Draft

Amador County Fire Hazard Reduction Plan

Steps To Implementation

Steps To Implementation

AMADOR FIRE SAFE COUNCIL

2004

Signature Page

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Amador County Board Of Supervisors

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Eldorado National Forest

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Bureau of Land Management

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California Department Of Forestry

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Amador Fire Protection District

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Jackson Fire Department

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Amador County Air Pollution Control Dist

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Amador County Office of Emergency Services

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Amador County Agricultural Department

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Foothill Conservancy

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Sutter Creek Fire District

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Ione Fire Department

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Lockwood Fire Protection District

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Jackson Valley Fire District

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Sutter Creek Fire District

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Kirkwood Fire Department

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Amador Fire Safe Council

Note

"Steps to Implementation" is Amador Fire Safe Council's draft implementation plan for its activities and projects. It is currently under review by the council's executive board. It is the logical extension of the fire hazard reduction plan prepared by EIP Associates for Amador Fire Safe Council. Where EIP focused primarily on fuel modification opportunities, "Steps to Implementation" takes a broader view that incorporates all council activities.

Following adoption of this plan, the council will begin work on its Five Year Plan. This plan provides the means to implement the council's strategy for reducing damage to people, improvements, and natural resources from wildfire.

Those readers desiring a copy of the final version of "Steps to Implementation" can contact Amador Fire Safe Council's Executive Director, Susan Snoke after the September meeting of AFSC.

Table of Contents

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Foreword

"Steps to Implementation" analyses the fire environment and identifies wildfire risk to humans, resource values, and property values within Amador County. It consists of three sections:

Section 1 - Amador Fire Safe Council's Strategic Plan

The Strategic Plan contains specific recommendations based on the goals and objectives established by Amador Fire Safe Council. These recommendations form the basis of a strategy to guide the Council's activities and to provide a rationale for establishing priorities. These recommendations are based on a detailed study of fuels, weather, terrain, and wildfire history. While this section will guide the Council's actions over time, it is not nor should it be, considered a final product. Like all good strategic plans, it must change to meet new challenges or new opportunities.

Section 2 – Amador Fire Safe Council's Five Year Plan

Where the Strategic Plan lays out broad initiatives and defines priorities, the Five Year Plan provides the tactical actions for achieving the Strategic Plan's goals. The Five Year Plan contains specific projects relating to the Council's strategic initiatives. These are:

- Fire Defense Improvement Initiatives
  - Fuel Breaks
  - Community Fire Safe Projects
- Public Education Initiatives
  - Evacuation Plans
  - Model Home Project
  - AFSC Web Site
  - Educational Presentations and Speakers
  - Audio Visual Library
  - Fire Safety Pamphlets And Materials
  - Public/Media Events
- Defensible Space Initiatives
  - Senior Assistance Program
  - AFSC Chipper Program
  - Public Resource Code 4291 Voluntary Compliance Test Project
- Fire Wise Construction and Development Initiatives
  - Fire Safe Building Codes
  - Fire Safe Subdivision/Development
- Miscellaneous Initiatives

- Mt. Zion Camera Project

Unlike a Strategic Plan, the Fire-Year Plan provides a timeline to accomplish specific objectives over the next five years. The Five-Year Plan allows the Council to track its accomplishments and to measure performance of each of the Council's strategic initiatives. However, this plan is by nature fluid and designed to be reactive to sudden changes in circumstances. This flexibility allows the Council to make midstream adjustments it deems necessary.

Section 3 – Appendix

The appendix contains information and maps supporting the Strategic and the Five-Year Plans.

Strategic Plan

The greatest protection for the greatest number within the limited resources available"
--Amador Fire Safe Council

Prepared: 2004

Revised:

Executive Summary

Amador Fire Safe Council

The Amador County Fire Safe Council is a non-profit organization that partners local businesses, community organizations, and property owners of Amador County. It is assisted by the USFS, CDF, BLM, Amador Resource Conservation District, the Amador County Board of Supervisors and Central Sierra RC&D. The Amador County Fire Safe Council was established to provide a means for Amador County residents to participate in wildfire prevention, wildfire protection, and wildfire damage mitigation.

Amador Fire Safe Council History of Accomplishments

Senior Assistance Program
Model Home Project
Fuel Reduction Plans – Pioneer/Volcano and Pine Grove/Volcano
Five-Year Fire Prevention Plan (Draft)
Chipper Program
Evacuation Manual
Mt. Zion Lookout Camera Project

Amador Fire Council Mission Statement

"To protect the people of Amador County and their property from the effects of catastrophic wildfire through education, cooperation, innovation and action"

Amador Fire Council Primary Goal

"The primary goal of ASFC is 100% compliance with California Resources Code 4291, in achieving defensible space around all structures in the county."

Problem Overview

California is the quintessential wildfire environment. Long, dry, summers punctuated with periods of severe drought combine with erratic weather and heavy fuel concentrations create one of the most explosive fire environments on earth. Wildfire in California causes serious environmental damage and unacceptable resource loss based on these conditions alone.

However, Amador County's growing population creates conditions for catastrophic lose of homes and businesses as well as human life. These loses reverberate long after a fire is controlled. Erosion from fire scared hills cause water storage facilities clog with silt, more homes are lost to the classic fire/flood sequence, and spawning beds are filled with silt. Financially strapped local governments

see their property tax assessments evaporate with the loss of hundreds of homes and businesses.

In 2003, conditions that support large damaging wildfire occurred in southern California. The rest of California watched, while *"over 739,597 acres burned; 3,631 homes, 36 commercial properties and 1,169 outbuildings destroyed; 246 injuries; and 24 fatalities, including one firefighter. At the height of the siege, 15,631 personnel were assigned to fight these fires.*[1]*"* The same conditions existed in northern California, including Amador County, at that time. The only difference was the strong northerly winds predicted for northern California did not materialize.

While Amador County has not experienced a large damaging fire since 1961, it is not immune. In fact, the lack of recent large fires makes Amador County even more vulnerable. Forest fuels have grown unabated. The area of the county most at risk for catastrophic wildfire is so large that even the most concerted effort to manage fuels makes little difference in the overall problem. Overgrown fuels coupled with a growing population exposes increasing numbers of structures and humans to destruction by wildfire.

The Governor's Blue Ribbon Fire Commission makes many recommendations. Most are beyond the reach of the local community to achieve because they require federal or state legislation and budget allocations. Two problems identified in the commission's findings are consistent with the Amador Fire Council's mission statement and its primary goal of 100% compliance with Public Resources Code 4291 (Appendix I.)

1. **A comprehensive public awareness education program is needed.**[2]

   "The lack of a comprehensive public education program by local, a state and federal agency has resulted in a public that is uninformed or apathetic

[1] Page 9, Governor's Blue Ribbon Fire Commission Report, April 2004
[2] Governor's 2003 Blue Ribbon Commission Report, April 2004

about wildfire prevention, risk reduction and firefighters' capabilities to combat catastrophic wildfires."

2. **Most structural losses occurred where homes had little or no vegetation clearance or were built using combustible building materials, and were thus vulnerable to wildfires**.

   "In Ventura County, where building codes and brush clearance requirements have been in place for over a decade, no homes were lost."

Because the problem is so immense, the AFSC needs a strategy to plan and prioritize projects based on relative risk and the *greatest good for the greatest number of Amador County citizens.*

Amador Fire Safe Council Planning Goals

The AFSC established the following goals for its Fire Hazard Reduction Plan.

- Provide a method to identify, prioritize, and link Fuel Modification Management Areas (FMMA) in order to create fire safe communities.
- Within each of the eight Fuel Modification Management Areas, assess the risk of ignition, fire history, and potential fire behavior.
- Identify viable fuel mitigation opportunities and cooperators within Fuel Modification Management Areas.
- Provide an assessment of individual landowners and public agencies level of knowledge, motivation, and ability to implement fire hazard reduction projects.
- Determine current and future needs to construct and maintain Defensible Fuel Profile Zones (DFPZ)

Methodology

The Strategic Plan was prepared from public documents readily available from the Internet and government agencies. The Department of Finance's web site provided demographic information. Fire hazard, terrain, occurrence, values at risk, and fuel types are from the California Department of Forestry and Fire Protection's (CDF) local administrative unit and CDF's Fire and Resources Assessment Program's web page. CDF provides this data in a downloadable "Arc View[3]" format.

Each CDF Battalion Chief responsible for fire suppression within Amador County provided data regarding the most important fuels modification projects and their

[3] Arc View is a computer mapping system that provides map layers for users to create, edit, and print digitized maps of virtually any data.

locations in order of priority. Where appropriate, CDF Ignition Management Plans[4] were reviewed to determine exiting initiatives to mitigate ignition sources.

CDF's Amador Eldorado Unit annual fire-plan obtained from CDF's web site provided CDF's priority for vegetation management projects as well as the status of current projects.

The USFS provided a historical review of congressional efforts to address the growing losses from wildfire. Included in this review are the various federal laws that form the core of many programs available to the AFSC. Additionally, the USFS provided information relating to changes in its fire protection program designed to improve fire suppression on federal and adjacent private lands.

Strategic Initiatives

The Strategic Plan contains five separate initiatives:

- **Fire Defense Improvements** - Fuel reduction projects that directly support those projects currently planned or in progress by the CDF and the USFS (and/or maintenance of those projects.) Community fire safe plans are included in this initiative.

- **Public Education** – An ongoing public awareness campaign to inform the citizens and visitors to Amador County of the danger of wildland fire and their role as citizens in preventing them and preparing for their inevitable occurrence

- **Defensible Space** – On going effort to obtain 90% compliance with Public Resources Code (PRC) 4291

- **Fire Wise Construction/Development** – Work with governing boards, the building industry, realtors, insurance companies, and developers to promote fire safe construction and development.

- **Miscellaneous Opportunities** – This plan is not constrained by the previous four initiatives but allows for any project that the AFSC feels appropriate

[4] Annual plans developed by CDF Battalion Chiefs that are used to compile the Ranger Unit's fire Plan.

Strategic Plan's Initiative Boundaries

Different boundaries are envisioned for each strategic initiative. These boundaries are:

- Fire Defense Improvements targeted for the highest fire hazard areas of the county - east of highway 49.
- Public Education - countywide
- Defensible Space - countywide
- Fire Wise Construction/Development - countywide
- Miscellaneous - countywide

Summary of Recommendations

Recommendation 1: Reduce the Council's defensible space compliance goal to 90%.

Recommendation 2: Obtain a grant to hire a consultant with proven experience in developing methods capable of changing landowner resistance to defensible space requirements. Include the charge to develop a program to meet the 90% compliance with PRC 4291.

Recommendation 3: Proposals to conduct fuel modification projects on corporate and private lands or to enter into cooperative agreements with corporations and private owners of large parcels to conduct vegetation management projects include a cost benefit analysis.

Recommendation 4: Wherever possible, link ASFC projects with ongoing USFS and/or CDF fuel modification efforts.

Recommendation 5: Coordinate with BLM to develop projects on BLM lands that link with ongoing USFS and/or CDF fuel modification projects.

Recommendation 6*:* Encourage BLM to reduce fuels on BLM wherever BLM lands are within three miles of any community designated as community at risk by the California Fire Alliance.

Recommendation 7: Coordinated AFSC sponsored fuel break projects with USFS, BLM, and CDF projects either to:

1. Extend existing fuel breaks
2. Maintain/widen/improve existing breaks
3. Link to existing USFS, BLM, and CDF fuel breaks
4. Construct fuel breaks deemed priority by USFS, BLM, and CDF

Recommendation 8: Concentrate fire defense improvements (fuel breaks) in those areas having a high risk Total Asset Score, especially along the Highway 88 corridor from Pine Grove east to Dew Drop (Pine Grove, Up-Country, and Pioneer/Volcano Fuel Modification Areas)

Recommendation 9: Limit Community Fire Safe Projects in those areas east of Highway 49 designated high risk by their Total Asset Score (Pine Grove, Up-County, Pioneer/Volcano, and parts of Sutter/Amador Fuel Modification Areas).

Recommendation 10: Use the Council's limited resources to design and implement those initiatives that are consistent with the Council's mission statement and have the greatest cost benefit ratio.

Recommendation 11: Concentrate fire defense initiatives in those areas with the highest fire hazard

Recommendation 12: Develop a five-year plan to implement the Council's strategic objectives.

Goal Analysis and Recommendations

Goal 1: "Assessment of Individual Landowners and Public Agencies Levels of Knowledge, Motivation, and Ability to Implement Fire Hazard Reduction Projects."

Defensible Space (Individual Landowners)

Legal Requirements

There are many laws relating to fire safety. (Appendix H)

However, study after study and commission report after commission report show that the single most important regulation is the Public Resources Code 4291 (PRC 4291)

PRC 4291[5] requires that every property owner within the "State Responsibility Area[6]" provide a clearance round their structures of no less than 30 feet or to the property line whichever is less (and in steep terrain where property ownership permits up to 100 feet.)

Failure to clear flammable fuels from around structures has ramifications beyond individual properties.

- Failure to clear can endanger neighboring properties.
- Failure to clear can place firefighters at greater risk.
- Failure to clear can endanger citizens fleeing encroaching fires and block escape routes.
- Failure to clear can result in the fire department writing off the property during a wildfire as not defendable and deploying their resources to defendable properties.

Impediments to Compliance

Historically, compliance with PRC 4291 has been hit and miss. CDF has attempted to gain compliance through public education and law enforcement. Both these methods have produced limited results.

[5] In 2004, legislation to increase the minimum distance from 30' to 100' was proposed in the California Legislature

[6] State Responsibility Area refers to those areas of California where the California Department of Forestry and Fire Protection has primary responsibility for prevention and suppression of wildfire. In Amador County, that includes all lands except the incorporated cities and federal lands.

Enforcement fails because there are too many structures needing inspection for the CDF's limited prevention staff to inspect. Complicating this is the fact that most judges are not keen on handling cases where CDF cites landowners is on the first inspection. Most judges want multiple inspections over a reasonable period, usually several months, before they will entertain issuing fines. Usually three inspections are required thus increasing the inspection workload by three-fold. As a result the best CDF has been able to do is deal with the most flagrant violators or concentrate all its efforts on a very small area. Neither approach is successful.

Likewise, traditional public education efforts have failed to produce the desired results. There are many reasons for this. For example:

- Belief that "it won't happen to me."
- Inability to translate information on brochures into meaningful action
- Dislike of government regulation
- Lack of appreciation for the power of wildfire
- Belief that all trees and plants must be cleared leaving their property unattractive and barren
- Desire for privacy and to screen neighbors from view
- Physically and/or economically unable to accomplish the work
- Not understanding that their lack of action can directly endanger their neighbors
- Apathy

Some citizens assume that they must clear all vegetation from around their homes in order to comply with PRC 4291. This misconception makes many reluctant to comply with the law. This coupled with the belief that wildfire will not occur here is the exact recipe for the disaster that occurred in Southern California during the 2003 fire siege.

Clearing around structures does not require total removal of natural vegetation. More often, it involves removing ladder fuels[7] and cutting back native grasses and clearing ground litter. Even where the native fuels are primarily brush, breaking up the fuel continuity by removing selected specimens along with clearing the ground litter is often all that is required to provide protection.

Alternatively, landowners can replace some or all the native vegetation with fire resistant species. These species are fire resistant - they are more difficult to ignite, do not spread fire as rapidly, and do not produce the intense heat characteristic of most native fuels.

[7] Ladder fuels are those vegetations that provide a ladder for the fire to climb into the crowns of trees. Most often, these are brush and small saplings.

While not required by the Public Resources Code, commonsense suggests that flammable material such as firewood and lumber is located at least thirty feet from structures.

Building construction is not normally considered part of defensible space. However, it is clear from analysis of past fire events that building construction plays a major role in the survivability of homes and buildings threatened by wildfire. The Governor's Blue Ribbon Fire Commission reconfirmed these earlier findings. Homes with stucco exterior, tile roofs, and thirty feet clearance have a ninety five percent chance of surviving a wildfire.

Other measures such as enclosing eaves and locating roof vents to the outside edge of the enclosed eave prevent firebrands[8] from entering the attic area of structures.

Like most areas, Amador County has an abundance of homes and other structures constructed before these facts were widely appreciated. These are the structures most at risk. They will remain so for the near future.

Recommendations

Traditional methods have not worked. Continuing those types of efforts is not likely to meet the Council's goal of 100% compliance with PRC 4291.

Recommendation 1: ***Reduce the Council's defensible space compliance goal to 90%.***

Recommendation 2: ***Obtain a grant to hire a consultant with proven experience in developing methods capable of changing landowner resistance to defensible space requirements. Include the charge to develop a program to meet the 90% compliance with PRC 4291.***

[8] Embers carried by the wind or thermal currents generated by a wildfire.

Large Private Landowners

In most cases, landowners owning undeveloped property are not legally bound to reduce the fuel loading on their properties. Owners of large parcels own land in its natural state and their management goals may be to maintain that state indefinitely.

However, many corporate and private landowners do see the value of managing fuels. These landowners opt to enter into fuel modification projects as a business decision affecting their bottom line. For example:

- Sierra Pacific Industries (SPI) is currently a cooperator with the USFS in several projects to construct fuel breaks on their lands. Clearly, SPI sees a benefit to protecting their timber reserves.

- Pacific Gas & Electric (PG&E) now conducts a going project to meet PRC 4292 clearance requirements around power poles and transmissions lines.

Many of these landowners will actively participate in fuels modification programs if shown to be in their *economic* best interest.

Recommendation 3: ***Proposals to conduct fuel modification projects on corporate and private lands or to enter into cooperative agreements with corporations and private owners of large parcels to conduct vegetation management projects include a cost benefit analysis.***

Public Agencies

CDF Vegetation Management Program (VMP)

Over the past 10 years, CDF's Amador Eldorado Unit (AEU) has treated an average of 1000 acres annually under the Vegetation Management Program (VMP). The unit has treated approximately 19,469 acres between 1982 and 2002. Many of the projects undertaken have been within the Wildland-Urban Intermix (WUI). Due to existing land use patterns and increasing population densities in Amador, it is anticipated that the emphasis of the VMP will continue to focus on projects within the wildland/urban intermix area. Future projects will concentrate on densely populated areas with high assets at risk. CDF anticipates a trend towards more complex projects with multiple landowners in the future.

Table 1 2003-2004 CDF Pre-Fire grant Summary

Project Name	Year of App.	Batt.	Value	Status
Shake Ridge/Amador Pines (Amador Prop 204)	1999	3	$150,000	Complete
Sutter Highlands (FEMA Hazard Mitigation)	1999	3	$130,000	Complete
Pine Acres FS Plan (USFS Planning)	2000	2	$22,000	Active*
Amador Fire Safe Council (Sac. Reg. FSC)	2001	3,4	$54,000	Complete
Pine Acres FSP (WUI)	2002	3	$44,562	Active
Omo Ranch Extension (WUI)	2003	3	$63,000	Withdrawn
Kennedy Mine FSP (WUI)	2003	4	$54,000	Withdrawn
Omo Ranch Extension (Title III)	2003	3	$60,000	Active
Pine Acres 2 (WUI)	2004	3	$85,000	Pending
Amador County Prop 13/50	2004	3,4	$425,000	Pending
Omo Ranch Extension (WUI)	2005	3	$63,000	Re-Sub
Kennedy Mine FSP (WUI)	2005	4	$54,000	Re-Sub

Complete = Project Completed and Grant Closed
Active = Project Active, Funds Available
Active* = Project Complete, Awaiting Reimbursement from Grantor
Pending = Awaiting Approval
Withdrawn = Funds Previously Awarded, Later Withdrawn from Grantor
Re-Sub = Re-Submission of Withdrawn Applications
Total Approved Grant Funding for Project Work $1.2 Million
Pending Grant Approval $948,000

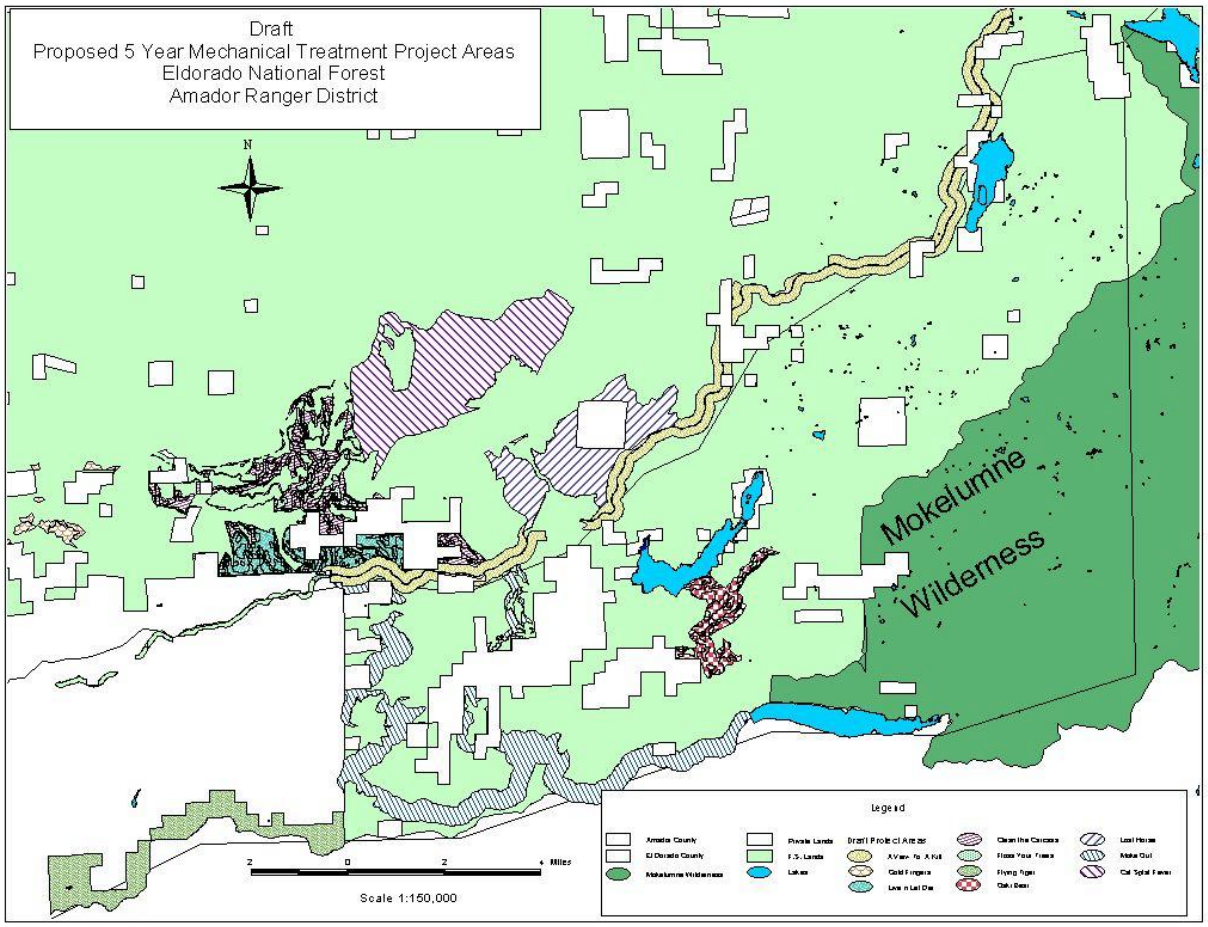
U.S. Department of Agriculture, Forest Service (USFS)

The Amador Ranger District of the Eldorado National Forest is responsible for implementing federal forest policy on forest service lands located within Amador County. Because of numerous large, damaging wildfires in the western states, Congress made major changes in federal land management policy and law (Appendix L). These changes will translated into projects designed to reduce the intensity, frequency, and damage caused by wildfire. The District directs a great deal of effort towards reducing fuels where federal lands abut private lands with areas of wildland urban interface receiving special attention.

The district is currently developing a five-year plan to implement fuels reduction project designed to protect natural resource values and man-made values. These planning efforts include close coordination with cooperators and stakeholders, including the Amador Fire Safe Council.

The district's five-year plan includes two significant projects designed to reduce fuel loading and improve forest health. The Mokey Bear Fuels Reduction and Forest Health Project will affect approximately 1,100-forested acres, south of Highway 88, to establish a system of fuel reduction zones that connect similar projects already accomplished along Highway 88, Panther Ridge, and Beaver Ridge. These are ridge top fuel breaks cooperatively developed with private landowners to ensure continuity of treatments between property boundaries. The purpose is to reduce surface and ladder fuels wildland urban intermix sufficiently to modify fire behavior and to create stand densities less predisposed to insect attacks and diseases.

Hoot Prescribed Fire Maintenance Project proposes prescribed fire on approximately 1,750 acres in the southwest corner of the district to strategically link to the Mokey Bear mechanical treatment units and enhance the effectiveness of the Beaver Ridge and Panther Fuel Breaks. The purpose of the prescribed fire project is to maintain mosaic patterns of previously treated areas (by mechanical methods and prescribed fire) for low levels of surface and ladder fuels more typical of the historical fire regime in the mid elevations of the Sierra Nevada.



U.S. Department of Interior, Bureau of Land Management (BLM)

The BLM, Folsom Field Office is responsible for management activities on approximately 8749 acres within Amador County. Most of BLM land is within the lower reaches of the Mokelumne River drainage, or divided into 40 to 160- acre parcels surrounded by private lands (WUI).

The same policies directing the USFS, including the Federal Wildland Policy, the 10-Year Comprehensive Strategy, the National Fire Plan, the Healthy Forest Initiative, and the Healthy Forest Restoration Act, also direct the BLM.

Recommendations:

Recommendation 4: ***Wherever possible, link ASFC projects with ongoing USFS and/or CDF fuel modification efforts.***

Recommendation 5: ***Coordinate with BLM to develop projects on BLM lands that link with ongoing USFS and/or CDF fuel modification projects.***

Recommendation 6*:* ***Encourage BLM to reduce fuels on BLM wherever BLM lands are within three miles of any community designated as community at risk by the California Fire Alliance.***

Goal 2: "Provide the Amador Fire Safe Council a Method to Identify, Prioritize, and Link Fuel Modification Treatment Areas in Order To Create a Fire Safe Community."

Wildland Fire Problem Definition

Fire Environment

Amador County is on the west slope of the Central Sierra Mountains. It is a rural county that is experiencing increasing population growth. The Department of Finance projects the county population to increase 17% by 2020. Most of this growth will likely occur outside the incorporated cities and east of State Highway 49. This highway bisects the county in a north/south direction.

The area east of Highway 49 currently contains the largest population. This same area contains the most hazardous fuels and most difficult terrain. Consequently, most of the manmade values at risk [9] from wildfire are also located in the eastern portion of the Amador County between highway 49 and the Eldorado Nation Forest Boundary

[9] "Values at risk" i.e. structure, human, watershed improvement, etc.

The fire environment in the Amador County is conducive to large destructive wildfires as shown by the fire history map (Appendix D). Over 59% of the CDF's Direct Protection Area[10] (DPA) contains high hazard fuels (brush and timber). The county contains steep, rugged river canyons that limit accessibility except on foot. Fighting fires with bulldozers is difficult, if not impossible in some locations in the county. The USFS DPA contains even steeper slopes (Appendix F).

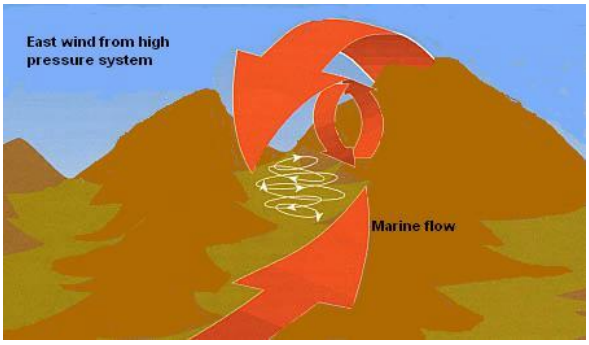
Fire History

Amador County's fire history is one of numerous small fires with large fires occurring every thirty to forty years. The last large fire was the Rancheria Creek Fire in 1961. However, over the past twenty years population growth and development in the wildland have placed many additional homes and business at risk - now small fires often create wildland/urban interface fire protection problems previously only found in the most densely populated areas of southern California.

Appendix D contains the fire history and the ten-year fire occurrence maps of Amador County. Most large fire aligned east to west. This orientation is due to two factors, prevailing winds and terrain.

Fire Weather

Weather conditions dramatically influence fire behavior. Large costly fires are frequently, though not always, associated with severe fire weather conditions. Severe fire weather is typified by high temperatures, low humidity, and strong surface winds.



The normal summer weather pattern is an onshore flow (marine flow) which last several days followed by a northerly[11] flow as the high-pressure system reasserts itself. As the marine flow moves through the Carquinez Straits, it pushes the warm valley air mass ahead of it. The resulting west winds are brisk and push fires in a west to east direction. The major canyons in Amador County are also orientated west to east. This orientation tends to channel wind into canyons in a way that increases its upslope velocity.

This combination of terrain and wind creates the potential for fast moving fires running up canyon towards the areas of high hazard fuels and greater concentrations of structures at risk. If the marine flow is strong enough, it will bring cooler temperatures and higher humidity in a few hours thus reducing the timeframe where a large fire can occur.

[10] DPA refers to all lands CDF is statutorily or contractually responsible for wildland fire protection. In this context, the 59% refers to all DPA within the Amador Eldorado ranger Unit.
[11] Amador County is not usually affected by north winds except in the lower country.

Occasionally the marine flow is weak and overtaken by a quick reestablishment of a high-pressure system. If the high is located slightly north of its normal location a strong, dry, down slope, east wind develops. This is what drove the Rancheria Creek Fire after its initial run to the east. It reversed itself in a matter of minutes and crossed over Highway 49 on its way to Ione. It was also the primary factor in the spread of the Eight Mile Fire in Eldorado County.

The fire history map shows several large fires coming off the national forest that have burn patterns that suggest an east wind presumably as a result of the high being slightly north of its usual location. (See Fire History Maps in Appendix D)

What does all this mean? Simply put there are a few days each summer where weather will be the dominant factor in the spread of a wildfire. There are certain weather and terrain factors that combine to produce the potential for catastrophic losses. The threat is greatest in those identified high hazard areas of the county. The potential for large damaging fires is significantly less in the lower elevations where the fuels and wind patterns are different. *The greatest threat comes from fires originating in SRA east of highway 49 and from fires originating on USFS lands above Dew Drop.*

Hazardous Fuels

Fire agencies measure hazardous fuel conditions in several ways. CDF use a composite score to develop a ranking system of *Low, Medium, High, and Very High*. In Amador County, there are no significant areas of low hazard fuels (Appendix G).

West of Highway 49 is a mix of Medium and High hazard fuels with comparatively small pockets of very high hazard fuels. Interestingly, most of the residential structures in this area are located away from the high and very high hazard fuels concentrations. However, along the Highway 88 corridor, the predominate fuel ranking is very high. This is the same area where most of the residential structures are located (Appendix E).

Terrain/Slope

A similar comparison exists when overlaying slope on a map of the county. West of Highway 49, slopes vary between 0 to 10% with a few scattered areas where slope is in the 11 to 25% range. As before, the areas east of Highway 49 have the steeper slopes and the Highway 88 corridor the steepest (Appendix F).

Land Use/Development Trends

California Department of Finance population trend data indicates that Amador County's population grew by seventeen percent between the 1990 and 2000 censuses. The department projects a similar population growth over the next two decades.

If current development trend continues, much of this new population will reside in the most hazardous areas of the county. The map in Appendix E uses the county's parcel information to display the current distribution of improved residential parcels.

The heaviest concentrations of residential structures are along the Highway 88 corridor from Pine Grove east to Dew Drop and are within the Pioneer\Volcano and Pine Grove Fuel Modification Management Areas.

Risk Assessment

The primary goal of wildland fire protection is to safeguard the wide range of assets found across wildland areas. These assets include human and animal life and safety, structures, range, recreation, hydroelectric power, fire-flood watersheds, soil erosion, water storage, water supply, scenic, timber, air quality, historic buildings, non-game wildlife, game wildlife and infrastructure (Appendix B).

Knowledge of the types and magnitudes of assets at risk to wildfire, as well as their locations, is critical to project selection and planning. Given the limits on funding, these resources should be allocated based on the value of the assets at risk.

To determine the relative value of these assets over a broad geographical area, CDF has divided the state into planning blocks of 450 acres. Assets within these blocks are inventoried and each given a numerical rating. See Appendix B for a description of the rating system. These ratings combined with other factors produce a Total Asset Score for each 450-acre block.

The "Total Assets at Risk" map in Appendix B represents the ranking of each 450-acre plot. This ranking provides a means identifying areas having the highest combined asset values at risk. It is clear from the map that the highway 88 corridor from Pine Grove eastward scores highest.

For the Council, the primary concern should be reducing the fire risk faced by the various assets described in Appendix B. Knowledge of assets at risk is necessary to choose those projects that provide the greatest benefit for a given amount of investment. Emphasis should be placed on those projects that protect life and property.

Recommendations:

Recommendation 7: ***Coordinated AFSC sponsored fuel break projects with USFS, BLM, and CDF projects either to:***

5. ***Extend existing fuel breaks***
6. ***Maintain/widen/improve existing breaks***
7. ***Link to existing USFS, BLM, and CDF fuel breaks***
8. ***Construct fuel breaks deemed priority by USFS, BLM, and CDF***

Recommendation 8: ***Concentrate fire defense improvements (fuel breaks) in those areas having a high risk Total Asset Score, especially along the Highway 88 corridor from Pine Grove east to Dew Drop (Pine Grove, Up-Country, and Pioneer/Volcano Fuel Modification Areas).***

Recommendation 9: ***Limit Community Fire Safe Projects in those areas east of Highway 49 designated high risk by their Total Asset Score (Pine Grove, Up-County, Pioneer/Volcano, and parts of Sutter/Amador Fuel Modification Areas).***

Goal 3: "Assess the Relative Risk of Each Fuel Modification Area to damage by Wildfire."

The best measure of potential for a damaging fire is "Assets at Risk". When other factors of fuels, weather, slope, residential structure density, etc are added, it is possible to develop a matrix which represents relative potential for large damaging fires within each of the nine Fuel Modification Management Areas (FMMA).

Table 2- Risk Factors by Fuel Modification Management Area (Highest risk =1, lowest = 7)

Risk Factor	Assets At Risk	Weather	Slope	Residential Distribution	Hazardous Fuels Distribution	Ladder Fuel Distribution	Composite Score	Overall Ranking
Plymouth	9	6	8	8	7	7	45	7
Ione	8	8	9	4	8	8	45	7
Comanche	7	7	7	6	9	9	45	7
Jackson	4	5	6	3	6	6	30	6
Sutter/Amd.	5	4	4	5	5	5	28	5
Fiddletown	6	3	5	7	3	3	27	4
Pine Grove	3	3	2	1	2	2	13	2
Pioneer/Vol.	1	2	3	2	1	1	10	1
Upcountry	2	1	1	9	4	4	21	3

Recommendations:

Recommendation 10: ***Use the Council's limited resources to design and implement those initiatives that are consistent with the Council's mission statement and have the greatest cost benefit ratio.***

Recommendation 11: ***Concentrate fire defense initiatives in those areas with the highest fire hazard***

Goal 4: "Identify Viable Hazard Fuel Mitigation Opportunities and Cooperators within Fuel Modification Management Areas."

Goal 5: "Determine current and future needs to construct and maintain Defensible Fuel Profile Zones (DFPZ)"

Recommendations:

Rather than state in Amador Fire Safe Council's "***Strategic Plan***" each hazardous fuel mitigation opportunity and potential cooperator, these goals form the basis of the next section, "***Amador Fire Safe Council Five-Year Plan***." As stated earlier, the Five-Year Plan is a "living document" subject to change as circumstances and finances dictate. It is intended that the five-year plan be updated annually to insure the projects are appropriate and within the ability of the AFSC and cooperators to accomplish.

It is envisioned that at least one, if not more, annual planning meetings will occur with the AFSC (or its selected committee(s)), United States Forest Service, California Department Of Forestry, Bureau of Land Management, and other stakeholders to determine which projects represent the most critical and/or effective projects to pursue in the five year plan (Appendix M.)

This type of close coordination between the protection agencies, stakeholders, and AFSC is mandatory if the object is to provide the greatest protection for the greatest number within the limited resources available. Decisions regarding project selection and priority, as well as other initiatives not related to fuel modification, must be based on identified areas at risk determined within the Strategic Plan.

Recommendation 12: ***Develop a five-year plan to implement the Council's strategic objectives.***

Five Year Plan

2004 - 2009

“ I have not failed 700 times. I have not failed once. I have succeeded in proving that those 700 ways will not work. When I have eliminated the ways that will not work, I will find the way that will work.”
--Thomas Edison

Forward

"***Amador Fire Safe Council's Five Year Plan***" provides the Council with a short-term plan for tracking projects and initiatives. As living document, amendments are made as circumstances dictate. Revised annually, it encompasses on the Council's Strategic Planning Guide and includes projects identified within that document's broad initiatives.

These initiatives are:

- Fire Defense Improvements
  - Construction of fire defense improvements in coordination with the United States Forest Service and the California Department of Forestry and Fire Protection's projects that improve public safety in identified high-risk areas.
  - Maintenance of existing fire defense improvements to ensure continued benefit to the affected populations
- Public Education
  - Informing the public how to safely live in a high-risk wildfire environment
  - Educating private industry and county officials about the economic benefits of collaborating with the Council to create fire safe communities and developments
- Defensible Space
  - Ninety percent voluntary compliance with Public Resources Code 4291 countywide
  - Companion programs such as the senior chipping program
- Fire Wise Construction and Development
  - Enactment of Fire Safe Building Codes Zones based on identified fire risk
- Miscellaneous – Projects or programs that do not fit within the previous four categories

Sample Community Fire Plan

Priority: 1

Project Title: Pine Acres Community Fire Safe Plan

General Location: Pine Acres

Fuel Modification Management Area (FMMA): Pine Grove

FMMA Ranking: 2

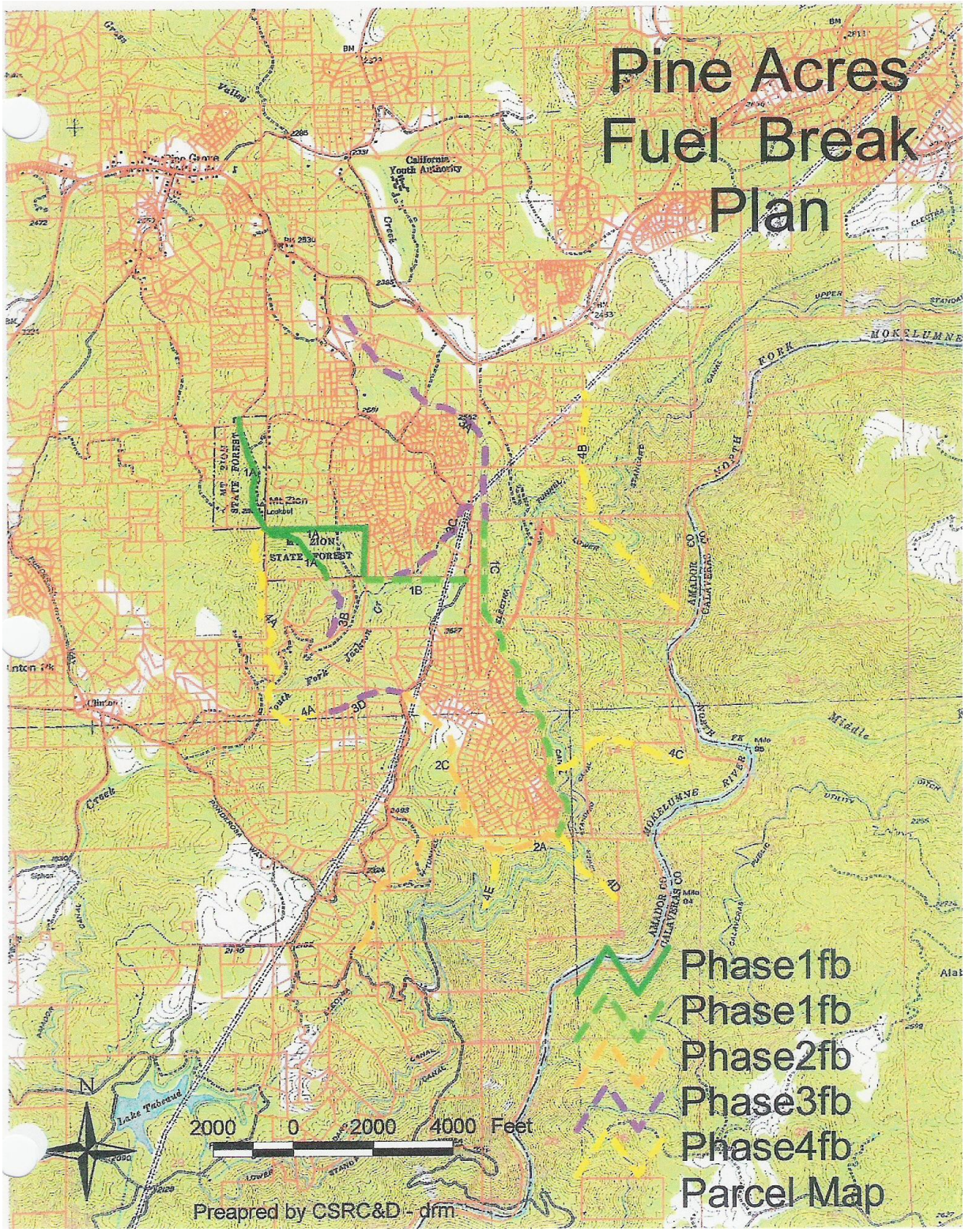
Fire Hazard Ranking: Very High

Project Description: Designed to establish a defensible fuel zone between the community of Pine Acres and the Mokelumne River Canyon the Pine Acres Fire Safe Project receive funding from a BLM grant for $225,000. CDF has submitted a follow up WUI grant for $85,000 and is awaiting approval of funding.

Fuel Reduction Treatment and/or Methods:

Cooperators: AFSC, CDF, BLM, and various landowners

Year	Funding	Funds	Work Plan	Labor Source	Status
2005	BLM Grant	$225,000	Complete phase 3	CDF crews and private contractors	**Construction** Grant approved Work to begin in November 2004 and be completed by June 2005
2006	Grant	$0	Complete phase 4	CDF crews and private contractors	**Construction** Pending funding source and grant cycle
2007	Grant	$0	Complete phase 5	CDF crews and private contractors	**Construction** Pending funding source and grant cycle
2008	Grant	$0	Complete maintenance work on phases 1 and 2	CDF crews and private contractors	**Maintenance** Pending funding source and grant cycle
2009	Grant	$0	Complete maintenance work on phases 3 and 4	CDF crews and private contractors	**Maintenance** Pending funding source and grant cycle



Sample Fire Defense Project

Priority: 2
Project Title: Shake Ridge/Antelope Fuel Break
General Location: Shake Ridge
Fuel Modification Management Area (FMMA): Pioneer/Volcano
FMMA Priority Ranking: 1
Fire Hazard Ranking: Very High

Project Description: - a comprehensive fire safe project near the Amador Pines subdivision. The project includes prescribed fire, fire crew pre/post prescribed fire treatments, roadside clearance work, dooryard chipping, mastication, tree thinning, and enhanced LE-38 inspections. The primary objective of the project is to establish defensible fuel zones around the community near Amador Pines and provide assistance with fire safe clearances. All work on this project falls under a mitigated negative declaration and VMP.

Fuel Reduction Treatment and/or Methods:

Cooperators: CDF***,*** the USFS, El Dorado National Forest, Sierra Pacific Industries, Amador Resource Conservation District, Amador Fire Safe Council, and numerous homeowners

Year	Funding	unds	Work Plan	Labor Source	Status
2005	BLM Grant	$0	Complete phase 3	CDF crews and private contractors	**Construction** Grant approved Work to begin in November 2004 and be completed by June 2005
2006	Grant	$0	Complete phase 4	CDF crews and private contractors	**Construction** Pending funding source and grant cycle
2007	Grant	$0	Complete phase 5	CDF crews and private contractors	**Construction** Pending funding source and grant cycle
2008	Grant	$0	Complete maintenance work on phases 1 and 2	CDF crews and private contractors	**Maintenance** Pending funding source and grant cycle
2009	Grant	$0	Complete maintenance work on phases 3 and 4	CDF crews and private contractors	**Maintenance** Pending funding source and grant cycle
2009	Grant	$0	Complete maintenance work on phases 3 and 4	CDF crews and private contractors	**Maintenance** Pending funding source and grant cycle

Samples

Public Education Initiatives

Priority: 1
Project Title: Amador County Fair Display
Project Description: In cooperation with the USFS, CDF, local fire agencies, Amador County Office of Emergency Services assist in the design and staffing of a county fair booth. The theme of the booth is "Help Us Help You." AFSC and the fire agencies will provide information to citizens about how to fire safe their properties, current activities of the agencies to implement fire defense improvements under the Health Forest Act and other programs, and general fire safe information.

Priority: 2
Project Title: Amador Cinemas Public Service Announcements
Project Description: Through a Pell grant hire a commercial filmmaker to develop five shorts for use by the local cinema. These shorts will play before each screening of a movie. Each short will contain a single message. The messages pertain to:

- Home Clearance
- Senior Assistance Program
- Chipping Program
- Healthy Forests
- What To Do In Case Of Wildfire

Samples

Defensible Space Initiatives

Project Title: Voluntary PRC 4291 Compliance Program

Project Description: Using modern motivational and public information techniques design and test a multiyear project to achieve 90% voluntary compliance with PRC 4291 standards in selected test areas. The methodology will be developed by a consulting firm with a proven record of success in similar projects.

Year	Funding	Funds	Work Plan	Contractor	Status
2005	Grant	$0			
2006	Grant	$0			
2007	Grant	$0			

Project Title: Senior Assistance Program

Project Description: This project provides contractors to clear hazardous fuels from properties of senior citizens who meet a qualifying income threshold.

Fuel Reduction Treatment and/or Methods:

Year	Funding	Funds	Work Plan	Contractor	Status
2005	Grant	$28000	Administered by AFSC paid staff and the work plan vary based on need and location.	Fire Stop Great Tree Tenders DL landscaping	On going annual program
2006	Grant	$0			
2007	Grant	$0			
2006	Grant	$0			
2007	Grant	$0			

Samples

Fire Wise Construction/Development Initiatives

Note this section incomplete; Expected subjects include:

- *Building codes based on risk*
- *Development requirements based on risk*
- *Possible Amador Fire council seal of approval for developments meeting minimum fire safe standards*
- *Etc.*

1. Builders who agree to build to fire safe standards
2. Developers who agree to create subdivision that:
    a. Have fuels reduced during development stage
    b. Establish home owners association or special district to maintain fuel reduction over time
    c. Use fire safe material
    d. Follow fire department/CDF minimum standards
3. Change county codes to require increased fire safety measures for building or development in high-risk areas

Miscellaneous Initiatives

Project Title: Mt Zion Lookout Camera Program

Project Description: This project sells access to an Internet web site where the users can interactively view real time video from two cameras mounted on CDF's Mt. Zion lookout. The income from this project is intended to fund the operation of the lookout during the fire season

Year	Funding	Funds	Work Plan	Contractor	Status
2004	Donations	Various on rate of donations	This program is administered by AFSC paid staff	None	Startup year. Cameras provided by ACAPD.
2005		$0			
2006		$0			

Appendix

Appendix A - Fire Weather

Determination of Sever Fire Weather Index

Severe fire weather is defined using the Fire Weather Index (FWI) developed by the USDA Forest Service Riverside Fire Lab. The FWI combines air temperature, relative humidity, and wind speed into a single score. The FWI gives wildland fire managers an index that indicates relative changes in fire behavior due to the weather (fuel and topography conditions are not included in the calculation).

Severe fire weather occurs when the FWI, calculated from hourly weather measurements[12], exceeds a predetermined threshold. The threshold FWI is derived from average bad fire weather of approximately 95° F, 20% relative humidity, and a 7 mph eye-level wind speed.

Frequency of severe fire weather is defined as the percent of time during the budgeted fire season that the weather station records severe fire weather. Individual weather stations are ranked as low, medium, or high frequency of severe fire weather. This ranking can then be applied to the area on the ground represented by the weather station.

WxSCORE[13]

The WxSCORE indicates the percent of time a weather station is experiencing severe weather. This calculation ignores non-fire season data. The assumption is that during winter the fuels are not ready to burn regardless of the weather. There are exceptions to this, but trying to count every possible contingency would weaken the result fire managers are trying to achieve.

WxRANK

The WxSCORE intensity rating is lumped into three categories (L, M, H) to create a severe Fire Weather Frequency Ranking (WxRANK). The rankings for Amador and Eldorado Counties indicate a low or moderate frequency of sever fire weather. This does not mean that these areas are any less prone to large fires. It simple means that the combination of factors that create sever fire weather only occur on relatively few days each fire season.

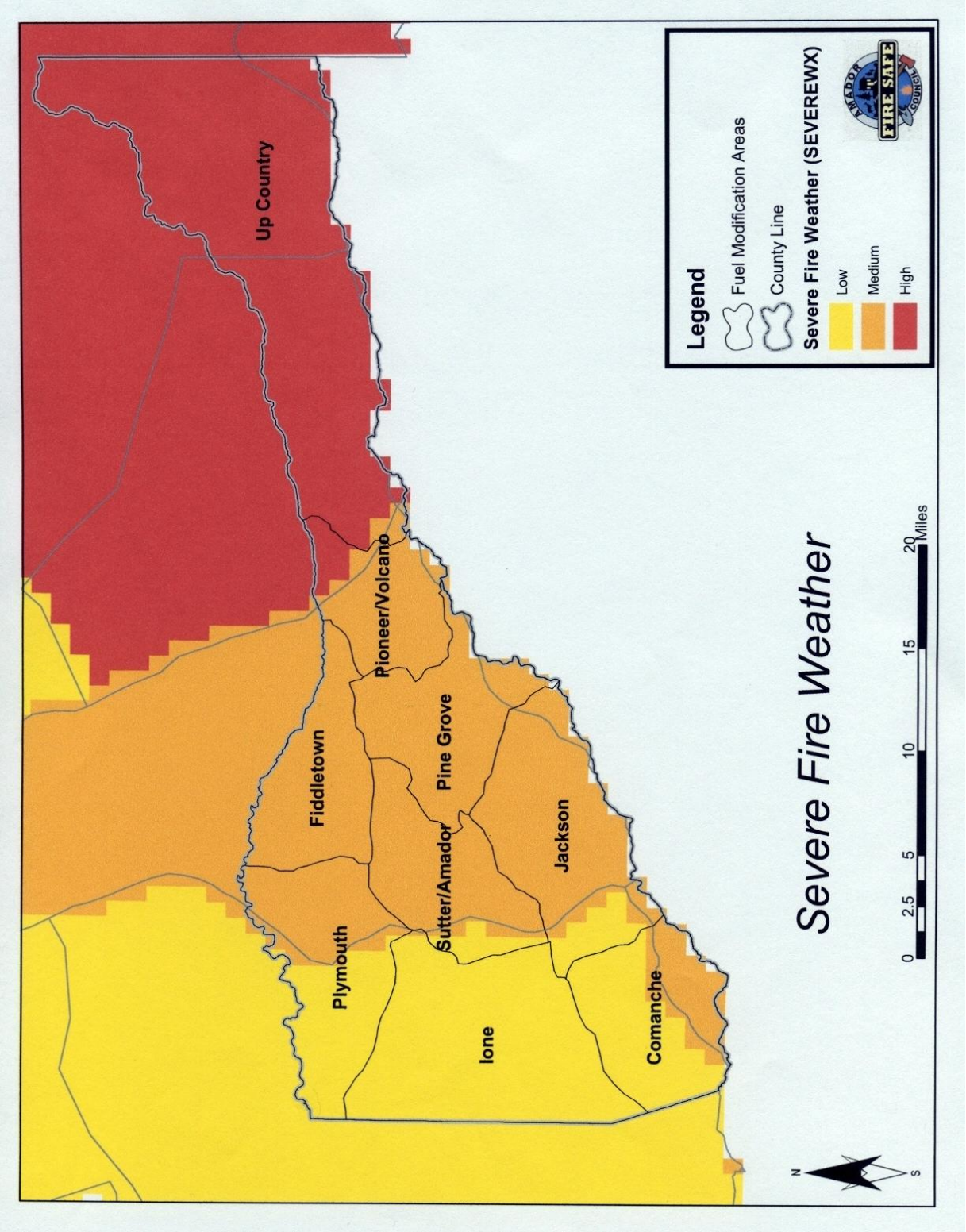
Weather is not a localized event. Typically, weather patterns persist over the entire state. Fires starting in one area can quickly draw down statewide resources leaving

[12] Readings taken from remote automated weather stations (RAWS) are transmitted to the wildland fire agencies.
[13] WxSCORE = SevereWx/WxInSeas * 100

other areas vulnerable to large fires during these times. Using the Mt. Zion WxSCORE and applying it to the typical five and one half month fire season, yields 14.4 days of sever fire weather in Amador County within CDF protection and a considerably higher number of days on USFS protected lands.

Table 3 - WxRank by Fuel Modification Management Area

FMMA	Low	Medium	High	Ranking
Plymouth	53%	47%	0%	6
Ione	96%	4%	0%	8
Comanche	70%	30%	0%	7
Jackson	14%	86%	0%	5
Sutter/Amador	12%	88%	0%	4
Fiddletown	0%	100%	0%	3
Pine Grove	0%	100%	0%	3
Pioneer/Volcano	0%	86%	14%	2
Upcountry	0%	2%	98%	1



Appendix B – Assets at Risk

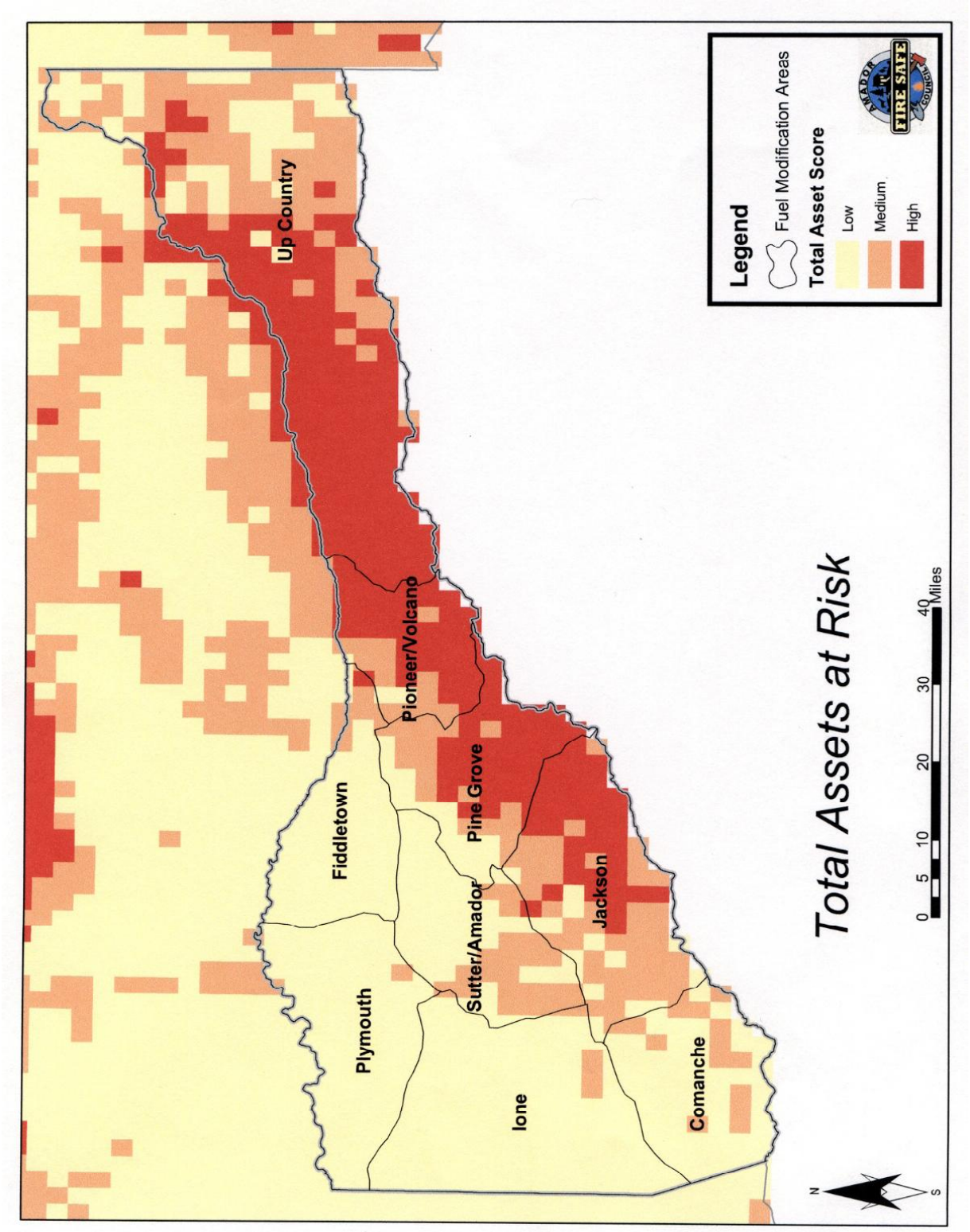
Assets at risk refer to real and societal values that have the potential for damaged by wildfire. CDF uses seventeen categories of assets and ranks each as to its risk from wildfire. The table below provides a description of the assets evaluated.

Table 4 Risk Factors

Asset at Risk	Public Issue Category	Location and ranking methodology
Hydroelectric power	Public welfare	1) Watersheds that feed run of the river power plants, ranked based on plant capacity; 2) cells adjacent to reservoir based plants (Low rank); and 3) cells containing canals and flumes (High rank)
Fire-flood watersheds	Public safety Public welfare	Watersheds with a history of problems or proper conditions for future problems, ranked based on affected downstream population
Soil erosion	Environment	Watersheds ranked based on erosion potential
Water storage	Public welfare	Watershed area up to 20 miles upstream from water storage facility, ranked based on water value and dead storage capacity of facility
Water supply	Public health	1) Watershed area up to 20 miles upstream from water supply facility (High rank); 2) grid cells containing domestic water diversions, ranked based on number of connections; and 3) cells containing ditches that contribute to the water supply system (High rank)
Scenic	Public welfare	Four mile view shed around Scenic Highways and 1/4 mile view shed around Wild and Scenic Rivers, ranked based on potential impacts to vegetation types (tree versus non-tree types)
Timber	Public welfare	Timberlands ranked based on value/susceptibility to damage
Range	Public welfare	Rangeland ranked based on potential replacement feed cost by region/owner/vegetation type
Air quality	Public health Environment Public welfare	Potential damages to health, materials, vegetation, and visibility; ranked based on vegetation type and air basin
Historic buildings	Public welfare	Historic buildings ranked based on fire susceptibility
Recreation	Public welfare	Unique recreation areas or areas with potential damage to facilities, ranked based on fire susceptibility
Structures	Public safety Public welfare	Ranked based on housing density and fire susceptibility
Non-game wildlife	Environment Public welfare	Critical habitats and species locations based on input from California Department of Fish and Game and other stakeholders
Game wildlife	Public welfare Environment	Critical habitats and species locations based on input from California Department of Fish and Game and other stakeholders
Infrastructure	Public safety Public welfare	Infrastructure for delivery of emergency and other critical services (e.g. repeater sites, transmission lines)
Ecosystem Health	Environment	Ranking based on vegetation type/fuel characteristics

Table 5 Assets at risk by fuel modification management areas

FMMA	Low	Medium	High	Ranking
Plymouth	99%	1%	0%	9
Ione	96%	4%	0%	8
Comanche	92%	8%	0%	7
Jackson	16%	43%	41%	4
Sutter/Amador	69%	31%	0%	5
Fiddletown	91%	9%	0%	6
Pine Grove	24%	28%	48%	3
Pioneer/Volcano	5%	23%	72%	1
Upcountry	13%	34%	53%	2



Appendix C – Fire Agencies

Wildland Fire Agencies

The two agencies (CDF[14] and USFS) responsible for prevention and suppression of wildfire in Amador County have long ago integrated their emergency response systems. Both agencies dispatch resources from a joint CDF/USFS dispatch center located at Camino in Eldorado County. This state of art computer assisted dispatch center coordinates all wildland fire responses for both agencies in Amador, Eldorado, and Sacramento Counties. In addition, it provides dispatch services for all local government fire agencies in Amador and Eldorado counties as well as dispatch EMS in Eldorado County.

Almost all fire reports originate either from a fire lookout or via a Public Service Answering Point (PSAP). The PSAP for Amador County is the Amador County Sheriff's Office (ASO). The ASO is also the county's 911 center. The PSAP automatically transfers calls reporting fires to Camino.

Both CDF and USFS dispatch fire resources based on predetermined plans that are adjusted throughout each day based on predicted and actual fire weather and the burning index.[15] Both agencies routinely trade resources back and forth across their jurisdictional boundaries based on the closest resource concept[16].

Additionally, CDF and the USFS maintain numerous mutual[17] and automatic aid[18] agreements with local fire agencies that in turn are included in the closest resource concept.

If during a fire all CDF, USFS, and local agency resources are committed or at draw down[19], the dispatch center access the California Master Mutual Aid System which exposes the resources of all agencies within California to meet requests for help by CDF and USFS.

This system is design to handle multiple fire starts over a large geographical area. However, when a large fire starts, most of the CDF and USFS resources are committed

[14] The Bureau of Land Management contracts with CDF for the protection of BLM lands within CDF's protection area.
[15] Burning Index or BI as a number that represents how severely a wildfire will burn.
[16] The closest resource concept sends the nearest initial attack resource to the fire without regard to jurisdictional responsibility.
[17] Mutual aid agreements provide for assistance from one fire department to another based on the sending department's ability to respond at the time of the request for assistance.
[18] Automatic aid agreements provide for immediate response as if it were the sending department's jurisdiction.
[19] A predetermined number of resources needed to maintain a response to a new incident.

to the fire. Both agencies attempt to backfill behind the committed resources to provide an adequate response to any new fire starts. During the time CDF or USFS is waiting for these resources to arrive, local government fire agencies endure the most of the responsibility for new fires. Fortunately, because of the close working relationships between agencies and a common goal of public protection, local government fire agencies are very capable of this role.

Once a fire becomes large enough or there are multiple fires posing coordination problems, Amador County Office of Emergency Service is requested to open the county's Emergency Operations Center (EOC) to coordinate the various agencies based on pre-established roles that vary according to the type of emergency.

The USFS and California fire agencies developed the Incident Command System (ICS) following disastrous wildland fires in the early 1970's. ICS provides the standard management system used by all fire agencies. This system allows personnel from many different departments to assume positions within the organization without regard to agency jurisdiction.

Local Government Fire Agencies

Local government fire agencies are responsible for life and property protection within CDF and USFS direction protection area. By Attorney General's opinion, this responsibility does not extend beyond the foundation of structures with regard to fire protection. Because state law specifically excludes wildland within city limits from CDF's protection responsibility, city fire departments are also legally and financially responsible for wildland fire protection within city boundaries.

However, there is a great difference between legal responsibilities and practical fire protection. In the real world, CDF responds to cities within Amador County automatically because any fire can become a wildfire that can spread beyond the city boundary. Likewise, city fire departments respond to wildfire outside their borders to prevent wildfires from burning into the city.

The same relationship exists with CDF and fire districts. Even though structure fires are the legal responsibility of fire districts, they present an immediate threat to the wildland. Conversely, wildland fires threaten structures within fire districts, so fire districts respond automatically to wildfires within their boundaries.

Superimposed over this is a system of automatic aid and mutual aid agreements that provide the mechanism for sharing resources anywhere within the county as the need dictates. These agreements allow a higher level of protection than any single community or district can afford to provide on its own.

<u>City Fire Departments</u>

City of Ione Fire Department

City of Jackson Fire Department
Amador City Fire Department (contracted to Sutter Creek Fire Protection District)
City of Plymouth Fire Department (contracted to Amador Fire Protection District)

Fire Protection Districts

Amador Fire Protection District
Jackson Valley Fire Protection District
Lockwood Junction Fire Protection District

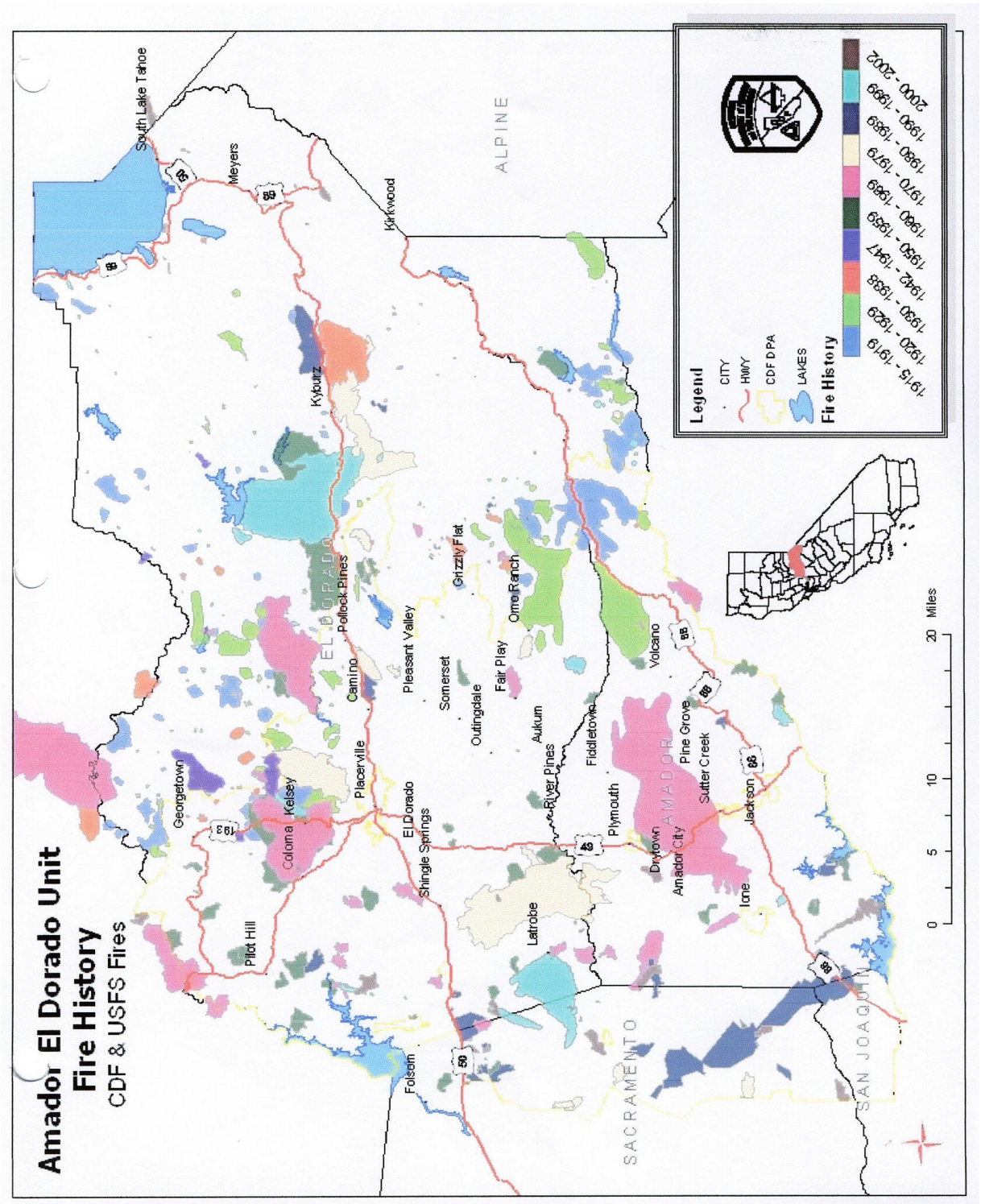
County Fire Companies

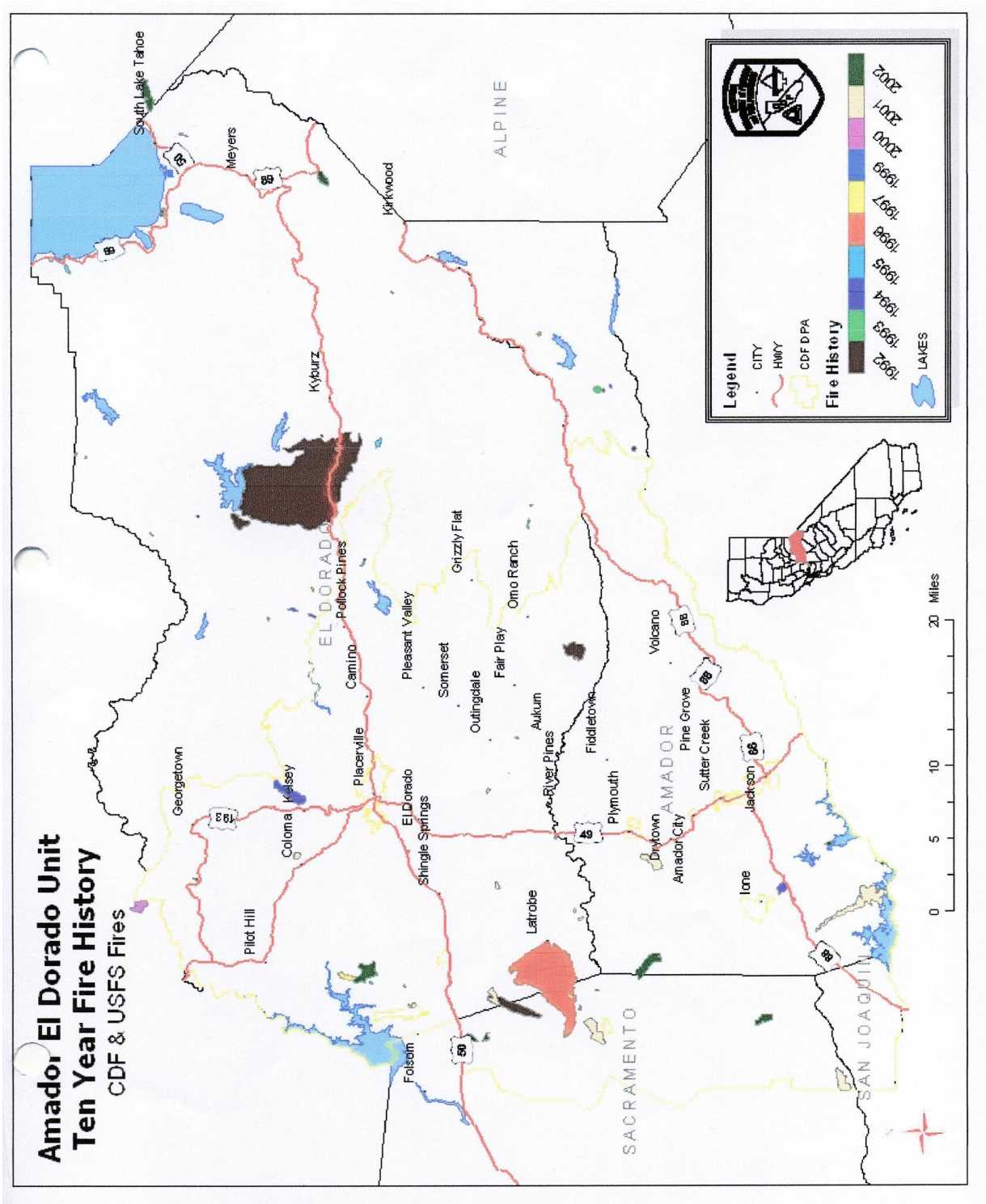
Kirkwood Fire Department (tri-county Amador, Alpine, Eldorado)

Appendix D – Fire Occurrence Maps

Fire occurrence maps of Amador County show the affect of wind, fuels, and geography on fire spread. The western portion of the county most often experiences surface winds blowing from the north and west. The dryer north winds combined with light flashy fuels create conditions for large grass fires. These fires appear menacing but generally do little long-term damage. The fire history map show one such fire (deep blue color) originating in Sacramento County and burning almost to Lake Comanche. It occurred in the early 1980's and burned twenty-five thousand acres in one day.

In contrast, the Rancheria Creek Fire (pink color) burned in 1961. This fire was first under the influence of a strong marine flow blowing from the west. Fire crews worked from the origin eastward along the fire's flanks only to face a sudden wind change that reversed the fire's direction within minutes. This change of direction occurred because the California high-pressure system reestablishing itself in a slightly different position, which created strong easterly winds. This scenario poses the greatest threat to areas east of highway 49 where the fuels rate as having high and very high potential for a damaging fire. These are the same areas where the steeper slopes and most residential parcels are located.





Appendix E – Residential Property Distribution

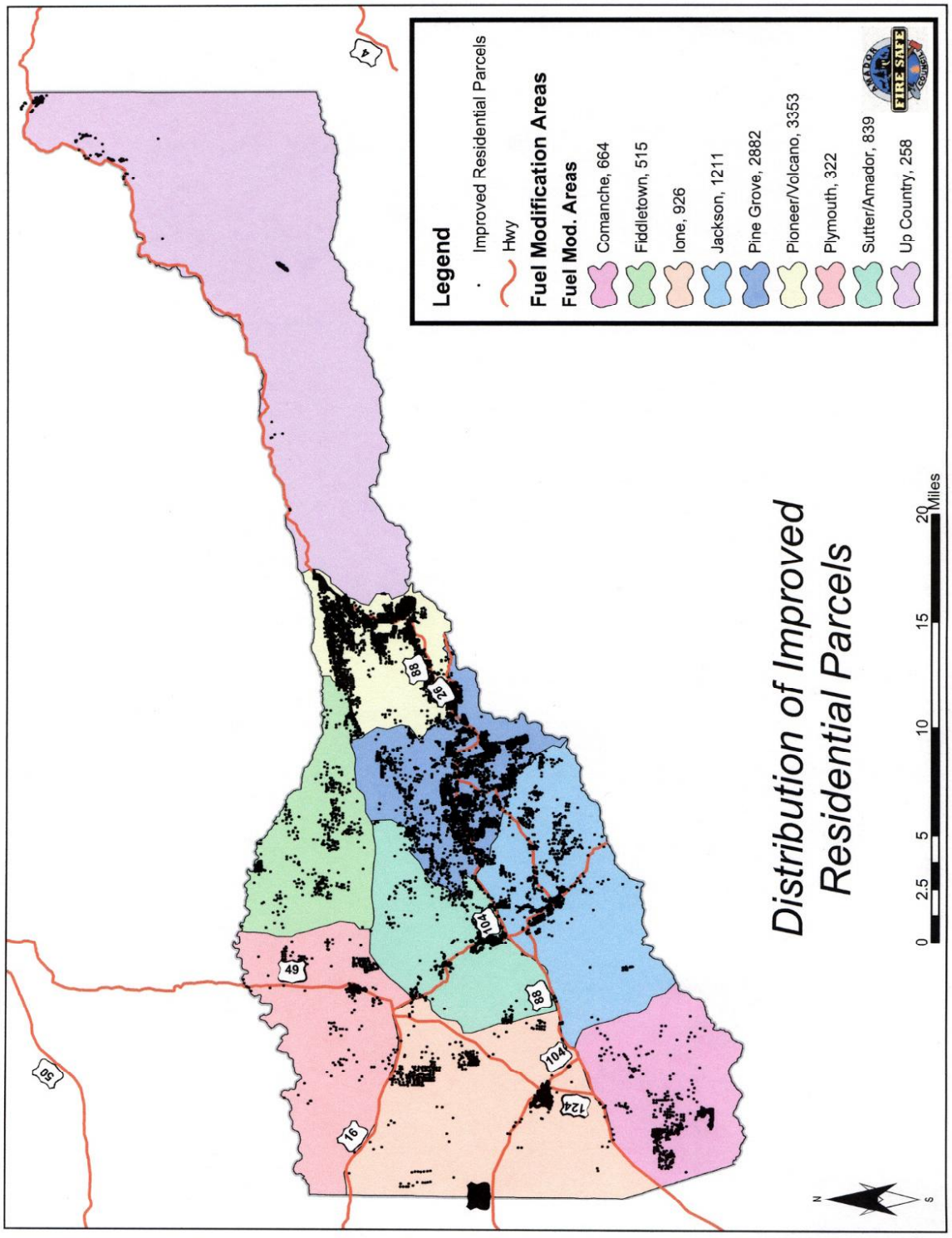
Residential property distribution is a count of *improved* residential properties. It is not a count of properties zoned R1. The number of residential structures present in each Fuel Modification Management Area is only important when combined with other risk factors that in combination create a wildfire environment capable of multiple structure losses.

Not surprisingly, the greatest numbers of residential structures in Amador County are located in the highest risk areas. This poses a risk of massive structure losses should a catastrophic wildfire occur. This fact should be of particular concern to county officials. The loss of large number of structures would have a significant impact on county tax receipts in the out years following such an event. Fire safe development and construction standards can improve structure survivability for future development. Compliance with PRC 4291 can limit structure loss in the event of a large wildfire.

The location of structures within high hazard areas helps define and prioritize potential community fire safe projects and fire defense improvement initiative for the Amador Fire Safe Council and fire agencies.

Table 6 Residential Structures Density by Fuel Modification Management Area

FMMA	Count	Ranking
Plymouth	322	8
Ione	926	4
Comanche	664	6
Jackson	1211	3
Sutter/Amador	839	5
Fiddletown	515	7
Pine Grove	2882	2
Pioneer/Volcano	3353	1
Upcountry	258	9



Appendix F – Slope Classes

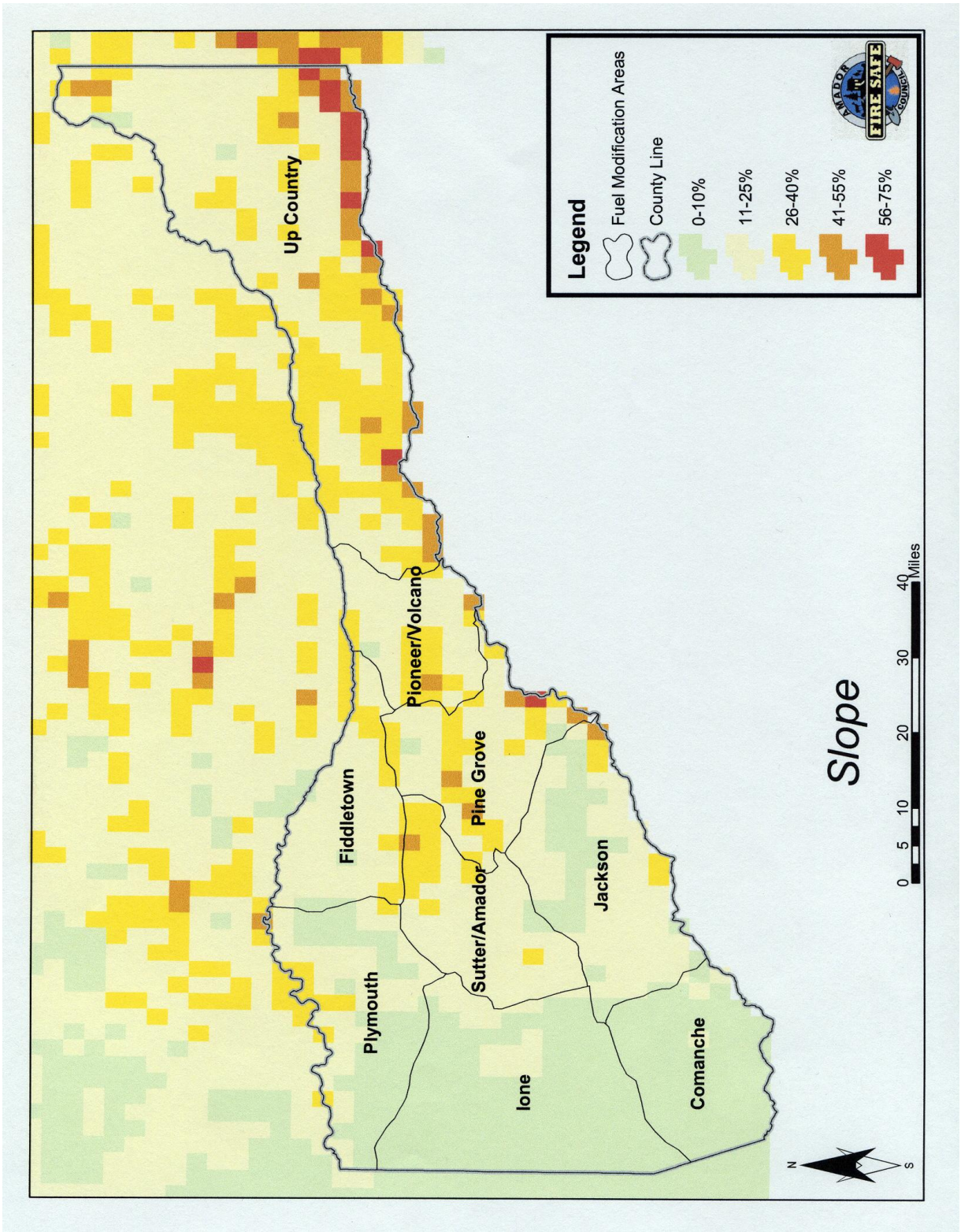
Slope affects the rate of spread and resistance to control of wildfire. For the purpose of this analysis, six slope codes. The Slope Class Code represent the predominate slope expressed as a percent within each 450 acre planning block. These codes are:

Table 7 Slope Class Codes

Value	Definition
0	0 – 10%
1	11 – 25%
2	26 – 40%
3	41 – 55%
4	56 – 75%
5	>75%

Table 8 Percentages of Slope Classes by Fuel Modification Management Area

FMMA	0	1	2	3	4	5	Ranking
Plymouth	80%	10%	10%	0%	0%	0%	8
Ione	90%	10%	0%	0%	0%	0%	9
Comanche	85%	15%	0%	0%	0%	0%	7
Jackson	15%	75%	10%	0%	0%	0%	6
Sutter/Amador	10%	25%	50%	10%	0%	0%	4
Fiddletown	10%	60%	30%	0%	0%	0%	5
Pine Grove	0%	25%	50%	10%	10%	5%	2
Pioneer/Volcano	0%	25%	50%	10%	15%	0%	3
Upcountry	0%	40%	20%	20%	10%	10%	1



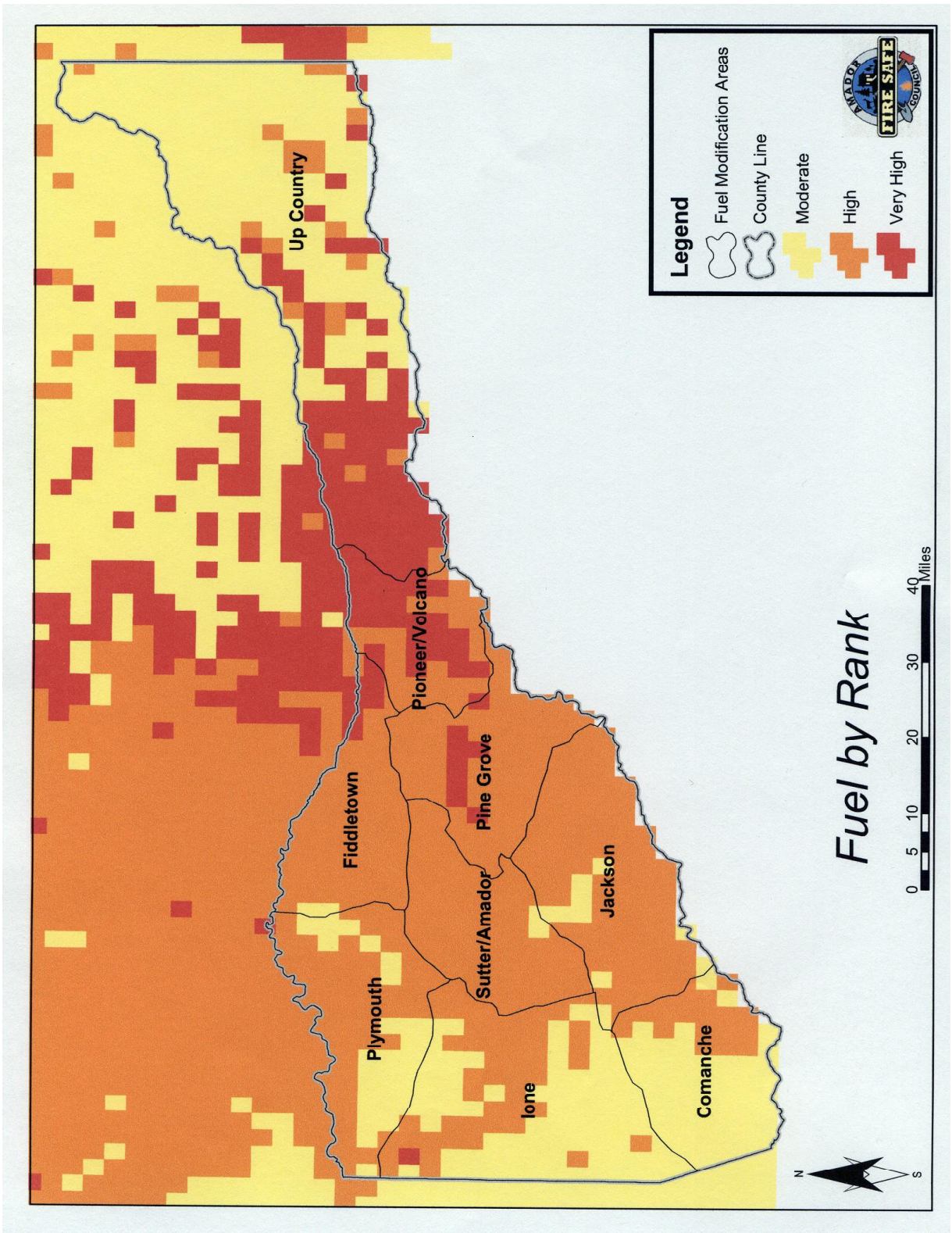
Appendix G – Hazardous Fuels Map

Fuels are burnable vegetation and a major component of the fire planning process. Vegetation within the county varies widely and includes grassland, oak woodland, brush, mixed conifer, and true fir. CDF's GIS database ranks each 450-acre planning block by age and type of vegetation. These rankings identify high-volume fuel areas with accumulations of dead fuel having the potential for costly and damaging fires.

The hazardous fuel ranking system is based on estimates of potential fire behavior associated with the particular fuel type; and as such, has a direct relationship to the burning characteristics of that fuel. A fuel's rank is a composite index of fire behavior indicators – rate of spread, fire line intensity, heat per unit area, etc. This index represents how a fuel complex burns under a particular set of weather conditions. The index provides a means of stratifying the landscape into areas of moderate, high, and very high hazard relating to potential fire behavior.

Table 9 Hazardous Fuels Distribution by Fuel Modification Management Area

FMMA	Moderate	High	Very High	Ranking
Plymouth	33%	67%	0%	7
Ione	61%	38%	<1%	8
Comanche	89%	11%	0%	9
Jackson	10%	90%	0%	6
Sutter/Amador	3%	97%	0%	5
Fiddletown	3%	88%	9%	3
Pine Grove	0%	89%	11%	2
Pioneer/Volcano	0%	47%	53%	1
Upcountry	7%	63%	30%	4



Appendix H - Local Government Fire Protection Agreement

CDF provides fire protection services to a variety of local government entities throughout California. These services are provided through a "Local Government Fire Protection Agreement." Commonly referred to as a "Schedule A" agreement, this contracting method allows CDF to participate with local government using CDF personnel, facilities, and equipment.

For the purposes of using CDF personnel, including California Youth Authority wards, for work on Fire Safe Council projects, this agreement provides the best mechanism for reimbursing CDF for work provided. This is accomplished by a simple amendment to the agreement with Amador County to accept the council's grant monies for the work into its budget. Amador County's budget is then modified to include these funds for the specific project work requested by the council. CDF then bills the county monthly for actual expenditures made against the project funds. CDF tracks the expenditures against the actual budget so CDF expends no more than the budgeted amount.

Using this approach, CDF can avoid the complexities of contracting with a nongovernmental agency thus freeing the council from billing for services and accounting.

Appendix I - Public Resources Code

PRC 4291 – Defensible Space Any person that owns, leases, controls, operates, or maintains any building or structure in, upon, or adjoining any mountainous area or forest-covered lands, brush-covered lands, or grass-covered lands, or any land which is covered with flammable material, shall at all times do all of the following:

(a) Maintain around and adjacent to such building or structure a firebreak made by removing and clearing away, for a distance of not less than 30 feet on each side thereof or to the property line, whichever is nearer, all flammable vegetation or other combustible growth. This subdivision does not apply to single specimens of trees, ornamental shrubbery, or similar plants which are used as ground cover, if they do not form a means of rapidly transmitting fire from the native growth to any building or structure.

(b) Maintain around and adjacent to any such building or structure additional fire protection or firebreak made by removing all brush, flammable vegetation, or combustible growth which is located from 30 feet to 100 feet from such building or structure or to the property line, whichever is nearer, as may be required by the director if he finds that, because of extra hazardous conditions, a firebreak of only 30 feet around such building or structure is not sufficient to provide reasonable fire safety. Grass and other vegetation located more than 30 feet from such building or structure and less than 18 inches in height above the ground may be maintained where necessary to stabilize the soil and prevent erosion.

(c) Remove that portion of any tree which extends within 10 feet of the outlet of any chimney or stovepipe.

(d) Maintain any tree adjacent to or overhanging any building free of dead or dying wood.

(e) Maintain the roof of any structure free of leaves, needles, or other dead vegetative growth.

(f) Provide and maintain at all times a screen over the outlet of every chimney or stovepipe that s attached to any fireplace, stove, or other device that burns any solid or liquid fuel. The screen shall be constructed of nonflammable material with openings of not more than one-half inch in size.

(g) Except as provided in Section 18930 of the Health and Safety Code, the director may adopt regulations exempting structures with exteriors constructed entirely of nonflammable materials, or conditioned upon the contents and composition of same, he may vary the requirements respecting the removing or clearing away of flammable vegetation or other combustible growth with respect to the area surrounding said structures. No such exemption or variance shall apply unless and until the occupant thereof, or if there be no occupant, then the owner thereof, files with the department, in such form as the director shall prescribe, a written consent to the inspection of the interior and contents of such structure to ascertain whether the provisions hereof and the regulations adopted hereunder are complied with at all times.

4292 - Power lines. Except as otherwise provided in Section 4296, any person that owns, controls, operates, or maintains any electrical transmission or distribution line upon any mountainous land, or forest-covered land, brush-covered land, or grass-covered land shall, during such times and in such areas as are determined to be necessary by the director or the agency which has primary responsibility for fire protection of such areas, maintain around and adjacent to any pole or tower which supports a switch, fuse, transformer, lightning arrester, line junction, or dead end or corner pole, a firebreak which consists of a clearing of not less than 10 feet in each direction from the outer circumference of such pole or tower. This section does not, however, apply to any line which is used exclusively as telephone, telegraph, telephone or telegraph messenger call, fire or alarm line, or other line which is classed as a communication circuit by the Public Utilities Commission. The director or the agency which has primary fire protection responsibility for the protection of such areas may permit exceptions from the requirements of this section which are based upon the specific circumstances involved.

4293. Except as otherwise provided in Sections 4294 to 4296, inclusive, any person that owns, controls, operates, or maintains any electrical transmission or distribution line upon any mountainous land, or in forest-covered land, brush-covered land, or grass-covered land shall, during such times and in such areas as are determined to be necessary by the director or the agency which has primary responsibility for

the fire protection of such areas, maintain a clearance of the respective distances which are specified in this section in all directions between all vegetation and all conductors which are carrying electric current:

(a) For any line which is operating at 2,400 or more volts, but less than 72,000 volts, four feet.

(b) For any line which is operating at 72,000 or more volts, but less than 110,000 volts, six feet.

(c) For any line which is operating at 110,000 or more volts, 10 feet.

In every case, such distance shall be sufficiently great to furnish the required clearance at any position of the wire, or conductor when the adjacent air temperature is 120 degrees Fahrenheit, or less. Dead trees, old decadent or rotten trees, trees weakened by decay or disease and trees or portions thereof that are leaning toward the line which may contact the line from the side or may fall on the line shall be felled, cut, or trimmed so as to remove such hazard. The director or the agency which has primary responsibility for the fire protection of such areas may permit exceptions from the requirements of this section which are based upon the specific circumstances involved.

4294. A clearing to obtain line clearance is not required if self-supporting aerial cable is used. Forked trees, leaning trees, and any other growth which may fall across the line and break it shall, however, be removed.

4295. A person is not required by Section 4292 or 4293 to maintain any clearing on any land if such person does not have the legal right to maintain such clearing, nor do such sections require any person to enter upon or to damage property which is owned by any other person without the consent of the owner of the property.

4296. Sections 4292 and 4293 do not apply if the transmission or distribution line voltage is 750 volts or less.

4296.5 - Railroads. (a) Any person or corporation operating a railroad on forest, brush, or grass-covered land shall, if ordered by the director or the agency having primary responsibility for fire protection of the area, destroy, remove, or modify so as not to be flammable any vegetation or other flammable material defined by
regulation of the director to be a fire hazard on the railroad right-of-way. The director shall adopt regulations establishing fire prevention hazard reduction standards for broad geographic areas by fuel type, slope, and potential for ignition from hot or flaming exhaust, carbon particles, hot metal, burning signal devices, burning tobacco, and other similar potential sources of ignition.

(b) The order to destroy, removes, or modify vegetation or other flammable material shall specify the location of the hazard to be destroyed, removed, or modified within the right-of-way, the width of the hazard which shall not exceed the width of the right-of-way, and the time within which compliance with the order is required.

(c) The director or the agency having primary responsibility for fire protection of the area shall allow a reasonable period of time for compliance with an order to destroy, remove, or modify vegetation or other flammable material.

4297. Upon the showing of the director that the unrestricted use of any grass-covered land, grain-covered land, brush-covered land, or forest-covered land is, in the judgment of the director, a menace to life or property due to conditions tending to cause or allow the rapid spread of fires which may occur on such lands or because of the inaccessible character of such lands, the Governor through the director, may, by a proclamation, which declares such condition and designates the area to which, and the period during which the proclamation shall apply, require that such area be closed to hunting and fishing and to entry by any person except a person that is within one of the following classes:

(a) Owners and lessees of land in the area.

(b) Bona fide residents in the area.

(c) Persons engaged in some bona fide business, trade, occupation, or calling in the area and persons employed by them in connection with such business, trade, occupation, or calling.

(d) Authorized agents or employees of a public utility entering such area for the purpose of operating or maintaining public utility works or equipment within the area.

(e) Members of any organized firefighting force.

(f) Any federal, state or local officer in the performance of his duties.

(g) Persons traveling on public roads or highways through the area.

4298 - Fire Closures. The proclamation by the Governor shall be released to the wire news services in the state, and shall be published at least once in a newspaper of general circulation in each county which contains any lands covered by the proclamation. Notice of closure shall also be posted on trails or roads entering the area covered by the proclamation. The closure shall be effective upon issuance of the proclamation by the Governor. Each notice shall clearly set forth the area to be subject to closure and the effective date of such closure. The closure shall remain in full force and effect until the Governor shall by order terminate it. The notice of such termination shall follow the same procedure by which such closure was effected. The order of termination shall be effected upon issuance.

4299. Any person who violates Section 4297 or 4298 is guilty of a misdemeanor and shall be punished by a fine of not less than fifty dollars ($50) nor more than one thousand dollars ($1,000) or by imprisonment in the county jail for not less than 10 days nor more than 90 days or both such fine and imprisonment. All state and county law enforcement officers shall enforce orders of closure.

4475 – Prescribed Fire. The director, with the approval of the Director of General Services, may enter into a contract for prescribed burning with (1) the owner or any other person who has legal control of any property or (2) any public agency with regulatory or natural resource management authority over any property which is included within any wildland for any of the following purposes, or any combination thereof:

(a) Prevention of high-intensity wildland fires through reduction of the volume and continuity of wildland fuels or removal of unwanted, unused, or deteriorated structures that are fire hazards by burning such fuels or structures.
(b) Watershed management.
(c) Range improvement.
(d) Vegetation management.
(e) Forest improvement.
(f) Wildlife habitat improvement.

No contract may be entered into pursuant to this section unless the director determines that the public benefits estimated to be derived from the prescribed burning pursuant to the contract will be equal to or greater than the foreseeable damage that could result from the prescribed burning.

4475.1. The director, with the approval of the Director of General Services, may enter into a master agreement with federal land management agencies to conduct joint prescribed burning operations on wildlands and federal lands where these operations serve the public interest and are beneficial to the state. This master agreement shall be known as the Interagency Agreement for Cooperative Use of Prescribed Fire and shall establish guidelines for the cooperative management of joint prescribed burning operations. The master agreement shall require the completion of a project agreement for each individual prescribed burn which shall include the following:

(a) A list of all participants.
(b) A joint prescribed burn plan.
(c) A display of the project costs to be assumed by each participant.
(d) A summary of the benefits to be received by each participant.
(e) An apportionment of suppression cost to each participant in the event a wildfire escapes from the project.

Project costs to be assumed by each agency or cooperator shall be based on the benefits received by each participant. The apportionment of suppression cost shall be based on the following:

(1) The benefits received by each participant.
(2) The amount at risk of each participant.
(3) The cost to produce the desired benefits received by each participant.
(4) The total acreage included by each participant.

4475.5. (A) The state may assume a proportionate share of the costs of site preparation and prescribed burning conducted pursuant to this article on wildlands other than wildlands under the jurisdiction of the federal government. The state's share of those costs shall bear the same ratio to the total costs of the operation as the public benefits bear to all public and private benefits to be derived from the prescribed burning operation, as estimated and determined by the director. The state's share of the costs may exceed 90 percent of the total costs of the operation only if the director determines that no direct private economic benefits will accrue or will be utilized by a person that owns or controls any property under contract pursuant to Section 4475.

(b) The board shall adopt regulations establishing standards to be used by the director in determining the state's share of such costs and in determining whether, pursuant to Section 4475, the public benefits of a prescribed burning operation will equal or exceed the foreseeable damage there from

(c) The determination of public and private benefits pursuant to this section shall reflect any substantial benefit to be derived from accomplishing any of the purposes specified in Section 4475 and the prevention of degradation of air quality.

(d) All or part of such costs to be borne by the person contracting with the department may be met by the value of materials, services, or equipment furnished by that person directly, or furnished by that person pursuant to an agreement with a private consultant or contractor, or furnished by a combination of both means, that are determined by the department to be suitable for the preparation for, and the conduct of, the prescribed burning operation.

4476. Any contract which is entered into pursuant to this article shall do all of the following:

(a) Vest in the director the final authority to determine the time during which wild land fuel and structural fire hazards may be burned to minimize the risk of escape of a fire set in a prescribed burning operation and to facilitate maintenance of air quality.

(b) Clearly state the obligation of each party to the contract to provide, maintain, and repair equipment and indicate the number of each type of equipment to be provided and the duration of its availability.

(c) Designate an officer of the department as the fire boss with final authority to approve and amend the plan and formula applicable to the prescribed burning operation, to determine that the site has been prepared and the crew and equipment are ready to commence the operation, and to supervise the work assignments of departmental employees and all personnel furnished by the person contracting with the department until the prescribed burning is completed and all fire is declared to be out.

(d) Specify the duties of, and the precautions taken by, the person contracting with the department and any personnel furnished by that person.

(e) Provide that any personnel furnished by a person contracting with the department to assist in any aspect of site preparation or prescribed burning shall be an agent of that person for all purposes of worker compensation. However, any volunteer recruited or used by the department to suppress a wild land fire originating or spreading from a prescribed burning operation is an employee of the department for all purposes of worker compensation.

(f) Specify the value assigned to the materials, services, or equipment furnished by the person contracting with the department in lieu of payment of all or part of that person's share of the actual costs.

(g) Specify the total costs of the prescribed burning operation and the pro rata share thereof for each party to the contract. Any person contracting with the department shall, prior to the commencement of any work by the department, place on deposit in an interest-bearing escrow or trust account with a California-licensed financial institution an amount equal to that person's pro rata share of the costs, less the value of materials, services, or equipment specified pursuant to subdivision (e). Interest earned on the account shall accrue to the depositor and may be separately disbursed from the principal amount upon request of the depositor.

Disbursement of funds on deposit in the trust or escrow account shall be authorized by the depositor within 15 days after completion, to the depositor's satisfaction, of all work specified in the contract to be done by the department.

(h) Provide that the department may, in its discretion, purchase a third party liability policy of insurance which provides coverage against loss resulting from a wild land fire sustained by any person or public agency, including the federal government. The amount of the policy, if purchased, shall be determined by the director. The policy shall name the person contracting with the department and the department as joint policyholders. The premium shall be included as a cost prorated as provided in subdivision (g). A

certificate of insurance, if purchased, covering each policy shall be attached to or become a part of the contract. If the department elects not to
purchase insurance, the department shall agree to indemnify and hold harmless the person or public agency contracting with the department with respect to liability arising out of performance of the contract.

4477. If the amount of moneys due the state is not paid as provided in subdivision (e) of Section 4476, such amount shall become a lien upon the property.

(a) Notice of the lien shall be recorded by the department in the office of the county recorder of the county in which the property is situated within one year.

(b) An action to foreclose the lien shall be commenced by the Attorney General in the name of the people of the State of California within six months after the lien is filed and recorded.

(c) When the property is sold, enough of the proceeds to satisfy the lien and the costs of the foreclosure shall be paid to the state and the surplus, if any, shall be paid to the owner of the property.

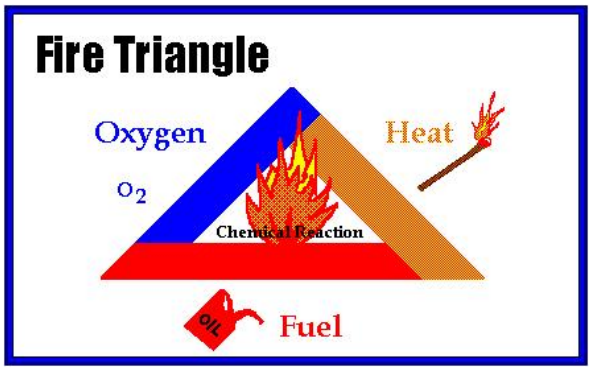
4478. All moneys received by the department pursuant to this article shall be credited to the department's current support appropriation as a reimbursement.

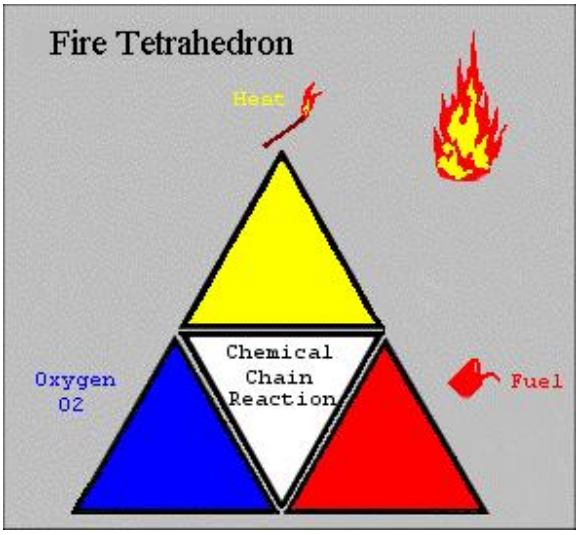
4479. Liability for any costs incurred by the department in suppressing any wildland fire originating or spreading from a prescribed burning operation conducted pursuant to a contract entered into pursuant to this article shall be governed by subdivision (b)of Section 13009 of the Health and Safety Code.

4480. In any area of the state where there are substantially more requests for prescribed burning operations pursuant to this article than can be conducted directly by the department in a single fiscal year, the director may, with the approval of the Director of Finance, enter into an agreement with private consultants or contractors or with other public agencies for furnishing all or a part of the state's share of the responsibility for planning the operation, preparing the site, and conducting the prescribed burning. The private consultant or contractor or other public agency, and the work assignments of its employees, shall be supervised by the fire boss, as provided in subdivision (c) of Section 4476. No agreement may be entered into pursuant to this section unless the director determines that it will enable the prescribed burning operation to be conducted at a cost equal to, or less than, the cost that would otherwise be incurred by the state.

Appendix J – Fire Behavior

In Fire Physics, the Fire Triangle describes what elements must exist for fire to occur. These elements are heat, oxygen, and fuel. Each represents one side of the Fire Triangle. In theory, removing any side of the triangle puts a fire out. For many years, the Fire Triangle symbolized the concept of fire.





Further fire research determined that a fourth element, a chemical chain reaction, is a necessary component of fire. The fire triangle changed to a fire tetrahedron to reflect this fourth element. A tetrahedron can be described as a pyramid which is a solid having four facets. Essentially all four elements must be present for fire to occur - fuel, heat, oxygen, and a chemical chain reaction. Removal of any one of these essential elements causes the chain reaction to stop and the fire to cease burning.

While the Fire Tetrahedron graphically represents the components necessary to support fire, it does little to describe fire behavior. Fire behavior is far more complex and depends on multiple factors that constantly change within the wildland fire environment. Understanding how these various factors interact allows the fire behaviorist and planners to predict how a wildland fire will burn under a given set of circumstances. Using predicted fire behavior, planners can determine the most critical areas to treat with various fuel modification projects and to prioritize them given the limits of funding and resources.

Fuel

Fuel Moisture

Fuel moisture is the percentage of moisture within the forest fuels. This varies by fuel state – living or dead.

Dead fuels react to the moisture content of the surrounding air by either gaining or losing moisture. Forest fire agencies refer to dead fuels as one-hour, ten-hour, hundred-hour, or thousand-hour fuels. The hour designation is the time it takes the fuel to reach equilibrium with the moisture content of the surrounding air. Grasses are one-hour fuels while large logs are thousand-hour fuels. So on a day where the relative humidity drops to 20% and the wind is calm; it will take one hour for the grass to dry out to moisture content of 20%. This drying will occur faster if there is wind.

Live fuel moisture is the percentage moisture within living plants. The amount of moisture in plants depends on several factors – location, species, time of year, etc. All plants lose moisture as the summer progresses. Wildland fire managers collect samples of various fuels and weigh them green. These samples are then dried in ovens and reweighed to determine the fuel moisture. Green fuels burn readily when their fuel moisture is low enough. By tracking changes live fuel moisture; fire managers can predict how intensely living fuels will burn.

Live to Dead Ratio

Within each plant's foliage is some dead material. Forest fuels are no exception. Most of the time, the ratio of living material to dead material is heavily weighted in favor of living. In periods of prolonged drought, this ratio becomes skewed towards dead material. When there is sufficient dead material mixed with live material, the benefit of the moisture in the plants is diminished and the plant burns more readily and with more intensity. Fire managers track this ratio to predict how certain key plant communities will burn.

Fuel Arrangement

How fuel is arranged affects fire behavior. On a micro level, compacted fuels do not burn nearly as well as loosely arranged fuels. This occurs because less surface area of the fuel (one facet of the Fire Tetrahedron) is exposed to the air (another facet of the Fire Tetrahedron). Smaller loosely arranged fuels ignite and burn more readily than larger fuels. One only need try starting a fireplace fire without kindling to see this.

On a macro level, how fuel is arranged affects how and what a wildfire will burn. Horizontal fuel continuity affects how far a wildfire can burn and its intensity. Vertical fuel continuity affects what forest fuels will burn and its intensity. Breaking up horizontal continuity slows the spread of wildfire and reduces its intensity. Similarly, eliminating ladder fuels breaks the vertical continuity and decreases fire intensity.

How does this work? Heat transfer occurs by through three methods – radiation, convection, and conduction. Heat transfer by conduction is not a factor in wildfire. However, heat transfer by convection and radiation are key factors in the spread and intensity of wildfire.

Radiant heat is heat given off by a burning material and is transmitted equally in all directions from the fire. Radiant heat is *inversely proportional to the square of the distance* from the heat source. Thus, a person standing four feet from a campfire receives sixteen times less heat than a person standing next to the fire does. Breaking up horizontal continuity takes advantage of this phenomenon by separating fuels so that they receive less radiant heat and are less likely to ignite by radiated heat. Breaking up horizontal fuels also prevents fire spread by direct flame impingement.

Convection is heat carried upward by expansion. Breaking up vertical continuity achieves the same thing with respect to radiant heat but also reduces the amount of convection heat. Without sufficient heat, treetops are not susceptible to crown fire.

Since there are millions of acres of lands susceptible to wildfire, CDF uses a gross method to determine which lands are likely to have the most contiguous and greatest amount of vertical fuels. Using a grid where each cell is four hundred and fifty acres in size, CDF has measured these factors and created a digitized map representing vertical continuity (Ladder Fuel Map –Appendix K).

Whether it be a prescribed burn, a fuel break, or clearance around a structure these fuel continuity issues form the basis for all fire defense improvement projects.

Size

Size of fuel is also a factor in fire behavior. Smaller fuels like grasses ignite easily and extinguish easily. Larger fuels are more difficult to ignite but once ignited release greater heat for longer periods and are more difficult to extinguish.

Species

Plant species also play a role in fire behavior. Some species contain natural resins and oils that make them burn with great intensity while others species return higher fuel moisture even during drought.

Terrain

Slope

Slope greatly affects the spread and intensity of wildfire. All other factors being even, the steeper the slope the faster wildfire spreads and the greater its intensity. Three factors cause this increase in rate of spread and intensity – convention, radiation, and direct flame impingement. When a fire burns on a slope, the surrounding heated air moves upward by convection along the surface of the ground. This hot updraft preheats the upslope fuels driving off residual fuel moisture. It also causes the fire's flames to bend upslope and lengthen. These lengthened flames reach out and touch (impinge upon) the dry preheated upslope fuels. As more fuels preheat, fire intensity increases. As intensity increases, greater convection occurs. To a lesser extent, radiation assists in preheating upslope fuels.

Aspect

Slope aspect refers the cardinal direction a slope faces. Vegetation often varies on different aspect slopes. Most notably north aspect slopes generally support more lush vegetation. This is because north aspect slopes in the northern hemisphere receive less direct sunlight and thus tend to be wetter environments. In contrast, south and west aspect slopes generally receive sunlight that is more direct for longer period of the day and thus tend to be dryer. Vegetation on these slopes tend toward species that resist drought and that have lower fuel moistures. Thus, the generalization that all things being equal, south aspect fires burn with greater intensity then north aspect fires.

Weather

Wind

Of all weather factors, wind has the greatest affect on fire behavior. Wind increases drying by moving the evaporated moisture away from the fuel and replacing the localized moist air with dryer air. This is much the same effect as using a hair dryer to dry one's hair. Major wind events such as the Santa Anna winds in southern California override the local diurnal winds and the effects of terrain and temperature. Wind can override the affect of slope, convection, and flame impingement to push fire downhill faster than it travels uphill. Wind creates eddies that causes extreme erratic fire behavior.

Diurnal Winds

Canyons, gullies, and drainages create chimneys that funnel air heated by convection upward along their length similar to a fireplace chimney. On a micro level, these chimneys can trap firefighters and have been the cause of numerous fatalities. They can and do affect the direction and intensity of wildfire. Each day as the valley floor is

heated, the normal (diurnal) wind flow is funneled up canyon. After sundown, this flow reverses as the higher-level air is cooled it slides down slope. All wildland firefighters understand this phenomenon and plan for it.

Humidity

Humidity influences fire behavior dramatically. In most fuels, a fire will not spot ahead when the humidity exceeds 40%. Fires do not spread rapidly when the humidity exceeds 30%. Humidity ranging from 22% to 30% creates the average bad fire conditions common in central California during most summers. Humidity below 22% represents those few days each fire season where large fires are most likely to occur.

Temperature

Temperatures greatest impact is on the comfort of firefighters. To a lesser extent, it increases the evaporation of moisture from fuels and makes them more burnable. This however is not always true. Temperatures can be very high and be associated with high humidity. In which case, temperature plays little if any role in fire potential.

Appendix K – Ladder Score

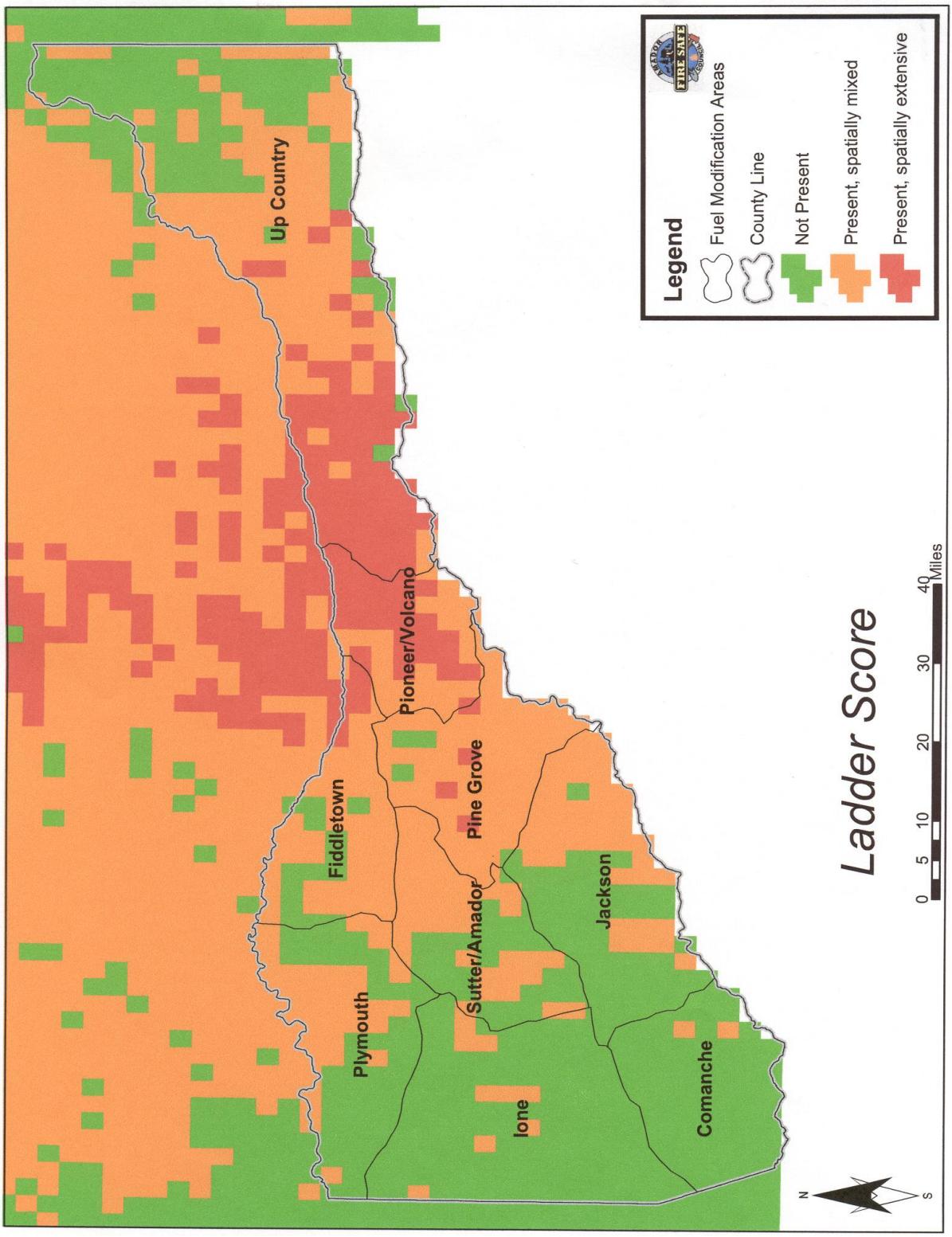
The amount, location, and distribution of ladder fuels affect fire behavior. CDF maps these fuels as part of it risk analysis. The ladder fuel map classifies fuels as:

- Not present
- Present, spatially mixed
- Present, spatially extensive

The ladder fuel score represents the amount of intermediate fuels between the ground and the crowns of the surrounding shrubs and trees. These scores are important because wildland fire agencies designed fuel projects to significantly reduce or, in some case, eliminate these fuels. Areas with greater amounts of ladder fuels represent areas of greater potential for damaging wildfire and pose greater resistance to control.

Table 10 Ladder Fuels Distribution by Fuel Modification Management Area

FMMA	Not Present	Present, spatially mixed	Present, spatially intensive	Ranking: Lower number = higher risk
Plymouth	58%	42%	0%	7
Ione	91%	9%	0%	8
Comanche	97%	3%	0%	9
Jackson	43%	75%	0%	6
Sutter/Amador	43%	57%	0%	5
Fiddletown	14%	81%	10%	3
Pine Grove	4%	90%	6%	2
Pioneer/Volcano	0%	48%	52%	1
Upcountry	32%	43%	25%	4



Appendix L – Federal Forest Fuels Policy

The USFS, Eldorado National Forest (ENF) provides valuable fire prevention and fire education expertise and materials, primarily in Amador and El Dorado counties, through interaction with individual citizens, public forums, public events, school- field trips, publications and grants. Prior to 1995 however, fire management on the Eldorado NF along with the other federal land managers in the western states, focused the congressional appropriated dollars for fire management on funding a fire suppression organization that was less than optimal in terms of numbers of personnel and equipment, and values at risk attempting to maximize fire protection on federal lands. The focus on fire suppression did little to address the larger issue of ecosystems that were beyond their natural range of variability in regards to stand density, species composition and hazardous fuel accumulation. The tragic death of 14 firefighters on the South Canyon Fire in Colorado, 1994, led federal land managers to reexamine their fire policies and procedures and began a series of changes that have refocused fire management on federal lands, including the Eldorado NF.

- 1995 Federal Wildland Fire Management Policy and Program Review, signed by the secretaries of the department of Agriculture and Interior, revises wildland fire suppression and fire use policy and procedures. The 1995 policy also directs federal wildland fire agencies to achieve a balance between fire suppression and fuels management to sustain healthy forests, especially in fire-adapted ecosystems. The 1995 review began a process that redirected some of the allocated dollars from wildland fire suppression to a more proactive fuels management program. Modest increases in budget allocations and the accompanying target of acres to be treated dictated the primary treatment for hazardous fuels reduction to be prescribed fire use.

- April 1999, the US General Accounting Office (GAO) issued a report to the subcommittee on Forests and Forest Health, Committee on Resources and the House of Representative entitled, and “Western National Forest a Cohesive Strategy is needed to Address Catastrophic Wildfire Treats”. This report recognized that while the Forest Service in the previous decade had attempted to reduce the threat of catastrophic wildland fire, primarily using timber sales and understory tree removal prescriptions, the agency had failed to make significant progress in reducing the number and severity of large wildfires. The GAO report recognized that the over accumulation of vegetation that had little to no commercial value was a critical component fueling destructive wildfires.

- September 2000, after 8.4 million acres burned during 2000 fire season, primarily in the western states, President Clinton directs the secretaries of Agriculture and the Interior to establish the National Fire Plan (NFP). The NFP contains five key areas to which funding will be channeled.

- **Firefighting Resources**: Increases the level of funding for suppression resources to the Most Efficient Levels (MEL) based on the values at risk and the cost of staffing a fire suppression force to protect them.
- **Rehabilitation and Restoration**: Burned Area Emergency Rehabilitation teams (BAER) formed to respond to large and damaging wildfires to identify emergency projects to protect life, property and key ecosystem components damaged by wildfire.
- **Hazardous Fuel Reduction**: Working with area cooperators, identified and implemented projects to reduce potential wildfire damage.
- Community Assistance: The NFP directs federal wildland fire managers to work with communities to reduce hazardous fuels, increase local employment with jobs in restoration and fuel reduction projects, provide defensible space information, volunteer and rural firefighting assistance and economic action programs.
- **Accountability**: Establishes a tracking system to monitor progress of acres treated and monies spent.

- October 2000, the Forest Service issued a response to the GAO report title "Protecting People and Sustaining Resources in Fire-Adapted Ecosystems, A Cohesive Strategy". The Cohesive Strategy establishes priorities for treatment areas in the fire-prone national forests: 1) Wildland-urban interface 2) Readily accessible municipal watersheds 3) Threatened and endangered species habitat and 4) Maintenance of existing low risk Condition Class 1 areas. The Cohesive Strategy recognizes that not every acre need treating but does direct the Forest Service to strategically place treatments to protect values associated with the four priority areas.

- January 2001, Sierra Nevada Conservation Framework Environmental Impact Statement released. In response to the decline of late seral species, specifically the California spotted owl, the eleven national forests residing in the Sierra Nevada amend their Land and Resource Management Plans. A key portion of Record of Decision, Appendix A, establishes a definition of Wildland Urban Intermix (WUI) where fuels reduction work will be concentrated.

    - The urban wildland intermix zone is an area where human habitation is mixed with areas of flammable wildland vegetation. It extends out from the edge of developed private land into Federal, private, and State jurisdictions. The urban wildland intermix zone extends one ½ mile out from areas that have residences, commercial buildings or administrative sites with facilities. It is comprised of two zones: and inner ¼ mile wide buffer (the defense zone) and an outer 1 /14 mile buffer (the threat zone). The actual boundaries of the urban wildland intermix zone are determined locally, based on the actual distribution of structures and communities adjacent to or intermixed with national forest lands. Strategic landscape features, such as roads, changes in fuels types, and topography, are used in delineating the physical boundary of the urban wildland intermix zone.

The USFS designs fuel reduction treatments to protect human communities from wildland fires as well as minimize the spread of fires that might originate in urban areas. The management objective in the urban wildland intermix zone is to enhance fire suppression capabilities by modifying fire behavior inside the zone and providing a safe and effective area for possible future fire suppression activities.

Among the management direction for urban wildland intermix zones is to:
Determine the distribution, schedule, and types of fuel reduction treatments through collaboration with local agencies, air regulators, groups, and individuals; and
Place the highest density and intensity of treatments in developed areas within the urban wildland intermix zone.

- August 2001, the 10-Year Comprehensive Strategy is released. The Western Governors Association, the National Association of State Foresters, National Association of Counties, the Intertribal Timber Council and the Secretaries of the Interior and Agriculture joined to endorse *A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment: A 10-Year Comprehensive Strategy.* The 10-Year Comprehensive Strategy refines the framework of the NFP and establishes implementation outcome expectations, performance measures, and implementation tasks for the four goals of the 10-year Comprehensive Strategy. The four goals are:

    - Improve Fire Prevention and Suppression
    - Reduce Hazardous Fuels
    - Restore Fire-Adapted Ecosystems
    - Promote Community Assistance

- August 2002, President Bush, while visiting the Squires Peak Fire in Oregon, announces the Healthy Forest Initiative (HFI). The HFI is in response from federal agencies concerned with administrative procedures that are delaying the preparation and implementation of hazardous fuel reduction project in critical areas and impeding the implementation of the NFP. The HFI expedites the administrative procedures for certain hazardous fuel reduction projects by issuing new categorical exclusion categories that reduces lengthy environmental and sociological documentation. The new categorical exclusions require both USFS and Department of the Interior (DOI), Bureau of Land Management (BLM) to participate in a public collaboration process with State and local governments, Tribes, landowners and other interested persons and community-based groups in order to identify new project areas and treatments.

- January 2003, with bipartisan support the Healthy Forest Restoration Act (HFRA) passes into law. The HFRA supports the HFI and the NFP by expediting procedures for critical fuels reduction projects. The HFRA also contains language that not less than 50 percent of the funds shall be allocated for authorized hazardous fuel reduction projects in the wildland-urban interface. Also, to the maximum extent practicable, give funding priority to communities that have adopted a Community Wildfire Pro-

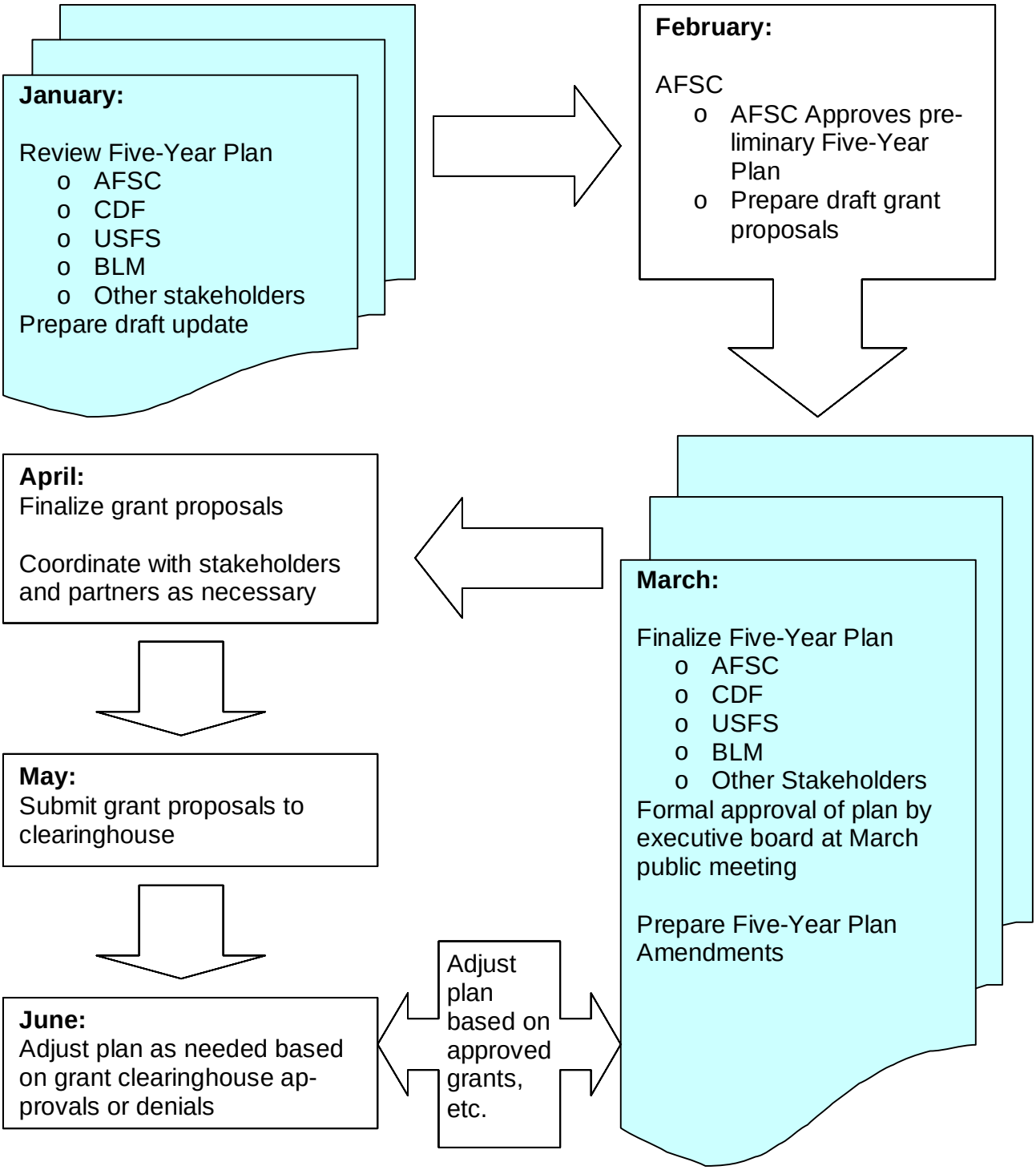
tection Plan or have taken proactive measures to encourage willing property owners to reduce fire risk on private property.

The HFRA has a default definition of WUI for at-risk communities that have not designated their WUI as part of a Community Wildfire Protection Plan. The default definition of WUI as stated in The Healthy Forests Initiative and Healthy Forests Restoration Act, Interim Field Guide, FS-799, February 2004, is:

Extending ½ mile from the boundary of an at-risk community
OR
Extending one ½ mile from the boundary where other criteria are met – for example, a sustained steep slope, and a geographic feature that could help when creating an effective firebreak or Condition Class 3 land.
OR
Adjacent to an evacuation route

There is no distance limitation for evacuation routes.

Appendix M – Project Planning Flow Chart



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