR projects in the WUI on public lands -** Complete all proposed Quincy Library Group (QLG) projects, and seek opportunities to expand priority HFR projects adjacent to communities and in the WUI. 2) **Explore incentives for all landowners to reduce hazardous fuels** - Explore incentives (e.g. tax breaks, waive yield taxes, and THP exemptions) for existing large landowners to meet HFR standards on their properties.

E	**Risk Condition:**	**Long Term Forest Health**
	Risk Condition:	Mitigation Measures:
E1	Forests are at risk from overcrowding of canopy, understory, and ground vegetation due to decades of restrictions on all wildfires and management negligence.	**1) Continue to seek alliances** between Plumas residents, Firewise Communities, the U.S. Forest Service, CAL FIRE, and the Sierra Nevada Conservancy to mitigate overcrowding through collaborative thinning and under-burning efforts. 2) Educate Plumas residents as to the benefits of the use of prescribed fire near communities.

E2	Tree mortality risk is elevated as a result forest stress from overcrowding and more frequent drought conditions due to climate change.	**1) Continue to seasonally review tree mortality outbreaks** through efforts of the Plumas County Tree Mortality Task Force. **2) Help Communities at Risk** to evaluate and educate their residents on how to deal with dead trees locally during mortality outbreaks. 3) Continue to be ready and prepared to work with State and Federal resources during mortality outbreaks.

Appendices

All Appendices are maintained on the Plumas County Fire Safe Council website: https://www.plumasfiresafe.org/wildfire-planning-documents.html

A. Supporting Maps

1. **Plumas County Communities at Risk & WUI Map**
2. **Plumas County Fire Departments and Boundaries**
3. **Plumas County Fire History Map 1900 to 2018**
4. **Plumas Existing Vegetation Types Map**
5. **Cal Fire Hazard Fuels Rank County of Plumas Map**
6. **Plumas County Fire Safe Council Hazardous Fuel Reduction Base Map**
7. **Fire Return Interval Departure Maps**
8. **Plumas County Ignition Occurrences by Point Source**

B. Countywide Hazardous Fuel Reduction Projects

C. Plumas County Hazardous Fuel Assessment and Strategy 2004