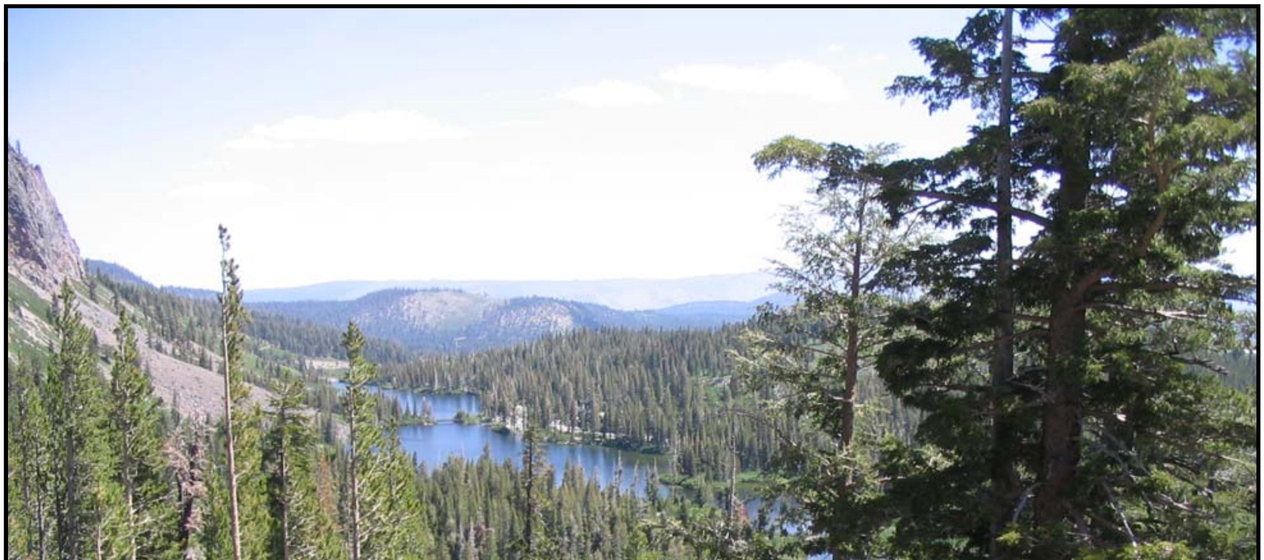
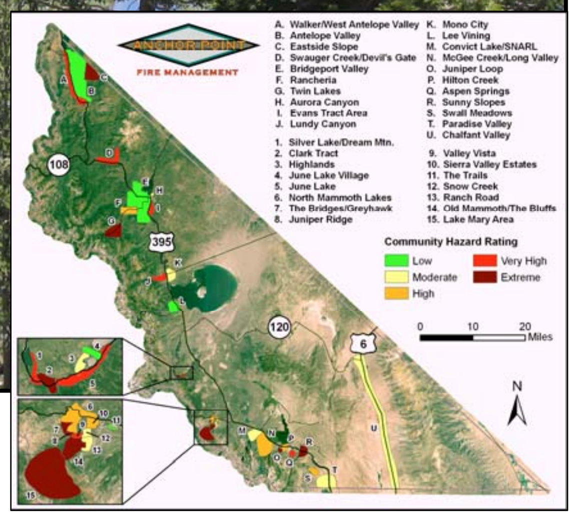
MONO COUNTY, CALIFORNIA

Community Wildfire Protection Plan





Prepared for:

Mono County
Mammoth Lakes, California

Submitted By:
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Boulder, Colorado

May, 2009

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PURPOSE

This document has the following primary purposes:

1. To provide a comprehensive, scientifically-based analysis of wildfire related hazards and risks in the Wildland-Urban Interface (WUI) areas of Mono County, California.
2. Using the results of the analysis, generate recommendations designed to prevent and/or reduce the damage associated with wildfire to WUI values in Mono County.
3. Create a Community Wildfire Protection Plan (CWPP) document for Mono County which conforms to the standards for CWPPs established by the Healthy Forest Restoration Act (HFRA) and the State of California and local FireSafe Council

INTRODUCTION

The Mono County CWPP is a result of a county-wide planning effort that included extensive field data gathering, the compilation of existing documents and GIS data, scientifically based analyses, and recommendations designed to reduce the threat of wildfire related damages to values at risk. This document incorporates new and existing information relating to wildfire which will be valuable to citizens, policy makers, and public agencies in Mono County, CA. Participants in this project include the Bureau of Land Management (BLM), the United States Forest Service (USFS), The Mammoth Lakes Fire Department, The Paiute Tribe (Bridgeport Colony and Benton Paiute Reservation), CalFire, the Los Angeles Department of Water and Power (DWP), other local fire departments, FireSafe councils, HOA groups, and stakeholders. This document meets the requirements of the federal Healthy Forest Restoration Act of 2003 for community fire planning.

The assessment portion of this document estimates the hazards and risks associated with wildland fire in proximity to communities. This information, in conjunction with identification of values at risk, defines “areas of concern” for Mono County and allows for prioritization of mitigation efforts. From the analysis of this data, solutions and mitigation recommendations are offered that will assist homeowners, land managers and other interested parties in the process of developing short-term and long-term fuels and fire management plans.

Wildfire hazard data is derived both from the community Wildfire Hazard Rating system (WHR) and from the analysis of Fire Behavior Potential, which are extensive and/or technical in nature. Detailed findings and methodologies for these analyses are included in their entirety in appendices rather than the main report text. This approach is designed to make the plan more readable, while establishing a reference source for those interested in the technical elements of the Mono County wildfire hazard and risk assessment.

For the purposes of this report the following definitions apply:

Risk is considered to be the likelihood of an ignition occurrence. This is primarily determined by the fire history of the area.

Hazard is the combination of the WHR ratings of the Wildland-Urban Interface (WUI) neighborhoods and the analysis of Fire Behavior Potential, as modeled from the fuels, weather, and topography of the study area. Hazard attempts to quantify the severity of undesirable fire outcomes to the Values at risk. In essence, hazard represents the vulnerability of Values at risk to negative impacts from wildfire.

Values at risk are the intrinsic values identified by the citizens and stakeholders as being important to the way of life in the study area (e.g., life safety, property conservation, access to recreation, and wildlife habitat).

THE NATIONAL FIRE PLAN AND THE HEALTHY FOREST RESTORATION ACT

In the year 2000, more than eight million acres burned across the United States, marking one of the most devastating wildfire seasons in American history. One high-profile incident, the Cerro Grande fire at Los Alamos, NM, destroyed more than 235 structures and threatened the Department of Energy's nuclear research facility.

Two reports addressing federal wildland fire management were initiated after the 2000 fire season. The first report, prepared by a federal interagency group, was titled "Review and Update of the 1995 Federal Wildland Fire Management Policy" (2001). This report concluded, among other points, that the condition of America's forests had continued to deteriorate.

The second report, titled "Managing the Impacts of Wildfire on Communities and the Environment: A Report to the President in Response to the Wildfires of 2000", was issued by the Bureau of Land Management (BLM) and the United States Department of Agriculture Forest Service (USFS). It became known as the National Fire Plan (NFP). This report, and the ensuing congressional appropriations, ultimately required actions to:

- Respond to severe fires
- Reduce the impacts of fire on rural communities and the environment
- Ensure sufficient firefighting resources

Congress increased its specific appropriations to accomplish these goals. 2002 was another severe season: more than 1,200 homes were destroyed and over seven million acres burned. In response to public pressure, congress and the Bush administration continued to designate funds specifically for actionable items such as preparedness and suppression. That same year, the Bush administration announced the HFRA initiative, which enhanced measures to restore forest and rangeland health and reduce the risk of catastrophic wildfires. In 2003, that act was signed into law.

Through these watershed pieces of legislation, Congress continues to appropriate specific funding to address five main sub-categories: preparedness, suppression, reduction of hazardous fuels, burned-area rehabilitation, and state and local assistance to firefighters. The general concepts of the NFP blended well with the established need for community wildfire protection in the study area. The spirit of the NFP is reflected in the Mono County CWPP.

This CWPP meets the requirements of HFRA by:

1. Identifying and prioritizing fuels reduction opportunities across the landscape (see *Fuels Modification Projects*, page 44).
2. Addressing structural ignitability (see *Home Mitigation*, page 35 and **Appendix B**).

3. Assessing community fire suppression capabilities (see *Local Preparedness and Firefighting Capabilities,* page 41)
4. Collaborating with stakeholders (see page 4 and **Appendix F**).

GOALS AND OBJECTIVES

Goals for this project include the following:

1. Enhance life safety for residents and responders.
2. Mitigate undesirable fire outcomes to property and infrastructure.

In order to accomplish these goals, the following objectives have been identified:

1. Establish an approximate level of risk (the likelihood of a significant wildfire event in the study area).
2. Provide a scientific analysis of the fire behavior potential of the study area.
3. Group values at risk into "communities" that represent relatively similar hazard factors.
4. Identify and quantify factors that limit (mitigate) undesirable fire effects to the values at risk (hazard levels).
5. Recommend specific actions that will reduce the vulnerability of the values at risk.

Other Desired Outcomes

1. To promote community awareness:
    - Quantifying the community's hazards and risk from wildfire will facilitate public awareness and assist in creating public action to mitigate the defined hazards.
2. To improve wildfire prevention through education:
    - Community awareness, combined with education, will help to reduce the risk of unplanned human ignitions.
3. To facilitate and prioritize appropriate hazardous fuel reductions:
    - The identification of areas of concern will improve the focus and accuracy of pre-planning, and facilitate the implementation of cross-boundary, multi-jurisdictional projects.

COLLABORATION: COMMUNITY / AGENCIES / COUNCILS

The names of the representatives involved in the development of the Mono County CWPP are included in the **Table 1**, along with their organizations and various roles and responsibilities. For more information on the collaborative process that led to the development of this CWPP see **Appendix F**, *Mono County CWPP Collaborative Effort*.

Table 1. Mono County CWPP Development Team

Name	Organization	Roles / Responsibilities
Debra Hein	**BLM**	**Contract Management – Primary Contact**
Bob Rooks	**Mammoth Lakes FD**	**Contract Management – Primary Contact**
Dale Schmidt	**LADWP/Wheeler VFD**	**Agency Representation**
Marc McDonald / Chris White	**Anchor Point**	**Primary Team Representatives**

STUDY AREA OVERVIEW

Mono County is located in east central California. The area of the County is 3,132 square miles (8,111.8 km^2). Of this area, 3,044 square miles (7,883.9 km^2) are land and 87 square miles (225.3 km^2 – 2.79%) are water.

Mono County is highly varied in terms of topography and climate. The study area encompasses, at one extreme, the high country of the eastern Sierra Nevada, where annual snowfall reaches 385 inches in some places; at the other extreme is the Chalfont Valley, which represents a significant desert area. Many different climate and life zones are encompassed by this large and diverse county. Vegetation and coverage ranges from the heavy mixed-conifer timber of the Sierra Nevada to the sparse desert shrubs and grasses of Chalfont Valley.

Figure 1 shows the neighborhoods that define the Wildland-Urban Interface (WUI) study area. As a part of this project, the most populated areas in the WUI were divided into 36 communities. **Figure 2** shows the designated WUI for the county as defined by a five mile buffer around each community. For the purposes of this report, land beyond the five mile buffer is not considered interface.

Each of the 36 communities represents certain dominant hazards from a wildfire perspective. Fuels, topography, structural flammability, availability of water for fire suppression, egress and navigational difficulties, as well as other natural and manmade hazards, are considered in the overall hazard ranking of these communities.

The methodology for this assessment uses the WHR community hazard rating system that was developed specifically to evaluate communities within the WUI for their relative wildfire hazard.[1] The WHR model combines physical infrastructure (structure density, roads, etc.) and Fire Behavior Components (fuels, topography, etc.) with the field experience and knowledge of wildland fire experts. For more information on the WHR methodology please see **Appendix B**.

[1] White, C. “Community Wildfire Hazard Rating Form.” *Wildfire Hazard Mitigation and Response Plan*. Colorado State Forest Service. Ft. Collins, CO. 1986.

Figure 1. Mono County Community Hazard Rating Map

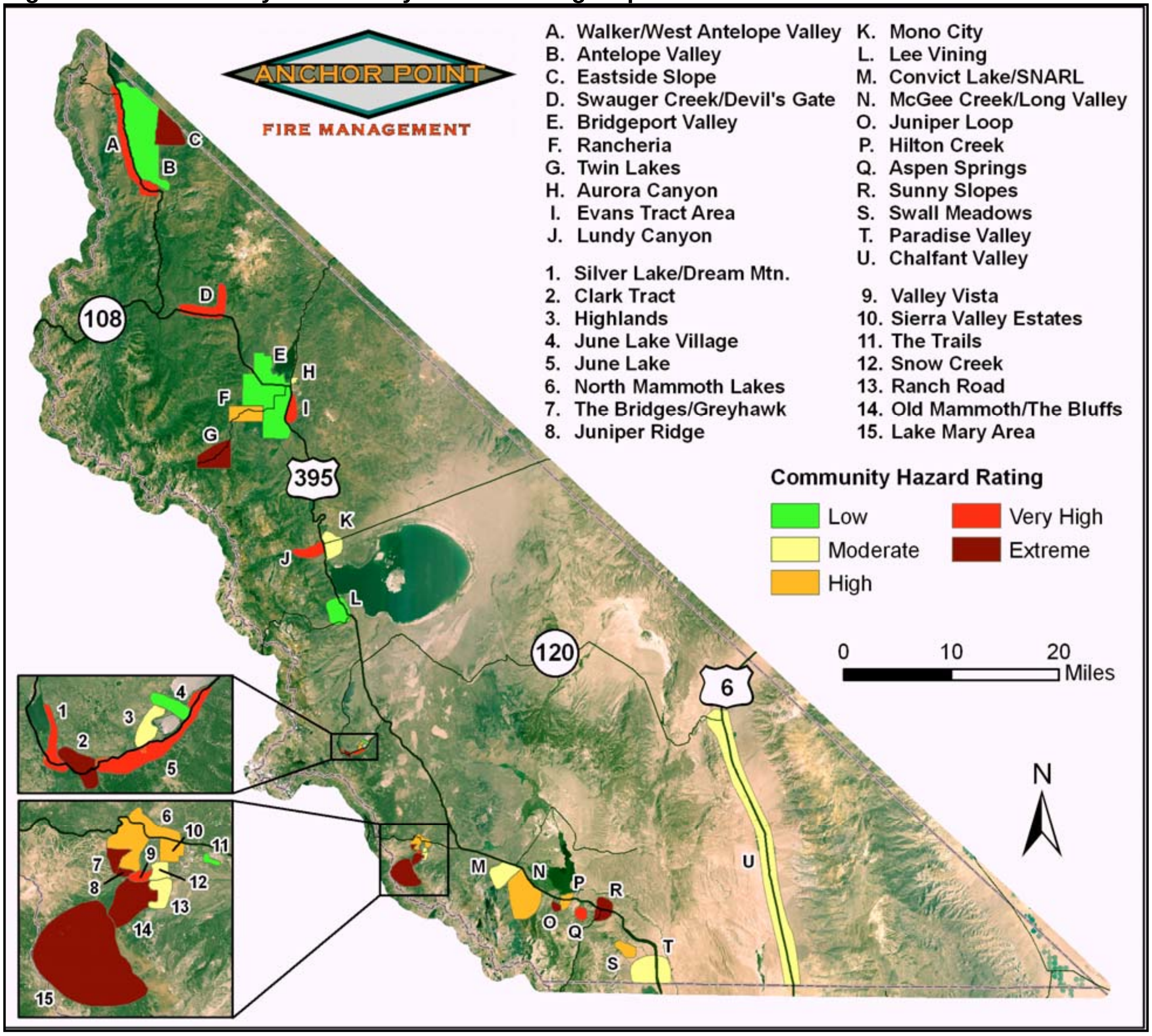
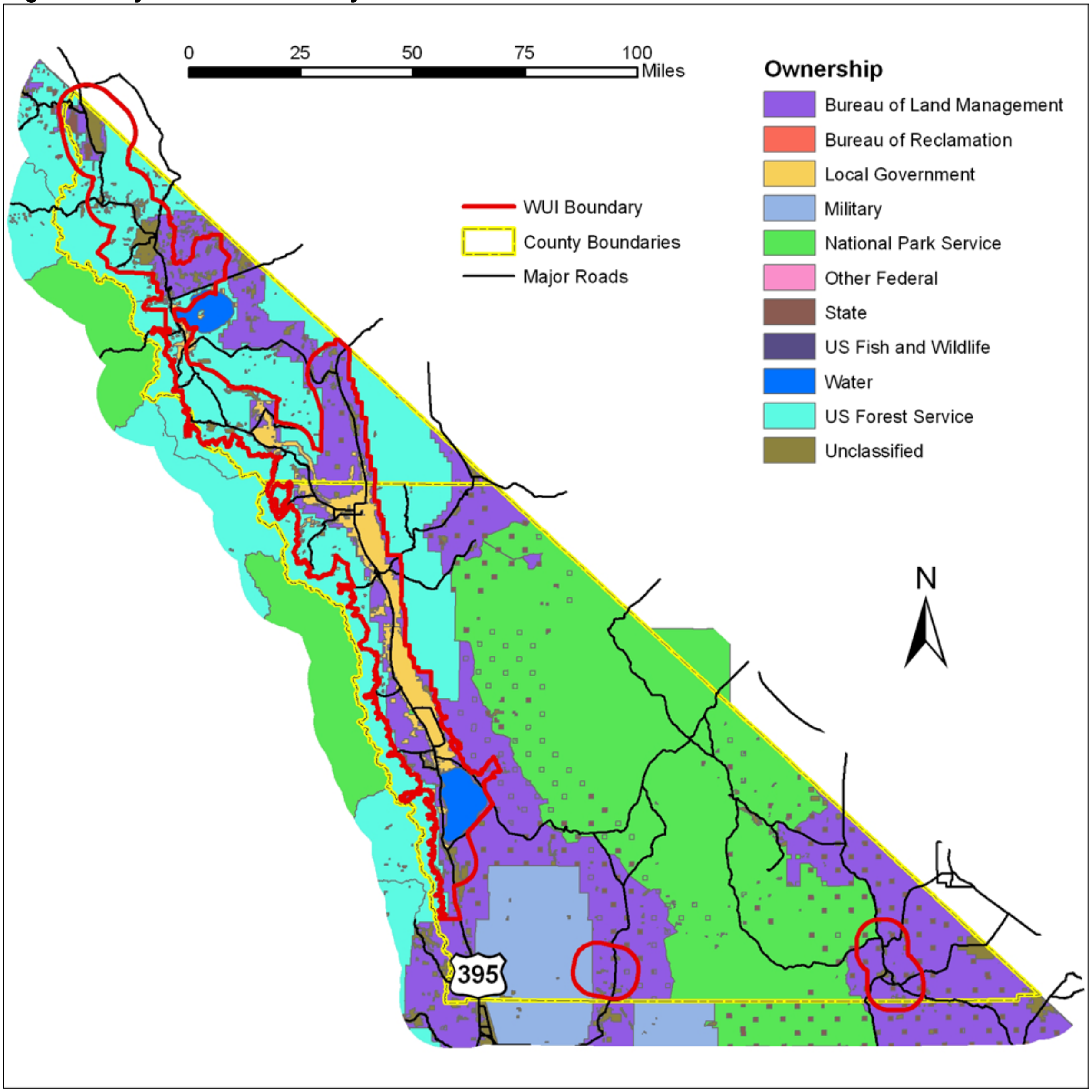


Figure 2. Inyo and Mono County WUI boundaries



The designated Wildland-Urban Interface boundary for Mono County was determined by adding a custom buffer around designated WUI communities (shown above). The actual study area for this CWPP includes a standard 5-mile buffer around designated communities. This custom buffer around each community (shown in red above) should help to account for some of the dispersed development surrounding defined communities. Some homesteads and ranches may lie outside of the defined WUI communities; these are not considered communities and are therefore not within the scope of this CWPP, although they may fall within the designated WUI.

Figure 3 and **Figure 4** show the general topography of the area. These graphic representations of the landforms of the study area (elevation and slope) will be helpful in interpreting other maps in this report. Please refer to these figures as necessary while reading this document.

Figure 3. Mono County Slopes

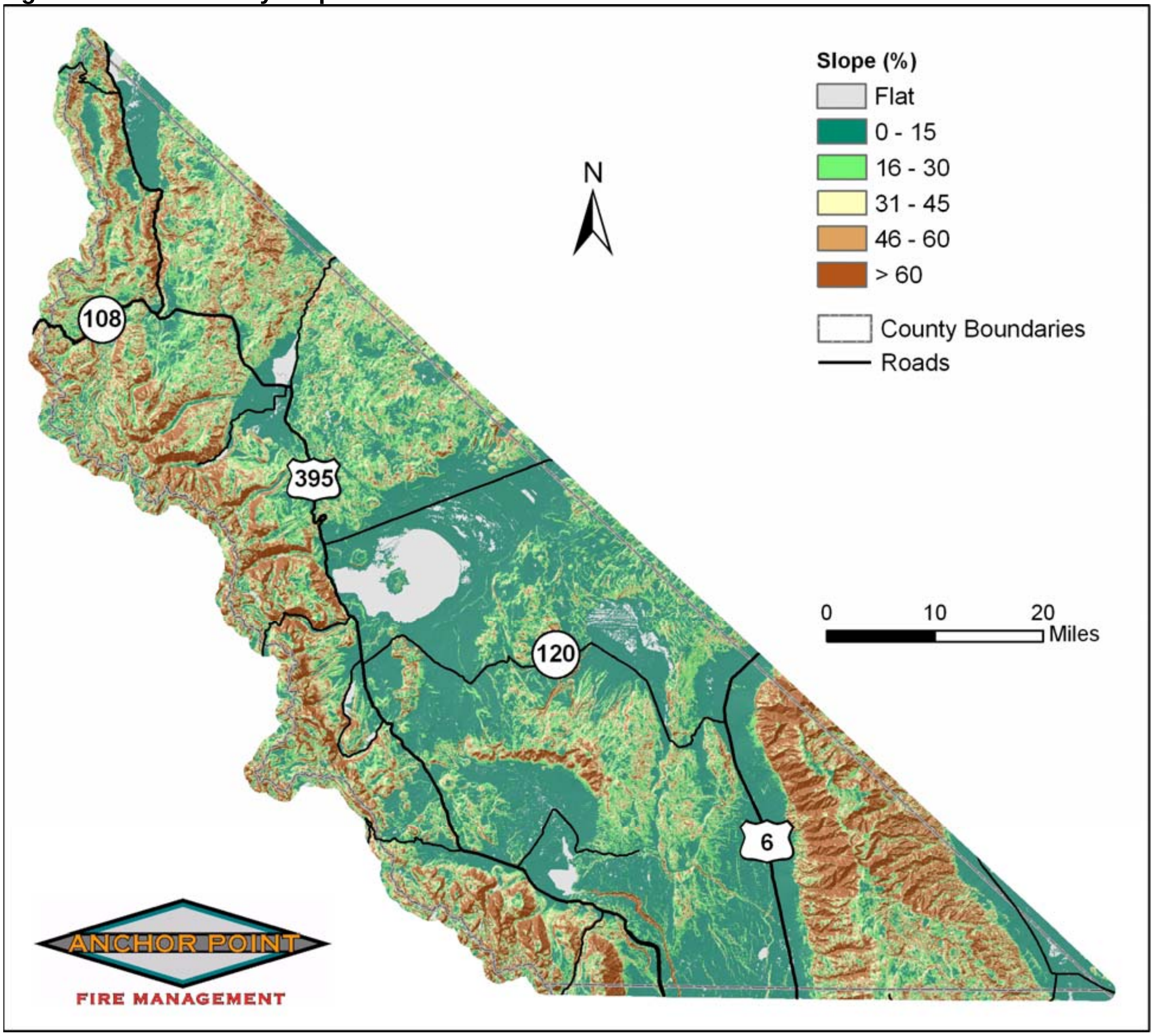
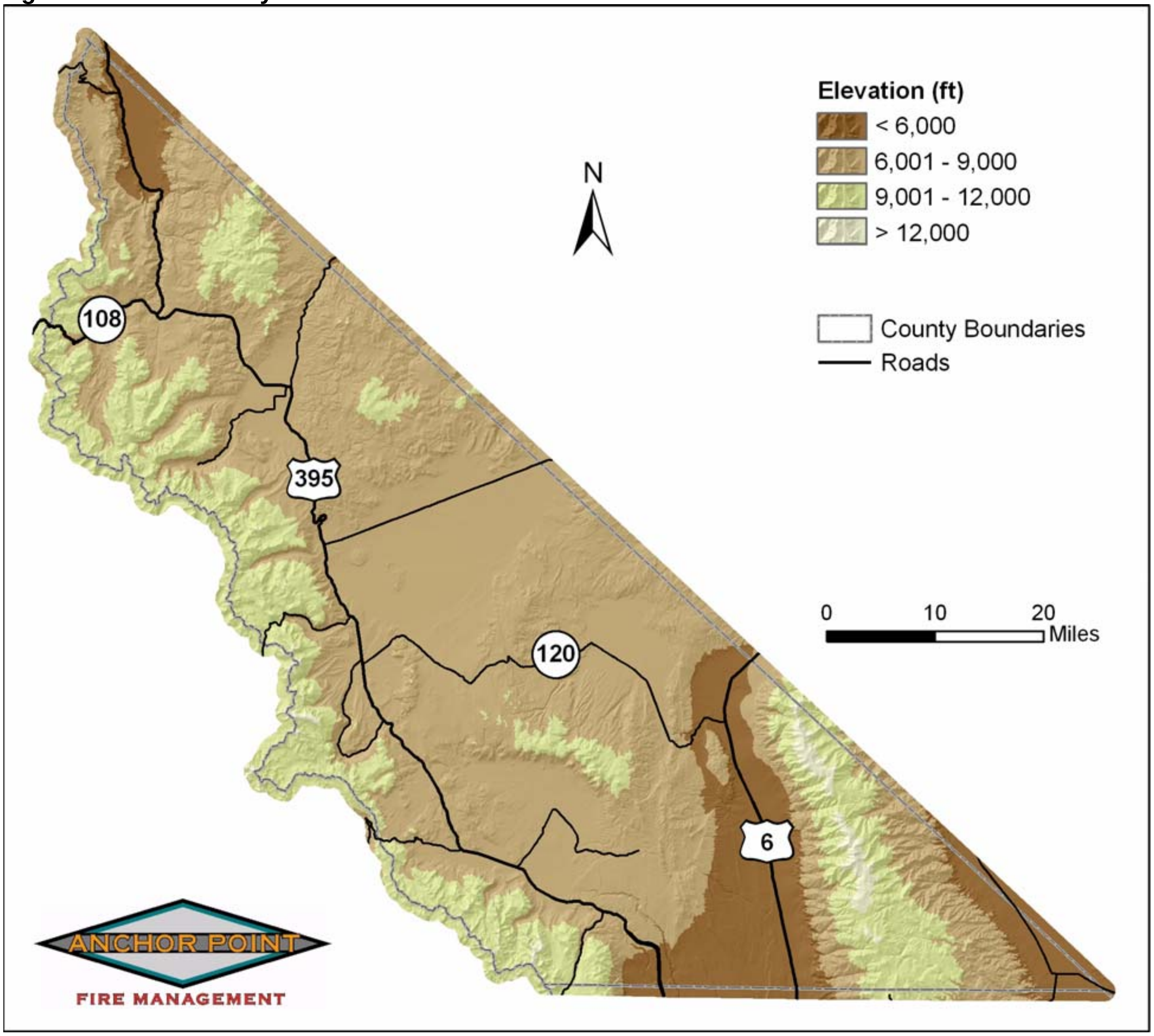


Figure 4. Mono County Elevations



VALUES

Mono County is a land of magnificent natural diversity, and public lands account for over 94% of Mono County, with 88% federal and 6% state-owned lands.[2] According to 2006 statistics, approximately 12,654 residents reside within 5,137 households in Mono County.[3] Maintaining Mono County's natural environment and rural quality of life is a priority for residents.

Of the 36 WUI communities in Mono County, nine were found to represent an extreme hazard, eight were rated as very high hazard, six as high hazard, eight as moderate hazard, and five as low hazard (see **Figure 1**). Construction type, condition, age, the fuel loading of the structure/contents, and position are contributing factors in making homes more susceptible to ignition under even moderate burning conditions. Under extreme burning conditions, there is a likelihood of rapid fire growth and spread in these areas, due to steep topography, flammable construction types, natural or manmade hazards, fast burning or flashy fuel components, and topographic features that contribute to channeling winds and promotion of extreme fire behavior. These areas may also represent a high threat to life safety due to poor egress, the likelihood of heavy smoke and heat, and extended response times.

RECREATION AND LIFESTYLE

Mono County offers many recreational opportunities, such as backcountry skiing, alpine climbing, hang gliding, horseback riding, and mountain biking. Damage by wildfire could threaten the recreational and scenic value of the area.

With over two million acres, the Inyo National Forest, which extends into both Inyo and Mono counties, is home to many natural wonders, including Mono Lake, the Mammoth Lakes Basin, and seven Congressionally-designated Wildernesses comprising over 650,000 acres of land. Mono County is also home to the Humbolt-Toiyabe National Forest.

The Bishop Field Office of the BLM cares for a unique vestige of wild California, emphasizing conservation, education and partnerships. Their mission is to sustain the health, diversity and productivity of the 750,000 acres of BLM public lands they are entrusted to manage.

To support the vast amount of recreational opportunities within Mono County, multiple public campgrounds and countless private campgrounds exist. Nationally campgrounds are threatened and damaged every year by wildfire.

ENVIRONMENTAL FACTORS

Countless animal and plant species thrive within Mono County, a few of which are categorized as threatened and/or endangered. Wildfire produces more than just a visual alteration to the landscape. Animal habitat is disrupted through the loss of food sources such as edible twigs, leaves of woody plants, and grasses. Soil erosion increases sedimentation into the waterways threatening varieties of fish.

The effects of wildfire can damage critical watershed areas thus creating water quality issues. All mountain, wilderness, and rangelands hold some sort of watershed value.

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[2] Mono County Collaborative Planning Team MOU, April 2000.
[3] US Census Bureau, http://quickfacts.census.gov/qfd/states/06/06027.html, Accessed 02/07

CURRENT RISK SITUATION

For the purposes of this report the following definitions apply:

> **Risk** is considered to be the likelihood of an ignition occurrence. This is primarily determined by the fire history of the area.
>
> **Hazard** is determined by combining the WHR ratings of the WUI neighborhoods with Fire Behavior Potential, as modeled from the fuels, weather, and topography of the study area.

Most of the northern and southwestern portions of the county are at a high risk for WUI fires. Most of the populated areas of the northern and southwestern portions of the county are at a moderate risk for WUI fires. In addition to this report's analysis, the following communities are listed on the Federal Register as communities at risk from wildfire.

- (http://www.forestsandrangelands.gov/resources/documents/351-358-en.pdf): Bridgeport Valley, Twin Lakes, June Lake, Mono City, Lee Vining, Aspen Springs, Swall Meadows, and Snow Creek.

FIRE REGIME CONDITION CLASS

Fire Regime Condition Class (FRCC) is a landscape evaluation of expected fire behavior as it relates to the departure from historic norms. The data used for this study is from a national-level map. The minimum mapping unit for this data is one square kilometer. FRCC should not be confused with BEHAVE and FlamMap fire behavior models (detailed in the fire behavior section of this report), which provide the fire behavior potential analysis for expected flame length, rate of spread, and crown fire development.

FRCC is an expression of the departure of the current condition from the historical fire regime. It is used as a proxy for the probability of severe fire effects such as the loss of key ecosystem components (soil, vegetation structure, species) or alteration of key ecosystem processes (nutrient cycles, hydrologic regimes). Consequently, the FRCC is an index of hazards to the status of many components (e.g., water quality, fish status, wildlife habitats, etc.). **Figure 5** displays graphically the return interval and condition class of the study area.

FRCC is derived by comparing current conditions to some estimate of the historical range that existed prior to substantial settlement by Euro-Americans. The departure of the current condition from the historical baseline serves as a proxy to likely ecosystem effects. The condition class concept assumes that historical fire regimes accurately represent the conditions under which the ecosystem components within a fire-adapted ecosystem naturally evolved. Thus, if it is projected that fire intervals and/or fire severity have changed from the historical conditions, one would expect that fire size, intensity, and burn patterns will also be subsequently altered if a fire occurred. Furthermore, it is assumed that if these basic fire characteristics have changed, then it is likely that there would be subsequent effects to those ecosystem components that had adapted to the historical fire regimes. As used here, the potential of ecosystem effects reflects the probability that key ecosystem components may be lost if a fire were to occur within the study area. It should be noted that key ecosystem components can be represented by virtually any attribute of an ecosystem (for example, soil productivity, water quality, floral and faunal species, large-diameter trees, snags, etc.).[4]

The following categories of condition class are used to qualitatively rank the potential of effects to key ecosystem components:

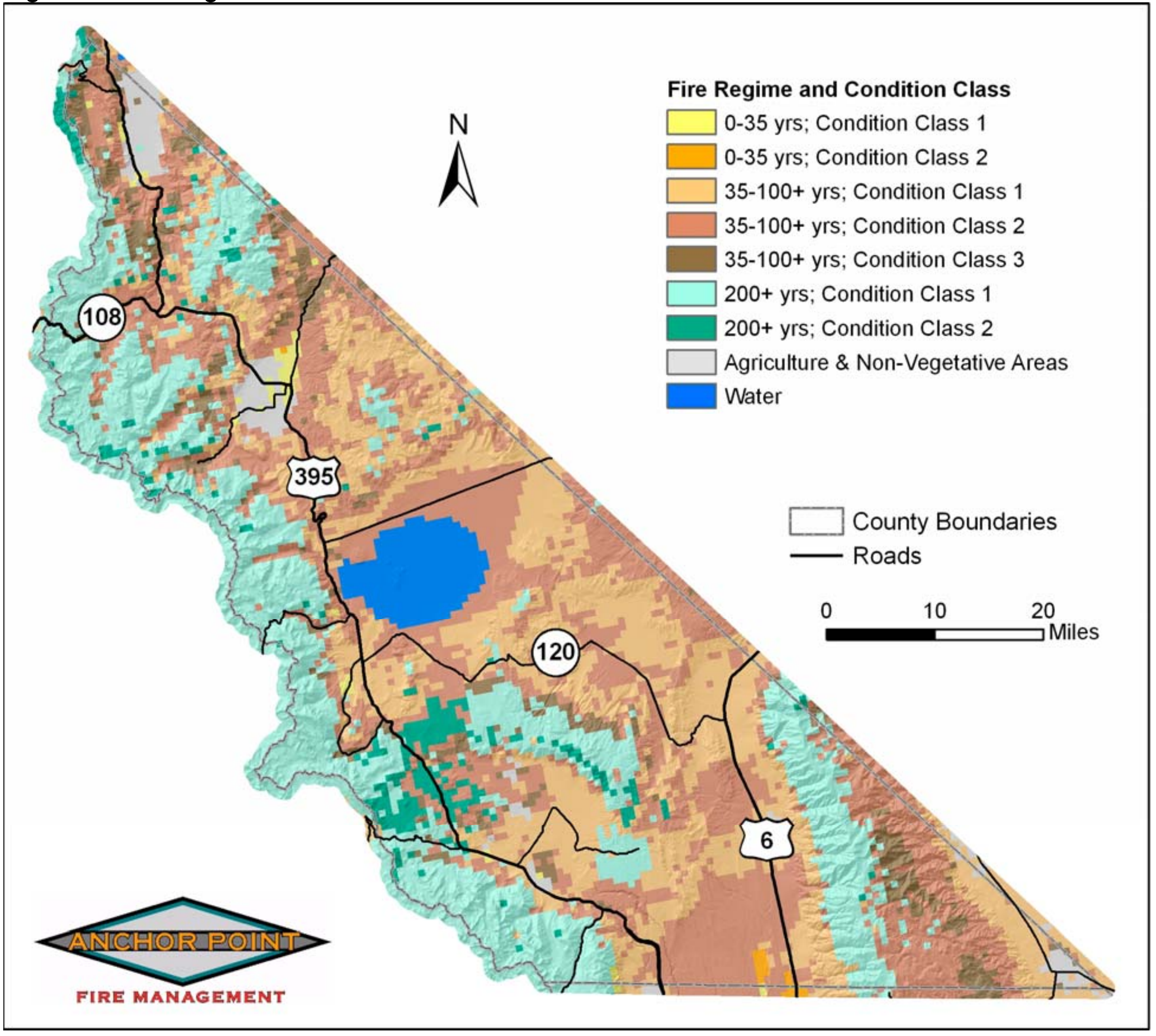
[4] Fire Regime Condition Class, website, http://www.frcc.gov/, July 2005.

Table 2. Condition Class Descriptions

Condition Class	Condition Class Description
1	Fire regimes are within their historical range and the risk of losing key ecosystem components as a result of wildfire is low. Vegetation attributes (species composition and structure) are intact and functioning within a historical range. Fire effects would be similar to those expected under historic fire regimes.
2	Fire regimes have been moderately altered from their historical range. The risk of losing key ecosystem components as a result of wildfire is moderate. Fire frequencies have changed by one or more fire-return intervals (either increased or decreased). Vegetation attributes have been moderately altered from their historical range. Consequently, wildfires would likely be larger, more intense, more severe, and have altered burn patterns than that expected under historic fire regimes.
3	Fire regimes have changed substantially from their historical range. The risk of losing key ecosystem components is high. Fire frequencies have changed by two or more fire-return intervals. Vegetation attributes have been significantly altered from their historical range. Consequently, wildfires would likely be larger, more intense, and have altered burn patterns from those expected under historic fire regimes.

The WUI portions of the study area are dominantly classified under Condition Classes 1 and 2. Thus, fire regimes are either within their historic range or moderately altered from their historical range. The risk of losing key ecosystem components to fire is low to moderate. Consequently, in Condition Class 2 areas, fire effects are expected to be larger, more intense, and more severe than would be expected under historic fire regimes, with altered burn patterns.

Figure 5. Fire Regime and Condition Class



The surrounding federally managed lands report an active fire history. Fire statistics for the Mono Lake, Mammoth, and White Mountain Ranger Districts (USFS) were extracted from Personal Computer Historical Analysis (PCHA) data for the 20-year period from 1986-2006. These areas represent all USFS managed lands in and near the study area, but do not include any data from areas that are exclusively the responsibility of local or state (CalFire) agencies. **Figure 6** shows the data extent for this analysis. The results are graphed and summarized on pages 16 and 17 below.

Figure 6. Data Extent for Mono County Fire History

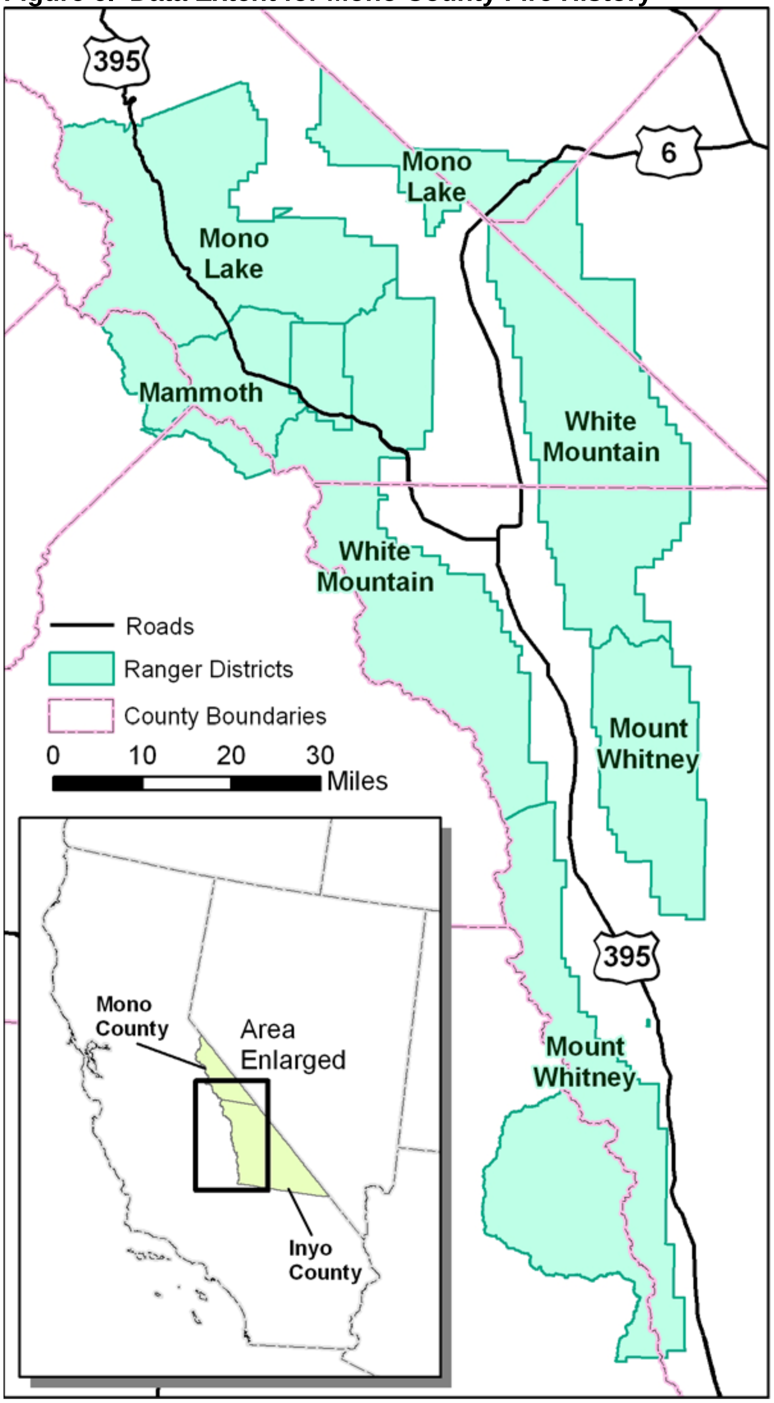


Figure 7. Number of Fires by Year (1986-2006)

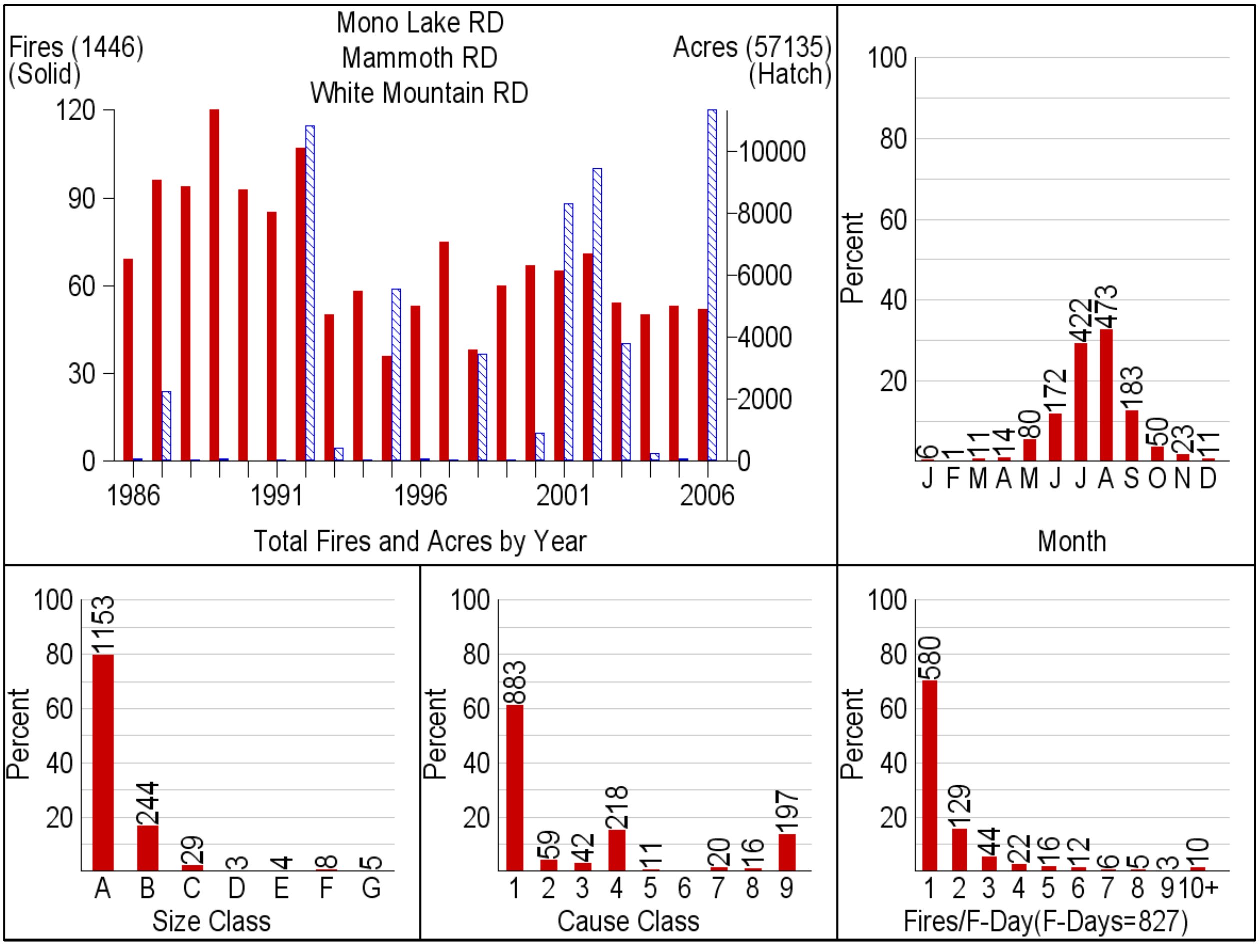


Figure 7 shows the number of fires in the Mono Lake, Mammoth, and White Mountain Ranger Districts between 1986 and 2006. The number of annual fires ranges from approximately 30 to over 120 per year, with significant variation from year to year. Similarly, there is a large degree of variability in the annual number of acres burned, ranging from too few to appear on the graph, to more than 10,000 acres burned per year.

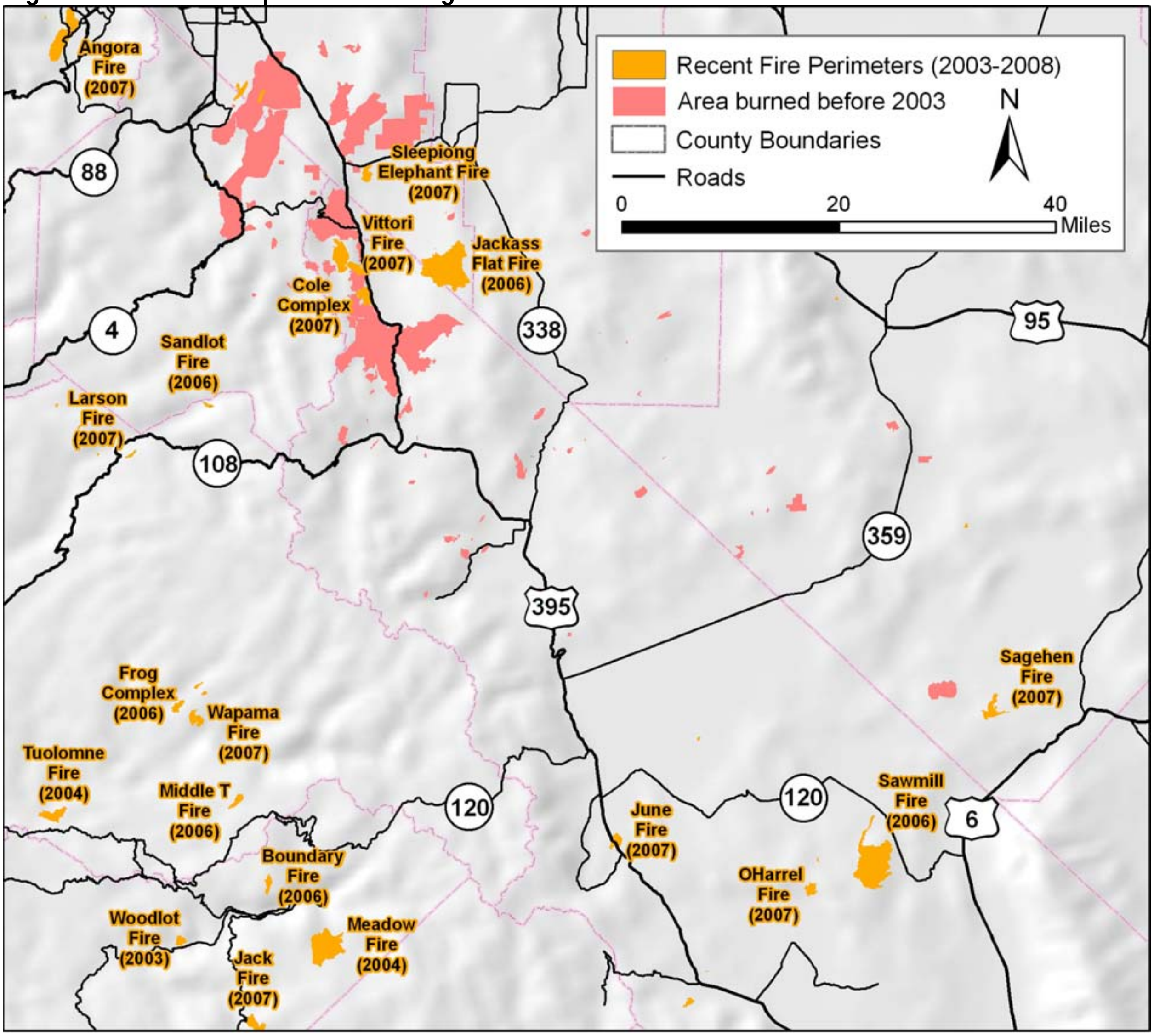
The graph in the lower left-hand corner of **Figure 7** shows the size class distribution of fires. Of the 1,446 fires recorded between 1986 and 2006, only 20 were major fires (fires of 100 acres or more). 96% of the reported fires (1,397 fires) were extinguished before reaching 10 acres in size. These statistics reflect the norm throughout the western US, where the majority of fires are controlled on initial attack.

Size Class	A	B	C	D	E	F	G
Acres	< ¼	¼ - 9	10 – 99	100 – 299	300 – 999	1000 – 4999	5000 +

The panel in the lower middle section of **Figure 7** shows the number of fires occurring by each cause class. As shown in the graph, 73% of the fires in the area (883 fires) were caused by lightning. Of the known causes, the next most frequent are campfires (218 fires), and equipment (59 fires). The prominence of naturally-occurring (lightning-ignited) fires in the area could be an indicator that fire return intervals are still primarily controlled by natural processes. As large areas of wildland fuels come under pressure through increasing development and recreational use, the causes of wildfires could shift toward human-caused events.

Cause Class	Cause
1	**Lightning**
2	**Equipment**
3	**Smoking**
4	**Campfire**
5	**Debris Burning**
6	**Railroad**
7	**Arson**
8	**Children**
9	**Miscellaneous**

Figure 8. Historic fire perimeters: Large fires



FIRE BEHAVIOR POTENTIAL

Weather observations were collected for a 20-year period (1986-2006) and used to define two weather scenarios (moderate and extreme) for modeling fire behavior potential. The moderate conditions fire behavior potential maps (**Figures 9, 11** and **13**) graphically display potential rate of spread, flame length, and crown fire activity given the most common weather conditions existing during the fire season over the last 20 years. The extreme conditions maps (**Figures 10, 12** and **14**) were calculated using ninety-seventh percentile weather data. This means the weather conditions existing on the most severe fire weather days (the top 3% sorted by Spread Component) in each season for the 20-year period were averaged together. These predictions were calculated using the FlamMap 3.0 fire behavior modeling software (see **Glossary**). Other inputs for the fire behavior model include vegetative fuels (type and coverage) and topographical features including slope, elevation and aspect. These inputs were generated for the study area by using a combination of GIS data and field data collection and analysis.

Reference Weather Used in the Fire Behavior Potential Analysis

Mono County covers an area of over 3,100 square miles, or almost 2 million acres. Because of the huge variations in elevation and precipitation levels within the study area, no single set of weather inputs can accurately capture the range of variability that exists in the study area. Likewise, no single weather can adequately provide the weather inputs for the fire behavior analysis.

Seasonal percentile weather reports were generated for all of the available Remote Automated Weather Stations (RAWS) and reviewed by our staff Fire Behavior Analyst (FBAN). Sites with poor data or significant errors were eliminated. Data from five RAWS were used to create fire weather zones. After evaluating the RAWS data, three fire weather zones were created for use in the fire behavior potential analysis. Percentile weather observations were calculated from each station using the Fire Family Plus software package to generate the moderate and extreme fire weather conditions classes. For a more complete discussion of the fire behavior potential methodology, please see **Appendix A**.

FIRE BEHAVIOR MODELING LIMITATIONS AND INTERPRETATION

This evaluation is a prediction of likely fire behavior, given a standardized set of conditions and a single point-source ignition in every cell (each 10 x 10 meter area). It does not consider cumulative impacts of increased fire intensity over time and space. The model does not calculate the probability a wildfire will occur. It assumes an ignition occurrence for every cell. These calculations may be conservative (under predict) compared to observed fire behavior.

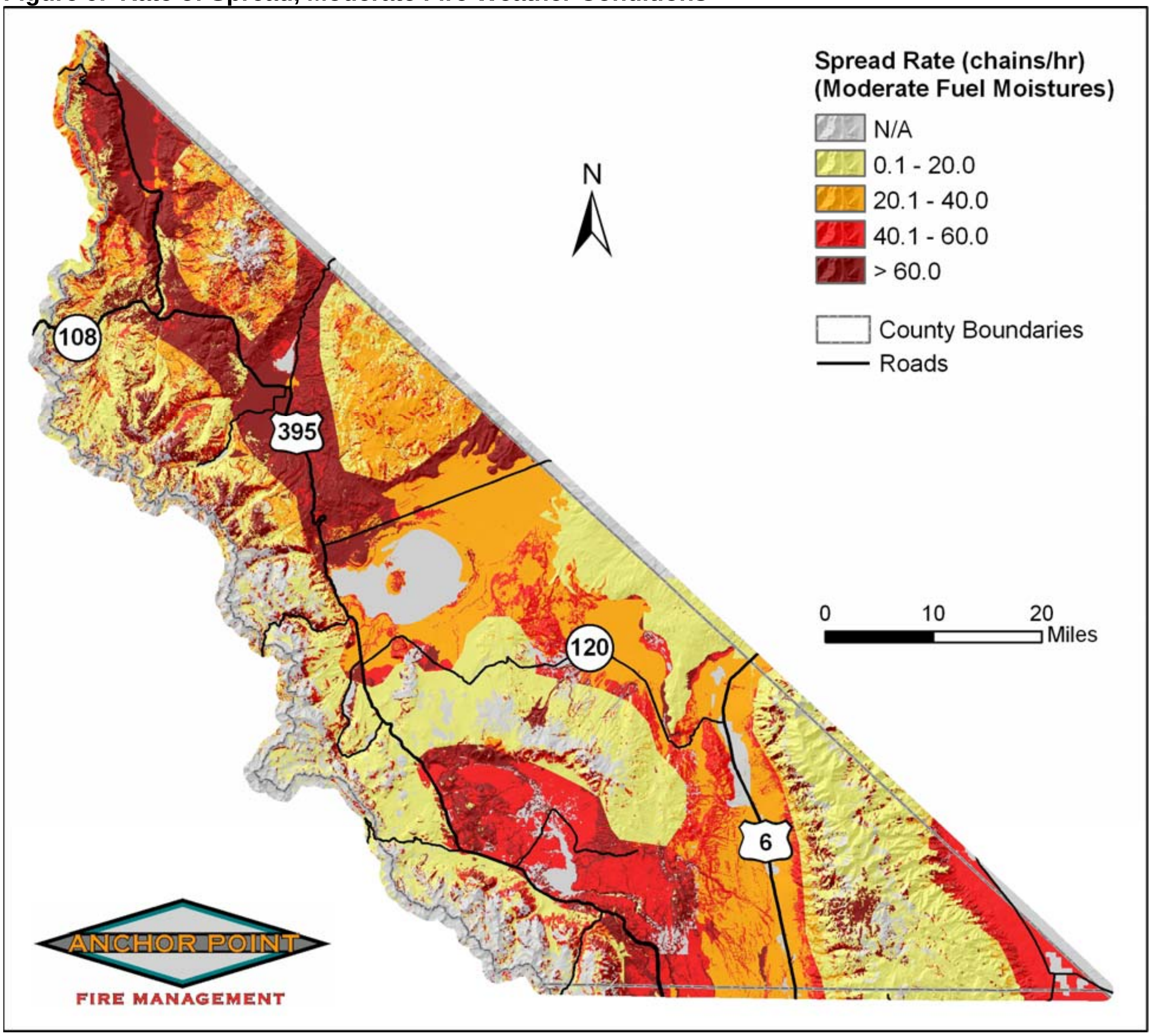
This model can be conceptually overlaid with the Community Wildfire Hazard Ratings (WHR) or other values at risk to generate current and future "areas of concern," which are useful for prioritizing mitigation actions. This is sometimes referred to as a "values layer." One possibility is to overlay the fire behavior potential maps with the community hazard map (**Figure 1**) in order to make general evaluations of the effects of the predicted fire behavior in areas of high hazard value (that is, areas where there are concentrations of residences and other man-made values). However, since the minimum mapping unit used for fire behavior modeling is one acre, fine-scale fire behavior and effects are not considered in the model. Additionally, weather conditions are extremely variable and not all combinations are accounted for. The fire behavior prediction maps are best used for pre-planning and not as a stand-alone product for tactical planning. If this information is used for tactical planning, fire behavior calculations should be done with actual weather observations during the fire event. For greatest accuracy, the most current

Energy Release Component (ERC) values should be calculated and distributed during the fire season to be used as a guideline for fire behavior potential.

RATE OF SPREAD

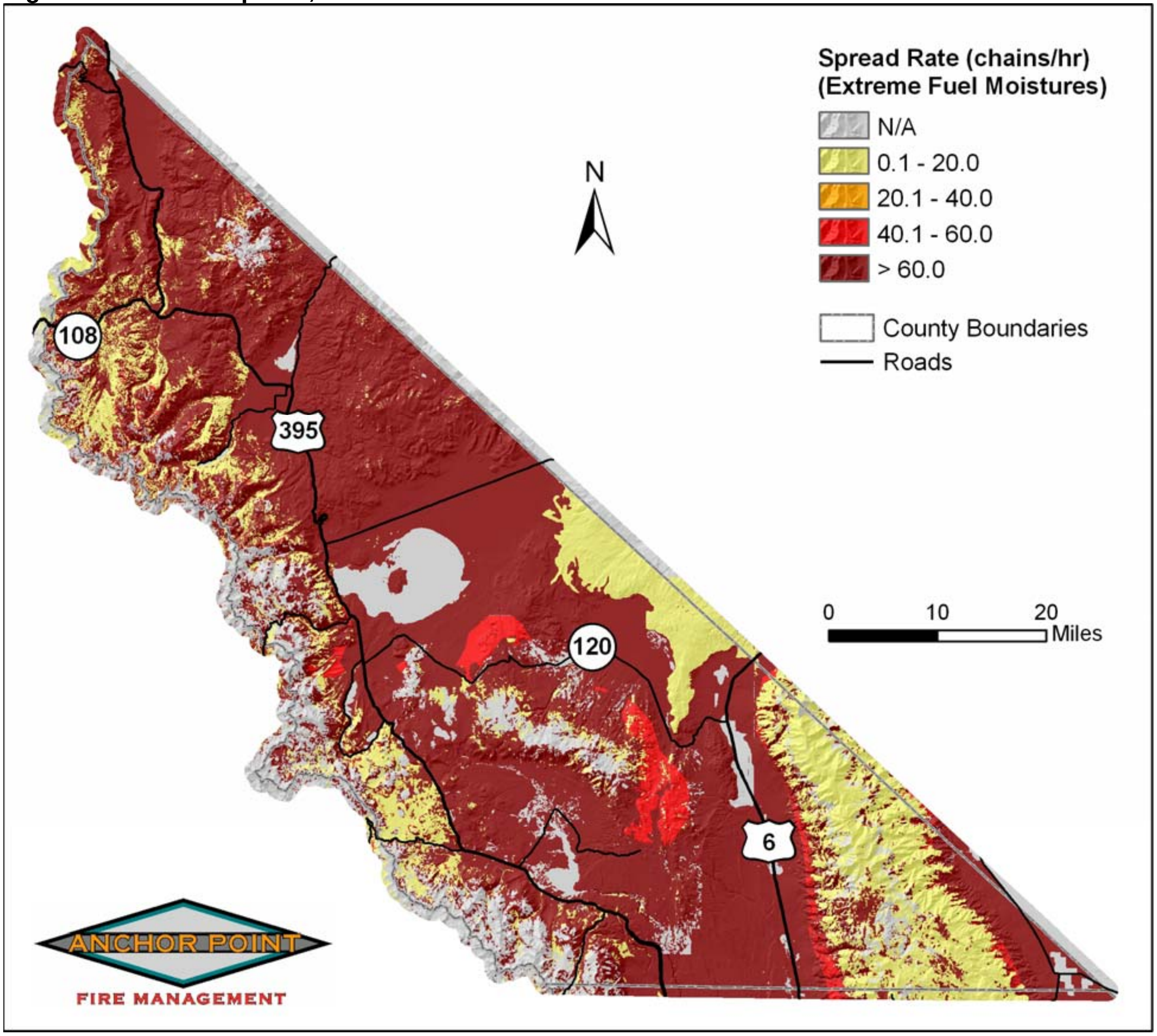
Figures 9 and **10** show the predicted rates of spread for the moderate fire weather and extreme fire weather scenarios respectively.

Figure 9. Rate of Spread, Moderate Fire Weather Conditions



Rates of spread are expressed in chains/hour (CPH). A chain is a unit of measure commonly used by foresters and firefighters. It is equal to 66 feet; therefore, one mile equals 80 chains. Rates of fire spread are influenced primarily by the wind, slope steepness, fuel type/continuity and fuel sheltering from the wind. Fire is the only force of nature which moves faster uphill than downhill. In areas where high to extreme rates of spread are predicted (ROS of >40 CPH or ½ mile per hour) it is possible fires could spread faster than humans can escape, creating extremely dangerous conditions for firefighters and evacuating residents. High rates of spread also make suppression efforts less effective and increase the tactical complexity of the incident.

Figure 10. Rate of Spread, Extreme Fire Weather Conditions



In the moderate fire weather scenario, moderate to extreme rates of spread are predicted throughout the populated areas in the northern parts of the study area. High rates of spread (>40 CPH or ½ mile per hour) are predicted for some of the communities east of the Sierras in the southwestern part of the study area (see **Figure 1**), where desert grasses and shrubs with little sheltering from the wind are the dominant fuels. Rates of spread increase to extreme levels where these conditions are combined with increasing slopes, most notably in the lower slopes of the eastern Sierras and the mountain ranges of the desert areas in the eastern and southern portions of the study area.

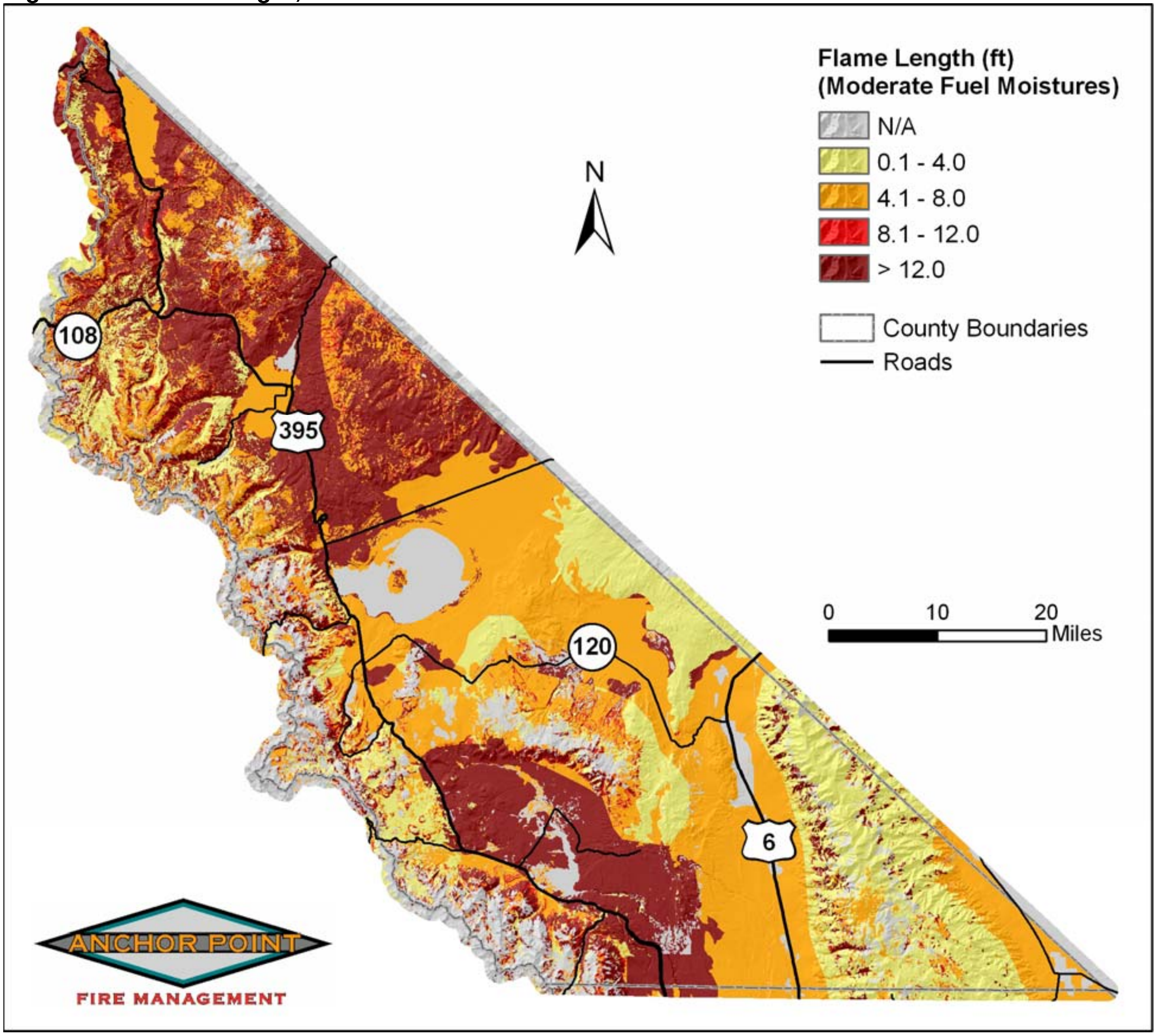
In the extreme fire weather scenario, extreme rates of spread are predicted for all of the populated portions of the study area with the exception of the higher elevations of the Sierras and White Mountains and areas where combustible fuels are sparse or not present.

FLAME LENGTH

Flame length is used as a proxy for fire intensity. It is important to note that flame length represents the entire distance from the base of the flame to the tip, irrespective of angle – not simply the flame height above the ground. In high wind conditions, it is possible to have very intense flames (high flame lengths) which are relatively close to the fuel bed.

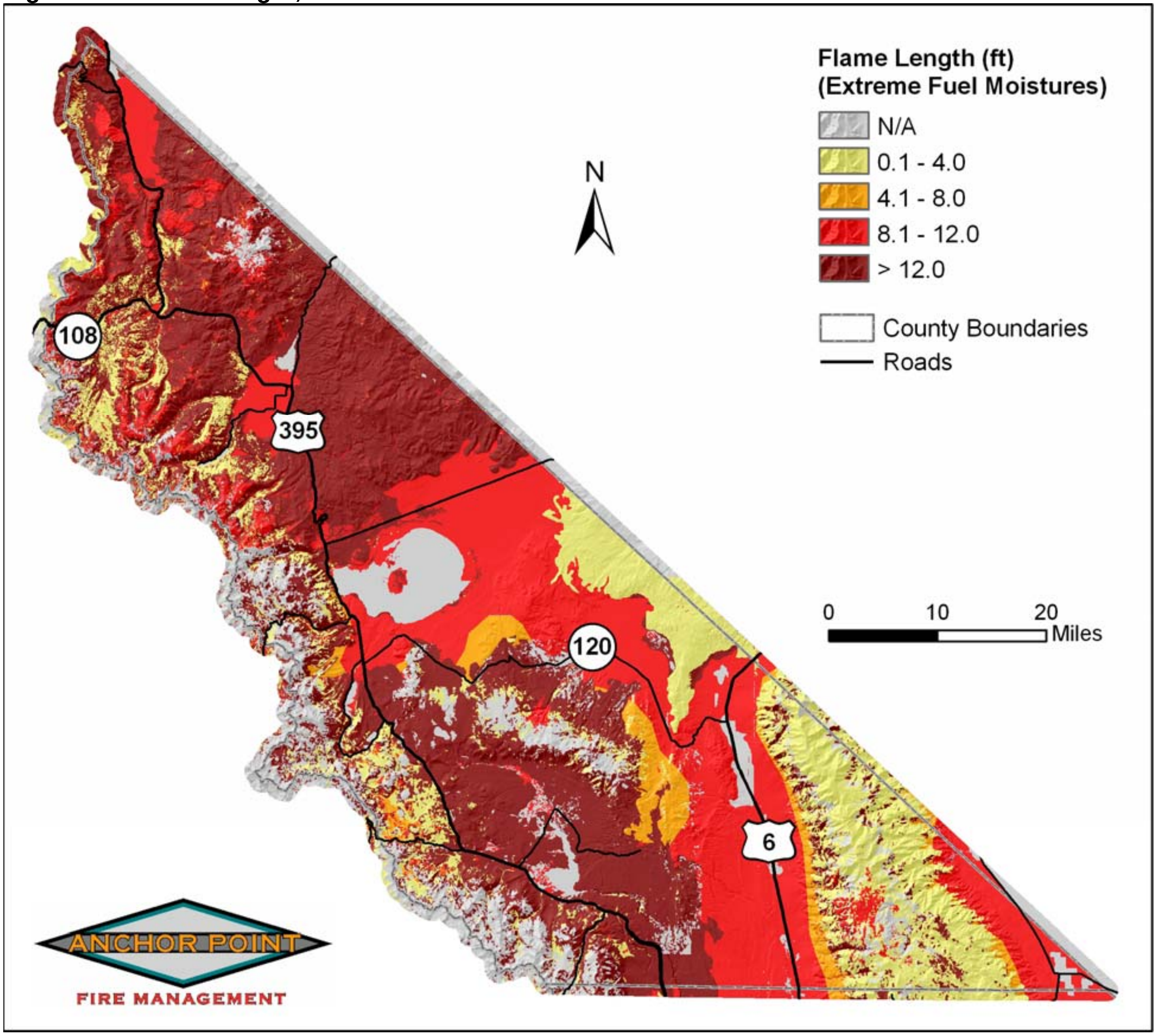
Figures 11 and **12** display flame length in ranges that are meaningful and useful to firefighters. Flame lengths of four feet or less are considered low enough intensity to be suitable for direct attack by hand crews, and represent the best chances of direct extinguishment and control. Flame lengths of less than eight feet are suitable for direct attack by equipment such as bulldozers and tractor plows. Flame lengths of 8 to 12 feet are usually attacked by indirect methods and aircraft. In conditions where flame lengths exceed 12 feet, the most effective tactic is fuel consumption ahead of the fire by burnouts or mechanical methods. Although indirect fire line and aerial attack are also used for such fires, as flame lengths increase the effectiveness of these tactics decrease. Their use is this case is generally intended to slow rates of spread and reduce fire intensity, especially in areas where values at risk are concentrated.

Figure 11. Flame Length, Moderate Fire Weather Conditions



In the moderate fire weather scenario, continuous areas of low intensity flame lengths (< 4') are only predicted for the higher elevations of the Sierras, which are very sparsely populated and do not contain any of the WUI communities. Small pockets of low flame lengths are predicted for higher elevations of the Sierras and areas where fuels are sparse or not present (such as the Owens Lake dry lake bed). However, it is important to note that in most of the areas on the eastern slope of the Sierras where communities exist, moderate to extreme flame lengths are predicted.

Figure 12. Flame Length, Extreme Fire Weather Conditions



Under the extreme fire weather scenario, high to extreme flame lengths are predicted throughout the areas covered by the WUI communities with the exceptions of some small pockets where elevations and/or fuel conditions moderate the large scale conditions. Under extreme weather and fuel moisture conditions, fire intensity is expected to be a serious issue and control will be difficult and complex to establish and maintain.

CROWN FIRE ACTIVITY

The Crown Fire Activity maps (**Figures 13** and **14**) display the potential for fires to move from the surface into the canopy of trees and shrubs.

Figure 13. Crown Fire Activity, Moderate Fire Weather Conditions

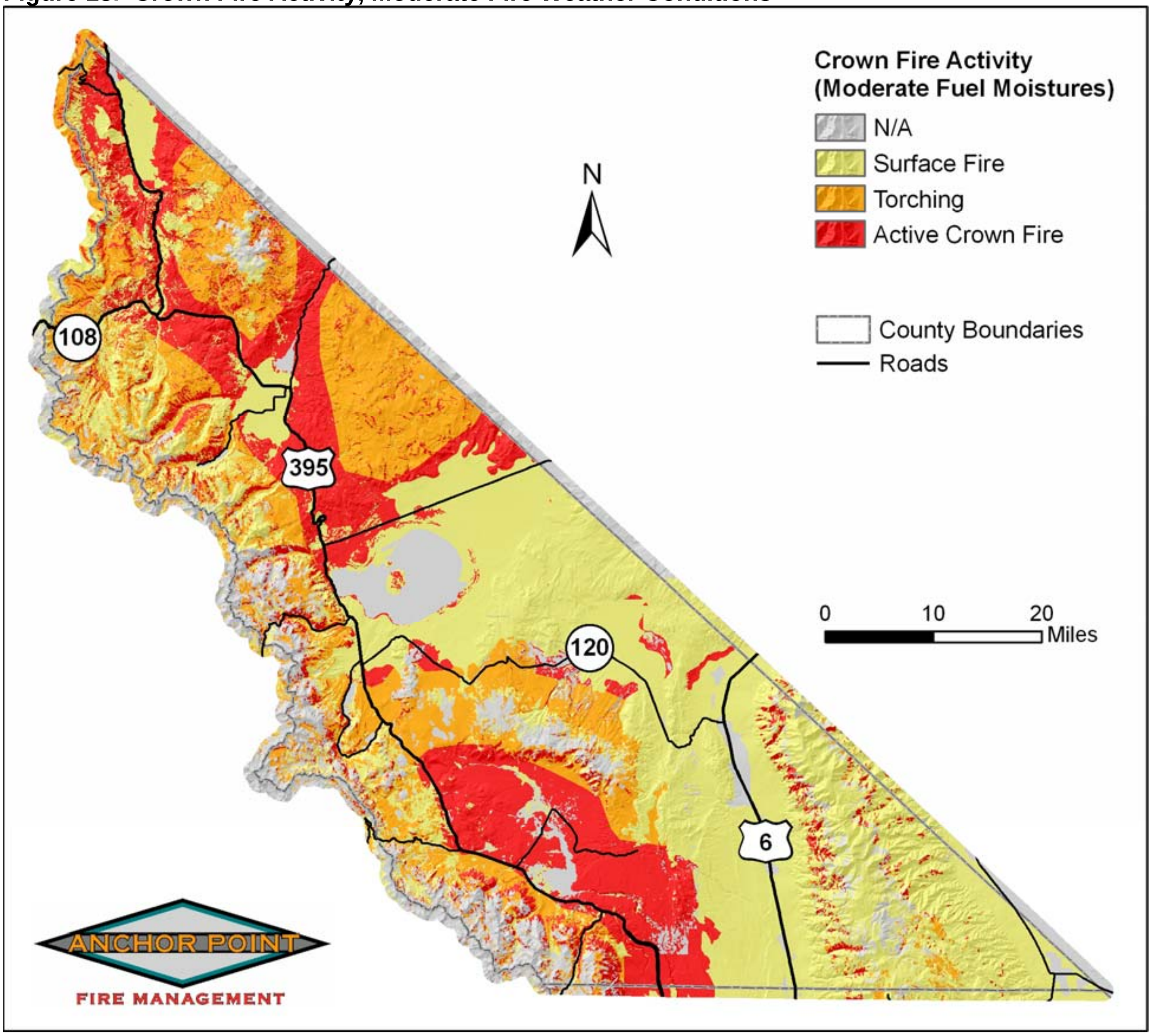
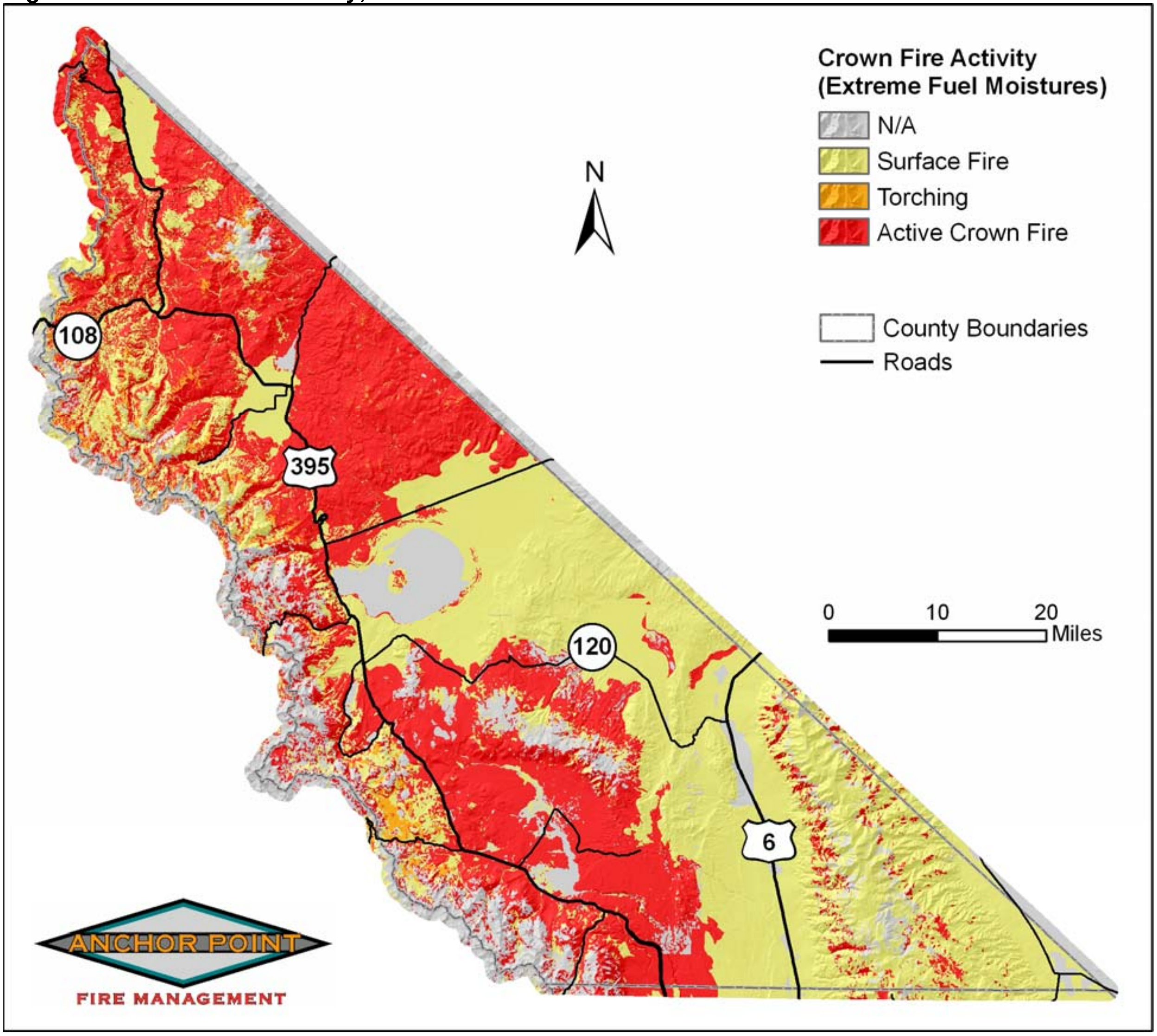


Figure 14. Crown Fire Activity, Extreme Fire Weather Conditions



Note that the likelihood of progression from the surface into the aerial fuels is displayed in four categories. ***N/A*** refers to areas where surface fires are unlikely to develop due to the lack of combustible fuels. These would include any area lacking a combustible fuel bed such as rock, ice, snow fields, water, sand or some urban landscapes. The ***Surface Fire*** category covers areas where fires are expected to be limited to the surface fuels and lack the energy to initiate and sustain vertical development into the aerial fuels. Areas where grass fuels without overstory plants are dominant fall into this category regardless of the energy produced by the fire, due to the lack of an aerial fuel bed.

Areas designated by the ***Torching*** category are expected to experience isolated combustion of the tree crowns in individual trees and groups of trees. In other words, individual or relatively small clusters of trees will be completely involved, but these fires lack the energy to initiate sustained horizontal movements (referred to as "runs" by fire fighters) through the crowns.

The ***Active Crown Fire*** category includes areas where sustained horizontal movements through tree crowns are expected. This category can be subdivided into ***dependent*** or

independent crown fire. Dependent crown fires rely on the presence of surface fires to support aerial burning. Independent crown fires develop when aerial burning is sustained without the need for associated surface fire. Independent crown fires are rare and are associated with the most extreme fire behavior conditions. Current fire behavior models do not have the ability to predict independent crown fire development. All crown fires, regardless of whether they are dependent or independent, represent extreme fire behavior conditions and are notoriously resistant to all methods of suppression and control.

It is interesting to note that weather variables had little effect on the development of crown fire in the study area. In general, there is a possibility of torching and/or active crown fire development wherever timber fuels are present (the northeast portion of the study area and along the eastern slope of the Sierras).

The model predicts the possibility of active crown fire developing in the aerial fuels. However, a limitation of the model is that it will show shrub models as crowning. Technically, shrubs cannot crown and it would be better to use the flame length outputs to make interpretations. In most of the populated areas, primarily the central Hwy 395 corridor, large scale crown fires are unlikely to develop. Please see **Appendix B** for a further discussion of the WHR methodology.

RECOMMENDED SOLUTIONS

Mitigation solutions for the protection of values at risk are reflected in specific recommendations, such as developing effective public outreach programs, or designating geographic treatment areas that may have related fuel reduction projects. Specific activities, actions and objectives are recommended for each category of mitigation. Local land and fire management agencies, with the input of the citizen's advisory council or fire safe councils, must determine specific priority actions.

The following mitigation solutions have been identified for the study area. Recommendations are provided for each category.

- Addressing
- Public Education
- Local Preparedness and Firefighting Capabilities
- Home Mitigation
- Fuels Modification Projects

These categories are NOT ordered by priority in this report, but priority levels have been provided for specific tactical mitigation actions, where appropriate, within each category.

ADDRESSING

In most of the WUI communities within Mono County, missing or inadequate street signage and addressing is an issue. Where applicable, this problem is also noted in the community descriptions in **Appendix B**. Markers of all types, some homemade, are used throughout the study area with no particular order or system. In some parts of Mono County, street signs are broken or worn out. The most common type of address marker is at the mailbox. Address numbers on the box itself, or on the post, are frequently the only indication of the address. In most cases address marker poles and mailbox poles are wooden.

There are some community driveways in the study area where multiple homes are accessed from a single driveway off the public road. Some of these unmarked and some have flagged addressing. Flagged addressing is a term describing the placement of multiple addresses on a single sign, servicing multiple structures located on a common access. Where flagged addressing exists, the marker placements are inconsistent and in some cases confusing.

(Section continues on next page.)

There also are numerous properties scattered throughout the county with no address marker of any type, or with small, non-reflective, addressing that is hidden from view, difficult to see, or mounted onto a flammable material.

There are also some gated driveways with no marker of any kind. These and other addressing issues present particular difficulties for responding firefighters. While some residents may consider reflective address signage to be unattractive, it is essential for quick and effective response. The value of the time saved to the welfare of homes and evacuees, especially at night and in difficult conditions, cannot be overestimated. Knowing at a glance the difference between a road and a driveway (and which houses are on the driveway) cuts down on errors and time wasted interpreting maps. This is especially true when resources from outside the area are brought in for project fires and the responders do not have experience with local access issues. General recommendations for address markers can be found in **Appendix D**.

RECOMMENDATIONS

- A program of locating and replacing worn or difficult to read street signs should be undertaken. Every intersection and street name change should have large, reflective signage. Enlist the help of CalFire and public land managers to enforce home address marker requirements in state responsibility areas.
- Flagged addressing on community driveways should be replaced with reflective markers that indicate the proper road fork, where applicable, for each address. This system should be repeated at every place where the driveway divides and an individual driveway leaves the community driveway.
- For each home, reflective markers should be placed where the driveway leaves an access road and on the house itself. These may be in addition to, or in place of, existing decorative address markers. Consistency in height and placement should be stressed.
- Disseminate the address marker specifications in **Appendix D** to HOAs and local fire departments with the recommendation that they be adopted as a part of the local fire code and HOA covenants.
- For all new construction, lot markers should be replaced with address markers as soon as the home has a certificate of occupancy.
- Where dead-end and private road markers occur, the addresses of homes beyond the marker should be clearly posted. This can be done with a group address marker, for example "14391-14393 Highway 120."
- Develop a public education campaign to advise property owners of the importance of proper street addressing and how to properly address their property.
- Conduct an inventory of all locked gates fire response agencies do not have access to. Property owners should be contacted regarding providing emergency access such as a Knox Box or combination lock codes to local responders.

PUBLIC EDUCATION

Organization and Ordinances

The purpose of this organization and ordinances section is to provide recommendations on how to best achieve certain administrative activities within Mono County related to this CWPP. The underlying goal is to work with communities and citizens to educate, inform and involve them in all aspects of the wildfire issues facing Mono County.

ORGANIZATIONAL RECOMMENDATIONS

Very High Priority: Develop a countywide wildfire coordinator position to help develop annual operating plans, coordinate with community groups, provide public information and education, increase volunteer fire department membership and increase operating funds and grants. Define responsibilities of position within a county wildfire ordinance.

Very High Priority: Develop an annual operating plan to coordinate wildfire management. An annual operating plan would be prepared cooperatively with local, state, and federal government agencies to encourage the following:

- fire prevention
- public education
- defensible space
- public information during incidents
- evacuation planning and coordination
- fuels treatments

Very High Priority: Emphasize the use of the Incident Command System (ICS). ICS will help organize multi-agency incidents and smooth out communications problems. Ensure that all county agencies are National Incident Management System (NIMS) compliant. Refer to the FEMA web site for more information and clarification.[5]

High Priority: Mono County should coordinate with community groups to promote fire prevention, fuels treatments and defensible space in the wildland urban interface.

High Priority: Develop a lead Public Information Officer (PIO) position. Other individuals should be developed to support the lead PIO. This would be a collateral duty for those individuals.

Moderate Priority: Conduct a review of all levels of county wildfire agreements to ensure that no conflicts exist between them.

[5] http://www.fema.gov/emergency/nims/

ORDINANCES RECOMMENDATIONS

High Priority: Consider adopting the Wildland-Urban Interface codes to reduce structural ignitability in the LRA. The code recognizes issues such as construction standards and creation of defensible space and fuels treatment to reduce risk. The codes also recognize importance of access and water availability. The State of California has adopted a version the code statewide in the SRA .

High Priority: Create an ordinance to manage open burning. The goal would be to create an ordinance to streamline the process and improve coordination between landowners and the county.

PUBLIC EDUCATION AND AWARENESS RECOMENDATIONS

Within Mono County there is likely to be a varied understanding among property owners of the hazards associated with the threat of a wildfire. An approach to wildfire education that emphasizes safety and hazard mitigation on an individual property level should be undertaken, in addition to the risk reduction efforts by county agencies. Attempts should be made to provide educational materials through personal contact. Property owner education and the wildfire hazard mitigation message should be an ongoing effort.

Very High Priority: Provide information to citizens during emergencies such as wildfire. Use the PIO position to coordinate public information. Use local radio (English and Spanish), reverse 911, internet and local phone trees to provide the public with information. Early notification to residents and visitors to the area will provide the greatest benefit.

Very High Priority: Educate homeowners about forest health and fire prevention. Programs should provide the public with information about mechanical treatments and the use of prescribed fire for fuels treatments. Workshops should include information on how to create defensible space and promote the safe use of chainsaws (professional instruction and PPE).

Very High Priority: Emphasize homeowners need to take responsibility to help fire departments better protect their homes.

Very High Priority: Encourage public involvement and feedback.

Very High Priority: Public Land Management Agencies should create an updated procedure for notifying local fire departments of their prescribed fires and other types of fuel treatment plans and operations.

Priority Level High: Promote the defensible space and hazard reduction recommendations for each community. Community-specific recommendations can be found in **Appendix B**.

High Priority: Obtain additional “Fire Awareness” signs for use along major highways to inform the public of the current fire danger and to promote fire prevention. Where current signs are placed, check to be sure they are visible. If a fire danger rating sign is used, ensure that it will be kept current to reflect actual fire danger.

High Priority: Conduct fire prevention campaigns during times of high fire danger, such as during the spring when fires can start in dry fuels and spread rapidly in windy conditions.

Disseminate fire prevention messages in the local newspaper and on the radio to raise public awareness of the danger of wildfires.

High Priority: Provide FireSafe fire prevention materials to homeowners and landowners. This will promote the concept of personal responsibility and encourage people to voluntarily implement defensible space, a practice that will do more to limit fire-related property damage than any other recommendation in this report. To this end, consider having firefighters distribute FireSafe materials door to door and provide fire prevention/home protection advice in person.

High Priority: Ensure that any and all Address Map books are updated to reflect information stemming from this CWPP. Consider the development of a Wildfire Pre-Attack Plan. Every piece of emergency equipment in the county should have a copy (county and municipal fire departments, the county road department, CalFire, USFS, BLM). Command/Supervisor vehicles will need multiple copies or the ability to generate multiple copies. This will allow for the distribution of specific maps to incoming mutual aid resources that may not have the maps.

Visit these web sites for a list of public education materials. These are suitable for firefighters and homeowners alike:

- http://www.nwcg.gov/pms/pubs/pubs.htm
- http://www.firewise.org
- http://www.firesafecouncil.org/homeowner/index.cfm

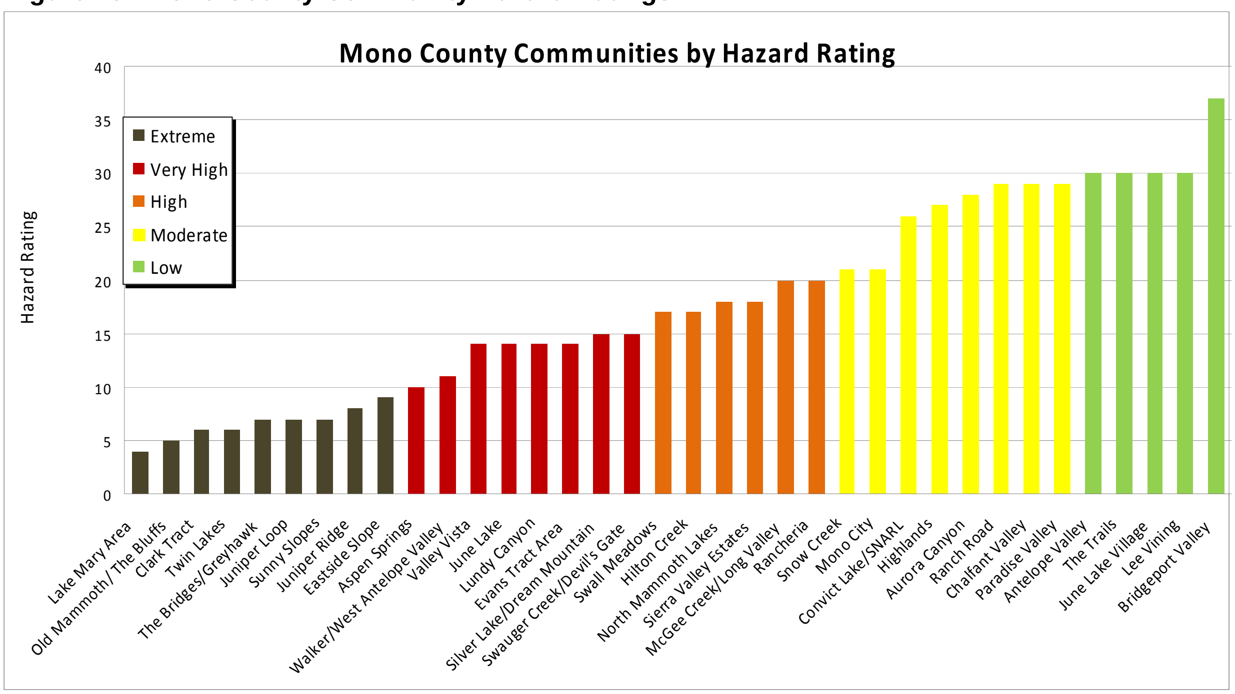
HOME MITIGATION

Community responsibility for self-protection from wildfire is essential. Educating homeowners is the first step in promoting a shared responsibility. Part of the educational process is defining the hazard and risks both at the community and parcel levels.

The community-level assessment has identified 17 of the 36 communities in the study area to be at extreme or very high risk. Construction type, condition, age, the fuel loading of the structure/contents, and position are contributing factors in making homes more susceptible to ignition under even moderate burning conditions. There is also a likelihood of rapid fire growth and spread in these areas due to steep topography, fast burning or flashy fuel components and other topographic features that contribute to channeling winds and promotion of extreme fire behavior.

Figure 15 illustrates the relative hazard rankings for communities in the study area.

Figure 15. Mono County Community Hazard Ratings



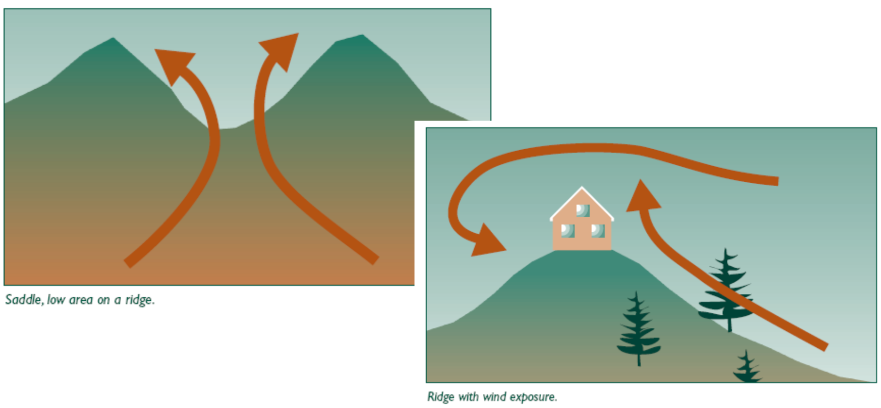
- A rating of nine or less indicates an area of extreme hazard.
- A rating of 10 to 15 indicates a very high hazard.
- A rating of 16 to 20 indicates high hazard.
- A rating of 21 to 30 indicates moderate hazard.
- A rating of 30 or greater indicates a low hazard.

DEFENSIBLE SPACE

The most important element for the improvement of life safety and property preservation is compliant, effective defensible space for every home in the study area. Defensible space is especially important for homes with wood roofs and homes located on steep slopes, in chimneys, saddles, or near any other topographic feature that contributes to fire intensity.

Due to the nature of the vegetation and topography of the study area, combined with the majority of homes situated on medium sized parcels, an aggressive program of evaluating and implementing defensible space for all homes will do more to limit fire-related property damage than perhaps any other single recommendation in this report.

Figure 16. Saddle & Ridge Top Development[6]



To improve life safety and preserve property, every home in the study area must have compliant, effective defensible space. This is especially important for homes with wood roofs and homes located on steep slopes, in chimneys, saddles, or near any other topographic feature that contributes to fire intensity. These recommendations are intended to give homeowners enough information to immediately begin making their home fire-safe or improve existing home mitigation efforts. Defensible space must be maintained throughout the year.

Outside of the established communities in the study area, there are many ranches and individual home sites. The following recommendations apply to all structures which could be threatened by wildfire.

- ✓ Trees and shrubs should be properly thinned and pruned within the defensible space. Slash from the thinning must be disposed of properly.
- ✓ Roof and gutters should be cleared of debris. Branches overhanging the roof and chimney are removed.
- ✓ Chimney screens are in place and in good condition.
- ✓ An outdoor water supply is available, complete with a hose and nozzle that can reach all parts of the house. Fire extinguishers are checked and in working condition. Hand tools such as shovels and rakes are easily accessible.

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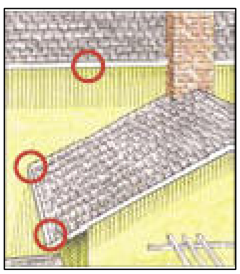
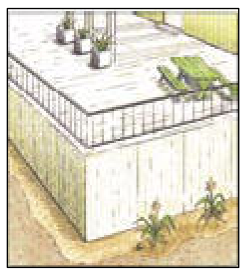
6 FireWise Construction, Peter Slack, Boulder, Colorado.

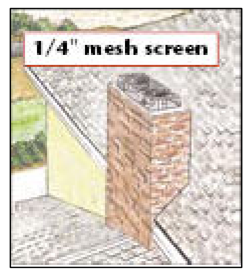
- ✓ The driveway is wide enough. The clearance of trees and branches is adequate for fire and emergency equipment. (Check with your local fire department.)
- ✓ Road signs and your house number are posted and easily visible.
- ✓ Attic, roof, eaves, and foundation vents are screened and in good condition. Stilt foundations and decks are enclosed, screened or walled up.
- ✓ Firewood is staked on a side contour, at least 50 feet away from structures.
- ✓ Propane tanks should be located at least 30' from all structures. The area around the tank must be free of combustible material such as yard debris, weeds, etc.
- ✓ Power poles have vegetation cleared away in a 5 foot radius.
- ✓ Maintain your defensible space constantly:
    - o Mow non-irrigated grass to a low height. Mow early in the morning, avoiding times of wind, and avoid rocks because a grass fire could ignite from a spark.
    - o Remove any branches overhanging the roof or chimney.
    - o Remove all debris and cuttings from the defensible space.



Clean Gutters and Roof



Enclose Decks



Maintain Chimneys

Figure 17. Defensible Space Zones (Timber and Brush Lands)[7]

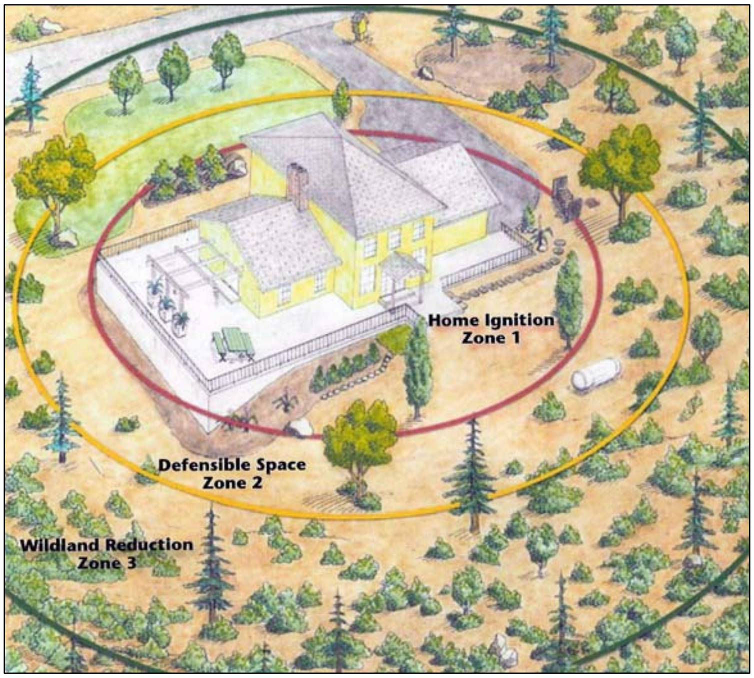
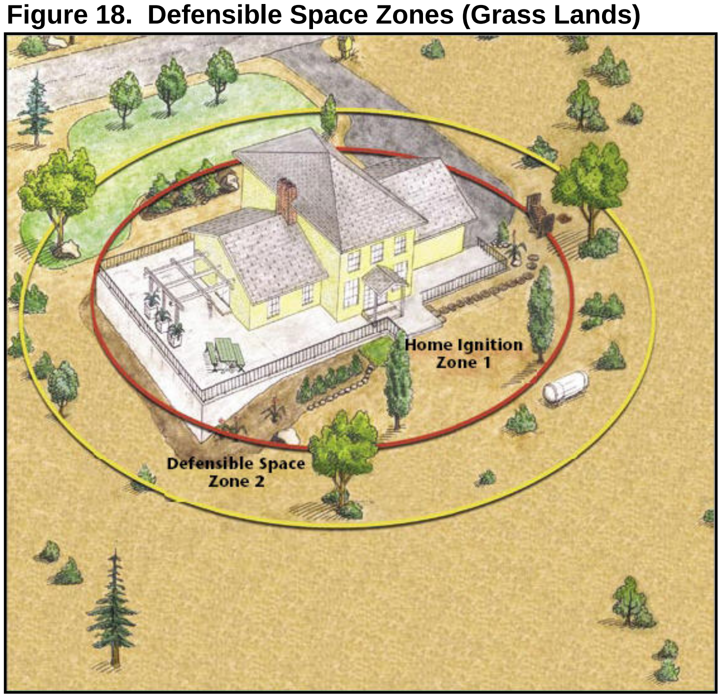


Figure 18. Defensible Space Zones (Grass Lands)



ZONE 1 (within 15 feet of the home), shown as Home Ignition Zone, suggests eliminating all flammable materials (fire-prone vegetation, wood stacks, wood decking, patio furniture, umbrellas, etc.). Irrigated grass, rock gardens, non-flammable decking, or stone patios are desirable substitutions.

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[7] A Homeowner's Guide to Fire Safe Landscaping (2005), www.firesafecouncil.org, referenced 9/10/07

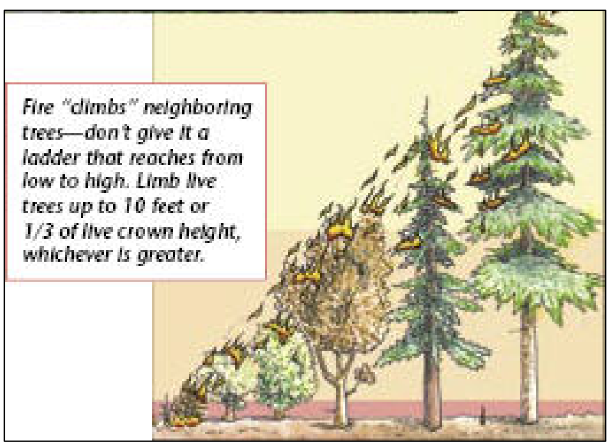
ZONE 2 Defensible Space (15 to 100 feet from the home – on steep slopes or areas of high winds the Defensible Space will need to be expanded to 150 feet) suggests thinning trees and large shrubs so there is at least 10 feet between tree tops (crowns). Crown separation is measured from the furthest branch of one tree to the nearest branch on the next tree. On steep slopes or areas subject to high winds, allow at least 1.5 times more space between tree crowns. Remove all ladder fuels from under these remaining trees. Prune all trees to a height of at least 10 feet, or 1/3 of the live crown height. Small clumps of 2 to 3 trees may be occasionally left but leave more space between the crowns of these clumps and surrounding trees. Isolated shrubs may remain, provided they are not under tree crowns. Remove dead stems from trees and shrubs annually. Where shrubs are the primary vegetation in Zone 2, refer to the "Brush and Shrubs" section below.[8]

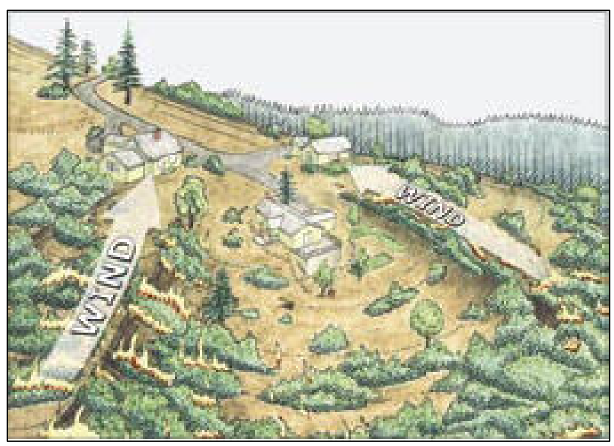
ZONE 3 Wildland Reduction, aka Extended Defensible Space (beyond 100 feet), suggests a much more limited thinning and pruning to the standards in zone 2. The goal in this zone is to improve the health of the wildlands, which will also help to slow the approaching wildfire.

BRUSH AND SHRUBS

Brush and shrubs are smaller than trees, often formed by a number of vertical or semi-upright branches arising close to the ground. On nearly level ground (increase 1.5 times for slope and windy areas), minimum spacing recommendations between clumps of brush or shrubs is 2 1/2 times the height of the vegetation. Maximum diameter of clumps should be 2 times the height of the vegetation. All measurements are made from the edges of vegetation crowns.

For example: For shrubs 6 feet high, spacing between shrub clumps should be 15 feet or more apart (measured from the edges of the crowns of vegetation clumps). The diameter of shrub clumps should not exceed 12 feet (measured from the edges of the crowns). Branches should be pruned to a height of 3 feet.





Increase Defensible Space in Windy and Steep Areas

[8] http://www.ext.colostate.edu/PUBS/natres/06302.html, referenced 9/10/07

RECOMMENDATIONS

Very High Priority: Develop defensible space around individual homes and structures.

High Priority: Any community with a rating of extreme, very high, or high hazard should undergo a parcel-level analysis (individual home assessment) as soon as possible. Please see **Appendix B** for detailed information on each community. The data in **Appendix B** will facilitate the following important fire management practices:

- Establish a baseline hazard assessment for homes in these communities
- Educate the community through the presentation of the parcel-level Hazard and Risk Analysis at neighborhood public meetings
- Identify defensible space needs and other effective mitigation techniques
- Identify and facilitate "cross-boundary" projects such as fuels modification projects adjacent to the community
- Assist fire agencies in developing strategies and tactics that will mitigate incidents when they occur.

UELS

High Priority: Use the structure triage methodology provided in **Appendix C** to identify homes not likely to be defendable.

LOCAL PREPAREDNESS AND FIREFIGHTING CAPABILITIES

Mono County fire suppression is provided by a patchwork of rural fire departments, town/city fire departments, CalFire, and Federal Land Management Agencies. Coordination between agencies regarding firefighter training and communications will greatly enhance the safety and effectiveness during fire suppression.

Mono County should take the lead by coordinating and supporting the following recommendations as much as possible. Land management agencies within the county have the ability to call upon agency experts from outside the county and should be viewed as a valuable resource before, during, and after wildfire incidents.

TRAINING

High Priority: Develop a Regional Training program to facilitate local training for structural and wildland firefighting.

High Priority: Work with state and federal agencies to conduct basic wildfire suppression and multi-agency ICS training.

- I-100 (basic ICS) for all firefighters and I-200 (Intermediate ICS) for all fire officers. NIMS courses could satisfy these recommendations.
- A Mono County tailored Basic Wildland Firefighting and Fire Behavior (NWCG S-130/190) for all City and County fire department members.
- At a minimum, have the safety and structure triage units from the S-215 class “Fire Operations in the Wildland Urban Interface” presented to all City and County fire department members.
- Provide a NWCG S-234 Firing Operations course to City and County fire department members.
- Organize and facilitate table-top or sand table wildfire exercises with all county agencies attending.
- Organize and facilitate an annual wildfire interface training exercise within the communities outlined in this CWPP and encourage multi-agency participation.
- Encourage personnel to participate in out of county training opportunities.
- Encourage personnel to participate in federal and state prescribed fire opportunities. These burns should also be scheduled on weekends so as to attract volunteer firefighter who otherwise would not be able to attend.

High Priority: Consider adopting “appropriate response” or indirect fire suppression tactics in remote areas, given the threat from heavy fuel loading and the lack of county resources.

High Priority: Work with state and federal agencies to conduct the pack test and annual refresher courses that can be worked into local fire department schedules such as evenings and weekends.

High Priority: Train local fire departments on how to create defensible space around homes.

FIREFIGHTER SAFETY

High Priority: Provide minimum wildland Personal Protective Equipment (PPE) for all career and volunteer firefighters. (See NFPA Standard 1977 for requirements.)

High Priority: Establish a personnel rehabilitation system. At a minimum, each department should have drinking water and MREs (meals ready to eat) to support their personnel for 24-48 hours.

High Priority: Bridge Load Limits: Post load limits on all bridges.

COMMUNICATIONS

Adequate communication is crucial to firefighter safety. Communication problems are very commonly linked to tragic results.

High Priority: Publish a list of frequencies for each fire department and list the associated channels.

High Priority: Consider organizing all fire department frequencies in similar configurations. Develop an inventory of radio equipment and create a list of needs for replacement and new acquisitions.

High Priority: Develop and publish a general communications plan for incidents that require multi-fire department response.

High Priority: Participate in the California Statewide Interoperability Communications Program to increase competitiveness for communication grants.

EQUIPMENT

High Priority: Develop and publish a list of fire equipment by location. Develop an equipment needs and replacement list.

High Priority: Work with the Mono County Road Department and the California Department of Transportation to train employees, provide employees with personal protective equipment such as fire shirts and fire shelters, and mobilize equipment to fight fires that threaten life and property.

WATER SUPPLY

As with many of the mountainous and rural areas of California, water is a critical fire suppression issue in Mono County. Only a few communities have a reliable source of water via hydrants. Most of the communities are reliant on seasonal ponds and creeks. The following recommendations are meant to help ensure immediately accessible water sources.

Very High Priority: Work with community water associations to assure new hydrant systems are adequate for fire suppression when water supply is available.

Very High Priority: Map existing water sources and make them known.

High Priority: Where secondary pressurized water sources exist (golf courses, development landscaping or other types of sprinkler systems), develop a procedure for quickly activating these systems.

High Priority: Develop a plan, and install dry hydrant and cistern water supply systems around the County.

High Priority: Ensure that hydrants are operational. Test hydrants annually and guarantee that they are obstruction-free and visible.

FUELS MODIFICATION PROJECTS

Introduction

One of the most effective forms of landscape scale fuels modification is the fuelbreak (sometimes referred to as “shaded fuelbreak”). A fuelbreak is an easily accessible strip of land of varying width, depending on fuel and terrain, in which fuel density is reduced, thus improving fire control opportunities. Vegetation is thinned, removing diseased, fire-weakened, and most standing dead trees. Thinning should select for the more fire-resistant species. Ladder fuels – such as low limbs and heavy regeneration – are removed from the remaining stand. Brush, dead and down materials, logging slash, and other heavy ground fuels are removed and disposed of to create an open park-like appearance. The use of fuelbreaks under normal burning conditions can limit the uncontrolled spread of fires and aid firefighters in slowing the spread rate. Under extreme burning conditions, where spotting occurs for miles ahead of the main fire, and probability of ignition is high, even the best fuelbreaks have limited effectiveness. Factors that were considered when determining the need for fuelbreaks in Mono County communities include:

- The presence and density of hazardous fuels (see *Fire Behavior Outputs* in **Appendix A**)
- Slope (see *Fire Behavior Outputs* in **Appendix A**)
- Other hazardous topographic features
- Crowning potential (see *Fire Behavior Outputs* in **Appendix A**)
- Ignition sources

Chimneys, saddles, and deep ravines are all known to accelerate fire spread and influence intensity. Communities with homes located on or above such features, as well as developments located on summits and ridge tops, were given significant consideration for fuel breaks. Crown fire activity values for Mono County were generated by the FlamMap model and classified into four standard ranges. In areas where independent and dependent crown fire activity is likely to exist, fuelbreaks were considered. When there were known likely ignition sources (such as recreation areas that allow campfires) present in areas where there is a threat of fire being channeled into communities, fuelbreaks were considered.

Fuelbreaks should always be connected to a good anchor point, like a rock outcropping, river, lake, or road. The classic location for fuelbreaks is along the tops of ridges, in order to stop fires from backing down the other side or spotting into the next drainage. This is not always practical from a WUI standpoint, because the structures firefighters are trying to protect are usually located at the tops of ridges or mid-slope. Mid-slope positioning is considered the least desirable for fuelbreaks, but it may be easiest to achieve as an extension of defensible space work or off existing roads and escape routes. One tactic would be to create fuelbreaks on slopes below homes located mid-slope and on ridge tops, so that the area of continuous fuels between the defensible space of homes and the fuelbreak is less than ten acres. Another commonly employed tactic is to position fuelbreaks along the bottom of slopes. It would make sense to locate fuelbreaks mid-slope below homes to break the continuity of fuels into the smaller units mentioned above, even though this position is considered the least desirable from a fire suppression point of view.

Fuelbreaks are often easiest to locate along existing roadbeds. The minimum recommended fuelbreak width is usually 200 feet. As spread rate and intensity increases with slope angle, the size of the fuelbreak should also be increased, with an emphasis on the downhill side of the roadbed or centerline employed. The formulas for slope angles of 30% and greater are as follows: below road distance = 100' + (1.5 x slope %), above road distance = 100' – slope % (see **Table 3**). Fuelbreaks that pass through hazardous topographic features should have these distances increased by 50%.[9] Since fuelbreaks can have an undesirable effect on the aesthetics of the area, crown separation should be emphasized over stand density levels. In other words, isolating groupings rather than cutting for precise stem spacing will help to mitigate the visual impact of the fuelbreak.

Fuelbreaks must be maintained to be effective. Thinning usually accelerates the process of regenerative growth. The effectiveness of the fuelbreak may be lost in as little as three to four years if ladder fuels and regeneration are not controlled.

One of the most difficult issues in establishing and maintaining fuelbreaks is securing the cooperation and participation of landowners. Ownership maps of the area indicate that implementation of fuels reduction projects recommended here would require the approval of public land management agencies as well as private landowners.

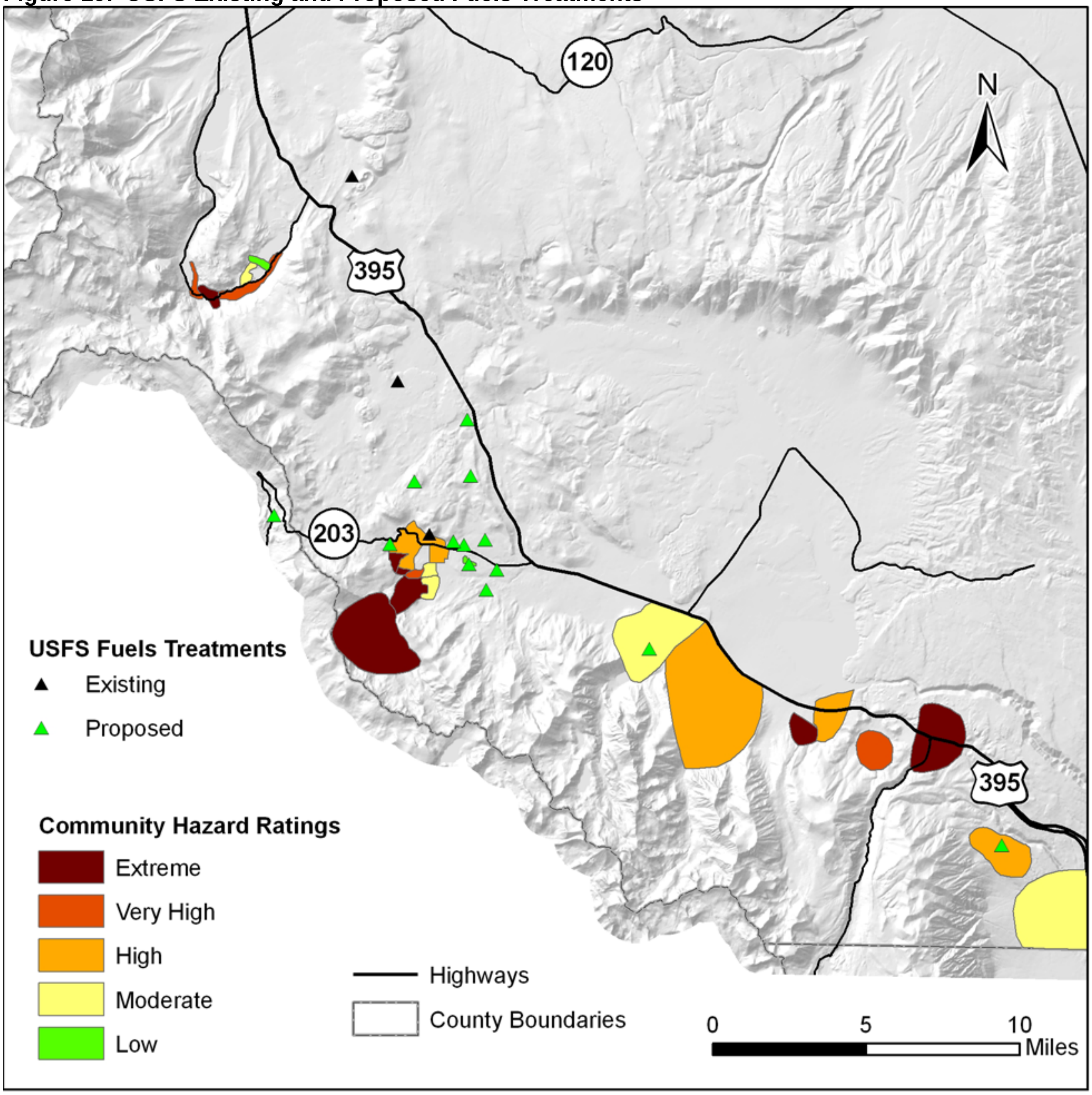
NOTE: It is very important to recognize that the **Mono County Recommended Fuels Modification Projects** detailed on the follow pages are treatment areas recommended through the above stated criteria, but are not specific forestry prescriptions. The graphics represent the general area in which the fuels reduction is recommended but not the specific length, width or even location. It is imperative that the local Federal land agency be contacted to collaborate on specific fuel reduction design criteria, so that a coordinated approach to private/public fuels reduction is assured.

9 Frank C. Dennis, "Fuelbreak Guidelines for Forested Subdivisions" (Colorado State Forest Service, Colorado State University, 1983), p. 11.

MONO COUNTY EXISTING AND FUTURE FUELS MODIFICATION PROJECTS

The following projects are USFS Existing and proposed Fuels Treatment areas.

Figure 19. USFS Existing and Proposed Fuels Treatments



INYO NATIONAL FOREST EXISTING FUELS MODIFICATION PROJECTS IN MONO COUNTY

(Continued maintenance is recommended to maintain effectiveness)

Project Name	Agency	Year	Acres	General Location
Mono City	Inyo NF	2004	93	Mono City
DeChambeau Ranch and Meadow	Inyo NF	1999	20	Mono Basin
June Lake	Inyo NF	2005	142	June Lake
Railroad	Inyo NF	2003	1,000	Mono Mills
June Fire Forest Restoration	Inyo NF	2008	110	June Lake Junction
Jeffrey Pine Forest Health and Fuels Reduction	Inyo NF	2007	4,228	Mammoth Lakes/June Lake
Smoke, Lookout, Crestview, Aqueduct and Pilot Timber Compartment	Inyo NF	2004	14,187	Crestview/Bald Mountains
“Windmill Amendment” to Smoke, Lookout, Crestview, Aqueduct and Pilot Timber Compartment	Inyo NF	2007	1,107	Owens River Road
Rust II Forest Health and Fuels Reduction	Inyo NF	200	461	Bald Mountain
West Tunnel	Inyo NF	1999	600	June Lake Junction
Mammoth Rehab Fuelbreak	Inyo NF	2002	895	Mammoth Lakes
Mill City	Inyo NF	2008	125	Mammoth Lakes
Doe Ridge Interagency Prescribed Fire	Inyo NF	2009	509	Long Valley
Swall Meadows Community Defense	Inyo NF	1998	36	Swall Meadows
Swall - Witcher Fuels Reduction	Inyo NF	2004	526	Swall Meadows

HUMBOLDT-TOIYABE NATIONAL FOREST, BRIDGEPORT DISTRICT: FUELS MODIFICATION PROJECTS – MONO COUNTY

(Continued maintenance is recommended to maintain effectiveness)

Project Name (planned)	Acres	Implementation	General Location
Twin Lakes-WUI	1500	2011	Twin Lakes Drainage
Swauger Creek/Devils Gate WUI	3000	2012	Swauger Creek
Camp Antelope Piles-WUI	50	2009	Walker/Camp Antelope
Mill Canyon	2000	2009-2014	Walker/Camp Antelope
MWTC-Sonora Pass-WUI	800	2009-2012	Sonora Pass

BLM EXISTING FUELS MODIFICATION PROJECTS IN MONO COUNTY

(Continued maintenance is recommended to maintain effectiveness)

Project Name	***Agency***	***Year***	***Acres***	***General Location***
Antelope Valley	BLM	2005	645	Walker/Coleville/Topaz
Golden Gate Mill	BLM	2004	10	Walker/Coleville/Topaz
Invasive Weed and Hazardous Fuels Reduction Project for Marine Housing, Slinkard, Aristo Ranch, and Dry Canyon Allotments	BLM	2006	7,000	Walker/Coleville/Topaz
Pinyon MX	BLM	2004	1,000	Virginia Creek Settlement
Dog and Green Creek Aspen Drainages Habitat Improvement	BLM	2007	50	Dog and Green Creek
Virginia Creek Lodgepole Pine Removal/Aspen Habitat Improvement I	BLM	2004	25	Virginia Creek Drainage
Virginia Creek Lodgepole Pine Removal/Aspen Habitat Improvement II	BLM	2005	25	Virginia Creek Drainage
Mono City/Conway Ranch	BLM	2004	15	Mono City/Conway Ranch
Evaluation of Pinyon Removal Effects Typical of a Wildland – Urban Interface (WUI) Fuels Reduction	BLM	2005	273	Mono Basin
Benton	BLM	2007	58	Benton/Benton Hot Springs

Doe Ridge Interagency Prescribed Fire	BLM	2009	486	Long Valley
Swall Meadows Fuel Break	BLM	2001	25	Swall Meadows
Chidago Canyon Weed Control and Cultural Site Improvement	BLM	2007	10	Hammil Valley
Fish Slough Prescribed Burn	BLM	2008	200	Fish Slough

BLM FUTURE FUELS MODIFICATION PROJECTS IN MONO COUNTY

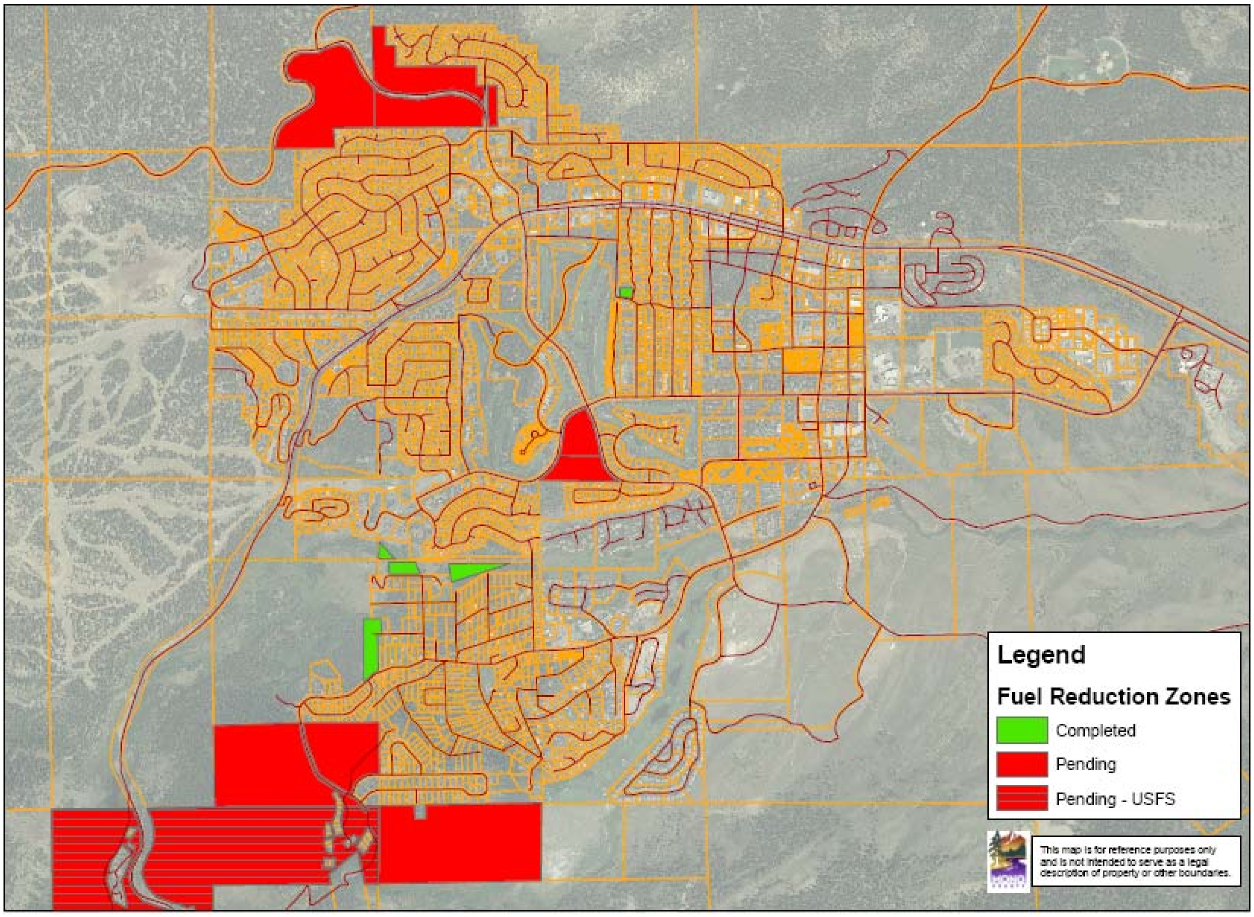
(Continued maintenance is recommended to maintain effectiveness)

Project Name	***Agency***	***General Location***
Slinkard Valley Interagency	BLM	Walker/Coleville/Topaz
Little Antelope Valley Interagency	BLM	Walker/Coleville/Topaz
Eastside Lane	BLM	Walker/Coleville/Topaz
Bridgeport Valley	BLM	Bridgeport/Bodie Hills
Bodie Hills	BLM	Bodie Hills/Bodie
Dynamo Pond	BLM	Bridgeport Valley
Bodie Interagency	BLM	Bodie
Pole Line Road Community	BLM	Pole Line Road
Crowley Communities Interagency	BLM	Crowley Lake
Paradise	BLM	Round Valley
Highway 6 Communities	BLM	Laws/Chalfant/Hammil

MAMMOTH LAKES FIRE DEPARTMENT FUEL REDUCTION ZONES

The following is a map of the Mammoth Lakes Fire Department proposed and completed fuels reduction projects. Local USFS pending treatments are shown as well. Contact the Department for more information on these specific projects.

Figure 20. MLFD Fuel Reduction Zones



MONO COUNTY CWPP RECOMMENDED FUELS MODIFICATION PROJECTS

Table 3. Fuels Modification Projects

Fuelbreak Name	Size	Priority Level
Walker Fuelbreak 1	3812 feet	**Priority level - High**
Walker Fuelbreak 2	5059 feet	**Priority level - High**
Rancheria Fuelbreak	3901 feet	**Priority level - High**
Rancheria Fuelbreak Extension	1266 feet	**Priority level - High**
Twin Lakes Fuelbreak 1	2257 feet	**Priority level - High**
Virginia Lakes Fuelbreak	12143 feet	**Priority level - High**
Clark Tract Fuelbreak	2651 feet	**Priority level - High**
June Lake Fuelbreak 1	2260 feet	**Priority level - High**
June Lake Fuelbreak 2	4367 feet	**Priority level - High**
Lyle Terrace Defensible Spaces	3.749 acres	**Priority level - High**
Lake Mary Fuelbreak	7.746 acres	**Priority level - High**
Lake Mary Road Thinning	7398 feet	**Priority level - High**
Chair 15 Fuelbreak	3500 feet	**Priority level - High**
Juniper Loop Road Thinning	4482 feet	**Priority level - High**
Sunny Slopes Access Improvement	9471 feet	**Priority level - High**
Lundy Canyon Fuelbreak	1411 feet	**Priority level - High**
Lundy Canyon Access Thinning	1721 feet	**Priority level - High**
Evans Tract Fuelbreak	1762 feet	**Priority level - High**
Twin Lakes Fuelbreak 2	6.5 acres	**Priority level - High**
Silver Lake Fuelbreak	2057 feet	**Priority level - High**
June Lake Fuelbreak 3	1739 feet	**Priority level - High**
Coldwater Campground Fuelbreak	9498 feet	**Priority level - High**
Swall Meadows Access Thinning	1195 feet	**Priority level - High**
McGee Creek Safety Zones	.338 acres	**Priority level - High**
Long Valley Fuelbreak 2	4888 feet	**Priority level - High**

GLOSSARY

The following definitions apply to terms used in the Mono County Community Wildfire Protection Plan.

1 hour Timelag fuels: Grasses, litter and duff; <1/4 inch in diameter

10 hour Timelag fuels: Twigs and small stems; ¼ inch to 1 inch in diameter

100 hour Timelag fuels: Branches; 1 to 3 inches in diameter

1000 hour Timelag fuels: Large stems and branches; >3 inches in diameter

Active Crown Fire: This is a crown fire in which the entire fuel complex – all fuel strata – become involved, but the crowning phase remains dependent on heat released from the surface fuel strata for continued spread (also called a Running Crown Fire or Continuous Crown Fire).

ArcGIS 9.x: This is Geographic Information System (GIS) software that is designed to handle mapping data in a way that can be analyzed, queried, and displayed. ArcGIS is in its ninth major revision and is published by the Environmental Systems Research Institute (ESRI).

Crown Fire (Crowning): The movement of fire through the crowns of trees or shrubs; may or may not be independent of the surface fire.

Defensible Space: An area around a structure where fuels and vegetation are modified cleared or reduced to slow the spread of wildfire toward or from the structure. The design and distance of the defensible space is based on fuels, topography, and the design/materials used in the construction of the structure.

Energy Release Component: An index of how hot a fire could burn. ERC is directly related to the 24-hour, potential worst case, total available energy within the flaming front at the head of a fire.

Extended Defensible Space (also known as Zone 3): This is a defensible space area where treatment is continued beyond the minimum boundary. This zone focuses on forest management with fuels reduction being a secondary consideration.

Fine Fuels: Fuels that are less than ¼-inch in diameter, such as grass, leaves, draped pine needles, fern, tree moss, and some kinds of slash which, when dry, ignite readily and are consumed rapidly.

Fire Behavior Potential: The expected severity of a wildland fire expressed as the rate of spread, the level of crown fire activity, and flame length. This is derived from fire behavior modeling programs using the following inputs: fuels, canopy cover, historical weather averages, elevation, slope, and aspect.

Fire Danger: In this document we do not use this as a technical term, due to various and nebulous meanings that have been historically applied.

Fire Hazard: Given an ignition, the likelihood and severity of Fire Outcomes (Fire Effects) that result in damage to people, property, and/or the environment. The hazard rating is derived from the Community Assessment and the Fire Behavior Potential.

Fire Mitigation: Any action designed to decrease the likelihood of an ignition, reduce Fire Behavior Potential, or to protect property from the impact of undesirable Fire Outcomes.

Fire Outcomes, AKA Fire Effects: This is a description of the expected effects of a wildfire on people, property and/or the environment, based on the Fire Behavior Potential and physical presence of Values at risk. Outcomes can be desirable as well as undesirable.

Fire Risk: The probability that an ignition will occur in an area with potential for damaging effects to people, property, and/or the environment. Risk is based primarily on historical ignitions data.

Flagged Addressing: A term describing the placement of multiple addresses on a single sign, servicing multiple structures located on a common access.

FlamMap: A software package created by the Joint Fire Sciences Program, Rocky Mountain Research Station. The software uses mapped environmental data such as Elevation, Aspect, Slope, and Fuel Model, along with fuel moisture and wind information, to generate predicted fire behavior characteristics such as Flame Length, Crown Fire Activity, and Spread Rate.

Flame Length: The distance between the flame tip and the midpoint of the flame depth at the base of the flame (generally the ground surface)—an indicator of fire intensity.

Fuelbreak: A natural or constructed discontinuity in a fuel profile that is used to isolate, stop, or reduce the spread of fire. Fuelbreaks may also make retardant lines more effective and serve as control lines for fire suppression actions. Fuelbreaks in the WUI are designed to limit the spread and intensity of crown fire activity.

ICP (Incident Command Post): The base camp and command center from which fire suppression operations are directed.

ISO (Insurance Standards Office): A leading source of risk (as defined by the insurance industry) information to insurance companies. ISO provides fire risk information in the form of ratings used by insurance companies to price fire insurance products to property owners.

Jackpot Fuels: A large concentration of fuels in a given area such as a slash pile.

Passive Crown Fire: A crown fire in which individual or small groups of trees torch out (candle), but solid flaming in the canopy fuels cannot be maintained except for short periods.

Shelter-in-Place Areas: A method of protecting the public from an advancing wildfire that involves instructing people to remain inside their homes or public buildings until the danger passes. This concept is new to wildfire in the United States, but not to hazardous materials incident response, where time, hazards, and sheer logistics often make evacuation impossible. This concept is the dominant modality for public protection from wildfires in Australia, where fast-moving, short-duration fires in light fuels make evacuation impractical. The success of this tactic depends on a detailed preplan that takes into account the construction type and materials of the building used, topography, depth and type of the fuel profile, as well as current and expected weather and fire behavior. For a more complete discussion of the application and limitations of shelter-in-place concepts, see the *Addressing, Evacuation, and Shelter-In-Place* section in the main report.

Slash: Debris left after logging, pruning, thinning, or brush cutting. This includes logs, chips, bark, branches, stumps, and broken understory trees or brush.

Spotting: Refers to the behavior of a fire producing sparks or embers that are carried by the wind and start new fires beyond the zone of direct ignition by the main fire.

Structural Triage: The process of identifying, sorting, and committing resources to a specific structure.

Surface Fire: A fire that burns in the surface litter, debris, and small vegetation on the ground.

Timelag: Time needed under specified conditions for a fuel particle to lose about 63% of the difference between its initial moisture content and its equilibrium moisture content.

Values at risk: People, property, ecological elements, and other human and intrinsic values within the project area. Values at risk are identified by inhabitants as important to the way of life in the study area, and are particularly susceptible to damage from undesirable fire outcomes.

WHR (Community Wildfire Hazard Rating, AKA Community Assessment): A sixty-point scale analysis designed to identify factors that increase the potential for and/or severity of undesirable fire outcomes in WUI communities.

WUI (Wildland Urban Interface): The line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels. This is sometimes referred to as Urban Wildland Interface, or UWI.

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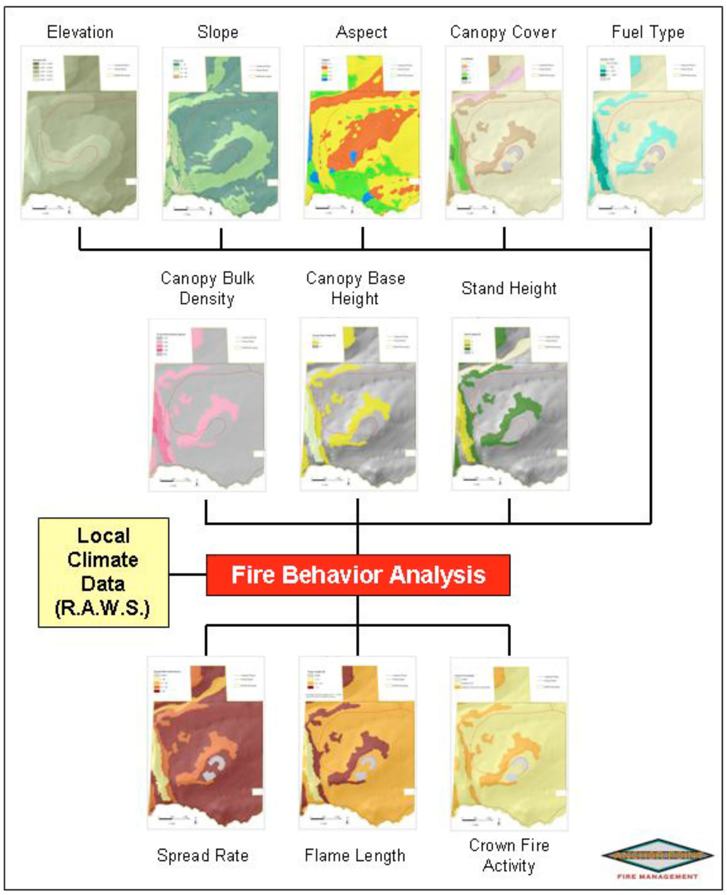
APPENDIX A

FIRE BEHAVIOR POTENTIAL ANALYSIS METHODOLOGY

Purpose

The purpose of this document is to describe the methodology used to evaluate the threat represented by physical hazards—such as fuels, weather and topography—to values-at-risk in the study area, by modeling their effects on fire behavior potential.

Figure 1. Flow Chart



The fire behavior potential analysis reports graphically the probable range of spread rate, flame length, and crown fire potential for the analysis area, based upon a set of inputs significant to fire behavior. The model inputs include aspect, slope, elevation, canopy cover, fuel type, canopy bulk density, canopy base height, stand height, and climate data. The model outputs are determined using FlamMap[1], which combines surface fire predictions with the potential for crown fire development. Calculations for surface fire predictions (rate of spread and flame length) are based on the USDA Forest Service's BEHAVE[2] model.

BEHAVE

The BEHAVE fire behavior prediction and fuel modeling system was employed to determine surface fire behavior estimates for this study. BEHAVE is a nationally recognized set of calculations used to estimate a surface fire's intensity and rate of spread given certain conditions of topography, fuels, and weather. The BEHAVE modeling system has been used for a variety of applications, including prediction of an ongoing fire, prescribed fire planning, fuel hazard assessment, initial attack dispatch, and fire prevention planning and training. Predictions of wildland fire behavior are made for a single point in time and space, given simple user-defined fuels, weather, and topography. Requested values depend on the modeling choices made by the user.

Assumptions of BEHAVE:

- Fire is predicted at the flaming front
- Fire is free burning
- Behavior is heavily weighted towards the fine fuels
- Continuous and uniform fuels
- Surface fires

FlamMap

Anchor Point uses FlamMap to evaluate the potential fire conditions in the fire behavior study area. Mono County encompasses 2,004,344 acres (3,131.8 square miles). The study area for the fire behavior analysis covers approximately 2,213,067 acres (3,457.9 square miles). This area includes the entire county plus a one-mile buffer in all directions. The use of this buffer provides the county with an analysis of potential fire behavior on adjacent lands. The study area is broken down into grid cells of 10-meters per side (10M). Using existing vector and raster spatial data and field data, ArcGIS spatial analysis capabilities are used to calculate model inputs for each 10M cell. These values are input into FlamMap, along with reference weather and fuel moisture (long-term weather observations statistically calculated from the Rifle Remote

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[1] Mark Finney, Stuart Brittain and Rob Seli., The Joint Fire Sciences Program of the Rocky Mountain Research Station (USDA Forest Service, Missoula, Montana), the Bureau of Land Management and Systems for Environmental Management (Missoula, Montana).

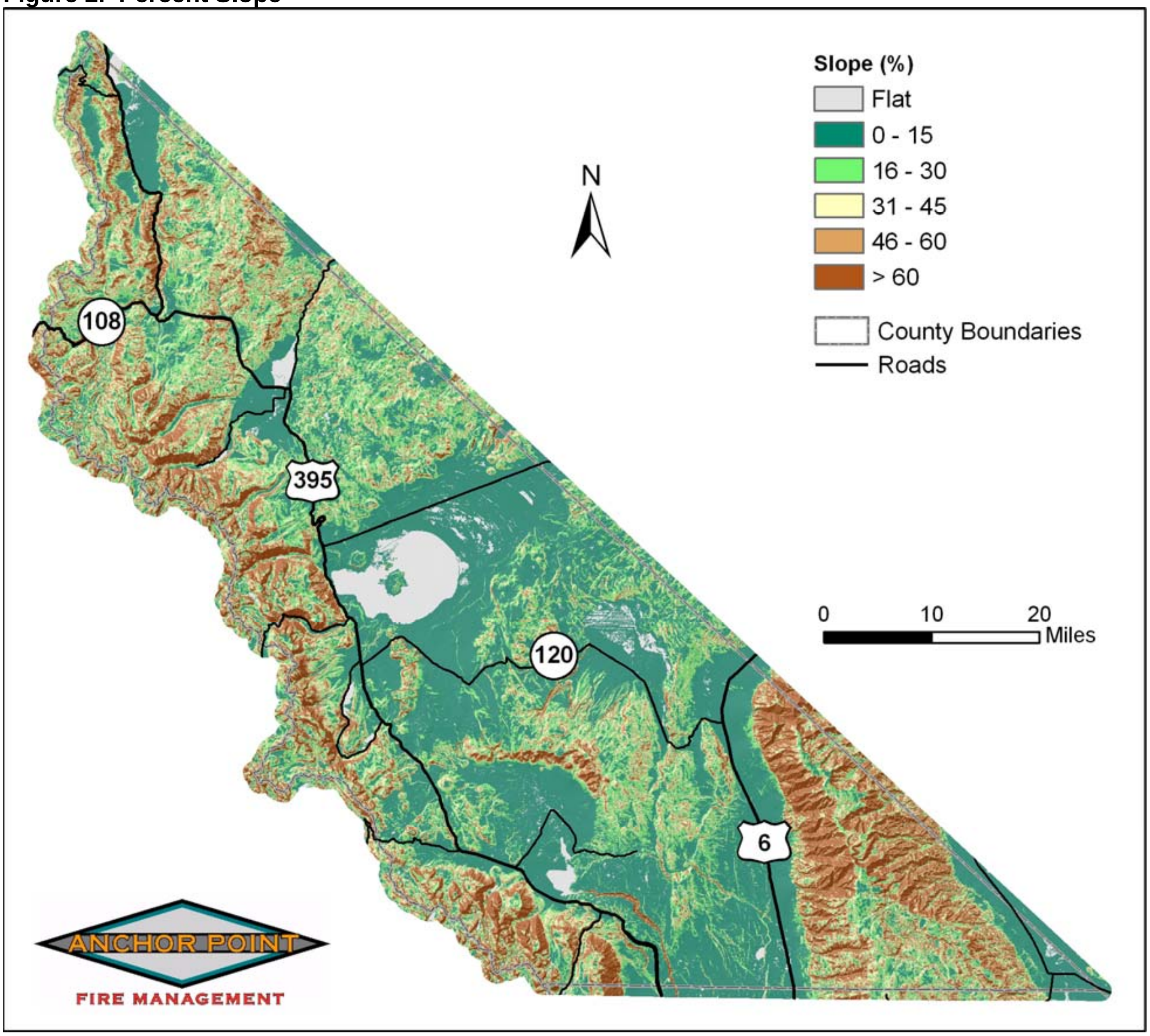
[2] Patricia L. Andrews, producer and designer, Collin D. Bevins, programmer and designer, The Joint Fire Sciences Program of the Rocky Mountain Research Station (USDA Forest Service, Missoula, Montana) and Systems for Environmental Management (Missoula, Montana).

Automated Weather Station information). The outputs of FlamMap include the estimated Rate of Spread (ROS) (from BEHAVE), Flame Length (FL) (from BEHAVE) and Crown Fire Activity for a fire in that 10M cell. The model computes these values for each cell in the study area independently, so the data in each cell is unaffected by adjacent cells.

Fire Behavior Inputs

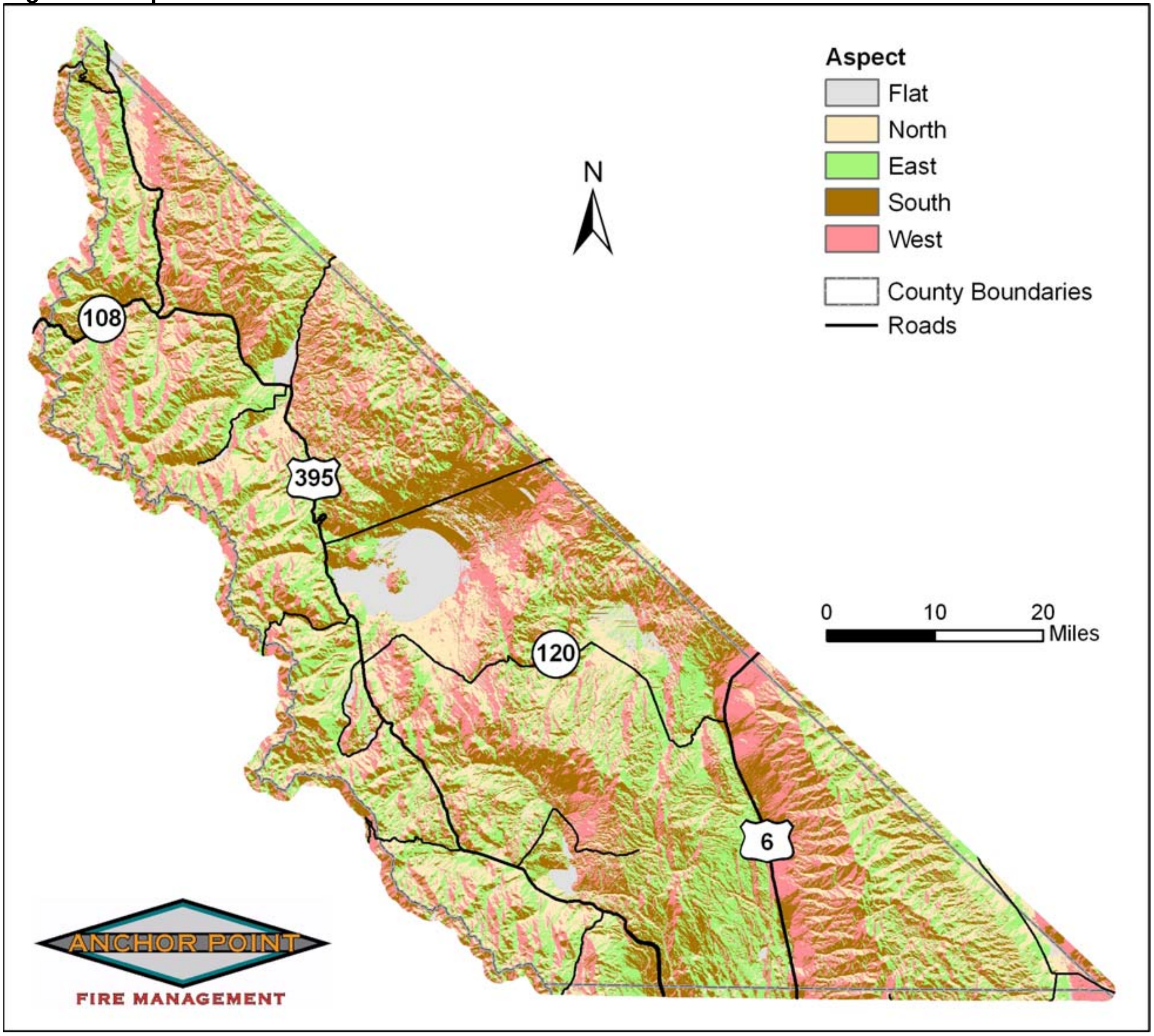
The major factors influencing fire behavior are fuels (type and coverage), weather, and topography (aspect, slope and elevation). The following pages contain a brief explanation of each.

Figure 2. Percent Slope



Slopes are shown here as percent (rise/run x100). Steeper slopes intensify fire behavior and thus will contribute to a higher wildfire hazard rating. Rates of spread for a slope of 30% are typically double those of flat terrain, when all other influences are equal.

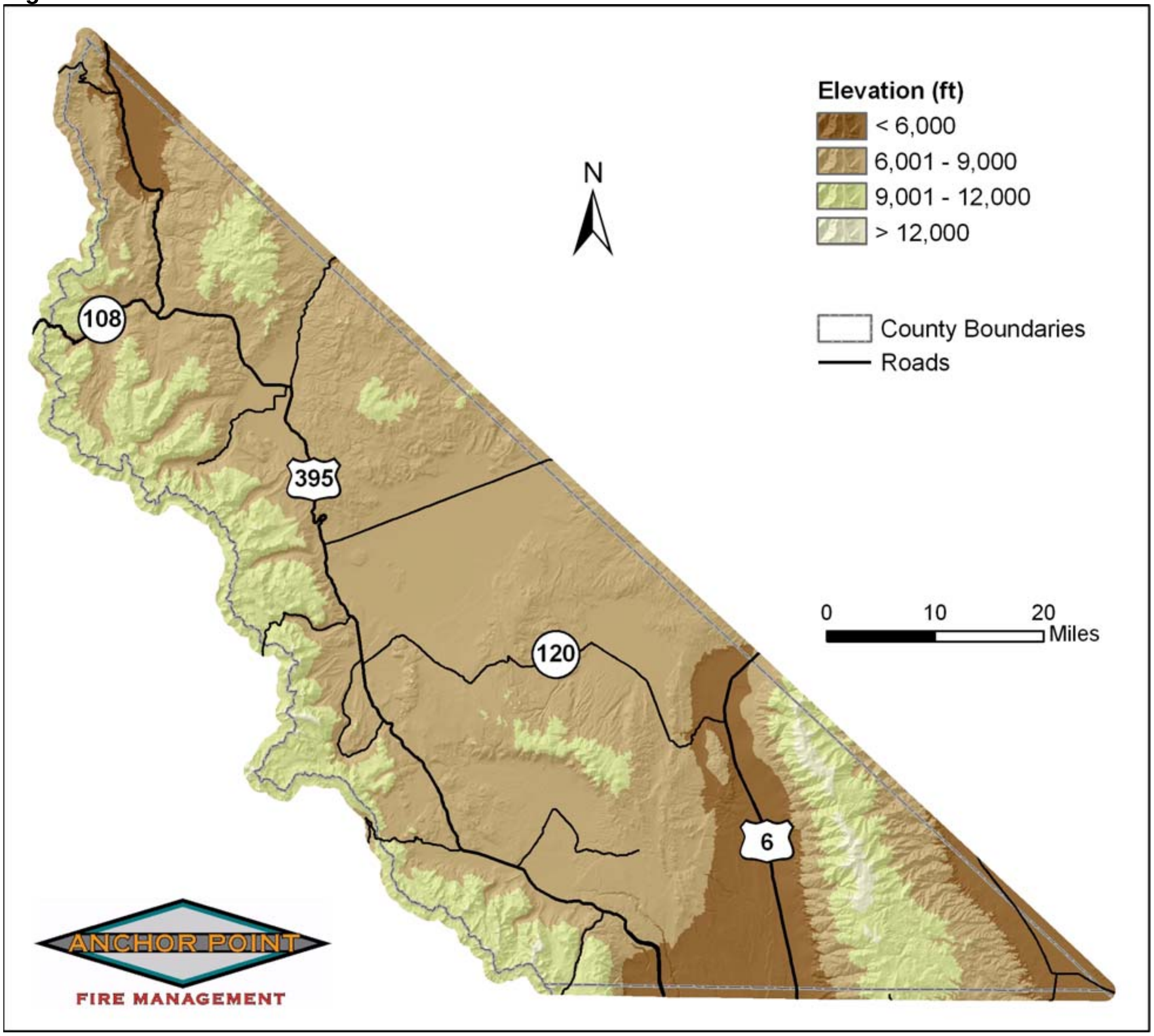
Figure 3. Aspect



Aspects are shown as degrees from north ranging from 0 to 360 according to their orientation. Aspects are influential in the type and quantity of vegetative fuels. Fuels on south facing slopes tend to be drier and more lightly loaded than fuels on north facing slopes, when all other influences are equal. Aspect also has an influence on plant species dominance.

Classification	North	East	South	West
Range (degrees)	**315-45**	**45-135**	**135-225**	**225-315**

Figure 4. Elevation



Elevations within the study area range from 4,200′ to over 10,000′. As elevation increases, environmental conditions, fuel species, and characteristics change.

Fuel Models and Fire Behavior

Fire behavior fuel models are a set of numbers that describe fuels in terms that a fire behavior model, in this case FlamMap, can use. There are seven characteristics used to categorize fuel models.

- Fuel Loading
- Size and Shape
- Compactness
- Horizontal Continuity
- Vertical Arrangement
- Moisture Content
- Chemical Content

Each of the major fuel types present in the study area are described below in terms of the characteristics that coincide with that fuel model. Fuel model descriptions are taken from Anderson's *Aids to Determining Fuel Models for Estimating Fire Behavior*[3], a national standard guide to fuel modeling, unless otherwise noted. **Vegetation for the project area may or may not be specifically listed in the description**. Plant species are only an aid to help visualize the characteristics of the model. The photos are taken from the project area and show where the local vegetation fits in.

The study area is represented primarily by eight fuel models (FM): FM 1, 2, 5, 6, 8, 9, 10 and 15 (a CDF custom fuel model). Other fuel models may exist, but not in quantities sufficient to significantly influence fire behavior in the Wildland Urban Interface. **Figure 5** displays the fuel types graphically for the study area.

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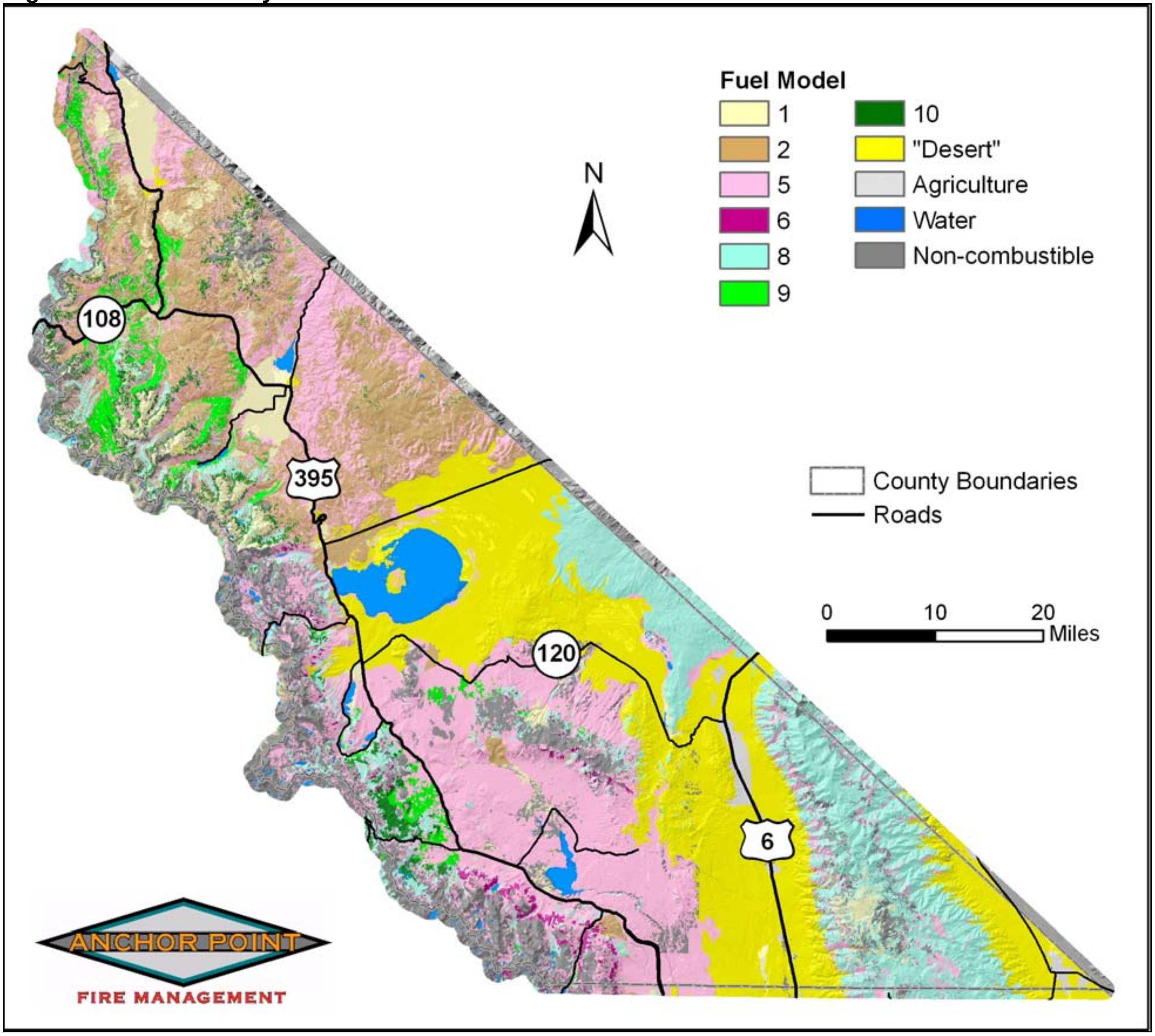
[3] Anderson, Hal E., *Aids to Determining Fuel Models for Estimating Fire Behavior*, National Wildfire Coordinating Group, NFES 1574, April 1982.

Figure 5. Mono County Fuel Models



“Desert” is a custom CDF fuel model (FM 15). Fuel models 97, 98, and 99 in the map legend indicate areas of insignificant combustibility such as water, rock, sand, etc.

FUEL MODEL 1

Figure 6. Short grasses

Characteristics

Grasslands and savanna are represented along with stubble, grass-tundra, and grass-shrub combinations.

Common Types/Species

Annual and perennial grasses are included in this fuel model.

Fire Behavior

Fire spread is governed by the fine, very porous, and continuous herbaceous fuels that have cured or are nearly cured. Fires in this fuel model are surface fires that move rapidly through the cured grass and associated material. Very little shrub or timber is present—generally less than one third of the area.

FUEL MODEL 2

Figure 7. Open canopy timber and shrubs with grass understory

Characteristics

Fire spread is primarily through the fine herbaceous fuels, either curing or dead.

Common Types/Species

Open shrub lands and pine stands or scrub oak stands that cover one third to two thirds of the area may generally fit this model. Such stands may include clumps of fuels that generate higher intensities and that may produce firebrands. Some Pinyon-juniper may be in this model.

Fire Behavior

These are surface fires where the herbaceous material—in addition to litter and dead-down stemwood from the open shrub or timber overstory—contributes to the fire intensity.

FUEL MODEL 5

Figure 8. Young green stands of sage and chaparral

Characteristics

This model consists of continuous stands of low brush. Generally, heights do not exceed six feet. The stands will have a grass or scattered grass understory. Usually shrubs are short and almost totally cover the area.

Common Types/Species

Young, green stands with no dead wood would qualify: laurel, vine maple, alder, or even chaparral, manzanita, or chamise. Mountain grasses are also associated with this type.

Fire Behavior

The fires are generally not very intense because surface fuel loads are light, the shrubs are young with little dead material, and the foliage contains little volatile material. Fire is generally carried in the surface fuels that are made up of litter cast by the shrubs and the grasses or forbs in the understory. Cured leaves retained on shrubs can cause greater intensities.

FUEL MODEL 6

Figure 9. Mixed stands of mesquite and big sage less than 6 feet high

Characteristics

Shrubs in Fuel Model 6 are older than, but not as tall as, the shrub types of Fuel Model 4. They also do not contain as much fuel as FM 4.

Common Types/Species

A broad range of shrub conditions is covered by this model. Fuel situations to be considered include intermediate stands of chamise, chaparral, oak brush, low pocosin, Alaskan spruce taiga, and shrub tundra. Even hardwood slash that has cured can be considered. Pinyon-juniper shrub lands may be represented but may over-predict rate of spread except at high winds, such as 20 mi/h (32 km/h) at the 20-foot level.

Fire Behavior

Fires carry through the shrub layer where the foliage is more flammable than fuel model 5, but this requires moderate winds, greater than 8 mi/h (13 km/h), at mid-flame height. Fire will drop to the ground at low wind speeds or at openings in the stand.

FUEL MODEL 8

Figure 10. Aspen stands

Characteristics

Hardwoods that have leafed out support fire in the compact litter layer. This layer is mainly needles, leaves, and occasionally twigs because little undergrowth is present in the stand. Amounts of needle and woody litter are also low.

Common Types/Species

Closed canopy stands of short-needle conifers or hardwoods. Representative conifer types are white pine, Lodgepole pine, spruce, fir and larch.

Fire Behavior

Fires in this fuel model are slow burning and low intensity, burning in surface fuels. Fuels are mainly needles and woody litter. Heavier fuel loadings from old dead and down trees or branches can cause flare-ups. Heavier fuel loads have the potential to develop crown fires in extreme burning conditions.

FUEL MODEL 9

Figure 11. Mixed conifer stands with moderate loads of dead and down

Characteristics

This stand is represented by closed canopy stands of Ponderosa pine and mixed conifer. Understory may consist of small trees and shrubs, grasses, and moderate concentrations of down, dead woody litter. High amounts of needle litter may be present. This model can exist from foothills to sub-alpine.

Common Types/Species

This model can include Ponderosa pine, Lodgepole pine, and a mixture of Douglas-fir spruce and pine. Some mountain shrubs and grasses are present.

Fire Behavior

Fires run through surface litter, torching of individual trees is possible. Under high burning conditions, crown fires can be encountered.

FUEL MODEL 10

Figure 12. Mixed conifer stands with heavy dead and regeneration in the understory

Characteristics

This model is represented by dense stands of over-mature ponderosa pine, Lodgepole pine, mixed-conifer, and continuous stands of Douglas-fir. In all stand types, heavy down material is present. There is also a large amount of dead, down woody fuels. Reproduction may be present, acting as ladder fuels. This model includes stands of budworm-killed Douglas-fir, closed stands of ponderosa pine with large amounts of ladder and surface fuels, and stands of Lodgepole pine with heavy loadings of downed trees. This model can occur from the foothills through the sub-alpine zone.

Common Types/Species

All types of vegetation can occur in this model, but primary species are Douglas-fir, ponderosa pine and Lodgepole pine.

Fire Behavior

Fire intensities can be moderate to extreme. Fire moves through dead, down woody material. Torching and spotting are more frequent. Crown fires are quite possible.

FUEL MODEL 15

Figure 13. Desert shrubs and grasses (custom fuel model from FRAP)

FM 15 is a desert grass custom model. It most closely resembles the Scott and Burgan FM 121 (GS1).[4] The following descriptions are from "Standard Fire Behavior Fuel Models: A Comprehensive Set for Use with Rothermel's Surface Fire Spread Model" by Joe H. Scott and Robert E. Burgan.[5]

Characteristics

The primary carrier of fire in GS1 is grass and shrubs combined. Shrubs are about one foot high, grass load is low.

Common Types/Species

Dry-climate grasses and shrubs.

Fire Behavior

Spread rate is moderate: flame length is low. Moisture of extinction is low.

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[4] Source: email communication from David Sapsis, Wildland Fire Scientist, CDF Fire and Resource Assessment Program (FRAP), August 17, 2006.

[5] Joe H. Scott and Robert E. Burgan, *Standard Fire Behavior Fuel Models: A Comprehensive Set for Use with Rothermel's Surface Fire Spread Model*, USDA Forest Service Rocky Mountain Research Station, General Technical Report RMRS-GTR-153, June 2005, page 36.

Reference Weather Used in the Fire Behavior Potential Evaluation

Inyo and Mono Counties cover an area of over 8,000,000 acres. The study area includes the highest (Mt. Whitney 14,495') and the lowest (Badwater Flats 282' below sea level) points in the continental United States. Mammoth Lakes averages 385 inches (32 feet) of snowfall per year[6] and Death Valley (2.5 inches of precipitation annually, July average temperature of 115°F)[7] is one of the hottest and driest places in the western hemisphere. No single set of weather inputs can capture the range of variability that exists in the study area and no single weather station is adequate to provide the weather inputs for the fire behavior analysis. Seasonal percentile weather reports were generated for all of the available Remote Automated Weather Stations (RAWS) and reviewed by our staff Fire Behavior Analyst (FBAN). Sites with poor data or significant errors were eliminated. Data from 10 RAWS were used to create fire weather zones for use in the fire behavior potential analysis. Site information for these stations is displayed in **Table 1**.

After evaluating the RAWS data, three fire weather zones were created for use in the fire behavior potential analysis. Percentile weather observations were calculated from each station using the Fire Family Plus software package to generate a moderate fire weather conditions class and an extreme fire weather conditions class. The moderate conditions class (16th to 89th percentile) was calculated for each variable (1 hour, 10 hour, and 100 hour fuel moisture, woody fuel moisture, herbaceous fuel moisture, and wind speed). This weather condition class most closely represents an average fire season day. Conditions class data from the stations within each zone were then averaged together to create an aggregate value for calculating the weather inputs for **FlamMap** for each fire weather zone.

The extreme conditions class was calculated using 97th percentile weather data. In other words, the weather conditions existing on the three to five most severe fire weather days (sorted by Spread Component) in each season were averaged together. It is reasonable to assume similar conditions may exist for at least five days of the fire season during an average year. During extreme years, such conditions may exist for significantly longer periods. These calculations may be conservative compared to observed fire behavior. Each weather zone is described below. Elevation ranges and vegetation descriptions are approximate.

Mountain Weather Zone (Fire Weather Zone 1) **-** Elevation 7,000' to 14,495', RAWS sites used: Crestview CA, Gaylor Meadow (Tuolumne) CA. The mountain fire weather zone contains the high elevations of the Sierra Nevada, Inyo, White and Sweetwater mountain ranges. Although high elevations exist in other portions of the study area, most notably in the Panamint and Amargosa mountain ranges in Death Valley National Park, the areas included in the mountain weather zone are typically substantially wetter and cooler than the high elevations of the desert areas. The presence of heavy to moderate coverage of timber makes surface fuels in the mountain zone the most shaded of the three weather zones. The values used in **FlamMap** for the mountain weather zone are shown in **Table 2**.

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[6] http://www.sfgate.com/cgi-bin/document.cgi?file=/sports/skiing/pages/resorts/mammoth.DTL

[7] http://www.nps.gov/archive/deva/weather.htm

High Valleys Weather Zone (Fire Weather Zone 2) – Elevation 3,000' to 7,000', RAWS sites used: Walker CA, Bridgeport CA, Benton CA, Rock Creek CA, Owens Valley CA and Oak Creek CA. This fire weather zone contains the high valleys of the US 395 and US 6 corridors including Antelope Valley, Mono Valley, Chalfant Valley and the Owens Valley. The majority of WUI communities in the study area occur in this weather zone. Vegetative cover includes irrigated agricultural, Pinyon-juniper stands, sage and annual grasses. The values used in **FlamMap** for the high valleys weather zone are shown in **Table 3**.

Desert Weather Zone (Fire Weather Zone 3) – Elevation -282' to 11,000', RAWS sites used: Panamint CA, Oriental Wash NV. This fire weather zone includes Death Valley National Park, China Lake and portions of the Amargosa desert. Although elevations vary widely in this weather zone, the weather inputs used reflect the conditions below 7,000 feet. The high peaks have greater vegetation, usually Pinyon and other pine species, and more moisture but the vast majority of this zone is hot, dry and sparse in vegetation. That being said, however, wildland fires do occur in Death Valley (the Calico fire occurred just shortly before the data collection was done for this report) and WUI communities exist in this weather zone. The values used in **FlamMap** for the desert weather zone are shown in **Table 4**.

Table1: RAWS Site Information (listed north to south)

Walker, CA (Station ID # 043707)

Latitude (dd mm ss)	38° 33' 55" N
Longitude (dd mm ss)	119° 27' 33" W
Elevation (ft.)	5,440

Bridgeport, CA (Station ID # 043702)

Latitude (dd mm ss)	38° 16' 19" N
Longitude (dd mm ss)	119° 17' 21" W
Elevation (ft.)	6,650

Gaylor Meadow, CA (Station ID # 043611)

Latitude (dd mm ss)	37° 52' 06" N
Longitude (dd mm ss)	119° 19' 06" W
Elevation (ft.)	9,270

Benton, CA (Station ID # 043708)

Latitude (dd mm ss)	37° 50' 35" N
Longitude (dd mm ss)	118° 28' 40" W
Elevation (ft.)	5,450

Crestview, CA (Station ID # 043709)

Latitude (dd mm ss)	37° 44' 42" N
Longitude (dd mm ss)	118° 59' 00" W
Elevation (ft.)	7,600

Rock Creek, CA (Station ID # 043710)

Latitude (dd mm ss)	37° 33' 05" N
Longitude (dd mm ss)	118° 40' 02" W
Elevation (ft.)	7,040

Owens Valley, CA (Station ID # 044803)

Latitude (dd mm ss)	37° 23' 24" N
Longitude (dd mm ss)	118° 33' 02" W
Elevation (ft.)	4,640

Oriental Wash, NV (Station ID # 261502)

Latitude (dd mm ss)	37° 14' 07" N
Longitude (dd mm ss)	117° 29' 47" W
Elevation (ft.)	4,100

Oak Creek, CA (Station ID # 044804)

Latitude (dd mm ss)	36° 50' 33" N
Longitude (dd mm ss)	118° 15' 34" W
Elevation (ft.)	4,100

Panamint, CA (Station ID # 044806)

Latitude (dd mm ss)	36° 07' 13" N
Longitude (dd mm ss)	117° 05' 16" W
Elevation (ft.)	6,880

Table 2: FlamMap Weather Inputs, Alpine Weather Zone

Moderate Weather Conditions	
Variable	**Value**
20 ft Wind speed up slope	15 mph
Herbaceous fuel moisture	67%
Woody fuel moisture	98%
100-hr fuel moisture	12%
10-hr fuel moisture	7%
1-hr fuel moisture	5%

Extreme Weather Conditions	
Variable	**Value**
20 ft Wind speed up slope	23 mph
Herbaceous fuel moisture	30%
Woody fuel moisture	71%
100-hr fuel moisture	8%
10-hr fuel moisture	4%
1-hr fuel moisture	3%

Table 3: FlamMap Inputs High Valleys Weather Zone

Moderate Weather Conditions	
Variable	**Value**
20 ft Wind speed up slope	18 mph
Herbaceous fuel moisture	31%
Woody fuel moisture	61%
100-hr fuel moisture	6%
10-hr fuel moisture	4%
1-hr fuel moisture	3%

Extreme Weather Conditions	
Variable	**Value**
20 ft Wind speed up slope	36 mph
Herbaceous fuel moisture	31%
Woody fuel moisture	59%
100-hr fuel moisture	6%
10-hr fuel moisture	3%
1-hr fuel moisture	3%

Table 4: FlamMap Inputs Desert Weather Zone

Moderate Weather Conditions	
Variable	**Value**
20 ft Wind speed up slope	19 mph
Herbaceous fuel moisture	34%
Woody fuel moisture	60%
100-hr fuel moisture	5%
10-hr fuel moisture	4%
1-hr fuel moisture	3%

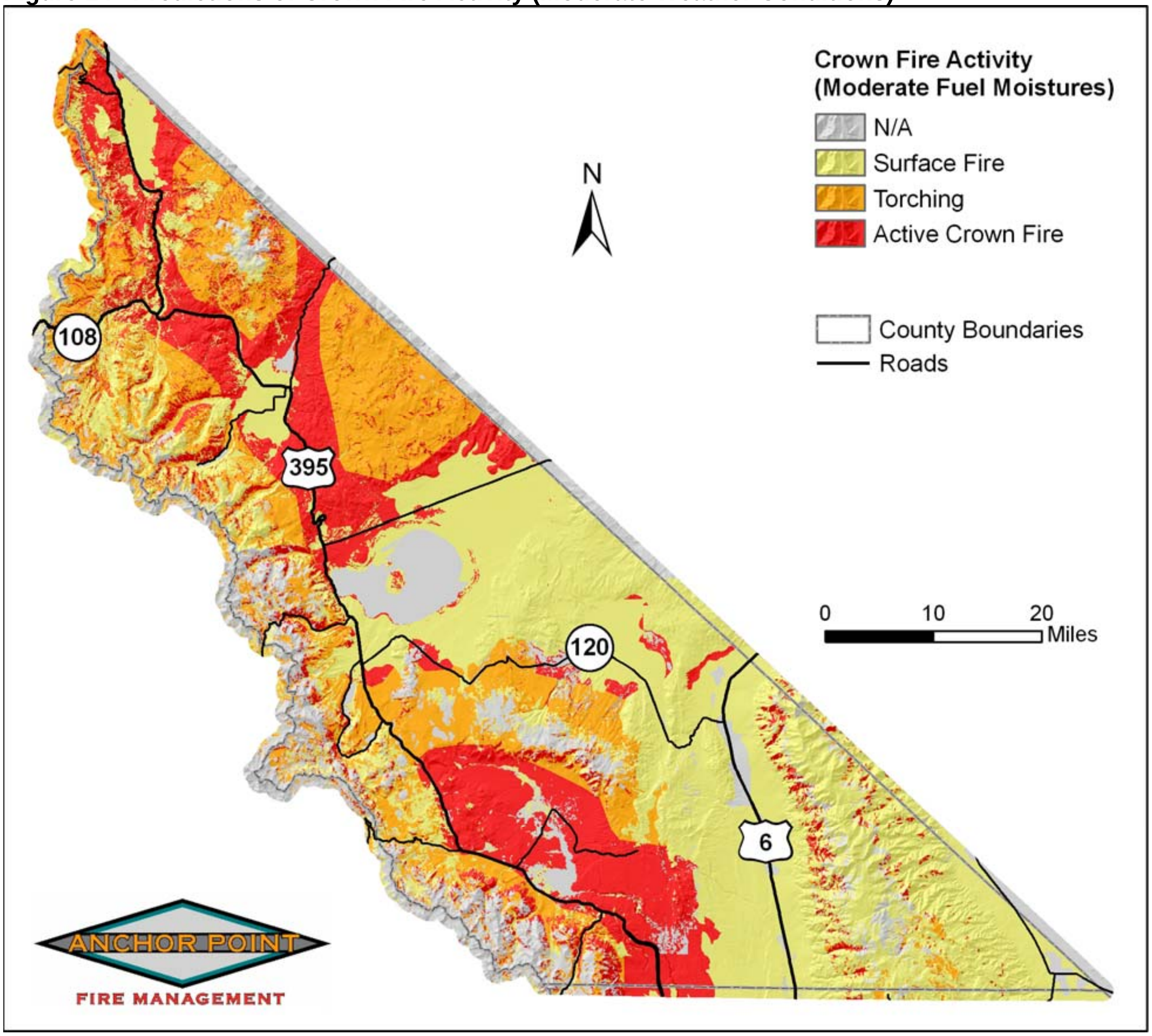
Extreme Weather Conditions	
Variable	**Value**
20 ft Wind speed up slope	30 mph
Herbaceous fuel moisture	34%
Woody fuel moisture	57%
100-hr fuel moisture	4%
10-hr fuel moisture	3%
1-hr fuel moisture	2%

Note:
Winds at 20 ft will be significantly less noticeable at ground level. Therefore, a “gentle breeze” may actually constitute an 11 MPH 20-foot wind, adding one of the components necessary for extreme weather conditions.

Fire Behavior Analysis Outputs

Crown fire activity, rate of spread, and flame length are derived from the fire behavior predictions. The following maps graphically display the outputs of **FlamMap** for both average and extreme weather conditions.

Figure 14. Predictions of Crown Fire Activity (Moderate Weather Conditions)



Crown fire activity values are generated by the **FlamMap** model and classified into four categories based on standard ranges: Active, Passive, Surface, and Not Applicable. In the surface fire category, little or no tree torching will be expected. During passive crown fire activity, isolated torching of trees or groups of trees will be observed and canopy runs will be limited to short distances. During active crown fire activity, sustained runs through the canopy will be observed that may be independent of surface fire activity.

Figure 15. Predictions of Crown Fire Activity (Extreme Weather Conditions)

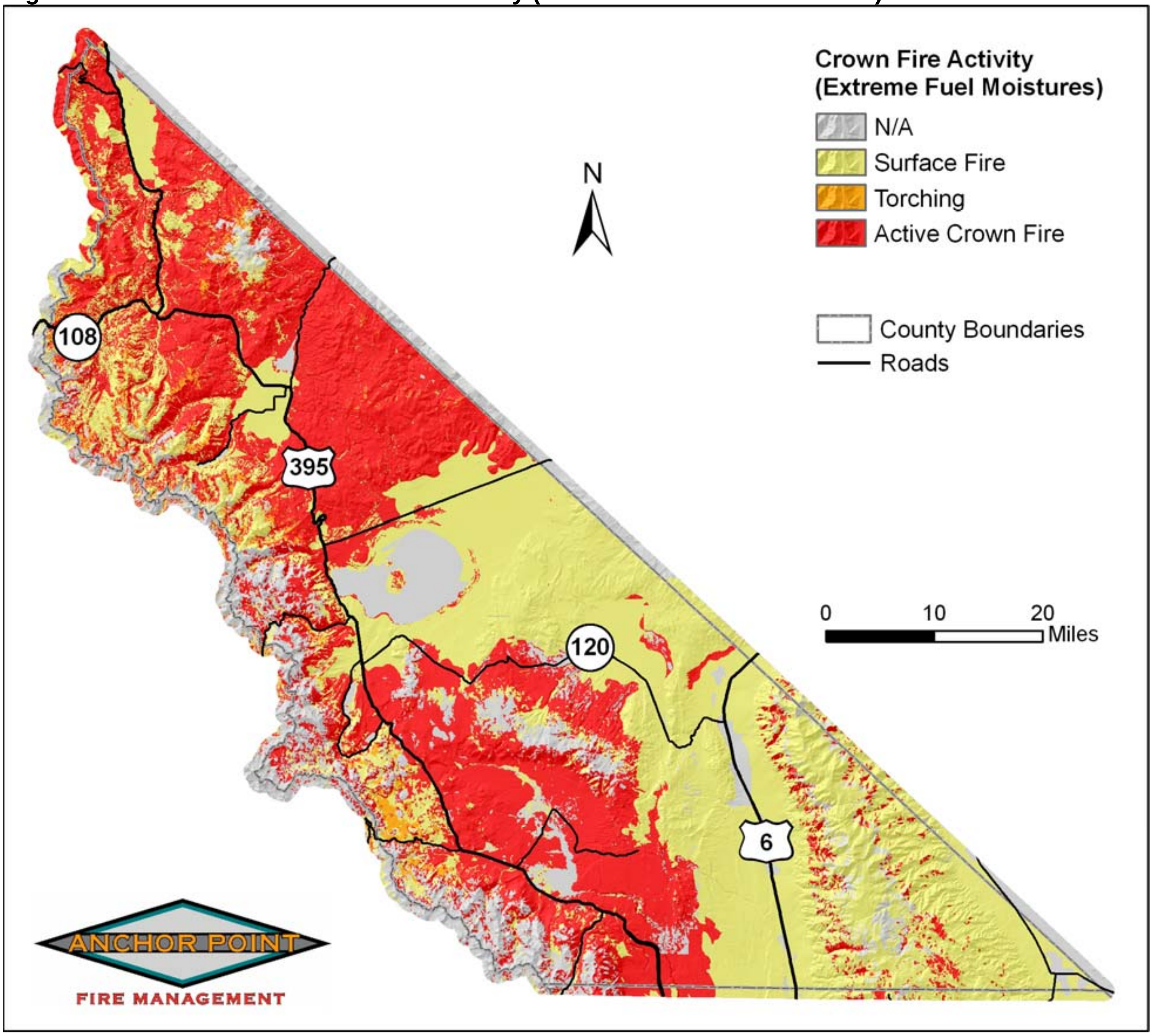
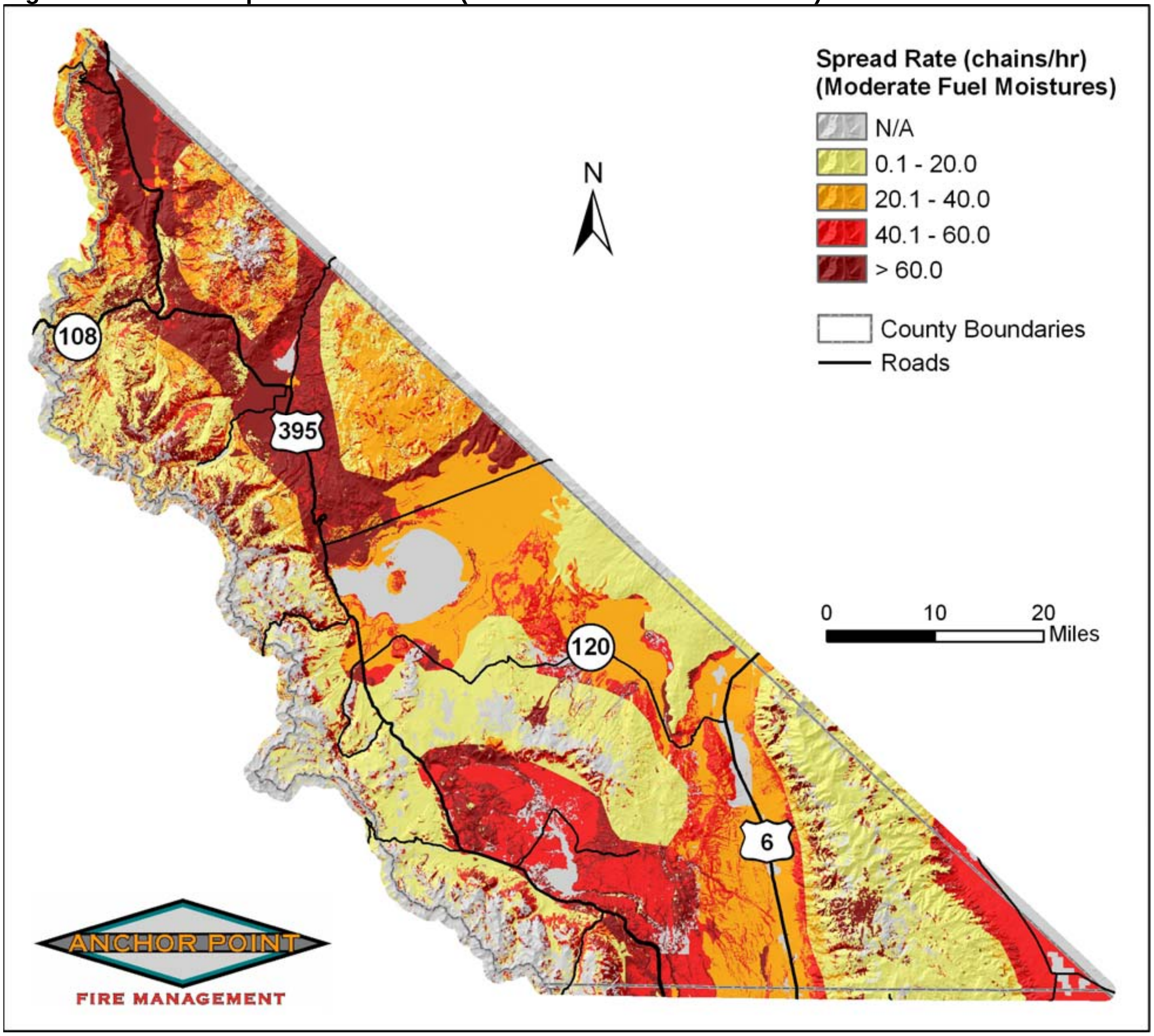


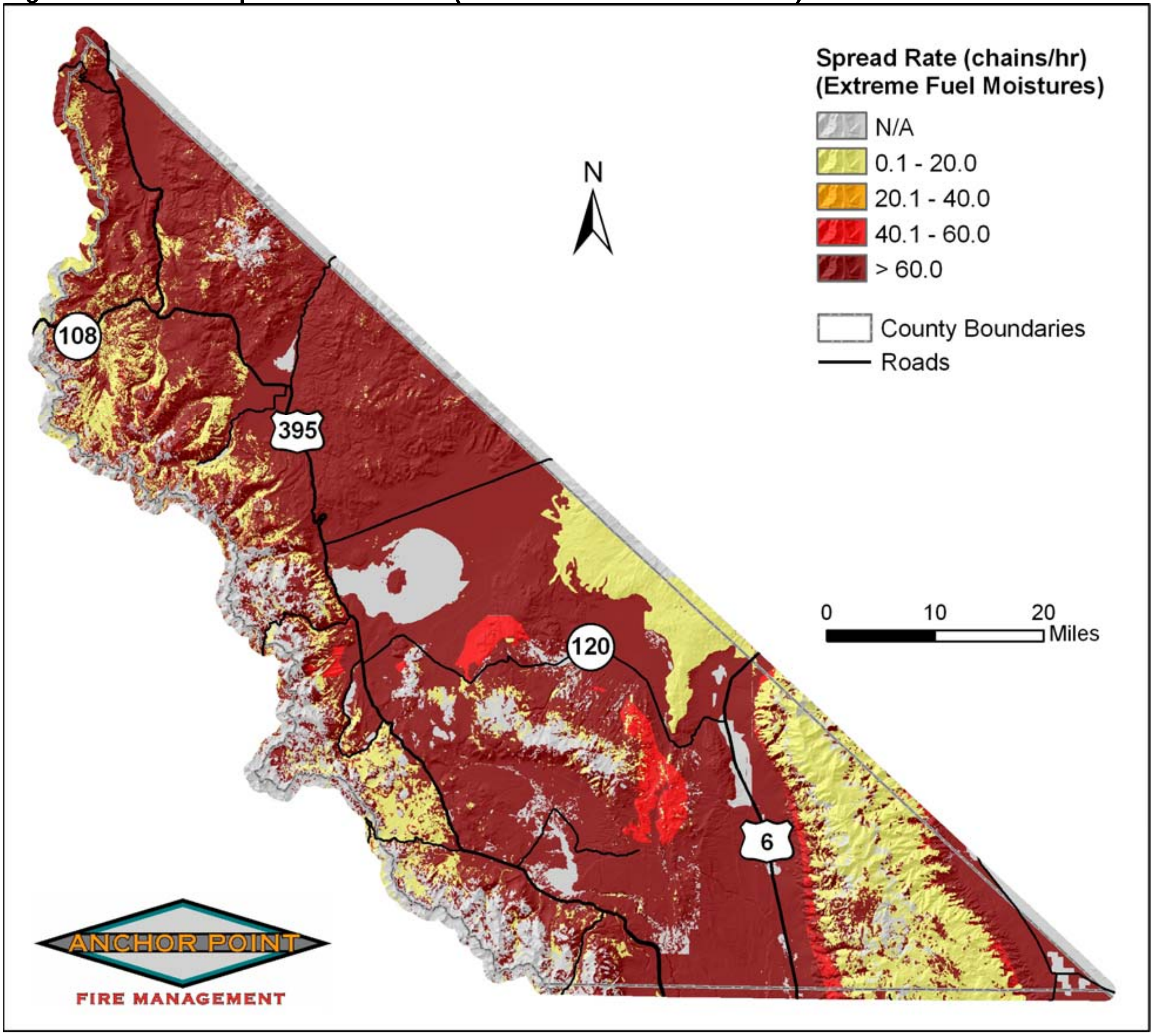
Figure 16. Rate of Spread Predictions (Moderate Weather Conditions)



Rate of spread in chains/hour
(1 chain=66 ft) (80 chains/HR = 1 MPH)

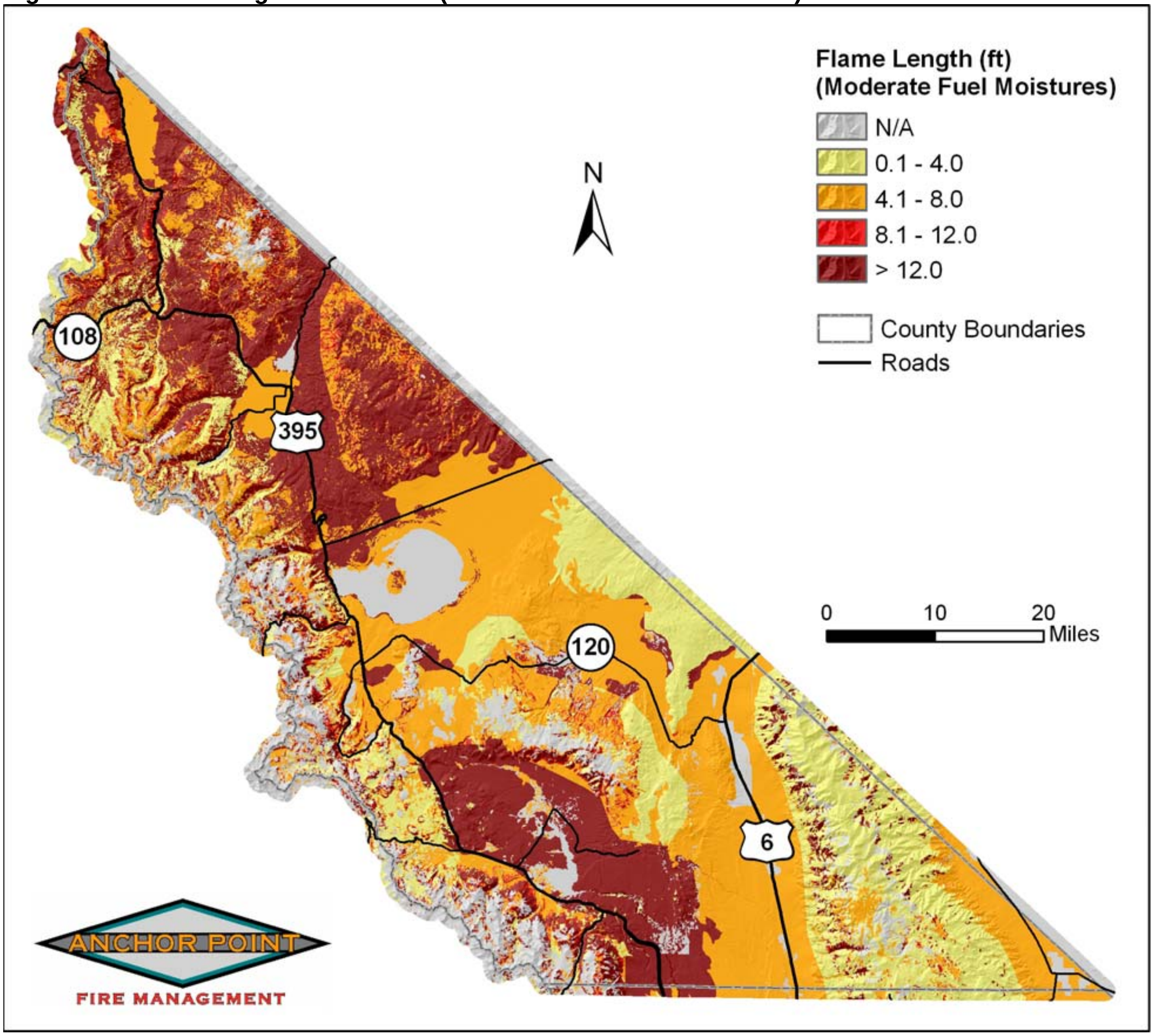
Spread rate values are generated by the **FlamMap** model and classified into four categories based on standard ranges: 0-20 ch/h (chains/hour), 20.1-40 ch/h, 40.1-60 ch/h, and greater than 60 ch/h. A chain is a logging measurement that is equal to 66 feet. One mile equals 80 chains. 1 ch/h equals approximately 1 foot/minute or 80 chains per hour equals 1 mile per hour.

Figure 17. Rate of Spread Predictions (Extreme Weather Conditions)



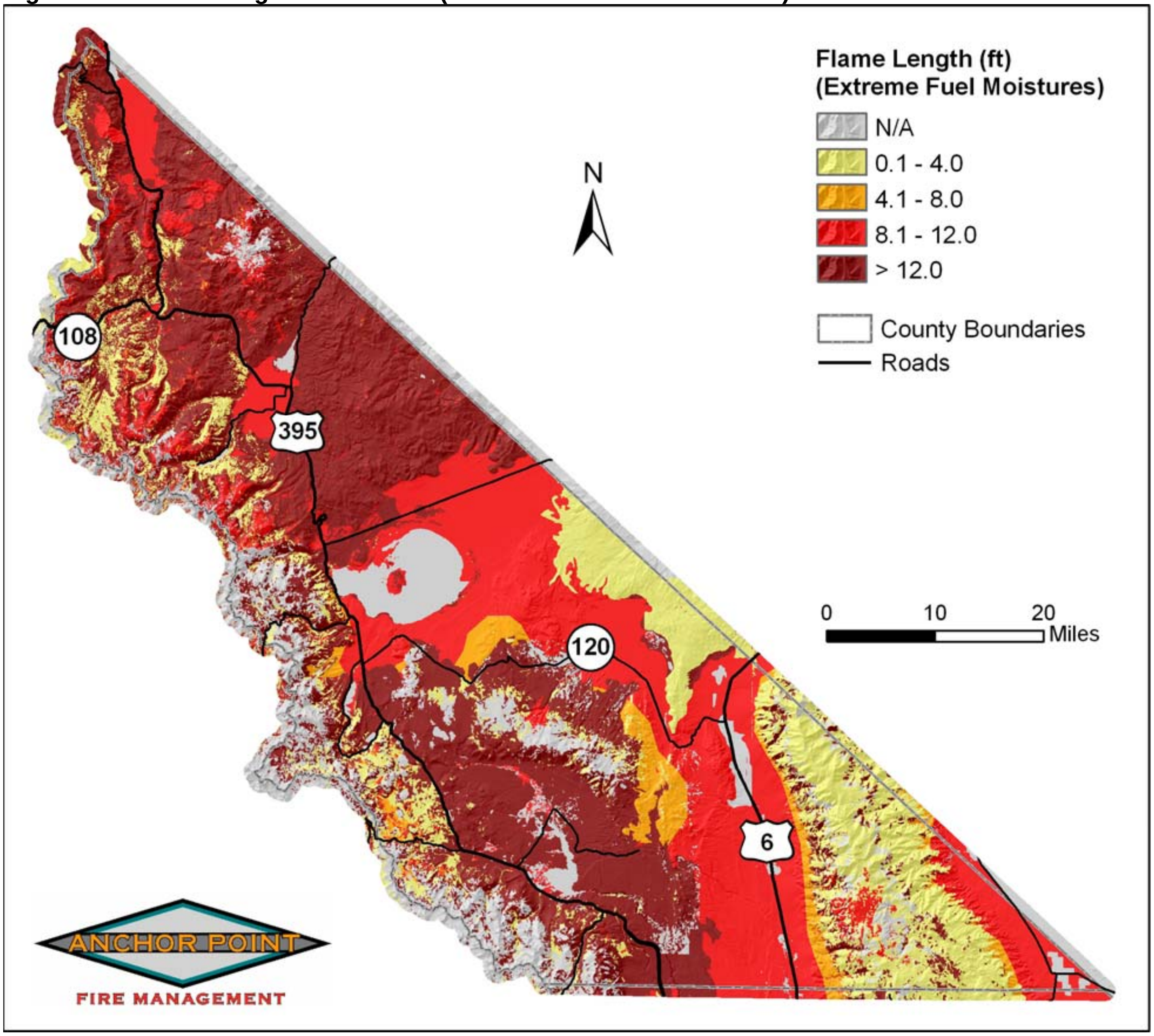
Rate of spread in chains/hour
(1 chain=66 ft) (80 chains/HR = 1 MPH)

Figure 18. Flame Length Predictions (Moderate Weather Conditions)



Flame length values are generated by the **FlamMap** model and classified in the four categories based on standard ranges: 0-4 feet, 4.1-8 feet, 8.1-12 feet and 12.1-60 feet. Flame lengths of 4 feet and less are acceptable for direct attack by hand crews. Flame lengths of 8 feet and less are suitable for direct attack by machinery. With flame lengths of greater than 8 feet, indirect attack and aerial attack are the preferred methods.

Figure 19. Flame Length Predictions (Extreme Weather Conditions)



Fire Behavior Interpretation and Limitations

This evaluation is a prediction of likely fire behavior, given a standardized set of conditions and a single point source ignition at every point. It does not consider cumulative impacts of increased fire intensity over time and space. The model does not calculate the probability that a wildfire will occur. It assumes an ignition occurrence for every cell (each 10 x 10 meter area).

Weather conditions are extremely variable and not all combinations are accounted for. These outputs are best used for pre-planning and not as a stand-alone product for tactical planning. Whenever possible, fire behavior calculations should be done with actual weather observations during the fire. The most current ERC values should also be calculated and distributed during the fire season to be used as a guideline for fire behavior potential.

APPENDIX B: NEIGHBORHOOD IGNITABILITY ANALYSIS AND RECOMMENDATIONS

Purpose

The purpose of this appendix is to examine in greater detail the communities in the study area. Of the 36 WUI communities in Mono County, nine were found to represent an extreme hazard; eight were rated as very high hazard; six as high hazard; eight as moderate hazard; and five as low hazard. **Figure 1** below represents this in pie chart format for easy visual reference. On the following pages, maps, charts and tables using these same statistics can be found, and should be used for reference throughout this document.

Figure 1. Community Groupings by Hazard Class

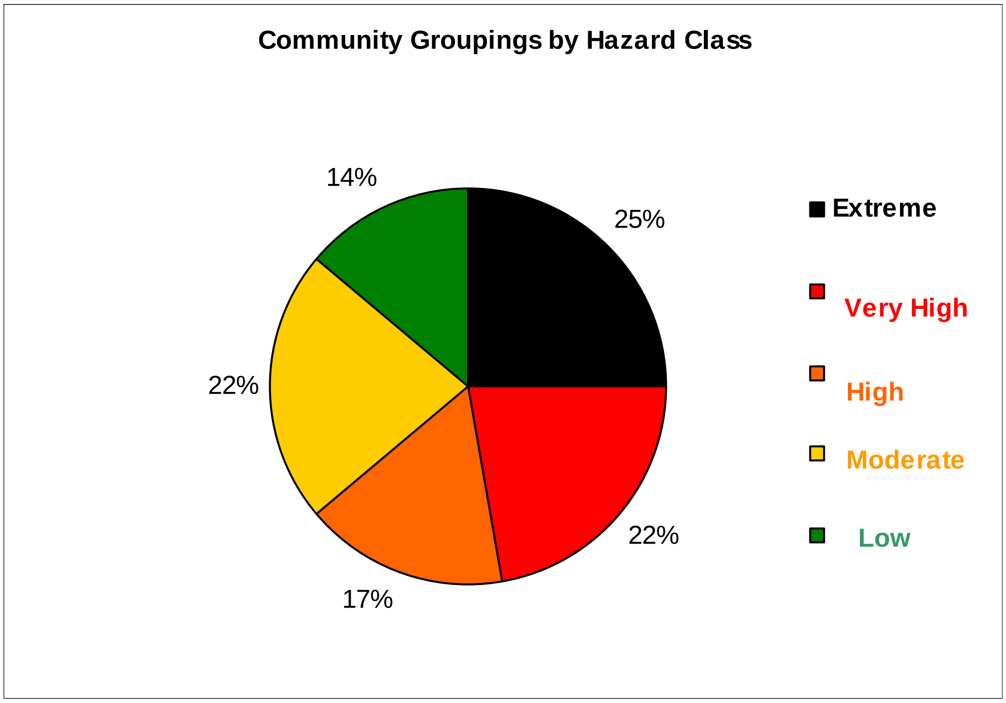


Figure 2. Mono County Community Hazard Rating Map

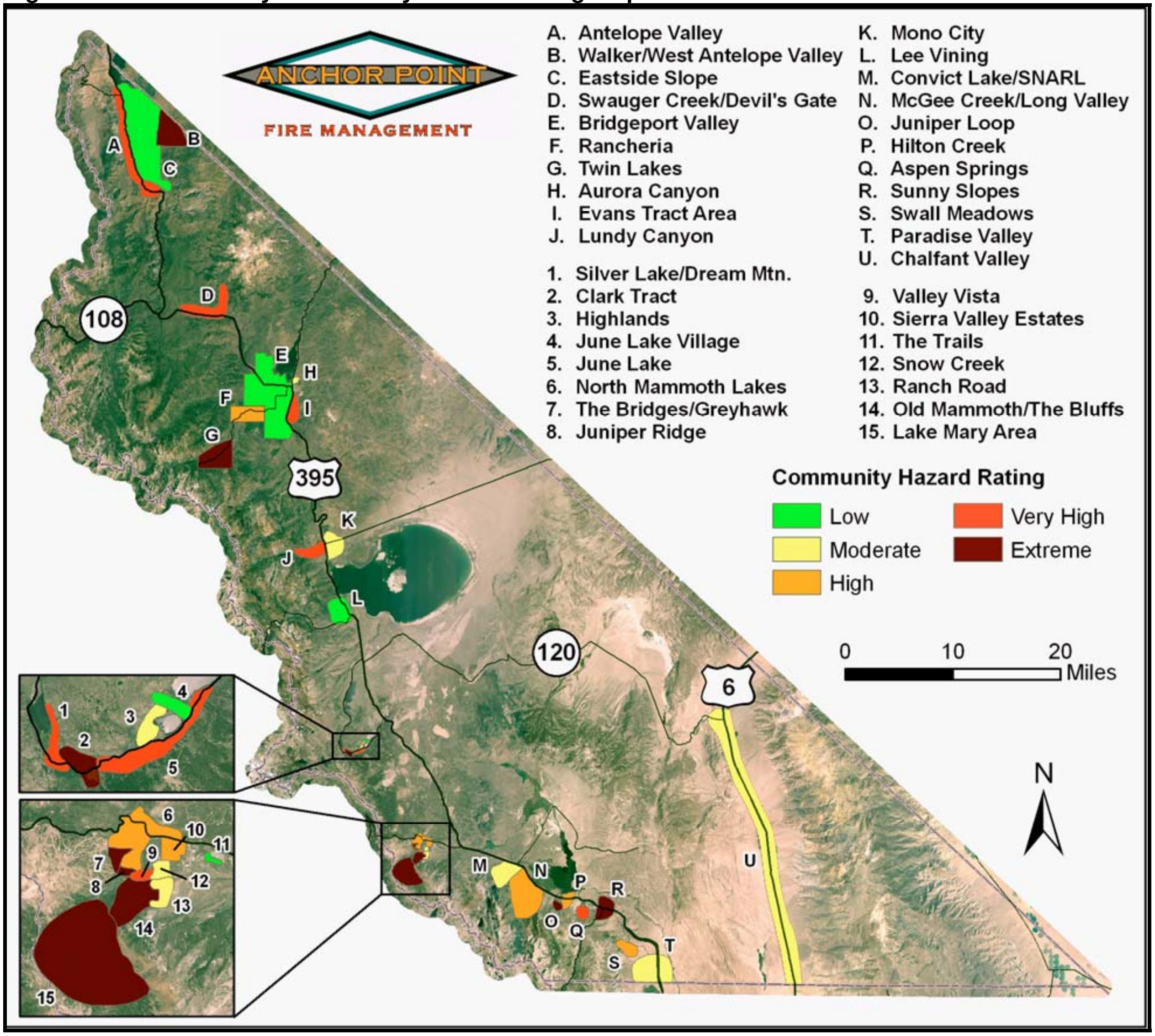


Figure 3. Mono County Communities by Hazard Rating

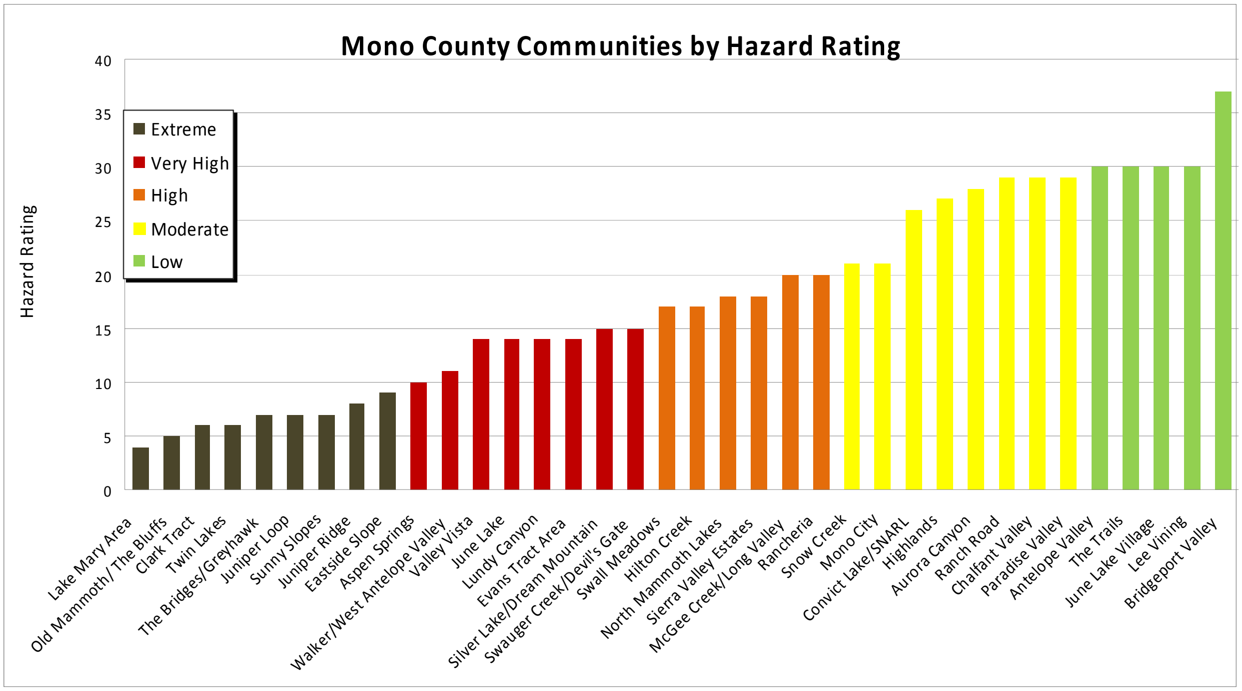


Table 1. Mono County Communities by Hazard Rating

1. Lake Mary Area	19. Hilton Creek
2. Old Mammoth/The Bluffs	20. North Mammoth Lakes
3. Clark Tract	21. Sierra Valley Estates (Mammoth area)
4. Twin Lakes (and Virginia Lakes)	22. McGee Creek/Long Valley
5. The Bridges/Greyhawk	23. Rancheria (Bridgeport area)
6. Juniper Loop (Crowley Lake area)	24. Snow Creek
7. Sunny Slopes	25. Mono City
8. Juniper Ridge (Mammoth Lakes area)	26. Convict Lake/SNARL
9. East Side Slope (Antelope Valley)	27. Highlands
10. Aspen Springs	28. Aurora Creek
11. Walker/West Antelope Valley	29. Ranch Road (Mammoth Lakes area)
12. Valley Vista	30. Chalfant Valley
13. June Lake	31 Paradise Valley
14. Lundy Canyon	32. Antelope Valley
15. Evans Tract Area	33. The Trails
16. Silver Lake/Dream Mountain	34. June Lake Village
17. Swauger Creek/Devils Gate	35. Lee Vining
18. Swall Meadows	36. Bridgeport Valley

GENERAL RECOMMENDATIONS

A combination of adequate access, ignition resistant construction, and fuels reduction should create a safe environment for emergency service personnel and provide reasonable protection to structures from a wildfire. These techniques should also significantly reduce the chances of a structure fire becoming an ignition source to the surrounding wildlands.

In addition to the suggested mitigations listed for the individual communities, several general measures can be taken to improve fire safety. The following recommendations should be noted and practiced by anyone living in the Wildland-Urban Interface:

1. Be aware of the current fire danger in the area.
2. Clean your roof and gutters at least two times a year, especially during cure-up in autumn.
3. Stack firewood uphill or on a side contour, at least 30 feet away from structures.
4. Don't store combustibles or firewood under decks.
5. Maintain and clean spark arresters on chimneys.
6. When possible, maintain an irrigated greenbelt around the home.
7. Connect, and have available, a minimum of 50 feet of garden hose.
8. Post reflective lot and/or house numbers so that they are clearly visible from the main road. Reflective numbers should also be visible on the structure itself.
9. Trees along driveways should be limbed and thinned as necessary to maintain a minimum 13’6” vertical clearance for emergency vehicle access.
10. Maintain your defensible space constantly.
    - Mow grass and weeds to a low height.
    - Remove any branches overhanging the roof or chimney.
    - Remove all trash, debris, and cuttings from the defensible space.

Note
All communities rated as extreme to high hazard level were recommended for a parcel-level analysis. In the moderate level communities a parcel-level analysis was recommended only if the evaluator found that a significant number of homes had no, or ineffective, defensible space or a significant number of hazards near homes was detected. In short, the recommendation was made if the evaluator felt a parcel-level analysis would generate a noticeable improvement in the community's defensibility.

Technical Terms

The following definitions apply to terms used in the "Description" and "Comments and Mitigation" sections of this appendix.

Defensible Space: An area around a structure where fuels and vegetation are modified, cleared, or reduced to slow the spread of wildfire toward or from the structure. The design and extent of the defensible space is based on fuels, topography, and the design and materials of the structure.

Extended Defensible Space (also known as Zone 3): In this defensible space zone, treatment is continued beyond the recommended minimum boundary for defensible space. This zone focuses on forest management, with fuels reduction being a secondary function.

Shelter-in-Place Areas: There are several ways to protect the public from an advancing wildfire. One of these methods is evacuation, and involves relocation of the threatened population to a safer area. Another is to instruct people to remain inside their homes or public buildings until the danger passes. This concept is new to wildfire in the United States, but not to hazardous materials incident response, where time, hazards, and sheer logistics often make evacuation impossible. This concept is the dominant modality for public protection from wildfires in Australia, where fast moving, non-persistent fires in light fuels make evacuation impractical. The success of this tactic depends on a detailed pre-plan that takes into account the construction type and materials of the building used, topography, depth and type of the fuel profile, as well as current and expected weather and fire behavior.

Citizen Safety Zone: An area that can be used for protection by residents in the event that the main evacuation route is compromised. The area should be maintained, cleared of fuels, and large enough for all residents of the area to survive an advancing wildfire without special equipment or training.

Fuelbreak: A natural or constructed discontinuity in a fuel profile used to segregate, stop, or reduce the spread of fire. As a practical matter, fuelbreaks in the WUI are most effective against crown fires.

Community Assessment Methodology

The community level methodology for this assessment uses a Wildfire Hazard Rating (WHR) that was developed specifically to evaluate communities within the Wildland Urban Interface (WUI) for their relative wildfire hazard.[1] The WHR model combines physical infrastructure such as structure density and roads, and fire behavior components like fuels and topography, with the field experience and knowledge of wildland fire experts. This methodology has been proven and refined by use in rating over 1,400 neighborhoods throughout the United States.

Many knowledgeable and experienced fire management professionals were queried about specific environmental and infrastructure factors, and wildfire behavior and hazards. Weightings within the model were established through these queries. The model was designed to be applicable throughout the western United States.

The model was developed from the perspective of performing structural triage on a threatened community in the path of an advancing wildfire with moderate fire behavior. The WHR survey and fuel model ground truthing are accomplished by field surveyors with WUI fire experience. The rating system assigns up to a maximum of 60 points based on seven categories: average lot size, slope, primary aspect, average fuel type, fuel continuity, dominant construction type and surface fuel loading. The higher the community scores, the lower its wildfire hazard. For example, a community with an average lot size of less than 1 acre and slopes of greater than 30% would receive 0 points for those factors, whereas a community with an average lot size of 5 acres and slopes of less than 15% would receive 16 points for the same factors. Additional hazards are then subtracted from the subtotal of points earned in the seven categories to give a final numeric value. The final value is then used to group communities into one of five hazard ratings: Extreme, Very High, High, Moderate, or Low.

It is important to note that not all groupings occur in every geographic region. There are some areas with no low hazard communities, just as there are some areas with no extreme communities. The rankings are also related to what is customary for the area. For example, a high hazard area on the plains of Kansas may not look like a high hazard area in the Sierra Nevada. The system creates a relative ranking of community hazards in relation to the other communities in the study area. It is designed to be used by experienced wildland firefighters who have a familiarity with structural triage operations and fire behavior in the interface.

[1] C. White, "Community Wildfire Hazard Rating Form" *Wildfire Hazard Mitigation and Response Plan*, Colorado State Forest Service, Ft. Collins, CO, 1986.

COMMUNITIES

1. Lake Mary Area

Hazard Rating	Extreme
Does the neighborhood have dual access roads?	No
Are there road grades > 8%?	Yes
Are all access roads of adequate width?	No
Average lot size:	1-5 Acres
Fuel models found in the neighborhood:	8, 10, 5
Water supply:	Draft from lakes
Hazards:	Steep slopes, ravines, inadequate roads, propane tanks, power lines, wood roofs

Description: The Lake Mary Area community consists of forest service lease cabins and resort properties in heavy timber surrounding an alpine lake. Most structures are widely spaced. The dominant construction type is small cabins with flammable or log siding and asphalt or metal roofs; however, there are several wood roofs in this community. There are some narrow, steep roads and driveways. Addressing here is poor. Most homes are within two miles of the nearest fire station (Station 2, Mammoth Lakes Fire Department). There are no hydrants, but it is possible to draft from lakes in this community. Fuels are heavy loads of mixed conifer. There are few defensible spaces here. Topography is steep and complex.

LAKE MARY AREA RECOMMENDATIONS

- A parcel-level analysis is recommended.
- Adequate defensible space is recommended for all homes (see the **Home Mitigation** section in the main report for details).
- Extended defensible space is recommended for most homes due to position, fuels and terrain.
- Discourage the use of combustible materials for decks, siding and roofs, especially where homes are upslope from heavy fuels. Replace all shake roofs with non-combustible types such as metal or composite shingle.
- Open areas below decks and projections should be enclosed or screened to prevent the ingress of embers and kept clean of flammable materials, especially where such openings are located on slopes above heavy fuels.
- Clean leaf and needle litter from roofs and gutters and away from foundations. Clear flammable vegetation away from power lines near homes. Clear weeds and flammable vegetation to at least 30 feet away from propane tanks.
- Discourage the planting of flammable ornamentals such as conifers within 30 feet of homes. Encourage the use of fire and drought tolerant plants for ornamental plantings especially within 30 feet of homes (see the **Home Mitigation** section in the main report).
- Thin vegetation along access roads and driveways. This is especially important for narrow driveways and road segments.
- Consider creating a shelter-in-place plan that includes preplanned escape routes from homes with flammable construction types to homes designated as last resort shelter-in-place areas. Concentrate thinning efforts on fuels below the access to these homes. Shelter-in-place tactics are only recommended for ignition-resistant homes with conforming extended defensible space, and even then only as a last resort, due to the dangerous fuels and topography in this community.
- Wherever possible, on driveways and private roads longer than 300 feet, add pullouts for emergency apparatus. Turnarounds should be constructed at the end of all driveways and dead-end roads.
- Add reflective addressing to all driveways and homes.
- Consider adding dry hydrant installations to the lakes in this community to improve the speed of water handling.

2. Old Mammoth/The Bluffs

Hazard Rating	Extreme
Does the neighborhood have dual access roads?	No
Are there road grades > 8%?	Yes
Are all access roads of adequate width?	No
Average lot size:	<1 Acre
Fuel models found in the neighborhood:	10, 9, 5
Water supply:	Hydrants
Hazards:	Steep slopes, ravines, inadequate roads, natural chimneys, propane tanks, power lines, wood roofs

Description: This community contains moderate to large homes on small lots. Dominant construction is wood siding with a mix of asphalt and wood shake roofs. This is a high density community. Access is poor in some areas. There are several dead-end roads and some very narrow roads with poor surfaces. Poor address markers are common, many with missing or inconsistent placement and low visibility. Many homes have wood decks and projections. In Old Mammoth in particular, there are overhead power lines and propane tanks (many overgrown with vegetation). Very few homes have defensible space. Many yards have flammable clutter including wood stacked against the structure. There are hydrants every 300 feet throughout most of this area. Fuels are primarily heavy loads of mixed conifers (FM 10). The topography in this community is steep and complex.

OLD MAMMOTH/THE BLUFFS RECOMMENDATIONS

- A parcel-level analysis is recommended.
- Adequate defensible space is recommended for all homes (see the **Home Mitigation** section in the main report for details).
- Extended defensible space is recommended for homes located in dangerous topography (saddles, above natural chimneys, mid-slope on steep slopes or summits) with heavy fuel loads near or below the home.
- Discourage the use of combustible materials for decks, siding and roofs, especially where homes are upslope from heavy fuels. Replace all shake roofs with non-combustible types such as metal or composite shingle.
- Open areas below decks and projections should be enclosed or screened to prevent the ingress of embers and kept clean of flammable materials, especially where such openings are located on slopes above heavy fuels.
- Clean leaf and needle litter from roofs and gutters and away from foundations. Clear flammable vegetation away from power lines near homes. Clear weeds and flammable vegetation to at least 30 feet away from propane tanks.
- Discourage the planting of flammable ornamentals such as conifers within 30 feet of homes. Encourage the use of fire and drought tolerant plants for ornamental plantings especially within 30 feet of homes (see the **Home Mitigation** section in the main report).
- Thin vegetation along access roads and driveways. This is especially important for narrow driveways and road segments.
- Consider creating a shelter-in-place plan that includes preplanned escape routes from homes with flammable construction types to homes designated as last resort shelter-in-place areas. Concentrate thinning efforts on fuels below the access to these homes. Shelter-in-place tactics are only recommended for ignition-resistant homes with conforming extended defensible space, and even then only as a last resort, due to the dangerous fuels and topography in this community.
- Wherever possible, on driveways and private roads longer than 300 feet, add pullouts for emergency apparatus. Turnarounds should be constructed at the end of all driveways and dead-end roads.
- Add reflective addressing to all driveways and homes.

3. Clark Tract

Hazard Rating	Extreme
Does the neighborhood have dual access roads?	Yes
Are there road grades > 8%?	Yes
Are all access roads of adequate width?	No
Average lot size:	<1 Acre
Fuel models found in the neighborhood:	5, 8, 10
Water supply:	Hydrants
Hazards:	Steep slopes, ravines, inadequate roads, natural chimneys, power line, wood roofs

Description: The Clark Tract community is comprised of small homes on small lots. Homes are mostly wood siding construction with a mix of asphalt, metal and wood roof types. Construction is generally older in this community, and some homes have wood decks or projections. Most homes do not have visible address markers, and the few that do are not reflective. Access is generally poor. Roads are rough, steep and narrow. Most roads and driveways are dirt and rutting and washboarding is typical. Although there are two ways in and out of this community, there are also several dead-end roads. There are fire hydrants in this community. Very few homes have any defensible space. Overhead power lines may represent a hazard to fire apparatus. Fuels are heavy to moderate loads of mixed conifer and shrubs often with sage in the understory. Topography is steep and complex.

CLARK TRACT RECOMMENDATIONS

- A parcel-level analysis is recommended.
- Adequate defensible space is recommended for all homes (see the **Home Mitigation** section in the main report for details).
- Extended defensible space is recommended for homes located in dangerous topography (saddles, above natural chimneys, mid-slope on steep slopes or summits) with heavy fuel loads near or below the home.
- Discourage the use of combustible materials for decks, siding and roofs, especially where homes are upslope from heavy fuels. Replace all shake roofs with non-combustible types such as metal or composite shingle.
- Open areas below decks and projections should be enclosed or screened to prevent the ingress of embers and kept clean of flammable materials, especially where such openings are located on slopes above heavy fuels.
- Clean leaf and needle litter from roofs and gutters and away from foundations. Clear flammable vegetation away from power lines near homes.
- Discourage the planting of flammable ornamentals such as conifers within 30 feet of homes. Encourage the use of fire and drought tolerant plants for ornamental plantings especially within 30 feet of homes (see the **Home Mitigation** section in the main report).
- Thin vegetation along access roads and driveways. This is especially important for narrow driveways and road segments.
- Wherever possible, on driveways and private roads longer than 300 feet, add pullouts for emergency apparatus. Turnarounds should be constructed at the end of all driveways and dead-end roads.
- Add reflective addressing to all driveways and homes.

4. Twin Lakes (includes Virginia Lakes Area)

Hazard Rating	Extreme
Does the neighborhood have dual access roads?	No
Are there road grades > 8%?	Yes
Are all access roads of adequate width?	No
Average lot size:	<1 Acre
Fuel models found in the neighborhood:	8, 2, 9
Water supply:	Hydrants
Hazards:	Steep slopes, ravines, inadequate roads, inadequate water supply, power lines, wood roofs

Description: These two communities are very similar, even though they are separated by several miles. They each contain cabins built in the 1930s and 1940s with modern construction mixed in. Most homes are moderate size on small lots. Wood siding with an asphalt or metal roof is the most common construction type; however, there are almost as many wood shake roofs in this community as ignition resistant roofs. Street signs are non-reflective wooden markers and some are broken. Most would be hard to see in dark or smoky conditions. Most homes have address markers on the home and at the street, but they are generally not reflective and may be difficult to spot in dark or smoky conditions. There are some very poor roads in these communities and some long narrow driveways. There are a few homes with minimum defensible space, but most have vegetation growing right up to the structure. Fuels are moderate to heavy loads of mixed conifers and aspen stands with shrubs and grasses in the understory. There are also heavy loads of standing dead fuels present. These communities have overhead power lines which may be a hazard to fire apparatus. There are also areas of heavy recreational use throughout both communities. This increases both the likelihood of an ignition and the difficulty of evacuation and access. The topography in these areas is complex and steep.

TWIN LAKES / VIRGINIA LAKES RECOMMENDATIONS

- A parcel-level analysis is recommended.
- Adequate defensible space is recommended for all homes (see the **Home Mitigation** section in the main report for details).
- Extended defensible space is recommended for homes located in dangerous topography (saddles, above natural chimneys, mid-slope on steep slopes or summits) with heavy fuel loads near or below the home.
- Discourage the use of combustible materials for decks, siding and roofs, especially where homes are upslope from heavy fuels. Replace all shake roofs with non-combustible types such as metal or composite shingle.
- Open areas below decks and projections should be enclosed or screened to prevent the ingress of embers and kept clean of flammable materials, especially where such openings are located on slopes above heavy fuels.
- Clean leaf and needle litter from roofs and gutters and away from foundations. Clear flammable vegetation away from power lines near homes.
- Discourage the planting of flammable ornamentals such as conifers within 30 feet of homes. Encourage the use of fire and drought tolerant plants for ornamental plantings especially within 30 feet of homes (see the **Home Mitigation** section in the main report).
- Thin vegetation along access roads and driveways. This is especially important for narrow driveways and road segments.
- Wherever possible, on driveways and private roads longer than 300 feet, add pullouts for emergency apparatus. Turnarounds should be constructed at the end of all driveways and dead-end roads.
- Improving the water supply to increase hydrant pressure and flow should be a priority project.
- Replacing broken and non-reflective street signs should also be considered a priority project.
- Add reflective addressing to all driveways and homes.
- A fuels reduction grant project (#09USFS-SFA0059) has been funded by the USFS. The project will begin during the summer of 2009, and substantial fuels reduction will occur within private residential and recreational properties of Upper Twin Lakes bordering the Humboldt-Toiyabe National Forest. The fuels reduction work includes a combination of understory thinning, trimming, and chipping of dead trees and brush along the south shore of Upper Twin Lakes, and along the western boundary of Mono Village Resort. All fuels reduction recommendations should be coordinated with private and federal agencies, regardless of jurisdictional ownership to ensure best value and functionality.

5. The Bridges/Greyhawk

Hazard Rating	**Extreme**
Does the neighborhood have dual access roads?	No
Are there road grades > 8%?	Yes
Are all access roads of adequate width?	No
Average lot size:	<1 Acre
Fuel models found in the neighborhood:	5, 8
Water supply:	Hydrants
Hazards:	Steep slopes, ravines, inadequate roads, inadequate water supply, wood roofs

Description: This community consists primarily of newer construction, condo complexes and large to moderate size homes on small lots. This is a high density community surrounded by wildland fuels. The dominant construction type is wood siding with asphalt or metal roofs, but there are also some wood shake roofs in this community. The homes have address markers, but most are not reflective. Road surfaces are good, although there are some narrow streets and steep grades (>10%) which make both evacuation and firefighter access more difficult. Most homes do not have adequate defensible space. Hydrants are good except for along John Muir Road, where the spacing is approximately ¼ mile and the hydrant flows are low. This community has heavy loads of mixed conifer and shrub fuels. The topography is steep and complex.

THE BRIDGES/GREYHAWK RECOMMENDATIONS

- A parcel-level analysis is recommended.
- Adequate defensible space is recommended for all homes (see the **Home Mitigation** section in the main report for details).
- Extended defensible space is recommended for homes located in dangerous topography (saddles, above natural chimneys, mid-slope on steep slopes or summits) with heavy fuel loads near or below the home.
- Discourage the use of combustible materials for decks, siding and roofs, especially where homes are upslope from heavy fuels. Replace all shake roofs with non-combustible types such as metal or composite shingle.
- Open areas below decks and projections should be enclosed or screened to prevent the ingress of embers and kept clean of flammable materials, especially where such openings are located on slopes above heavy fuels.
- Clean leaf and needle litter from roofs and gutters and away from foundations.
- Discourage the planting of flammable ornamentals such as conifers within 30 feet of homes. Encourage the use of fire and drought tolerant plants for ornamental plantings especially within 30 feet of homes (see the **Home Mitigation** section in the main report).
- Thin vegetation along access roads and driveways. This is especially important for narrow driveways and road segments.
- Wherever possible, on driveways and private roads longer than 300 feet, add pullouts for emergency apparatus. Turnarounds should be constructed at the end of all driveways and dead-end roads.
- Investigate improving the water supply to increase pressure and flow of the hydrants along John Muir Road.
- Add reflective addressing to all driveways and homes.

6. Juniper Loop

Hazard Rating	Extreme
Does the neighborhood have dual access roads?	Yes
Are there road grades > 8%?	Yes
Are all access roads of adequate width?	No
Average lot size:	<1 Acre
Fuel models found in the neighborhood:	5, 8
Water supply:	None
Hazards:	Steep slopes, ravines, inadequate roads, inadequate water supply, power lines, wood roofs

Description: This community is a mix of old and new construction. The dominant construction type consists of wood siding with asphalt or metal roofs; however, there are some wood shake roofs in this community. Addressing is poor in this community. Address markers are difficult to locate on many homes, and in some cases, they are missing entirely. Roads are steep and narrow with no pullouts or turnarounds for fire apparatus. Many driveways are rough and narrow with vegetation encroaching upon the drivable surface. There is no water supply for fire suppression and few homes have any defensible space. This community has overhead power lines which may be a hazard to fire apparatus. There are heavy loads of mixed timber and shrub fuels including Pinyon-juniper, Jeffrey pine, bitterbrush and sage. In the drainages, aspen with sage and other shrubs in the understory become dominant. Dead and down material loads are moderate to heavy in some parts of this community. The general topography is complex and moderate to steep.

JUNIPER LOOP RECOMMENDATIONS

- A parcel-level analysis is recommended.
- Adequate defensible space is recommended for all homes (see the **Home Mitigation** section in the main report for details).
- Extended defensible space is recommended for homes located in dangerous topography (saddles, above natural chimneys, mid-slope on steep slopes or summits) with heavy fuel loads near or below the home.
- Discourage the use of combustible materials for decks, siding and roofs, especially where homes are upslope from heavy fuels. Replace all shake roofs with non-combustible types such as metal or composite shingle.
- Open areas below decks and projections should be enclosed or screened to prevent the ingress of embers and kept clean of flammable materials, especially where such openings are located on slopes above heavy fuels.
- Clean leaf and needle litter from roofs and gutters and away from foundations. Clear flammable vegetation away from power lines near homes.
- Discourage the planting of flammable ornamentals such as conifers within 30 feet of homes. Encourage the use of fire and drought tolerant plants for ornamental plantings especially within 30 feet of homes (see the **Home Mitigation** section in the main report).
- Investigate the possibility of improving and widening the road surface of the primary access roads into this community. High density and poor roads will make this community difficult to evacuate quickly in the event of a rapidly moving fire.
- Thin vegetation along access roads and driveways. This is especially important for narrow driveways and road segments.
- Wherever possible, on driveways and private roads longer than 300 feet, add pullouts for emergency apparatus. Turnarounds should be constructed at the end of all driveways and dead-end roads.
- Investigate the possibility of adding at least two large (10,000 - 30,000 gallon) community cisterns for fire suppression use. *Improving water supply is a critical need in Juniper Loop.*
- Add reflective addressing to all driveways and homes.

7. Sunny Slopes

Hazard Rating	Extreme
Does the neighborhood have dual access roads?	No
Are there road grades > 8%?	Yes
Are all access roads of adequate width?	No
Average lot size:	<1 Acre
Fuel models found in the neighborhood:	5, 8
Water supply:	Hydrants
Hazards:	Steep slopes, ravines, inadequate roads, inadequate water supply, power lines, wood roofs

Description: This community is a mix of year-round private cabins and USFS lease cabins, some dating back as far as 1916. Construction is generally wood siding or log with wood shake roofs, but approximately 40% of the structures have ignition-resistant (metal or asphalt) roofs. Cabins are small to moderate size on small lots making this a fairly dense community. Some residences in this community are more than five miles from the nearest fire station. There is a good hydrant network in some parts of Sunny Slopes, but the hydrant network and the Sunny Slopes water supply does not service any of the USFS lease properties. There are several steep, narrow roads and some are little more than rough dirt tracks. This community has overhead power lines which may be a hazard to fire apparatus. Few properties have any defensible space. Fuels are moderate loads of open canopy Jeffery pine with sage and other shrubs in the understory. Topography is complex and moderate to steep. There are many outcroppings of volcanic rock, which will be a hazard to firefighters, especially at night or in smoky conditions.

SUNNY SLOPES RECOMMENDATIONS

- A parcel-level analysis is recommended.
- Adequate defensible space is recommended for all homes (see the **Home Mitigation** section in the main report for details).
- Extended defensible space is recommended for homes located in dangerous topography (saddles, above natural chimneys, mid-slope on steep slopes or summits) with heavy fuel loads near or below the home.
- Discourage the use of combustible materials for decks, siding and roofs, especially where homes are upslope from heavy fuels. Replace all shake roofs with non-combustible types such as metal or composite shingle.
- Open areas below decks and projections should be enclosed or screened to prevent the ingress of embers and kept clean of flammable materials, especially where such openings are located on slopes above heavy fuels.
- Clean leaf and needle litter from roofs and gutters and away from foundations. Clear flammable vegetation away from power lines near homes.
- Discourage the planting of flammable ornamentals such as conifers within 30 feet of homes. Encourage the use of fire and drought tolerant plants for ornamental plantings especially within 30 feet of homes (see the **Home Mitigation** section in the main report).
- Investigate the possibility of improving and widening the road surface of the primary access roads accessing the forest service lease cabins on the north side of highway 395. This will improve evacuation for residents and access for firefighters.
- Thin vegetation along access roads and driveways. This is especially important for narrow driveways and road segments.
- Wherever possible, on driveways and private roads longer than 300 feet, add pullouts for emergency apparatus. Turnarounds should be constructed at the end of all driveways and dead-end roads.
- For fire suppression in areas not serviced by the hydrant network, investigate the possibility of adding cisterns (2,500 gallons or greater) at least every ¼ mile.
- Add reflective addressing to all driveways and homes.

8. Juniper Ridge

Hazard Rating	Extreme
Does the neighborhood have dual access roads?	No
Are there road grades > 8%?	Yes
Are all access roads of adequate width?	No
Average lot size:	<1 Acre
Fuel models found in the neighborhood:	5, 8, 10
Water supply:	Hydrants
Hazards:	Steep slopes, ravines, natural chimneys, inadequate roads, wood roofs

Description: Not to be confused with Juniper Loop (community #6), Juniper Ridge is a subdivision in Mammoth Lakes. This is a dense community of moderate to large homes on small lots. All these homes are of newer wood siding construction, but approximately 50% have wood shake roofs. Addressing is present for all of the residences, but is not reflective. This community does have a good hydrant network. The road surfaces are all good, but there are some steep grades (>10%). There are no pullouts or turnarounds for fire apparatus and this community has only one way in and out. Most homes do not have adequate defensible space. Fuels are heavy loads of mixed conifer and shrubs with heavy ladder fuels and moderate loads of dead and down materials. The general topography is steep and complex.

JUNIPER RIDGE RECOMMENDATIONS

- A parcel-level analysis is recommended.
- Adequate defensible space is recommended for all homes (see the **Home Mitigation** section in the main report for details).
- Extended defensible space is recommended for homes located in dangerous topography (saddles, above natural chimneys, mid-slope on steep slopes or summits) with heavy fuel loads near or below the home.
- Discourage the use of combustible materials for decks, siding and roofs, especially where homes are upslope from heavy fuels. Replace all shake roofs with non-combustible types such as metal or composite shingle.
- Open areas below decks and projections should be enclosed or screened to prevent the ingress of embers and kept clean of flammable materials, especially where such openings are located on slopes above heavy fuels.
- Clean leaf and needle litter from roofs and gutters and away from foundations.
- Discourage the planting of flammable ornamentals such as conifers within 30 feet of homes. Encourage the use of fire and drought tolerant plants for ornamental plantings especially within 30 feet of homes (see the **Home Mitigation** section in the main report).
- Thin vegetation along access roads and driveways. This is especially important for narrow driveways and road segment.
- Wherever possible, on driveways and private roads longer than 300 feet, add pullouts for emergency apparatus. Turnarounds should be constructed at the end of all driveways and dead-end roads.
- Add reflective addressing to all driveways and homes.

9. East Side Slope – Antelope Valley Area (also known as East Side Lane)

Hazard Rating	Extreme
Does the neighborhood have dual access roads?	No
Are there road grades > 8%?	Yes
Are all access roads of adequate width?	No
Average lot size:	<5 Acre
Fuel models found in the neighborhood:	6, 5, 1
Water supply:	None
Hazards:	Steep slopes, ravines, no water supply, inadequate roads, power lines, propane tanks, wood roofs

Description: This is a community of approximately 50 homes on large lots. This area was threatened by the Jackass Flats Fire in 2006. Access could be challenging due to complex terrain. There is no water for fire suppression in this community and there are power lines and propane tanks which may be a hazard to firefighters. Fuels are primarily heavy loads of Pinyon-juniper, sage and grass. The general topography is steep and complex.

EASTSIDE SLOPE RECOMMENDATIONS

- A parcel-level analysis is recommended.
- Adequate defensible space is recommended for all homes (see the **Home Mitigation** section in the main report for details).
- Extended defensible space is recommended for homes located in dangerous topography (saddles, above natural chimneys, mid-slope on steep slopes or summits) with heavy fuel loads near or below the home.
- Discourage the use of combustible materials for decks, siding and roofs, especially where homes are upslope from heavy fuels. Replace all shake roofs with non-combustible types such as metal or composite shingle.
- Open areas below decks and projections should be enclosed or screened to prevent the ingress of embers and kept clean of flammable materials, especially where such openings are located on slopes above heavy fuels.
- Clean leaf and needle litter from roofs and gutters and away from foundations. Clear flammable vegetation away from power lines near homes. Clear weeds and flammable vegetation to at least 30 feet away from propane tanks.
- Discourage the planting of flammable ornamentals such as conifers within 30 feet of homes. Encourage the use of fire and drought tolerant plants for ornamental plantings especially within 30 feet of homes (see the **Home Mitigation** section in the main report).
- Thin vegetation along access roads and driveways. This is especially important for narrow driveways and road segments.
- Wherever possible, on driveways and private roads longer than 300 feet, add pullouts for emergency apparatus. Turnarounds should be constructed at the end of all driveways and dead-end roads.
- Consider adding at least two large (10,000 - 30,000 gallon) cisterns for fire suppression use in this community. *Water supply is a critical need in Eastside Slope*.
- Add reflective addressing to all driveways and homes.

9. Aspen Spring

Hazard Rating	Very High
Does the neighborhood have dual access roads?	Yes
Are there road grades > 8%?	Yes
Are all access roads of adequate width?	No
Average lot size:	1-5 Acres
Fuel models found in the neighborhood:	5, 8
Water supply:	One cistern (60,000 gallons)
Hazards:	Steep slopes, ravines, inadequate roads, inadequate water supply, power lines, wood roofs

Description: This is a community of large homes on moderate to large lots. Homes are of mixed ages, but older wood siding construction is dominant. Approximately 50% of the homes in Aspen Spring have wood shake roofs. Addressing is poor in this community. Some homes have no address markers and others are not easily visible. None of the address markers that are present are reflective. Road surfaces are generally good, but most of the roads and driveways are steep and narrow (some up to 16% grade). There is only one large cistern for fire suppression and it is in need of repair. Few homes have adequate defensible space. Fuels are moderate to heavy loads of Pinyon-juniper, sage, bitterbrush and other shrubs. Topography is steep and complex.

ASPEN SPRING RECOMMENDATIONS

- A parcel-level analysis is recommended.
- Adequate defensible space is recommended for all homes (see the **Home Mitigation** section in the main report for details).
- Extended defensible space is recommended for homes located in dangerous topography (saddles, above natural chimneys, mid-slope on steep slopes or summits) with heavy fuel loads near or below the home.
- Discourage the use of combustible materials for decks, siding and roofs, especially where homes are upslope from heavy fuels. Replace all shake roofs with non-combustible types such as metal or composite shingle.
- Open areas below decks and projections should be enclosed or screened to prevent the ingress of embers and kept clean of flammable materials, especially where such openings are located on slopes above heavy fuels.
- Clean leaf and needle litter from roofs and gutters and away from foundations. Clear flammable vegetation away from power lines near homes.
- Discourage the planting of flammable ornamentals such as conifers within 30 feet of homes. Encourage the use of fire and drought tolerant plants for ornamental plantings especially within 30 feet of homes (see the **Home Mitigation** section in the main report).
- Thin vegetation along access roads and driveways. This is especially important for narrow driveways and road segments.
- Wherever possible, on driveways and private roads longer than 300 feet, add pullouts for emergency apparatus. Turnarounds should be constructed at the end of all driveways and dead-end roads.
- *Repairing the existing cistern should be considered a priority project for this community.* Investigate the possibility of adding an additional cistern to further improve the water supply.
- Add reflective addressing to all driveways and homes.

10. Walker/West Antelope Valley

Hazard Rating	**Very High**
Does the neighborhood have dual access roads?	No
Are there road grades > 8%?	Yes
Are all access roads of adequate width?	No
Average lot size:	1-5 Acres
Fuel models found in the neighborhood:	15, 5, 2, 1
Water supply:	Possible draft from river and stock ponds
Hazards:	Ravines, natural chimneys, inadequate roads, inadequate water supply, power lines, propane farm, wood roofs

Description: Homes on the west side of highway 395 through Antelope Valley are primarily small to moderate size, on moderate to large lots. This area has an active fire history and steep complex terrain; however, most of the homes are located near the highway where the terrain is more moderate. Access for homes located near the highway is generally good, but addressing is generally poor. Homes south of highway 395 in the Walker area are built on moderate to steep slopes and in ravines. The density is higher here and most of the residences in this community are on small lots. Access roads are steeper here and driveways are longer, but like the rest of this community, access roads and driveways running off highway 395 are narrow with rough dirt surfaces. There are several dead ends and few turnarounds adequate for fire apparatus. There is no apparent water supply for fire suppression, although it may be possible to draft from the Walker River at some points. There are overhead power lines and propane tanks which may be a hazard to fire apparatus. Few homes have adequate defensible space. Fuels are much heavier here than on the east side of Antelope Valley (east of Hwy 395) and consist primarily of moderate to heavy loads of Pinyon-juniper, sage and other shrubs. The general topography is complex and moderate to steep.

WALKER/WEST ANTELOPE VALLEY RECOMMENDATIONS

- A parcel-level analysis is recommended.
- Adequate defensible space is recommended for all homes (see the **Home Mitigation** section in the main report for details).
- Extended defensible space is recommended for homes located in dangerous topography (saddles, above natural chimneys, mid-slope on steep slopes or summits) with heavy fuel loads near or below the home.
- Discourage the use of combustible materials for decks, siding and roofs, especially where homes are upslope from heavy fuels. Replace all shake roofs with non-combustible types such as metal or composite shingle.
- Open areas below decks and projections should be enclosed or screened to prevent the ingress of embers and kept clean of flammable materials, especially where such openings are located on slopes above heavy fuels.
- Clean leaf and needle litter from roofs and gutters and away from foundations. Clear flammable vegetation away from power lines near homes. Clear weeds and flammable vegetation to at least 30 feet away from propane tanks.
- Discourage the planting of flammable ornamentals such as conifers within 30 feet of homes. Encourage the use of fire and drought tolerant plants for ornamental plantings especially within 30 feet of homes (see the **Home Mitigation** section in the main report).
- Thin vegetation along access roads and driveways. This is especially important for narrow driveways and road segments.
- Wherever possible, on driveways and private roads longer than 300 feet, add pullouts for emergency apparatus. Turnarounds should be constructed at the end of all driveways and dead-end roads.
- Investigate the possibility of adding some large (20,000 - 30,000 gallon) cisterns especially in the Walker area. A reliable water supply for fire suppression is a critical need in this community.
- Add reflective addressing to all driveways and homes.

11. Valley Vista

Hazard Rating	Very High
Does the neighborhood have dual access roads?	No
Are there road grades > 8%?	No
Are all access roads of adequate width?	Yes
Average lot size:	<1 Acres
Fuel models found in the neighborhood:	5, 9
Water supply:	Hydrants
Hazards:	Ravines, steep slopes, power lines, wood roofs

Description: This community consists of condos and moderate size homes on small lots. Construction is primarily newer wood siding with asphalt or metal roofs, although many homes still have wood shake roofs. Many also have flammable projections and decks. Roads are generally wide enough with good surfaces, but there are some steep grades. Addressing is present on most homes, but not reflective and difficult to locate in many cases. There is a good hydrant network, but few homes have any defensible space and most have vegetation growing right up to the structure. There are overhead power lines which may be a hazard to fire apparatus. Fuels are heavy loads of mixed conifers with plentiful ladder fuels. Terrain is generally moderate to steep and complex.

VALLEY VISTA RECOMMENDATIONS

- A parcel-level analysis is recommended.
- Adequate defensible space is recommended for all homes (see the **Home Mitigation** section in the main report for details).
- Extended defensible space is recommended for homes located in dangerous topography (saddles, above natural chimneys, mid-slope on steep slopes or summits) with heavy fuel loads near or below the home.
- Discourage the use of combustible materials for decks, siding and roofs, especially where homes are upslope from heavy fuels. Replace all shake roofs with non-combustible types such as metal or composite shingle.
- Open areas below decks and projections should be enclosed or screened to prevent the ingress of embers and kept clean of flammable materials, especially where such openings are located on slopes above heavy fuels.
- Clean leaf and needle litter from roofs and gutters and away from foundations. Clear flammable vegetation away from power lines near homes.
- Discourage the planting of flammable ornamentals such as conifers within 30 feet of homes. Encourage the use of fire and drought tolerant plants for ornamental plantings especially within 30 feet of homes (see the **Home Mitigation** section in the main report).
- Thin vegetation along access roads and driveways. This is especially important for narrow driveways and road segments.
- Wherever possible, on driveways and private roads longer than 300 feet, add pullouts for emergency apparatus. Turnarounds should be constructed at the end of all driveways and dead-end roads.
- Add reflective addressing to all driveways and homes.

12. June Lake

Hazard Rating	Very High
Does the neighborhood have dual access roads?	No
Are there road grades > 8%?	Yes
Are all access roads of adequate width?	No
Average lot size:	<1 Acres
Fuel models found in the neighborhood:	9, 5
Water supply:	Hydrants
Hazards:	Steep slopes, inadequate roads, power lines, wood roofs

Description: Small houses and cabins on small to moderate size lots. Wood siding construction with metal and asphalt roofs is dominant, although there are still some homes with wood shake roofs in this community. Most of the construction is older and many of these properties were USFS lease cabins which have been converted to private ownership. Many homes do not have address markers. Markers are inconsistent and generally non-reflective on the homes where they are present. Many street signs are also missing in this community, but there is a program being considered to correct this problem. Roads are generally poor, consisting of rough, narrow dirt tracks, and they are steep in spots. There are several dead ends in this community and there are no pullouts and few turnarounds suitable for fire apparatus. This community does have a good hydrant network. Few homes have any defensible spaces and there are many properties with flammable yard clutter. There are overhead power lines which may be a hazard to fire apparatus. Fuels are predominately heavy loads of Jeffrey pine with grass and shrubs in the understory. Ladder fuels are plentiful. The general topography is steep.

JUNE LAKE RECOMMENDATIONS

- A parcel-level analysis is recommended.
- Adequate defensible space is recommended for all homes (see the **Home Mitigation** section in the main report for details).
- Extended defensible space is recommended for homes located in dangerous topography (in saddles, above natural chimneys, mid-slope on steep slopes or summits) with heavy fuel loads near or below the home.
- Discourage the use of combustible materials for decks, siding and roofs, especially where homes are upslope from heavy fuels. Replace all shake roofs with non-combustible types such as metal or composite shingle.
- Open areas below decks and projections should be enclosed or screened to prevent the ingress of embers and kept clean of flammable materials, especially where such openings are located on slopes above heavy fuels.
- Clean leaf and needle litter from roofs and gutters and away from foundations. Clear flammable vegetation away from power lines near homes.
- Discourage the planting of flammable ornamentals such as conifers within 30 feet of homes. Encourage the use of fire and drought tolerant plants for ornamental plantings especially within 30 feet of homes (see the **Home Mitigation** section in the main report).
- Thin vegetation along access roads and driveways. This is especially important for narrow driveways and road segments.
- Wherever possible, on driveways and private roads longer than 300 feet, add pullouts for emergency apparatus. Turnarounds should be constructed at the end of all driveways and dead-end roads.
- Add reflective addressing to all driveways and homes.

13. Lundy Canyon

Hazard Rating	Very High
Does the neighborhood have dual access roads?	No
Are there road grades > 8%?	No
Are all access roads of adequate width?	Yes
Average lot size:	<1 Acres
Fuel models found in the neighborhood:	5, 2, 8, 1
Water supply:	Drafting from streams may be possible, but not likely
Hazards:	Steep slopes, ravines, inadequate roads, inadequate water supply, no fire protection

Description: The Lundy Canyon community consists of moderate size homes on small lots. Most homes are wood siding with metal roofs and are newer construction. Addressing and roads are generally good. There is no water for fire suppression and this community is not covered by a fire protection district. There is a BLM fire station that may respond to this area, and Mono City FD may respond here as well. Heavy recreational use could result in a higher risk of ignition and potential evacuation difficulties in this community. Fuels are continuous beds of sage and other shrubs with ornamental plantings of conifer near homes. Fuels in the drainages consist of a mix of conifers and riparian hardwoods. Fuel loading is generally moderate, but flammable ornamental plantings and the lack of defensible space make these fuels more hazardous. Although the topography near the homes is generally low to moderate, the overall topography of the area is steep and complex.

LUNDY CANYON RECOMMENDATIONS

- A parcel-level analysis is recommended.
- Adequate defensible space is recommended for all homes (see the **Home Mitigation** section in the main report for details).
- Extended defensible space is recommended for homes located in dangerous topography (in saddles, above natural chimneys, mid-slope on steep slopes or summits) with heavy fuel loads near or below the home.
- Discourage the use of combustible materials for decks, siding and roofs, especially where homes are upslope from heavy fuels. Replace all shake roofs with non-combustible types such as metal or composite shingle.
- Open areas below decks and projections should be enclosed or screened to prevent the ingress of embers and kept clean of flammable materials, especially where such openings are located on slopes above heavy fuels.
- Clean leaf and needle litter from roofs and gutters and away from foundations.
- Discourage the planting of flammable ornamentals such as conifers within 30 feet of homes. Encourage the use of fire and drought tolerant plants for ornamental plantings especially within 30 feet of homes (see the **Home Mitigation** section in the main report).
- Thin vegetation along access roads and driveways. This is especially important for narrow driveways and road segments.
- If there is no agreement already in place, this community should contract with the nearest fire department (most likely Mono City FD) for structure protection in the event of a wildfire.
- Wherever possible, on driveways and private roads longer than 300 feet, add pullouts for emergency apparatus. Turnarounds should be constructed at the end of all driveways and dead-end roads.
- Investigate the possibility of adding one or two large (20,000 - 30,000 gallon) cisterns in this community. *A reliable water supply for fire suppression is a critical need in Lundy Canyon.*
- *An evacuation plan for this community is highly recommended.* Heavy recreation traffic during the summer could hamper evacuation efforts in this single-access community.
- Add reflective addressing to all driveways and homes.

14. Evans Tract Area

Hazard Rating	**Very High**
Does the neighborhood have dual access roads?	Yes
Are there road grades > 8%?	No
Are all access roads of adequate width?	No
Average lot size:	<1 Acres
Fuel models found in the neighborhood:	5, 2, 1
Water supply:	Hydrants
Hazards:	Ravines, inadequate roads, power lines, propane tanks, wood roofs

Description: The Evans Tract Area community consists of small homes on small lots with a mix of old and new construction. The dominant construction type is wood siding with asphalt roofs, but there are some wood shake roofs in this community. Most homes have some type of address marker, but generally they are not reflective and hard to find on some properties. Most access roads have good surfaces, but are steep and narrow. Most of the driveways are short and offer good access to the structure, but there are no pullouts and few turnarounds adequate for fire apparatus. This community has an adequate hydrant network. Few homes have any defensible space and there are some properties with flammable yard clutter including firewood stacked against the home. There are overhead power lines and propane tanks surrounded by vegetation which may be a hazard to fire operations. Fuels are moderate to heavy loads of sage and Pinyon-juniper near the homes, transitioning to heavy Pinyon-juniper on the upper slopes. Topography is moderate to steep and complex.

EVANS TRACT AREA RECOMMENDATIONS

- A parcel-level analysis is recommended.
- Adequate defensible space is recommended for all homes (see the **Home Mitigation** section in the main report for details).
- Extended defensible space is recommended for homes located in dangerous topography (saddles, above natural chimneys, mid-slope on steep slopes or summits) with heavy fuel loads near or below the home.
- Discourage the use of combustible materials for decks, siding and roofs, especially where homes are upslope from heavy fuels. Replace all shake roofs with non-combustible types such as metal or composite shingle.
- Open areas below decks and projections should be enclosed or screened to prevent the ingress of embers and kept clean of flammable materials, especially where such openings are located on slopes above heavy fuels.
- Clean leaf and needle litter from roofs and gutters and away from foundations. Clear flammable vegetation away from power lines near homes. Clear weeds and flammable vegetation to at least 30 feet away from propane tanks.
- Discourage the planting of flammable ornamentals such as conifers within 30 feet of homes. Encourage the use of fire and drought tolerant plants for ornamental plantings especially within 30 feet of homes (see the **Home Mitigation** section in the main report).
- Thin vegetation along access roads and driveways. This is especially important for narrow driveways and road segments.
- Wherever possible, on driveways and private roads longer than 300 feet, add pullouts for emergency apparatus. Turnarounds should be constructed at the end of all driveways and dead-end roads.
- Add reflective addressing to all driveways and homes.

15. Silver Lake & Dream Mountain

Hazard Rating	Very High
Does the neighborhood have dual access roads?	No
Are there road grades > 8%?	No
Are all access roads of adequate width?	No
Average lot size:	<1 Acres
Fuel models found in the neighborhood:	5, 9, 8, 1
Water supply:	Hydrants
Hazards:	Inadequate roads, wood roofs

Description: Most of the residences in this community are small forest service lease cabins on small lots. Most construction is older; wood or log siding with metal or asphalt roofs is dominant. There are, however, several cabins with wood roofs in this community. Roads in this community are narrow with poor, rutted dirt surfaces. Addressing is also poor and many homes do not have any address marker. There is an adequate hydrant network in this community. Most homes do not have any defensible space. Fuels are heavy loads of decadent aspen and mixed conifer with heavy dead and down in the understory. Shrubs and other ladder fuels are also heavy throughout this community. Topography is generally moderate to low.

SILVER LAKE & DREAM MOUNTAIN RECOMMENDATIONS

- A parcel-level analysis is recommended.
- Adequate defensible space is recommended for all homes (see the **Home Mitigation** section in the main report for details).
- Extended defensible space is recommended for homes located in dangerous topography (saddles, above natural chimneys, mid-slope on steep slopes or summits) with heavy fuel loads near or below the home.
- Discourage the use of combustible materials for decks, siding and roofs, especially where homes are upslope from heavy fuels. Replace all shake roofs with non-combustible types such as metal or composite shingle.
- Open areas below decks and projections should be enclosed or screened to prevent the ingress of embers and kept clean of flammable materials, especially where such openings are located on slopes above heavy fuels.
- Clean leaf and needle litter from roofs and gutters and away from foundations. Clear flammable vegetation away from power lines near homes. Clear weeds and flammable vegetation to at least 30 feet away from propane tanks.
- Discourage the planting of flammable ornamentals such as conifers within 30 feet of homes. Encourage the use of fire and drought tolerant plants for ornamental plantings especially within 30 feet of homes (see the **Home Mitigation** section in the main report).
- Wherever possible road surfaces should be improved and vegetation thinned along access roads and driveways. This is especially important for narrow driveways and road segments.
- Wherever possible, on driveways and private roads longer than 300 feet, add pullouts for emergency apparatus. Turnarounds should be constructed at the end of all driveways and dead-end roads.
- Add reflective addressing to all driveways and homes.

16. Swauger Creek & Devil's Gate

Hazard Rating:	**Very High**
Does the neighborhood have dual access roads?	No
Are there road grades > 8%?	No
Are all access roads of adequate width?	No
Average lot size:	>5 Acres
Fuel models found in the neighborhood:	2, 5
Water supply:	Draft sites marked and mapped by USFS
Hazards:	Inadequate roads, wood roofs

Description: This community contains moderate to large homes on large lots (minimum 40 acres). Dominant construction is wood siding with metal or asphalt roofs, but there are some wooden roofs and many homes have flammable projections and decks. Addressing is poor. Most homes do not have address markers at the driveway and if there are markers on the homes they are not visible from the road. Access roads are dirt and are narrow in spots. There are several long, narrow driveways with no pullouts or turnarounds suitable for apparatus. There are marked draft sites for fire suppression in this community. There has been some mitigation work in this area, but there are still several homes with vegetation growing right up to the structure. Fuels are primarily conifers with grasses and sage in the understory, becoming sage-dominant in the bottoms. There are also significant stands of aspen and mixed conifers in the riparian drainages. Topography varies widely from broad flat areas to steep slopes complicated by ravines and chimneys.

SWAUGER CREEK & DEVIL'S GATE RECOMMENDATIONS

- A parcel-level analysis is recommended.
- Adequate defensible space is recommended for all homes (see the **Home Mitigation** section in the main report for details).
- Extended defensible space is recommended for homes located in dangerous topography (saddles, above natural chimneys, mid-slope on steep slopes or summits) with heavy fuel loads near or below the home.
- Discourage the use of combustible materials for decks, siding and roofs, especially where homes are upslope from heavy fuels. Replace all shake roofs with non-combustible types such as metal or composite shingle.
- Open areas below decks and projections should be enclosed or screened to prevent the ingress of embers and kept clean of flammable materials, especially where such openings are located on slopes above heavy fuels.
- Clean leaf and needle litter from roofs and gutters and away from foundations.
- Discourage the planting of flammable ornamentals such as conifers within 30 feet of homes. Encourage the use of fire and drought tolerant plants for ornamental plantings especially within 30 feet of homes (see the Home Mitigation section in the main report).
- Thin vegetation along access roads and driveways. This is especially important for narrow driveways and road segments.
- Wherever possible, on driveways and private roads longer than 300 feet, add pullouts for emergency apparatus. Turnarounds should be constructed at the end of all driveways and dead-end roads.
- Add reflective addressing to all driveways and homes.

The following recommendations have been taken from the **Devil's Gate Swauger Creek Fire Safe Council's board report** and has been included here at their request. The report lists fuels reduction projects to be completed in order to lessen the fire hazard and provide better access for Fire Equipment in the Devil's Gate Swauger Creek Fire Safe Council's area

These projects, specifications and recommendations have not been evaluated or prioritized by Anchor Point. They are reprinted here verbatim.

- Create a fuel shaded fuel break interface between U. S. Forest Service, Bureau of Land Management Lands and private lands. 200 foot wide shaded fuelbreak between these boundaries. Approximately eight miles.
- Create a shaded fuelbreak along existing driveways, 100 feet each side, enlarging driveway width to allow for large fire trucks and apparatus to pass. On long driveways over 300 feet long, provide for turnouts every 300 feet for passing and at the ends create "Y" or "Hammerhead turnarounds" for driveways that do not have space to turnaround.

Install reflective street sign numbers at the entrance of each driveway coming off the main roadway. This will create a north-south fire break in the area. Approximately 4 miles.

- Clear around existing homes and create shaded fuelbreaks, minimum 150 feet. This could be more depending on the terrain and slopes.
- Road maintenance making the road easier access with Fire Equipment and create shaded fuel break on existing fire road going west from Valdez property, to United States Forestry land. Approximately 1.5 miles.
- Aspen Grove restoration and shaded fuel break, South end of Valdez Property. Approximately 3 Acres.
- Create 200 foot wide, 100 feet each side of road, shaded fuel break along Highway 395 Corridor from Rattlesnake bend to 1 mile west of Devil's gate rocks. Approximately 3.5 miles. Heavily traveled road and vulnerable for manmade fires, lighted cigarettes thrown from vehicles etc.
- Create signs and show place for shaded fuel break when completed on Highway 395 a major Highway with large volumes of traffic. Leave small section as it was to start with, showing major difference and potential fire hazard removal.
- Create shaded fuel break along Power Line Road 100 feet each side, widen areas to permit large Fire Equipment access. Approximately 2 miles long.
- Create a North South shaded fuel break on "Woods" Property, most winds come from the westerly direction. Approximately 1.5 miles long. Along his driveway to meet width and turn around requirements and West property line.
- Aspen Grove restoration and shaded fuel break, on "Woods" Property. Approximately 25 acres.
- Obtain water tender, storage facility and training of residents for operation of this unit for wildland fires initial attack until back up units arrive.
- Install 25,000 gallon water storage tank along Highway 395, to provide a quick source of water to refill fire apparatus, areas not close to Swauger Creeks existing draft points.
- 300 acres ladder fuels reduction on private property, various locations within Devil's Gate Swauger Creek Fire Safe Council's area.
- Create shaded fuel break, on Quartz Mine Road 150 feet each side and improve road width for approximately 1.5 miles.
- Finish Swauger Creek Road widen shaded fuel break to existing dedicated road right-of-way.
- Review all created shaded fuel breaks for maintenance every 5 years.

17. Swall Meadows

Hazard Rating	High
Does the neighborhood have dual access roads?	No
Are there road grades > 8%?	Yes
Are all access roads of adequate width?	No
Average lot size:	<1 Acre
Fuel models found in the neighborhood:	5, 8
Water supply:	Hydrants
Hazards:	Inadequate roads, steep slopes, ravines, power lines

Description: There have been two large fires in this community since 1982. Most homes are moderate to small size on moderate lots, with a mix of old and new construction. Wood siding with metal or asphalt roofs is the dominant construction type. There are a few homes with some defensible space, but there are also many homes with vegetation growing right up to the structure. There are also some properties with flammable yard clutter. There is one way in and out of this community and the access road is narrow, winding and constructed mid-slope for a considerable distance. There are some steep narrow driveways and some poor dirt roads in this community. Addressing is generally poor (missing and inconsistent markers, few reflective). Overhead power lines exist which may be a hazard to fire apparatus. There are hydrants in this community and there is a fire station located on Willow Drive. Fuels are primarily sage and Jeffery pine, with sage in the understory (except in drainages where a mix of hardwood, shrubs and cedars is dominant). Topography is moderate to steep.

SWALL MEADOWS RECOMMENDATIONS

- A parcel-level analysis is recommended.
- Adequate defensible space is recommended for all homes (see the **Home Mitigation** section in the main report for details).
- Extended defensible space is recommended for homes located in dangerous topography (saddles, above natural chimneys, mid-slope on steep slopes or summits) with heavy fuel loads near or below the home.
- Discourage the use of combustible materials for decks, siding and roofs, especially where homes are upslope from heavy fuels.
- Open areas below decks and projections should be enclosed or screened to prevent the ingress of embers and kept clean of flammable materials, especially where such openings are located on slopes above heavy fuels.
- Clean leaf and needle litter from roofs and gutters and away from foundations. Clear flammable vegetation away from power lines near homes. Clear weeds and flammable vegetation to at least 30 feet away from propane tanks.
- Discourage the planting of flammable ornamentals such as conifers within 30 feet of homes. Encourage the use of fire and drought tolerant plants for ornamental plantings especially within 30 feet of homes (see the **Home Mitigation** section in the main report).
- Thin vegetation along access roads and driveways. This is especially important for narrow driveways and road segments.
- Investigate the possibility of improving and widening the road surface of the rougher dirt access roads.
- Wherever possible, on driveways and private roads longer than 300 feet, add pullouts for emergency apparatus. Turnarounds should be constructed at the end of all driveways and dead-end roads.
- Add reflective addressing to all driveways and homes.

18. Hilton Creek

Hazard Rating	**High**
Does the neighborhood have dual access roads?	No
Are there road grades > 8%?	Yes
Are all access roads of adequate width?	No
Average lot size:	<1 Acre
Fuel models found in the neighborhood:	5
Water supply:	Hydrants
Hazards:	Inadequate roads, steep slopes, ravines, wood roofs

Description: Delta Drive serves as the dividing line between this community and the more hazardous Juniper Loop community. Most of the homes were built in the 1980s and the dominant construction type is wood siding with asphalt or metal roofs. There are some wood roofs in this community and few homes have adequate defensible spaces; however, the fuels are not as dense and the topography not as steep as in Juniper Loop. There are several dead-end roads in this community. Most, but not all, of the access roads are of adequate width, but some are steep. Addressing is generally present, but not reflective, and some markers are hard to locate. There is a good water supply in this community. Fuels are moderate loads of Pinyon-juniper and sage. Topography is moderate to steep.

HILTON CREEK RECOMMENDATIONS

- A parcel-level analysis is recommended.
- Adequate defensible space is recommended for all homes (see the **Home Mitigation** section in the main report for details).
- Extended defensible space is recommended for homes located in dangerous topography (saddles, above natural chimneys, mid-slope on steep slopes or summits) with heavy fuel loads near or below the home.
- Discourage the use of combustible materials for decks, siding and roofs, especially where homes are upslope from heavy fuels. Replace all shake roofs with non-combustible types such as metal or composite shingle.
- Open areas below decks and projections should be enclosed or screened to prevent the ingress of embers and kept clean of flammable materials, especially where such openings are located on slopes above heavy fuels.
- Clean leaf and needle litter from roofs and gutters and away from foundations.
- Discourage the planting of flammable ornamentals such as conifers within 30 feet of homes. Encourage the use of fire and drought tolerant plants for ornamental plantings especially within 30 feet of homes (see the **Home Mitigation** section in the main report).
- Thin vegetation along access roads and driveways. This is especially important for narrow driveways and road segments.
- Wherever possible, on driveways and private roads longer than 300 feet, add pullouts for emergency apparatus. Turnarounds should be constructed at the end of all driveways and dead-end roads.
- Add reflective addressing to all driveways and homes.

19. North Mammoth Lakes

Hazard Rating	High
Does the neighborhood have dual access roads?	Yes
Are there road grades > 8%?	No
Are all access roads of adequate width?	Yes
Average lot size:	<1 Acre
Fuel models found in the neighborhood:	5, 9, 10
Water supply:	Hydrants
Hazards:	Power lines, propane tanks, wood roofs

Description: This is a high density community of small to moderate size homes and condo complexes. Most construction is wood siding with a metal or asphalt roof, but some shake roofs are present. Most homes do not have adequate defensible space and many have vegetation growing right up to the structure. Roads are generally good and most driveways are short. Addressing is present, but not reflective, and some markers are hard to find. There is a good hydrant network in this neighborhood and most homes are within two miles of a fire station. Fuels are moderate to heavy loads of shrubs and mixed conifer with moderate dead and down material and plentiful ladder fuels. Topography is moderate to low.

NORTH MAMMOTH LAKES RECOMMENDATIONS

- A parcel-level analysis is recommended.
- Adequate defensible space is recommended for all homes (see the **Home Mitigation** section in the main report for details).
- Extended defensible space is recommended for homes located in dangerous topography (saddles, above natural chimneys, mid-slope on steep slopes or summits) with heavy fuel loads near or below the home.
- Discourage the use of combustible materials for decks, siding and roofs, especially where homes are upslope from heavy fuels. Replace all shake roofs with non-combustible types such as metal or composite shingle.
- Open areas below decks and projections should be enclosed or screened to prevent the ingress of embers and kept clean of flammable materials, especially where such openings are located on slopes above heavy fuels.
- Clean leaf and needle litter from roofs and gutters and away from foundations. Clear flammable vegetation away from power lines near homes. Clear weeds and flammable vegetation to at least 30 feet away from propane tanks.
- Discourage the planting of flammable ornamentals such as conifers within 30 feet of homes. Encourage the use of fire and drought tolerant plants for ornamental plantings especially within 30 feet of homes (see the **Home Mitigation** section in the main report).
- Thin vegetation along access roads and driveways. This is especially important for narrow driveways and road segments.
- Wherever possible, on driveways and private roads longer than 300 feet, add pullouts for emergency apparatus. Turnarounds should be constructed at the end of all driveways and dead-end roads.
- Add reflective addressing to all driveways and homes.

20. Sierra Valley Estates (Mammoth Lakes area)

Hazard Rating	**High**
Does the neighborhood have dual access roads?	Yes
Are there road grades > 8%?	No
Are all access roads of adequate width?	Yes
Average lot size:	<1 Acre
Fuel models found in the neighborhood:	5, 9, 10
Water supply:	Hydrants
Hazards:	Power lines, propane tanks, wood roofs

Description: This is a high density community of small homes and apartments on small lots. Most construction is older and quite a bit of it is very hazardous. Wood A-frames with cedar shake roofs that go almost all the way to the ground are common. Wood siding is dominant and roofs are a mix of asphalt and wood shake. There are no homes with adequate defensible spaces and many residences have flammable yard clutter. Addressing is poor and most homes do not have any address markers. There are power lines and propane tanks which can create a hazard for firefighters. There is a good hydrant network and most homes are within 2 miles of a fire station. Fuels are heavy to moderate loads of mixed conifer. Topography is low to flat.

SIERRA VALLEY ESTATES RECOMMENDATIONS

- A parcel-level analysis is recommended.
- Adequate defensible space is recommended for all homes (see the **Home Mitigation** section in the main report for details).
- Extended defensible space is recommended for homes located in dangerous topography (saddles, above natural chimneys, mid-slope on steep slopes or summits) with heavy fuel loads near or below the home.
- Discourage the use of combustible materials for decks, siding and roofs, especially where homes are upslope from heavy fuels. Replace all shake roofs with non-combustible types such as metal or composite shingle.
- Open areas below decks and projections should be enclosed or screened to prevent the ingress of embers and kept clean of flammable materials, especially where such openings are located on slopes above heavy fuels.
- Clean leaf and needle litter from roofs and gutters and away from foundations. Clear flammable vegetation away from power lines near homes. Clear weeds and flammable vegetation to at least 30 feet away from propane tanks.
- Discourage the planting of flammable ornamentals such as conifers within 30 feet of homes. Encourage the use of fire and drought tolerant plants for ornamental plantings especially within 30 feet of homes (see the **Home Mitigation** section in the main report).
- Thin vegetation along access roads and driveways. This is especially important for narrow driveways and road segments.
- Wherever possible, on driveways and private roads longer than 300 feet, add pullouts for emergency apparatus. Turnarounds should be constructed at the end of all driveways and dead-end roads.
- Add reflective addressing to all driveways and homes.

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21. McGee Creek/Long Valley

Hazard Rating	High
Does the neighborhood have dual access roads?	Yes
Are there road grades > 8%?	No
Are all access roads of adequate width?	No
Average lot size:	<1 Acre
Fuel models found in the neighborhood:	5, 6
Water supply:	Hydrants, one creek-fed cistern
Hazards:	Ravines, wood roofs

Description: This is a community of small to moderate sized homes on small lots. Homes are in clusters interspersed with LADWP and public lands. Construction is a mix of new and older types and some areas are still being built out. Wood siding is dominant and roofs are a mix of asphalt and metal with some wood shakes. There are a few homes with defensible spaces but many residences have vegetation growing right up to the structure and some have flammable yard clutter. Access roads are generally good, but there are some steep grades and long narrow driveways. Most homes do not have address markers that are visible from the street. The McGee Creek area has a good hydrant network and there is a creek-fed cistern with a standpipe connection in the Long Valley area that can supply adequate flows. Fuels are light to moderate loads of shrubs, predominately sage, and short grasses with ornamental plantings near homes. Topography is low to moderate with some ravines in the McGee Creek area.

MCGEE CREEK/LONG VALLEY RECOMMENDATIONS

- A parcel-level analysis is recommended.
- Adequate defensible space is recommended for all homes (see the **Home Mitigation** section in the main report for details).
- Extended defensible space is recommended for homes located in dangerous topography (saddles, above natural chimneys, mid-slope on steep slopes or summits) with heavy fuel loads near or below the home.
- Discourage the use of combustible materials for decks, siding and roofs, especially where homes are upslope from heavy fuels. Replace all shake roofs with non-combustible types such as metal or composite shingle.
- Open areas below decks and projections should be enclosed or screened to prevent the ingress of embers and kept clean of flammable materials, especially where such openings are located on slopes above heavy fuels.
- Clean leaf and needle litter from roofs and gutters and away from foundations.
- Discourage the planting of flammable ornamentals such as conifers within 30 feet of homes. Encourage the use of fire and drought tolerant plants for ornamental plantings especially within 30 feet of homes (see the **Home Mitigation** section in the main report).
- Thin vegetation along access roads and driveways. This is especially important for narrow driveways and road segments.
- Wherever possible, on driveways and private roads longer than 300 feet, add pullouts for emergency apparatus. Turnarounds should be constructed at the end of all driveways and dead-end roads.
- Add reflective addressing to all driveways and homes.

22. Rancheria – Bridgeport Area

Hazard Rating	High
Does the neighborhood have dual access roads?	Yes
Are there road grades > 8%?	No
Are all access roads of adequate width?	No
Average lot size:	1-5 Acres
Fuel models found in the neighborhood:	10, 1, 5
Water supply:	Creek weir (portable pump only)
Hazards:	Inadequate roads, wood roofs

Description: This is a community of small to moderate size homes on moderate sized lots. Wood siding construction is dominant and roofs are approximately half wood shake and half ignition-resistant construction, primarily asphalt. A few homes have some defensible space, but most have vegetation growing right up to the structure. There are many homes with flammable decks and projections and some homes with flammable yard clutter. Most roads are paved and relatively flat but many are narrow and overgrown. There is a secondary access off of Hackmore, but this narrow dirt road is overgrown and would need fuels reduction and surface improvement to be a good escape route. Address markers are generally present, but not reflective and difficult to see on most homes. The only water for fire suppression in this community is from a six-foot concrete creek weir. Fuels are heavy mixed conifer with aspen and riparian shrubs in the creek bottoms. Topography is generally low, but some homes back up to steeper slopes and rolling materials could be a hazard.

RANCHERIA RECOMMENDATIONS

- A parcel-level analysis is recommended.
- Adequate defensible space is recommended for all homes (see the **Home Mitigation** section in the main report for details).
- Extended defensible space is recommended for homes located in dangerous topography (saddles, above natural chimneys, mid-slope on steep slopes or summits) with heavy fuel loads near or below the home.
- Extended defensible space is recommended for homes located at the bottom of steep slopes with heavy fuels above to prevent rolling burning materials from igniting structures.
- Discourage the use of combustible materials for decks, siding and roofs, especially where homes are upslope from heavy fuels. Replace all shake roofs with non-combustible types such as metal or composite shingle.
- Open areas below decks and projections should be enclosed or screened to prevent the ingress of embers and kept clean of flammable materials, especially where such openings are located on slopes above heavy fuels.
- Clean leaf and needle litter from roofs and gutters and away from foundations.
- Discourage the planting of flammable ornamentals such as conifers within 30 feet of homes. Encourage the use of fire and drought tolerant plants for ornamental plantings especially within 30 feet of homes (see the **Home Mitigation** section in the main report).
- Consider a shaded fuelbreak or linked defensible spaces for homes adjacent to the heavier conifer fuel beds.
- Thin vegetation along access roads and driveways. This is especially important for narrow driveways and road segments.
- The secondary access off Hackmore should be thinned to conform to shaded fuelbreak recommendations (see the main report for details) and the surface improved to provide a viable escape route.
- Wherever possible, on driveways and private roads longer than 300 feet, add pullouts for emergency apparatus. Turnarounds should be constructed at the end of all driveways and dead-end roads.
- Add reflective addressing to all driveways and homes.

23. Snow Creek

Hazard Rating	Moderate
Does the neighborhood have dual access roads?	No
Are there road grades > 8%?	No
Are all access roads of adequate width?	Yes
Average lot size:	<1 Acres
Fuel models found in the neighborhood:	5, 9
Water supply:	Hydrants
Hazards:	Wood roofs

Description: This is a high density community of primarily town homes and condos. Single family homes are small on small lots. Wood siding with shake roofs is the dominant construction type. Some homes have wood piles and other flammable materials too close to the structure and/or under flammable projections and decks. Some homes have defensible space. Roads are good and most driveways are short and paved. Most homes have address markers but many are not visible (covered by vegetation). This area has a good hydrant network and is less than one mile from Mammoth Lakes FD Station 2. Fuels are conifers with grass and shrubs in the understory broken by irrigated lawns. Topography is low to flat.

SNOW CREEK RECOMMENDATIONS

- Adequate defensible space is recommended for all homes (see the **Home Mitigation** section in the main report for details).
- Extended defensible space is recommended for homes with heavy fuel loads near or below the home.
- Discourage the use of combustible materials for decks, siding and roofs, especially where homes are upslope from heavy fuels. Replace all shake roofs with non-combustible types such as metal or composite shingle.
- Open areas below decks and projections should be enclosed or screened to prevent the ingress of embers and kept clean of flammable materials, especially where such openings are located on slopes above heavy fuels.
- Clean leaf and needle litter from roofs and gutters and away from foundations.
- Discourage the planting of flammable ornamentals such as conifers within 30 feet of homes. Encourage the use of fire and drought tolerant plants for ornamental plantings especially within 30 feet of homes (see the **Home Mitigation** section in the main report).
- Thin vegetation along access roads and driveways. This is especially important for narrow driveways and road segments.
- Wherever possible, on driveways and private roads longer than 300 feet, add pullouts for emergency apparatus. Turnarounds should be constructed at the end of all driveways and dead-end roads.
- Add reflective addressing to all driveways and homes. Clean all vegetation away from existing address markers.

24. Mono City

Hazard Rating	Moderate
Does the neighborhood have dual access roads?	No
Are there road grades > 8%?	No
Are all access roads of adequate width?	Yes
Average lot size:	<1 Acres
Fuel models found in the neighborhood:	2
Water supply:	Hydrants (but poor flows)
Hazards:	Inadequate water supply, power lines, wood roofs

Description: This is a community of small homes on small lots. Most construction is older wood siding with metal or asphalt roofs, although there are several wood shake roofs in this community. Few homes have any defensible space. Roads and driveways are generally good. Some are dirt, but most have good surfaces and are of adequate width. Some homes are missing address markers and most others are present but not reflective and may be difficult to locate. Hydrants are present but flows are poor. Mono City has a volunteer fire department. Overhead power lines are present which may be a hazard to firefighters. Fuels are primarily sage, mesquite and other shrubs and are continuous except for some irrigated lawns. Topography is low to flat.

MONO CITY RECOMMENDATIONS

- Adequate defensible space is recommended for all homes (see the **Home Mitigation** section in the main report for details).
- Extended defensible space is recommended for homes with heavy fuel loads near or below the home.
- Discourage the use of combustible materials for decks, siding and roofs, especially where homes are upslope from heavy fuels. Replace all shake roofs with non-combustible types such as metal or composite shingle.
- Open areas below decks and projections should be enclosed or screened to prevent the ingress of embers and kept clean of flammable materials, especially where such openings are located on slopes above heavy fuels.
- Clean leaf and needle litter from roofs and gutters and away from foundations.
- Discourage the planting of flammable ornamentals such as conifers within 30 feet of homes. Encourage the use of fire and drought tolerant plants for ornamental plantings especially within 30 feet of homes (see the **Home Mitigation** section in the main report).
- Thin vegetation along access roads and driveways. This is especially important for narrow driveways and road segments.
- Wherever possible, on driveways and private roads longer than 300 feet, add pullouts for emergency apparatus. Turnarounds should be constructed at the end of all driveways and dead-end roads.
- A second means of ingress/egress is needed for this community. A committee with the Mono Basin RPAC is currently working on this issue as of the writing of this report.
- Consider supplementing the poor hydrant network with a large (10,000 - 30,000) community cistern.
- Install a generator to keep the current water system operating during power outages.
- Add reflective addressing to all driveways and homes.

25. Convict Lake/SNARL

Hazard Rating	Moderate
Does the neighborhood have dual access roads?	No
Are there road grades > 8%?	No
Are all access roads of adequate width?	No
Average lot size:	<1 Acres
Fuel models found in the neighborhood:	5, 6
Water supply:	Hydrants (Convict Lake only)
Hazards:	Inadequate water supply, inadequate access roads, ravines

Description: SNARL (Sierra Nevada Aquatic Lab) has residential housing for the research lab. The residences are wood and metal siding with metal roofs. This is an isolated area and address markers are not applicable, although the buildings are numbered. This area is a long distance from the nearest fire station. The only water for fire suppression is a pump system fed by a small reservoir, which is inadequate for this community. Fuels are a mixture of shrubs and short grasses. Topography is low to flat.

The residences at Convict Lake are predominately cabins and duplex units with one large summer resort property. There is a mix of old and new construction. Most residences are wood siding with metal or asphalt roofs. Addressing is poor and this area is a long distance from the nearest fire station. This community has a network of 2 ½" standpipe hydrants gravity fed by a 60,000 gallon cistern. Fuels are moderate loads of shrubs as much as four to six feet high in some areas. Near residences, aspen with sage and other shrubs in the understory is dominant. Topography is low to moderate with some ravines.

CONVICT LAKE/SNARL RECOMMENDATIONS

- Adequate defensible space is recommended for all homes (see the **Home Mitigation** section in the main report for details).
- Extended defensible space is recommended for homes with heavy fuel loads near or below the home.
- Discourage the use of combustible materials for decks, siding and roofs, especially where homes are upslope from heavy fuels.
- Open areas below decks and projections should be enclosed or screened to prevent the ingress of embers and kept clean of flammable materials, especially where such openings are located on slopes above heavy fuels.
- Clean leaf and needle litter from roofs and gutters and away from foundations.
- Discourage the planting of flammable ornamentals such as conifers within 30 feet of homes. Encourage the use of fire and drought tolerant plants for ornamental plantings especially within 30 feet of homes (see the **Home Mitigation** section in the main report).
- Thin vegetation along access roads and driveways. This is especially important for narrow driveways and road segments.
- Wherever possible, on driveways and private roads longer than 300 feet, add pullouts for emergency apparatus. Turnarounds should be constructed at the end of all driveways and dead-end roads.
- Consider supplementing the small reservoir at SNARL with a large (10,000 - 30,000) community cistern.
- Add reflective addressing to all driveways and homes in Convict Lake (not applicable to SNARL).

26. Highlands

Hazard Rating	Moderate
Does the neighborhood have dual access roads?	No
Are there road grades > 8%?	No
Are all access roads of adequate width?	Yes
Average lot size:	<1 Acres
Fuel models found in the neighborhood:	5, 6
Water supply:	Hydrants
Hazards:	Propane tanks

Description: This is a community of moderate size homes on small lots. This community is still being built out and is likely to become a high density area. Most construction is newer rock and wood siding with ignition resistant roofs. Some homes have defensible spaces, but most have shrubs and ornamental vegetation too close to the structure. Most roads are good and addressing is generally present, but not reflective, and may be difficult to locate at some residences. This community has a good hydrant network. Fuels are moderate loads of primarily sage and other short shrubs. Fuel beds are generally continuous throughout this community. Topography is low to moderate.

HIGHLANDS RECOMMENDATIONS

- Adequate defensible space is recommended for all homes (see the **Home Mitigation** section in the main report for details).
- Discourage the use of combustible materials for decks, siding and roofs, especially where homes are upslope from heavy fuels.
- Open areas below decks and projections should be enclosed or screened to prevent the ingress of embers and kept clean of flammable materials, especially where such openings are located on slopes above heavy fuels.
- Clean leaf and needle litter from roofs and gutters and away from foundations. Clear flammable vegetation away from power lines near homes. Clear weeds and flammable vegetation to at least 30 feet away from propane tanks.
- Discourage the planting of flammable ornamentals such as conifers within 30 feet of homes. Encourage the use of fire and drought tolerant plants for ornamental plantings especially within 30 feet of homes (see the **Home Mitigation** section in the main report).
- Thin vegetation along access roads and driveways. This is especially important for narrow driveways and road segments.
- Wherever possible, on driveways and private roads longer than 300 feet, add pullouts for emergency apparatus. Turnarounds should be constructed at the end of all driveways and dead-end roads.
- Add reflective addressing to all driveways and homes.

27. Aurora Canyon

Hazard Rating	Moderate
Does the neighborhood have dual access roads?	No
Are there road grades > 8%?	No
Are all access roads of adequate width?	Yes
Average lot size:	<1 Acres
Fuel models found in the neighborhood:	15, 2
Water supply:	Hydrants
Hazards:	Power lines, propane tanks

Description: This is a community of small homes on small lots. The dominant construction type is wood siding with asphalt roofs. Some homes have defensible spaces but most have ornamental plantings, grasses and/or sage too close to the structure. Roads are generally good and most homes have addressing present on the structure, but most markers are not reflective and some are difficult to locate. There are no address markers on the street, but most driveways are short. Power lines and propane tanks exist, which can be hazardous to firefighters. There is an adequate hydrant network in this community. Fuels are light loads of small sage and grasses (CDF desert fuel model, FM 15). Fuels change to Pinyon-juniper dominant further up canyon. Topography is low to moderate.

AURORA CANYON RECOMMENDATIONS

- Adequate defensible space is recommended for all homes (see the **Home Mitigation** section in the main report for details).
- Discourage the use of combustible materials for decks, siding and roofs.
- Open areas below decks and projections should be enclosed or screened to prevent the ingress of embers and kept clean of flammable materials.
- Clean leaf and needle litter from roofs and gutters and away from foundations. Clear flammable vegetation away from power lines near homes. Clear weeds and flammable vegetation to at least 30 feet away from propane tanks.
- Discourage the planting of flammable ornamentals such as conifers within 30 feet of homes. Encourage the use of fire and drought tolerant plants for ornamental plantings especially within 30 feet of homes (see the **Home Mitigation** section in the main report).
- Thin vegetation along access roads and driveways. This is especially important for narrow driveways and road segments.
- Wherever possible, on driveways and private roads longer than 300 feet, add pullouts for emergency apparatus. Turnarounds should be constructed at the end of all driveways and dead-end roads.
- Add reflective addressing to all driveways and homes.

28. Ranch Road – Mammoth Lakes area

Hazard Rating	Moderate
Does the neighborhood have dual access roads?	No
Are there road grades > 8%?	No
Are all access roads of adequate width?	Yes
Average lot size:	<1 Acres
Fuel models found in the neighborhood:	5, 1
Water supply:	Hydrants
Hazards:	Wood roofs, power lines, propane tanks

Description: This is a high density community of newer homes. Homes are small to moderate size on small lots. The dominant construction type is log, wood siding or wood siding with partial rock veneer. Roofs are predominately wood shake, although there are also many asphalt roofs. Many homes have flammable projections and decks. Most homes do not have any defensible space, and flammable ornamental plantings too close to the structure are common. All homes have address markers, but most are not reflective and there are no address markers at the street. There is a good hydrant network in this community (hydrants every 300 to 500 feet) and all of the homes are less than one mile from a fire station. Fuels are moderate to light loads of sage, riparian shrubs and grasses. Topography is flat to gently rolling.

RANCH ROAD AREA RECOMMENDATIONS

- Adequate defensible space is recommended for all homes (see the **Home Mitigation** section in the main report for details).
- Discourage the use of combustible materials for decks, siding and roofs.
- Open areas below decks and projections should be enclosed or screened to prevent the ingress of embers and kept clean of flammable materials.
- Clean leaf and needle litter from roofs and gutters and away from foundations. Clear flammable vegetation away from power lines near homes. Clear weeds and flammable vegetation to at least 30 feet away from propane tanks.
- Discourage the planting of flammable ornamentals such as conifers within 30 feet of homes. Encourage the use of fire and drought tolerant plants for ornamental plantings especially within 30 feet of homes (see the **Home Mitigation** section in the main report).
- Thin vegetation along access roads and driveways. This is especially important for narrow driveways and road segments.
- Wherever possible, on driveways and private roads longer than 300 feet, add pullouts for emergency apparatus. Turnarounds should be constructed at the end of all driveways and dead-end roads.
- Add reflective addressing to all driveways and homes.

29. Chalfant Valley

Hazard Rating	Moderate
Does the neighborhood have dual access roads?	Yes
Are there road grades > 8%?	Yes
Are all access roads of adequate width?	Yes
Average lot size:	1-5 Acres
Fuel models found in the neighborhood:	15
Water supply:	None
Hazards:	No water supply, ravines, power lines, propane tanks

Description: Residences in this community are primarily ranch and farm properties with small to moderate size homes on moderate to large lots. There is a mix of old and new construction with wood siding and asphalt or metal roofs as the dominant type, although there are also many trailer homes in this community. Many properties have flammable outbuildings and several have cluttered yards. Although there are some homes with defensible space (mostly resulting from agricultural irrigation), there are many homes with native vegetation and ornamental plantings too close to the structure. Some access roads and long driveways are dirt, but most are flat and of adequate width. Addressing is poor. Many homes do not have markers, there are several long driveways with no marker at the street, and some homes only have a mailbox as a marker. Most of the markers that do exist are not reflective and some are difficult to locate. There is no water supply for fire suppression and many of the homes are a long way from the nearest fire station. Power lines and propane tanks exist which may be a hazard to firefighters. Fuels are light loads of small sage and grasses (CDF desert fuel model, FM 15). Fuels are discontinuous, broken by irrigated agricultural fields and lawns. The general topography is low to flat. However, topography does increase closer to the White Mountains, and there are some ravines in this area.

CHALFANT VALLEY RECOMMENDATIONS

- Adequate defensible space is recommended for all homes (see the **Home Mitigation** section in the main report for details).
- Extended defensible space is recommended for homes with heavy fuel loads near or below the home.
- Discourage the use of combustible materials for decks, siding and roofs.
- Open areas below decks and projections should be enclosed or screened to prevent the ingress of embers and kept clean of flammable materials.
- Clean leaf and needle litter from roofs and gutters and away from foundations. Clear flammable vegetation away from power lines near homes. Clear weeds and flammable vegetation to at least 30 feet away from propane tanks.
- Discourage the planting of flammable ornamentals such as conifers within 30 feet of homes. Encourage the use of fire and drought tolerant plants for ornamental plantings especially within 30 feet of homes (see the **Home Mitigation** section in the main report).
- Thin vegetation along access roads and driveways. This is especially important for narrow driveways and road segments.
- Wherever possible, on driveways and private roads longer than 300 feet, add pullouts for emergency apparatus. Turnarounds should be constructed at the end of all driveways and dead-end roads.
- Water supply is a critical need in Chalfant Valley. This community is very spread out along Highway 6. Consider adding at least one large (10,000 - 30,000 gallon) cistern in each of the most populated areas (Benton, Hammil and Chalfant Valley) for fire suppression use in this community.
- Add reflective addressing to all driveways and homes.

30. Paradise Valley

Hazard Rating	Moderate
Does the neighborhood have dual access roads?	No
Are there road grades > 8%?	No
Are all access roads of adequate width?	No
Average lot size:	<1 Acre
Fuel models found in the neighborhood:	5, 15
Water supply:	Hydrants
Hazards:	Ravines, wood roofs, propane tanks

Description: Approximately 175 people live in this community of small to moderate size homes on small lots. Most of the construction is newer with wood siding and asphalt roofs, but there are at least two wood shake roofs in this community. There are 83 homes currently built with plans to increase to 138 at maximum build out. Some homes have defensible space, but some have ornamental plantings and sage too close to the structure. Roads are good, paved and of adequate width. Most driveways are short. Address markers are present, but not reflective except for some reflective numbers on mailboxes. There is a good hydrant network in this community and all of the homes are within one mile of a fire station. Propane tanks exist which may be a hazard to firefighters, although most of the tanks are fairly new. Fuels are light loads of sage and desert grasses. Plants are generally widely spaced except for willow and aspen present in some drainages. Topography is low to moderate with some ravines.

PARADISE VALLEY RECOMMENDATIONS

- Adequate defensible space is recommended for all homes (see the **Home Mitigation** section in the main report for details).
- Extended defensible space is recommended for homes with heavy fuel loads near or below the home and for homes above ravines or other hazardous topographic features.
- Discourage the use of combustible materials for decks, siding and roofs.
- Open areas below decks and projections should be enclosed or screened to prevent the ingress of embers and kept clean of flammable materials.
- Clean leaf and needle litter from roofs and gutters and away from foundations. Clear flammable vegetation away from power lines near homes. Clear weeds and flammable vegetation to at least 30 feet away from propane tanks.
- Discourage the planting of flammable ornamentals such as conifers within 30 feet of homes. Encourage the use of fire and drought tolerant plants for ornamental plantings especially within 30 feet of homes (see the **Home Mitigation** section in the main report).
- Thin vegetation along access roads and driveways. This is especially important for narrow driveways and road segments.
- Turnarounds should be constructed at the end of all driveways and dead-end roads.
- Add reflective addressing to all driveways and homes.

31. Antelope Valley

Hazard Rating	**Low**
Does the neighborhood have dual access roads?	Yes
Are there road grades > 8%?	No
Are all access roads of adequate width?	No
Average lot size:	1-5 Acre
Fuel models found in the neighborhood:	1, 5
Water supply:	Hydrants
Hazards:	Inadequate access roads, no water supply, power lines, propane tanks

Description: This community, which is primarily located in the central portion of Antelope Valley, is dominated by agricultural properties. There are also some homes around Topaz Lake, which is an area of heavy recreational use. Except for the homes around the Lake and in the town of Topaz (population 100), most of the homes are small to moderate size on large lots. Near the lake and in Topaz, homes are closer together, but still tend to be on moderate size lots. Most of the homes in this area are older and the dominant construction type is wood siding with an asphalt or metal roof. Many homes have defensible space mostly due to agricultural irrigation, but there are some with sage and ornamental plantings growing right up to the structure. There is a volunteer fire station and a BLM fire station in Topaz. There is no water for fire suppression in this community, although there are likely to be places on Topaz Lake or the Walker River where it will be possible to draft depending on the water levels. Other than Highway 395, most of the roads are improved dirt. Widths are generally good, but there are some long narrow driveways. Addressing is poor, with many homes not marked at the driveway or the structure. Fuels are generally light loads of sage and short grasses except for scattered riparian shrubs and hardwoods in drainages and planted near some homes. Fuels are discontinuous due to large irrigated agricultural plots. Topography is generally low to flat.

ANTELOPE VALLEY RECOMMENDATIONS

- Adequate defensible space is recommended for all homes (see the **Home Mitigation** section in the main report for details).
- Discourage the use of combustible materials for decks, siding and roofs.
- Open areas below decks and projections should be enclosed or screened to prevent the ingress of embers and kept clean of flammable materials.
- Clean leaf and needle litter from roofs and gutters and away from foundations. Clear flammable vegetation away from power lines near homes. Clear weeds and flammable vegetation to at least 30 feet away from propane tanks.
- Discourage the planting of flammable ornamentals such as conifers within 30 feet of homes. Encourage the use of fire and drought tolerant plants for ornamental plantings especially within 30 feet of homes (see the **Home Mitigation** section in the main report).
- Thin vegetation along access roads and driveways. This is especially important for narrow driveways and road segments.
- Wherever possible, on driveways and private roads longer than 300 feet, add pullouts for emergency apparatus. Turnarounds should be constructed at the end of all driveways and dead-end roads.
- Inventory and preplan all draft sites and any stock tanks or other water sources which could be useful for fire suppression.
- Add reflective addressing to all driveways and homes.

32. The Trails

Hazard Rating	Low
Does the neighborhood have dual access roads?	Yes
Are there road grades > 8%?	No
Are all access roads of adequate width?	Yes
Average lot size:	<1 Acre
Fuel models found in the neighborhood:	5, 28
Water supply:	Hydrants
Hazards:	Heavy ornamental plantings

Description: This is a community of primarily moderate size homes on small lots. Most of the construction is newer and this community is still being built out. Wood siding with an asphalt or metal roof is dominant. Flammable decks and projections are common. Although the native fuels are light, most homes do not have any defensible space, because conifers and flammable ornamentals are planted too close to (in most cases right up to) the structure. Ornamental plantings are the biggest threat to the homes in this community. Roads are good and driveways are short. Address markers are present, but not reflective. The homes in this community are approximately two miles from the nearest fire station (Mammoth Lakes Station 1). Fuels are primarily light loads of short sage with occasional conifers, except for the heavy ornamental plantings near the homes noted above. This community backs up to a cleared industrial park which is a significant fuelbreak. Topography is low to flat.

THE TRAILS RECOMMENDATIONS

- Adequate defensible space is recommended for all homes (see the **Home Mitigation** section in the main report for details).
- Discourage the use of combustible materials for decks, siding and roofs.
- Open areas below decks and projections should be enclosed or screened to prevent the ingress of embers and kept clean of flammable materials.
- Clean leaf and needle litter from roofs and gutters and away from foundations.
- Discourage the planting of flammable ornamentals such as conifers within 30 feet of homes. Encourage the use of fire and drought tolerant plants for ornamental plantings especially within 30 feet of homes (see the **Home Mitigation** section in the main report).
- Thin vegetation along access roads and driveways. This is especially important for narrow driveways and road segments.
- Turnarounds should be constructed at the end of all driveways and dead-end roads.
- Add reflective addressing to all driveways and homes.

33. June Lake Village

Hazard Rating	Low
Does the neighborhood have dual access roads?	Yes
Are there road grades > 8%?	No
Are all access roads of adequate width?	No
Average lot size:	<1 Acre
Fuel models found in the neighborhood:	5
Water supply:	Hydrants
Hazards:	Power lines, wood roofs

Description: This is a community of small houses on small lots. Most of the construction is older and in various states of repair. Wood siding with an asphalt or metal roof is dominant, but there are some wooden roofs in this community. Flammable decks and projections are common. Roads are narrow but the surfaces are generally good and driveways are short. Addressing is poor. Many homes do not have markers. Most of the markers that do exist are not reflective and some are difficult to locate. This area has a good hydrant network and is close to the June Lakes fire station. Power lines and propane tanks exist which may be a hazard to firefighters. Fuels are riparian shrubs and grasses broken by irrigated lawns. Topography is moderate to low.

JUNE LAKE VILLAGE RECOMMENDATIONS

- Adequate defensible space is recommended for all homes (see the **Home Mitigation** section in the main report for details).
- Discourage the use of combustible materials for decks, siding and roofs.
- Open areas below decks and projections should be enclosed or screened to prevent the ingress of embers and kept clean of flammable materials.
- Clean leaf and needle litter from roofs and gutters and away from foundations. Clear flammable vegetation away from power lines near homes. Clear weeds and flammable vegetation to at least 30 feet away from propane tanks.
- Discourage the planting of flammable ornamentals such as conifers within 30 feet of homes. Encourage the use of fire and drought tolerant plants for ornamental plantings especially within 30 feet of homes (see the **Home Mitigation** section in the main report).
- Thin vegetation along access roads and driveways. This is especially important for narrow driveways and road segments.
- Turnarounds should be constructed at the end of all driveways and dead-end roads.
- Add reflective addressing to all driveways and homes.

34. Lee Vining

Hazard Rating	**Low**
Does the neighborhood have dual access roads?	Yes
Are there road grades > 8%?	No
Are all access roads of adequate width?	Yes
Average lot size:	<1 Acre
Fuel models found in the neighborhood:	15
Water supply:	Hydrants
Hazards:	Power lines, wood roofs

Description: This is a community of small houses on small lots. Most of the construction is older and in various states of repair. Wood siding with an asphalt or metal roof is dominant, although there are some wooden roofs in this community. Flammable decks and projections are common. Roads are generally good and driveways are short. Addressing is poor. Many homes do not have markers. Most of the markers that do exist are not reflective and some are difficult to locate. This area has a good hydrant network and there is a volunteer fire station in this community. There is also a USFS fire station in Lee Vining. Power lines and propane tanks exist which may be a hazard to firefighters. Fuels are light loads of small sage and grasses (CDF desert fuel model, FM 15). Fuels are discontinuous, broken by irrigated lawns. Topography is moderate to low.

LEE VINING RECOMMENDATIONS

- Adequate defensible space is recommended for all homes (see the **Home Mitigation** section in the main report for details).
- Discourage the use of combustible materials for decks, siding and roofs.
- Open areas below decks and projections should be enclosed or screened to prevent the ingress of embers and kept clean of flammable materials.
- Clean leaf and needle litter from roofs and gutters and away from foundations. Clear flammable vegetation away from power lines near homes. Clear weeds and flammable vegetation to at least 30 feet away from propane tanks.
- Discourage the planting of flammable ornamentals such as conifers within 30 feet of homes. Encourage the use of fire and drought tolerant plants for ornamental plantings especially within 30 feet of homes (see the **Home Mitigation** section in the main report).
- Thin vegetation along access roads and driveways. This is especially important for narrow driveways and road segments.
- Turnarounds should be constructed at the end of all driveways and dead-end roads.
- Add reflective addressing to all driveways and homes.

35. Bridgeport Valley

Hazard Rating	Low
Does the neighborhood have dual access roads?	Yes
Are there road grades > 8%?	No
Are all access roads of adequate width?	Yes
Average lot size:	1-5 Acre
Fuel models found in the neighborhood:	1, 5
Water supply:	Hydrants
Hazards:	Power lines, propane tanks

Description: This community is dominated by agricultural properties. Lot sizes vary from small lots in the town of Bridgeport to large agricultural properties. Homes in this area are a mix of new and old construction. The dominant construction type is wood siding with asphalt or metal roofs. Most homes have defensible space primarily due to agricultural irrigation and the lack of native fuels. Some roads are dirt, but most are flat and of adequate width. There are some long driveways with no pullout or turnaround for apparatus. Addressing outside of the town of Bridgeport is poor, with many homes not marked at the driveway or the structure. Homes in Bridgeport generally have address markers, but most are not reflective and some are difficult to locate. There is a good hydrant network in Bridgeport. There is also a volunteer fire station and a USFS fire station in Bridgeport. Fuels are generally light loads of short grasses and sage which are quite discontinuous due to large irrigated agricultural plots and irrigated lawns. Although surrounded by hills, this community is in a flat valley bottom.

BRIDGEPORT VALLEY RECOMMENDATIONS

- Adequate defensible space is recommended for all homes (see the **Home Mitigation** section in the main report for details).
- Discourage the use of combustible materials for decks, siding and roofs.
- Open areas below decks and projections should be enclosed or screened to prevent the ingress of embers and kept clean of flammable materials.
- Clean leaf and needle litter from roofs and gutters and away from foundations. Clear flammable vegetation away from power lines near homes. Clear weeds and flammable vegetation to at least 30 feet away from propane tanks.
- Discourage the planting of flammable ornamentals such as conifers within 30 feet of homes. Encourage the use of fire and drought tolerant plants for ornamental plantings especially within 30 feet of homes (see the **Home Mitigation** section in the main report).
- Thin vegetation along access roads and driveways. This is especially important for narrow driveways and road segments.
- Wherever possible, on driveways and private roads longer than 300 feet, add pullouts for emergency apparatus. Turnarounds should be constructed at the end of all driveways and dead-end roads.
- Add reflective addressing to all driveways and homes.

APPENDIX C
STRUCTURAL TRIAGE AND PREPARATION

SIZE UP CONSIDERATIONS

- What is the current and expected weather?
- Are fuels heavy, moderate, or light? What is the arrangement and continuity of fuels?
- Note any hazardous topography.
- What have fires in this area done before?
- What is the fire's current and expected behavior?
  - What is the rate and direction of spread?
  - What is the potential for spotting and firebrands?
  - Will topographical features or expected weather changes affect the rate of spread?
- What are the number and density of structures threatened?
- What are the available resources?
- Will you have to evacuate people or animals?
  - Are there residents who will not evacuate?
- How hazardous is the structure?
  - What is the roofing material?
  - Are the gutters full of litter?
  - Are there open eves and unscreened vents?
  - Does the structure have wooden decking?
  - Is there defensible space?
  - Are there large windows with flammable drapes or curtains?
  - What is the size and location of propane tanks and/or fuel storage tanks?

FIREFIGHTER SAFETY

- What are the routes of egress and ingress?
  - What is the largest engine that can access the structure safely?
  - Are the roads two-way or one-way?
  - Are there road grades steeper than 8%?
  - Are the road surfaces all-weather?
  - Are there load-limited bridges?

- Are there anchor points for line construction?
- Are there adequate safety zones?
- What are the escape routes?
- Are there special hazards such as hazardous materials, explosives, high-voltage lines, or above- ground fuel tanks?
- Are communications adequate?

STRUCTURAL TRIAGE CATEGORIES

Sort structures into three categories:

1. Stand Alone or Not Threatened

2. Defendable

3. Not Defendable

- Factors that may make an attempt to save a structure too dangerous or hopeless:
    - The fire is making sustained runs in live fuels and there is little or no defensible space
    - Spot fires are too numerous to control with existing resources
    - Water supply will be exhausted before the threat has passed
    - The roof is more than ¼ involved in flames
    - There is fire inside the structure
    - Rapid egress from the area is dangerous or may be delayed

APPARATUS PLACEMENT CONSIDERATIONS

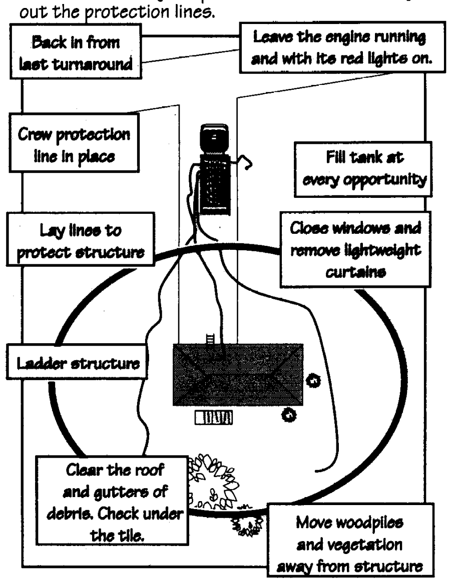
Common Ignition Points (remember, in windy conditions, firebrands can enter almost any opening)

- Flammable roof coverings and debris
- Unscreened vents, windows, or holes
- Open doors, windows, or crawl spaces
- Wooden decks, lawn furniture, stacked wood, and trash piles
- Openings under porches or patio covers

Note: See diagram for Engine Positioning and Setup on the next page.

ENGINE POSITIONING AND SETUP

It is critical that you position you, your personnel and apparatus in positions to protect the structure, but also so that you can make a quick move, if necessary. Prepare the structure and lay out the protection lines.



[1]

[1] Teie,William C.,1995, Firefighter's Guide, Urban/Wildland Situations. Deer Valley Press

APPENDIX D: ACCESS AND WATER SUPPLY RECOMMENDED GUIDELINES

INTRODUCTION

This appendix has been designed with public education in mind, and is intended to help familiarize homeowners, contractors, and developers with the general principles of the access and water supply needs of firefighters. The recommendations in this section are based on proven practices. However, they are not meant to be a substitute for locally adopted codes.

Emergency response personnel do their best to respond to calls in a timely manner, often while negotiating difficult terrain. Planning for access by emergency equipment allows for a more efficient response, improving safety for residents and their families, as well as that of the firefighters and emergency medical technicians that will arrive on scene. This is especially important in rural areas, where response times may be considerably longer than in cities.

ACCESS GUIDELINES

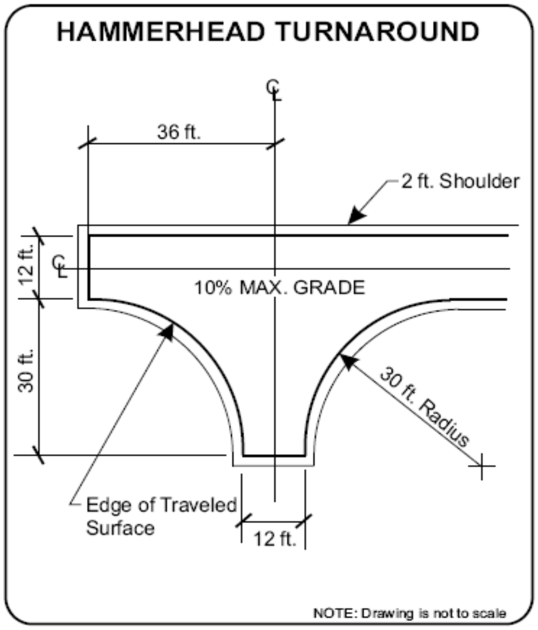
Driveway Turnarounds

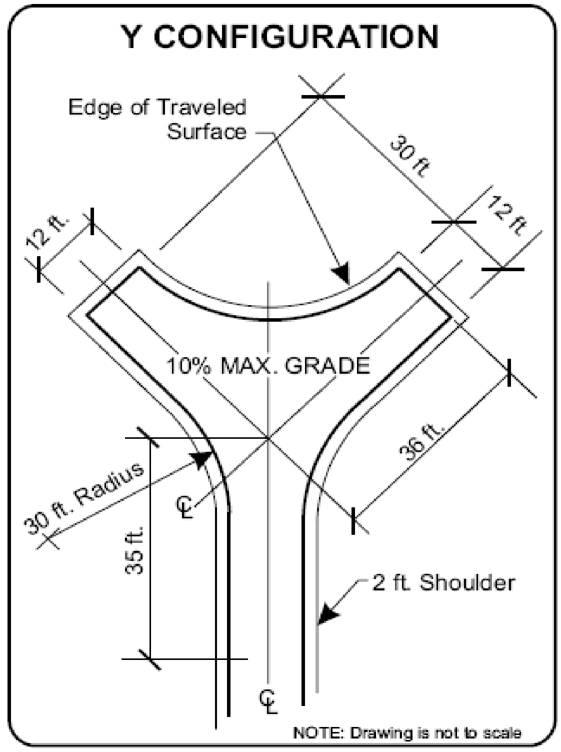
Turnarounds unobstructed by parked vehicles should be located at the end of every driveway. They should be designed to allow for the safe reversal of direction by emergency equipment. The “Y” and “Hammerhead” turnarounds shown below are preferred because they provide the necessary access, while minimizing disturbance to the site.

Driveway Width and Height

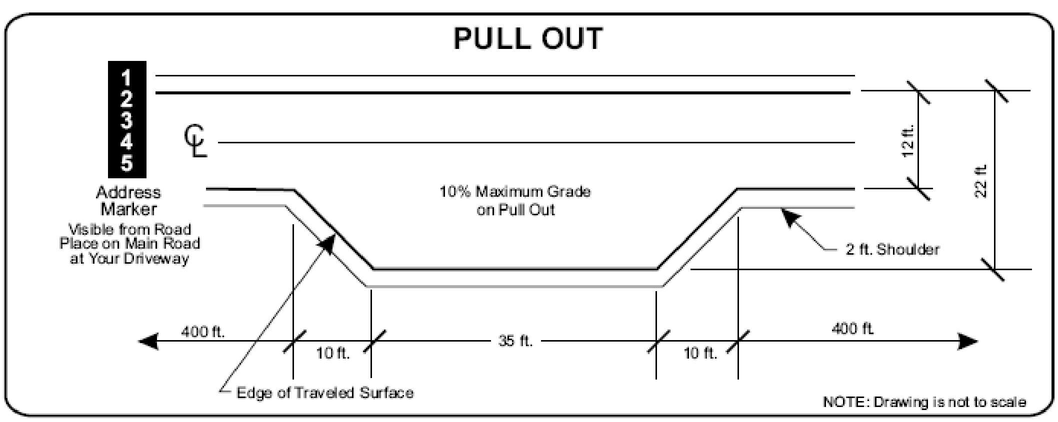
Driveways should have an unobstructed vertical clearance of 13 feet 6 inches. Trees may need to be limbed and utility lines relocated, to provide the necessary clearance. Driveways should have a 12 foot-wide drivable surface and 14 feet of horizontal clearance.

Note: Diagrams illustrating these guidelines can be seen on the next page.





Driveway pullouts should be designed with sufficient length and width to allow emergency vehicles to pass one another during emergency operations. These features should be placed at 400-foot intervals along driveways and private access roads (community driveways). The location of pullouts may be modified slightly to accommodate physical barriers such as rock outcroppings, wetlands, and other natural or manmade features.



Address Markers
Every building should have a permanently posted, reflective address marker mounted on a non-combustible pole. The sign should be placed and maintained at each driveway entrance. Care should be taken to ensure that the location will not become obscured by vegetation, snow, or other features, whether natural or manmade. It is critical that the location and markings be adequate for easy night-time viewing. It is preferable to locate markers in a consistent manner within each community. A good guideline for this practice is to place the markers five feet above ground level on the right side of every driveway. Where access to multiple homes is provided by a single driveway, all addresses accessed via that driveway should be clearly listed on the driveway marker. Where multi-access driveways split, each fork should indicate all residences accessed by that fork, and the proper direction of travel to arrive at a given address. It is not adequate simply to mark addresses on a common pole in the center of the fork. Further, residential homes should have an additional reflective address marker permanently attached to the home, in clear view of the driveway or access road. Homes that are marked by lot number while under construction should have the lot number removed and a permanent address marker posted before granting a certificate of occupancy.

Bridge Load Limits
Bridge load limits should be posted with a permanently mounted, reflective marker at both entrances to the bridge. Care should be taken to ensure that these markers will not become obscured by vegetation, snow, or other features, whether natural or manmade. It is critical that the location of the markings and the markings themselves be adequate for easy night-time viewing.

ALTERNATIVE WATER SOURCES

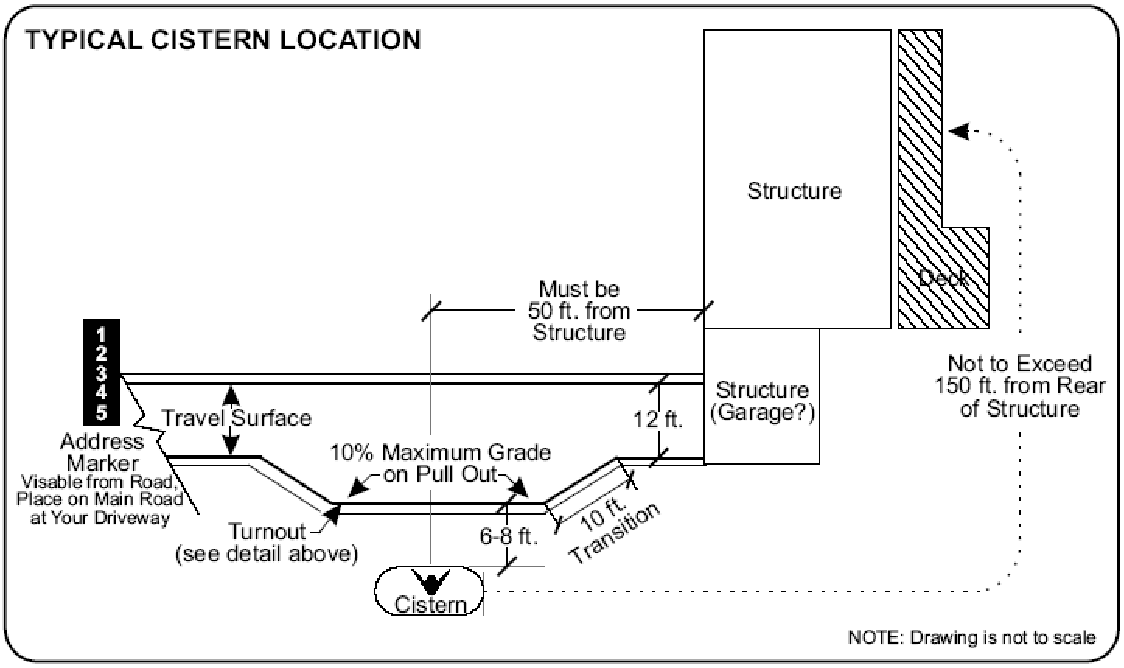
In the study area, like in many WUI areas in the west, water is a critical fire suppression issue. Although some communities in Mono County have a good network of pressurized hydrants, the hazard assessment revealed several communities in the study area which are a considerable distance from reliable water sources for fire suppression. The following information on the use of cisterns and dry hydrant installations has been included to provide information regarding supplementing existing pressurized hydrants, cisterns and natural water sources. It is not intended to be a replacement for existing water supplies. For more detailed recommendations regarding enhancement of the existing water supply system, please see the **Water Supply** section of the main report.

CISTERNS

Once emergency vehicles have arrived on site, they will need a dependable supply of water to help control the fire. Although residential wells with outdoor taps can be used by fire crews to help fill engine tanks, they are not adequate for fire control. If the property is a significant distance from a reliable water supply or fire station, it may be advisable to employ one of the following water supply options:

- An on-site 1,800 - 2,500 gallon cistern for each residence.
- A monetary contribution to a large community cistern fund.

For more information about local standards and regulations, please contact your local fire department.



DRY HYDRANTS

Dry hydrant installations allow much faster and more reliable access to ponds and tanks than conventional drafting. Specific recommendations for dry hydrant locations may be found in the **Water Supply** section of the main report. Guidelines for the construction and maintenance of dry hydrants may be found in the *Dry Hydrant Manual* included as a supplement to this report.

It is always helpful to discuss any potential construction project with the fire department. Local fire department officials or the CDF can help determine what kind of access and water supply options will work best for your site. While the guidelines in this appendix have been assembled by querying firefighters with extensive Wildland-Urban Interface firefighting and fire code experience, local fire officials are in the best position to offer site-specific information.

APPENDIX E: DRY HYDRANT MANUAL

A Guide for Developing Alternative Water Sources for Rural Fire Protection From code originally developed for Summit County, Colorado.

ALTERNATE WATER SUPPLY POLICY

SCOPE

This policy is intended to offer guidance and assistance to the property owner, contractor, or developer for meeting the requirements of the Uniform Fire Code and Chapter 14 (as amended) of the Uniform Building Code for the provision of adequate water supplies for rural firefighting. This policy does not necessarily meet ISO requirements for installation of a draft fire hydrant.

GOALS

1. To reduce ISO ratings
2. To design each installation with the capability of flowing 1,000 gpm
3. To obtain points for fire mitigation
4. To function to protect life and property

DEFINITION

A draft fire hydrant is a specially designed and constructed fire hydrant, which has been approved by the Fire Department having jurisdiction. A draft fire hydrant must be connected to a year-round draft water source of sufficient capacity to meet any fire-fighting needs for the property or properties involved. Fire hydrants which are connected to a pressurized municipal watercourse are not covered by this policy.

PERMITS

A. A review of the draft fire hydrant plans must be completed by the Fire Department having jurisdiction prior to issuing a grading permit to allow construction of a draft hydrant. A site plan review is used to determine site-specific requirements including, but not limited to, depth of pipe, required insulation materials, backfill requirements, and draft site requirement. Additionally, it may be necessary to submit information about drought conditions for the past 50 years.

B. A statement authorizing access to and use of the draft fire hydrant by the Fire Department and its agents must be signed by the owner of the property on which the draft hydrant will be located. The Fire Department having jurisdiction will be using water under the presumption of non-injury/non-consumption for fire emergency use.

ACCEPTANCE TESTING

All draft hydrants are subject to acceptance testing approved by the Fire Department having jurisdiction, prior to being accepted as a water source. Acceptance testing must include GPM verification of the water source. Maintenance and testing will return water within 200 feet of its drainage.

MAINTENANCE

A. Draft fire hydrants require bi-annual testing and maintenance. The hydrants should be tested with a pumper. Back-flushing followed by a pumper test at a maximum designed flow rate is required, and records of each test need to be kept. Tests of this kind will not only verify that the hydrant is in proper condition, but will also ensure that the line and strainer are clear of silt, thus keeping water supply available for any fire emergency.

B. A homeowner using the draft hydrant who has obtained points for mitigation or an ISO classification is responsible at all times for maintaining the draft hydrant. This maintenance includes keeping the draft hydrant and its protective barriers free from obstruction by vehicles, materials, structures, snow, or other obstructions, and ensuring that the draft hydrant is in a serviceable condition at all times.

C. It is the responsibility of the property owners using the hydrant for mitigation of ISO classification purposes to immediately notify the Fire Department having jurisdiction of any draft hydrant which is obstructed, damaged, or out of service for any reason.

DESIGN REQUIREMENTS

A. All draft hydrants must be located within 8 feet of a road with year-round maintenance. Access to the system must conform to the road and bridge standards in Appendix D, "Access and Water Supply".

B. All draft hydrants must have a single draft connection located no more than 30” from the fire apparatus, measured from the grade level of the roadway where the fire apparatus will be parked, to the top of the draft hydrant’s threaded connection. Additionally, life is determined by measuring from year-round low level of the water surface to the truck intake.

C. All draft hydrants must have a draft tube running horizontally from the water source to the base of the riser, constructed of PVC no smaller than six inches in diameter. PVC pipe meeting AWWA specification C9000 with a SDR of 18 or less may be required through or under foundations and under driveways (schedule 80 pipe or its equivalent may be deemed necessary in some instances). All joints must be sealed to ensure that they are watertight, airtight, and root proof.

D. The piping must be placed in bedding material of ¾-inch washed or screen rock, or in native soils, providing that the native soils contain no sharp materials or stones larger than 2½ inches that may damage the piping.

E. The bedding material must be placed to a depth of 4 inches below the pipe and 6 inches above the top of the pipe.

F. The draft hydrant pipe extending from the water source to the rise pipe connection must have a minimum grade of .5% to a maximum of 2% toward the water source. (This excludes the riser section immediately preceding the fire department connection).

G. All draft fire hydrants must have a single draft connection consisting of an approved fitting and cap with 6-inch male NST threads. (Size of connection is determined by the Fire Department having jurisdiction.)

H. No more than two elbows are recommended. Elbows may be 90 or 45 degree bends. (See Figure 1.)

INSTALLATION REQUIREMENTS

A. Draft fire hydrants must be painted red (using oil base paint) with reflective tape, to protect PVC pipe from the adverse effects of sunlight and to assist in the rapid location and identification by the Fire Department.

B. All draft fire hydrants must be protected from damage by snowplows, motor vehicles, etc., by the installation of three steel pipes buried three feet into the ground with four feet extending above the grade level of the roadway. The entire pipe must be filled with concrete. The protective pipes must be located in a triangle configuration approximately three feet away from the draft hydrant. Steel pipes must also be painted with red oil base paint and reflective tape.

C. All draft hydrants must have a sign stating “draft hydrant” displayed in a location acceptable to the Fire Department having jurisdiction.

The above policy is subject to change or modification by the Fire Department having jurisdiction.

MAXIMUM LIFT CONSIDERATIONS

Definition: Lift is determined by measuring from the lowest level of the water surface to the truck intake, which is 36” above grade.

Maximum vertical lift recommendations:

Elevation	Do Not Exceed
4,000 ft	13 ft
5,000 ft.	12 ft.
6,000 ft.	11 ft.
7,000 ft.	10 ft.
8,000 ft.	9 ft.
9,000 ft.	8 ft.
10,000 ft.	7 ft.

APPENDIX F
MONO COUNTY CWPP COLLABORATIVE EFFORT

THE NEED FOR A CWPP

In response to the Healthy Forest Restoration Act (HFRA), and in an effort to create incentives, Congress directed interface communities to prepare a Community Wildfire Protection Plan (CWPP). Once completed, a CWPP provides statutory incentives for the federal agencies to consider the priorities of local communities as they develop, and implement forest management and hazardous fuel reduction projects.

CWPPs can take a variety of forms, based on the needs of the people involved in their development. CWPPs may address issues such as wildfire response, hazard mitigation, community preparedness, structure protection, or all of the above.

The minimum requirements for a CWPP are:

- Collaboration between local and state government representatives, in consultation with federal agencies and other interested parties.
    - Addressed in this appendix
- Prioritized fuel reduction in identified areas, as well as recommendations for the type and methods of treatments
    - Addressed in Main CWPP report (see recommendations sections)
- Recommendations and treatment measures for homeowners and communities to reduce the ignitability of those structures in the project area.
    - Addressed in Appendix B of this CWPP

INTER-AGENCY COLLABORATION

Roles and Responsibilities
To be successful, wildfire mitigation in the interface must be a community-based, collaborative effort. Stakeholders and, primarily, Mono County and the local Fire Safe Councils, will have the greatest responsibility for implementing the recommended mitigation projects. Cal Fire and the USFS/BLM will be valuable participants in addressing cross-boundary projects throughout the area.

Nearly all of the recommendations from this report affect private land or access roads to private land. There are also mitigation recommendations for individual structures, which are the responsibility of the homeowner. Homeowners will, however, need a point of contact to help them implement these recommendations. The best defensible space will be created with oversight and expert advice from the fire department and/or government forestry personnel. One-on-one dialog will continue to build the relationship with community members. This level of involvement will allow agencies to keep track of the progress and update this plan to reflect the latest modifications at the community level.

THE COLLABORATIVE PROCESS

"The initial step in developing a CWPP should be the formation of an operating group with representation from local government, local fire authorities, and the state agency responsible for forest management. (…) Once convened, members of the core team should engage local representatives… to begin sharing perspectives, priorities, and other information relevant to the planning process."[1]

Numerous federal, State, local, and private agencies (stakeholders) participated in this CWPP. These stakeholders included:

- Mono County stakeholders:
    - Debra Hein, BLM
    - Bob Rooks, Mammoth Lakes, FD
    - Dale Schmidt, LADWP/Wheeler VFD
- Mono County communities including:
    - Lake Mary Area
    - Twin Lakes
    - June Lake
    - Swauger Creek/Devils Gate
    - North Mammoth Lakes
    - Mono City
    - Lee Vining
- Mammoth Lakes Fire Protection District
- Mono County Supervisors
- California Department of Fire (CalFire)
- Bureau of Land Management
- United States Forest Service
- Anchor Point Group

The true collaborative process was initiated through a stakeholder meeting held in June, 2005. The purpose of the meetings was to bring all past, current, and future efforts and needs to the table. The primary focus was on the identification and delineation of communities, areas of concern, and values at risk. Best practices and anticipated "roadblocks" were identified.

A second round of stakeholder meetings was held in January of 2009 to present the results and discuss any issues or concerns with the draft report.

In addition public meetings were held to get input and feedback from residents. There was support for the projects and interest in convening community meetings to start the process. Comments were incorporated into the final document.

[1] A handbook for Wildland-Urban Interface Communities March 2004, http://www.safnet.org/policyandpress/cwpphandbook.pdf

FUNDING CWPP RECOMMENDATIONS

There are many sources of funds available for implementing the recommendations within the CWPP. Some available grants and websites where more information can be found are provided below.

- **Agency: Homeland Security, Office for Domestic Preparedness**
    - Purpose: to assist local, state, regional, or national organizations in addressing fire prevention and safety. The emphasis for these grants is the prevention of fire-related injuries to children.
    - More information: http://www.firegrantsupport.com/

- **Agency: Federal Emergency Management Agency (FEMA)**
    - Purpose: to improve firefighting operations, purchase firefighting vehicles, equipment, and personal protective equipment, fund fire prevention programs, and establish wellness and fitness programs.
    - More information: http://usfa.fema.gov/dhtml/inside-usfa/grants.cfm

- **Agency: National Volunteer Fire Council**
    - Purpose: to support volunteer fire departments
    - More information: http://www.nvfc.org/federalfunding.html

- **Agency: Community Facilities Grant Program**
    - Purpose: to help rural communities. Funding is provided for fire stations
    - More information: www.rurdev.usda.gov/rhs/

- **Agency: Firehouse.com**
    - Purpose: emergency services grants
    - More information: www.firehouse.com/funding/grants.html

- **Agency: Cooperative Forestry Assistance**
    - Purpose: to assist in the advancement of forest resources management, the control of insects and diseases affecting trees and forests, the improvement and maintenance of fish and wildlife habitat, and the planning and conduct of urban and community forestry programs
    - More information: www.usfa.fema.gov/dhtml/inside-usfa/cfda10664.html

- **Agency: Forest Service, Economic Action Programs**
    - Purpose: Economic Action Programs that work with local communities to identify, develop, and expand economic opportunities related to traditionally underutilized wood products and to expand the utilization of wood removed through hazardous fuel reduction treatments.
    - More information: www.fireplan.gov/community_assist.cfm

- **Agency: FEMA**
    - Purpose: Assistance to Firefighters Grant Program
    - More information: www.usfa.fema.gov/dhtml/inside-usfa/apply.cfm and www.nvfc.org/federalfunding.html