
KERN RIVER VALLEY
COMMUNITY WILDFIRE PROTECTION PLAN
JANUARY 2011 UPDATE
FireSafe
COUNCIL
Kern River
Valley
LEARNING TO LIVE WITH WILDFIRE

Kern River Valley Community Wildfire Protection Plan

Certification and Agreement

The Community Wildfire Protection Plan developed for the Kern River Valley:

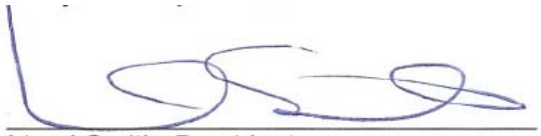
- Was collaboratively developed under contract by the Kern River Valley Fire Safe Council. The council is a partnership of the communities within the Kern River Valley area. Other members of the council include representatives of the Sequoia National Forest, Kern County Fire Department, Kern County Parks Department and the Bureau of Land Management.
- This plan identifies and prioritizes areas for hazardous fuel reduction treatments and recommends the types and methods of treatment that will protect the communities within the Kern River Valley area.
- This plan recommends measures to reduce the ignitability of structures throughout the area addressed by the plan.

The Kern River Valley CWPP is consistent with and supports the following local documents:

- Kern County Multi-jurisdictional Natural Hazard Mitigation Plan (FEMA approved 10/27/06).
- BLM Draft Risk Assessment and Mitigation Strategies Plan.
- US Forest Service "Fire Shed" Fuels Treatments Analysis System.
- Kern River Ranger District Ecosystem and Fuels Management 10-year Program of Work.

The views and conclusions contained in this document are those of the authors and should not be interpreted as representing the opinions or policies of the California Fire Safe Council or the United States Government. Mention of trade names or commercial products does not constitute their endorsement by the California Fire Safe Council or the United States Government.

The following entities attest that the standards listed above have been met and mutually agree, in concept, with the contents of the Community Wildfire Protection Plan. The plan does not obligate any agency to implement the recommended actions in whole or part. Implementation of projects on Federal, State or Local lands would follow standard agency requirements for environmental analysis and public disclosure.

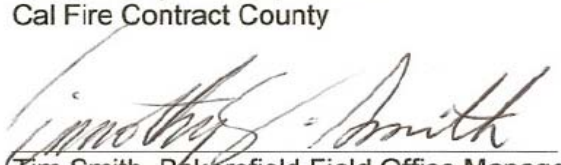


Lloyd Smith, President
Kern River Valley Fire Safe Council

8 Feb 2008
Date

Dennis Thompson, Fire Chief
Kern County Fire Department
Cal Fire Contract County

2/26/08
Date



Tim Smith, Bakersfield Field Office Manager
Bureau of Land Management

2/29/08
Date

The Kern River Valley Community Fire Safe Plan

Created by
HangFire Environmental
for the
Kern River Fire Safe Council
and the citizens they strive to protect.
October 2002

The Kern River Valley Community Fire Safe Plan was funded by a grant to the Kern River Valley Fire Safe Council by the United States Department of Agriculture-Forest Service, National Fire Plan-Economic Action Program.

Table of Contents

Introduction

Fire is part of the Kern River Valley. As settlers migrated and developed the region, the role of fire was considered dangerous and a suppress-all-fires attitude prevailed. Excluding wildfire lead to the build-up of vegetation which today fuels fires that are bigger, costlier, and more damaging. With the number of homes found in the Valley, it is inevitable that future wildfires will threaten or damage the life, health and property of the Kern River Valley residents.

Figure 1: A tree burning during the Manter Fire.

The preceding paragraph was written prior to July 21, 2002. Sadly, it was a very accurate prediction. On the 21st, the Deer Fire burned 1800 acres while it moved through the community of Bodfish. In its wake, it damaged or destroyed 47 residences, destroyed 63 vehicles, 84 sheds, eight boats and 22 trailers. Hopefully, this is the wakeup call needed to motivate the citizens into taking a proactive stance concerning wildfire.

The purpose of this plan is to synergize the agencies and citizens of the Kern River Valley. The emphasis of the plan is to inform all citizens of the potential of wildland fires and the mitigation strategies that may be employed. Strategies to protect residents and property from the potential impacts of wildfire include construction of shaded fuel breaks, prescribed burns, public education to prevent unwanted fires, and focused enforcement of the fire codes and laws within the Valley.

The Kern River Valley Community Fire Plan is a recipe for making the Valley safer from wildfire. The ingredients include an assessment of the landscape to define hazards and risk. Included with the assessment will be pre-suppression strategies to reduce the impacts of a wildfire.

Treatment measures or mitigation strategies are not always popular amongst citizens within a community. Some people don't want a fuelbreak in their backyard while others realize the benefit. Some people see a prescribed burn as a forest destroyed versus a forest renewed. Some people don't want to maintain a defensible space[1] around their dwelling while others realize that the odds of structure survivability increases significantly through this modest investment of time and money.

The next ingredient in the planning process is to define which pre-suppression strategies are understood and embraced by the citizens. A firesafe market study has been performed. This

[1] Defensible space is defined as a perimeter of land reduced in vegetation to prevent fire from burning a home. Vegetation clearance should range in distance from 30-150 feet depending on slope, vegetation, and building materials.

study was based on a survey mailed to 2000 homeowners. The survey's focus is to assess what firesafe perceptions are held by the community and where public education may be needed prior to implementing a firesafe project.

The Assessment Process

How do we prioritize pre-suppression projects? Where do we spend the limited funds for building fuelbreaks or burning hazardous fuels under prescription? Can we state Sierra Alta is a more dangerous place to live than Lake Isabella? This plan will provide the tools to visualize and compare many different aspects that define fire hazard and risk. It will document several factors assisting local firefighters, citizens, and decision makers to be proactive prior to the next large fire.

Hazards are defined as something causing danger, peril, risk or difficulty. This could be the slope of a hillside, the vegetation that may burn, or the occurrence of weather that is conducive to the dangerous spread of wildfire. Risk is defined as exposure to the chance of injury or loss. This may be a powerline falling or a careless hiker not completely extinguishing a campfire.

If fire is a natural process within the Valley, why must we define the hazards and risk involved? As a society, we have encroached into this environment and placed values on material and immaterial effects. Material values, such as homes and grazing lands and immaterial effects such as habitat for endangered species or the quality of the air we breathe. The effects are categorized as, "assets at risk" or simply something that someone doesn't want destroyed by wildfire. Within this plan, assets at risk will be categorized and mapped.

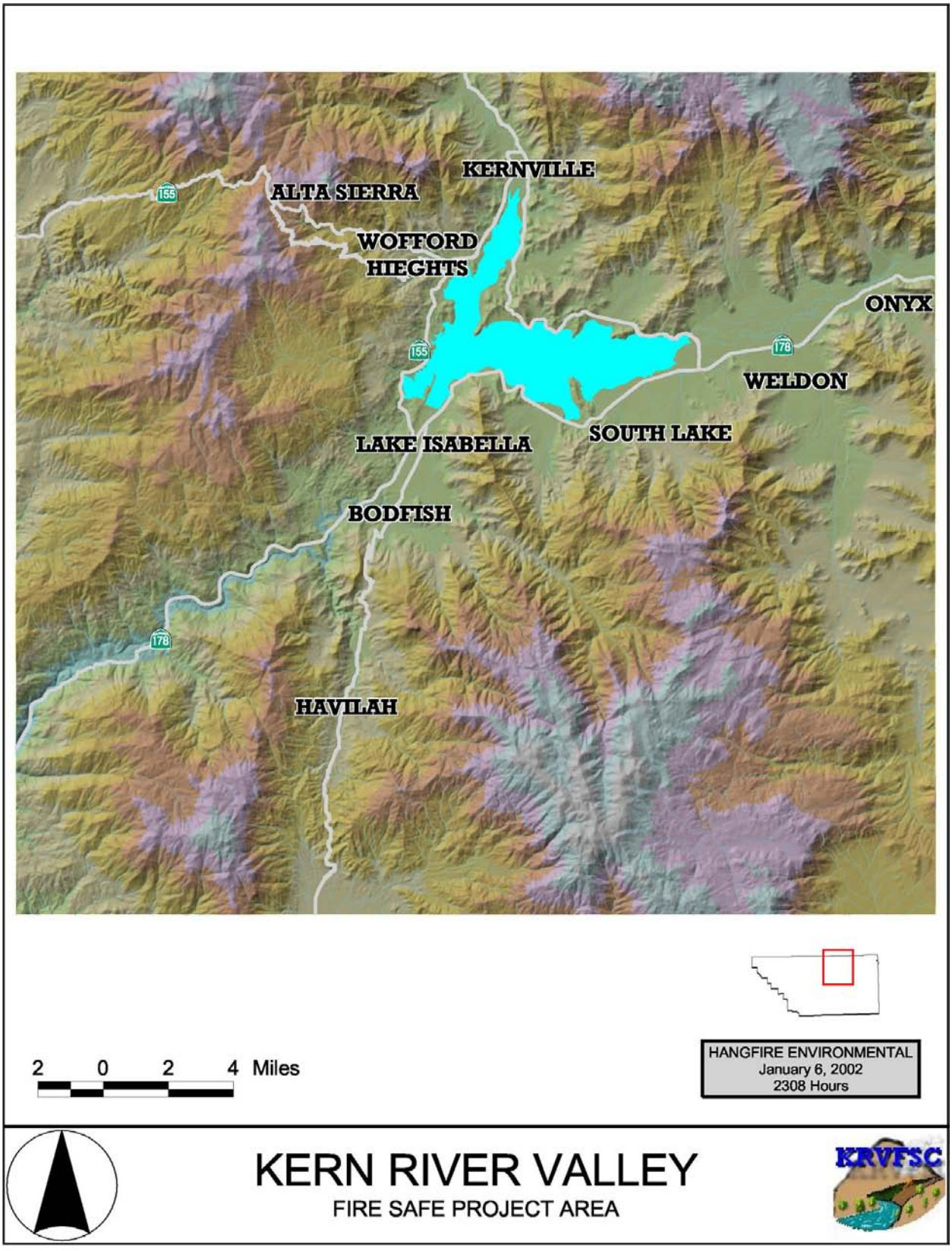
This plan will assess hazards, risk, and assets using computer technology known as Geographic Information Systems (GIS). GIS ties databases and map information together allowing very complicated queries to be performed. Queries such as slopes over 40 percent that are covered with conifer fuel type or housing density of 20 homes per 5 acres plots may be analyzed. Data was provided by stakeholders[2] such as the United States Forest Service (USFS), the Bureau of Land Management (BLM), Kern County Fire Department (KCFD), and the Southern Sierra Geographic Information Cooperative (SSGIC).

The first step of the plan will be to define the area within the fire safe assessment. The assessment focuses on 25 acre cells within a 750 square mile area surrounding Lake Isabella. Please see Figure 2 and 3. A low, moderate, or high ranking is placed on each cell based on three categories.

The categories are:

- Hazardous Fuels
- Assets at Risk
- Other Factors that Influence Risk

[2] Stakeholders are agencies or special interest groups that have something at stake as it concerns wildfires.



Map 1: The 750 square mile area surrounding Lake Isabella that frames the study area.

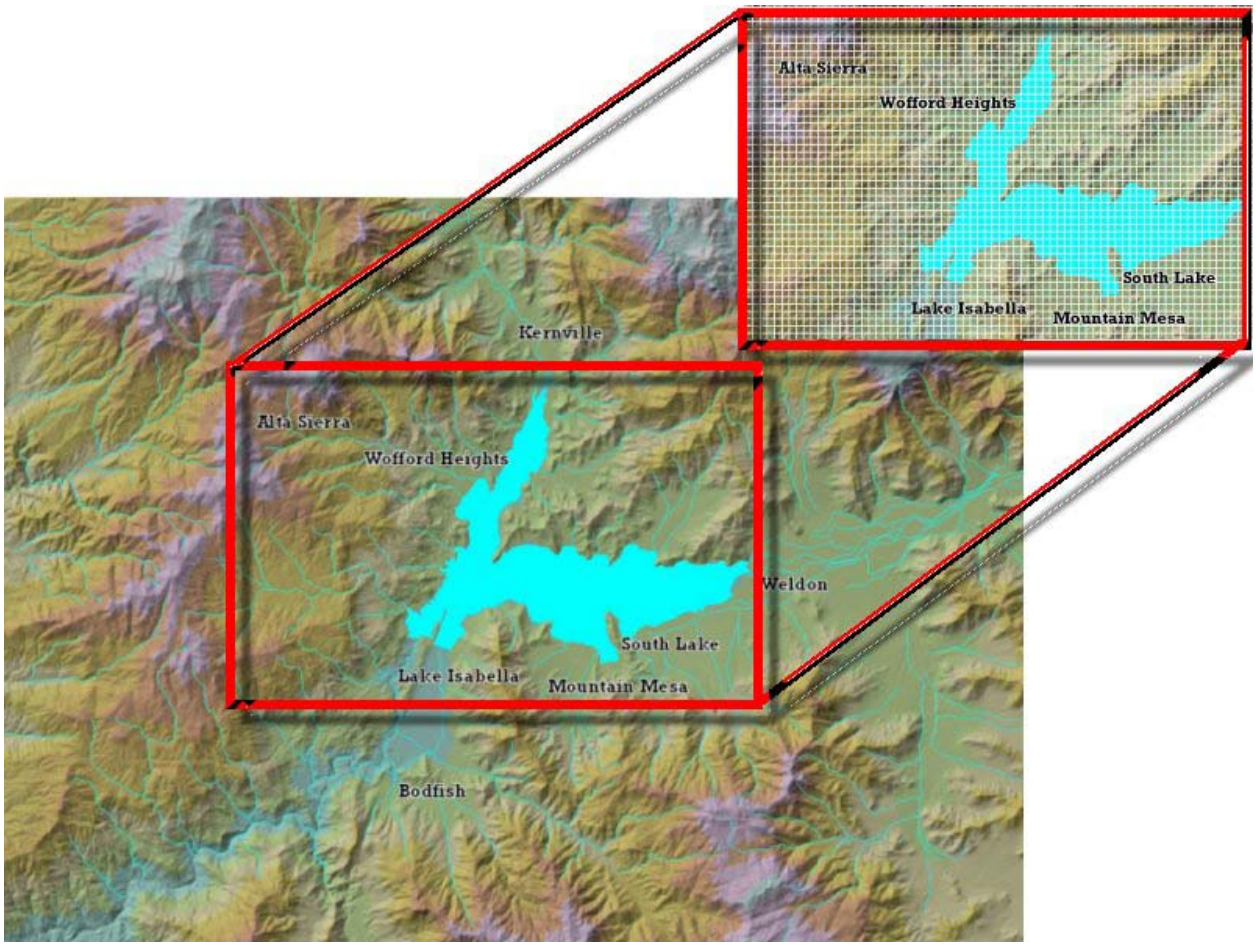


Figure 2: The study area was divided into 25 acre cells for assessing fire potential.

Fire Behavior

Fire behavior is how fast and intense a fire spreads. Numerous components of fire behavior can make this simple definition much more complex. A simple understanding is necessary for this assessment. Fire needs heat, fuel, and oxygen existing simultaneously known as the fire triangle. If any one of these components are removed, the fire will go out.

Figure 3: Fire Triangle

Fuel is the live and dead vegetation and sometimes structures that feed a wildfire. A fuelbreak removes fuel from the fire triangle while prescribe burns reduce the amount of available fuels. Heat sources can be a lightning strike, an abandoned campfire, or an arsonist's match. Once ignited, the fire will produce enough heat to continue to burn unless cooled by water or fire retardant. Oxygen exists in ambient air and is added in greater quantities with wind. This component of the fire triangle is impossible to remove from a wildland fire.

Figure 4: Fire Environment Triangle

If the three components of the fire triangle exist and a fire occurs, there are three main factors that determine how fast and intense the fire will burn. The three factors that comprise the fire environment triangle are fuels, topography, and weather.

Similar to the fire triangle, fuel is the vegetation that is consumed by a wildfire. Vegetation, such as annual grass, can burn fast with moderate intensity. On the other hand, large trees and brush can burn hot enough to melt metal and cast burning embers over a half mile in front of the fire.

Topography is the lay of the land. Topographical features such as river drainages can funnel wind causing an increase in speed. Slope or the amount of vertical rise compared to horizontal distance is another factor that influences how fast a fire will spread. It also restricts where fire engines, bulldozers, and firefighters can travel.

Weather is the biggest element of the fire environment triangle concerning fire behavior. Fuel and topography exist everywhere and in some places, they don't experience the wildfire problems associated with areas that are hot and dry. When some vegetation becomes very dry due to arid conditions, it produces resins to conserve what little water it can transpire. These resins are very flammable and when coupled with wind, more oxygen is added to the fire resulting in faster up and downhill rates of fire spread. Wind also causes burning embers to land in front of a fast moving fire, called spotfires.

By using an assessment process, the Kern River Valley is broken down into geographic areas that are ranked based on the potential to burn.

Hazardous Fuels

Hazardous fuels are defined as live or dead vegetation (or homes) that fuel a wildfire. There are three broad classifications of fuel: trees, brush, and grass. However, there is almost an endless combination of factors that effect how a wildfire burns.

How much of the fuel exists in a given place is known as fuel loading. The higher the loading, the higher the potential intensity or difficulty with fire suppression. Have the fuels been reduced by timber harvesting or prescribed burning or has the area been accumulating dead and down fuel for the last 70-100 years?

Horizontal continuity of the fuel is another factor. Are the plants close enough together to ignite from radiant heat or is a strong wind necessary to sustain the fire. Many slopes of the Kern River Valley are covered with sparse sage brush and need a significant wind to continue the combustion process. Unfortunately, windy conditions are an almost daily occurrence during fire season.

Vertical arrangement is another major element that can change the burning dynamics of a wildfire. Vegetation that is close to the ground, such as annual grass, burns fast but does not

cause spotfires. However, as a fire transitions from grass to brush, it climbs through low lying limbs, igniting the shrub, which results in higher intensities and possible spotfires.

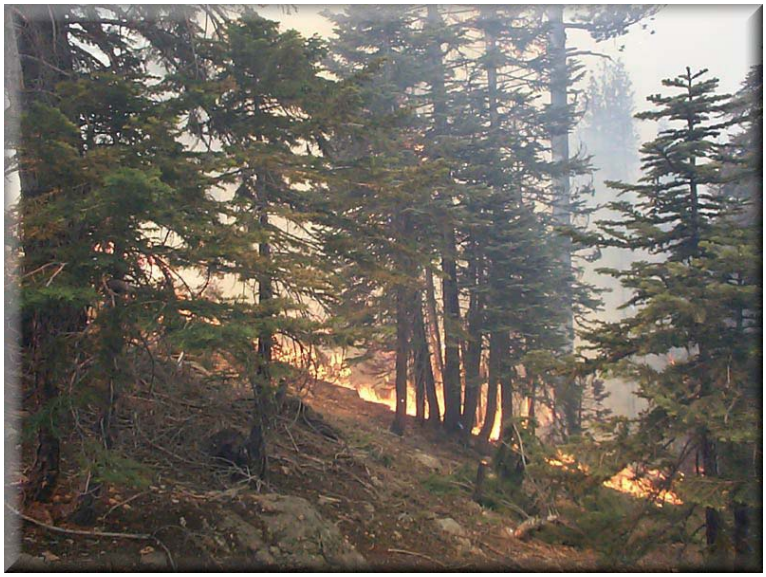


Figure 5: Dead and down tree limbs and needles contribute to the fuel loading. Low lying branches provide the ladder for fire to move vertically.

Fuel that allows fire to travel vertically are called ladder fuels. As the needle litter burns, it will ignite low lying limbs and allow the fire to transition to the upper parts of the tree called the crown. If a single tree ignites, the process is called torching. If multiple trees ignite, it is referred to as a crown fire. Torching and crowning are the most dangerous forms of fire behavior. As trees torch, numerous burning embers are lofted into the air and carried well in advance of the main body of fire. These embers will cause several simultaneous ignitions making a fire very difficult and dangerous to contain and control.

In order to classify and therefore place a rank on hazardous fuels, maps were obtained from the SSGIC. The SSGIC obtained the data from the CDF, KCFD, and USFS who mapped vegetation using satellite imagery. The maps delineate fuel models for different geographic areas. A fuel model is a quantitative value for rating fire behavior or simply a tool to help estimate fire behavior. Fuel types are given a numerical value based on fuel loading and expected fire behavior. The numerical value ranges between one and thirteen and represents one of the Northern Forest Fire Laboratory Standard Fuel Models[3].

Fuel types have been classified into four groups: grasses, brush, timber, and slash (or the material left behind after timber harvesting). There are three grass, slash, and timber fuel models and four brush fuel models. Of the 13 fuel models used in the Fire Behavior Prediction System, only eight are utilized within this assessment.

Figure 6: Fire crews take advantage of different fuel types-Manter Fire.

Other non-vegetative fuel types were used

[3] Anderson, H. C. 1983 Aids to Determining Fuel Models for Estimating Fire Behavior. USDA Forest Service General Technical Manuel INT-122, Intermountain Forest Experimental Station, Ogden, Utah.

to describe some variations in the landscape. This includes urban, agriculture, rock, barren, and water. With the exception of the homes and other development represented by the urban model, non-vegetative fuel types do not have burning characteristic associated with them due to their inability to burn. Although areas with development can be one of the greatest contributing factors for the spread of a wildfire, there are too many structural variables needed to model the spatial diversity found in any given neighborhood. Please see Appendix A for a complete listing of fuel models used in the assessment.

Fuel Ranking Methodology:

How vegetation burns is based on several factors but for this assessment, we will utilize three components. Ranks will be assigned for fuel models, slopes, and fire history. The three components will be given a value for each rank and summed to derive the overall fuel rank. The first step of ranking each 25 acre cell based on fuel was to assess the maps provided by the SSGIC. Obvious limitations were unfortunately discovered within this data set. The first obstacle was the lack of urban areas defined on the map. There were no changes in the fuel models to indicate structures, freeways, or manmade development. Consequently, urban areas need to be defined to assess the urban interface. This was done by assigning a fuel model to all urban areas. To delineate urban areas, one meter color aerial photography was used to digitize all urban and rural development.

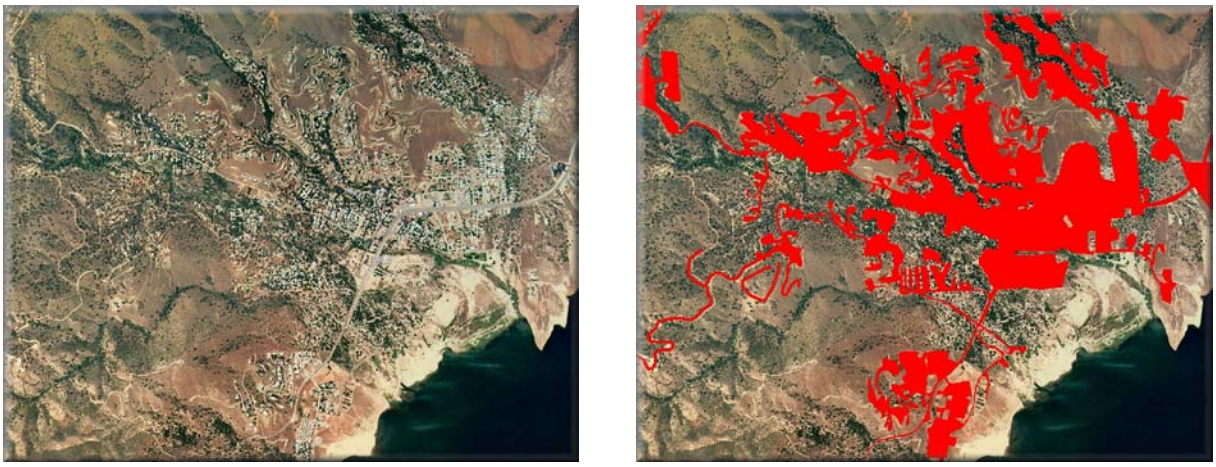


Figure 7: One meter pixel aerial photography, provided by Kern County Fire Department, was used to digitize the urban areas seen in red.

Once urban areas were digitized, they were merged back into the original SSGIC maps. Another shortcoming was the inconsistency with the mapping size unit based on jurisdiction. The federal jurisdictions are mapped at one level of detail, while the private land just had placeholder fuel models assigned to them. Simplistic rules were developed to assign a fuel model based on elevation and aspect in areas that lacked the detail of the federal jurisdictions. Gross errors of fuel model designations were corrected. Seams between the two jurisdictions were then smoothed to give a more consistent and realistic look to the fuel map.

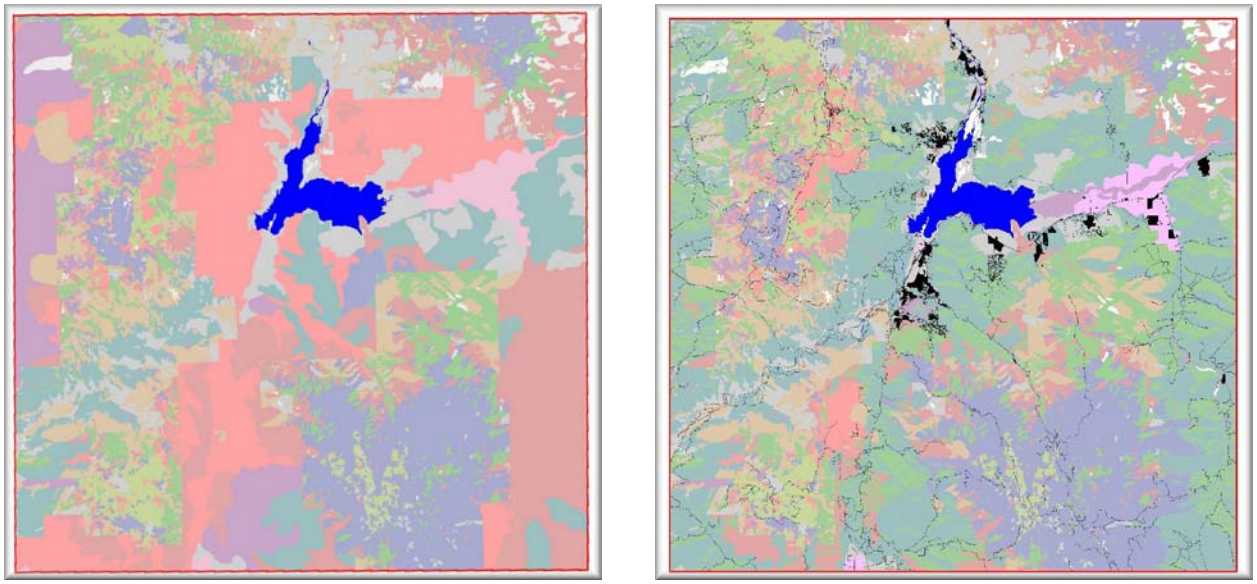


Figure 8: The diagram on the left shows how the data originally looked. The diagram on the right shows the corrections made, the refinement in detail, and the urban areas added (shown in black).

Maps were then sent to the Kern River Fire Safe Council for members to validate. Corrections were made based on input from experts from the Kern County Fire Department and the Sequoia National Forest. Please see Appendix B for changed methodology.

Utilizing the validated information, each 25 acre cell was assigned a fuel model based on the fuel model occupying the majority of each cell. Please see the Fuel Model Map (Map 1). The burning conditions of each fuel model are greatly affected by slope or the vertical rise of elevation compared to the horizontal distance expressed in percent. Fuel model ranks were determined by comparing the fuel model rank to the slope rank. Please see Appendix B for the Fuel Ranking Matrix.

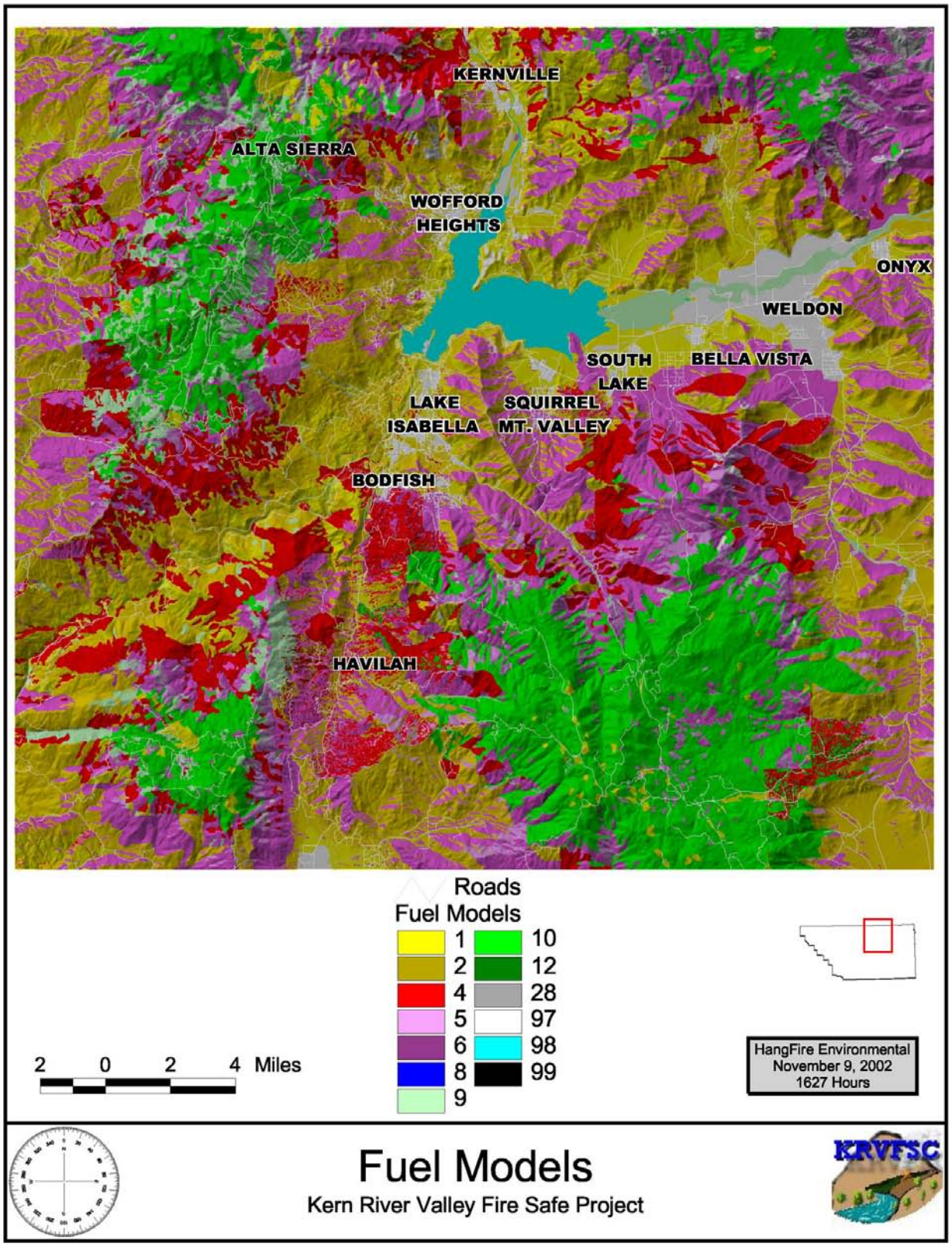
Slope

Slope greatly affects how fire burns in various fuel types. On the upslope side of the fire, the flames are closer to the vegetation causing a preheating effect of the fuel. This results in faster uphill rates of fire spread. As heat rises, steeper slopes create a draft similar to a chimney which will also increase spread rates. The steeper the slope, the faster fire will burn. A simple example of this is proven by modeling a grass fire[4] without wind on various slopes. Please see Table 1.

Table 1: How slope affects fire spread.

Percent of Slope	Rate of Spread
5 Percent	264 Feet Per Hour
30 Percent	1122 Feet Per Hour
60 Percent	3762 Feet Per Hour

[4] The results shown are with eight percent dead fuel moisture.



Map 2: Fuel Models

Another main contributing factor affecting how fast a fire will spread is burning, rolling materials. On steep slopes, ignited pine cones, logs, and other material roll downhill resulting in fires that cross drainages and roads. Increasing slope also hinders fire suppression resources. Typically, fire engines are restricted to slopes less than 40 percent and bulldozers less than 60 percent. Slope calculations were performed on each 25 acre cell. Cells were assigned a ranking based on the mean slope value for a given cell.

Table 2: Slope ranking methodology: the steeper the slope, the higher the rank.

Percent of Slope	Rank
0 – 10	0
11 – 25	1
26 - 40	2
41 - 55	3
55 - 75	4
> 75	5

In Figure 9, one meter aerial photography was combined with a digital elevation model to show the hazards created by fuel and slope. Please see the Over-all Slope Map (Map 2) and Slope Rank Map (Map 3).

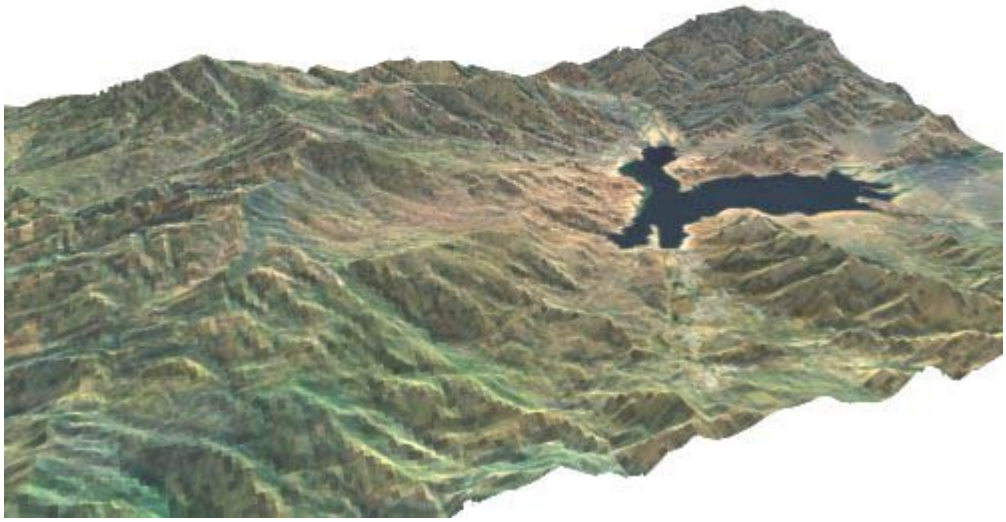
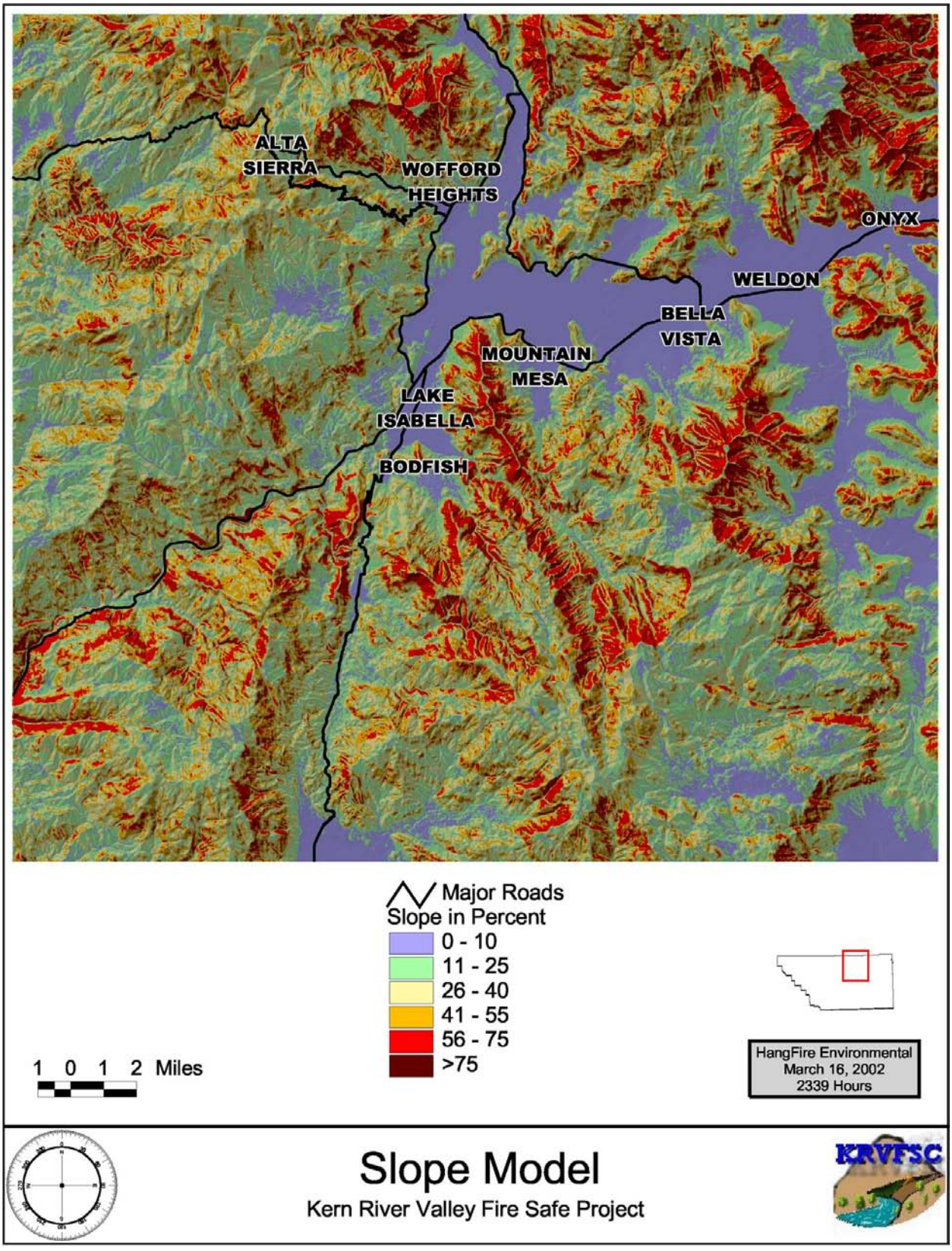
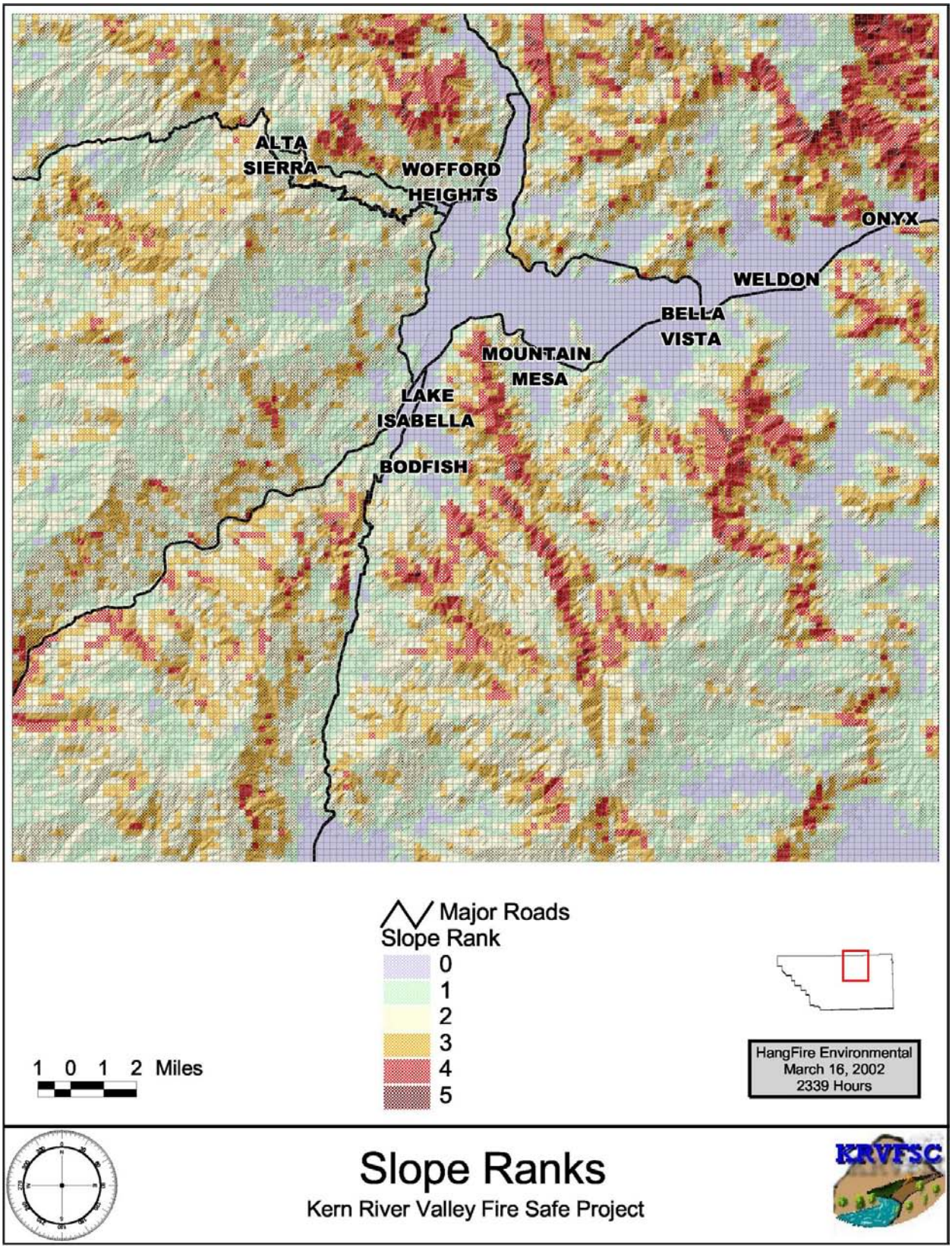


Figure 9: Using aerial photography draped over a digital elevation model, two components of the fire environment triangle can be visualized: fuel and topography.



Map 3: Slope Model Map.



Map 4: Slope Ranks by 25 Acre Cell Map.

Fire History

The final assessment as it relates to fuels is fire history. When fire burn through an area, it removes or reduces the overall amount of fuel on the ground. Depending on the fuel type, it may take a very long time before fuels reach their prefire hazard levels. Annual grasses will return to their prefire conditions by the next fire season. In other fuel types, prefire hazards will not be as great due to the reduction of the larger organic dead material such as fallen trees and branches removed by a fire.

Figure 10: As the Manter fire burns, it reduces the amount of vegetation or fuel.

Large fuel types like brush and timber may take several decades to return to their previous hazardous conditions. Some fuel types benefit from periodic fire over a given amount to time. Others fuel types can be converted, such as brush to grass, due to frequent fires.

This assessment will only focus on fire history within the last ten years due to the fuel conditions found within the Kern River Valley. With the exception of Alta Sierra and the slopes south of Bodfish, all of the fuel conditions surrounding the communities favor lighter and flashier fuel types. The vegetation is mostly composed of grass and sparse brush. By mapping fires over 13 acres (over one half the size of a 25 acre cell) since 1950, it becomes apparent that many areas will support large fire growth after 5 years without a fire. An example of this frequent occurrence can be found by looking at the Borel Fire that occurred during June of 2002. Within the perimeter of this fire, previous fires occurred in 1980, 1989, and 1995.

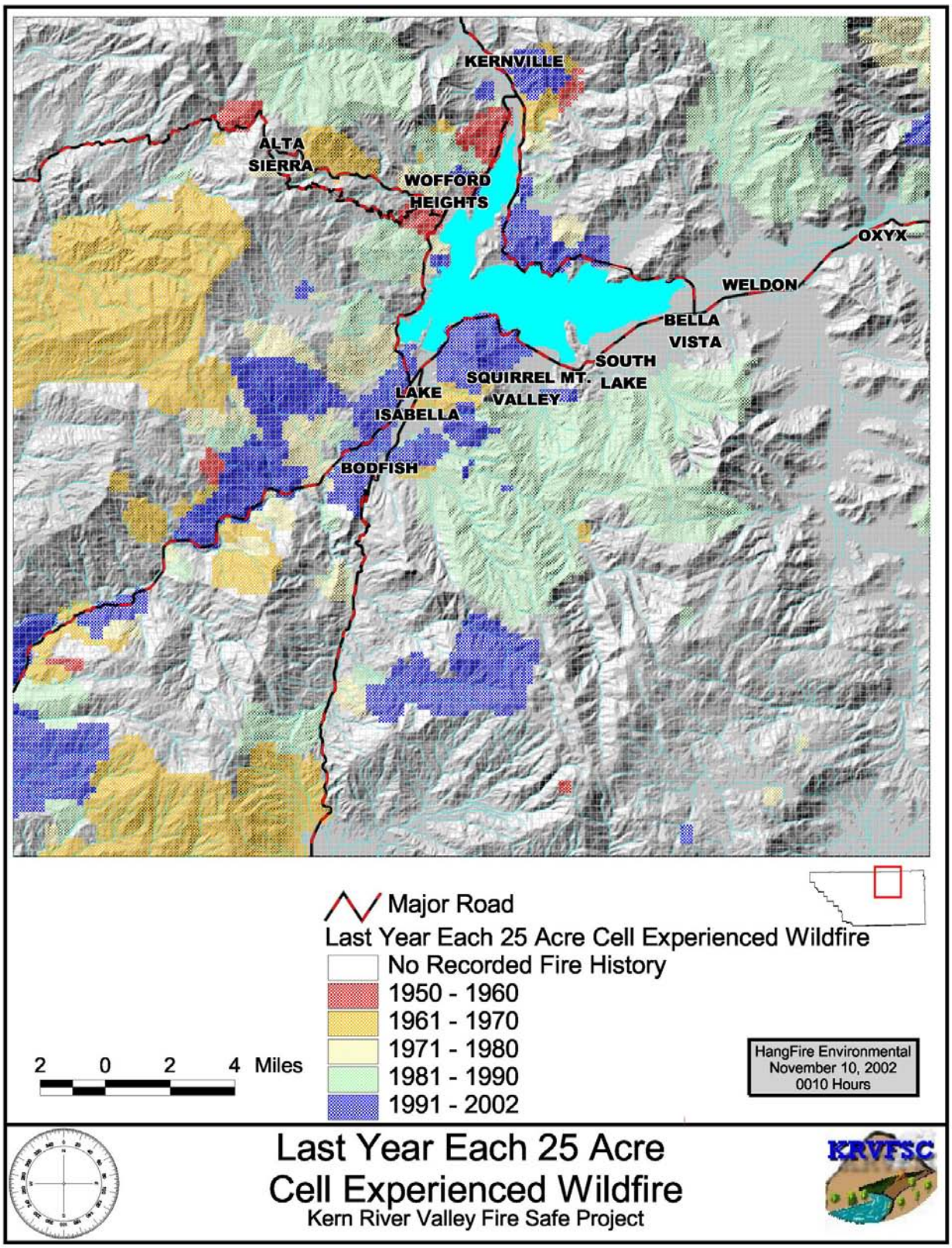
The fuel rank was reduced using the reduction factor found in Table 3. Fires that have reduced fuel within the last five years were reduced by two, within the last ten years were reduced by one. Please see the Last Year Each 25 Acre Cell Experienced Wildfire Map (Map 5) and Fuel Rank Reduction Factor Based on Recent Fires Map (Map 6).

Table 3: Fuel Rank Reduction Factors.

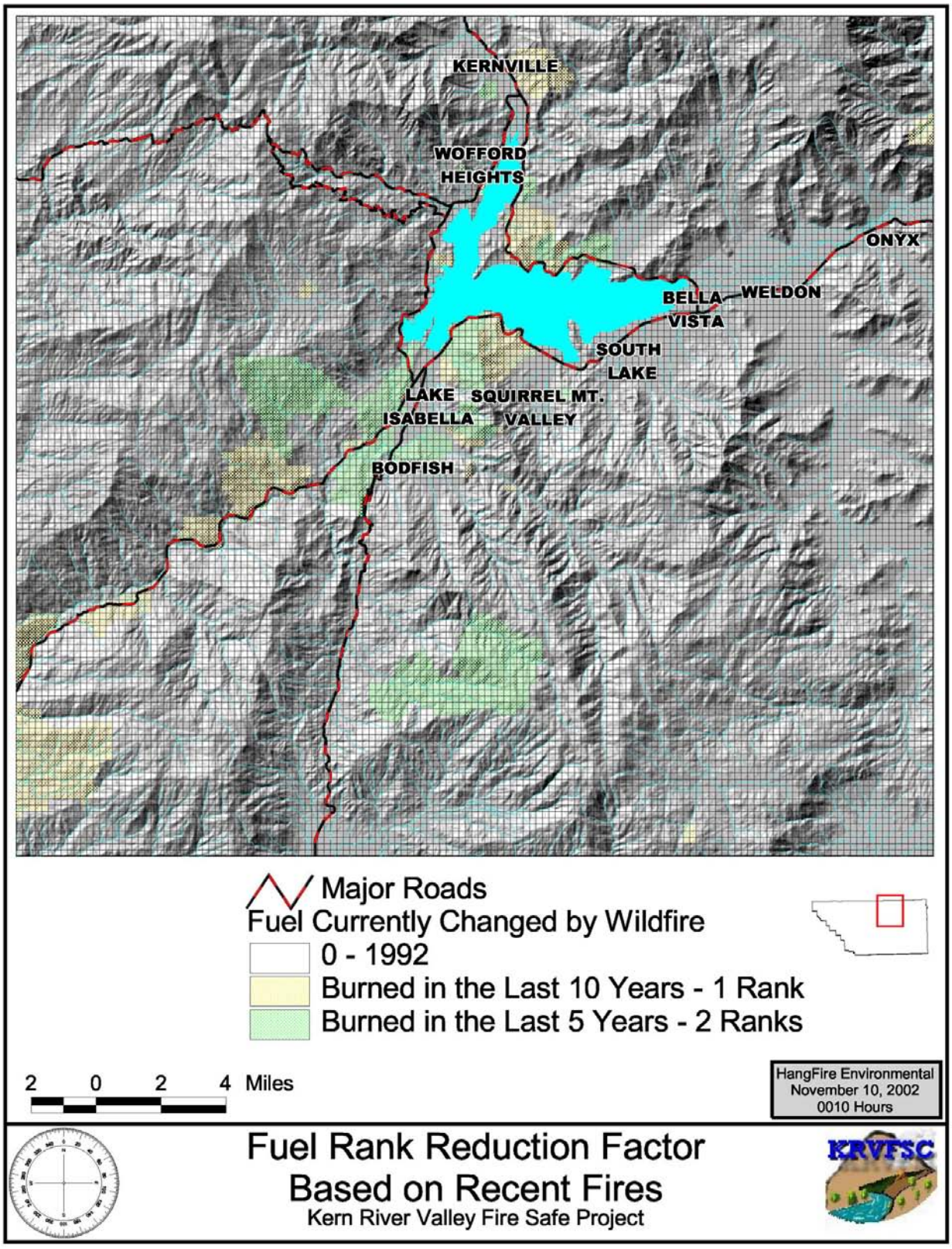
Time Since Last Fire	Reduction Factor
A fire between 2002 - 1998	-2
A fire between 1997 - 1993	-1
Fuel Model 1, 2 or Non-fuel type	0

Final Fuel Ranking

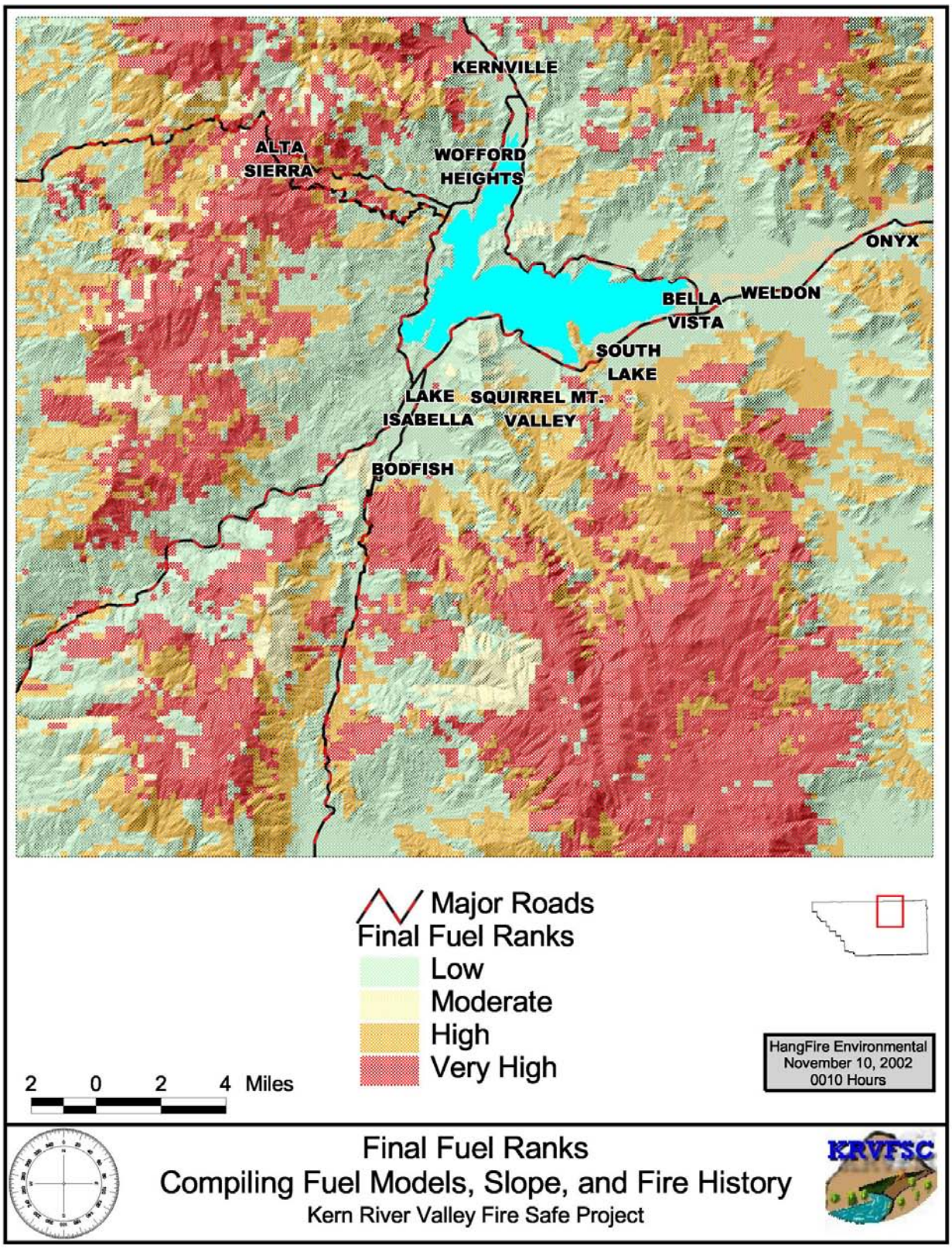
The final fuel ranking was performed by using the table found in Appendix B which combines attributes from the fuel model rank, slope rank, and previous fire reduction factors. Please see Final Fuel Ranking Map (Map 7).



Map 5: Last Year Each 25 Acre Cell Experienced Wildfire Map.



Map 6: Fuel Rank Reduction Map.



Map 7: Final Fuel Ranking.

Assets at Risk

A goal of the National Fire Plan is to protect communities and natural resources, and most importantly, the lives of firefighters and the public from wildfires. Assets at risk simply defined are something that someone does not want to burn. This could be a house, an endangered species, or grazing land for cattle. By assessing the assets at risk, it becomes apparent that the fire problem goes beyond the structures and homes. Several other resources can be affected by a wildfire or the mitigation measures employed to reduce damage. Measures such as a prescribed fire or shaded fuelbreaks may be placed in areas that may do more damage to cultural or ecologically sensitive areas.

There are several assets that were not included because of the sensitivity or the lack of data. Several areas within the Valley were historically visited by Native Americans. It would not be prudent to include maps of these areas due to scavengers seeking relics. Other assets have not been mapped or the reliability of the data is questionable. Several data sources were assessed for accuracy and completeness. For example, the United States Forest Service has compiled a large amount of data documenting the location of assets. The Forest Service data source could not be used exclusively because of the lack of data outside their jurisdiction. This would place a higher ranking for public versus private land. As more data becomes available, it should be added to the plan creating a living document.

By assessing assets, it may also bring other stakeholder interest into the project with the potential of different funding mechanisms. Examples of stakeholders that may be interested in asset protection may be homeowner insurance companies and the cattlemen's association. The emphasis of this plan is to protect communities; therefore, firesafe project location will favor structure survivability.

There is no priority to how assets are listed within the plan. With the exception of structures and ecologically sensitive areas, all assets are ranked equally. If an asset exists in a 25 acre cell, it will be given a score of one. Assets will be ranked based on the number of assets within each 25 acre cell. A cell may contain two structures, a threatened animal species, and pristine area, thus, it would receive a score of three. Due to the sensitivity of certain assets, some details were left off the maps or buffered an undisclosed distance. By buffering an asset, areas around a sensitive asset that would most likely be affected in the event of fire are also included. Outlines of the 25 acre cells were also excluded on the sensitive area maps to protect the areas.

The following information should be used by decision makers as a tool to seek more questions, **not** as a final planning document. It should be understood that all data becomes dated the moment it is printed. Prior to fuel modification project implementation, full environmental and cultural resource locations and impact reports will need to be documented.

Structure Density

Structures are the most politically sensitive asset. Nobody wants to lose their most prized possessions, their house. When a house burns, it takes with it memories, photos, and sentimental belongings as well as life's most precious need for shelter. The National Fire Plan[5] lists the following communities within the Kern River Valley at risk from wildfire:

[5] National Fire Plan listed by Federal Register / Vol. 66, No. 160 / Friday, August 17, 2001

- Alta Sierra
- Bodfish
- Bella Vista
- Kernville
- Lake Isabella
- Mountain Mesa
- South Lake
- Weldon
- Wofford Heights

Figure 11: Remains from a structure burned during the Deer Fire.

The State of California (California Department of Forestry and Fire Protection) also developed a Communities at Risk list and placed a hazard level code to indicate the fire threat level, where 2 denotes moderate threat, and 3 denotes high threat. The list included the entire communities listed in the Federal Register. All of the communities were given a 3 as a hazard level code. This is another methodology that proves that the Kern River Valley is at risk from a wildfire. It is also most likely a trigger point to obtain additional fire planning and prevention funding through grants. The methodology used by the State of California can be found in Appendix C.

Structure protection during a fast moving wildfire is a very difficult and dangerous strategy. Both firefighters and the public are placed in harm's way. To categorize which areas are more at risk based on the number of structures is a simplified approach. If ten structures are close together, such as a subdivision, then a single fire engine may be successful at protecting them. If the same ten homes were located on separate five acre parcels, then ten fire engines would be required to protect them.

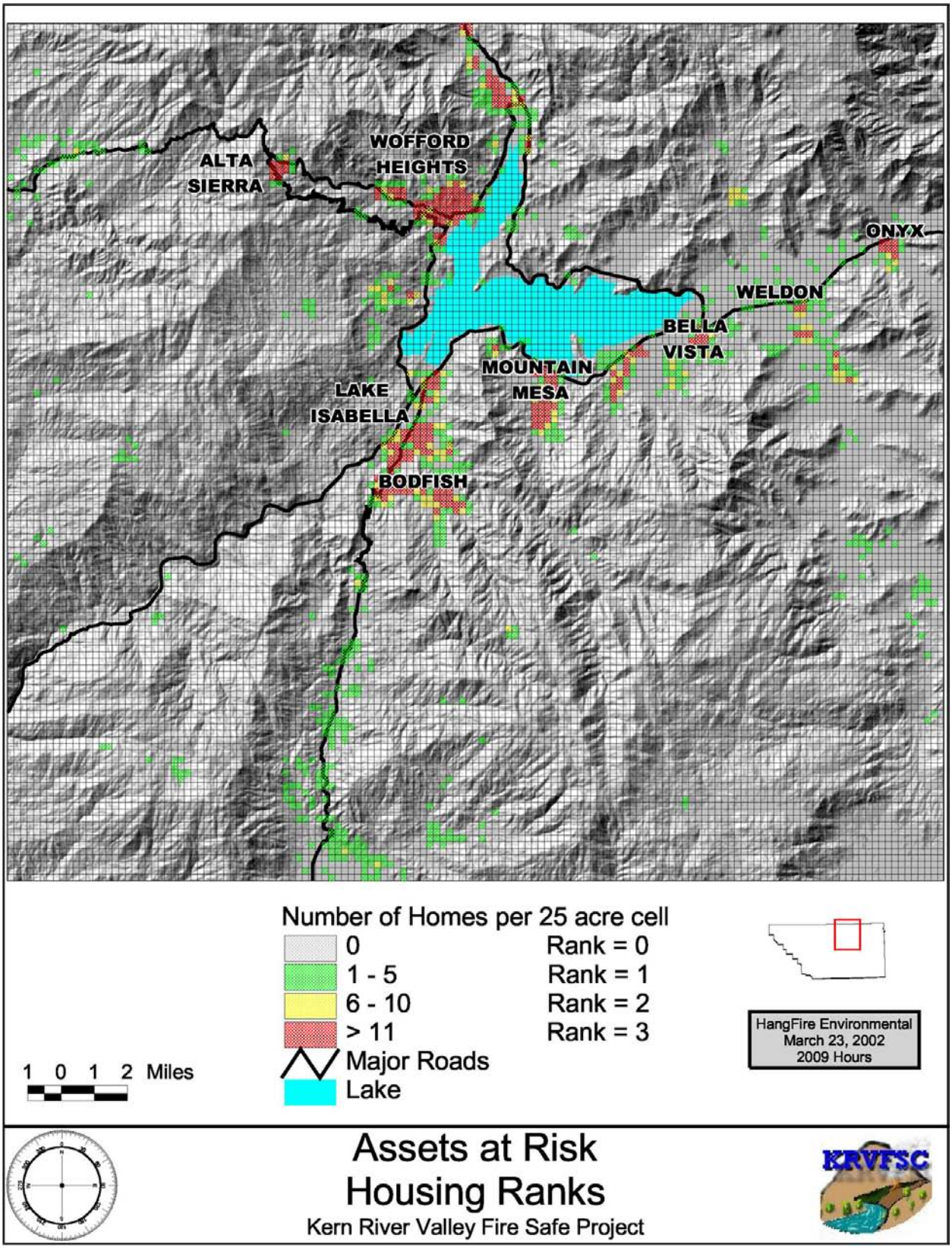
To identify which 25 acre cell has the highest threat based on structure density, the number of living units[6] were counted for each 25 acre cell. The following ranks were assigned based on the number of homes per 25 acre cell. Please see Table 4.

[6] Living unit defines as a parcel found in the Kern County's Parcel Database with an improvement value greater than $5000.00.

Table 4: Structure Ranking Methodology.

Number of Homes Per 25 Acre Cell	Rank
0	0
1 – 5	1
6 – 10	2
11 or more	3

Please see the Housing Asset at Housing Rank Map (Map 8).



Map 8: Number of Structures per 25 Acre Cell Map.

Ecological Sensitive Areas

Ecological Sensitive Areas are those areas intended to raise awareness about the presence of sensitive wildlife, plants and other ecological features. Many important natural areas have been lost in the past more through ignorance than by intentional abuse. Such sites can be assured increased protection when concerned individuals become aware of their location and significance. These sites include areas that provide habitat for both federally listed rare, threatened, endangered species and also species of concern. Wildfire and suppression actions can have a significant detrimental effect on these assets. Information was merged together to dilute spatial information for the protection of sensitive areas. They include several different sensitive areas and species including:

- California Natural Diversity Database list following sensitive **animal** species found within the project area:

1. Breckenridge mountain slender salamander
2. California Condor
3. California mastiff bat
4. California wolverine
5. Cooper's hawk
6. Fringed myotis
7. Goshawk
8. Kern Canyon slender salamander
9. Kern primrose sphinx moth
10. Mohave ground squirrel
11. Pacific fisher
12. Pale big-eared bat
13. Pine marten
14. San Joaquin pocket mouse
15. Small-footed myotis
16. Southern rubber boa
17. Southwestern pond turtle
18. Southwestern willow flycatcher
19. Spotted owl
20. Tricolored blackbird
21. Tulare grasshopper mouse
22. Western yellow-billed cuckoo
23. Willow flycatcher
24. Yellow warbler
25. Yellow-blotched salamander
26. Yellow-breasted chat
27. Yuma myotis

- California Natural Diversity Database list following sensitive **forest communities** species found within the project area:

    1. Southern interior cypress forest
    2. Great valley cottonwood riparian forest

- California Natural Diversity Database list following sensitive **plant** species found within the project area:

    1. Alkali Mariposa Lily
    2. Baja Navarretia
    3. Breedlove's Buckwheat
    4. Calico Monkeyflower
    5. Greenhorn Fritillary
    6. Kelso Creek Monkeyflower
    7. Kern Canyon Clarkia
    8. Mason's Neststraw
    9. Palmer's Mariposa Lily
    10. Piute Cypress
    11. Piute Mountains Jewel-flower
    12. Piute Mountains Navarretia
    13. Pygmy Poppy
    14. Shevock's Hairy Golden-aster
    15. Shirley Meadows Star-tulip
    16. Striped Adobe-lily
    17. The Needles Buckwheat
    18. Twisselmann's Nemacladus
    19. Unexpected Larkspur

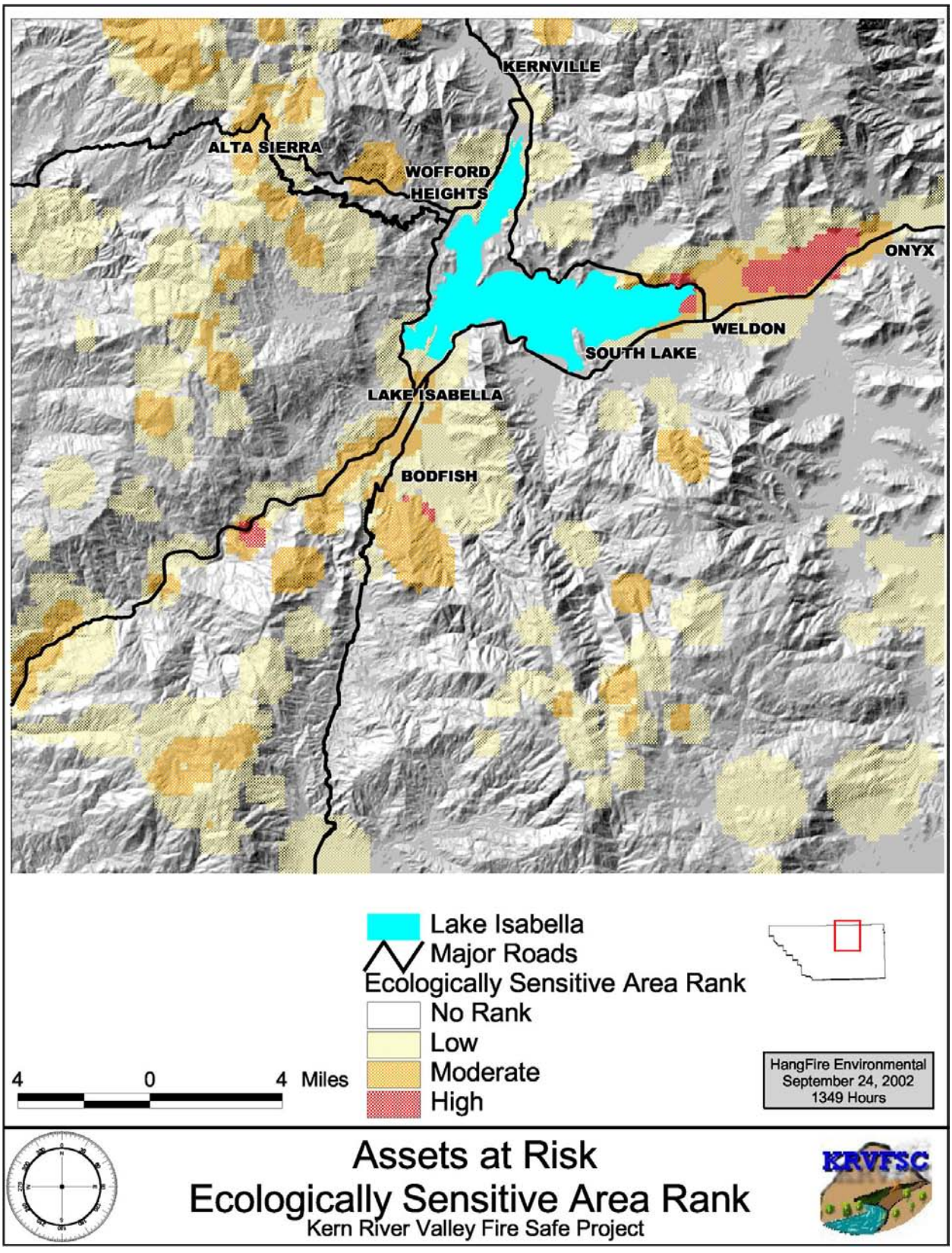
- Data provided by the United States Forest Service was also used to locate other sensitive species including California Spotted Owl, California Condor, and Goshawks.

A score of one was given to each 25 acre cell if it contained one of the aforementioned bullet points. The points were summed to define ecologically sensitive areas for the Kern River Valley. Ranks were assigned based on the total score.

Table 5: Ecologically Sensitive Area Ranking.

Summed Score	Rank
0	No score
1	1-Low
2	2-Moderate
3	3-High

Please see the Ecologically Sensitive Area Map (Map 9).



Map 9: Ecologically Sensitive Area Map.

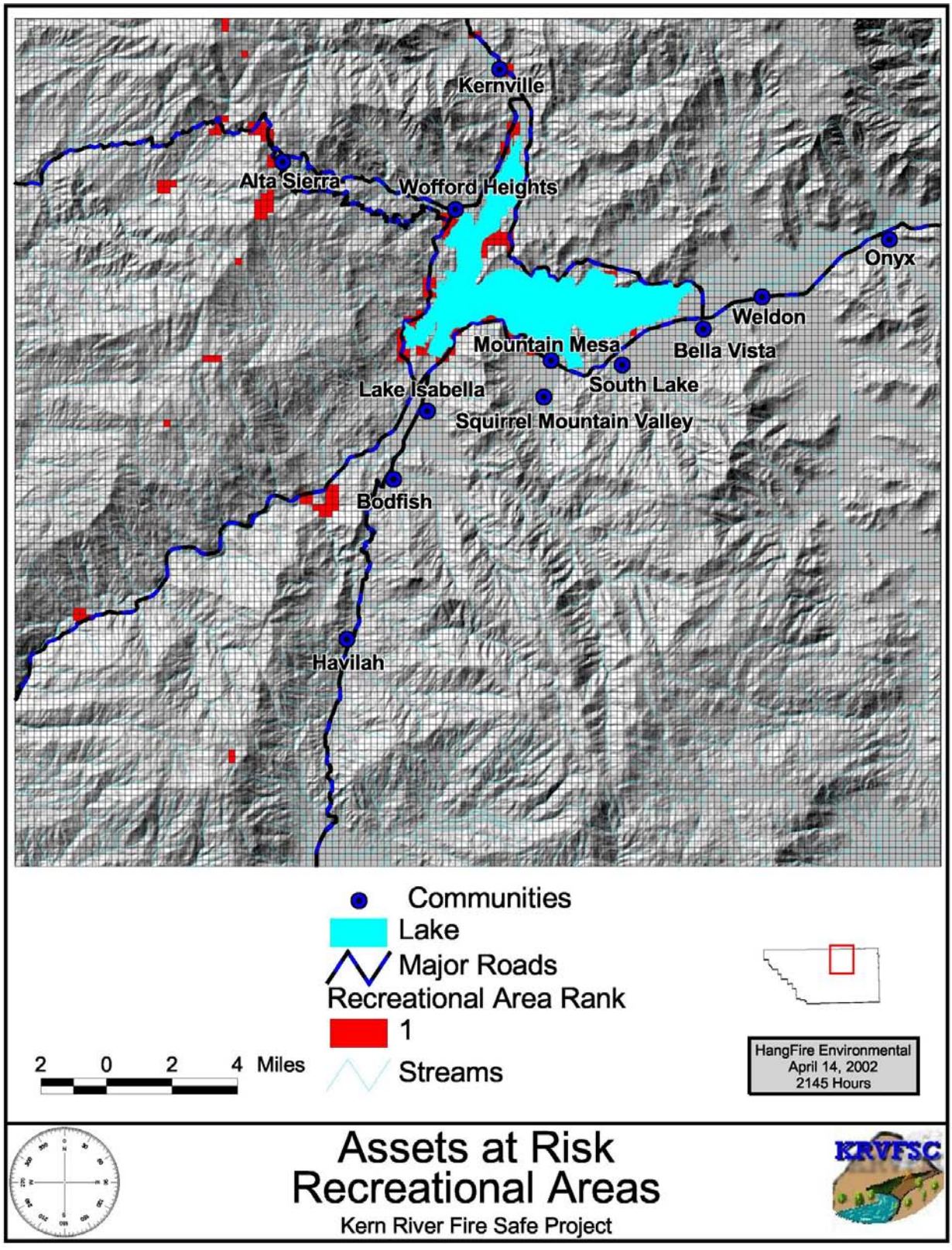
Recreational Areas

The Kern River Valley is a recreational Mecca. Numerous people visit the valley each year to enjoy white water rafting, camping, boating, and backpacking. The tourist industry is one of the greatest sources of income within the Valley with a major increase in population during the warmer months. During a major wildfire, recreational areas are often closed for visitor safety. It has been well documented that during major wildfires, the local economy can suffer due to the lack of tourist dollars. Unfortunately, recreational areas provide not only a source of income for the local tourist industry but also pose a possible increase for wildfire ignitions.

Data used for this assessment was from the United States Forest Service Recreational Areas database and the Geoname database developed by Steven Teale Data Center. Campgrounds, launch sites, and other recreational areas were mapped and given a score of one. The assessment was limited to these sites versus all public land possibly used for recreation due to the large amount of public land owned by the Bureau of Land Management and the United States Forest Service.

Recreational areas included in the assessment:

1. Alder Creek Campground
2. Alder Creek Summer Homes
3. Auxilary Dam Boat Ramp
4. Boulder Gulch Campground
5. Breckenridge Campground
6. Camp 9 Campground
7. Camp Owens
8. Cedar Creek Campground
9. Cedar Creek Summer Homes
10. Democrat Raft Take-Out
11. El Monte Summer Homes
12. Evans Flat Campground
13. French Gulch Boat Ramp
14. Girl Scout Camp Mtn. Meadow
15. Golf Course
16. Hanning Flat
17. Hobo Campground
18. Hobo Campground Overflow
19. Hobo Hot Springs Campground
20. Hungry Gulch Campground
21. Isabella Peninsula Boat Launch
22. Kern County Fish Hatchery
23. Kern Pk Summer Home
24. Kissack Bay Boat Launch
25. Live Oak Campground
26. Main Dam Campground
27. Miracle Hot Springs
28. Old Isabella Boat Launch & Campground
29. Paradise Cove Campground
30. Pioneer Campground
31. Riverkern Beach Picnic Area
33. Sandy Flat Campground
34. Shirley Meadow Summer Home
35. Shirley Peak Ski Area
36. South Fork Raft Takeout
37. South Fork Wildlife Area Parking
38. Summit Summer Homes
39. Tillie Creek Campground
40. Tillie Creek Group Use Area
41. Tiger Flat Campground
42. Gilbert Campground
43. Camp Kaweah
44. Live Oak Campground
45. Rhymes Campground
46. Slippery Rock Picnic Area
47. Davis Campground



Map 10: Recreational Area Map-A score of 1 was given to each 25 acre cell where recreational areas exist.

Pristine Areas

The Kern River Valley is a very biologically diverse area. There are few places in the world that several eco-regions come together allowing major changes in forest type within a short driving distance.

The Pristine Area category tries to capture the special and unique places within the Valley. All of these areas are federally listed and protected. Wilderness areas are one of the last guarantees of open space, a signature element of this region. A Wild and Scenic federally listed portion of the Kern River winds through the northeast portion of the study area. The southern reaches of the Giant Sequoia National Monument extends into the northwestern portion of the study area. Areas of Critical Environmental Concern provide habitat for variety of reptiles and birds as well as archeological resources. Natural Research Areas are defined as areas which have been established for the study of flora and fauna in their natural state. Although fire occurrence would add to the field of study, several of these plots were originally chosen due to the limited human caused disturbances.

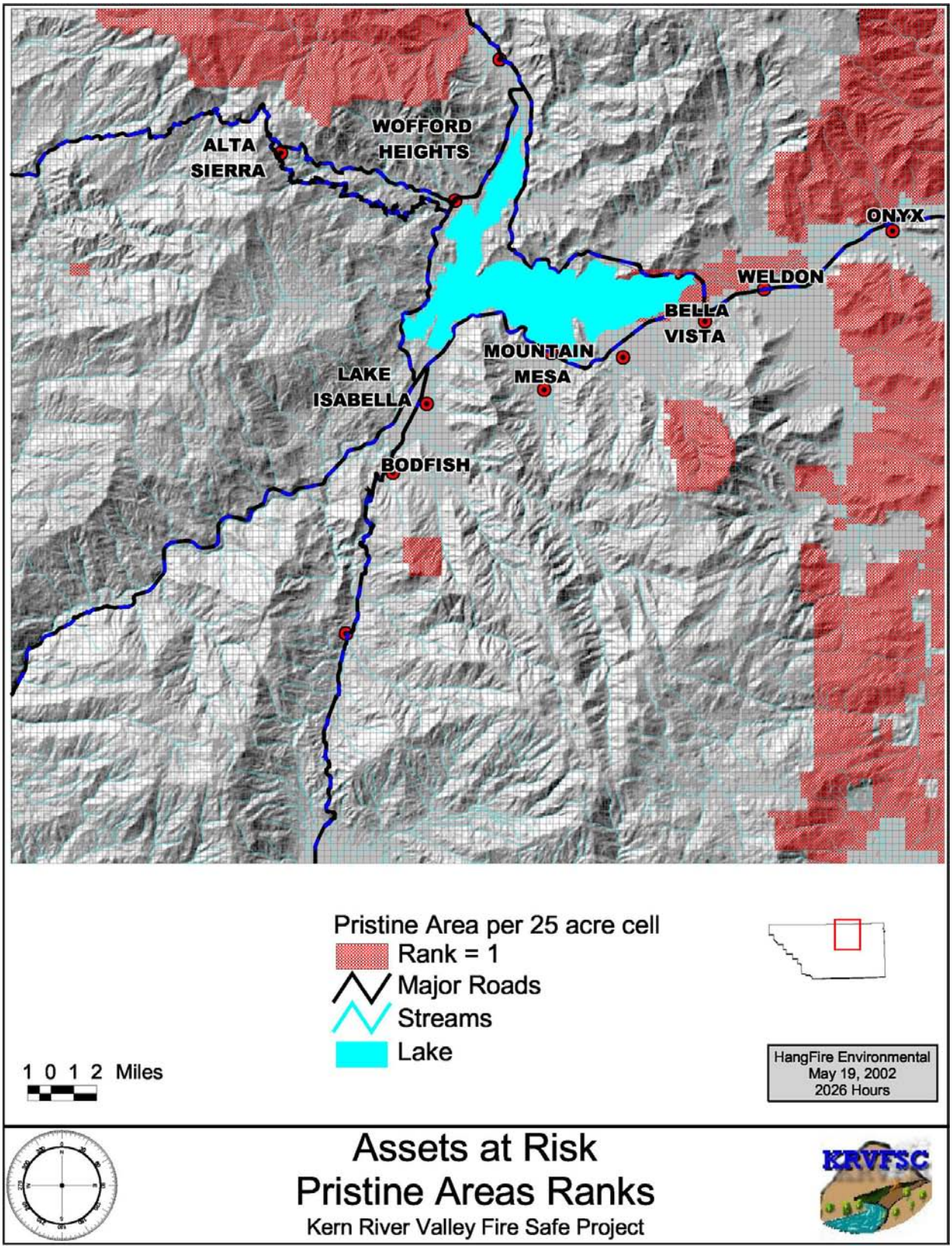
Fire would result in both natural and unnatural disturbance such as fireline construction, bulldozer lines, and retardant drops from firefighting aircraft where permitted. In wilderness areas, minimum impact suppression tactics (MIST) are employed to minimize environmental damage. Unfortunately, MIST can also allow a fire to have the upper hand, burning unchecked, due to the lack of bulldozer control lines and fire retardant airdrops[7].

All of these assets would be difficult to capture in fiscal terms. Their existence adds a significant value to the area. For this assessment, areas where these pristine areas exist receive a rank of one.

The following features make up the Pristine Areas asset at risk:

1. Domeland Wilderness
2. The Canebrake Ecological Reserve
3. South Folk Wildlife Areas
4. Jawbone Butterbredt Areas of Critical Environmental Concern
5. Brightstar Wilderness Area
6. Kern Wild and Scenic River
7. Bodfish Paiute Cypress Special Interest Area
8. Kern River Preserve-The Nature Conservancy
9. Kiavah Wilderness Area
10. Long Canyon Research Station
11. Williams Wildlife Area
12. Giant Sequoia National Monument

[7] Depending of the policies of the local forest.

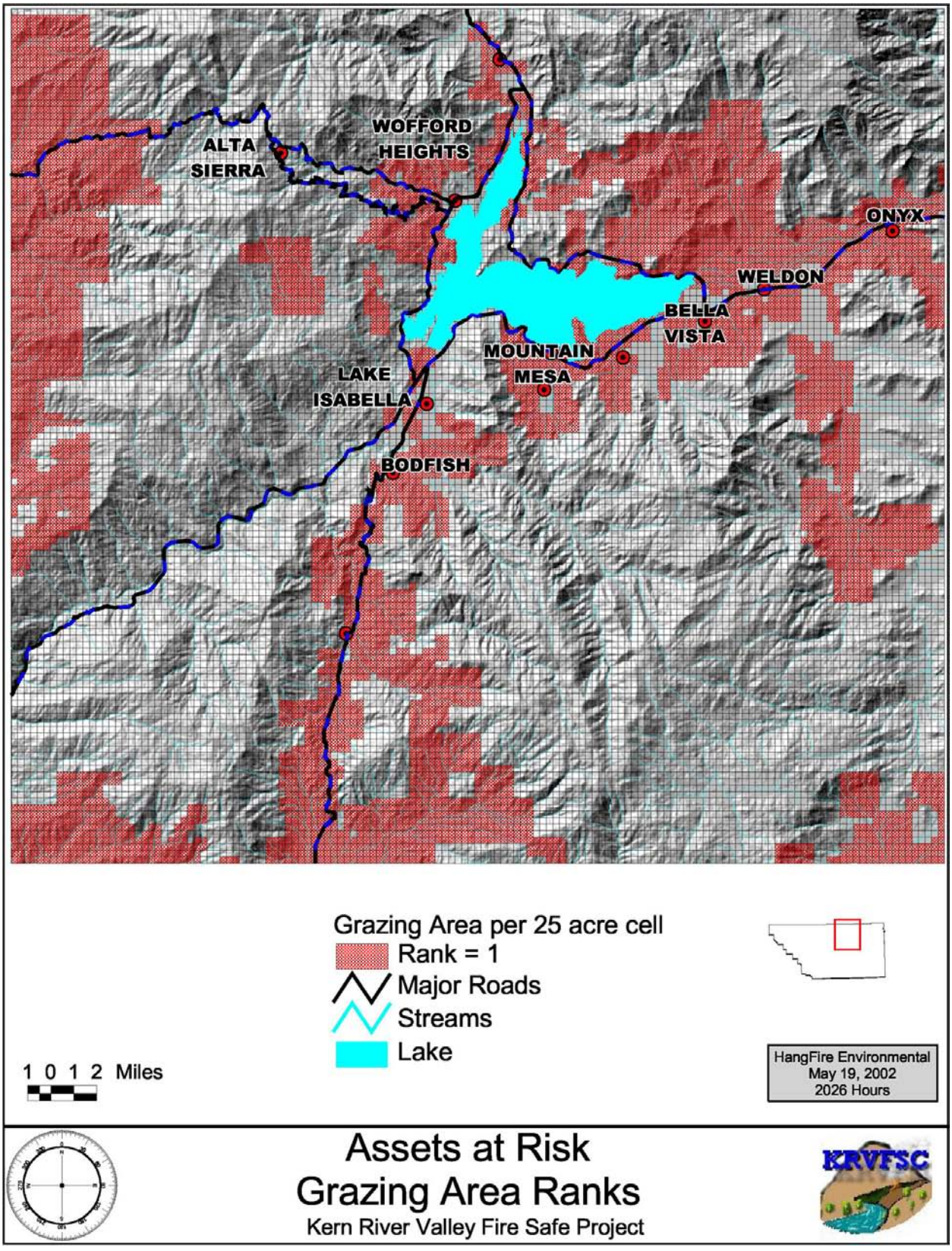


Map 11: Pristine Area Map-A score of 1 was given to each 25 acre cell where pristine areas exist.

Grazing Lands

A large portion of the Valley is used as fodder for cattle grazing. Fire can affect this asset in two different ways. First, it removes a food source. Secondly, several heads of cattle can be killed in a wildfire resulting in a severe economic setback to a rancher.

Areas are designated as grazing lands by the California Department of Conservation-Division of Land Resource Protection-Farmland Mapping and Monitoring Program. This category was developed in cooperation with the California Cattlemen's Association, University of California Cooperative Extension, and other groups interested in the extent of grazing activities. The data is based on mapping land on which the existing vegetation is suited to the grazing of livestock. The minimum mapping unit for Grazing Land is 40 acres. Areas that are designated as grazing lands received a rank of one.



Map 12: Grazing Area Rank Map-A score of 1 was given to each 25 acre cell where grazing areas exist.

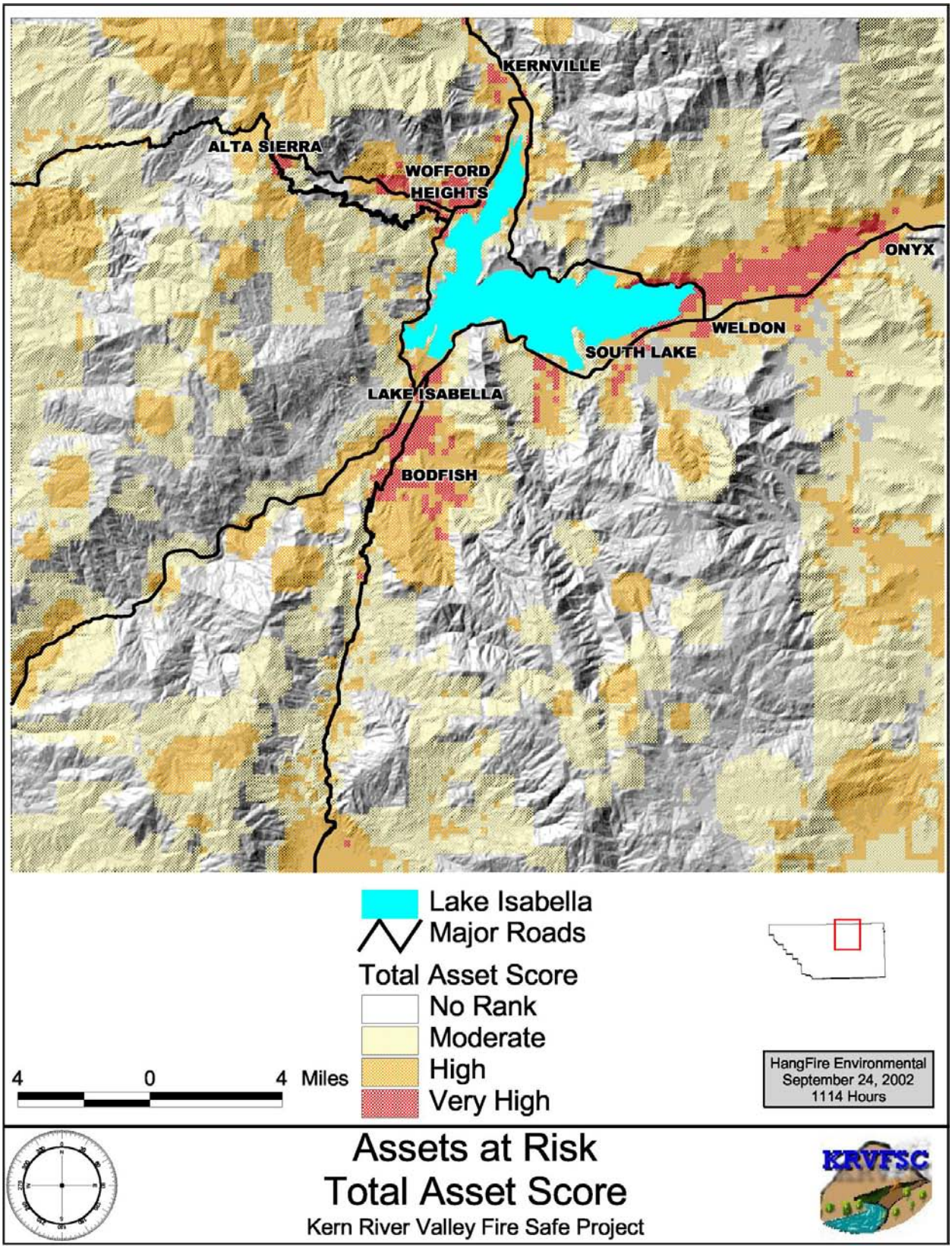
Total Asset Ranking

The final asset scores were a combination of the housing, ecologically sensitive areas, recreation, pristine, and grazing assessments. Housing and ecologically sensitive areas each had a possible rank between one and three depending on density. The other assets each had a rank of one depending whether they were present. Each 25 acre cell was given a value based on the rank totaled and displayed in the Table 6. Please see the Assets at Risk Total Asset Score Map (Map 13).

Table 6: Total Asset Ranking Methodology.

Summed Score	Rank
0	No score
1	Moderate
2 - 3	High
4-6	Very High

Figure 12: Several assets are destroyed by a wildfire. Some are easy to quantify damage, such as homes but others are more difficult, such as air quality.



Map 13: Assets at Risk Map-Created by accumulating all assets ranks.

Other Factors that Influence Risk

Introduction

There are several factors that influence if a fire will occur and the opportunities for it to escape control efforts. When a fire escapes initial attack, what factors cause it to become large, costly, and damaging? Did it take too long for the fire department to arrive? Did the homeowner fail to provide defensible space around their structures? Did the fire start on the damper north slope or the deserts dry south slope? Do certain areas pose a greater risk for an arsonist? Obviously not all of these questions can be answered but several can be modeled and ranked to indicate areas of higher risk and hazard.

Ignitions

If an area has a high density of historical ignitions in an area, it is safe to presume this will continue until something changes. What can change? This depends on the cause of the ignition. For example, if several fires are caused by children playing with fire, then a focused campaign of fire prevention in the school system is needed. This approach to cause determination and prevention strategy is called ignition management. This section will examine ignition density and management through the use of two models.

Ignition Density

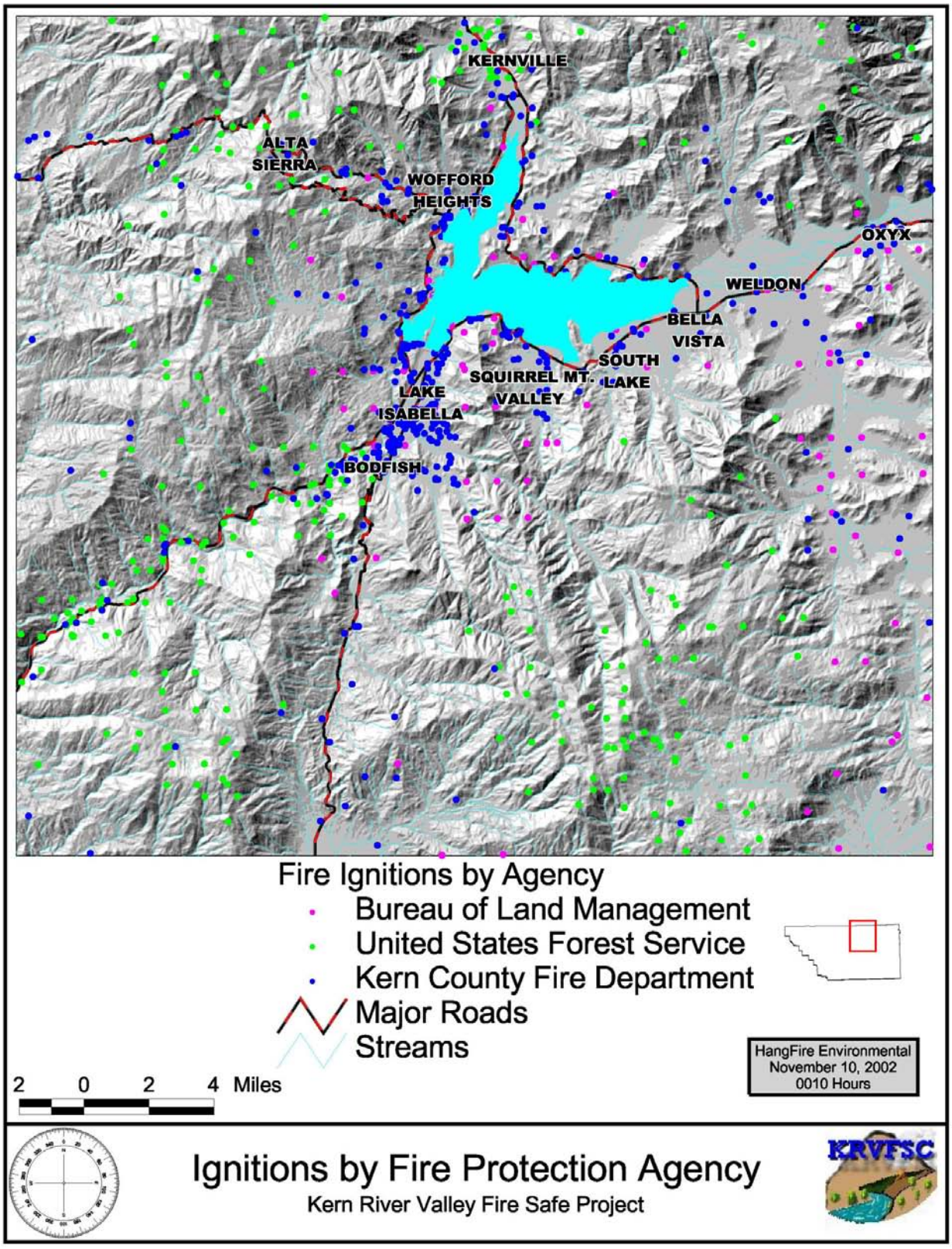
For this assessment, over 950 ignitions were mapped between 1982 and 2002. The original ignition data was provided by the Southern Sierra Geographic Information Cooperative (SSGIC). The data was altered because the SSGIS wanted to simulate 18 years of data for their analysis. The data did not include 18 years of information for all agencies. To make up the lack of data, they duplicated the nine years of data for Kern County Fire Department's jurisdiction. This duplicated information was deleted from the analysis and new data was provided by the Kern County Fire Department. Please see Table 7 for included years of data by agency.

Table 7: Number of ignitions by fire protection agency.

Agency	Years of Data	Number of Ignitions
Bureau of Land Management	1983-2000 (18)	139
Kern County Fire	1982-1989,1994,2000-2002 (12)	448
United States Forest Service	1982-2000 (19)	370

There are years of missing data but the trends are apparent within the assessment using the best available data. To help visualize the fire occurrence, three maps were created. The first shows ignitions by the reporting fire agency. Like most ignition studies, there is a strong correlation of ignitions near transportation corridors and urban areas. Please see the Ignitions by Fire Protection Agency Map (Map 14).

To quantify the number of ignitions, Map 15 will display a density analysis. A density analysis calculates a continuous density surface from the ignitions. The computer program queries and counts the ignitions within a half mile of each occurrence. Each cell in the map layer will contain the number of ignitions per square mile. Please see the Ignition Density Map (Map 15).



Map 14: Ignitions by Fire Protection Agency Map.

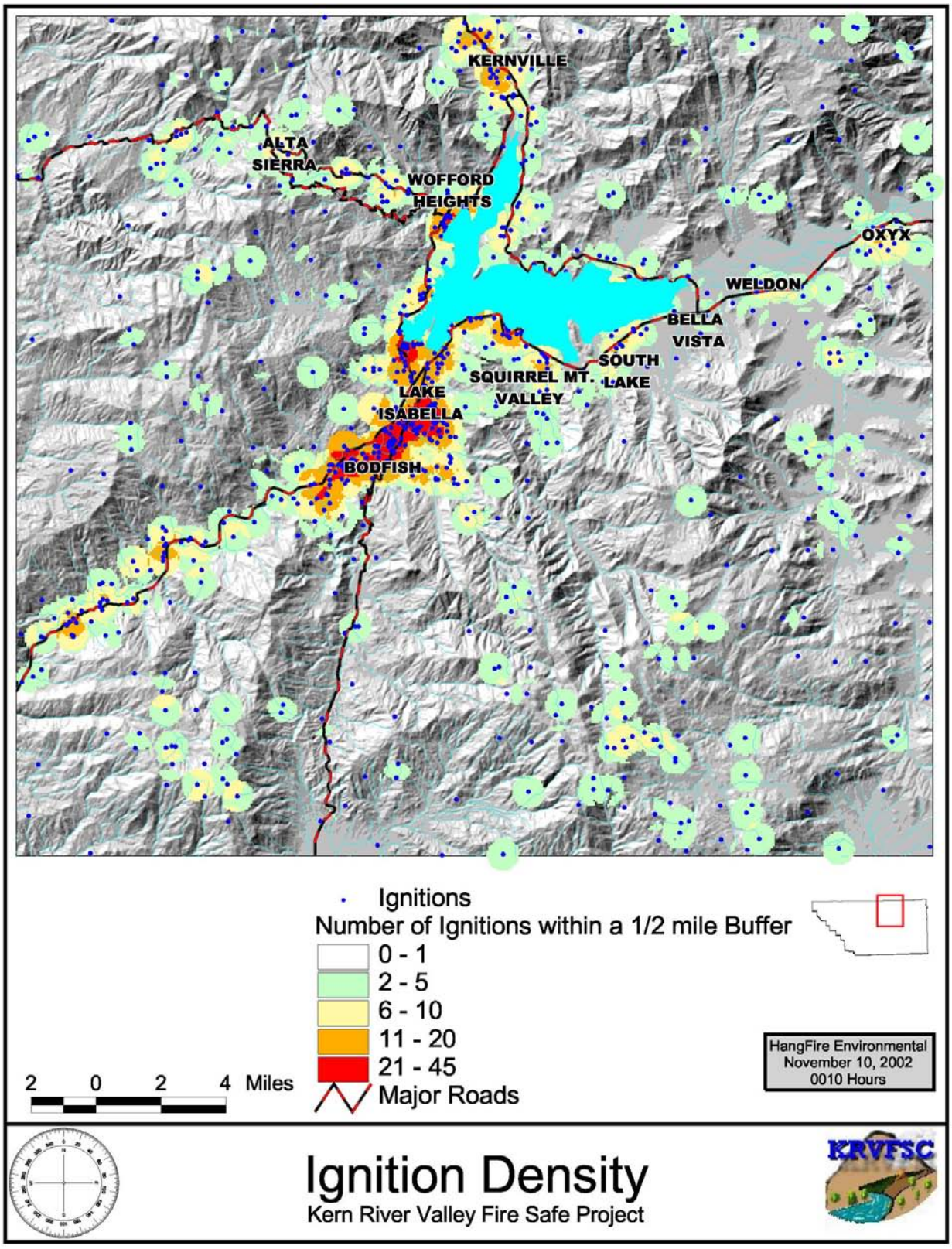
Figure 13: Some ignitions are successfully extinguished by fire suppression crews. This is determined by how quickly and intensely a fire burns.

The final map in this analysis sums ignitions within each 25 acre cell. The cells with the highest number of ignitions were given the highest rank. The assumption is that areas with a past ignition problem will continue to have a problem until a change occurs. In the Table 8, ranks were placed on each 25 acre cell based on the number of ignitions. Please see the Fire Occurrence in Each 25 Acre Cell Map (Map 16).

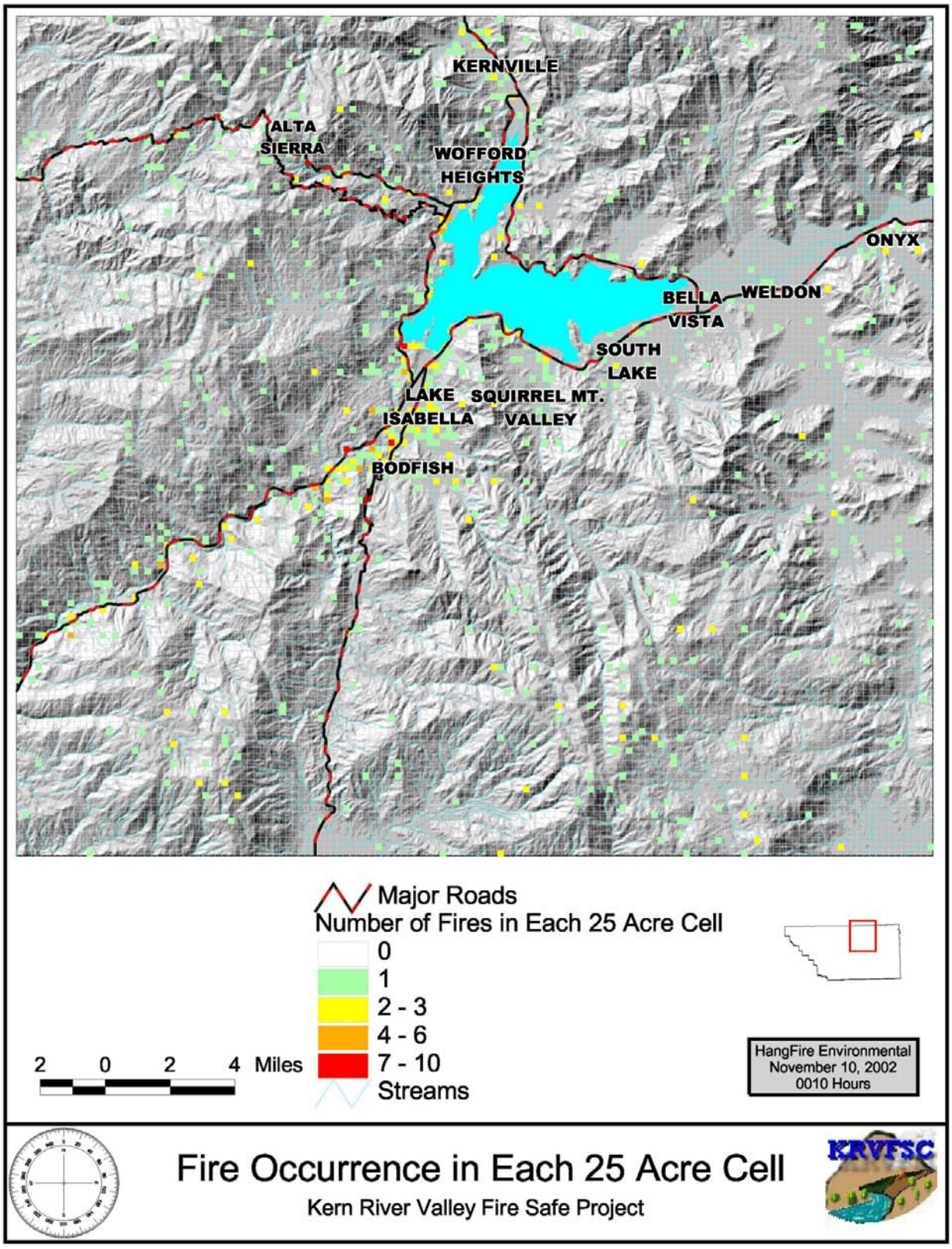
Table 8: Number of ignitions determines the ranking.

Number of Ignitions	Rank
0	0 - No Rank
1 - 2	1 - Low
3 - 5	2 - Moderate
6 - 10	3 - High

Figure 14: Some ignitions are not successfully extinguished by fire suppression crews resulting in large, damaging and costly fires. McNally Fire-2002



Map 15: Ignition Density Map created by buffering each ignition by one half mile and summing the total of ignitions found within the buffer.



Map 16: Fire Occurrence in Each 25 Acre Cell Map.

Fire Cause Analysis

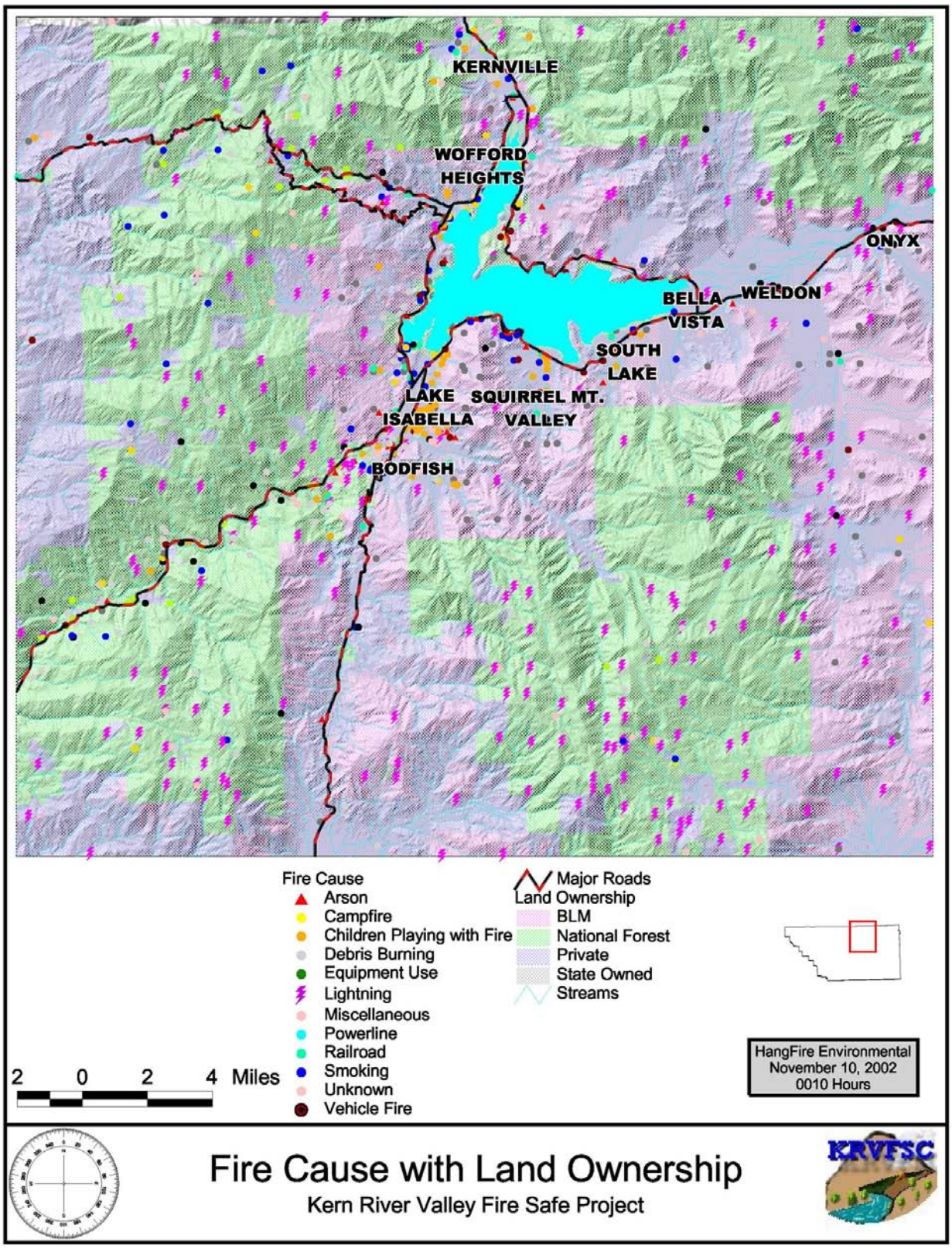
To prevent the damage of future fires, fire cause determination is a priority on every fire. How high of priority depends on the individual performing the fire investigation and filing the report. Like many studies of fire cause, there are some issues with the integrity of data. For example, there are 33 reported railroad caused fires. Unfortunately, there are no railroad tracks within the study area. Another strange coincidence is that on private land, there are 34 arson fires within the study area. On public lands, using 7 additional years of data than on private lands, there are no reported arson fires. On private lands there were 25 vehicle fires, yet on public there were none or this may fall into the "Equipment Use" category.

Figure 15: Fire cause determination is a priority on all fires to prevent future fires form occurring. McNally Fire-2002

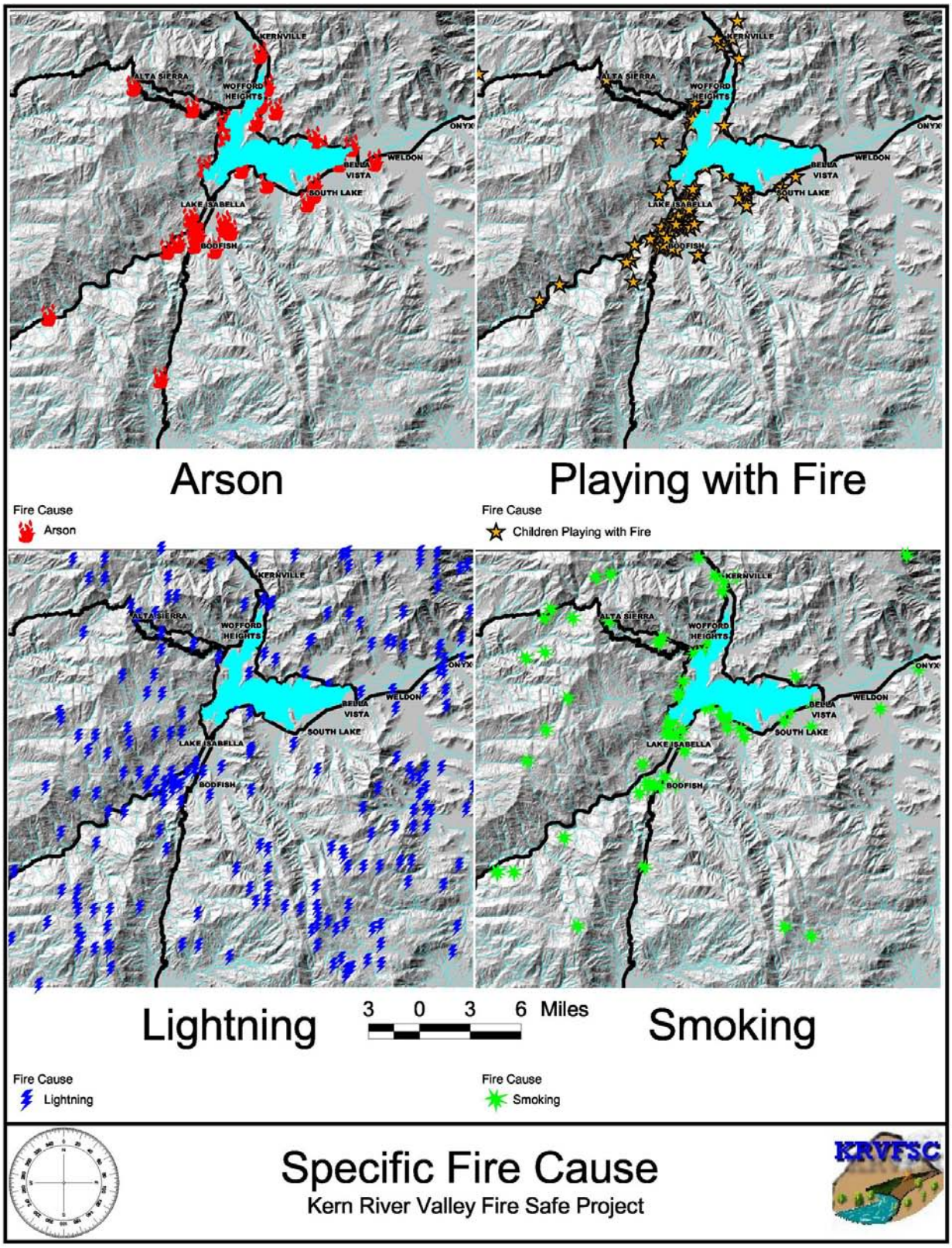
For future analysis, it is recommended to keep monthly tallies of fire cause within the Kern River Valley using multi-agency information. Common coding should be used by all agencies so that vehicle fires are captured as such. The information should be provided by a chief officer from each agency charged with checking the validity of the fire cause. This would ensure that the data is being scrutinized for errors prior to it being used for analysis. Please see the Fire Cause with Land Ownership Map (Map 17) and the Specific Fire Cause Map (Map 18).

Table 9: The number of fires with specific fire cause. See Table 7 for the number of years of data.

Fire Cause	Number of Fires
Lightning	275
Miscellaneous	165
Unknown	120
Children Playing with Fire	91
Smoking	74
Equipment Use	53
Debris Burning	35
Arson	34
Railroad	33
Campfire	31
Vehicle Fire	25
Powerline	21



Map 17: Fire Cause with Land Ownership Map.



Map 18: Specific Fire Cause Map.

Local versus Out of Town Residency

Another factor that influences the amount of damage by a wildfire is the number of structures destroyed. When fire threatens the interface of a neighborhood, firefighters usually stop fighting the fire and protect structures. This allows the fire to grow bigger and threaten even more homes. The July 2002 Deer Fire destroyed 47 dwellings, 63 vehicles, 84 outbuildings (garages, barns, sheds), eight boats and 22 trailers or recreational vehicles. Several homes were saved by firefighters. Several homes were also saved by local citizens that live in the area.

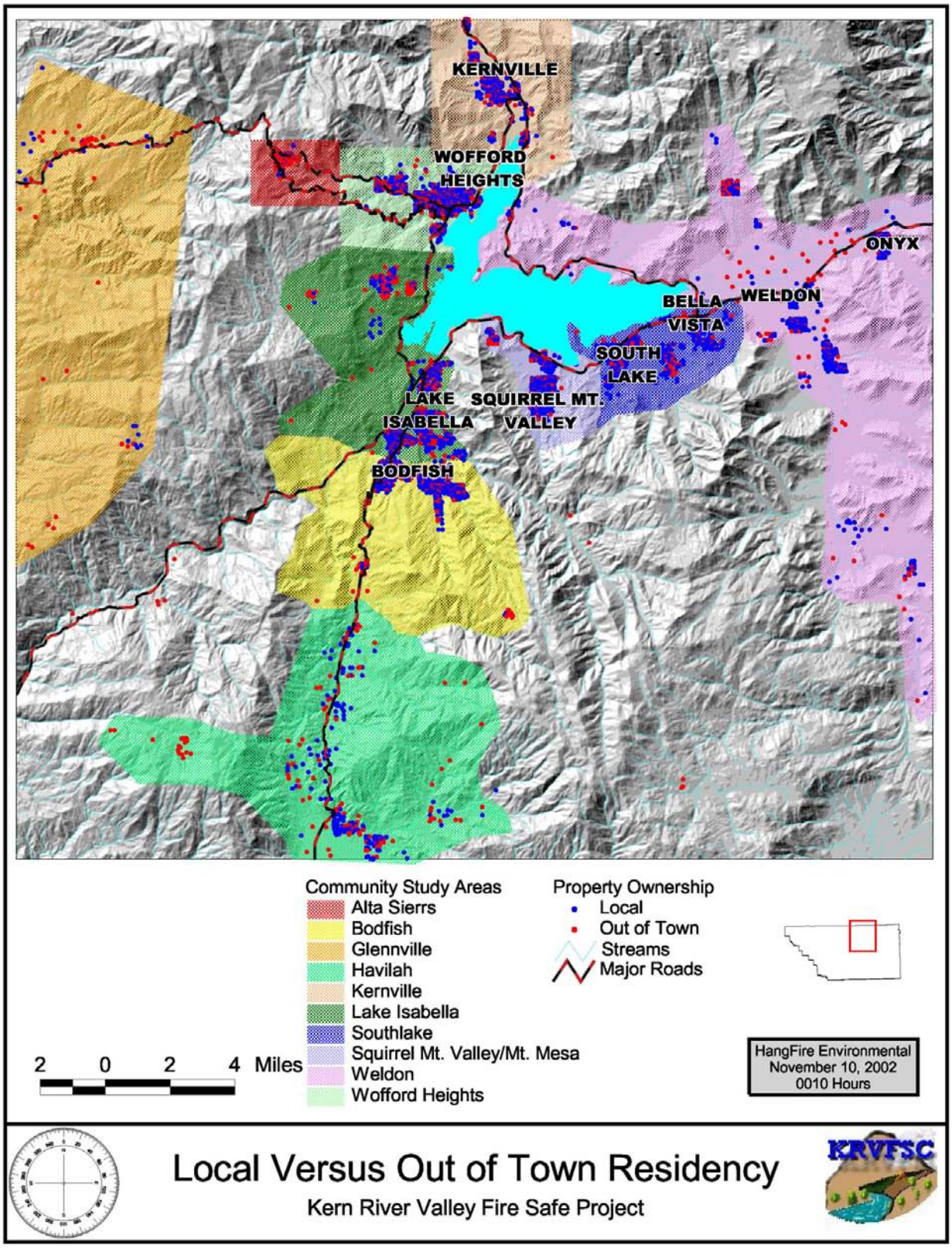
The Fire Safe Council wanted to know how many citizens were part-time versus fulltime residents. Many of these fulltime citizens may be able to assist in the event of a wildfire with proper training. Many of these residents may also be a liability due to their age, physical or mental conditions, and the combustible construction of their homes. Therefore, this information is not part of the assessment but further information to assist decision makers.

In order to better manage such a large area, the area was broken down into subsections of land called study areas. The study areas were based on common geographic areas. A handful of homes did not fall into any of these study areas due to their isolation. Table 10 lists the number of local residents versus out of town residents. Local residents are defined as an improved parcel[8], whose owner is listed in the database with a zip code found within the Valley. Please see the Study Area Map (Map 19).

Table 10: The number of local versus out of town residents.

Study Area	Local Residents	Out of Town Residents
Kernville	551	242
Wofford Heights	934	456
Alta Sierra	51	240
Glennville	21	46
Lake Isabella	1213	443
Bodfish	729	288
Havilah	152	108
South Lake	637	176
Weldon	506	171
Squirrel Mt. Valley/Mt. Mesa	590	122
Total	**5384**	**2292**

[8] Improved parcel is defined as a parcel within Kern County's parcel database with an improvement value of $5000.00.



Map 19: Local Versus Out of Town Residency. Residency was defined by the property owners zip code found within Kern County's Parcel Database.

Weather Analysis

There are five[9] weather stations surrounding the Kern River Valley that are representative of the historical climatic conditions in the area. These fire weather stations are situated in different locations and elevation to gather information that has the greatest effect on fire behavior. Although the Walker Pass Weather Station is outside the assessment area, it is representative of the eastern middle elevations.

As seen in the table below, the most dramatic change in weather is based on elevation. Under 6000 feet of elevation, there is very little variation of fire weather. The 95th percentile maximum temperature varies from 100-104 degrees, minimum humidity varies from 7-11 percent, and wind speeds varied from 8-14 miles per hour (mph).

In the upper elevations, due to the adiabatic lapse rate (5½ degrees per 1000 feet), temperatures are cooler and humidities are higher. There is a correlation between elevation and fire history. In the southeast quadrant of the assessment area, there are numerous ignitions, but no large fire history. Please see Elevation with Fire History Map (Map 20).

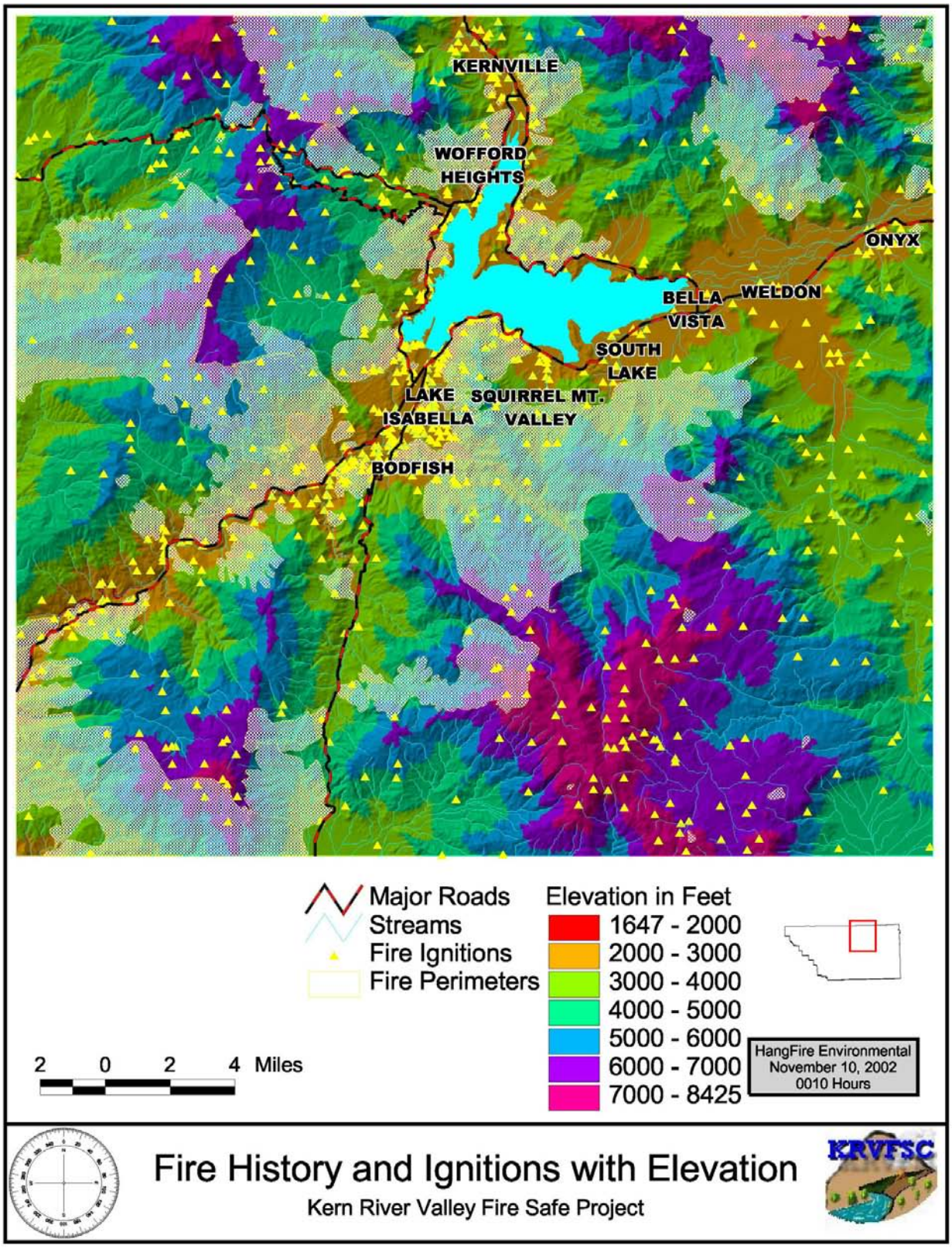
The last weather related factor that will influence the assessment is aspect. Aspect is defined as the direction the slope faces. Southern aspects receive more sun throughout the day resulting in dryer fuels with higher fuel temperatures. Due to the higher temperatures and lower humidity found on these slopes, the probability of ignition[10] is normally higher than other areas.

Figure 16: The fire is burning on the shaded northern slope with lower intensity.

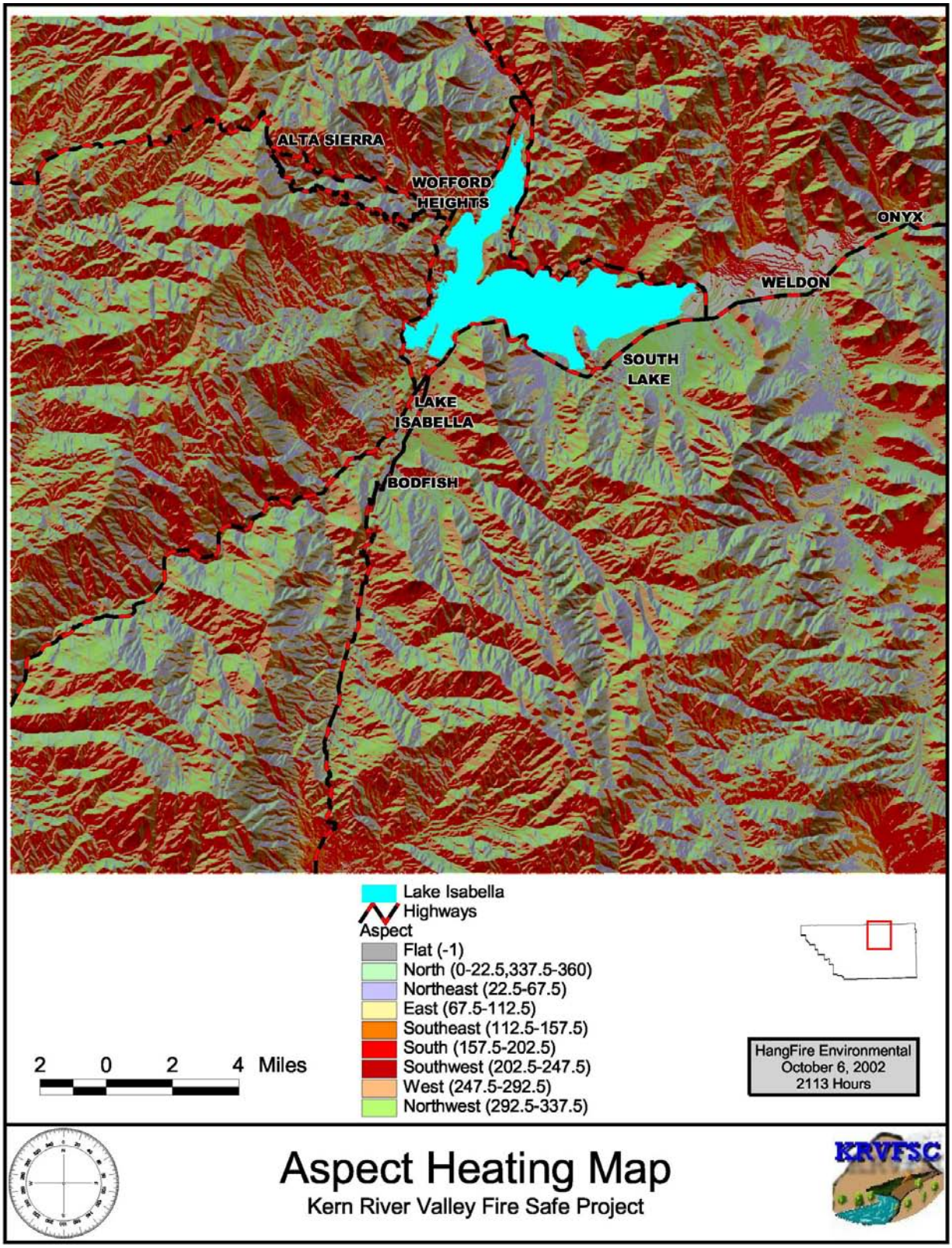
As seen in Figure 16, the fire is burning on the shaded slope resulting in a fire with lower intensity and rates of spread. Conditions would be much different if the fire was burning on the slope exposed to the sunlight.

Areas found on the southwestern, southern, and southeastern slopes will be given one additional point in the hazard ranking. Please see the Aspect Map and Aspect Ranking Map (Maps 21 and 22).

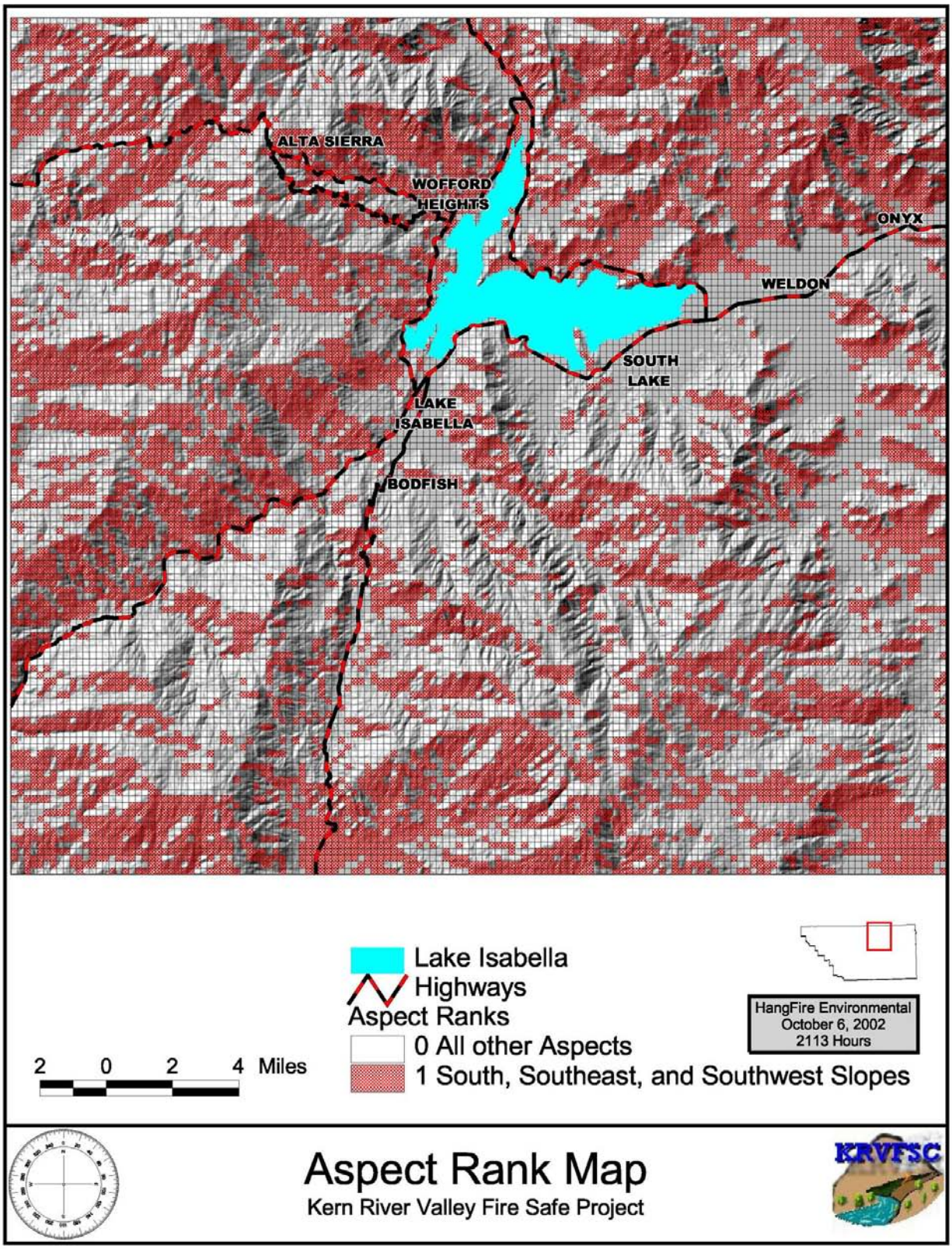
[9] The Bakersfield Portable remote automated weather station was not utilized for lack of data.
[10] The probability, in percent, of a burning ember landing in a receptive fuel and continuing to burn.



Map 20: Fire History (1950-Present) and Ignitions with Elevation Map. Notice the high number of ignitions in the southeast quadrant of the map without any large fire perimeters.



Map 21: Aspect Heating Map. The warmer colors represent slopes that receive higher amounts of solar radiation.



Map 22: Aspect Rank Map. The southern slopes were given a rank of one on account of the dryer conditions and lower fuel moistures.

Table 11: Democrat Weather Station-045002 Elevation: 2375 feet

Weather Condition	**Moderate** 70th percentile	**High** 90th percentile	**Extreme** 95th percentile
Maximum Temperature (F)	96°	100°	102°
Minimum Humidity	19%	13%	11%
Maximum Wind Speed	8 mph	12 mph	13 mph

Weather Condition	**Moderate** # of Days Meeting the criteria/ Total Observations	**High** # of Days Meeting the criteria/ Total Observations	**Extreme** # of Days Meeting the criteria/ Total Observations
Maximum Temperature	701/2532	248/2532	106/2532
Minimum Humidity	54/1875	133/1875	70/1875
Maximum Wind Speed	737/2532	167/2532	99/2532

Table 12: Breckenridge Weather Station-045009 Elevation: 7548 feet

Weather Condition	**Moderate** 70th percentile	**High** 90th percentile	**Extreme** 95th percentile
Maximum Temperature (F)	78°	82°	84°
Minimum Humidity	25%	19%	15%
Maximum Wind Speed	8 mph	13 mph	15 mph

Weather Condition	**Moderate** # of Days Meeting the criteria/ Total Observations.	**High** # of Days Meeting the criteria/ Total Observations.	**Extreme** # of Days Meeting the criteria/ Total Observations
Maximum Temperature	601/2208	218/2208	107/2208
Minimum Humidity	382/1357	135/1357	52/1357
Maximum Wind Speed	599/2212	189/2212	88/2212

Table 13: Kernville Weather Station-045005 Elevation: 2635 feet

Weather Condition	**Moderate** 70th percentile	**High** 90th percentile	**Extreme** 95th percentile
Maximum Temperature (F)	97°	102°	104°
Minimum Humidity	14%	10%	8%
Maximum Wind Speed	10 mph	13 mph	14 mph

Weather Condition	**Moderate** # of Days Meeting the criteria/ Total Observations	**High** # of Days Meeting the criteria/ Total Observations	**Extreme** # of Days Meeting the criteria/ Total Observations
Maximum Temperature	923/3321	241/3321	102/3321
Minimum Humidity	622/2405	194/2405	41/2405
Maximum Wind Speed	742/3321	261/3321	154/3321

Table 14: Walker Pass Weather Station- 045014[11] Elevation: 5572 feet

Weather Condition	**Moderate** 70%	**High** 90%	**Extreme** 95%
Maximum Temperature (F)	91°	96°	100°
Minimum Humidity	15%	8%	7%
Maximum Wind Speed	5 mph	7 mph	8 mph

Weather Condition	**Moderate** # of Days Meeting the criteria/ Total Observations	**High** # of Days Meeting the criteria/ Total Observations	**Extreme** # of Days Meeting the criteria/ Total Observations
Maximum Temperature	142/496	49/4996	21/496
Minimum Humidity	140/496	45/496	24/496
Maximum Wind Speed	90/496	36/496	24/496

[11] Only three years of data.

Response Time

Using the simple rule that the longer it takes a fire apparatus to respond to a new ignition, the larger the fire will become. Thus, a larger fire also has a greater opportunity to escape initial attack becoming more costly, and potentially damaging assets. To model response times, a computer program models the time it would take to drive segments that make up the road network.

This road network analysis is based on average driving speeds of normal vehicles, not fully loaded fire apparatus. Other limitations of the model are that it doesn't model for increases and decreases in grade, traffic, or stop lights. As a final limitation, this model indicates the distance traveled by a single responding resource. To truly appreciate what the model is showing, one must interpret how long it would take for multiple fire engines to get to any location. Most agencies dispatch up to five or more engines to a wildfire under high fire danger. Outside of these limitations, the model does an adequate job of modeling and comparing distance based on a road network and not just computing circles based on response times. For this reason, the shapes that are created for each fire station are irregular following the roads that fire trucks would respond on.

To compare how quickly a fire can grow without suppression forces, fires can be modeled using the BEHAVE modeling program. Using a grass fuel model, a 5 mile per hour wind, and 30 percent slope, Table 15 indicates growth potential.

Table 15: Fire growth compared to response time.

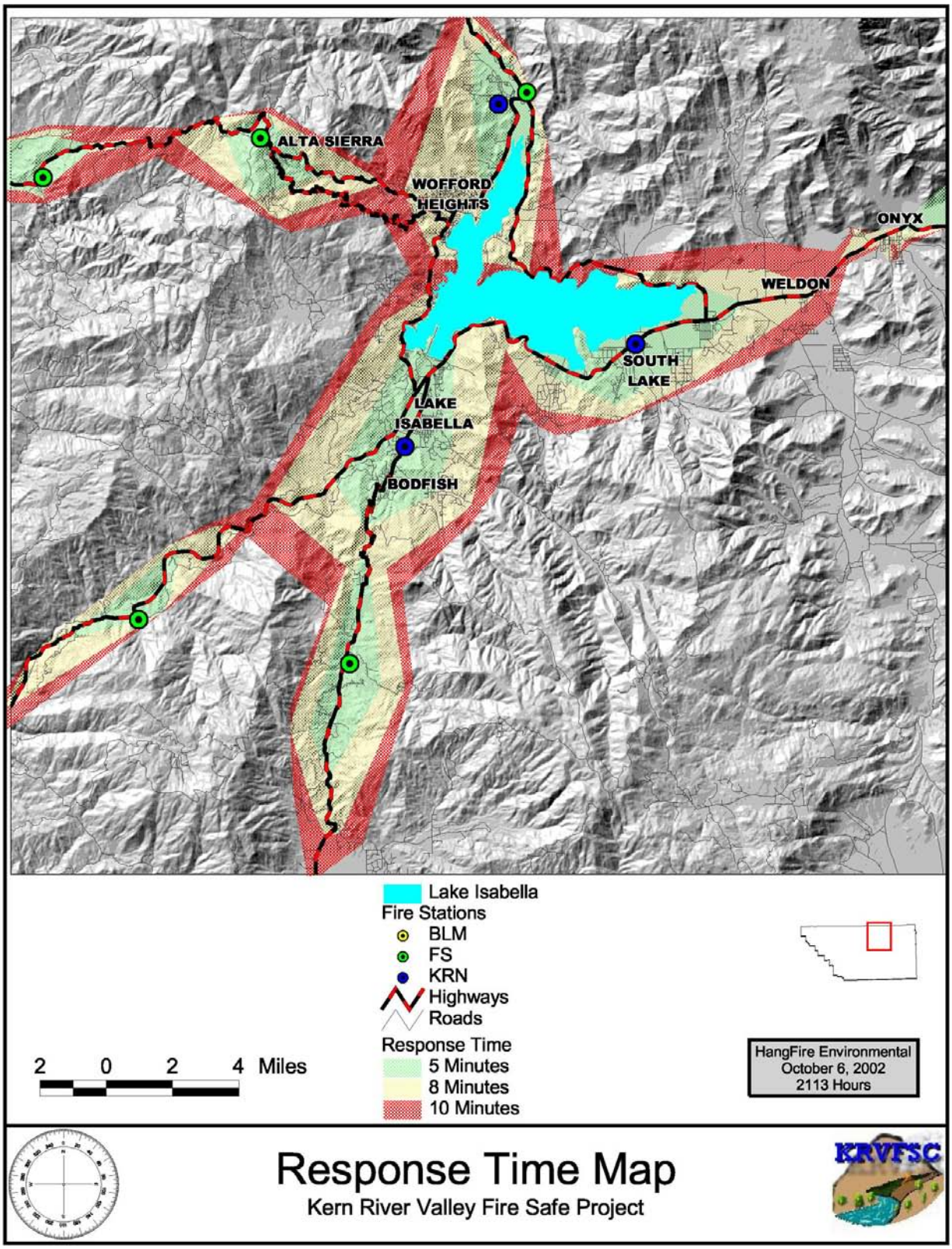
Time	Size in Acres	Perimeter Around Fire
6 Minutes	5.7	1980 feet
12 Minutes	23	4026 feet
18 Minutes	51	6006 feet

For the assessment; 5, 8, and 10 minute response times were modeled. Ranks were placed on each 25 acre cell based on the Table 16.

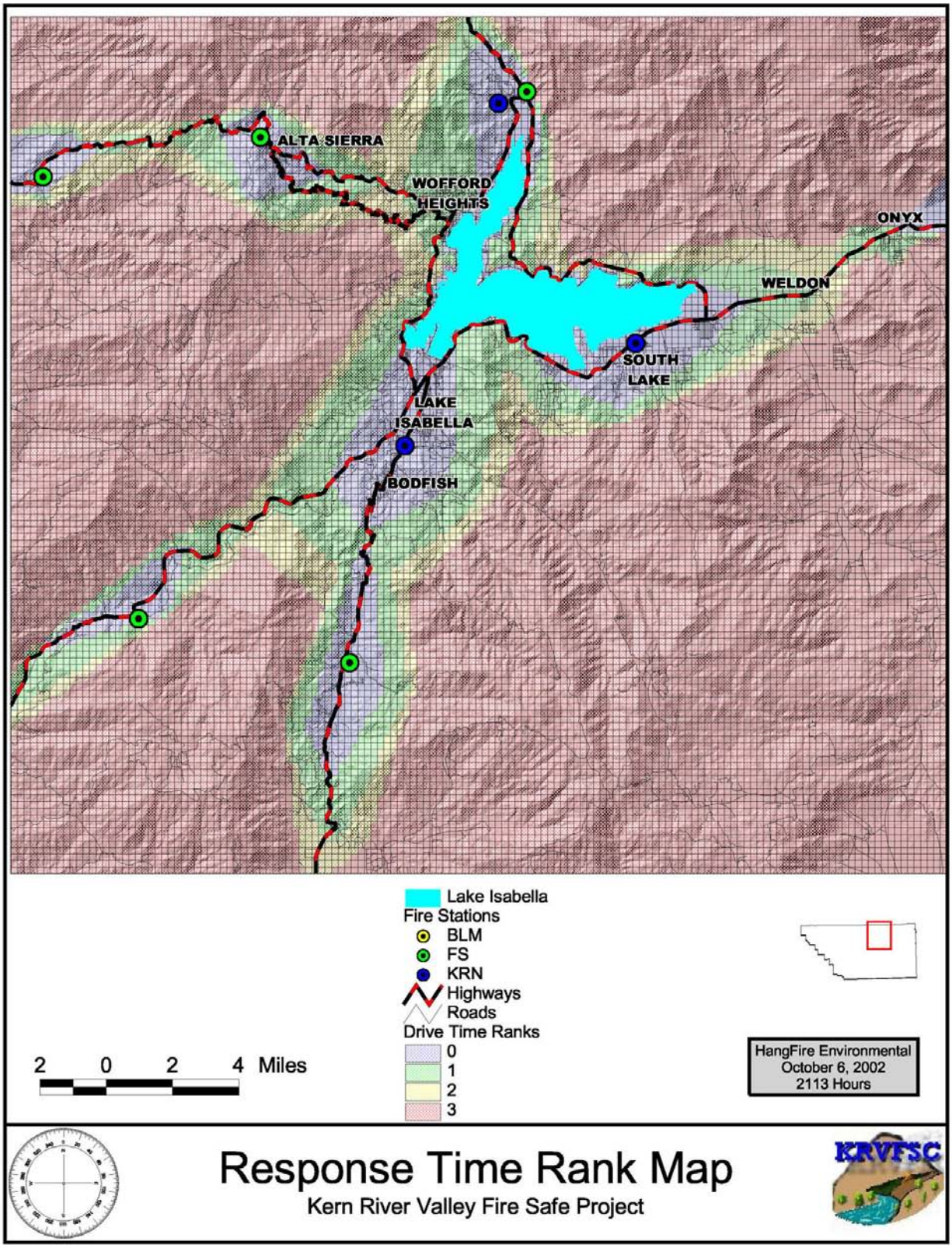
Table 16: Response time ranking methodology.

Response Time	Rank
5 minutes or less	0
5-8 minutes	1
8-10 minutes	2
> 10 minutes	3

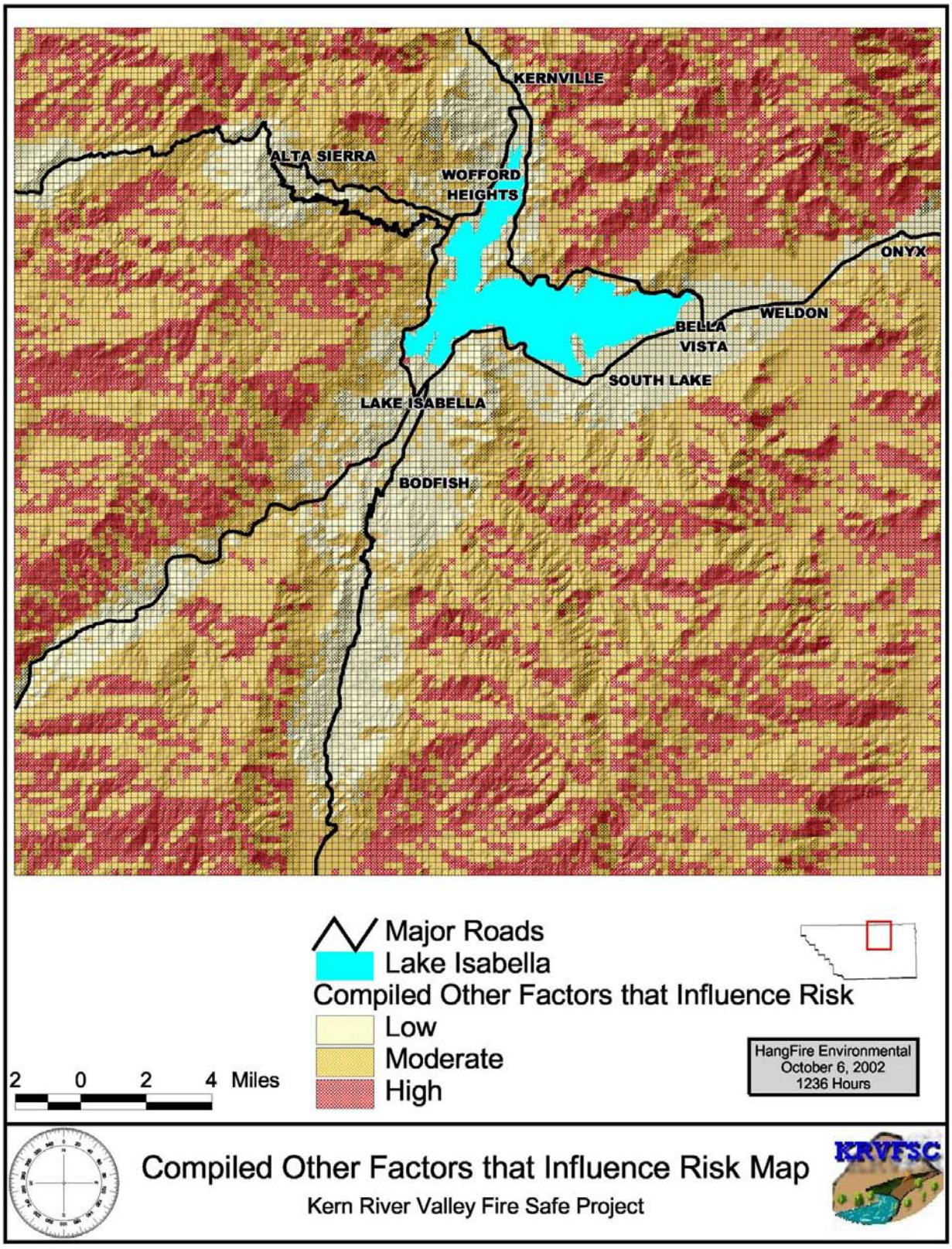
Please see the Response Time Map (Map 23) and the Response Time Rank Map (Map 24).



Map 23: Response times based on road network.



Map 24: Response Time Rank Map.



Map 25: Compiled Other Factors that Influence Risk Map indicates the ranks resulting from combining the aspect, response time, and ignition ranks.

Proposed Actions based on the Results of the Analysis

Both general and specific recommendations will be made based on the previous analysis and also based on information compiled for this plan. There are several factors that go into implementing any firesafe projects. Cost, politics, and environmental sensitivity are just a few. The following recommendations will take years to implement. Any one of the aforementioned can be an excuse for not implementing a project. It will take a commitment from all agencies to pursue the projects they see as a successful mitigation practice. Some of the recommendations are based on old fashion common sense such as fuelbreaks while others are very non-conventional.

General Recommendations:

New Code Adoption

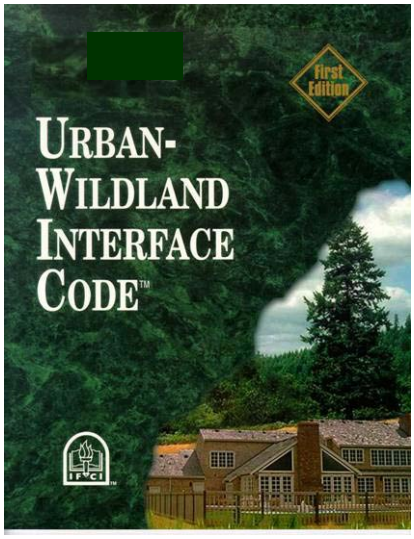


Figure 17: Urban-Wildland Interface Code

The first recommendation will be an adoption of a wildland fire code. Many communities within the Kern River Valley were not designed with the wildland fire problem in mind. There are numerous subdivisions with very narrow roads, one way access, and very fire prone building construction. There will be more conflagrations similar to the Deer Fire in the future. It is time to prepare new development for the inevitable. The code is the Urban Wildland Interface Code (UWIC) written by the International Fire Code Institute-2000 Edition.

The County of Kern is responsible for the fire planning code enforcement. Currently, the Uniform Building Code, with a series of amendments written by the County (See Appendix D), is used as the legal document for new development planning in private land that is designated either Local Responsibility Area (LRA) or State Responsibility Area (SRA). The Public Resource Code 4290 (See Appendix D) implies regulations for new development but is not specific. The UWIC contains very specific ordinances for developing in the wildland urban interface. Some of the specifics include:

- Definitions of hazards
- Urban-Wildland Interface Area Classification and Requirements including access and water supply
- Special building construction regulations
- Fire protection requirements including defensible space.
- A subdivision risk analysis section

Pros and Cons

The advantage of this recommendation is that future homes will be built to survive a wildland fire with little or no fire suppression protection. It provides much higher safety factor for citizens trapped in a wildfire as well as firefighters protecting structures. It covers most of the recommendations made in the Recommended Building Materials section of this plan. This includes one hour rating for exterior wall covering, boxed in eaves, and replacement of roof coverings.

The disadvantage of this recommendation is the cost to the home builder or developer. This type of construction often costs more money due to wider streets, turnarounds or hammerhead/T's that must be installed, and the basic building materials such as thermal or dual pane windows.

Feasibility Study for the Potential Deployment of a Type One Helitanker

Few resources can be as effective as a type one helicopter for fighting a wildland fire when a body of water is nearby. A helitanker can drop over 2500 gallons per load and can fill in 45 seconds. It has the ability to drop up to 30,000 gallons per hour of water, foam, or retardant making this a very efficient firefighting machine. These helicopters can draft water from as little as 18 inches. The Valley currently has a type two helicopter with a crew stationed in Kernville. It is recommended that a feasibility study be completed by the fire agencies to augment the current helicopter with an additional helitanker during the peak fire season.

Figure 18: Type one helitanker preparing to drop water on the Manter Fire.

Pros and Cons

The advantage of this recommendation is the increased performance of fighting fires utilizing the water from Lake Isabella. This performance may save homes, lives, and reduce the cost to tax payers by preventing a fire from escaping initial attack.

The disadvantage of this recommendation is cost. Helitankers are very expensive to have on contract waiting for a dispatch. Prices vary based on service provider, duration of contract, competing business and more.

Develop School Programs aimed at Elementary, Middle, and High School Students

Using the contingent of professional firefighters that are already providing school fire prevention programs, a new curriculum needs to be designed and delivered. The message is simple; Your Carelessness Could Cost! After lightning, the two leading causes of ignition within the Valley are children playing with fire and smoking. A school program based on student responsibility should be developed using the photos of damaged and destroyed homes from the Deer Fire. The program should include photos from the Deer and Borel Fires showing the damage and cost figures. Basic fire science, such as rates of fire spread and intensity could be incorporated into the program showing how fast fires can overwhelm even the best fire suppression agencies. Past fire prevention messages have always been: prevent forest fires, don't play with matches, or give matches to an adult. It is time to deliver the next message. If you are going to play with fire, here are the consequences:

- The Deer Fire destroyed or damaged 47 residences, 63 vehicles, 84 sheds, eight boats and 22 trailers.
- It cost millions of dollars to extinguish. These dollars could have been used for improving school programs.
- Several local families from your community lost their homes.
- The risk to lives in both the community and to firefighters was extreme.

A simple but effective demonstration could be built that would model fire behavior using the FARSITE program. The fire would spread through the community and using a mapping program, damage could be displayed as the fire spreads through Lake Isabella, Alta Sierra, or Kernville. The simulation could be based on the premise of a carelessly discarded cigarette. Addresses of real homes in the neighborhood could be displayed as destroyed.

Figure 19: An image of a home destroyed in the Deer Fire that could be used to teach students the results of their actions.

Pros and Cons

The advantage of this approach is the conveyance of a message that needs to be delivered to an older group of students. The program could be developed by the Speakers Bureau of Kern River Valley Fire Safe Council with all of the information that has been gathered from the recent fires. If needed, a contractor could be hired, using grant money, to develop the program.

The disadvantage is that the target audience excludes the younger students due to the sensitive nature of the material. Although this may seem like a callused approach, children are growing up faster today and need to be educated with a more mature message. The older students are often hard to reach, but the assumption must be made that somehow, they were all affected by the Deer or Borel Fires.

Fire Cause Determination and Tracking System

By performing the analysis on ignitions both by location and by cause type, it is apparent that a more concerted multi-agency approach is needed. The premise of fire prevention is that determining fire cause is the first step in preventing history from repeating itself. It is very difficult to prevent fires from happening when their exact location and cause is not accurately documented or mapped. Some federal and state agencies often map fire locations to the center of the legal section where the fire occurred. This equates to placing a dot in the center of a 640 acre box making spatial accuracy impossible and future analysis difficult.

It is recommended that the Kern River Fire Safe Council maintains a database that is reconciled at the end of every month. The database should include the date, time, fire size, jurisdiction, fire cause and precise location of every reported fire within the Kern River Valley. The Fire Safe coordinator or designee could provide a monthly report of fires within the valley at each meeting where prevention strategies could be focused on the specific need.

Pros and Cons
The advantage of this recommendation is that the cause and origin of fires within the Valley could be tracked with a common system and terminology. Currently, the fire reporting systems in place are designed separately for the needs of the Kern County Fire Department, the Bureau of Land Management and the United States Forest Service. This often results in deficient communication between these three fire protection agencies. For example, in an area where the three jurisdictions meet, they could experience a rise in fires caused by children playing with fire, but fail to realize this significant trend due to the separate reporting systems. This joint reporting system would allow for a monthly focus of the fire problem and appropriate steps may be taken in a timelier manner.

The disadvantage of the recommendation is time and cost. A council member would have to call each jurisdiction and collect the data. A computer and software may need to be purchased. This may be a consideration for a future grant for funding and implementation.

Fuel Reduction and Fire Management Workshop

There are a number of handcrews available to provide fuel reduction projects within the Kern River Valley. Every year, fuel reduction work is completed and training is performed with little organization done between the three fire protection agencies. It is recommended that prior to fire season, a workshop be organized and sponsored by the Fire Safe Council. The workshops focus is to determine and prioritize which fuel reduction projects will be completed. Timelines will be developed and a tracking system for project completion will be designed. It would be imperative to have the supervisors and decision makers at the workshop so cohesive strategies could be developed.

Some counties do not have a single handcrew available to perform fuel reduction. However, within a short driving distance to the Kern River Valley, there are the:

- Fulton Hotshots
- Rio Bravo Hotshots
- Golden Empire Hotshots
- Rincon Handcrew
- Breckenridge Handcrew
- Kern Valley Hotshots
- Kern County Fuel Reduction Crew

This is a very impressive resource pool! Large projects could be coordinated and completed by this pool if they were organized for a common goal. If training needs to be accomplished, there would be no doubt to which fuelbreak the crews would work on.
Possible workshop agenda may include:

1. Welcome and introductions.
2. Review of the Kern River Valley Community Fire Safe Plan.
3. Project priorities established for the upcoming year.
4. Assignments of fuel reduction projects to each crew.
5. Timelines and monthly reporting of project accomplishments.

Pros and Cons
The advantage of this approach is synergy between the fire agencies. There are many miles of fuelbreaks that need to be maintained or built. There is a significant amount of dead and down vegetation that need to be piled and burned. The only way this will occur is through multi-agency cooperation.

The disadvantage to this approach is the investment of time. The cost would be minimal with the majority of money being spent on travel and lodging if a multi-day workshop is needed.

Develop a Homeowners Guide to Living in the Forest; Neighborhood Fire Plan

As Alta Sierra is identified as a very high risk community for a wildland fire, a guide is needed to inform the public of their responsibility. Work can be done to thin the vegetation around the community on public lands, but this will not be successful without mutual thinning performed around the structures on private property. Since most of the homeowners are not full time residents the guide needs to be mailed to every homeowner. The guide needs to inform the homeowners that a future fire is inevitable and that fire insurance and fire departments will be unable to stop the destruction. They need to know their responsibility when they choose to live or recreate in high fire danger areas.

Possible chapters to be included may cover:

- The Kern County and California Laws Covering Defensible Space
- Fire's Role in Nature
- The Role of Prescribed Fire
- Moving to the Mountains, Common Misconceptions
- Creating Defensible Space
- Fire Resistant Landscaping
- Thinning Standards and Safe Tree Removal
- A house by house inventory of firesafe construction.
- A detachable contract allowing thinning to be performed by public agencies that addresses liability.

Pros and Cons
The advantage of this recommendation is informing the public of its responsibility and possibly obtaining a community that may survive a wildfire. The forest around Alta Sierra is over stocked with numerous small trees and very high accumulations of dead and down vegetation. It

is the public's responsibility to safeguard these structures from wildfire. New studies[12] have stated that even modest thinning near homes can keep crown fires at bay. Through public education, this thinning may be completed by the homeowner or agreements may be made that will allow thinning to occur on their lands by public agencies where their property borders public lands.

The disadvantage of this recommendation is the cost and time to produce the guide. The cost of publication may be covered by a grant. Another disadvantage is possible public apathy. The real possibility exists for a document to be completed and not utilized. Many homeowners from out of the area only think about their mountain cabin when they use it. Most of them do not want to spend any additional money having someone thin trees or expend the effort to do it themselves.

Enforcement of Address Posting Codes

During a major fire, emergency responders will be coming from all over the state and possibly the nation. Finding an address quickly can make the difference between life and death. While driving throughout the communities of the Kern River Valley, it becomes obvious that the posting of address numbers is done by individual preference. In some communities through California, some fire districts have codified the type, color, and placement of addresses. When driving through these communities, emergency response equipment can quickly find addresses, even when the emergency responders are from out of the area.

It is recommended that all fire agencies with the Valley develop a single approved address sign code. Once an agreement is made, the Kern County Fire Department could submit it to the Board of Supervisors as an amendment to the Kern County Fire Code.

Figure 20: Example of a uniform address sign.

Pros and Cons

The advantage of this recommendation is the protection of property is considerably easier by an emergency responder. Not only does this recommendation provide quicker response during a wildfire, but more often during a medical emergency.

The disadvantage of this recommendation is the cost and the perception that signs posted on the street are ugly. Having a government agency telling homeowners how, where, and what to do is also unpopular. The cost can be handled by different approaches. One approach is to charge residents for address signs which also covers the installation. Another approach may be to obtain funding though a grant.

Perform Neighborhood Assessments and Produce a Structure Protection Plan

[12] As printed in the Oregonian Newspaper, August 12, 2002 quoting Jack Cohen, Rocky Mountain Research Station, Missoula, MT

It is recommended that each community produce a neighborhood assessment for wildfire defensibility. Neighborhood assessment of defensible space could be modeled after the plan written for the Hungry Gulch and Sawmill Road Area by the Bureau of Land Management. The neighborhood assessment should include a parcel by parcel assessment to inspect and document:

- compliance with defensible space laws
- compliance with Kern County's Health and Safety Code 8.28.110[13]
- fire prone construction
- steep and hazardous driveways
- flammable ornamental vegetation

Once the assessments are complete, structure protection plans should be written for each community. Each plan should include information for incoming firefighting resources including:

- Maps of the area in a tile format
    - All structure locations
    - Identified hazard areas based on building construction and narrow roads
- Primary radio frequencies
- Primary escape routes for citizens
- Turn around areas for fire apparatus
- Water sources
- Fuelbreaks
- Safety zones
- Pre-established command post, staging areas, helispots and drop points with global positioning system coordinates (Latitude/Longitude).
- Blank Incident Command System Forms 200-204

The Forest Service is currently building a plan for the community of Alta Sierra which could be used as a model for the other communities. Each community should have an approved weatherguard[14] box to store the structure protection plans at pre-identified locations. These plans are to be used by incoming firefighting resources. It would not matter if local or visiting fire engines arrived at the scene of a major emergency because they would be able to use the plan to familiarize themselves to the area.

Pros and Cons

The advantage of this recommendation is that communities will have comprehensive plans developed. These plans will insure firefighters are intimately familiar with their areas and compel them into the multi-agency planning concept. Planning workshops should be held to insure this concept is utilized. Plans need to be developed moving away from the single home concept of defensible space into a community based philosophy of fire protection zones. These plans can be developed by the firefighters while on duty to reduce cost. Plans should take advantage of the GIS capabilities of the three main firefighting agencies.

The only disadvantage of this recommendation is the investment in time to create the plans and the minimal cost to reproduce them. If a more comprehensive multi-agency planning concept is

[13] Code makes it unlawful to accumulate solid waste (junk).

[14] A weatherproof type of box. This is not an endorsement for a particular brand.

desired, then a grant can be written for computers for each station with GIS software installed. The Kern Council of Governments can provide all of the necessary GIS based data to develop a comprehensive planning document.

Specific Recommendations

The following section will make specific recommendations based on results of the assessment. The Deer Incident proved that a large and costly fire can occur anywhere within the study area. The following projects are designed to compartmentalize each community to either keep a structure fire from burning into the wildland or keep a wildfire from burning into the wildland urban interface. Some of the recommendations may have been priorities in the past, but due to cost or other priorities, may have been disregarded. Other recommendations are already in the planning or implementation phase.

Alta Sierra Project

Shaded Fuel Break Network

The community of Alta Sierra is a very high wildfire risk based on the results from the assessment for numerous reasons. The fuel loading, lack of recent fire history, the number of fires surrounding the community in past decades, very narrow streets, the slope and aspect, and fire prone construction methods are a checklist for destruction.

Creating a fire protection zone throughout Alta Sierra will take several years and cooperation from fire protection agencies, homeowners, and a utility company. It will also take motivation and possibly a new contract for thinning the forest by a timber company.

The concept is simple in design but complex in effort, labor, and cost. Many of the projects have already been started or the planning process has been completed. Some of the recommendations have been done in the past, such as fuelbreaks, but need maintenance or anchor points to function successfully.

Together, the recommendations will contribute to the overall compartmentalization of Alta Sierra. The recommendation for Alta Sierra will be a combination of shaded fuelbreaks, timber sales, prescribed burning, a powerline fuelbreak, roadside thinning, and neighborhood defensible space. Some of the fuelbreaks may have had different names historically but new names will be used within this plan.

A series of fuelbreaks need to be reestablished surrounding the community of Alta Sierra. Although an ambitious undertaking, this network of shaded fuelbreaks will stop or slow a running crown fire from reaching Alta Sierra. A shaded fuelbreak is an area where crews concentrate on thinning out the smaller diameter trees, less than eight inches in diameter, remove dense underbrush, and prune lower limbs of the large diameter trees. Brush and trees that are thinned out are piled by the crews and are burned during the winter months.

This zone of pretreated fuels is likely to provide firefighters opportunities to quickly construct fireline, or apply a backfire with a good chance of success, since fire intensities in the fuelbreak will now be greatly reduced.

By analyzing the aerial photographs, several of these fuelbreaks were once utilized. Many of the historic breaks were not shaded fuelbreaks; they were traditional breaks where all of the fuel was removed. These new shaded fuelbreaks need to be improved and widened between 25-50 feet. Emphasis should be placed at keeping a surface fire from becoming a crown fire by removing a percentage of surface fuels in a responsible manner. Removing all surface fuels to bare mineral soil could result in erosion and an influx of exotic species. Table 17 gives the names of the new shaded fuelbreak network and the distance.

Table 17: Alta Sierra Shaded Fuelbreak Network.

Name	Jurisdiction	Distance in Feet
Summit	USFS	10500
Black Mountain	USFS	9450
Black Mountain Saddle	USFS	12090
Old State 1	USFS	8180
Old State 2	BLM	5550
Tillie Creek	Kern Co./USFS	10880

To fill in the voids of this fuelbreak network, several roads will also need to be integrated into this shaded fuelbreak system. Using established roads gives an additional area of cleared vegetation but thinning needs to occur on either or both sides of the road to reduce fire intensity. The Table 18 lists the names of the roads, jurisdiction, and the distance of each.

Table 18: Alta Sierra Roadside Thinning Network.

Name	Jurisdiction	Distance in Feet
Rancheria Road	USFS	6450
Old State Highway West	USFS/Kern Co.	22640
Forest Road 25S21	USFS	6280
Forest Road 25S17	USFS	1480
Old State Highway East	USFS/BLM	4300

The last component of the fuelbreak system is to reestablish a long and linear powerline fuelbreak that runs east-west parallel to Highway 155. The powerline runs from the Summit to Pala Ranch. This fuelbreak, which measures up to 20 feet wide in some locations, was a significant fuel modification project that if maintained, would provide a double benefit. First, if a powerline or a component thereof failed, the resulting fuelbreak may slow or stop a fire long enough for initial attack ground forces to successfully extinguish it. Secondly, the fuelbreak may stop, slow, or provide an anchor point in the event of a wildfire coming from Alta Sierra.

It is recommended that a letter be drafted from the Kern River Fire Safe Council encouraging the local utility company owning the powerline to conform to the fire codes, where applicable, and

maintain the fuelbreak. It is also recommended to have the County Fire Chief and Federal Fire Management Officers sign the letter demonstrating interagency cooperation. Please see the Shaded Fuelbreak Network Map (Map 26).

Ice Timber Sale

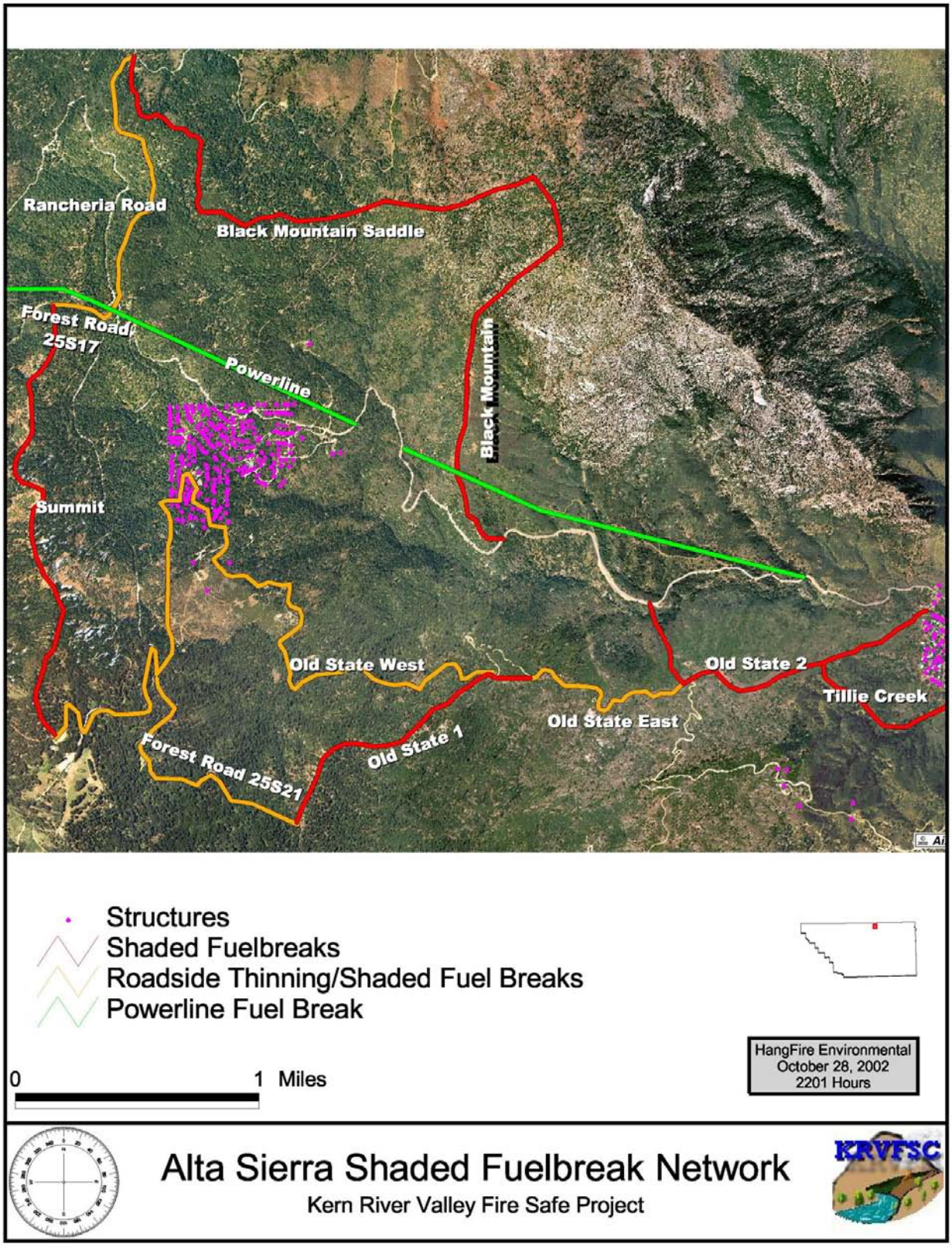
Considerable thinning of the forest around Alta Sierra will be accomplished once the Ice Timber Sale is completed. There is approximately 1350 acres identified for thinning by log removal surrounding the community. It is recommended that the areas below Alta Sierra be logged first to create a mosaic pattern of thinned fuel. By thinning these priority parcels first, a large area directly under the community would have enough fuel removed to slow an advancing wildfire. This action combined with a community shaded fuelbreak to the south and west would increase the community's survivability rate significantly. Please see the Alta Sierra Ice Timber Sale Map (Map 27).

Community Shaded Fuelbreak

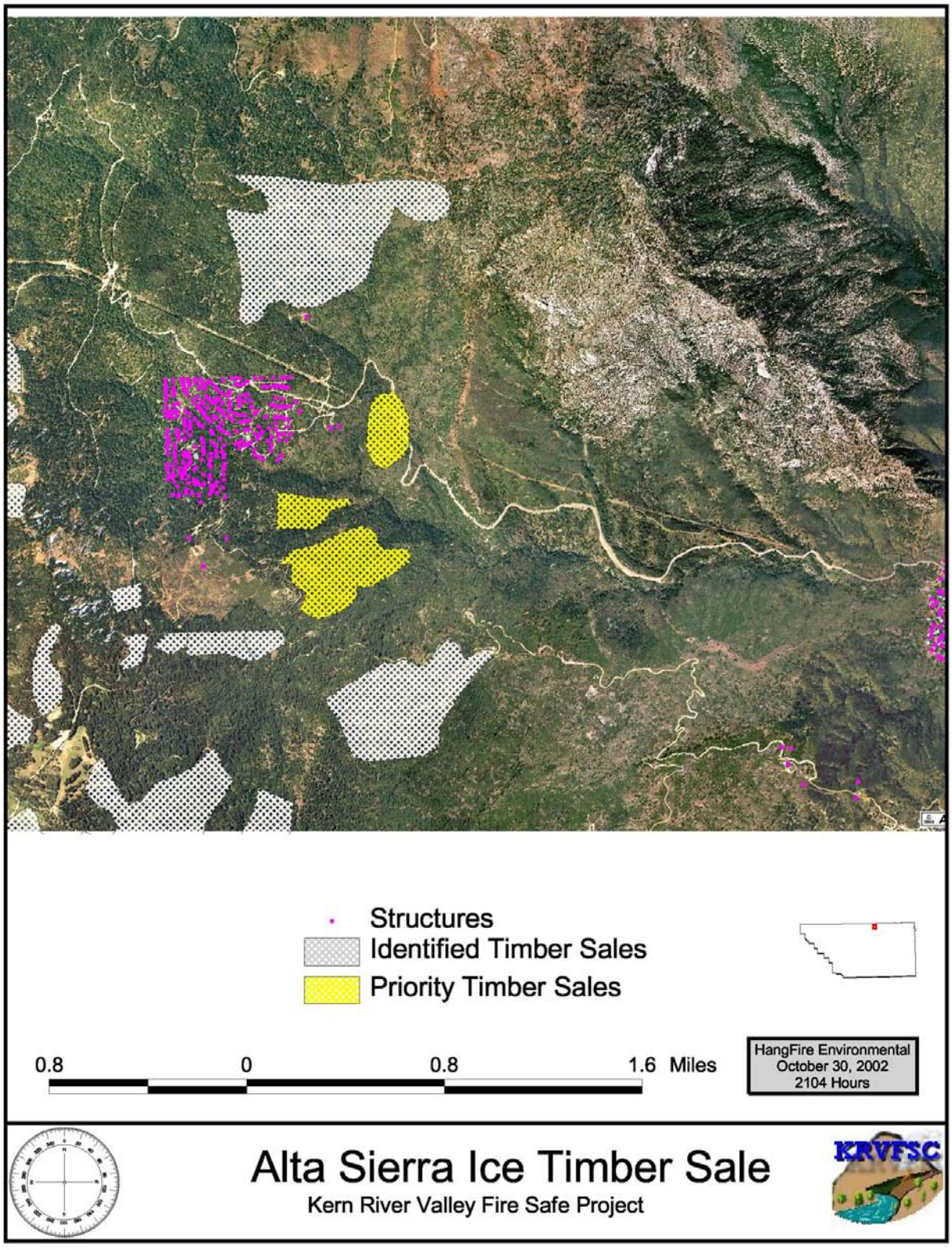
Defensible space is a very affective method for protecting structures. By providing a community shaded fuelbreak to around the community, firefighters protecting the community stand a chance of success. The shaded fuelbreak would also provide citizens a safer environment for evacuation in the event of a fire burning upslope.

The shaded fuelbreaks depicted on the map are between 100-150 feet wide and total 51 acres of treated fuel. The fuelbreaks are located on 12 private parcels and five Forest Service parcels. Biomass could be broadcast chipped or piled and burned during the winter months. Please see the Community Shaded Fuelbreak Map (Map 28).

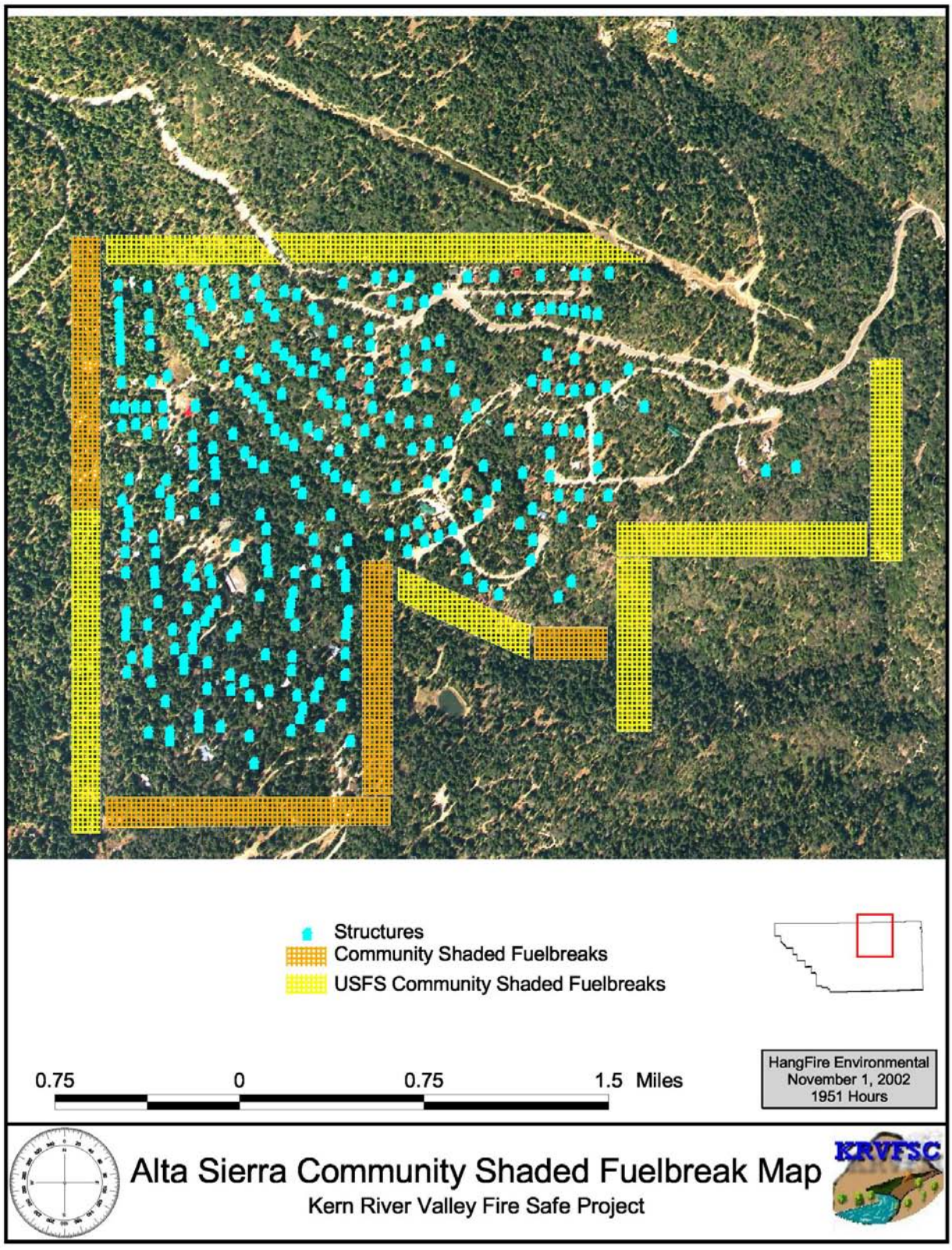
Figure 21: A typical home found in Alta Sierra; an open wood deck, wood siding, and fuel growing in close proximity to the house.



Map 26: Alta Sierra Shaded Fuelbreak Map.



Map 27: Alta Sierra Ice Timber Sale Map.



Map 28: Alta Sierra Community Shaded Fuelbreak Map.

Prescribed Fires

Prescribed burning is one of the most economical forms of fuel modification. Fires burning under a strict weather prescription will burn with lower intensities than wildfires removing the buildup of wood debris and underbrush that fuels a wildfire. Unfortunately, there are several drawbacks to this approach. Most importantly is the risk involved with burning near a residential development. Although recently there have been disastrous consequences from prescribed fires, it should be noted that they have been used successfully around Alta Sierra for years. Another drawback is smoke production. As a byproduct of combustion, smoke can settle near the earth during the night. Many people do not see any advantage of prescribed burning when they are forced to live with the smoke. To combat this, it is recommended that a guide be written and published documenting all of the successful prescribed fires performed around Alta Sierra. This could be a chapter in the aforementioned Guide to Living in the Forest.

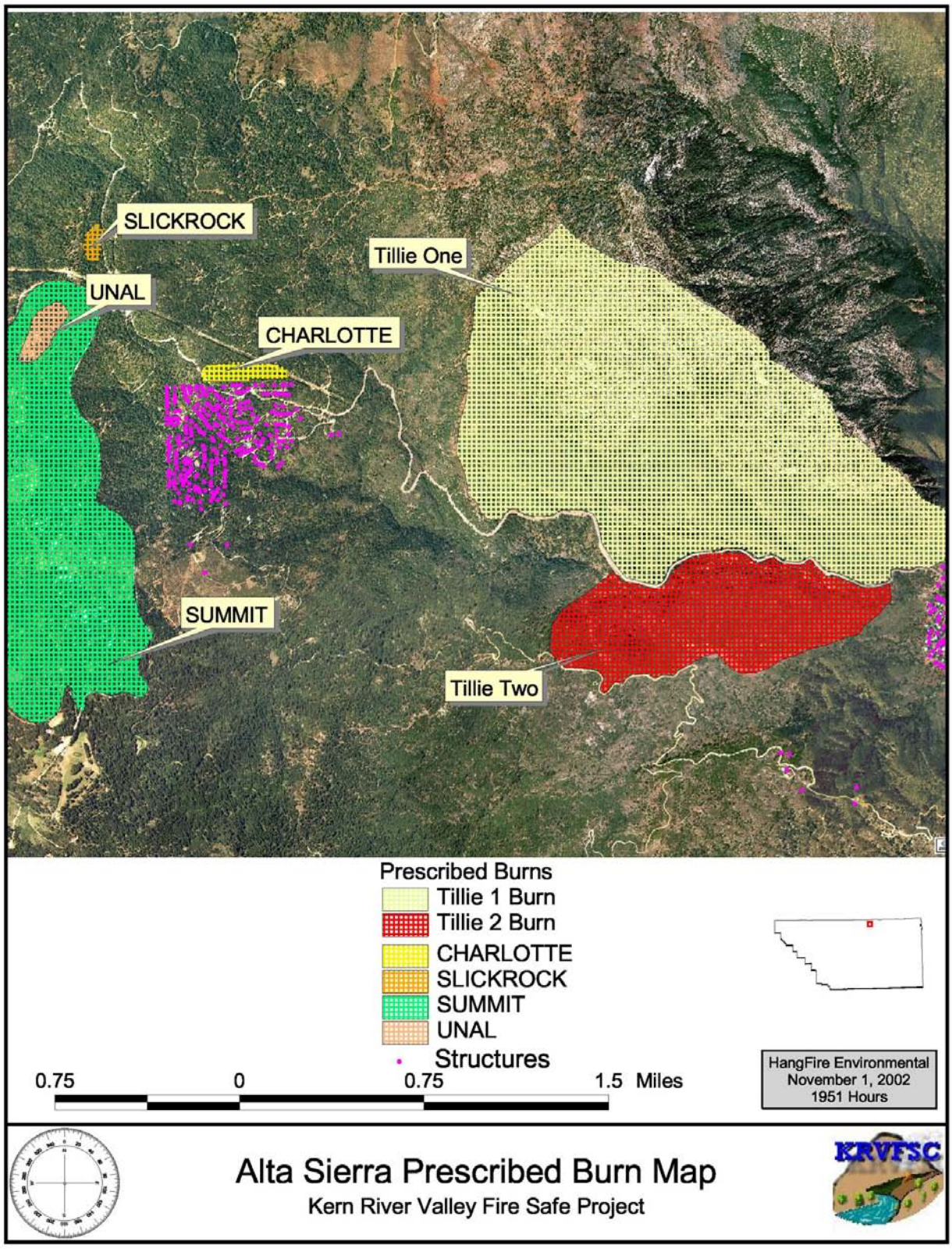
It is also recommended that the successful prescribed fire program be continued. There are seven prescribed fires that have been performed in the past or are currently being implemented. It is evident in the aerial photography that the Summit Prescribed Fire had lasting benefits. It burned under spring conditions burning the understory and removing jackpots of heavy downed vegetation. The burn area is a mosaic of vegetation that breaks up the continuity of fuel. If threatened by a wildfire, these treated fuels would display lower fire intensities allowing for a better opportunity for successful suppression actions.

Some of the prescribed fire projects are very small but their spatial location of fuel reduction should be noted as the most important element of the project. All of the projects will need continued maintenance and repetitive burning to reduce and/or remove additional fuel. Table 19 lists the prescribed fires, year completed, and acreage. Please see the Alta Sierra Prescribed Burn Map (Map 29).

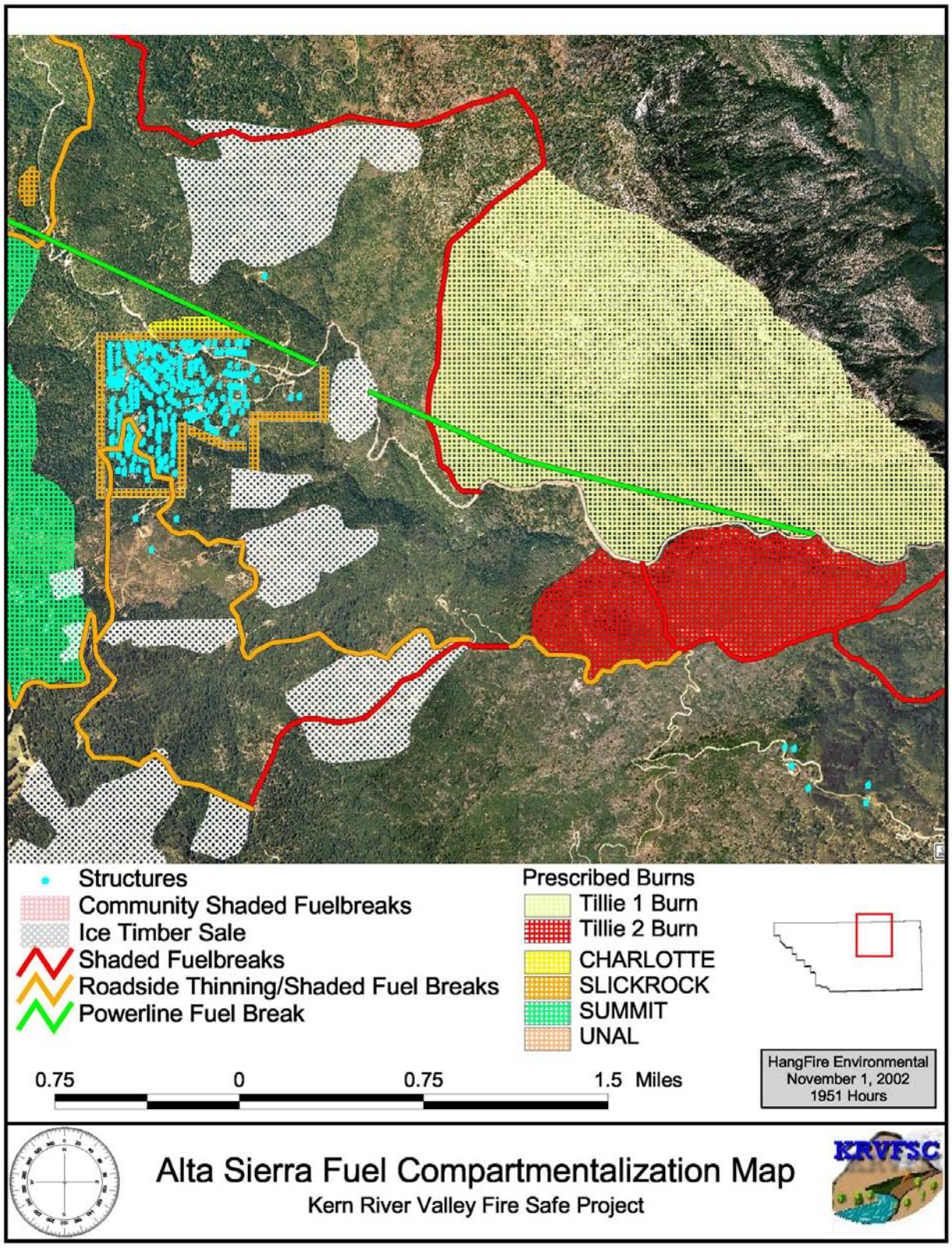
Table 19: Alta Sierra Prescribed Fires

Prescribed Fire Name	Year Completed	Acreage
Charlotte	1995	15
Unal	1995	16
Slickrock	1995	6
Summit	1997	525
Alder	1998	605
Tillie One	Still In Progress	1100
Tillie Two	Still In Progress	305

Creating a fire protection zone around Alta Sierra is based on compartmentalization of hazardous fuels. By breaking up the vegetation into smaller blocks using shaded fuelbreaks, timber sales, prescribed fires, and community shaded fuelbreaks, the size and intensity of a fire burning toward Alta Sierra from any direction is reduced. Please see the Alta Sierra Fuel Compartmentalization Map (Map 30).



Map 29: Alta Sierra Prescribed Burn Map.



Map 30: Alta Sierra Fuel Compartmentalization Map.

Bodfish Project

Shaded Fuel Break Network

The assessment indicated that the communities of Bodfish and Lake Isabella have the highest density of wildland fire ignitions. Obviously, not all ignitions result in large, damaging, and costly fires, but it only takes one careless act to result in a conflagration such as the Deer Fire. In the photograph below, the red line depicts the western half of the Deer Fire. The chartreuse polygons represent parcels that incurred damage by the fast moving fire. Note that a majority of the damaged parcels are not situated on steep slopes with heavy vegetation.

Figure 22: Chartreuse colored parcels incurred damage from the Deer Fire.

This assessment made obvious the lack of fire history information on the slopes south of Bodfish. If a structure fire ever lofted spotfires into this area of old decadent fuel, a north wind would propel a fire upslope with high intensities and flame lengths. If the wind shifted to a southerly direction, the fire would threaten the entire communities of Bodfish and/or Lake Isabella. Finally, the most significant threat depicted in the assessment is the fuel type found in the area. The area is covered with mixed chaparral and shrub species. Under a moderate wind, flame lengths will easily reach 40 feet with the steep slopes common to this area.

The highest fuel loading surrounding Bodfish is found on the slopes south of town and east of Ball Mountain. The accumulation of fuel has reached maximum loading due to the lack of fire in this area. To reduce the fuel loading, it is recommended that a vegetation management plan be prepared for the area. The components of the plan should include the use of shaded fuelbreaks combined with prescribed fires.

Figure 23: Brush with a high dead component covers the slopes south of Bodfish. Notice the homes at the base of the slope.

The shaded fuelbreaks need to be used in conjunction with roadside thinning to create a network of fuel compartmentalization. By breaking up the continuity of the fuel, fire suppression strategies have a much higher chance of safety and success. The roadside thinning project was left open between the Ball Mountain Project and the Saddle Springs Project on Saddle Springs Road. This was due to the lighter fuel loading on the west and southwest slopes visible in the aerial photographs. Ground validation is needed to confirm that this approach is sound.

Table 20 lists the name of the shaded fuelbreaks, jurisdiction, and length in feet.

Table 20: Bodfish shaded fuelbreak network

Shaded Fuelbreak Name	Jurisdiction	Length in Feet
Rim Road North	Kern County	4400
Rim Road South	Kern County	3500
Saddle-Rim	Kern County	5850

Table 21 lists the name of the roadside thinning/shaded fuelbreaks, jurisdiction, and length in feet.

Table 21: Bodfish roadside thinning project

Road Name	Jurisdiction	Length in Feet
Saddle Springs	BLM/Kern County	3100
Bause 1	BLM/Kern County	10100
Bause 2	Kern County	7450
Bause 3	Kern County	2900
Ball Mountain	USFS/Kern County/BLM	5500

Please see the Shaded Fuelbreak Network (Map 31).

Community Shaded Fuelbreak

By providing a community shaded fuelbreak to the south of the community, firefighters protecting the community stand a chance of success. The shaded fuelbreak would also provide citizens living on Rim Road a safer environment for evacuation in the event of a fire.

The shaded fuelbreaks depicted on the map (Map 31) average 150 to 200 feet wide by 8100 feet long resulting in a total of 37 acres of total treatment. The fuelbreak is located on 33 private parcels (24 separate landowners) and one Forest Service parcel. Biomass could be broadcast chipped or piled and burned during the winter months. Please see the Bodfish Community Shaded Fuelbreak Map (Map 32).

Prescribed Fires

Once the fuelbreaks are in place, prescribed burns are suggested to reduce the amount of fuel loading. The majority of the area needing a reduction in hazardous fuels is situated on northern aspects. There are three to four prescribed fires that can be implemented above Bodfish depending on the amount of constructed fireline. The Saddle Springs 1 and 2 burns could be combined into one burn if the weather is conducive for a bigger fire or more suppression resources are available for implementation. If two separate fires are desired, then an additional 4300 feet of fireline will need to be constructed along the ridge separating the two burns. In Table 22 and the Bodfish Prescribe Burn Map (Map 33), the project will be shown as four separate prescribed burns.

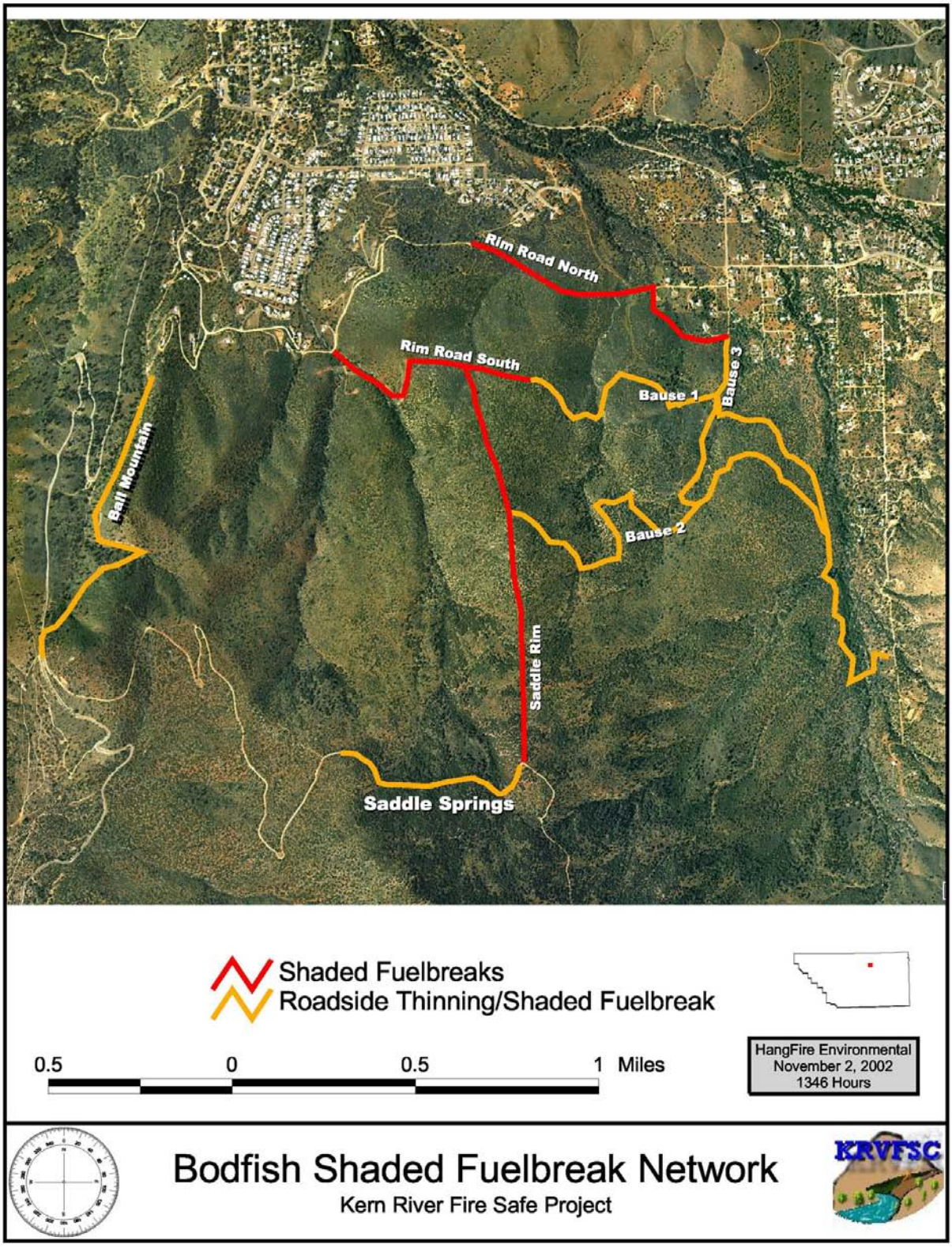
Table 22: Bodfish prescribed burns.

Prescribed Fire Name	Jurisdiction	Acreage
Rim Road	Kern County	185
Saddle Rim	Kern County	140
Saddle Springs 1	BLM	490
Saddle Springs 2	BLM	235

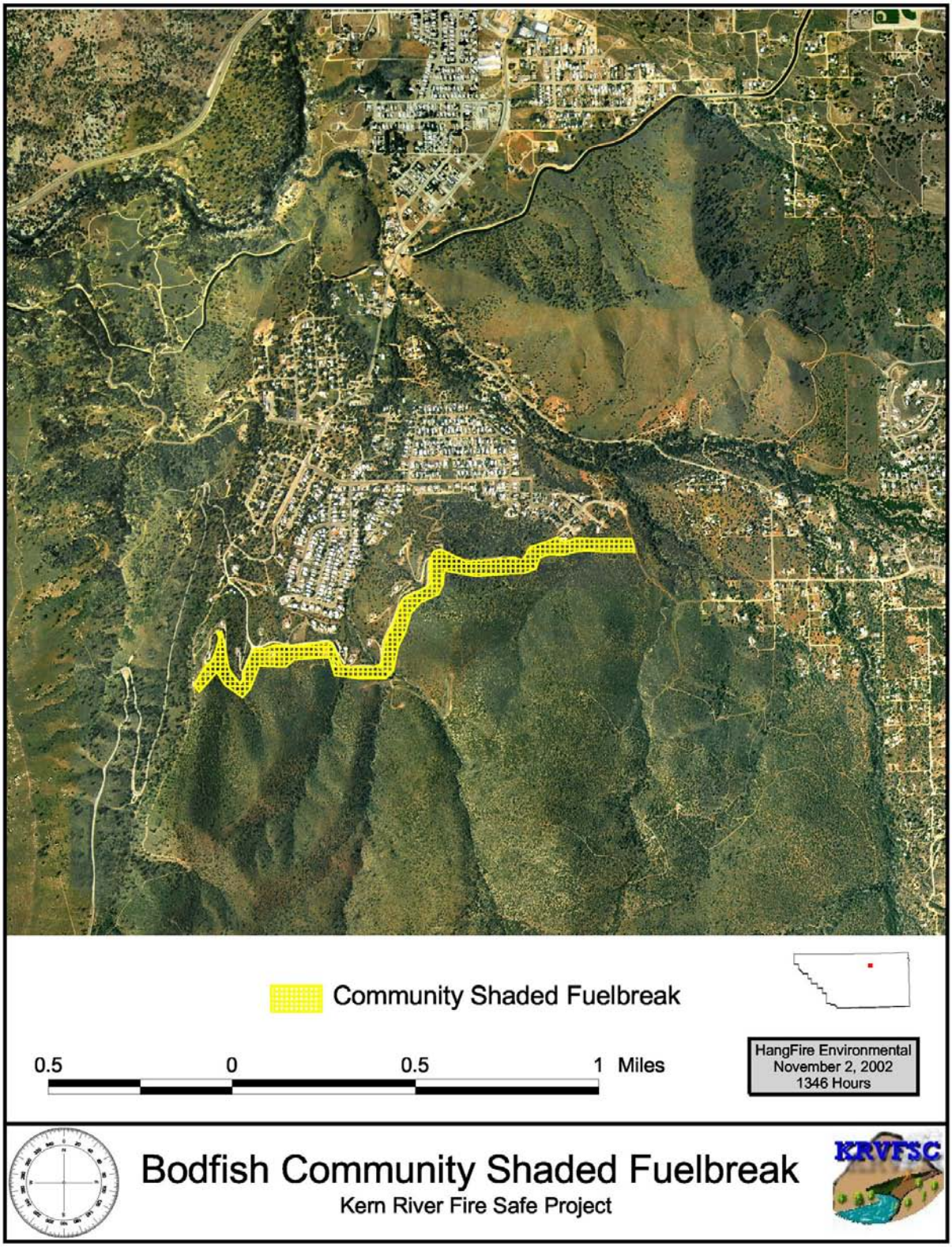
Creating a fire protection zone around Bodfish is based on compartmentalization of hazardous fuels. By breaking up the vegetation into smaller blocks using shaded fuelbreaks, prescribed

fires, and community shaded fuelbreaks, it reduces the size and intensity of a fire burning toward Bodfish from the south. Fuels located to the west were burned in the year 2002 Borel Fire. Fuels located to the north and east were either burned during the Deer Fire or are urban development found in the community of Lake Isabella mixed with grass. Please see the Bodfish Fuel Compartmentalization Map (Map 34).

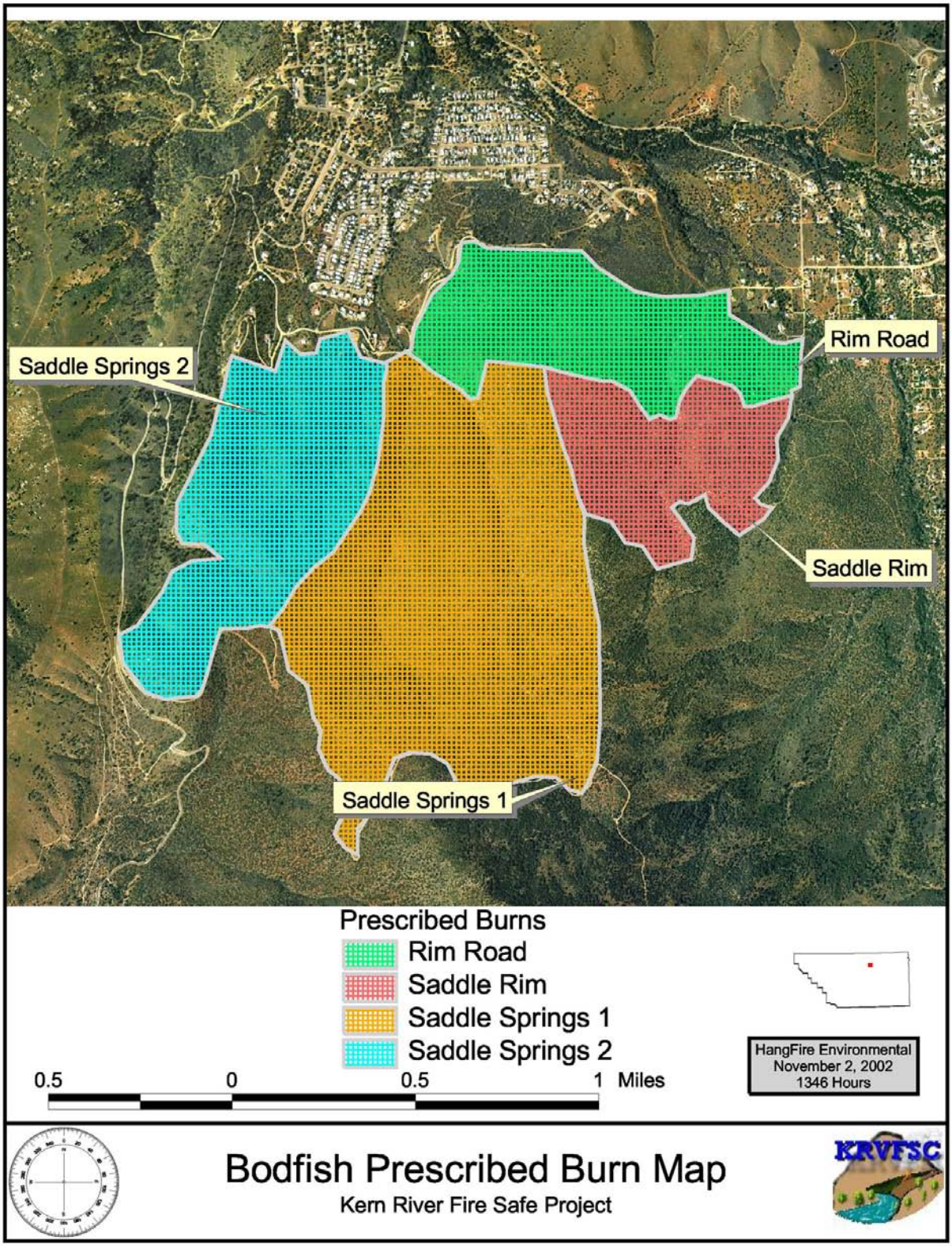
Figure 24: Structural remains from the Deer Fire.



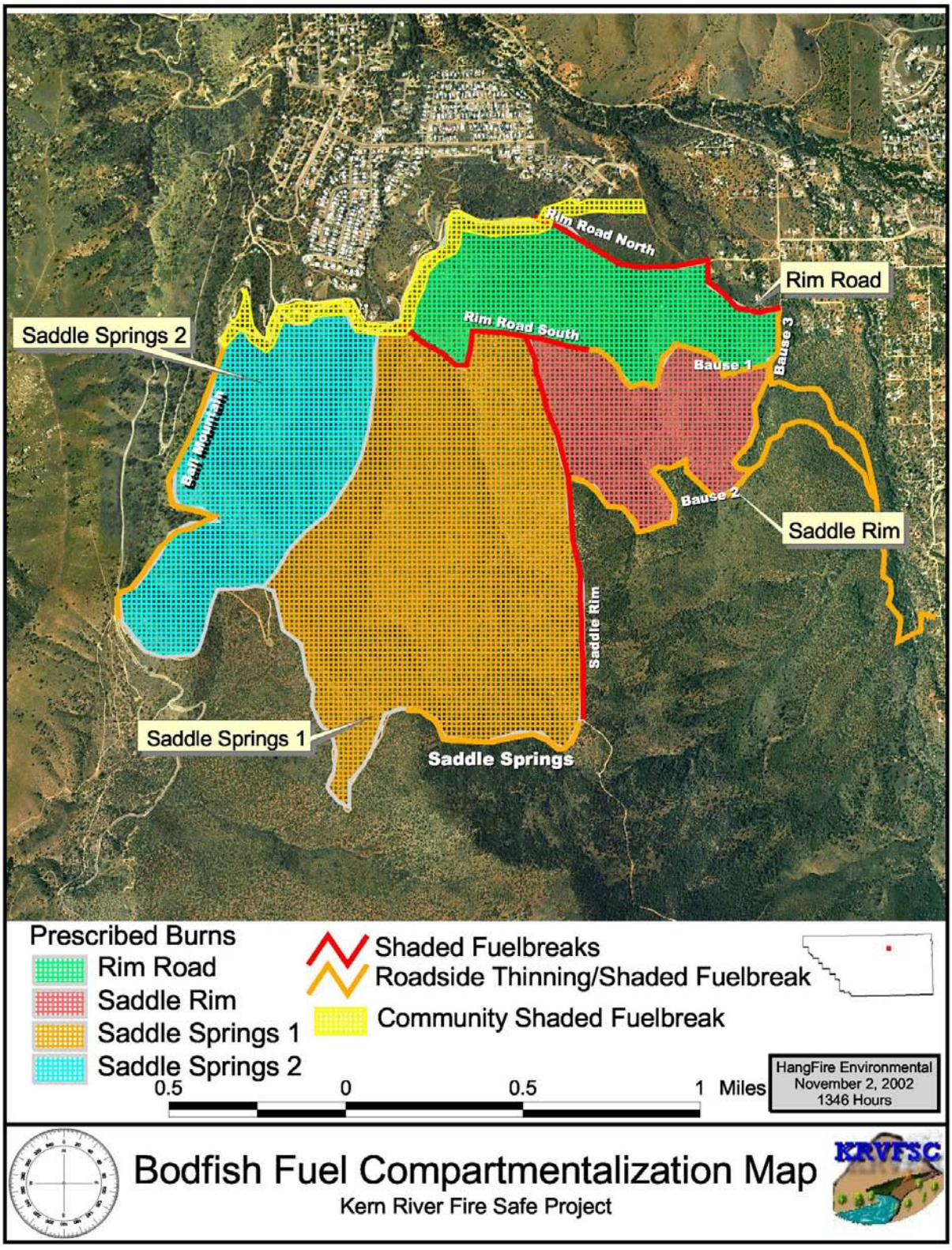
Map 31: Bodfish Shaded Fuelbreak Network Map.



Map 32: Bodfish Community Shaded Fuelbreak Map.



Map 33: Bodfish Prescribed Burn Map.



Map 34: Bodfish Fuel Compartmentalization Map.

Kernville Project

Figure 25: The town of Kernville situated at the base of very heavy fuel types on steep slopes.

Shaded Fuel Break Network

With the exception of a handful of smaller fires, such as the Hillside and Grandview, the slopes above Kernville have not experienced fire since the 1920's. Approximately 580 homes are located west of the Kern River. Most of the homes are situated on hillsides ranging from a gentle to steep grade. The homes located off of Rogers Road and Frontier Trail are situated on larger lots with very steep access. In the event of a wildfire, fire engines would need to be allocated for each structure for protection. This type of structure protection is not always available in a timely manner. To protect these homes, as well as all of Kernville, it is recommended to implement a community shaded fuelbreak network along with the continued practice of defensible space enforcement.

Again, the community shaded fuelbreak approach will slow or stop a wildfire or provide an anchor point for suppression crews. Most of the recommended fuelbreaks will be situated mid-slope reducing their effectiveness. Due to this deficiency, a wider break may be necessary. The goal in this application is to reduce the upslope spotting potential by thinning clumps of vegetation and reducing ladder fuels.

There are three separate fuelbreaks situated on 10 private property parcels, two parcels owned by the Bureau of Land Management, one parcel owned by the United States Forest Service, and three with unknown ownership[15].

A roadside thinning project should be implemented along the base of Frontier Trail. The fuel loading is lighter in several areas along this section of the road. This will allow for higher production rates for crews creating the shaded fuelbreak. With good road access, this would be a project conducive to chipping the biomass on site. Please see the Table 23 for the project name, length, and number of parcels within each project. Please see the Kernville Shaded Fuelbreak Network Map (Map 35).

[15] According to the Kern County Parcel Database.

Table 23: Kernville community shaded fuelbreak network.

Name	Number of Parcels	Length/Acres
Burma	(4) 1 public,3 private	4800'/16
Spuce/Grandview	(7) private	3700'/13
Grove Park	(5) 2 public, 3 unknown	3000'/8
Tollefson Roadside Clearing	(34) 29 landowners, 3 unknown	5100'/20

Neighborhood Fuel Modification

Within the perimeter of the shaded fuelbreak network, there are four areas with heavy fuel that would cause high fire intensities and flames lengths, and the ability to cast embers. It is recommended that these five acres be thinned with the biomass left on site. This project is located in two different areas. The first area is located south of Rogers Road in a small drainage. As Frontier Trail has been paved, new development may soon follow. Lots are currently for sale and this project would help protect current and future property owners situated above slope and adjacent to the drainage. This fuel modification would fall on private property situated on 6 parcels owned by five separate property owners.

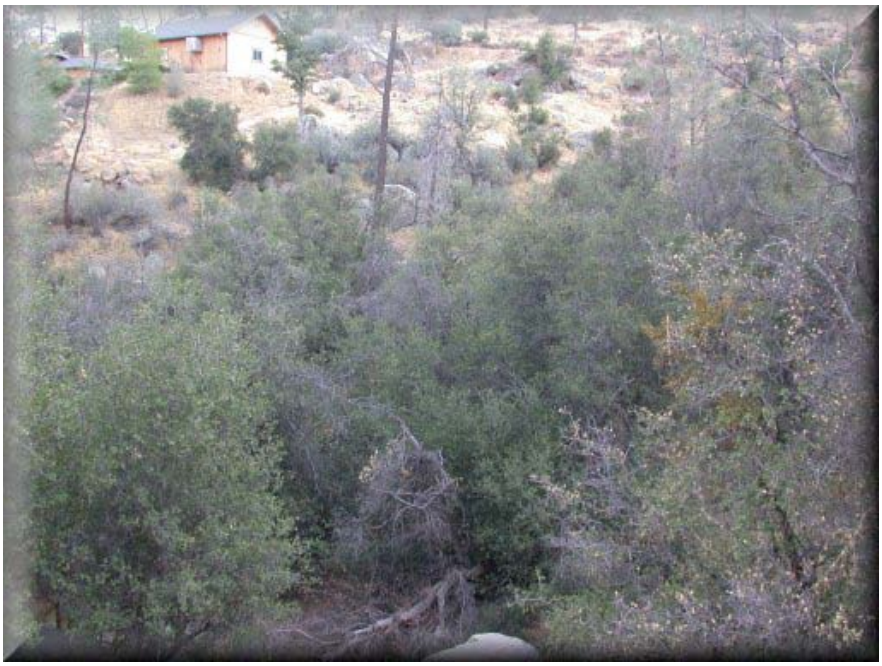
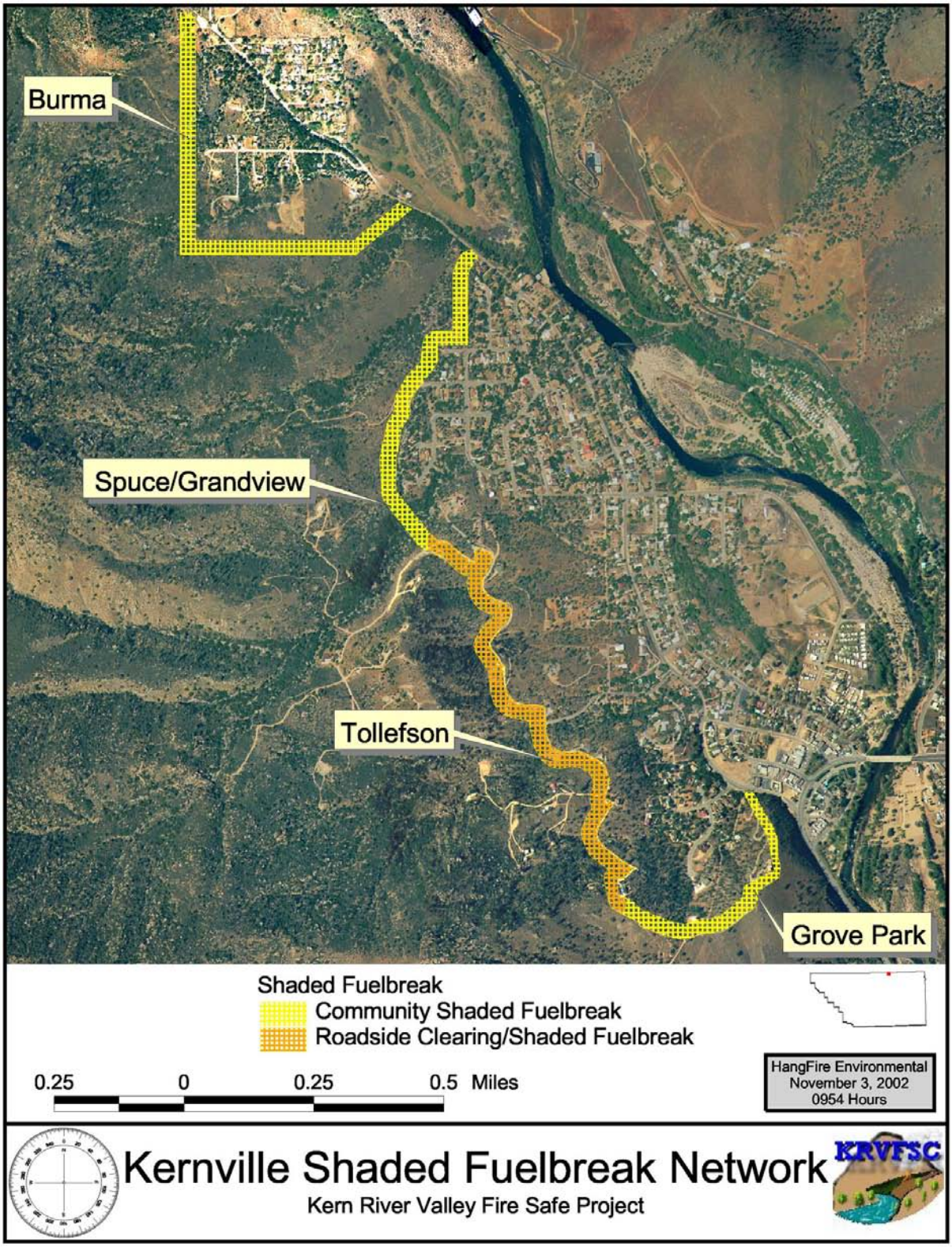


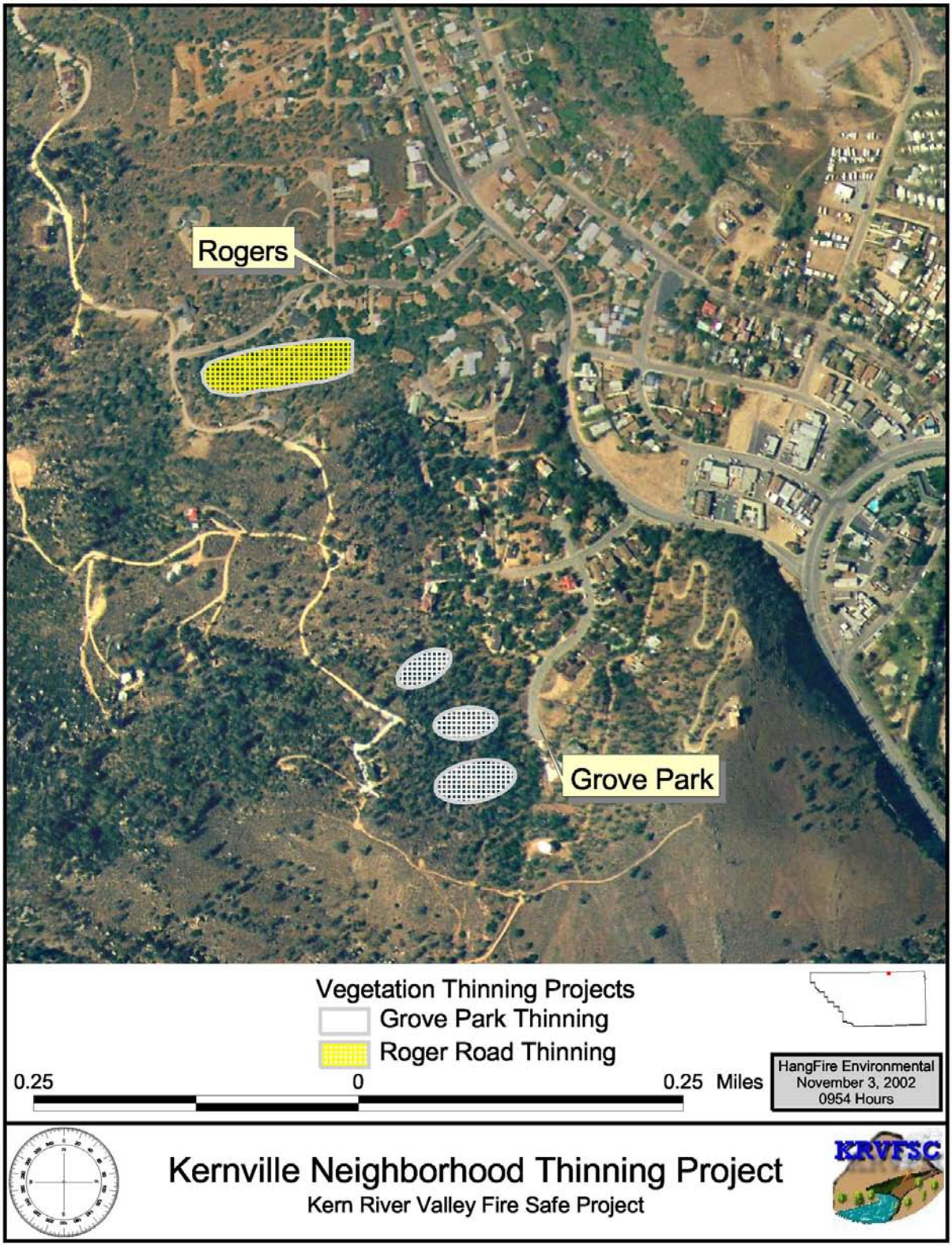
Figure 26: Fuels that need thinning located south of Rogers Road.

The second fuel modification project is located at the end of Grove Park Way. Thinning the vegetation is recommended in three separate sites breaking up the density and continuity. This fuel modification would fall on private property situated on 4 parcels owned by three separate property owners.

Please see the Kernville Neighborhood Thinning Project Map (Map 36).



Map 35: Kernville Community Shaded Fuelbreak Map.



Map 36: Kernville Neighborhood Thinning Project Map.

Squirrel Mountain Valley Project

Community Shaded Fuelbreak

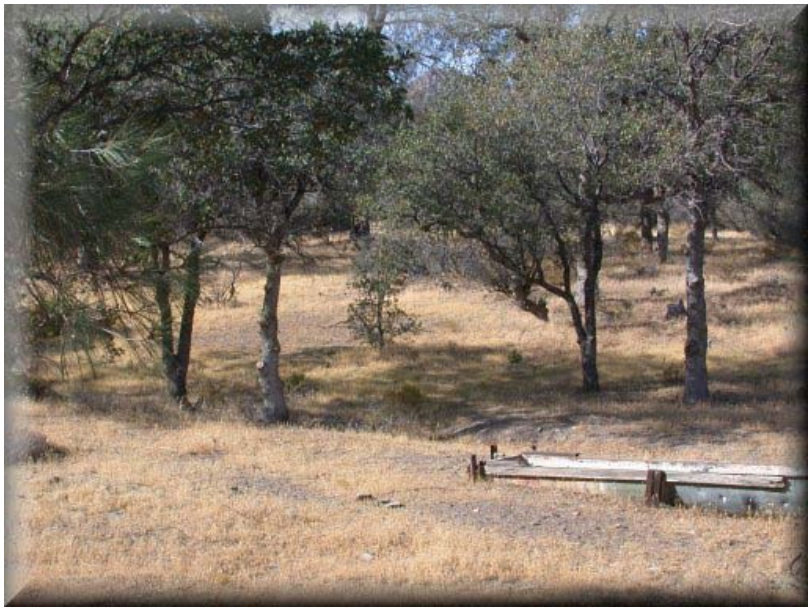


Figure 27: The Seclusion Shaded Fuelbreak. An excellent example of removing continuous heavy and ladder fuels.

Wildfires have burned around and through Squirrel Mountain Valley several times in the past. At least one structure has been destroyed by wildland fire. Several more are situated within the wildland urban interface and without some measure of preventative fuel modification, stand in harms way. The Kern County Fire Department has implemented a community shaded fuelbreak that parallels Seclusion Way to the west. It is recommended to continue maintenance of this fuelbreak to add to its length to the southeast.

Table 24: Squirrel Mountain Valley Fuelbreak.

Name	Length/Acres	Jurisdiction
Seclusion	10500’32	Kern County

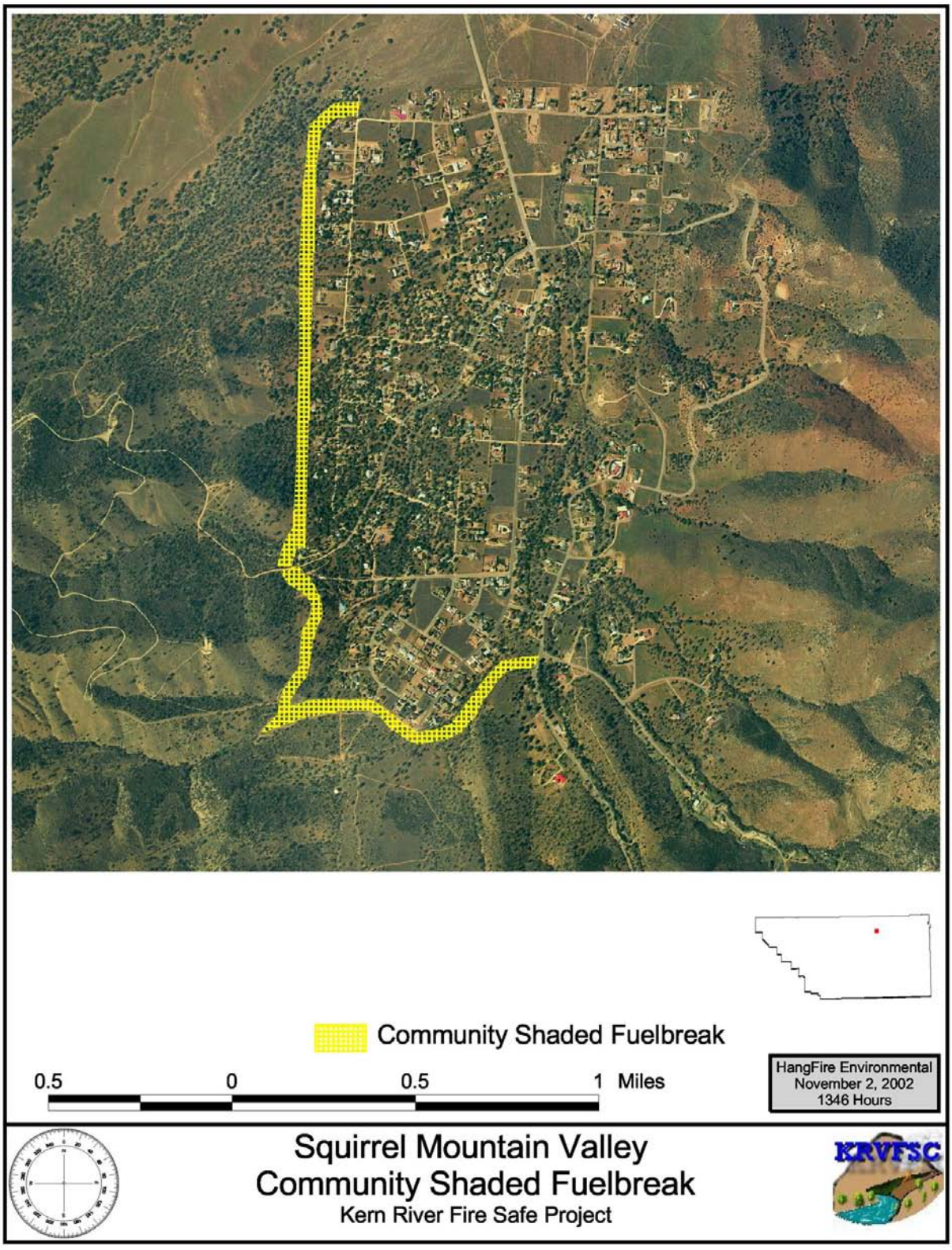
Please see the Squirrel Mountain Valley Community Shaded Fuelbreak Map (Map 37).

Pala Ranch Project

Shaded Fuelbreak

There are approximately 65 dwellings south of Highway 155 between Alta Sierra and Wofford Heights. A majority of these structures are located in Pala Ranch. They are positioned on east and southeasterly slopes with heavy vegetation surrounding them. Access into and egress out of Pala Ranch is by narrow roads with only one way in. With the continuation of the Tillie Fuelbreak mentioned in the Alta Sierra Project, a lateral shaded fuelbreak should be constructed across Tillie Creek[16]. The Tillie Creek Lateral Shaded Fuelbreak would widen a preexisting road named Senjaho Lane and tie into the Tillie Shaded Fuelbreak to the south. The fuelbreak would intersect between five and ten private property parcels depending on width and construction methods.

[16] When working near the creek, work should be performed to reduce erosion.



Map 37: Squirrel Mountain Valley Community Shaded Fuelbreak Map.

Continuation of the Tillie One and Tillie Two Prescribed Burns will allow additional fuel modification slowing a fire advancing from the west. This will only occur with a prescription burning hot enough to obtain higher fuel consumption.

Name	Length in Feet	Jurisdiction
Tillie Creek[17]	10,900	Kern County/BLM
Tillie Creek Lateral	1,500	Kern County

Please see the Pala Ranch Shaded Fuelbreak Map (Map 38).

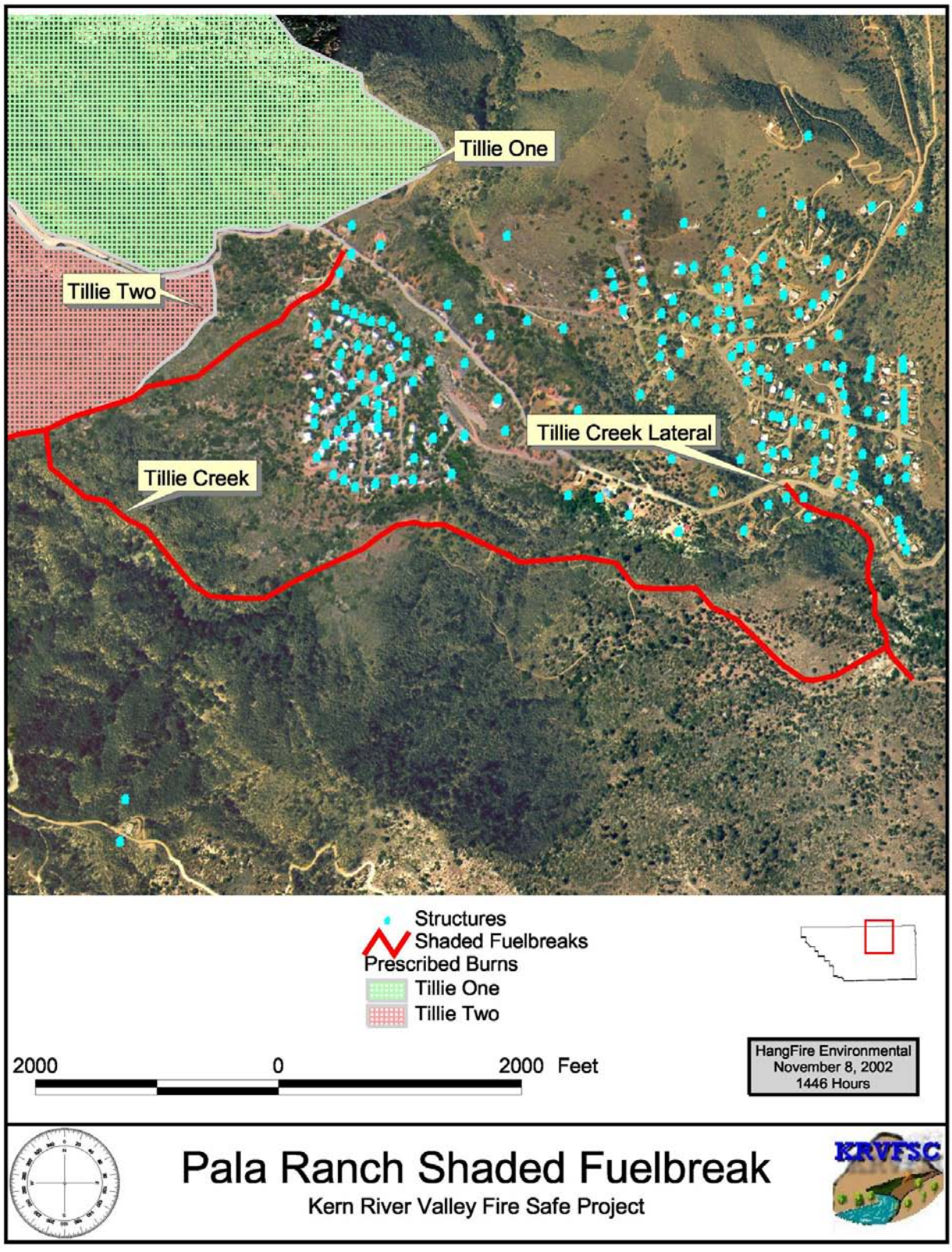
Yankee Canyon Project

Fuel Modification and Reduction

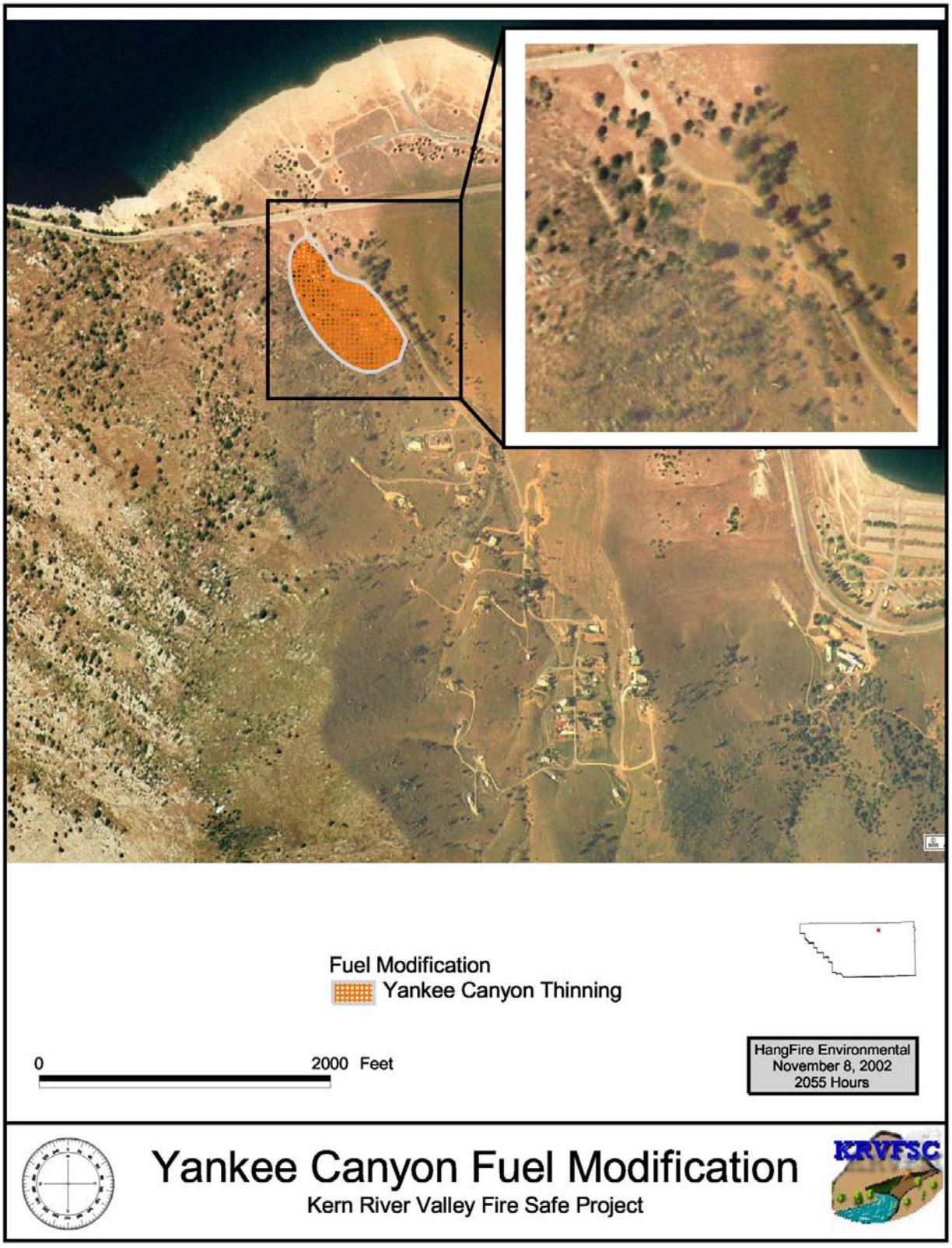
Yankee Canyon, located between Mountain Mesa and Lake Isabella, is a subdivision of approximately 40 homes. There is a boat launch and campsite in close proximity to the area which could produce an accidental source of ignition. In 1968, 1994, and 1998, major fires burned in and around the community. Yankee Canyon Drive is the only way into the community and hazardous brush and trees are becoming dense at the mouth of the canyon. In the event of a wildfire, it would be imperative for homeowners to evacuate through this corridor. It is recommended that a fuel management project be developed to reduce the density and ladder fuels found at the entrance into Yankee Canyon. This project falls on the Bureau of Land Management property and encompasses nine acres of treatment.

Please see the Yankee Canyon Fuel Modification Map (Map 39).

[17] Previously listed under the Alta Sierra Project.



Map 38: Pala Ranch Shaded Fuelbreak Map.



Map 39: Yankee Canyon Fuel Modification Map.

Recommended Building Materials

Reprinted from the pamphlet Firewise Construction Design and Materials written by Peter Slack for Colorado Firewise and funded by the Federal Emergency Management Agency.

Vents, eaves, and soffits

Building a fire-resistive house can be compared to building a watertight roof. One little hole in the roof allows water to leak in, and it doesn't matter how well the job was done on the rest of the roof, if it failed and damage occurred. Small building elements like soffits and vents can be the weak link in a fire. An otherwise fire resistive house is damaged or destroyed because fire found a way in through these areas. Vents are required by the building code to prevent accumulation of water vapor. All crawl spaces under wood floors are required to have ventilation.

One square foot of vent is required for every 150 square feet of floor area[18]. Since these vents are typically located near the ground, care should be taken to not have any combustible vegetation immediately next to them. Vents located on the downhill side of the house should have landscaping elements like stone patios or walls that block the direct path of the fire. Building codes typically allow alternatives to traditional vents. In some cases louvered vents are permitted. These can be closed when moisture is not a problem. (Fire season is usually the dry season.) Mechanical ventilation with intakes and exhaust located away from the ground or other vulnerable locations can also be used. All attic spaces and roof cavities are required to have ventilation. In both cases the vents should be made of metal with wire screen material that has 1/4 inch or smaller openings.

The extension of the roof beyond the exterior wall is the eave. This architectural form is particularly prone to ignition. As fire approaches the building, the exterior wall deflects the hot air and gasses up into the eave. If the exterior wall is combustible this effect is amplified. The solution is to cover the eave with a soffit. If the soffit is applied directly to the rafter eave, it forms a sloping soffit. This still makes a pocket that can trap fire. A better detail is to form a flat soffit that allows the building to more readily deflect fire outward. The soffit material should be at least 3/4 inch plywood in low fire hazard areas, noncombustible in moderate and high areas, and one-hour rated material in very high hazard areas.

Vents for roof ventilation are often found in the soffit. **Placing vents in these locations creates a perfect path for fire to enter the roof structure.** If the vent must be in this location it is better to place it farther from the wall and closer to the fascia. The vent can also be placed in the fascia or near the lower edge of the roof.

Decks

Decks are a very popular and well used part of the house, especially in mountainous terrain. Because they provide elevation above the terrain and surrounding vegetation, they offer a better view. They also supply flat areas for walking on otherwise sloping terrain. The problem is that most decks are highly combustible structures. They are the ultimate heat traps. Their shape traps hot gasses from an approaching fire. Decks often face downhill towards a fire's most likely approach up a slope.

[18] Please check local building code.

Decks are built perfectly to burn, almost as easily as wood stacked in a fireplace. All the components of a deck; joists, decking and railings, are made of only 2 inch thick wood with a high surface-to-volume ratios. When fire approaches, the wood quickly dries out and heats up. Ignition can occur very easily from either radiant energy from the fire or burning embers.

Ignition of decks

Conventional wood decks are so combustible that when wildland fire approaches, the deck often ignites before the fire gets to the house. Sometimes unburned vegetation exists between the house and the fire, demonstrating that the deck was more flammable than the vegetation.

Figure 28: A fast moving grass fire ignited flammable ornamental vegetation under the first deck. It quickly spread to the deck above and throughout the house.

Isolate the deck from the fire with a patio and a wall.

In low and moderate fire areas, it may be sufficient to isolate the deck from the fuels and fire by building a noncombustible patio and wall below it. The patio will assure that no combustible materials are below the deck. The wall will act as a shield, deflecting both the radiant and convective energy of the fire.

Heavy timber construction

In moderate hazard areas the use of heavy timber construction is acceptable. Like log siding, heavy timber is combustible but so thick that it burns very slowly. Minimum thickness for a heavy timber deck is 6 inches for the posts and structural members and 3 inches for the decking and rails. This type of construction can be used with a patio below for additional protection.

Fire-resistive deck construction

In the highest fire hazard areas, consider noncombustible surfaces and fire-resistive building materials for a deck. Wood frame construction is permitted, but change the surface to noncombustible or one-hour rated materials. To build this type of surface, place a waterproof membrane over the top of the deck. This allows the use of fire resistive soffit materials, which cannot tolerate moisture. The most common materials are cement fiber panels or metal (noncombustible), or gypsum (noncombustible and one-hour rated).

The membrane should be covered with decking. One suggestion is plastic wood which has low combustibility; it will burn, but only very slowly. Another suggestion is to use 1 to 2 inches of concrete or stone. This surface is fire-proof and protects the deck from air-born firebrands. However, this covering requires that the structure be strengthened to support the additional weight. Posts and railings can be economically built from steel. Wood posts near the ground can have stone, brick, or noncombustible coverings. A popular baluster design is steel wire, but this

is expensive. Steel pipe, usually 1 to 2 inches in diameter, is very economical and easy to work with. Square steel shapes can look like traditional wood railings.

Fully enclosed decks

The best design is to convert the deck to a solid form by fully enclosing it. This completely eliminates the heat trap. This form also complies with the new Urban/Wildland Interface Code (2000). It has a metal railing with heavy timber posts and concrete deck.

Ratings

When discussing building materials and components frequent references are made to ratings. Through testing, various national organizations provide ratings or evaluations for the fire resistivity of materials or building assemblies. A building assembly is a combination of materials that form a component of a building such as a roof or wall. The ratings are in the following categories:

- Combustible or noncombustible.
- Classes: A (best), B, and C.
- Time: 20 minute, one-hour, two-hour and four-hour.

The organizations that provide these ratings are: the International Conference of Building Officials (ICBO) through its publication, the *Uniform Building Code* (UBC); also a founding member of the International Code Council (ICC) through its publication, the *International Building Code* (IBC); The American Society for Testing and Materials (ASTM); the Underwriters Laboratory (UL); and the National Fire Protection Association (NFPA).

The difference between a noncombustible material and a rated material or assembly is the surface resistance to ignition versus the protection afforded the building behind it. A good example of a noncombustible material is metal roofing and siding. Metal is non-combustible, but an excellent conductor of heat. If the fire remains present long enough, the heat will be conducted through the metal and ignite the material behind it. An example of a fire-rated assembly is wood siding applied over gypsum sheathing. This assembly is rated as one hour. The surface can ignite, but the building is protected from the fire for one hour.

Most ratings are for commercial buildings in urban settings, but some apply to residential structures. For example, the wall between a garage and a house must be rated as one-hour fire resistive. The door between the garage and the house must have a “C label” rated for 20 minutes with an automatic closer. Material ratings for the wildland fire environment have been directly addressed by the I.C.B.O, through a subsidiary, the International Fire Code Institute, Fire Service Division and its publication, the *Urban Wildland Interface Code* and N.F.P.A. Standard 299.

Roofing

Roofing is one of the most important ways to protect a house from wildland fire. As shown earlier, when wildland fires become more intense, the lofted firebrands become a significant cause of the fire spread. Since most roofing has a rough surface and numerous cracks, it can trap wind blown embers and firebrands. In all major wildland urban interface fires, houses thousands of feet from the fire have been observed with burning roofs.

Wood shakes and shingles

Wood shakes and shingles are made perfectly to burn. They are almost like kindling. They are thin, 1/2 to 1 inch thick, with a very rough surface and many cracks. When a wood roof burns it also lofts burning embers, contributing to the spread of fire. Another important characteristic of wood roofs is that they dry out in the Kern River Valley's dry climate and extreme temperature variations.

Asphalt shingles

Asphalt shingles are probably the most economical way to roof a building, especially in terms of dollars spent per years of guaranteed life. Conventional mineral reinforced asphalt shingles have been around for more than 60 years. They are normally guaranteed for 10 to 20 years, and usually have a class C rating.

A cedar roof can be modified to be fire-resistive. Pressure treatment with chemicals can change wood shingles to a class B or C roof. Chemically treated cedar roofs built with a gypsum underlayment can have a class A assembly rating. However, many doubt that the testing conditions for these shingles matches the Valley's climate of low humidity, and high temperature. Mineral reinforced shingles have gradually been replaced by fiberglass reinforced asphalt shingles. These offer guarantees of 20 to 40 years and are a class A material. They are available in many colors and textures and can even imitate wood or slate shingles.

Metal: sheet and shingles

Metal roofing has always been available in sheet form in many colors. It usually has standing seams or ribs. The most common metal roof is galvanized steel with factory-applied paint (usually a two-part epoxy type, not too different from automobile paint). Metal roofing is also available as an imitation wood shingle. This product is made by stamping a texture and shape on the metal and then applying the appropriate color. This imitation is so good that at a distance of 100 feet or more it is difficult to tell the difference between it and a wood shingle. The advantage of metal roofing, both flat and stamped shingle, is that it is non-combustible, durable and very lightweight. It requires a gypsum underlayment in order to have a class A assembly rating, but that is only necessary in high or very high fire hazard situations. Guarantees start at 20 years and go to 50 years. In addition to galvanized steel with paint, metal roofing is also available in aluminum with paint, stainless steel and copper. These tend to be more expensive but also last longer.

Fiber–cement shingles

These shingles are made of cement and fiberglass, or cement and wood. Like the metal shingle, they are made to imitate a wood shingle's texture, shape and color. The cement in these products is altered with polymers to make it less brittle. These products are also noncombustible but require an underlayment for a class A assembly rating.

Membrane roofs

These materials include both rubber and hot applied bituminous saturated mineral felt for flat roofs. These materials are marginally combustible but are most often used with other covering systems like concrete. It can be applied over a gypsum underlayment for a class A assembly rating. Guarantees are only in the 10 to 20 year range, but these products can be considered permanent when covered with concrete.

Concrete shingles and tile, slate shingles, clay tile
These products provide the best fire -resistive roof, but they are expensive. They are 1 inch thick, heavy (10 pounds per square foot), noncombustible, class A rated and usually come with 50 year guarantees. Concrete shingles are manufactured to look like wood shingles. When having a tile roof installed, pay careful attention to the closure of the round openings of the tiles at the edge of the roof.

Exterior walls: siding

The exterior walls of a building are most affected by radiant energy from the fire and, if there is not enough defensible space provided, by the direct impingement of the fire.

Wood panels and boards
Wood panels and boards are the most common and economical forms of siding, but they are readily combustible. This siding is usually not very thick, 1/2 inch to 3/4 inch, and will burn through to the structure behind it in less than 10 minutes. A one-hour rating can be achieved by adding gypsum sheathing behind the siding. However, this addition is of limited value because the building can still ignite, and the fire can spread to other parts of the building such as the eaves above the exterior wall or the windows.

Fiber cement panels, boards and shingles
These products are noncombustible, but they may not be rated and may need gypsum sheathing to achieve a one-hour rating. These materials are very economical and cost slightly more than wood products. When these products are applied with the gypsum sheathing they offer the most economical way to side a house that will resist almost all fire hazard conditions. These materials are virtually permanent on a vertical surface and come with a 50 year guarantee, but they need to be painted. Some can even take a stain with satisfactory results. These products are available with textures molded to imitate wood grain.

Metal: galvanized steel, aluminum, boards, panels and shingles
Like their counterparts in roofing, these products are available in either flat sheets with seams, a stamped board or shingle that imitates a wood product. They are factory painted with two-part epoxy paint and usually have a 50 year guarantee. Unlike the fiber cement product, the paint on this product is a part of the guarantee; thus, it is an almost permanent, non-maintenance material. It is noncombustible, but like other metal products needs a gypsum sheathing to achieve a one-hour rating.

“Real” Stucco
Real stucco, as base material, is ¾ inch to 1 inch thick cement and gypsum. The stucco is applied in two or three coats with metal mesh reinforcement. The color is integrated into the final coat and thus lasts a very long time. Guarantees are 10 to 20 years. It is both a non-combustible and one-hour rated material, which makes it a very good material for high hazard areas. Real stucco tends to be expensive and is also prone to cracking if not applied correctly.

Synthetic stucco, exterior insulating finish system (EIFS)

This product is a 1/8 inch thick acrylic cement finish on fiberglass mesh, on top of one-two inches of expanded polystyrene (EPS). The color, like real stucco, is in the cement coat and thus lasts a long time. This is the preferred way to do stucco because it takes less labor and is therefore cheaper. The foam insulation isolates the stucco finish from the building which virtually eliminates cracking. The surface is non-combustible and has no rating by itself. This product significantly delays a fire due to the insulation quality of the rigid foam and the fact that the system does not ignite. In moderate to high fire hazard situations this product will work well. It can, like other products, obtain a one-hour rating with gypsum sheathing which should be used in a very high fire hazard area.

Heavy timber or log construction
This wood product has a minimum thickness of six inches for frame members and exterior siding, and three inches for decking and steps. Heavy timber is recognized by building codes as a separate fire resistive category. Even though heavy timber is combustible, the low surface to volume ratio causes it to burn very slowly, which makes it very appropriate for medium and high fire risk situations.

Concrete synthetic stone
These products are cast concrete with integral color forming the texture and shape of the stone being imitated. They have modular shapes that have consistent dimensions with flat backs, similar to brick, that keep labor costs down. Synthetic stone is reinforced with fiberglass and steel mesh making it very resistant to cracking. It is fully noncombustible and is usually rated as a one-hour material.

Brick, stone, block
These materials are both permanent and fire proof. Ratings are usually two hours. These are the best products to use in regard to fire resistivity, but are the most expensive.

Windows & Glass

Windows are one of the weakest parts of a building with regard to fire. They usually fail before the building ignites, providing a direct path for the fire to reach the building interior.

Glass failure
Glass provides only a partial barrier to fire and only for a short time. It fractures in the presence of heat and, in the case of a wildland fire, this will happen in about five minutes. Glass deflects most of the convective energy, but not the radiant energy of the fire. Convective energy is hot air and gasses. About 70% of the heat is deflected by window glass, about 20% of the heat is absorbed, and 10% of the heat is transmitted to the interior of the building. Radiant energy from a fire is infrared light energy, like the energy we experience from the sun. Approximately 70% is transmitted through the glass to the interior of the building while about 10% is reflected, and 20% is absorbed by the window glass. Both the radiant and convective energy heats the glass but the perimeter of the glass is covered and protected by a sash. This causes a differential heating of the glass, which stresses the glass and causes it to crack.

Large and small windows

Even if the glass does fracture, as long as it stays in place, the hot gasses (convective energy) from the fire and the fire itself cannot enter the building. Only the radiant energy heat can get through. Eventually, even with the glass in place, combustible materials behind the window may ignite. (See low E glass on the next page). Small windows, less than two feet on a side, will keep fractured glass in place, because the size of glass held in place by the sash is relatively small with little weight. Large windows (more than two feet on a side) cannot keep the fractured glass in place because the size and weight of glass in relationship to the length of sash is too great.

Thermopane or double glazed windows

Because of current energy codes, most glass today is double glazed or thermopane. Double-glazed windows last about twice as long as a single pane, or about ten minutes. The same processes of convective and radiant energy affect the front pane of glass. As long as the front pane is in place, the second pane is partially protected. When the front pane fails and falls away, the process continues on the second pane until it fails and falls away. If the duration of the fire is any longer than ten minutes because there is a good fuel supply around the house, or preheating is caused from a fire approaching from below, additional protection will be necessary to prevent glass failure and fire from entering the house.

Exterior window covers, shutters, screens

Only an additional ten to twenty minutes of protection is necessary for a window to survive a fire. Exterior window covers, such as in-place shutters that only need to be swung into place, can add this time. Shutters originated in New England as protection from storms when the wind would break the glass, and are now readily available in the Florida area for hurricane protection. Wood shutters are the most common and economical, but they will ignite within five minutes. However, if the wildland fire duration is short enough, an additional five minutes of protection may be all that is needed. Also, even though fire departments may use foam to protect structures it will not stick to glass, so shutters may still be advisable.

Metal shutters will protect the window long enough to last through the fire event, and will not ignite. The disadvantage of shutters is that they are not completely passive. They require intervention on the part of the homeowner or the fire department to work. Permanently placed exterior **metal** screens eliminate the deployment problem. Exterior screens are not going to protect the window as much as a solid cover, but as mentioned before, only five to ten minutes of additional protection may be needed, and they provide a surface for foam to adhere to. These screens cannot be used with outward acting windows, like casement or awning windows, but they can be used with horizontal sliding and double hung windows.

Tempered glass

Tempered glass is both resistant to high impacts and heat. Building codes require that tempered glass be used in patio doors and all areas subject to human impact. It is also the glass used in front of fireplaces. Tempered glass will stay in place and intact throughout the wildland fire event. A problem is cost. Windows with tempered glass typically cost 50% more than regular glass. There are strategies around this, and costs are coming down. Patio door replacement units are used to replace glass in patio doors. These units are massed produced and stocked by virtually every glass business. As a result they are very economical, and less expensive than conventional glass. They come in six sizes and typically can be used as a picture unit, or combined to make a window wall or solar structure. Using patio door replacement units

provides a lot of tempered glass and at a very economical price. A few brands of windows are marketed as replacement windows in existing mid-rise urban buildings where the use of tempered glass is necessary. As a result, the additional cost for the tempered glass is only 25% more than standard glass. A local window supplier can suggest appropriate manufacturers.

Low E glass

Low E stands for low emissitivity. This is an ultra thin, several microns thick, metallic coating on glass that appears white or reflective to infrared and ultra violet light. It is used in windows for energy efficiency because they hold more heat in during the winter and keep more heat out during the summer. It also protects fabrics from fading and wood from yellowing. This glazing option is widely used on windows today and only costs about 10% more than standard double glazed units. The advantage of this glass in a wildland fire is that it stops the radiant energy transfer to combustible materials that are behind the glass such as drapes or wood furniture and walls. **The combination of low E and tempered glass features for windows provides the best possible solution for windows in a wildland fire.** The glass will stay intact throughout the fire event and it will transfer less radiant energy to combustibles behind it. It should be noted that the use of tempered and low E glass is a recommendation based on observations in the field. Actual laboratory studies in a wildland fire setting need to be conducted to give these types of glass specific quantitative values.

Glass block

Glass block is the most fire resistive glass available because it has the highest available rating of 90 minutes. It has an excellent appearance but provides a poor view. It does not have the Low E option. A good use may be in a situation where only day lighting is needed, a view is not a factor, and the orientation of the window may be towards a very high fire hazard.

Frames and sashes

Windows with improved glass technology will only work as long as the glass remains in place. Consequently, the frame that holds the window also needs to withstand a fire. Wood frames will burn. They have a high surface to volume ratio causing them to readily ignite and burn freely. They are not recommended. Vinyl frames seldom ignite, and if they do, the combustion rate is very slow and does not contribute to the combustion of the house. The problem is that vinyl frames melt and structurally fail, allowing the glass to fall away. They are not recommended either. Aluminum clad wood is another option. The aluminum cover on a wood frame delays the ignition of the wood window. It does not completely protect the window because the aluminum conducts the heat to the wood, but this delay is enough in most wildland fires. All aluminum frames are even better. Since there are no combustible materials they remain fully intact during a fire. These frames are now available with a thermal break; a plastic spine that connects the interior frame to the exterior frame. This results in good thermal performance similar to wood frames.

Doors

Wood doors

Residential buildings typically use wood doors with glass inserts. The same fire issues related to window glass apply to glass in doors. An unrated wood door is typically 1½ - 2 inches thick, and can readily ignite and burn through in only ten minutes, which is much faster than the rest of the structure will burn. Wood doors are available with a class C, twenty-minute rating. These doors

are typically used between the garage and the house and are a good solution in moderate fire hazard situations. However, in very high fire hazard situations, they may not be appropriate because the door will burn according to its rated time, and this may be long enough to ignite other exterior building components.

Metal doors, steel and aluminum

Metal doors are non-combustible and available with 20 minute, 45 minute and 1½ hour ratings, which make them the most appropriate solution for very high hazard situations. Glass sizes are restricted in these doors. The surfaces are available with embossing to simulate wood grain and raised panel designs. Just as in energy conservation, a good fire resistive door requires adequate weather stripping so that the seal prevents hot gasses or burning embers from entering the building.

Current and Potential Funding Sources:

California Fire Alliance Resource Guide

Volunteer Fire Assistance

AGENCY TO COMMUNITIES/TRIBES/FIRE ASSOCIATIONS

Goal(s) of Program: To organize, train and equip local forces in rural areas and communities to prevent, control and suppress fires threatening life, resources and other improvements.

Assistance or Services Available: 50/50 matching federal grant. Funding for organizing, training and equipping volunteer/rural fire districts.

Agency: U.S.D.A. Forest Service Cooperative Fire Funding (Cooperative Forestry Assistance Act of 1978, CFAA). The California Department of Forestry and Fire Protection (CDF) administers this program.

Who is eligible: Local fire departments, Indian tribal fire departments, fire chiefs' associations.

Limitations & requirements: Funding cannot exceed 50% of actual expenditures. This assistance is available only to communities under 10,000, but groups of smaller communities may join together in a combined effort to service more than 10,000 people. Funds cannot be used for fire stations or capital improvements. The use of funds for new fire engines and other apparatus is not encouraged. Requests for HAZMAT, extrication, or medical aid equipment are not fundable. Successful applicants must complete their approved project(s) using local funds within a 13-month time period starting in July and then bill CDF within the grant agreement time frames in order to receive the funds. Expenditures made outside of the 13-month time period will not be covered by the grant.

Contact: Jim Troehler/Dennis Orbus

Phone: 916.653.6179/ 916.364.2851

Email: jim_troehler@fire.ca.gov / dorbus@fs.fed.us

Address:

CA Department of Forestry & Fire Protection
Cooperative Fire Programs
P.O. Box 944246
Sacramento, CA 94244-2460
U.S. Forest Service
3735 Neely Way
Mather, CA 95655

Funding cycle: Applications are due to local CDF Unit Headquarters by January 31 for funding that becomes available the following July. This is an annual program.

Funds available at this time: An estimated $588,000 is available for the State's Fiscal year 2002-2003. Maximum award is $20,000 and minimum award is $500. The maximum may be lowered 2002 California Fire Alliance Community Resource Guide, rev10/23/01 page 2 depending on the actual funding received, the number of applications received, the total value of all applications, and the nature of the applications.

State Fire Assistance (SFA)
AGENCY TO AGENCY
Goal(s) of Program: Development and transfer of new and improved fire control technologies; effective and efficient prevention, suppression and pre-fire programs.
Assistance or Services Available: 50/50 matching federal grant. The funds are used by CDF in programs that have direct fire protection activities relating to any of the following purposes: development and transfer of new and improved fire control technologies, organization of shared fire suppression resources and achievement of more efficient state fire protection, acquisition and loan of federal excess property, organizational improvement, and technology transfer.
Agency: U.S.D.A. Forest Service Cooperative Fire Funding (Cooperative Forestry Assistance Act of 1978, CFAA). The California Department of Forestry and Fire Protection (CDF) administers this program.
Who is eligible: CDF Units, Regions and Fire Protection Programs, Contract Counties through their CDF Region.
Limitations & requirements: Priority is given to projects that enable the CDF to achieve its strategic planning goals and objectives that are of statewide significance. CDF usually uses salaries, wages, and staff benefits as matching funds.
These funds cannot be used to augment General Funded programs, but may be appropriately applied to short-lived projects, and activities that will enhance existing programs. The funds cannot be used for non-fire projects/activities such as medical, hazardous materials, search, rescue, etc.
Contact: Jim Troehler/Dennis Orbus
Phone: 916.653.6179 916.364.2851
Email: jim_troehler@fire.ca.gov dorbus@fs.fed.us
Address:
CA Department of Forestry & Fire Protection
Cooperative Fire Programs
P.O. Box 944246
Sacramento, CA 94244-2460
U.S. Forest Service
3735 Neely Way
Mather, CA 95655
Funding cycle: Project proposals from CDF Regions and Headquarters programs are due to CDF's Sacramento Cooperative Fire Programs in the Fall for funding that becomes available the following July. This is an annual program.
Funds available at this time: An estimated $1,000,000 is available for the state's fiscal year 2002- 2003. Projects generally range from $6,000 to $150,000.

State Fire Assistance (SFA)—Wildland Urban Interface (WUI)
AGENCY TO AGENCY
Goal(s) of Program: Hazardous fuels mitigation reduction to reduce the fire threat in the wildland urban interface (WUI)
Assistance or Services Available: 50/50 matching federal grant. The funds are used by CDF for projects in three categories: 1) reduce hazardous fuels, 2) perform information and education programs targeting mitigation and prevention, and 3) risk reduction and hazard mitigation for homeowners and their communities.
Agency: U.S.D.A. Forest Service Cooperative Fire Funding (Cooperative Forestry Assistance Act of 1978, CFAA). A task group representing the Council of Western State Foresters and U.S.D.A. Forest Service western cooperative fire coordinators selects projects for funding. The California Department of Forestry and Fire Protection (CDF) receives funding for its projects through the USDA Forest Service.
Who is eligible: CDF Units, Regions and Fire Protection Programs, Contract Counties through their CDF Region.
Limitations & requirements: Funds are specifically earmarked for WUI projects. This earmarked funding is a new program to SFA. Funds must be utilized in the three categories cited above. CDF uses salaries, wages, and staff benefits as matching funds. A detailed budget by agency/organization involved in the project is required to identify level of involvement and ensure that matching funds are in compliance with laws and regulations.
Contact: Rich Schell
Phone: 916.653.7472
Email: Rich_Schell@fire.ca.gov
Address: CA Department of Forestry & Fire Protection Fire Plan
P.O. Box 944246
Sacramento, CA 94244-2460
Funding cycle: Applications are submitted to CDF's Northern and Southern Region offices, then on to CDF's Sacramento Fire Protection in late summer or early fall with submission to the western states task group in October or November. This is an annual program, dependent upon federal funding.
Funds available at this time: $1.4 million was awarded to CDF for 29 projects for the state's 2000-2001 Fiscal Year.

Economic Action Program
AGENCY TO TRIBE/AGENCY/COUNTY/CITY/NON-PROFIT ORGANIZATION
Goal(s) of Program: Preparation of community Firesafe plans to reduce fire hazards and utilize byproducts of fuels management activities in a value added fashion. Projects should demonstrate economic use of small diameter and underutilized forest products.
Assistance or Services Available: Up to 80% of the total cost of project may be covered. Grants, agreements and contracts are available instruments to support fire planning within areas of high forest fire threat. They also can be used to provide training, technical and financial assistance to identify existing markets and develop new markets for underutilized wood products; prepare market assessments, feasibility studies, provide marketing assistance, develop project plans, business plans, partner with universities or non-profit organizations to purchase wood processing equipment to demonstrate economic use of under utilized materials.
Agency: U.S.D.A. Forest Service
Who is eligible: Counties, cities, state or local government agencies, federally recognized tribes, and non-profit organizations such as Resource Conservation and Development areas, Resource Conservation Districts, Economic Development Districts may apply.
Limitations & requirements: Funding is intended to support community Firesafe planning and removal and utilization of biomass within areas of high forest fire threat. Projects must be supported by the area's federal, state, tribal or county fire protection agency in order to be considered for funding, and emphasize local employment where appropriate. Funding requests should range from $10,000 to $75,000 in value.
Contact: Local U.S.D.A. Forest Service Office, or Bruce Goines, USFS
Phone: 707.562.8910, bgoines@fs.fed.us
Internet: www.r5.fs.fed.us/fpm/cooperative_index.htm
Address: 1323 Club Drive
Vallejo, CA 94592
Funding cycle: Submit two-page concept papers to local National Forest office by late November for the current federal fiscal year. After screening, eligible projects will be invited to submit complete applications in January. By May projects funded for the Fiscal Year will be announced.
Funds available at this time: Approximately $2,800,000 was available in FY 2001.
Short description of a successful project: Community Fire Safe Plans, small diameter utilization projects, business plans or fuel reduction project plans. Projects involving biomass to energy 2002 California Fire Alliance Community Resource Guide, rev10/23/01 page 6 applications, composing, pulp, landscaping mulch, animal bedding, value added wood processing to posts, poles, or other applications; round timber construction demonstrations such as visitor centers, kiosks, park shelters; wood in transportation structures such as vehicular or pedestrian bridges constructed from round timbers.

Community Protection/Community Assistance to CDF and Contract Counties
AGENCY TO CDF AND CONTRACT COUNTIES
Goal(s) of Program: To assist communities with fire prevention planning, education and hazardous fuel reduction projects
Assistance or Services Available: 50/50 matching funds or services in kind. Funding for planning, education and hazardous fuel reduction for Community Protection/Community Assistance efforts. These projects are to be planned and implemented based on the California Fire Plan.
Agency: Department of Interior, Bureau of Land Management (BLM) Title IV funding authorized under the National Fire Plan. The California Department of Forestry and Fire Protection (CDF) will administer this program.
Who is eligible: Communities adjacent to lands managed by the Bureau of Land Management and listed in the *Federal Register* as "High or Medium Risk" from wildfire.
Limitations & requirements: Projects are to be planned through the California Fire Plan. Projects supporting the California Fire Plan and access to information will also be considered. The projects will identify education/prevention efforts or hazardous fuels projects for implementing a community protection strategy with community input and involvement.
Contact: Pat Kidder/Rich Schell
Phone: 916.978.4511 / 916.653.7472
Email: pkidder@ca.blm.gov Rich_Schell@fire.ca.gov
Address:

Bureau of Land Management
2800 Cottage Way
Sacramento, CA 95825

CA Department of Forestry & Fire
Protection, Fire Plan
P.O. Box 944246
Sacramento, CA 94244-2460

Funding cycle: October 1, 2001 for fiscal year 2002 projects. This will be an annual program based on availability of Title IV funding each year. Projects selected will have 18 months from time of approval for completion unless mutually agreed to different time frames. Task order to fund projects will be completed by March of 2001.
Funds available at this time: Federal fiscal year 2001 saw funding for 14 projects with spending approximately $1,400,000. Funding for federal fiscal year 2002 will be coordinated with the other federal agencies supporting the National Fire Plan with up to $2,750,000, which was requested by BLM in California.

Community Protection/Community Assistance to Non-Profit Groups
AGENCY TO LOCAL FIRE SAFE COUNCILS, RESOURCE CONSERVATION DISTRICTS, INDIAN TRIBES, HOME OWNERS ASSOCIATION AND SIMILAR GROUPS

Goal(s) of Program: To assist and fund local non-profit groups in fire protection planning, prevention/education, or hazardous fuel reduction projects to reduce the wildfire threat from California's Communities at Risk.

Assistance or Services Available: 90/10 cost shares. Funding and assistance for community fire protection planning, fire prevention/education or hazardous fuel reduction projects.

Agency: The Department of Interior, Bureau of Land Management (BLM) Title IV funding authorized under the National Fire Plan. The funding will be allocated based on recommendations from the California State Fire Safe Council, who will solicit and prioritize initiatives from Local Fire Safe Councils, Resource Conservation Districts, Indian Tribes, Home Owners Associations and other similar groups.

Who is eligible: Local Fire Safe Councils, Resource Conservation Districts, Indian Tribes, Home Owners Associations and other similar groups with developed strategies for community protection/community assistance, that are associated with the "Communities at Risk" identified as "High"or "Medium" risk by the California Fire Alliance and are close to federal lands.

Limitations & requirements: The group applying must contribute (cost-share) 10% of the total costs or services in kind. They must apply through a competitive process set up by the State Fire Safe Council. The group applying must have the ability to receive funding, track funding and complete the project within 18 months of being funded. The group applying must be able to receive funding from a non-profit organization and meet fiscal accounting requirements. There is no limit on the amount of funding to be requested by the group applying. Local Fire Safe Councils, Resource Conservation District, Indian Tribe, Home Owners Association and other similar group in coordination with the Protecting Agency should use the California Fire Plan's community involvement process for development of community protection/community assistance strategies. Requests for funding should be based on projects outlined in the California Fire Plan for education/prevention and hazardous fuels removal projects.

Contact: Pat Kidder, State Fire Safe Council,
CDF Liaison-Bryan Zollner
Phone: 916.978.4511 916.653.5817
Email: pkidder@ca.blm.gov Bryan_Zollner@fire.ca.gov
Address:
Bureau of Land Management
2800 Cottage Way
Sacramento, CA 95825
State Fire Safe Council

Community Protection/Community Assistance to Non-Profit Groups (Continued)
Funding cycle: 2001 was the first year for this BLM program. The State Fire Safe Council will solicit project proposals for federal fiscal year 2002 in February 2002.
Funds available at this time: For federal fiscal year 2001, a total of $4,000,000 was requested and obligated. 101 projects were funded out of a total of 151 received. Matching funding averaged over 33% from successful participants. Projects ranged from $1000 to $300,000. The Bureau of Land Management in California for federal fiscal year 2002 has requested $4,000,000 to be allocated through this process. 2002 California Fire Alliance Community Resource Guide, rev10/23/01 page 10.

Rural Fire Department Assistance
AGENCY TO TRIBES/LOCAL FIRE DEPARTMENTS
Goal(s) of Program: To organize, train and equip local firefighting forces in rural areas and communities to prevent, control and suppress fires threatening life, resources and other improvements.
Assistance or Services Available: 90/10 matching federal grant for training, personal protective equipment, and firefighting equipment for rural fire departments.
Agency: The Department of Interior, Bureau of Land Management (BLM) using Title IV funding authorized under the National Fire Plan.
Who is eligible: Local fire departments, Indian tribal fire departments, fire chief's associations. Available only to communities under 10,000 population.
Limitations & requirements: Funding cannot exceed 90% of actual expenditures. The fire departments must be within BLM's Designated Protection Area and responsible for initial attack with BLM. Funds may not be spent on new engines or apparatus. Maximum grant per department is $20,000.
Contact: Ed Wehking
Phone: 916.978.4431
Email: ewehking@ca.blm.gov
Address: Bureau of Land Management
2800 Cottage Way
Sacramento, CA 95825
Funding cycle: May 2001 through September 2001. At present, it is not certain if similar funding will be available in the future.
Funds available at this time: $420,000.

Community Assistance/Community Protection Initiative
AGENCY TO TRIBE/COMMUNITY
Goal(s) of Program: Treat fuels to reduce wildfire risk.
Assistance or Services Available: Funding for hazardous fuels reduction, fuelbreak construction and similar treatments.
Agency: National Park Service, Pacific West Region
Who is eligible: Communities adjacent to lands administered by the National Park Service.
Limitations & requirements: There is no cost share requirement.
Contact: Local Park Fire Management Officer, or Sue Husari
Phone: 510.817.1371, fax 510.817.1487 (Husari)
Email: Sue_Husari@nps.gov
Address: National Park Service
1111 Jackson Street, Suite 700
Oakland, CA 94607
Funding cycle: Apply by July for funding in the current year.
Funds available at this time: For federal fiscal year 2002, the National Park Service has about $9 million available nationally.

Rural Fire Assistance
WHO TO LOCAL FIRE DEPARTMENTS
Goal(s) of Program: To organize, train and equip local fire fighting forces in rural areas and communities to prevent, control and suppress fires threatening life, resources and improvements.
Assistance or Services Available: Federal grants for training, personal protective equipment and fire fighting equipment for rural fire departments.
Agency: The Department of Interior, U.S. Fish and Wildlife Service, California/Nevada Operations, using Title IV funding authorized under the National Fire Plan.
Who is eligible: Local fire departments and fire chief's associations adjacent to land administered by the U.S. Fish and Wildlife Service as part of the National Wildlife Refuge System.
Limitations & requirements: There is no cost share requirement.
For more information, contact local refuge Fire Management Officer, or
Contact: Richard Hadley/Pam Ensley
Phone: 916.414.6464 503.231.6174
Email: Richard_Hadley@fws.gov Pam_Ensley@fws.gov
Address:

U.S. Fish & Wildlife Service
California/Nevada Operations
2800 Cottage Way, Suite 2610
Sacramento, CA 95825

U.S. Fish & Wildlife Service
Pacific Regional Office
Eastside Federal Complex
911 N.E. 11th St
Portland, OR 97232-4181
Funding cycle: May 2001 through September 2001. Additional funding may be available in 2002.
Funds available at this time: For Federal fiscal year 2001, $40,000 is available for use in the state of California.

Payments to States & Counties
AGENCY TO COUNTY
Goal(s) of Program: To help fund programs such as community wildfire planning, fire prevention and education, and projects such as fuels reduction, utilization of biomass, watershed protection and restoration. Such projects may be coordinated with projects funded from other sources to increase their combined effectiveness.
Assistance or Services Available: Funding in lieu of taxes from federal lands. Similar funding was formerly provided under the Receipts Act.
Agency: The U.S.D.A. Forest Service provides funding to counties through the State of California under the Secure Rural Schools and Community Self-Determination Act, Public Law 106-393.
Who is eligible: Counties in which the U.S.D.A. Forest Service administers national forests.
Limitations & requirements: Generally, there are two categories of funding. Title II funds may be used for projects on federal lands. Title III funds may be used for efforts such as fire planning,

organizing fire safe councils, fire prevention and awareness programs and projects on non-federal lands.
Contact person: Local U.S.D.A. Forest Service office.
Funding cycle: Funds are made available each year. Projects should be identified before September 30 for the following fiscal year. Funds become available in October or November for use during that fiscal year. The federal fiscal year is October 1 through September 30.
Funds available at this time: Funding varies by county and is tied to a specific formula related to past receipts to the Forest Service. For fiscal year 2001, funding for the State of California could be as much as $12.8 million.

Assistance to Firefighters Grant Program
AGENCY TO TRIBAL & COMMUNITY FIRE DEPARTMENTS
Goal(s) of Program: To train firefighting personnel; to purchase fire fighting vehicles and equipment; and to implement fire prevention programs.
Assistance or Services Available: 70%-90% cost share with matching cash. Assistance is in the form of grants, contracts or cooperative agreements.
Agency: Federal Emergency Management Agency (FEMA)/United States Fire Administration (USFA) under the Firefighter Investment and Response (FIRE) Act.
Who is eligible: Local fire departments that are recognized by the state or other appropriate political entity.
Limitations & requirements: Certain expenditure levels and reporting are required.
Contact FEMA Michael Stanley, OES
Senior Emergency Services Coordinator
Hazard Identification and Analysis
Phone: Toll free 866.274.0960 or 301.447.1608 /916.845.8160, pager: 916.594.3071
Fax: Toll free 866.274.0492 916.845.8386
Email: USFAGrants@fema.gov
Internet: www.usfa.fema.gov
The USFA website also has a 7 page brochure *Developing and Writing Grant Proposals* available for downloading.
Funding cycle: Applications are due in spring for grants to be awarded by September 30. Please visit the US Fire Administration 2002 Assistance to Firefighters Grant Program website for applications and 2002 deadlines.

Hazard Mitigation Grant Program and Pre-disaster Mitigation Program
Goal(s) of Program: To reduce or eliminate the long-term risk to life and property from natural disasters by assisting California communities in developing and implementing hazard mitigation projects.
Agency: The Governor's Office of Emergency Services (OES) administers these programs using Federal Emergency Management Agency (FEMA) mitigation funds.
Assistance or Services Available: OES assists communities in hazard identification, local planning and project development.
Eligible Projects: OES has supported the funding of vegetation management, fuel reduction, defensible space and fire education projects. Available grant funds are limited and are provided on a 75%-25% cost share basis. OES determines program priorities based on the state mitigation plan and recommends projects for funding up to the amount available.
Who is eligible: Local, state and tribal governments and certain private non-profit agencies.
Limitations & Requirements: Applications for funding are accepted only after the declaration of a federal disaster by the President. Awards are based on the priorities established by OES and based on local and state mitigation plans. Eligible projects must comply with federal cost effectiveness and environmental requirements.
Contact: John Rowden
Phone: 916.845.8150
Email: John_Rowden@oes.ca.gov
Address: The Governor's Office of Emergency Services
Hazard Mitigation Unit
P.O. Box 419023
Rancho Cordova, California 95741-9023

Funding Cycle: Hazard Mitigation Grant Program: Post-disaster grants tied to presidential declarations. Pre-disaster Mitigation Program: This program began as the Project Impact Communities initiative. Local communities are grant recipients. The previously funded communities are still completing their work plans, some of which include urban/wildland fire mitigation elements. Congress is still determining funding for the Pre-disaster Mitigation Program.
Funds Available at this time: No funds are available at this time. New funding will occur with the next presidential disaster declaration.

Appendix A-Fuel Model Guide

Fuel Model 1 describes areas where annual grass is the main vegetative component. With a wind speed of five miles per hour (mph) and fuel moisture content of eight percent, this fuel type will burn at 5148 feet per hour or close to one mile per hour with 4 foot flames lengths.

Fuel Model 2 is used in areas that annual grass would be the primary carrier of the fire but with a sparse sage brush component. The sage brush will have longer burn out times slowing the forward rate of spread but with taller flames. With a wind speed of five mph and fuel moisture content of eight percent[19], this fuel type will burn at 2310 feet per hour or close to one half mile per hour with 6 foot flames lengths.

Fuel Model 4 is used for area covered with high concentrations of brush. Brush has an ability to withstand drought due to the water conservation method that inherently exists in the plants make-up. The plant emits resins that conceal the water within the plant reducing transpiration. These resins are very waxy thus flammable making fuel model 4 extremely dangerous and difficult to suppress. With a wind speed of five mph and fuel moisture content of eight percent, this fuel type will burn at 4950 feet per hour or close to one mile per hour with 19 foot flames lengths.

Fuel Model 5 is used to model conditions in sparer and younger brush. The fire is generally carried in the surface fuels that are made up of material found below the brush. The fires are generally not very intense because surface fuel loads are light, the shrubs are young with little dead material, and the foliage contains little volatile material. Usually shrubs are short and almost totally cover the area. With a wind speed of five mph and fuel moisture content of eight percent, this fuel type will burn at 1188 feet per hour or less than a quarter mile per hour with 4 foot flames lengths.

Fuel Model 6 is used to model brush that is more flammable than fuel model 5 under moderate winds (greater than 8 mph). The shrubs are older, but not as tall as shrub types of model 4, nor do they contain as much fuel as model 4. With a wind speed of five mph and fuel moisture content of eight percent, this fuel type will burn at 2112 feet per hour with 6 foot flames lengths.

Fuel Model 9 is used for areas with conifer stands with moderate density. Fires run through the surface litter faster than model 8 and have longer flame lengths. Concentrations of dead-down woody material will contribute to possible torching out of trees, spotting, and crowning. With a wind speed of five mph and a fuel moisture content of eight percent, this fuel type will burn at 495 feet per hour with 2.6 foot flames lengths.

Fuel Model 10 is used to model areas with heavy amounts of dead and down woody material. Crown fires, spotting problems, and torching of individual trees are more frequent in the fuel loading type, leading to potential fire control difficulties. With a wind speed of five mph and fuel moisture content of eight percent, this fuel type will burn at 521 feet per hour with 4.8 foot flame lengths.

---

[19] Eight percent fuel moisture is used to remain consistent with Anderson, H. C. 1983 Aids to Determining Fuel Models for Estimating Fire Behavior.

Fuel Model 12 is used for areas with large dense stands of Jeffrey pine and mixed fir for the Cannell District. Although this model was designed to be used for modeling burning slash, the local district feels the burning characteristic of this vegetation type matches those of this model. With a wind speed of five mph and a fuel moisture content of eight percent, this fuel type will burn at 779 feet per hour with 7.5 foot flames lengths.

Fuel Model 28 is used for urban areas. This is any area where homes or other development could be seen in the aerial photograph. Although areas with development can be one of the greatest contributing factors for the spread of a wildfire, there are too many structural variables needed to model the spatial diversity found in any given neighborhood. For example, a house made of stucco with enclosed decks and eaves will withstand a fire possibly without fire protection. Since it will most likely not ignite and add to the convective smoke column, it will not be a contributing factor to the spread of a fire. On the other hand, houses with wood siding, a wood roof, open decking and eaves will possibly burn even with fire protection. It would definitely add to the spread of the fire through embers lofted from the high heat outputs associated with structure fires. Without performing a time intensive neighborhood building assessment, placing a model on each home is prohibitive.

Fuel Model 97 is used for agriculture, a non-fuel.

Fuel Model 98 is used for water, a non-fuel.

Fuel Model 99 is used for barren areas.

Table 25: Fuel model loading, depth, and moisture of extinction[20].

Fuel Model	Typical fuel complex	1 hour ton/acre	10 hour ton/acre	100 hour ton/acre	Live	Fuel bed depth-feet	Moisture of extinction dead fuels-percent
1	Short Grass (1 foot)	.74	.00	.00	.00	1	12
2	Timber (grass and understory[21]	2.00	1.00	.50	.50	1	15
4	Mature chaparral (6 feet)	5.01	4.01	2.00	5.01	6	20
5	Brush (2 feet)	1.00	.50	.00	2.00	2	20
6	Dormant brush, hardwood slash	1.50	2.50	2.00	0.00	2.5	25
9	Hardwood litter	2.92	.41	.15	.00	2	25
10	Timber(litter and understory)	3.01	2.00	5.01	2.00	1	25
12	Medium logging slash[22]	4.01	14.03	16.53	.00	2.3	20

Grass fuel models

Brush fuel models

Timber fuel models

[20] Anderson, H. C. 1983 Aids to Determining Fuel Models for Estimating Fire Behavior. USDA Forest Service General Technical Manuel INT-122, Intermountain Forest Experimental Station, Ogden, Utah.

[21] Used to model grass with a sparse sage brush component.
[22] Used to model Jeffery Pine.

Appendix B-Fuel Ranking Details

Changes made to the first draft of the Fuel Model Map by the Kern River Fire Safe Council:

1. Change all non-Forest Service Fuel Model 2 below 3500' &/or on south and west aspects (135-270 degrees) to Fuel Model 1.

2. Change all Fuel Model 5 on south and west aspects (135-270 degrees) to Fuel Model 6.

3. Change all non-Forest Service Fuel Model 5 below 3500' to Fuel Model 6.

4. Change the Fuel Model 8 polygon (cottonwood/willow forest with heavy dead & down) east of the Lake to Fuel Model 9.

5. For the Tillie/Shirley Creek drainage between Wofford Heights & Alta Sierra, roughly defined by Black/Split Mountains on the North, Sunday/Woodward Peak Ridge on the West & Shirley/Cook Peak on the South:

- Change all Fuel Model 5 on the South and West (135-270 degrees) aspects to Fuel Model 6.
- Change all Fuel Model 9 to Fuel Model 10.

Changes made to the second draft of the Fuel Model Map by the Kern River Fire Safe Council:

1. Change all Fuel Model 5 below 5000' to Fuel Model 6.

2. In Shirley & Ice House Creeks of Alta Sierra area change all Fuel Model 5 above 5000' to Fuel Model 10.

3. South side of Shirley Peak change all Fuel Model 9 on south aspects to Fuel Model 10.

4. From South Lake to Weldon & south to Nicoll's Peak, change all Fuel Model 2 to Fuel Model 1.

5. West of town of Lake Isabella on west side of Kern River in Keysville area, change scattered patches of Fuel Model 6 to Fuel Model 2.

6. In Kelso Creek change Fuel Model 8 to Fuel Model 9.

7. In Bodfish change Fuel Model 8 to Fuel Model 2.

8. On Lightner Peak change Fuel Model 9 below 5000' on south aspects (90-270 degrees) to Fuel Model 2. North aspects (270-90 degrees) to Fuel Model 6

9. Change all remaining Fuel Model 8 to Fuel Model 9.

Fuel Ranking Matrix

Fuel Model Matrix developed by the California Department of Forestry and Fire Protection for the California Fire Plan.

Table 26: Fuel Ranking Matrix.

Fuel Model	Slope Class	Fuel Rank
1	0	1 Moderate
1	1-5	2 High
2	0-2	2 High
2	3-5	3 Very High
4	All	3 Very High
5	0-4	2 High
5	5	3 Very High
6	0-4	2 High
6	5	3 Very High
9	All	1 Moderate
10	All	3 High[23]
12	0	2 High
12	1-5	3 Very High
28[24]	All	1 Moderate
97,98, 99	All	0 No Rank (Non Fuel)

Final Fuel Ranks were determined by combining the Fuel Rank and the Fire Occurrence Reduction Factors:

Table 27: Fuel Reduction Factors

Time Since Last Fire	Fire Occurrence Reduction Factor
A fire between 2002 - 1998	-2
A fire between 1997 - 1993	-1
Fuel Model 1, 2 or Non-fuel type	0

[23] Increased one rank from the CDF methodology due to the ladder component and canopy spacing found throughout the forest surrounding the Valley.

[24] Although not a fuel type, structures do add to the forward rate of spread and intensity rates if they ignite and burn. For this reason, it was decided to give them a fuel rank but with a minimum score due to the fire resistive nature of some building materials.

Appendix C-Characterizing the Fire Threat to Wildland-Urban Interface Areas in California[25]

Introduction

This document outlines in general terms the procedures used to identify areas in California that pose significant threats from wildfire to the people of California. It was prepared under the auspices of the California Fire Alliance -- a coalition of representatives from State and Federal Fire Agencies, originally formed in 1996, who have collaborated on integrating fire management and planning across jurisdictional boundaries. While much of the basic premise and data for the development of this analysis has a beginning in the California Department of Forestry and Fire Protection's California Fire Plan, this work represents new and original work that is sanctioned by the USDA Forest Service, the USDI Bureau of Land Management and National Park Service, in addition to CDF. The Fire Alliance views the issue of the wildland interface as a natural area for collaboration, and is optimistic that the following analysis can be a model for other areas. The analysis was prepared in response to a mandate from Congress in the 2000-2001 Interior Appropriations bill establishing the National Fire Plan.

Utilizing a Geographic Information System (GIS) approach that is at the heart of the California Fire Plan, the three main components in the assessment of threat from wildland fire to Wildland-Urban Interface areas of California are:

- Ranking fuel hazard.
- Assessing the probability of wildland fire.
- Defining areas of suitable housing density that lead to Wildland-Urban Interface fire protection strategy situations.

These three independent components were then combined using GIS capabilities to identify wildland interface areas threatened by wildfire. In addition to mapping these areas, a list of communities were developed that summarized a non-spatial assessment of key areas within the vicinity of significant threat from wildland fire. A subset of that list was made that includes those communities that have a significant fire threat from nearby federal lands. A buffer distance of 1.5 miles was used in the analysis to define "nearby" federal lands.

Methods

1. Defining Fuel Hazard

The CDF's Fire and Resource Assessment Program staff built a methodology for assigning fire hazard across diverse landscapes of California as part of the California Fire Plan. The steps included:

1) the development of a vegetation map which involved correlation with the Fire Behavior Prediction System fuels models, modifications of the map to include recent large fires to reflect current wildland fuel conditions, and the application of a forest growth model to account for new vegetation growth since the last wildfire. The California Interagency Fuel Mapping Group, comprised of federal, state and local representatives, guided this assessment and resolved mapping differences at jurisdictional boundaries.

2) Converting the fuels map to a fire hazard map. Potential fire behavior drives the hazard ranking with fire hazard defined as the fire behavior potential of the wildland fuel, given average bad fire weather conditions. Fire behavior is calculated using the Fire Behavior Prediction

[25] Reprinted from the CDF-Fire Resource Assessment Program website.

System equations and then summarized into moderate, high, or very high classes. The method first calculates the expected fire behavior for unique combinations of slope and fuels under average bad fire weather conditions. Thus, each fuel-by-slope-class combination receives a surface hazard.

The Fire Plan process uses a grid system for data analysis. Staff formed the grid by partitioning each 7.5" USGS quadrangle sheet into 81 (9-by-9) mini-quads. Each grid cell is approximately 450 acres. This method allows more complex data to be summarized and presented in a consistent mapping process. A surface hazard map is made by assigning a hazard ranking to each grid cell based on its slope class and fuel model. The final fire hazard includes an assessment of 2 additional factors that lead to severe fire behavior (ladder and crown fuels).

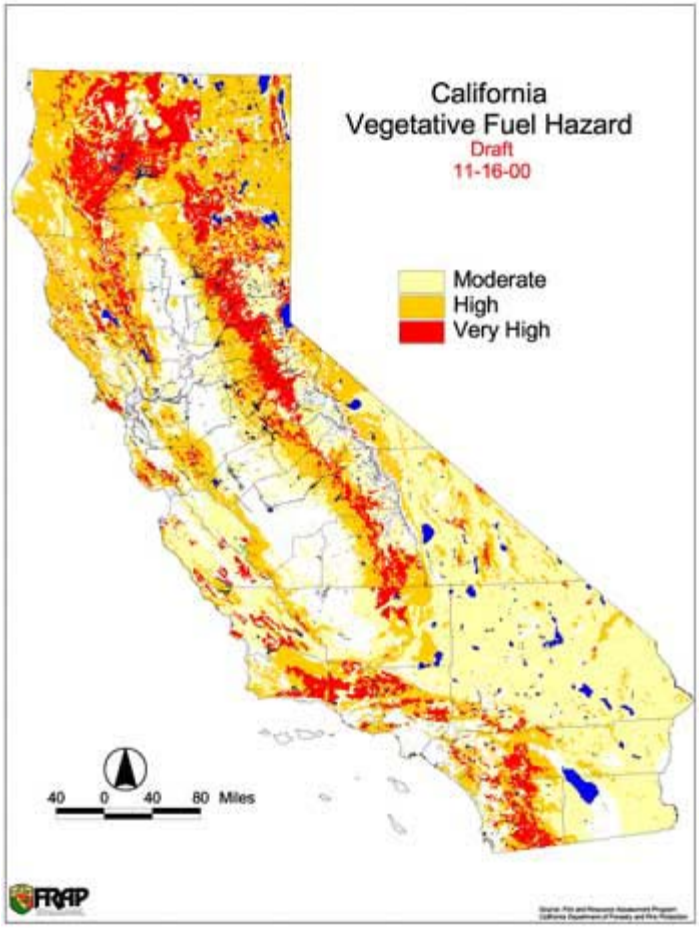


Figure 29: Shows the spatial allocation of fuel hazards across California.

2. Probability of Burning

The probability of a fire burning in a given location is based on many factors including vegetative fuel condition, weather, ignition source, fire suppression response, and more. The Fire and Resource Assessment Program staff has analyzed 47 years of fire history from 1950 - 1997 with respect to vegetation type, bio-region, and owner class to produce a 3 class ranking of the probability of a costly damaging fire (PFIRE). Fire perimeter data (from all of the wildland fire protection agencies) was overlaid on the vegetation type map to determine how many acres burned in each vegetation type during the entire period of record. These values were then divided by the total area in that particular vegetation type multiplied by the number of years of fire perimeter data in the record. The calculated probability values are then grouped into the following three classes:

- Very High (probability of a fire is 1% per year or greater)
- High (probability of a fire is 0.33% - 1% per year)
- Moderate (probability of a fire is less than 0.33% per year)

These values are equivalent to fire frequencies of less than 100 years, 100-300 years, and greater than 300 years, respectively.

The resultant figure represents the annual likelihood that a large damaging wildfire would occur in that particular vegetation type. The analysis is summarized by watershed and ranked based on the highest PFIRE identified through this analysis.

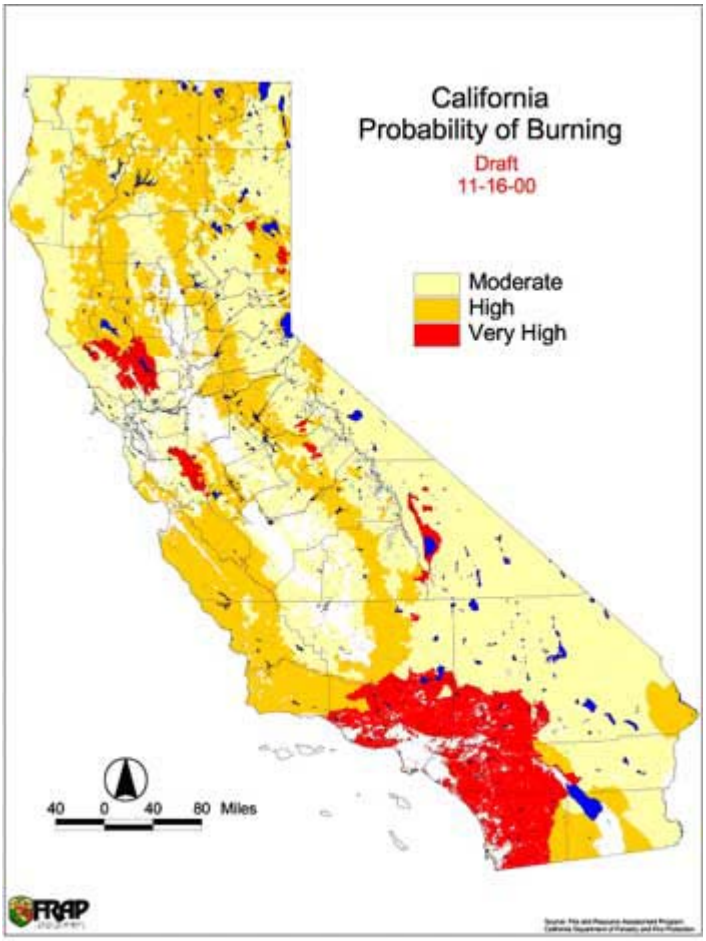


Figure 30: Identifies the probability of a given piece of ground burning.

3. Defining the Urban-Interface

Areas of concern regarding housing and public safety were defined as those areas that have a structure density of 1 house per 40 acres, or denser, as calculated from the 1990 census block data. The census data is resolved into polygons called "blocks", designed to hold roughly 400 people, and consequently vary widely in size and shape depending on the nature of development in a given area. Federal land is considered restricted development land in this analysis (houses in the wildland are on private ownership rather than federal ownership, generally). The migrated census data is categorized based on density and grouped into the following classes:

- Urban (more than one house per 0.5 acres).
- Intermix (from one house per 0.5 acres to one house per 5 acres).
- Rural (from one house per 5 acres to one house per 40 acres).
- Wildland (less than one house per 40 acres).

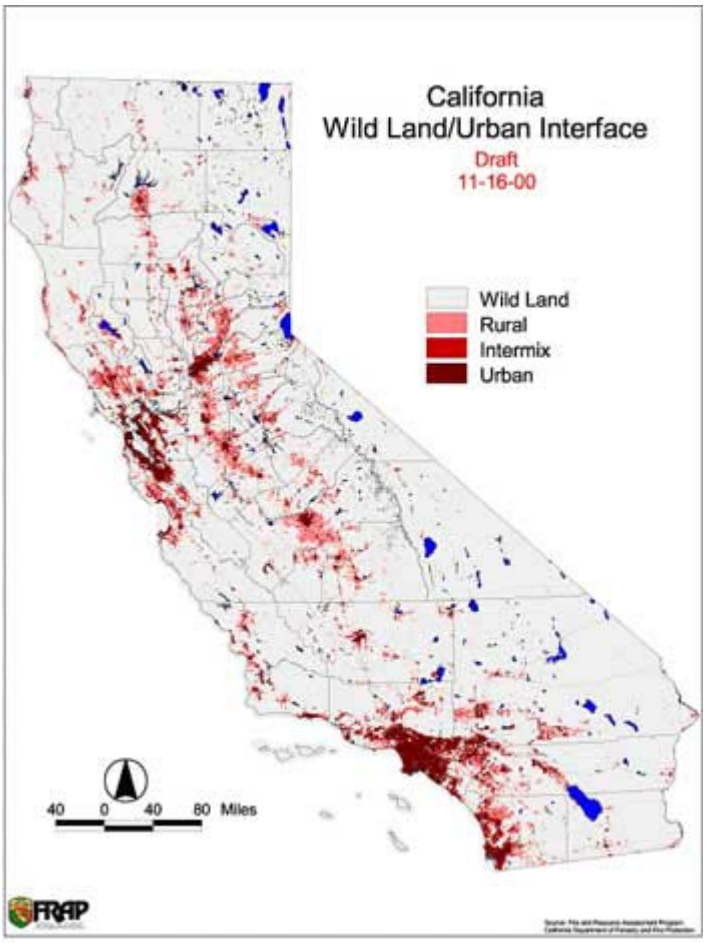


Figure 31: Characterizes the extent and density of the Wildland-Urban Interface.

4. Assessing Fire Threat

Staff calculated a numerical index of fire threat based on the combination of hazard rank and fire probability. A 1 - 3 ranking from PFIRE (probability of a damaging fire occurring) was summed with the 1 - 3 ranking from the fuel hazard component to develop a threat index ranging from 2

to 6. This threat index is then grouped into three threat classes. Scores from four to six received a high threat rank; a score of three received a moderate threat rank; and a score of two received a low threat rank (Table 28). Areas that did not support wildland fuels (e.g., open water, agriculture lands, etc.,) were omitted from the calculation of fire threat (Figure 32). Additionally, areas of very large urban centers (i.e., "concrete jungles") were also removed from the final analysis by combining the fire threat coverage with the urban-interface coverage.

Table 28: Fire threat matrix based on hazard rank and fire probability.

	Hazard Rank		
PFIRE	**1 (Moderate)**	**2 (High)**	**3 (Very High)**
1 (Moderate)	2 (Low)	3 (Moderate)	4 (High)
2 (High)	3 (Moderate)	4 (High)	5 (High)
3 (Very High)	4 (High)	5 (High)	6 (High)

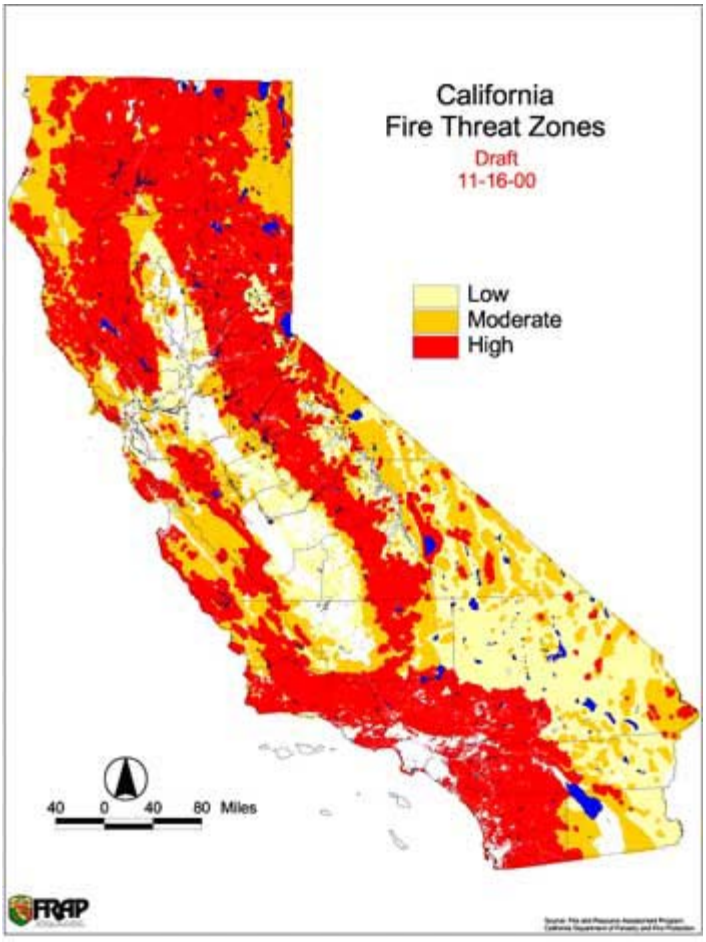


Figure 32: Characterizes the Fire Threat Zones.

5. Identifying Fire Threatened Wildland-Interface Areas

The final step in the analysis was to search for all areas identified in the urban interface layer that were in the vicinity of fire threats. Staff defined vicinity as all areas within 1.5 miles of a fire threat. Consequently, all areas with WUI values from 1 to 3 (i.e., densities greater than one house per 40 acres except those not supporting wildland fuels or in large urban centers) were labeled with the highest threat rank within a 1.5 mile radius. A 0.25 mile high density buffer for the urbanized density class (i.e., greater than 1 house per 0.5 acre) was included to account for the peripheral areas of urban centers abutting wildlands. Hence, high density areas lying immediately adjacent to wildlands would be included, but not those urbanized areas in the central parts of cities. Figure 33 shows not only the aerial extent of affected areas, but also the relative fire threat to those areas.

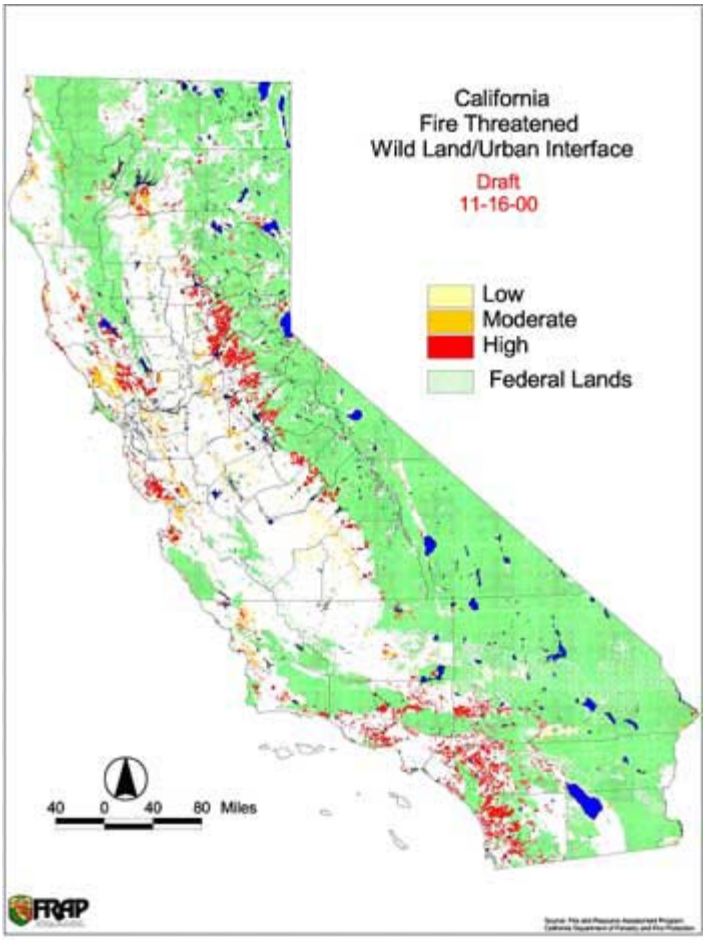


Figure 33: Shows fire threatened areas in the wildland-urban interface.

6. Threatened communities

As a final product, the data in Figure 33 was overlaid on a map of place names to derive a list of communities threatened by wildfire. Place names (from the U.S. Census Bureau) can be selected based on the level of threat posed to them. A similar subset list can be made to find those threatened communities that are within the vicinity of federal ownership. For mapping purposes, a 1.5 mile buffer distance or other appropriate buffer distance can be used to define "vicinity". To accomplish this, a mask of the fire threat data can be created to highlight only those areas on

federal lands, and then run the same calculations performed statewide. The list of these place names, and corresponding fire threat level is given for threatened communities statewide, (a separate list has been compiled of communities with threats from federal lands).

Discussion

While we believe the analysis presented accurately defines WUI areas potentially under threat from wildland fire, a number of caveats to the analysis are warranted. First, we have based our assessment on the proximity of houses and fire threat as defined by hazard and fire probability. Additional data, such as fire weather frequency, may improve the development of the "fire threat" concept. However, in as much as solutions to the WUI issue largely focus on mitigating hazard and improving structure and surrounding characteristics to avoid house ignition, we feel that this scheme of density of housing and assessments of wildland fire threats should form the key components of an effective analytical framework for addressing the problem.

One key element that has emerged in other assessments directed at this and similar land management issues, is the use of other resource data that might be combined into the framework. As an example, if watersheds providing municipal water supplies were viewed as important in selecting wildland areas for mitigation of fire threats, where both watershed and community protection objectives might be realized, then GIS-based data on watersheds could be brought into the analysis. In fact, this is the very foundation of the California Fire Plan. Managing for wildfire is a complex business, and there is no reason to believe that we should arbitrarily limit the complexity of our planning tools.

However, we are also obliged to note that constraints and caveats to the underlying data classifications, resolution, and accuracy could call into question the derived assessment when looked at under a microscope. If additional data is included, it simply also brings to bear these same issues as they relate to these new data. For the purpose of broadly defining these areas at the statewide scale, we are confident that the data used here are sufficient to the task. We further believe that errors in our assessment would be selected out during the project level planning process where refinement of project planning required to mitigate fire threats to people is undertaken. As the Fire Alliance has supported refinement of existing data, and the development of new data, we think that this assessment approach can easily incorporate new information as it becomes available. We also believe it is sufficiently flexible such that the framework can change to take advantage of new ideas in characterizing and classifying the Wildland-Urban Interface issue.

Disclaimers

This mapping analysis will need field review to validate the basic assessments and conclusions. The California Fire Plan process calls for using the best available data for analysis and having field fire managers and community stakeholders validate the underlying data. Tactical project decisions are then made on the best combination of strategic assessments and local knowledge. Most of the data sets used in this analysis have gone through this field validation process. However, several data sets are taken "as is" and may not reflect actual current conditions.

The urban-wildland interface assessment and the community names list are based on the 1990 Census Bureau information. There is a good likelihood that communities have been omitted that should be included and there are probably communities included that should be omitted.

California is experiencing rapid growth, especially in rural areas removed from the urban centers. Validating and updating the basic 1990 census data is beyond the capability of field managers and stakeholders so existing data is used 'as is" with the intent of updating the analysis when the 2000 census data is available.

One basic assumption in the Wildland-Urban Interface housing density mapping is that the houses in a census block are on the private land portion of the block and not on the federal land. There may be local exceptions to this assumption, for example: concentrations of summer cabins on national forest leases. Also, we assumed housing is evenly distributed over the private land portion of the census block. Field validation may find concentrations of housing that could alter the housing density mapping.

The hazard assessment is based on the best available vegetation maps. In some parts of California these data are very good. However, in other areas, the vegetation mapping is old and otherwise less than desirable. Field validation has corrected many mapping errors but probably not all.

The fire probability assessment includes fire perimeter maps for all agencies dating back to 1950. Older fire perimeters were digitized from paper map archives. The maps have been field validated to the extent that this history is available. It is possible that some fires are not in the database. This mapping is a cooperative effort between local and state wildland fire agencies and federal land management agencies with wildland fire protection responsibilities. The possibility exists that some fires from other land managers have not yet been included. For example, fires on military bases and prescribed fires on private ownerships may be missing from this analysis.

Field validation efforts are focused on areas of greatest concern, such as areas where their efforts will have the greatest impact. In other words, community stakeholders and fire managers are not spending a lot of time fine-tuning data in areas where they know fires are not a problem. The benefit to this approach is that projects are being proposed and developed in the most important areas. The caution is for those making decisions removed from this local knowledge base; the base data may not be perfect.

Appendix D-Fire Codes used in the Kern River Valley

17.32.010 Uniform Fire Code--Adopted

That portion of the State Building Standards Code that imposes substantially the same requirements as are contained in the Uniform Fire Code, 1997 Edition published by the International Fire Code Institute, together with those portions of the Uniform Fire Code, 1997 Edition, including Appendix Chapters I-C, II-A, II-B, II-C, II-F, II-I, II-J, III-A, III-C, III-D, IV-A, and the "Uniform Fire Code Standards, 1997 Edition," published by the International Fire Code Institute, not included in the State Building Standards Code, as modified and amended by this chapter, are adopted by this reference into this chapter, and are collectively declared to be the Kern County Fire Code for the purpose of regulating the safeguarding of life, property and public welfare to a reasonable degree from the hazards of fire, hazardous materials release and explosion arising from the storage, use and handling of dangerous and hazardous materials, substances and devices, the operation, installation, construction, location, safeguarding and maintenance of attendant equipment, and the installation and maintenance of adequate means of egress not provided for by the building code. (Ord. G-6598 § 10 (part), 1999)

17.32.080 Section 209 amended--Definition of hazardous fire area.

The definition of hazardous fire area in Section 209 of Article 2 of the Kern County Fire Code is amended to read as follows:

HAZARDOUS FIRE AREA shall mean any land which is covered with grass, grain, brush or forest, whether privately or publicly owned, which is so situated or is of such inaccessible location, that a fire originating upon such land would present an abnormally difficult job of suppression or would result in great and unusual damage through fire or resulting erosion. The Chief shall officially determine and publicly announce the creation of each Hazardous Fire Area, and shall declare the period during which the area shall be so designated. Notice of the creation of each Hazardous Fire Area shall be given by posting of notices along the exterior boundaries of such area at paved, designated (named) roads and highways and designated (named) trails passing through such area. A notice shall also be published once a week for two weeks setting forth the area affected in general terms in a newspaper of general circulation and printed and published in the County of Kern.

(Ordinance. G-6598 § 10 (part), 1999)

17.32.100 Section 902.2.1 amended--Required access.

Section 902.2.1 of Article 9 of the Kern County Fire Code is amended to read as follows:

902.2.1 Required Access. Fire apparatus access roads shall be provided in accordance with Sections 901 and 902.2 for every facility, building or portion of a building hereafter constructed or moved into or within the jurisdiction and for every mobile home as defined by Section 18211 of the Health and Safety Code hereafter located on a parcel of land when any portion of the facility or any portion of an exterior wall of the first story of the building is located more than 150 feet (45 720 mm) from fire apparatus access as measured by an approved route around the exterior of the building or facility. See also Section 902.3 for personnel access to buildings.

EXCEPTIONS:

1. When buildings are completely protected with an approved automatic fire sprinkler system, the provisions of Sections 902.2.1 and 902.2.2 may be modified.
2. When access roadways cannot be installed due to location on property, topography, waterways, nonnegotiable grades or other similar conditions, the chief may require additional fire protection as specified in Section 1001.9.

More than one fire apparatus access road may be required when it is determined by the chief that access by a single road may be impaired by vehicle congestion, condition of terrain, climatic conditions or other factors that could limit access.
Access in commercial, industrial, or other zones may require paving to match the grade of the rails where railroad loading is planned.
For high-piled combustible storage, see Section 8102.6.1.
For required access during construction, alteration or demolition of a building, see Section 8704.2.
(Ordinance. G-6598 § 10 (part), 1999)

17.32.101 Section 902.2.2.1 amended--Dimensions.
Section 902.2.2.1 of Article 9 of the Kern County Fire Code is amended to read as follows:
902.2.2.1 Dimensions. Fire apparatus access roads shall have an unobstructed width of not less than 20 feet (6096 mm) and an unobstructed vertical clearance of 15 feet (4572 mm).
EXCEPTIONS: 1. When serving only one Group R, Division 3 or Group U Occupancy the unobstructed width of the access road may be 12 feet (3658 mm).
2. Vertical clearance may be reduced, provided such reduction does not impair access by fire apparatus and approved signs are installed and maintained indicating the established vertical clearance when approved by the chief.
No access road shall be less than 32 feet (9754 mm) in width if vehicle parking is permitted on one side of the access road and not less than 40 (12 192 mm) feet in width if vehicle parking is permitted on both sides of the access road. To permit the free passage of vehicles, access roads designed for vehicle parking on only one side shall have signs or markings prohibiting the parking of vehicles on the traffic flow side of the roadway.
An access road divided into separate adjacent one-way traffic lanes by a curbed divider or similar obstacle shall be not less than 15 feet (4572 mm) in unobstructed width on each side of the divider.
Vertical clearance or widths shall be increased when in the opinion of the chief, vertical clearances or widths are not adequate to provide fire apparatus access.
(Ordinance G-6598 § 10 (part), 1999)
17.32.104 Section 902.2.2.3 amended--Turning radius.
Section 902.2.2.3 of Article 9 of the Kern County Fire Code is amended to read as follows:
902.2.2.3 Turning Radius. The inside turning radius of a fire apparatus access road shall be a minimum of 40 feet (12 192 mm).
(Ordinance G-6598 § 10 (part), 1999)
17.32.106 Section 902.2.2.6 amended--Grade.
Section 902.2.2.6 of Article 10 of the Kern County Fire Code is amended to read as follows:
902.2.2.6 Grade. The grade for a fire apparatus access road shall not exceed 15 percent.
(Ordinance G-6598 § 10 (part), 1999)
17.32.108 Section 902.2.4.1 amended--General.
Section 902.2.4.1 of Article 9 of the Kern County Fire Code is amended to read as follows:
902.2.4.1 General. The required width of a fire apparatus access road shall not be obstructed in any manner, including parking of vehicles. Fire apparatus access roads that are temporarily impassable due to inclement weather conditions including, but not limited to snow, dust, and flood, are not considered obstructed. The minimum required widths and clearances established under Section 902.2.2.1 shall be maintained at all times. Fire apparatus access roads shall be

established, constructed, and maintained in such a manner as to allow direct access to the building, mobile home or facility at all times without any physical obstruction or legal hindrance. Entrances to roads, trails or other access-ways which have been closed with gates and barriers in accordance with Section 902.2.4.2 shall not be obstructed by parked vehicles.
(Ordinance. G-6598 § 10 (part), 1999)

17.32.120 Section 903 amended--Water supplies for fire protection.

Section 903 of Article 9 of the Kern County Fire Code is amended to read as follows:

Section 903--Water Supplies For Fire Protection.

903.1 General. Water supplies and fire hydrants shall be in accordance with Section 901 and 903.

903.2 Required Water Supply for Fire Protection. Water supplies and fire hydrant requirements shall be required in accordance with Section 903.2.

903.2.1 New Facilities. An approved water supply capable of supplying the required fire flow for fire protection shall be provided to all premises upon which facilities, buildings or portions of buildings are hereafter constructed or moved into or within the jurisdiction.

903.2.2 Existing Facilities. When required by the chief, water supply and fire hydrants shall be provided at existing facilities when the fire load potential exceeds the water supply availability.

903.2.3 Additional On-Site Fire Hydrants. When any portion of the facility or building protected is in excess of 150 feet (45 720 mm) from a water supply on a public street, as measured by an approved route around the exterior of the facility or building, on-site fire hydrants and mains capable of supplying the required fire flow shall be provided when required by the Chief. See Section 903.4.

903.3 Type of Water Supply. Water supply may consist of reservoirs, pressure tanks, water mains, elevated tanks, or other fixed systems capable of supplying the required fire flow. The fire flow requirements shall be determined by the Chief and shall be computed on the basis of a minimum 20 p.s.i.g. (137.9 kPa) residual operating pressure at the point of lowest pressure of the street main from which the flow is measured. In setting the requirements for fire flow, the Chief may be guided by the provisions in Appendix III-A and by the minimum requirements set forth in Table 903-A, but may require higher standards on the basis of local conditions, exposure, congestion, or construction of the building. The required fire flows are to be provided in addition to the domestic requirements.

903.4 Fire Hydrant Systems.

903.4.1 General.

903.4.1.1 Applicability. Fire hydrant systems and fire hydrants shall be in accordance with Section 903.4.

903.4.1.2 Testing and Maintenance. Fire hydrant systems shall be subject to such periodic tests as required by the chief. Fire hydrant systems shall be maintained in an operative condition at all times and shall be repaired where defective. Additions, repairs, alterations and servicing shall be in accordance with approved standards.

903.4.1.3 Tampering and Obstruction. See Sections 1001.6 and 1001.7.

903.4.2 Required Installations. The location, number and type of fire hydrants connected to a water supply capable of delivering the required fire flow shall be in accordance with Section 903.4.2. and as required and approved by the Chief. Such fire hydrants shall be provided on the public street or on the site of the premises to be protected as required and approved by the Chief. Fire hydrants shall be accessible to the fire department apparatus by roadways meeting the requirements of Section 902.2.

903.4.2.1 Hydrant Spacing.

1. Fire hydrants shall be installed with a maximum spacing between hydrants as indicated in Table No. 903-A. A hydrant shall be placed at each intersection except where this would provide excessive hydrant coverage.

EXCEPTION: The spacing of hydrants shall have an individual tolerance of 10 percent. However, the average spacing between any three (3) adjacent hydrants shall not exceed the required spacing.

2. Fire hydrant spacing shall be computed separately for each side of major highways, divided roadways, canals, or railways.

3. The last hydrant on a cul-de-sac or stub street shall not be more than one-half the maximum spacing from the end of the street.

903.4.2.2 Installation.

1. Whenever any hydrant or other valve which is intended for use by the Chief for fire suppression purposes, is installed or replaced, the same shall be installed or replaced according to the modified copy of the standards for fire hydrant installation, entitled, "Fire Hydrant Standards, Kern County" dated September 1984 at the end of this chapter.

903.4.2.3 Water Distribution System.

1. The water distribution system shall be provided with valves and other facilities, such as tanks, so that no point on any lot at the street right-of-way shall be more than one and one-half (11/2) times the maximum hydrant spacing from a working hydrant as a result of any single break or shutdown for repairs, except where impractical.

2. All water mains serving hydrants shall have a minimum nominal diameter of 6 inches (15 mm). Stub lines over 800 feet (24 m) in length or supporting more than one hydrant shall have a minimum nominal diameter of 8 inches (20 mm).

TABLE NO. 903-A - FIRE FLOW REQUIREMENTS

DISTRICT CLASSIFICATION	**MINIMUM FIRE FLOW[1]**	**MINIMUM DURATION (in hours)**	**MAXIMUM HYDRANT SPACING**
Residential Includes: 1 and 2 family dwellings	500 GPM 1893 L/min	1	600' 202 m
Commercial Includes: all commercial uses, hotels, apartments, multiple residence buildings, schools, and colleges	1,000 GPM 3785 L/min	2	330' 101 m
Industrial	1,500 GPM 5678 L/min	4	330' 101 m

[1] When required by the Chief, the required fire flow may be increased in accordance with Section 903.3.

(Ordinance G-6598 § 10 (part), 1999)

17.32.146 Section 1111.1 amended--Fire-resistive construction.

Section 1111.1 of Article 11 of the Kern County Fire Code is amended to read as follows:

1111.1 Fire-resistive Construction. Required fire-resistive construction, including occupancy separations, area separation walls, exterior walls due to location on property, fire-resistive requirements based on type of construction, draft-stop partitions and roof coverings shall be maintained as specified in the Kern County Building Code and this code and shall be properly repaired, restored or replaced when damaged, altered, breached, penetrated, removed or improperly installed. Any deficiency or lack of maintenance, or opening or hole in the structure which would tend to increase the severity of fire or the spread of fire shall be corrected immediately.

When required, fire-rated gypsum wallboard walls or ceilings are broken to the extent that through openings exist, the damaged gypsum wallboard shall be replaced or returned to the required level of fire resistance using a listed repair system or using materials and methods equivalent to the original construction.

(Ord. G-6598 § 10 (part), 1999

Kern County Health and Safety Code

8.28.110 Keeping premises in sanitary condition.

A. Unlawful. Every person in possession, charge or control of any structure, property or other premises shall keep it free and clear of all accumulations of solid waste which may produce odor, attract or harbor insects or rodents or provide a breeding place for them, be offensive to the senses, invites plundering, promotes blight and deterioration, creates a fire hazard or otherwise be or become a hazard to health, safety and welfare of the public. Any structure, property or premises not kept free of such accumulations is a public nuisance and may be abated as provided in this chapter.

B. Summary Abatement. In the event the director or the public official determines that an accumulation of solid waste is unsanitary, as aforesaid in subsection (A) of this section, and also that an emergency exists which will make it dangerous to public health or safety to delay, in addition to any other rights and duties delegated to the director or the public official by this chapter, a designated representative, upon authorization of a department head, may enter at any time upon such premises and remove the offensive accumulation, and the person responsible, as hereinbefore provided, shall be liable civilly for the cost thereof, together with any expenses of collection, disposal and administrative costs, in addition to any other penalty provided in this chapter. (Ord. G-6530 § 3 (part), 1998)

8.46.020 Exception to area of applicability-- Abatement of fire hazards.

For the purpose of abating public nuisances which consist of excessive accumulations or growths of weeds which may create fire hazards for property or persons, the provisions of Section 8.46.010 shall apply to all unincorporated areas of the county. (Ordinance G-6530 § 6 (part), 1998)

Public Resource Code 4290

(a) The board shall adopt regulations implementing minimum fire safety standards related to defensible space which are applicable to state responsibility area lands under the authority of the department. These regulations apply to the perimeters and access to all residential, commercial, and industrial building construction within state responsibility areas approved after

January 1, 1991. The board may not adopt building standards, as defined in Section 18909 of the Health and Safety Code, under the authority of this section. As an integral part of fire safety standards, the State Fire Marshal has the authority to adopt regulations for roof coverings and openings into the attic areas of buildings specified in Section 13108.5 of the Health and Safety Code. The regulations apply to the placement of mobile homes as defined by National Fire Protection Association standards. These regulations do not apply where an application for a building permit was filed prior to January 1, 1991, or to parcel or tentative maps or other developments approved prior to January 1, 1991, if the final map for the tentative map is approved within the time prescribed by the local ordinance. The regulations shall include all of the following:

(1) Road standards for fire equipment access.

(2) Standards for signs identifying streets, roads, and buildings.

(3) Minimum private water supply reserves for emergency fire use.

(4) Fuel breaks and greenbelts.

(b) These regulations do not supersede local regulations which equal or exceed minimum regulations adopted by the state.

Public Resource Code 4291

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 is 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. 4291.1. (a) Notwithstanding Section 4021, a violation of Section 4291 is an infraction punishable by a fine of not less than one hundred dollars ($100), nor more than five hundred dollars ($500). If a person is convicted of a second violation of Section 4291 within five years, that person shall be punished by a fine of not less than two hundred fifty dollars ($250), nor more than five hundred dollars ($500). If a person is convicted of a third violation of Section 4291 within five years, that person is guilty of a misdemeanor and shall be punished by a fine of not less than five hundred dollars ($500). If a person is convicted of a third violation of Section 4291 within five years, the department may perform or contract for the performance of work necessary to comply with Section 4291 and may bill the person convicted for the costs incurred, in which case the person convicted, upon payment of those costs, shall not be required to pay the fine. If a person convicted of a violation of Section 4291 is granted probation, the court shall impose as a term or condition of probation, in addition to any other term or condition of probation, that the person pay at least the minimum fine prescribed in this section. (b) If a person convicted of a violation of Section 4291 produces in court verification prior to imposition of a fine by the court, that the condition resulting in the citation no longer exists, the court may reduce the fine imposed for the violation of Section 4291 to fifty dollars ($50).

Health and Safety Code 13108.5

The State Fire Marshal shall propose, and the State Building Standards Commission shall adopt, amend, and repeal regulations for openings into the attic areas of buildings in those fire hazard severity zones, including very high fire hazard severity zones, designated by the Director of Forestry and Fire Protection pursuant to Article 9 (commencing with Section 4201) of Chapter 1 of Part 2 of Division 4 of the Public Resources Code, and in very high fire hazard severity zones designated by a local agency pursuant to Chapter 6.8 (commencing with Section 51175) of Part 1 of Division 1 of Title 5 of the Government Code.

Appendix E-Glossary

Access: Available routes for fire trucks and equipment to approach and defend areas or structures, including roadways, driveways, etc.

Accessory Building: Any building used as an accessory to residential, commercial, recreational, industrial, or educational purposes as defined in the latest adopted edition of the California Building Code, Group U, Division 1, Occupancy that requires a building permit.

Adiabatic Lapse Rate: The rate at which temperature in a (dry) atmosphere drops as a function of height as a result of the atmosphere becoming thinner with increasing altitude.

Aspect: The direction (N, S, E, W) in which a property or slope faces. This has an effect on fire behavior and intensity.

Attic Opening: A vent which is placed on the outside of a structure that allows for airflow into the attic.

"Bates" Bill: Assembly Bill 337 (1992), authored by Tom Bates. It modified the Government Code for the purpose of identifying and mitigating hazards in areas prone to wildfire conflagration.

Biomass: The dry weight of all organic matter in a given ecosystem. It also refers to plant material that can be burned as fuel.

BLM: Bureau of Land Management.

Board of Forestry Fire Plan 1995: A comprehensive wildland fire protection plan for California that may reduce total costs and losses from wildland fire by protecting assets at risk through focused pre-fire management prescriptions and increasing initial attack success. The five strategic objectives include 1) create wildfire protection zones, 2) assess all wildlands, 3) identify and analyze key policy issues and develop recommendations for changes, 4) have strong fiscal policy focus, and 5) translate these analyses into public policies.

"Brown" Bill: Assembly Bill 3819 (1995), authored by Willie Brown. It modified the Health and Safety Code for the purpose of increasing fire resistant roofing regulations in areas prone to wildfire conflagration.

Building: Any structure used or intended for supporting or sheltering any use or occupancy that is defined in the latest adopted edition of the California Building Code, except Group U, Division 1, Occupancy. For the purposes of this subchapter, building includes mobile homes and manufactured homes, churches, and day care facilities.

California Fire Plan: A method developed by the California Department of Forestry and Fire Protection by which state and local governments might jointly coordinate General Plan updates to assure compliance with forestry and fire hazard mitigation regulations. It has influenced the development of many Fire Safe Councils statewide.

CDF: California Department of Forestry and Fire Protection.

CEQA: California Environmental Quality Act.

CFIRS: California Fire Incident Reporting System

Class A Roof: Effective against severe fire test exposures, pursuant to section 15.202.4.4.1 of the UBC. Under such exposures, roof coverings of this class are not readily flammable, afford a fairly high degree of fire protection to the roof deck, do not slip from position, and are not expected to produce flying brands.

Class B Roof: Effective against moderate fire test exposures, pursuant to section 15.202.4.4.2 of the UBC. Under such exposures, roof coverings of this class are not readily flammable, afford a moderate degree of fire protection to the roof deck, do not slip from position, and are not expected to produce flying brands.

Class C Roof: Effective against light fire test exposure, pursuant to section 15.202.4.4.3 of the UBC. Under such exposures, roof coverings of this class are not readily flammable, afford a measurable degree of fire protection to the roof deck, do not slip from position, and are not expected to produce flying brands.

Contract County: In California, one of the six counties that provides fire-prevention services in state responsibility areas under contract with the state. These counties are Marin, Kern, Santa Barbara, Ventura, Los Angeles, and Orange.

Convection Column: An area, usually in a canyon or below a ridgeline, in which an approaching fire can gain heat, speed and intensity by way of strong upward heat convection due to strong air drafts. The result is that the fire will spread uphill, with little to no chance of stopping it.

Dead-End Road: A road that has only one point of vehicular ingress/egress, including cul-de-sacs and looped roads.

Defensible Space: The area within the perimeter of a parcel, development, neighborhood, or community where basic wildland fire protection practices and measures are implemented, providing the key point of defense from an approaching wildfire or defense against encroaching wildfires or escaping structure fires. The perimeter as used herein is the area encompassing the parcel or parcels proposed for construction and/or development, excluding the physical structure itself. The area is characterized by the establishment and maintenance of emergency vehicle access, emergency water reserves, street names and building identification, and fuel modification measures.

Detached Structure: Any structure located on a property which is not attached to the principal dwelling. These can include garages, sheds, fences, carports, barns, silos, decks, and many others.

Development: As defined in Section 66418.1 of the California Government Code.

Driveway: A vehicular access that serves no more than two buildings, with no more than 3 dwelling units on a single parcel, and any number of accessory buildings.

Dwelling Density: The number and proximity of human-occupied structures in a given area usually stated in number of structures per acre. This can increase fire spread and intensity by contributing large amounts of flammable fuels to a conflagration fire.

Dwelling Unit: Any building or portion thereof which contains living facilities, including provisions for sleeping, eating, cooking, and/or sanitation for not more than one family.

Eave: The horizontal overhang of the non-sloping edge of a roof beyond the wall.

Eave Opening: A vent located in an eve or soffit, which allows airflow into the attic and/or walls of a structure.

Egress: A way or ways by which residents and/or fire equipment may exit an area in the event of a fire emergency.

Fair Plan: A public system of cursory insurance coverage created for the purpose of insuring property risks that are unacceptable to the private sector insurance industry, such as homes with unmitigated fire hazards that are located in Very High Fire Hazard Severity Zones.

Fascia: The horizontal member that is visible at the end of the roof rafters.

Federal Responsibility Area: An area where the federal government has the primary responsibility for fire protection and management activities.

FRA: See Federal Responsibility Area

FEMA: Federal Emergency Management Agency.

Fire Flood Cycle: A general term used to show that floods often follow wildfires due to vegetation being burned and soil often becoming more conducive to runoff.

Fire Hazard Mitigation: Various methods by which existing fire hazards can be reduced in a certain area, such as fuel breaks, non-combustible roofing, spark arresters, etc.
Fire Hazard Severity Zone: Any geographic area designated pursuant to Public Resources Code Section 4201 to contain the type and condition of vegetation, topography, weather, and structure density to increase the possibility of conflagration fires.
Fire Hazard Zoning: The process of designating certain areas as Very High, High, and Moderate Fire Hazard Severity Zones by evaluating the applicable risks and hazards, such as vegetation, topography, weather, and structure density.
Fire History: The known frequency and intensity of fires that have occurred in a given area over a period of time.
Fire Wall: A wall which has been constructed to be fire resistant by using non-combustible materials or high fire-rated construction techniques such as solid blocking and/or treated lumber.
Fire Weather: Frequency and intensity of weather that contributes to fire occurrence, such as high temperatures, low precipitation, and high winds.
Firesafe: A term that has come to mean "taking into consideration fire risks and hazards, and acting to mitigate them."
Foehn: An intense, dry wind that blows down the side of a mountain and serves to desiccate vegetation and fuels in its path.
Fuel: Anything that will burn easily, such as vegetation and wood frame structures.
Fuelbreak: An area in which flammable materials have been cleared away or thinned out to minimize fire spread to structures and/or natural resources.
Fuel Loading: The evaluation of specific fuel components and their value expressed in tons per acre.
Fuel Model: Fuel Models are used to predict potential fire behavior. Wildland fuels have been classified into four general groups: grasses, brush, timber, and slash. Each of these groups is further divided into more detailed categories. There are 13 fuel models used to predict fire behavior, and 20 fuel models are used to establish fire danger ratings.
Fuel Moisture: Moisture content is the amount of water in a material divided by its oven dry mass. Moisture content is a key factor in determining how a specific piece of wood will burn, along with such factors as density and surface/volume ratio.
Greenbelts: A facility or land use designed for a use other than fire protection, which will slow or resist the spread of a wildfire. Includes parking lots, irrigated or landscaped areas, golf courses, parks, playgrounds, maintained vineyards, orchards, or annual crops that do not cure in the field.
Hammerhead/T: A roadway that provides a "T" shaped, three-point turnaround space for emergency equipment, being no narrower than the road that serves it.
Hazard: A fuel complex defined by its volume, type, condition, arrangement, and location. It determines the ease of ignition and difficulty of suppression in the event of a wildland fire. It is also the resistance to control once a wildfire starts, being the fuels, weather, and topography which adversely affect suppression efforts.
Hydrant: A valved connection on a water supply/storage system, having at least one 2-1/2 inch outlet, with male American National Fire Hose Screw Threads (NH) used to supply fire apparatus and hoses with water.
I Zone: A popular term used to describe an area where various structures (most notably private homes) and other human developments meet or are intermingled with forest and other vegetative fuel types.

Ignition Resistant: Possessing properties that serve to slow or prevent possible ignition in order to slow the rate of fire spread. Can apply to vegetation or structural components.
Infrastructure: Roadways, utilities, and other basic elements of developed areas which can serve to lessen or increase the ease of access and egress, depending on their construction and location. Also refers to the system of public works of a country, state, or region, and also the resources (as personnel, buildings, or equipment) required or available for an activity.
Ingress: A way or ways by which residents and/or fire equipment may enter an area in the event of a fire emergency.
Limb-Up Trees: Removal of the lowest branches in order to minimize the risk of ignition of trees by low-standing fuels. Synonymous with pruning.
Local Responsibility Area: An area in which local government has the prime responsibility for fire protection.
LRA: See *Local Responsibility Area*.
Model Ordinance: Any ordinance created for the purpose of review and/or adoption by several jurisdictions, usually produced as a template showing new regulations that should be addressed.
Model Ordinance for the Defensibility of Space and Structures: A model ordinance created by the State Fire Marshal's Office in 1996, pursuant to AB 3819 (1995, Brown), which includes comprehensive pre-fire safety measures and hazard mitigation standards to be adopted by local agencies containing Very High Fire Hazard Severity Zones.
Mosaic: A method of vegetation management and landscaping which places groups of plants or trees together, with each group being spaced apart in such a way to prevent successive ignition of an entire area (NFPA Standard 299).
National Fire Plan: The National Fire Plan is a long-term investment that will help protect communities and natural resources, and most importantly, the lives of firefighters and the public. It is a long-term commitment based on cooperation and communication among federal agencies, states, local governments, tribes and interested publics. The federal wildland fire management agencies worked closely with these partners to prepare a 10-Year Comprehensive Strategy, completed in August 2001. An implementation plan will be developed by May 2002, to provide consistent and standard direction to implement the common purposes articulated in the Strategy and the National Fire Plan.
Natural Hazard Disclosure: A requirement of Assembly Bills 6X and 1195, by which a seller of real property must provide written disclosure of fire, earthquake, and flood hazards to a potential buyer prior to sale of the property (see Civil Code 2079.11, Government Codes 8589.3-5, 51179 and 51183.5, and Public Resources Codes 2621.9, 2694, 2696, 4125 and 4136).
Natural Hazard Disclosure Statement: A form found in Civil Code Section 1102.6, which is required to be completed by any seller or seller's agent for the purpose of notifying a potential buyer of real property that said property is in a natural hazard area, be it seismic, flood, or wildfire (SRA or LRA).
NFIRS: National Fire Incident Reporting System
Non-Combustible: Non-flammable.
Occupancy: The purpose for which a building, or part thereof, is used or intended to be used.
OES: Office of Emergency Services.
One-Way Road: A minimum of one traffic lane width designed for traffic flow in one direction only.
Ornamentals: Landscaping items that possess dense foliage or volatile oils which may serve to increase the fire risk to a nearby structure.

Roads, Streets, Private Lanes: Vehicular access to more than one parcel; access to any industrial or commercial occupancy, or vehicular access to a single parcel with more than two buildings or four or more dwelling units.
Roadway: Any surface designed, improved, or ordinarily used for vehicle travel.
Roof Assembly: The entire construction of a roof, including the covering (shingles, tiles, etc.), endcaps (if applicable), the underlying paper and the sheeting, which could be plywood, wafer board, slats, etc. All of these elements contribute to the ignition potential of a roof.
Roof Covering: The shingles, tiles or other top layer of a roof assembly.
Roof Requirements: Various levels of fire retardant roofing are required in different areas of California, pursuant to Health and Safety Code Section 13132.7. Wood roofing is prohibited throughout the state, unless it has passed an actual ten-year weather test.
Same Practical Effect: As used in regard to fire hazard mitigation ordinances, this means an exception or alternative with the capability of applying accepted fire suppression strategies and tactics, and provisions for firefighter safety, including:
(a) access for emergency fire equipment,
(b) safe civilian evacuation,
(c) signage that avoids delays in emergency equipment response,
(d) available and accessible water to effectively attack fire or defend a structure from fire, and
(e) fuel modification sufficient for civilian and firefighter safety.
Setback: The space between a structure and the property line.
Slope: The percentage of rise to run (45 degrees = 100%) on a hillside or road which might determine access difficulty or vulnerability to fire.
Soffit: The underside of an eave.
Spark-Arrester: A non-combustible screen placed over stove and chimney outlets or off-road vehicle exhaust pipes in order to minimize the risk of fires started by sparks emitted from such devices.
SRA: See *State Responsibility Area*.
State Responsibility Area: An area in which the California Department of Forestry and Fire Protection has the primary responsibility for fire protection for both structures and natural resources.
Structural Clearance: The distance around a structure from which flammable vegetation has been cleared or thinned.
Structural Density: See *Dwelling Density*.
Structure: That which is built or constructed; an edifice or building of any kind or any piece of work artificially built up or composed of parts joined together in some definite manner.
Topography: Geographic elements of an area, including slope, existence of hills, mountains, canyons, and rough terrain.
Traffic Lane: The portion of a roadway that provides a single line of vehicle travel.
Turnaround: A roadway, unobstructed by parking, which allows for a safe opposite change of direction for emergency equipment. Design of such area may be a hammerhead/T or terminus bulb.
Turnouts: A widening in a roadway to allow vehicles to pass.
UBC: Uniform Building Code.
UFC: Uniform Fire Code.
Under-Floor Area: Any area of a structure beneath the main floor that can make that structure vulnerable to ignition if not properly enclosed.

Urban-Wildland Interface: A popular term used to describe an area where various structures (most notably private homes) and other human developments meet or are intermingled with forest and other vegetative fuel types.
USDA: United States Department of Agriculture.
USFS: United States Forest Service.
UWI: See *Urban-Wildland Interface*.
Vegetation Management: Various practices of clearance, thinning or strategic placement of vegetation for the purpose of minimizing the rate of fire spread and intensity.
Vegetative Clearance: The distance from a structure to which native or ornamental vegetation has been removed or thinned.
Vertical Clearance: The minimum specified height of a bridge or overhead projection above the roadway.
Very High Fire Hazard Severity Zone: Any geographic area designated pursuant to Government ode Section 51178 to contain the type and condition of vegetation, topography, weather, and structure density to increase the possibility of conflagration fires.
Wildfire: An unplanned or unwanted natural or human-caused fire, or a prescribed fire that threatens to escape its bounds.
Wildland: Uncultivated land, other than fallow, neglected or maintained for such purposes as wood or range-forage production, wildlife, recreation, protective watershed cover or wilderness.

Appendix F-Community Wildfire Protection Plan Updates

This section of the plan is provided for future updates and amendments to the CWPP. As action items are completed, modified, or new actions are added, they should be documented in this section. The Kern River Valley Fire Safe Council shall re-evaluate the plan annually to note accomplishments and to make sure that the CWPP is still relevant. Events such as community growth or large fires may change the scope of the plan and/or priorities for treatment.

Specific updates on fuels projects completed, in progress, or in active stages of planning are included in Appendix G and are not intended to be included in this section.

Description of Change	Approved Change	Date of Change	Remarks
Change the name of this document to Kern River Valley Community Wildfire Protection Plan	LS	2/8/08	Name changed to be consistent with current California Fire Safe Council naming practice.
Change the boundary of the area of concern for the KRVFSC.	LS	2/8/08	Extend the boundaries of the KRVFSC area of concern to encompass Kennedy Meadows, Walker Pass, Kelso Valley, and Walker Basin.
Add Appendix F: CWPP Updates	LS	2/8/08	Appendix incorporated to facilitate updates and changes to the Kern River Valley CWPP
Add Appendix G: Kern River Valley Fuel Reduction Projects	LS	2/8/08	Appendix incorporated to acknowledge the Kern River Valley Fuel Reduction Projects as an integral part of the Kern River Valley CWPP.
Add Appendix H: Myers Canyon CWPP	LS	7/7/09	Appendix incorporated to consolidate applicable sub-region CWPP into comprehensive Kern River Valley CWPP
Add Appendix I: Alta Sierra CWPP	LS	7/7/09	Appendix incorporated to consolidate applicable sub-region CWPP into comprehensive Kern River Valley CWPP

Appendix G-Kern River Valley Fuel Reduction Projects

This section of the Community Wildfire Protection Plan is for documentation of fuel reduction projects completed, in progress, or in active stages of planning within the KRVFSC area of influence. These projects are listed in a separate binder, *"Kern River Valley Fuel Reduction Projects"*, which is a part of the Kern River Valley CWPP. This appendix lists projects sponsored by the KRVFSC, as well as projects undertaken by local and federal agencies. The list includes projects on both private and federal lands. The *"Kern River Valley Fuel Reduction Projects,"* binder shall be reviewed and updated each year after the annual fuels collaboration meeting.

Project Name/Identification	Approved Change	Date of Change	Remarks
Kern River Valley Fuel Reduction Projects	US	2/8/08	Adopted as Appendix G to the Kern River Valley Community Wildfire Protection Plan
Kern River Valley Fuel Reduction Projects	US	7/7/09	Updated in March 2009
Kern River Valley Fuel Reduction Projects	US	3/1/10	Updated in March 2010
Kern River Valley Fuel Reduction Projects	US	1/2/11	Updated in January 2011

Appendix H-Myers Canyon Community Wildfire Protection Plan

Please separate file “Myres CWPP 081605.pdf”.

Appendix I-Alta Sierra Community Wildfire Protection Plan

Please separate file “Alta Sierra CWPP 1204.pdf”.

Index of Tables

Index of Maps

Acknowledgments

The author would like to acknowledge the following people who contributed significantly to the creation of this plan. Denise and Breanna Walsh, my family for their patience and understanding and also final editing…from Denise that is. The Kern River Valley Fire Safe Council for countless phone calls, questions, prodding, and understanding of the 2002 fire season time delays. Two members from the council are worthy of special gratitude: Rich Olson for numerous questions and providing the "laugh test[26]" when needed. Rich also provided project guidance, encouragement, and the most educating tour of the study area a simple fireman could ever want. Linda Adams provided my email-a-day. The emails contained enough information to write five plans. Her enthusiasm for the protection of the folks of the Valley is worthy of a Golden Smokey. Her knowledge and professionalism made the plan a much better document.

Erin Noonan was the technical editor who provided the expertise and guidance to really clean up a bunch of maps and stuff.

Chuck Dickson answered one question asked 493 different ways and provided copious amounts of data and support. Nickie Washington provided great GIS data (for her first attempt) for the Alta Sierra Projects. Dan Kleinman provided a chief's prospective, "you're writing a plan?" On a serious note, Chief Kleinman provided invaluable history of the area including fires, responses, and resources.

Brent Scaggs provided weather information and a really important link to Heide Hosler while her computer was on the brink of destruction due to overloading by the SSGIC. Heide Hosler provided one gigaton[27] of GIS data and much needed humor. Deborah Santiago provided information concerning the Hungry Gulch/Sawmill Drive Fire Plan.

Thanks to the Kern County Fire Department and AirPhoto USA[28] for allowing use of the one-meter aerial photography. Also thanks to Russ Johnson with Environmental Systems Research Institute[29] for additional tools to build the plan and maps.

Additional GIS data were provided from the Kern Council of Government's internet site. It is truly unbelievable that an organization would have so much great data effortlessly available to the public.

Finally, without the efforts of Program Manager Anne Birkholz and the other participants of the SSGIC, this plan would not have been possible. Having data readily available with metadata was really the best.

TPW

[26] If he didn't fall down laughing, the concept would pass the test.
[27] 2000 pounds of gigabytes.
[28] This is not an endorsement.
[29] See footnote number 28.

Liability Statement

HangFire Environmental shall not be held liable for improper or incorrect use of the data described and/or contained herein. These data and related graphics are not legal documents and are not intended to be used as such. It is intended for "planning" purposes only. This data is intended to accurately represent the information that it portrays. The data contained herein is representational in nature and should not be used for assessment (of taxes) or legal purposes.

The information contained in this document is dynamic and may change over time. The data are not better than the original sources from which they were derived. It is the responsibility of the data user to use the data appropriately and consistent within the limitations of data in general and these data in particular. The related graphics are intended to aid the data user in acquiring relevant data; it is not appropriate to use the related graphics as data.

HangFire Environmental gives no warranty, expressed or implied, as to the accuracy, reliability, or completeness of these data. It is strongly recommended that these data are directly acquired from the appropriate source and not indirectly through other sources which may have changed the data in some way. This disclaimer applies both to individual use of the data and aggregate use with other data.

It is possible that errors and omissions will occur in data input or programming done by HangFire Environmental. The recipient accepts the plan “as is” and knows that there may be errors or omissions associated with any document with large data sources. The recipient understands and agrees that it will forever waive any and all rights, claims, cause of action, or other recourse that it might otherwise have against HangFire Environmental for any injuries, or damages, of any type, whether direct, indirect, incidental, consequential or otherwise, resulting from any error or omission in the data or in any programming used to design this plan or implementation of projects based on it.

Before any project is implemented, legal council is recommended to review all planning documents for impacts not included in this plan.

All updates to the plan are the responsibility of the Kern River Valley Fire Safe Council.

KERN RIVER VALLEY

Fuel Reduction Projects

January 2011

Collaboration Group Charter

Issues
The Kern River Valley and Kern Plateau areas (areas) in Tulare and Kern Counties have four government agencies and one non-government group responsible for community fire protection and hazardous fuels management.

- Kern River Valley Fire Safe Council (KRVFSC) – Including the Kennedy Meadows area
- Tulare County Fire Department
- Kern County Fire Department
- DOI Bureau of Land Management – Bakersfield Field Office
- USDA Forest Service – Sequoia National Forest
- The areas have a significant history of damaging wildfires and will continue to experience damaging, fast spreading and high intensity wildfires into the foreseeable future.
- Long range fuels management and community protection planning must be coordinated between the government agencies and the Kern River Valley Fire Safe Council.
- Federal and state law and policies prescribe a collaborative approach to community wildfire protection that is driven by the affected communities.

Purpose
The purpose of the collaboration group (group) is to work under the auspices of the Kern River Valley Fire Safe Council to:

- Share and review community threat and hazardous fuels analysis and existing plans. Work to improve integration and consistency of analysis and planning. The Southern Sierra Geographic Information Cooperative and FIRESHED may be useful to help with improving analysis capabilities.
- Review, develop and implement long-range community protection and hazardous fuels management strategies for areas that need cross-jurisdictional boundary, integrated coordination.
- Develop cooperative projects and establish project priorities.
- The intent of the group is not to interfere with or compromise agency specific planning and projects but rather to promote community based cooperation and collaboration.
- The group does not interfere with or influence CEQA or NEPA planning or decisions. The group's intent is to develop project proposals and work to build consensus about project priorities that will be implemented by the agencies and the KRVFSC, based on their respective legal and policy directions.

Process

- The group is chartered by the Kern River Valley Fire Safe Council Board of Directors (Board). The Board oversees and directs group work.
- The group will meet on an ad-hoc, as needed basis. Representatives should assign an alternate to attend meetings if they have a conflict.
- The group will select a chairperson annually at the beginning of the new-year.
- The group will provide meeting notes to the Board that documents group work and recommendations to the Board.
- The group will work to build consensus, but consensus may not be attained because of conflicting or unrelated agency policies.
- The Board may modify this charter at any time.

Members
The group is comprised of representatives from each of the following:

- Kern River Valley Fire Safe Council – Richard Olson, Ed Royce
- Tulare County Fire Department – Phil Brown
- Kern County Fire Department – John Smith
- USDI Bureau of Land Management – Bakersfield Field Office – Kevin Chambers (Dave Brinsfield)
- USDA Forest Service – Sequoia National Forest – Scott Williams

Kern River Valley Fuel Reduction Projects

Project Name	Map Key
Wofford Heights & Alta Sierra Sub-Region	
Alta Sierra Fuelbreak (USFS Alta Sierra Phase 1)	WH-1
Summit	WH-2
Ice/Tillie Ice Thinning Ice Prescribed Burning Tillie Prescribed Burning	WH-3
Hungry Gulch	WH-4
Sawmill (Lake Isabella Highlands) (Willow Flat)	WH-5
CND Wagy Flat	WH-6
Pala Ranches (Phase 1) Mountain Shadows (Phase 2)	WH-7
Dutch Flat	WH-8
Alta Sierra and Wofford Heights Fuel Reduction Project	WH-9
Wofford	WH-10
Slick Rock	WH-11
USFS Wagy Flat	WH-12
Alta Sierra Escape Routes	WH-13
Kernville Sub-Region	
Burma Extension	KV-1
Plater Road	KV-2
Frontier Homes	KV-3
Grandview	KV-4
Kernville/River Kern Hazard Fuels Reduction	KV-5
Rodgers Road Rodgers Road 2	KV-6
Tollefson	KV-7
Lake Isabella Sub-Region	
Bodfish Canyon	LI-1
Erskine	LI-2
Lynch Canyon	LI-3
Meyers Canyon	LI-4
Squirrel Valley	LI-5
Yankee Canyon	LI-6
Lake Isabella	LI-7
East Valley Sub-Region	
Jacks	EV-1

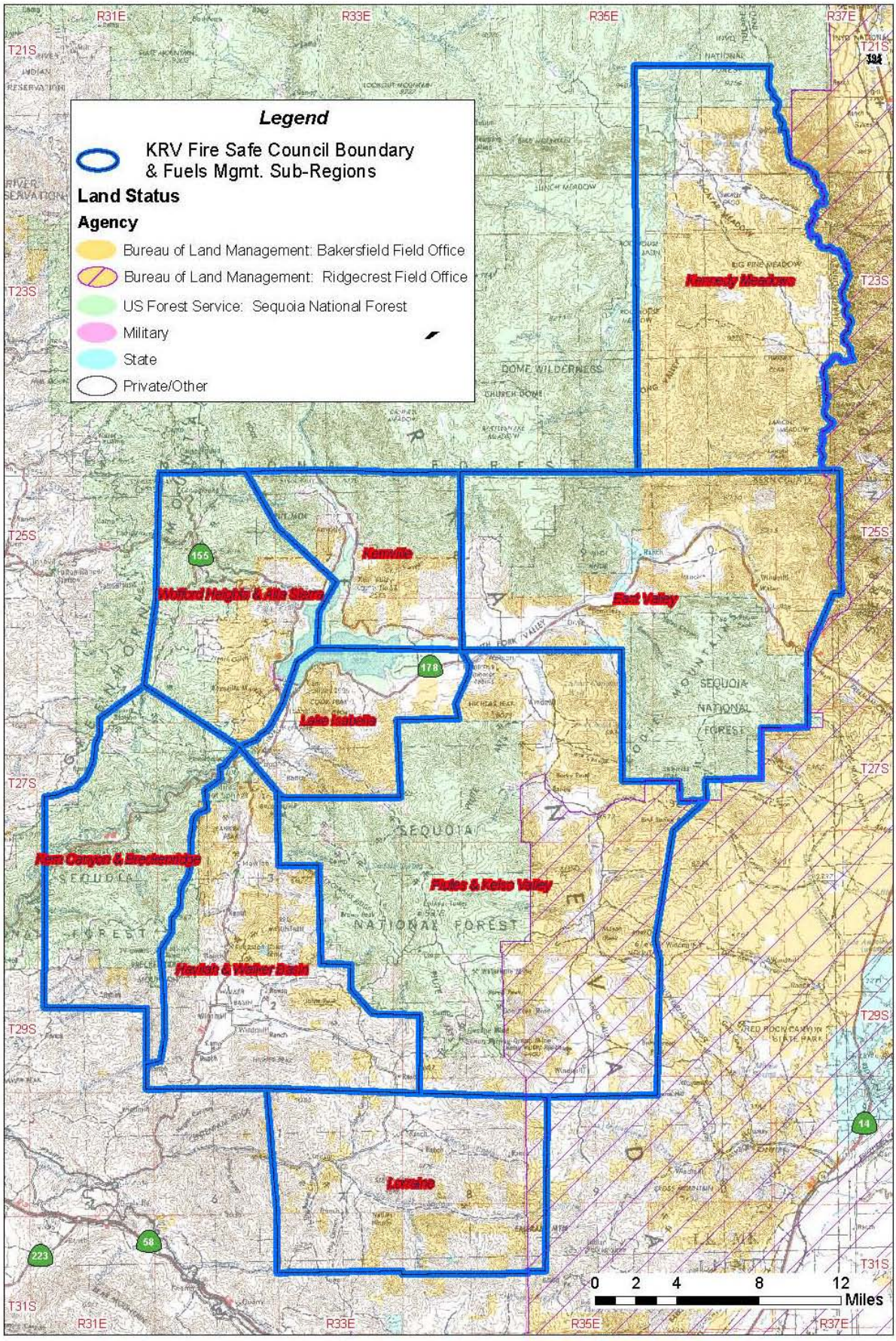
Walker Pass	EV-2
Walker Pass Subdivision	EV-3
Fay Ranch	EV-4
Kennedy Meadows Sub-Region	
Kennedy Meadows	KM-1
BLM Kennedy Meadows Roadside	KM-2
Piute & Kelso Valley Sub-Region	
Valley View	P/K-1
Havilah & Walker Basin Sub-Region	
Piute Meadows Community Escape Route	H/WB-1
Dutchman	H/WB-2
Red Mountain Subdivision	H/WB-3
Kern Canyon & Breckenridge Sub-Region	
Breckenridge Subdivision	KC/B-1
Loraine Sub-Region	
No projects identified to date	

CND – Bureau of Land Management, Bakersfield Office / Central California Region Fire and Aviation Management Program
CDD – Bureau of Land Management, California Desert District
KRVFSC – Kern River Valley Fire Safe Council
KRN – Kern County Fire Department
TCO – Tulare County Fire Department
USFS – United States Forest Service, Sequoia National Forest, Kern River Ranger District

EV = East Valley
H/WB = Havilah/Walker Basin
KM = Kennedy Meadows
KV = Kernville
KC/B = Kern Canyon & Breckenridge
LI = Lake Isabella
L = Lorraine
P/K = Piutes & Kelso Valley
WH = Wofford Heights & Alta Sierra

Implementation Phase – The project is being completed.
Maintenance Phase – All projects in shrub fuels need maintenance about every 2 years.
NEPA / CEQA Phase – The proposed project is going through the environmental compliance process.
Out Year Project – Out year new KRVFSC grant proposal projects or new CND / USFS projects.

Fuel Treatment Areas



Projects Description – Updated October 21, 2010

Project Name And Status	Map Key	Project Location and Size	Type of Project	Responsible Agency	Dates of Planning and Implementation
Wofford Heights & Alta Sierra Sub-Region					
Alta Sierra (USFS Alta Sierra Phase 1) KRVFSC Grant Project **Maintenance Phase**	WH-1	Alta Sierra community developed area – an in-holding surrounded by USFS. 50 acres KRN 50 acres of USFS	The project is a shaded fuelbreak that surrounds the Alta Sierra community and was accomplished by thinning small trees, removing brush near cabins and along egress routes. Cuttings were chipped or burned in piles.	KRN, USFS	Completed in 2005. KRN maintained private property portion during 2008. 2010 special grant WH-9 funded KRN maintenance. 2012 maintenance grant proposal. USFS needs to work on maintenance in 2011.
Summit (Replaces USFS Alta Sierra Phase 2) **Out Year Project**	WH-2	On USFS around the Alta Sierra community area. Acreage to be determined.	The project is designed to create shaded fuel breaks adjacent to private property by connecting the Ice project's units together into more continuous treatment areas.	USFS	No project schedule exists as of 10-21-10. Expected NEPA completion and implementation dates are unknown.

Project Name And Status	Map Key	Project Location and Size	Type of Project	Responsible Agency	Dates of Planning and Implementation
Ice / Tillie - Ice Thinning - Ice Prescribed Burning - Tillie Prescribed Burning **USFS NEPA and Implementation Phases** **CND Maintenance Phase**	WH-3	The project covers a large area around Alta Sierra and down slope on the east side of Alta Sierra, west of Wofford Heights. 4,980 acres of USFS 24 acres of CND	Ice thinning involves thinning the forest stands to bring them into desired structural condition. Ice prescribed burning will reduce hazardous fuels in the forest stands after the thinning is completed. Tillie prescribed burning involves cutting/piling/burning in brush fields west of Wofford Heights, and a ridge top fuel break. The CND portion of the Tillie project involves brush cutting/piling/ burning.	USFS, CND	USFS NEPA was completed in 1998 and is being re-written as of 10-21-10 due to litigation. No thinning action in Ice occurred until 2005. The thinning was soon stopped by litigation. The federal District Court is allowing sapling thinning and prescribed burning to continue. Fuels management in commercial thinning units has been on hold due to the risk of purchased trees being damaged. Tillie broadcast prescribed burning is canceled due to too high of risk burning brush under Alta Sierra. CND completed the

Project Name And Status	Map Key	Project Location and Size	Type of Project	Responsible Agency	Dates of Planning and Implementation
					Pala Ranches / Tillie fuelbreak in 2003 and the Tillie 3 fuelbreak along Old State Road in 2003. CND need for maintenance should be reviewed 2011.
Hungry Gulch KRVFSC Grant Project **Maintenance Phase**	WH-4	Fuel reduction along primarily roads, and fuel reduction along north, west, and south private and CND boundary – 5 acres. CND reduced fuels that are on CND land within 100 feet of adjacent structures to meet State of CA vegetation clearance guidelines. KRN completed defensible space fuelbreeaks on private property in 2006 – 27 acres.	Fuels reduction along the road system, 30' from centerline. Primary disposal of cut fuels was to chip as cut. Cut/pile/burn those fuels inaccessible to chipping.	KRN, CND	KRN completed private in 2006 and maintained in 2008. Needs maintenance in 2012. CND completed in 2008. 2012 maintenance grant proposal.
Sawmill (Lake Isabella Highlands) (Willow Flat) KRVFSC Grant Project **Maintenance Phase**	WH-5	Roadside brushing along primary roads 2.25 miles KRN - 26 acres 1.20 miles CND - 14 acres Fuels reduction down slope from structures.	Fuels reduction along the road system 30' from centerline. CND road brushing west of community and east of the community to HWY 155. Fuels reduction below structures was 80-90% in	KRN, CND	Completed 2004. 2012 maintenance grant proposal.

Project Name And Status	Map Key	Project Location and Size	Type of Project	Responsible Agency	Dates of Planning and Implementation
			treated areas.		
CND Wagy Flat **Maintenance and Implementation Phases**	WH-6	Adjacent to Sawmill Road west of Isabella Highlands subdivision running west to the Wagy Flat community. Adjacent to Trailblazer Jeep Trail and ridgeline fuelbreak east of Wagy Flat. Adjacent to FS Road 25S02 on the western edge of Wagy Flat community. Area mastication treatment proposed between ridgeline fuelbreak and eastern edge of Wagy Flat community. CND 68 acres total	Roadside clearing within 50 feet of either side of roads/trails through chipping, mechanical mastication or pile/burn. Reduce fuels approximately 50% in area treatment with mechanical mastication.	CND	Sawmill Road, Trailblazer Jeep Trail and ridgeline fuelbreak completed 2004. West side of Wagy Flat project completed 2007 (8 acres). Needs maintenance in 2011. New area treatment proposed for implementation in 2011 (28 acres).
Pala Ranches (Phase 1) Mountain Shadows (Phase 2) Phase 1 KRVFSC 2009 Grant Project	WH-7	Adjoining projects on the western edge of Wofford Heights community starting at Highway 155, continuing south along the western edge of the Pala Ranches	A combination of shaded fuel breaks and reduction of heavy fuel concentrations in the gullies, drainages and other areas with high volume fuels. Adjoins and ties into	KRN, CND KRN Phase 1 grant project completed in	Continuation of a project that was completed during late 1990's. CND RAWs project

Project Name And Status	Map Key	Project Location and Size	Type of Project	Responsible Agency	Dates of Planning and Implementation
Phase 2 KRVFSC 2011 Grant Project **Maintenance and Implementation Phases**		community then continuing east to border homes in the Old State Road area. KRN 98 acres CND 21acres This project is located just to the east of the end of the original Pala Ranches fuelbreak in the Ice / Tillie project (WH-3). Phase 1 = 57 acres. Phase 2 = 41 acres.	completed and proposed projects on adjacent CND land.	2009 – 57 acres. KRN Phase 2 2011 grant - 41 acres. CND has 2 phases in the project area.	completed adjacent to and north of Highway 155 in 2006 – 8 acres. Needs maintenance in 2011. Phase 1 (Pala Ranches) Project just west of Pala Ranches was completed in 2009. 2012 maintenance grant proposal. Ties into completed Pala Ranches fuelbreak. Phase 2 (Mountain Shadows) is being completed in 2011. CND has 13 acres to complete.
Dutch Flat **Out Year Project**	WH-8	Dutch Flat Road	Roadside clearing and improvement of defensible space.	KRN, CND	Out Year Project.
Alta Sierra and Wofford Heights Fuel Reduction Project	WH-9	Highway 155 and Old State Roads, Alta Sierra fuelbreak and Greenhorn Mountain	Maintenance of escape route roads, existing fuel break and cleanup of fuels in the	KRN, USFS	This was a special USFS grant for non-federal lands

Project Name And Status	Map Key	Project Location and Size	Type of Project	Responsible Agency	Dates of Planning and Implementation
Hazard Mitigation Treatment on Non-Federal Lands KRVFSC 2010 Grant Project **Implementation Phase**		Park timber sale. 125 acres roadside easement escape route brushing. 60 acres Alta Sierra fuelbreak maintenance. 80 acres of activity and natural fuels cleanup and disposal inside the Greenhorn Mountain Park.	Greenhorn Mountain Park timber sale area.		community protection made available during 2010. The project will be implemented over 3 years from 2010 to 2013.
Wofford **Out Year Project**	WH-10	Along both sides of Highway 155 above west of Wofford Heights. Acreage to be determined.	Shaded fuel break that ties into the CND shaded fuel break.	USFS	No project schedule exists as of 10-21-10. Expected NEPA completion and implementation dates are unknown.
Slick Rock **Out Year Project**	WH-11	Along both sides of Highway 155 and around the Slick Rock recreation cabin areas west of Greenhorn Summit. Acreage to be determined.	Shaded fuel break.	USFS	No project schedule exists as of 10-21-10. Expected NEPA completion and implementation dates are unknown.
USFS Wagy Flat **Out Year Project**	WH-12	Along Forest Service boundary adjacent to private property at Wagy Flat.	Shaded fuel break.	KRN, USFS	No project schedule exists as of 10-21-10.

Project Name And Status	Map Key	Project Location and Size	Type of Project	Responsible Agency	Dates of Planning and Implementation
		Acreage to be determined.			Expected NEPA completion and implementation dates are unknown.
Alta Sierra Escape Routes **Out Year Project**	WH-13	Highway 155 from Greenhorn Summit to western Forest Service boundary. Rancheria Road from Greenhorn Summit to about Davis Flat. Acreage to be determined.	Shaded fuel break along escape route roads.	KRN, CND, USFS	No project schedule exists as of 10-21-10. Expected NEPA completion and implementation dates are unknown.
Kernville Sub-Region					
Burma Extension KRVFSC 2010 Grant Project **Implementation Phase**	KV-1	Shaded fuelbreak along Burlando Road area. Project ties directly to and extends project KV-5. KRN – 35 acres	Shaded fuelbreak.	KRN	KRN completed implementation in 2010. Review for maintenance 2012.
Plater Road **Out Year Project**	KV-2	Create defensible space through a chipping project in a community of 16 homes. The community is located between Kernville and Wofford Heights. KRN – 8 acres CND - 5 acres	Thin existing vegetation among residences and brush the access roads to provide a safer route for property owners and emergency equipment.	KRN, CND	Outyear project.

Project Name And Status	Map Key	Project Location and Size	Type of Project	Responsible Agency	Dates of Planning and Implementation
Frontier Homes KRVFSC 2004 Grant Project **Maintenance Phase**	KV-3	Road brushing with fuel break along both sides of Frontier Trail (North & South). 1.4 miles of road brushing with 21.7 acres total cut.	Shaded fuelbreak.	KRN	Initial completion 2001. 2012 maintenance grant proposal.
Grandview **Maintenance Phase**	KV-4	Fuel reduction behind developed lots in Kernville from Burlando Road, behind Greenleaf, to Grandview, to Spruce. 30 acres	Shaded fuelbreak.	KRN	Initial completion 1994. Maintenance 2006 and 2008. 2012 maintenance grant proposal.
Kernville/River Kern Hazardous Fuels Reduction **Maintenance Phase**	KV-5	There are three units in this project: The Burma unit is near Burma Road and is 30 acres in size. Burma ties directly into KV-1. The Bowman/Luxton unit surrounds the private property just north of the Kernville Airport and is 24 acres in size. Riverkern 25 acres USFS The Riverkern project is on the east side of Riverkern.	Shaded fuelbreak.	USFS	Work on the Riverkern unit has been in maintenance status since the late 1990's. Burma and Bowman/Luxton units completed in 2007 and maintained annually.

Project Name And Status	Map Key	Project Location and Size	Type of Project	Responsible Agency	Dates of Planning and Implementation
Rodgers Road Rodgers Road 2 KRVFSC 2006 Grant Project **Maintenance Phase**	KV-6	Fuel reduction in drainage adjacent to Rodgers Road. Kernville. 4.8 Acres.	Shaded fuelbreak.	KRN	Rogers Road was completed in 2004. 2012 maintenance grant proposal.
Tollefson **Maintenance Phase**	KV-7	Fuels reduction to connect the Frontier Homes and Grandview fuel breaks. 4.2 acres.	Shaded fuelbreak.	KRN	Completed 2001. Maintenance completed in 2008. 2012 maintenance grant proposal.
Lake Isabella Sub-Region					
Bodfish Canyon KRVFSC 2007, 2008, 2010 Grant Projects **Maintenance Phase**	LI-1	Along Bodfish Canyon Road, Eastern end of Butternut Drive, and Bodfish Creek Road, and West of Laurel Drive. 141 acres total KRN land, in 7 units.	Shaded fuelbreak.	KRN	Phase 1 (32 ac) completed in 2008. 2012 maintenance grant proposal. Phase 2 (40 ac) completed in 2009. Review for maintenance in 2013. Phase 3 (35 ac) 2010 KRVFSC grant.

Project Name And Status	Map Key	Project Location and Size	Type of Project	Responsible Agency	Dates of Planning and Implementation
Erskine **Out Year Project**	LI-2	Part of Erskine Creek/Spring Gulch/Lynch Canyon Project. Along Erskine Creek Road, from 1.25 miles South East of Kern Valley High School to junction with Spring Gulch 4x4 Road. Total for this portion is 2.98 miles road work, 127 acres fuel break. KRN portion is 1.89 miles of road, and 76 acres of fuel break. CND portion is 1.2 miles of road and 51 acres of fuel break. Total project is 110 acres private (KRN), and 125 acres CND. Road work is 3.79 miles on CND, 3.14 miles on KRN.	Shaded fuelbreak along the road system along riparian area.	KRN, CND	Outyear Project – will monitor road and when it becomes overgrown project will be scheduled for implementation.

Project Name And Status	Map Key	Project Location and Size	Type of Project	Responsible Agency	Dates of Planning and Implementation
Lynch Canyon **Out Year Project**	LI-3	This section is from Squirrel Valley south up Lynch Canyon Rd. (dirt) to the Spring Gulch Pass. Ties into LI-2. Total size is 2.29 miles road, and 61 acres of fuelbreak.	Roadside shaded fuel break to facilitate fire suppression. Fuel Break varies in width from 50' to 300'.	KRN, CND KRN portion is .88 miles of road, and 23 acres of Fuel Break. CND portion is 1.41 miles of road and 38 acres of Fuel Break. Total project is 110 acres private (KRN), and 125 acres CND. Road work is 3.79 miles on CND, 3.14 miles on KRN.	Originally implemented in 1990's. Outyear Project.
Meyers Canyon KRVFSC 2004 Grant Project **Maintenance Phase**	LI-4	Meyers Canyon near Bodfish Canyon. 2 Miles road brushing along primary roads.	Shaded fuelbreak.	KRN All the road brushing and 13.3 acres of	Project completed 2005. 2012 maintenance grant proposal.

Project Name And Status	Map Key	Project Location and Size	Type of Project	Responsible Agency	Dates of Planning and Implementation
		20.9 acres of shaded fuel break along drainage west of structures.		the shaded fuel break was funded by a KRVFSC grant. The remainder and maintenance was direct KRN funding.	
Squirrel Valley **Maintenance Phase**	LI-5	Fuels reduction along fence line West of Squirrel Valley. 26 acres existing shaded fuels break. 22 acres proposed addition. A single blade dozer line is put in along the fuel break from Cook Peak Road on the South to Hwy 178 on an occasional basis.	Shaded fuel break.	KRN	Completed 1999. Maintained in 2008. KRVFSC 2004 Grant Project 2012 maintenance grant proposal.
Yankee Canyon **Out Year Project**	LI-6	In Yankee Canyon Subdivision. 7 to 15 acres.	Roadside clearing and escape route improvement.	KRN, CND	Outyear Project.
Lake Isabella KRVFSC 2011 Grant Project	LI-7	Fuel break in back yards along the east side of Lake Isabella.	Shaded fuel break.	KRN	To be implemented in 2011.

Project Name And Status	Map Key	Project Location and Size	Type of Project	Responsible Agency	Dates of Planning and Implementation
Implementation Phase		30 to 50 acres.			
East Valley Sub-Region					
Jacks **Out Year Project**	EV-1	USFS land bordering the private property in Walker Pass subdivision in Jacks Creek Area.	Shaded fuelbreak adjacent to structures.	USFS	No project schedule exists as of 10-21-10. Expected NEPA completion and implementation dates are unknown.
Walker Pass **Implementation Phase**	EV-2	Roadside clearing on CND land along 0.6 mile adjacent to Highway 178. CND - 8 acres	Reduce fuel loading within 50 feet of each side of Highway 178 through cut and chip. Fell hazard trees from roadside fire & chip branches.	CND	Approximately 75% of project complete 2008. Triangle section scheduled for 2011.
Walker Pass Subdivision **Out Year Project**	EV-3	Roadside clearing along roads within the subdivision and along Highway 178 on private land. KRN - 10 acres	Roadside Clearing	KRN	Outyear Project. Homeowners need to be polled to test support. Chipper support is needed.
Fay Ranch **Out Year Project**	EV-4	Along Fay Ranch Road. KRN - 35 acres	Roadside Clearing	KRN	Outyear Project. Environmental compliance issues – CEQA.
Kennedy Meadows Sub-Region					

Project Name And Status	Map Key	Project Location and Size	Type of Project	Responsible Agency	Dates of Planning and Implementation
Kennedy Meadows KRVFSC 2008 Grant Project **Maintenance Phase**	KM-1	34.5 acres of roadside clearance along strategic routes in the Kennedy Meadows community area.	Cleared fuels along 12 miles of roads in Kennedy Meadows including 5 miles along Kennedy Meadows Road. Brush was removed 20 feet or more from the roadway edge and lower tree limbs were pruned.	KRVFSC / KMPOA - Kennedy Meadows Property Owners and Associates, Inc.	KRVFSC completed in 2008. Review for maintenance in 2012.
CND Kennedy Meadows Roadside **Maintenance Phase**	KM-2	Roadside treatment in three section that border CND land. 5 acres	Clear brush within 20 feet of roads on CND land	CND	Completed 2007. Review for maintenance in 2012.
Piutes & Kelso Valley Sub-Region					
Valley View **Implementation Phase and Out Year Project**	P/K-1	Defensible space zone immediately around and adjacent to the Valley View private property in-holding located in the Piute Mountains. 73 acres of USFS. Out year project is for work to be completed on private lands.	Shaded fuel break adjacent to private property.	USFS	NEPA was completed in 2010. USFS will begin implementation in 2011. Out year KRVFSC grant project is for work to be completed on private lands.
Havilah & Walker Basin Sub-Region					
Piute Meadows	H/WB	Phase 1 - Adjacent to roads	Phase 1 - Reduce fuels within	KRN, CND	Phase 1 –

Project Name And Status	Map Key	Project Location and Size	Type of Project	Responsible Agency	Dates of Planning and Implementation
Community Escape Route (Phase 1) KRVFSC 2009 Grant Project **Maintenance Phase and Out Year Project**	-1	in Piute Meadows Community. 5 miles of road for approximately 25 acres. Phase 2 – Adjacent to Caliente/Bodfish Road and other roads within subdivision. Also includes fuelbreak on CND land north of subdivision to connect to Breckenridge Road. (10 acres CND)	20 feet of each side of arterial roads within community to provide safe access and escape routes. Phase 2 – Roadside clearing and fuelbreaks		Completed Phase 2 – Outyear Project 2012 maintenance grant proposal.
Dutchman **Out Year Project**	H/WB -2	Dutchman Ridge area on east side of Breckenridge Mountain.	Roadside shaded fuelbreak	CND, KRN, USFS	Outyear Project Private property portion would be a KRVFSC grant proposal.
Red Mountain Subdivision **Out Year Project**	H/WB -3	Red Mountain Subdivision – north of Walker Basin.	Improve defensible space in community area and improve escape routes.	KRN, USFS, CND	Outyear Project Private property portion would be a KRVFSC grant proposal.
Kern Canyon & Breckenridge Sub-Region					
Breckenridge Subdivision **NEPA Phase**	KC/B-1	Defensible space zone immediately around and adjacent to the Breckenridge Subdivision. 1,000 acres plantation	Shaded fuelbreak. The project proposal involves a defensible space, hazardous fuels reduction project around about 15 Breckenridge	USFS	Implementation is planned to start in 2011.

Project Name And Status	Map Key	Project Location and Size	Type of Project	Responsible Agency	Dates of Planning and Implementation
		thinning 1,000 forest health thinning and hazardous fuels reduction	Subdivision private parcels. Hazardous fuels reduction will be accomplished by thinning small trees in some dense pockets, limbing-up trees and removing brushy vegetation.		
Lorraine Sub-Region					
No projects identified.					

CND – Bureau of Land Management, Bakersfield Office / Central California Region Fire and Aviation Management Program
CDD – Bureau of Land Management, California Desert District
KRVFSC – Kern River Valley Fire Safe Council
KRN – Kern County Fire Department
TCO – Tulare County Fire Department
USFS – United States Forest Service, Sequoia National Forest, Kern River Ranger District

EV = East Valley
H/WB = Havilah/Walker Basin
KM = Kennedy Meadows
KV = Kernville
KC/B = Kern Canyon & Breckenridge
LI = Lake Isabella
L = Lorraine
P/K = Piutes & Kelso Valley
WH = Wofford Heights & Alta Sierra

Implementation Phase – The project is being completed.
Maintenance Phase – All projects in shrub fuels need maintenance about every 2 years.
NEPA / CEQA Phase – The proposed project is going through the environmental compliance process.
Out Year Project – Out year new KRVFSC grant proposal projects or new CND / USFS projects.

2012 Grant Cycle and Project Priority

The following ranking methodology was used by the collaboration group for prioritizing 2011 grant proposals and out year projects.

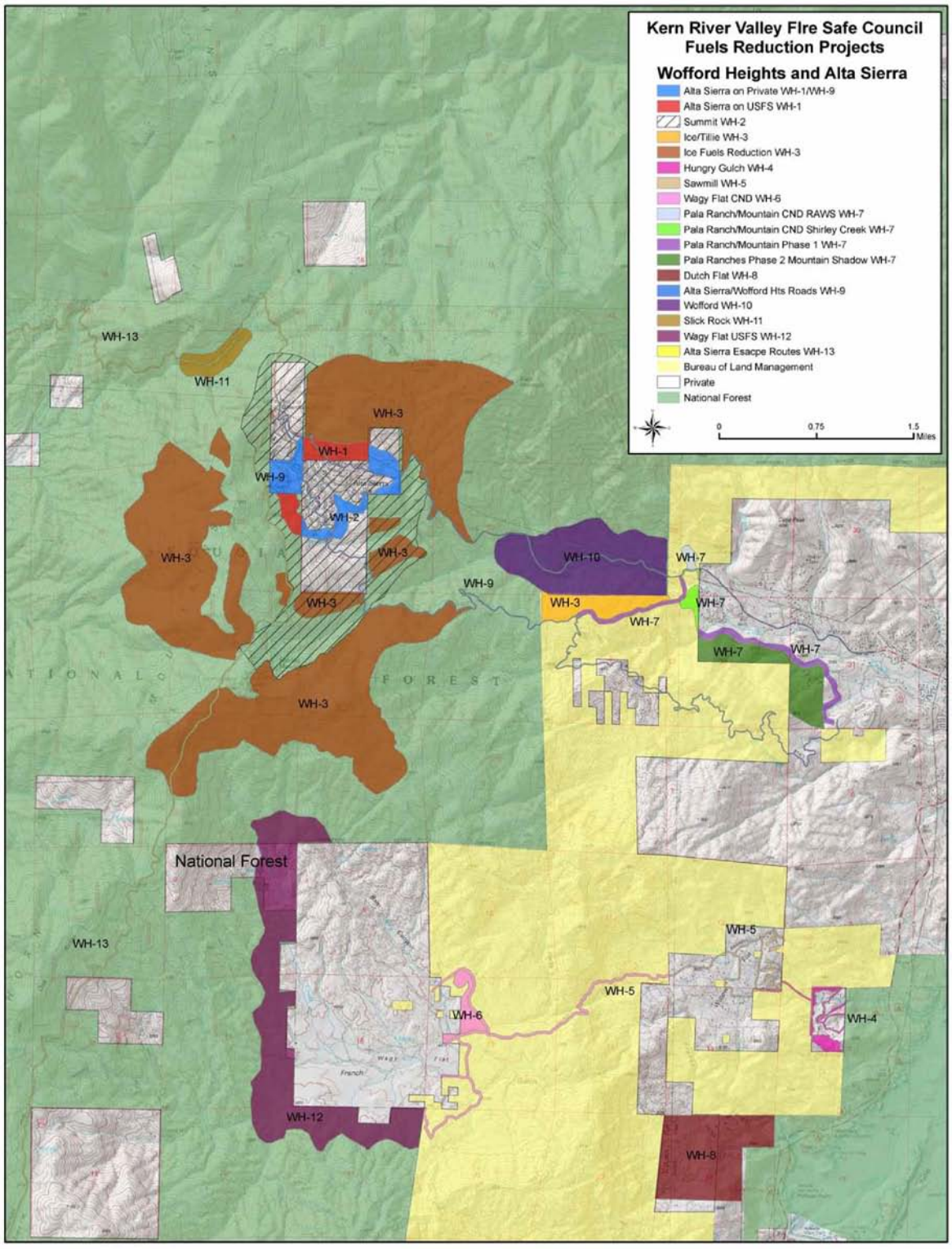
1. Feasible to complete project within Grant Timeline? - 0 to 5
2. Are hazardous fuels being reduce? - 0 to 5
3. Community "Participation" and involvement (are they doing their defensible space, chipper days, etc.?) - 0-7
4. Project is located in the Wildland-Urban Interface? - 0 to 5
5. Can maintenance be continued in the future? (roadside brushing, fuelbreak, etc.?) a responsibility of homeowners/FSC etc. (KCFD is key) - 0 to 5
6. Are public lands adjacent to the project? (CND, FS, USF&WL, NP etc.) - 0 to 5
7. Risk to Values? - 0-8

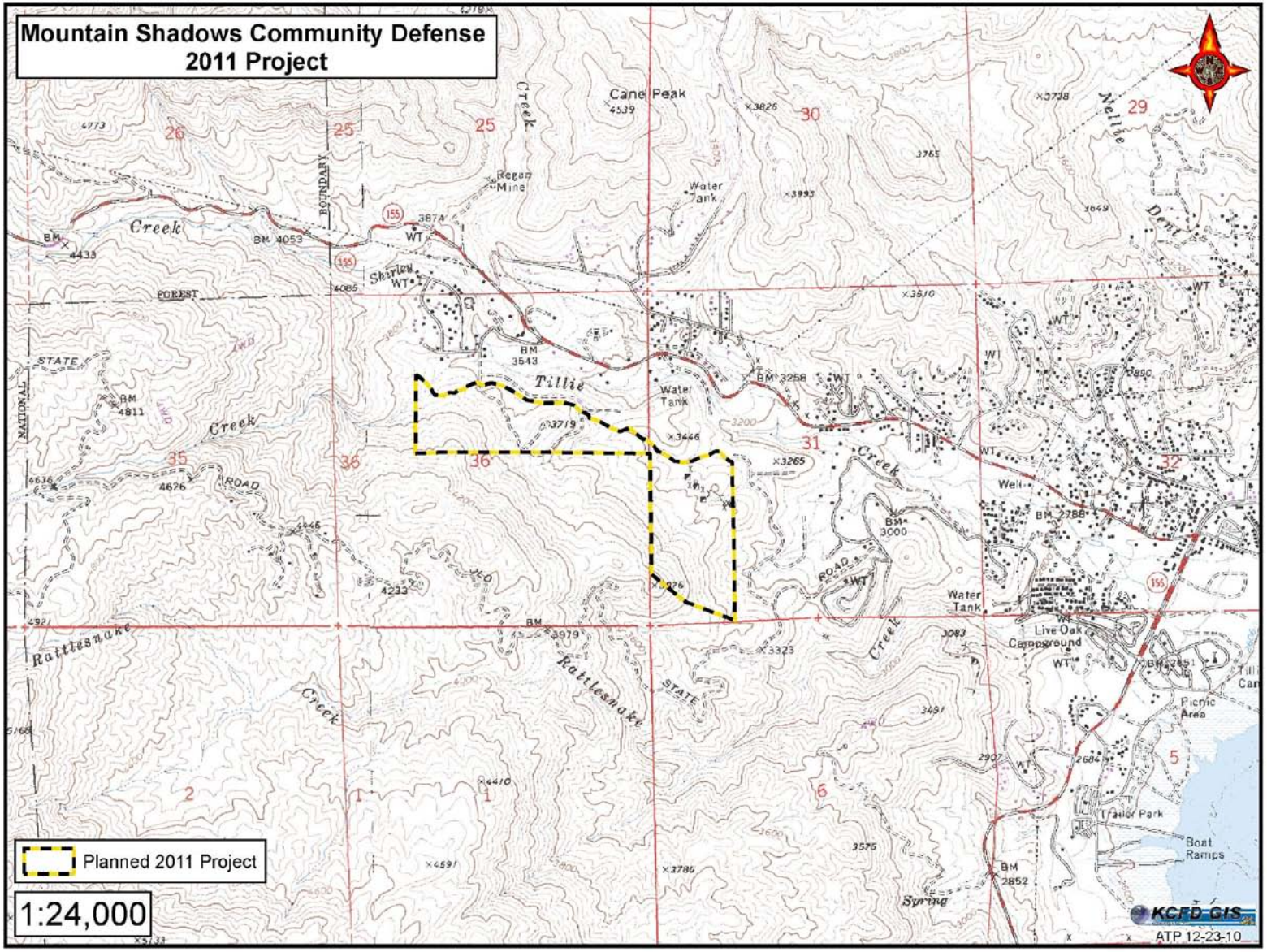
TIE BREAKER = Is the proposed project multi-phase and has been previously funded?

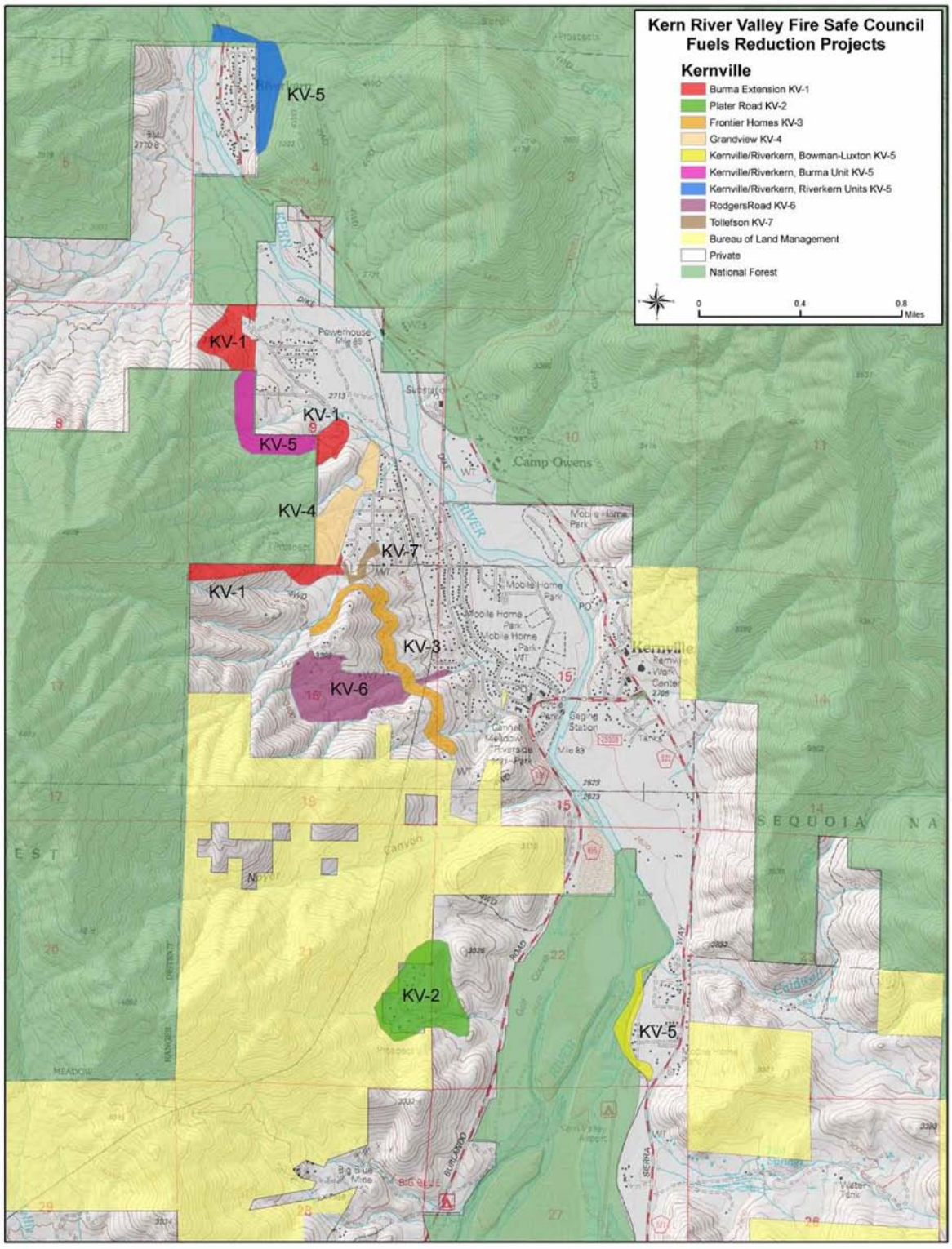
Priority	Name	Map Region	1	2	3	4	5	6	7	Score
N/A	Fay	CEQA ISSUES- HOLD OFF								
1	Maintenance Project Grant Proposal To Include: Hungary Gulch Sawmill Meyers Canyon Bodfish Phase 1 Grand View Tollefson Pala Ranches Alta Sierra Frontier Homes Rodgers Road Squirrel Valley Piute Meadows Community Escape Route	 WH-4 WH-5 LI-4 LI-1 KV-4 KV-7 WH-7 WH-1 KV-3 KV-6 LI-5 H/WB-1								Council Decision 10-21-10
2	Plater Road	KV-2	5	5	3	5	5	5	7	35
2	Yankee	LI-6	5	5	5	5	5	5	6	36
3	Walker	EV-2	5	5	7	5	5	5	6	38
4	Piute Meadows Community	H/WB-1	5	5	3	5	5	5	6	34
5	Dutch Flat	WH-8	5	5	3	3	5	5	4	30
6	Red Mountain	H/WB-3	3	5	0	5	5	5	6	29
7	Lynch	LI-3	5	5	7	5	5	5	6	24
8	Erskine	LI-2	3	5	0	3	5	5	3	24
9	Dutchman	H/WB-2	1	5	0	0	5	5	2	17
TBD	Valley View	P/K-1								Not Scored
TBD	Wagy Flat	WH-12								Not Scored

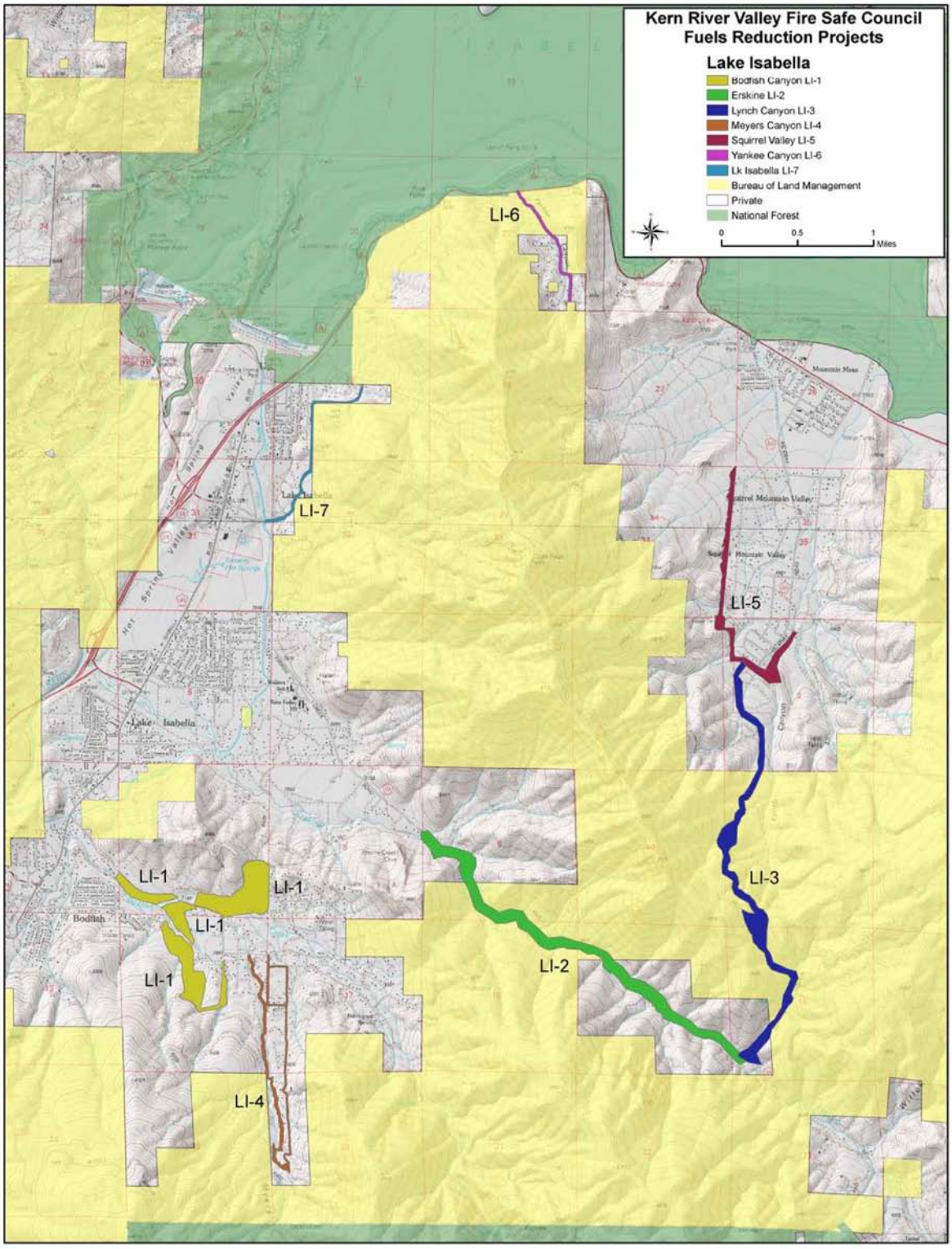
Fuel Reduction Project Sub Region Maps

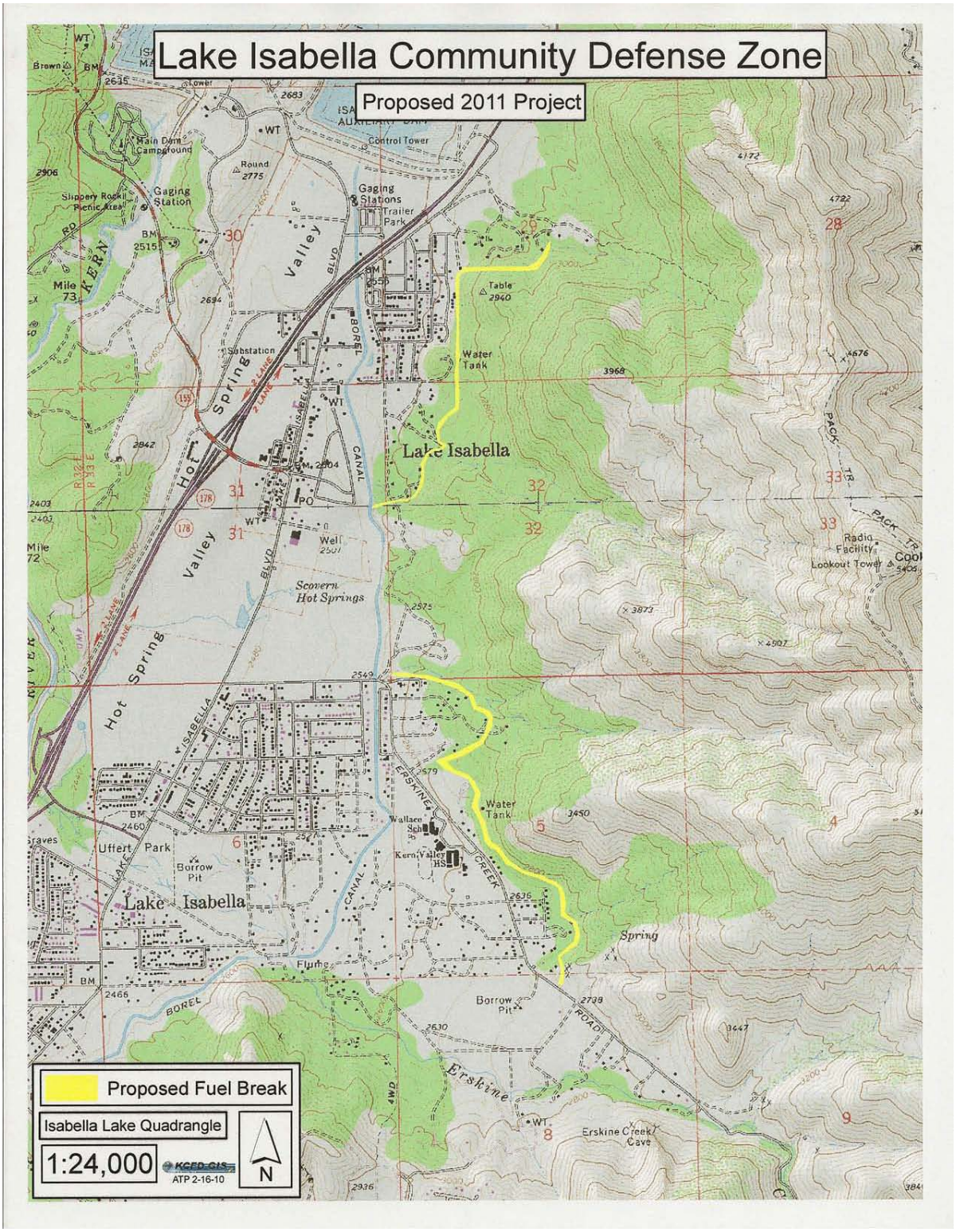
Title	Description	Designation
Wofford Heights and Alta Sierra Sub-Region	General Project Vicinity	WH
Mountain Shadows Interagency Defense Zone	2011 Project	WH-7
Kernville Sub-Region	General Project Vicinity	KV
Lake Isabella Sub-Region	General Project Vicinity	LI
Lake Isabella Community Defense Zone	2011 Project	LI-7
East Valley Sub-Region	General Project Vicinity	EV
Fay Canyon	General Project Vicinity	EV-4
Walker Pass	General Project Vicinity	EV-1, 2, & 3
Kennedy Meadows Sub-Region	General Project Vicinity	KM
Piutes & Kelso Valley Sub-Region	General Project Vicinity	P/K
Havilah & Walker Basin Sub-Region	General Project Vicinity	H/WB
Kern Canyon and Breckenridge Sub-Region	General Project Vicinity	KC/B
Loraine Sub-Region	No projects Identified	

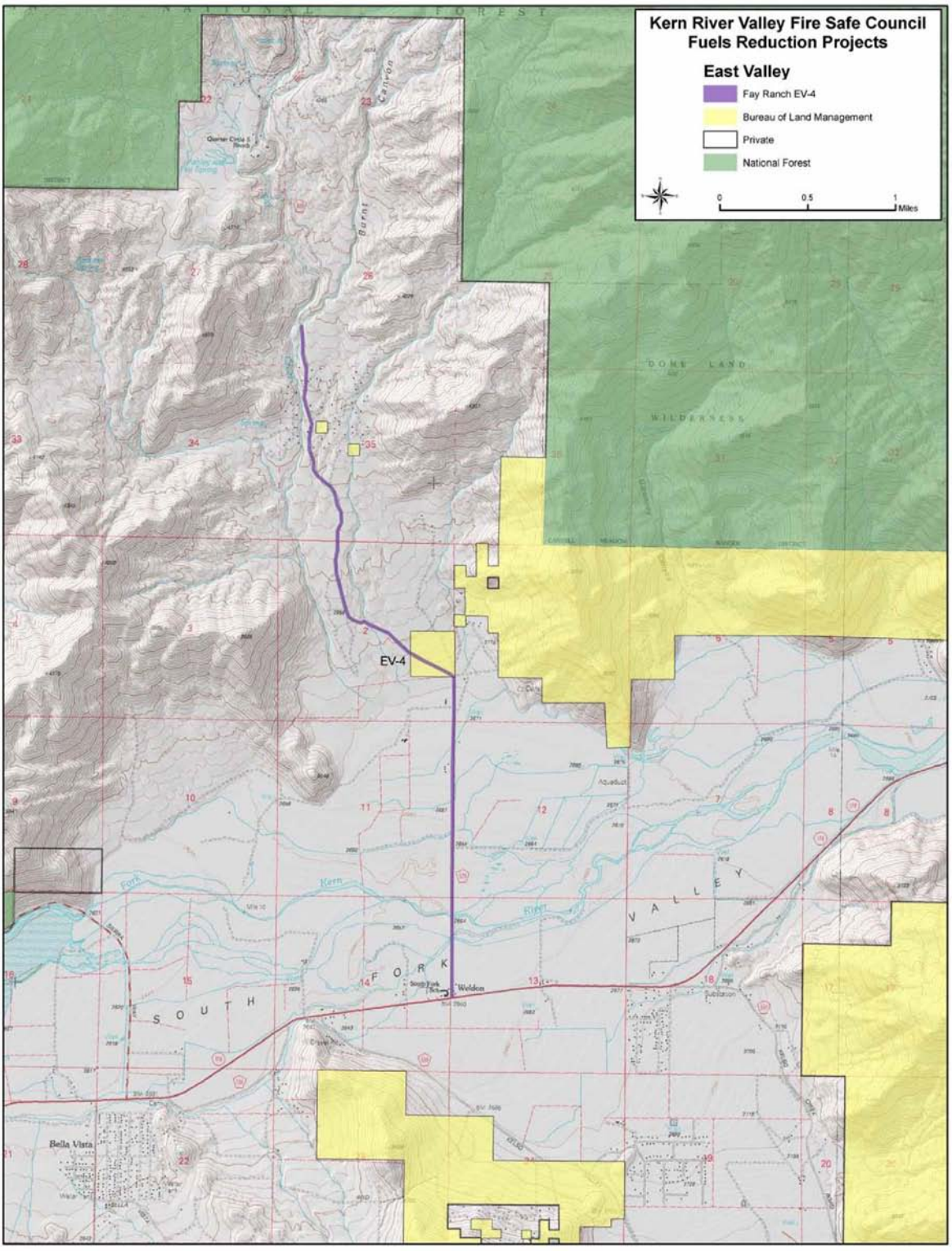

Kern River Valley FIre Safe Council
Fuels Reduction Projects
Wofford Heights and Alta Sierra
Alta Sierra on Private WH-1/WH-9
Alta Sierra on USFS WH-1
Summit WH-2
Ice/Tillie WH-3
Ice Fuels Reduction WH-3
Hungry Gulch WH-4
Sawmill WH-5
Wagy Flat CND WH-6
Pala Ranch/Mountain CND RAWS WH-7
Pala Ranch/Mountain CND Shirley Creek WH-7
Pala Ranch/Mountain Phase 1 WH-7
Pala Ranches Phase 2 Mountain Shadow WH-7
Dutch Flat WH-8
Alta Sierra/Wofford Hts Roads WH-9
Wofford WH-10
Slick Rock WH-11
Wagy Flat USFS WH-12
Alta Sierra Esacpe Routes WH-13
Bureau of Land Management
Private
National Forest
0
0.75
1.5
Miles
WH-13
WH-11
WH-3
WH-1
WH-9
WH-2
WH-3
WH-3
WH-3
WH-3
WH-10
WH-7
WH-9
WH-3
WH-7
WH-7
WH-7
WH-7
National Forest
WH-13
WH-5
WH-5
WH-6
WH-4
WH-12
WH-8

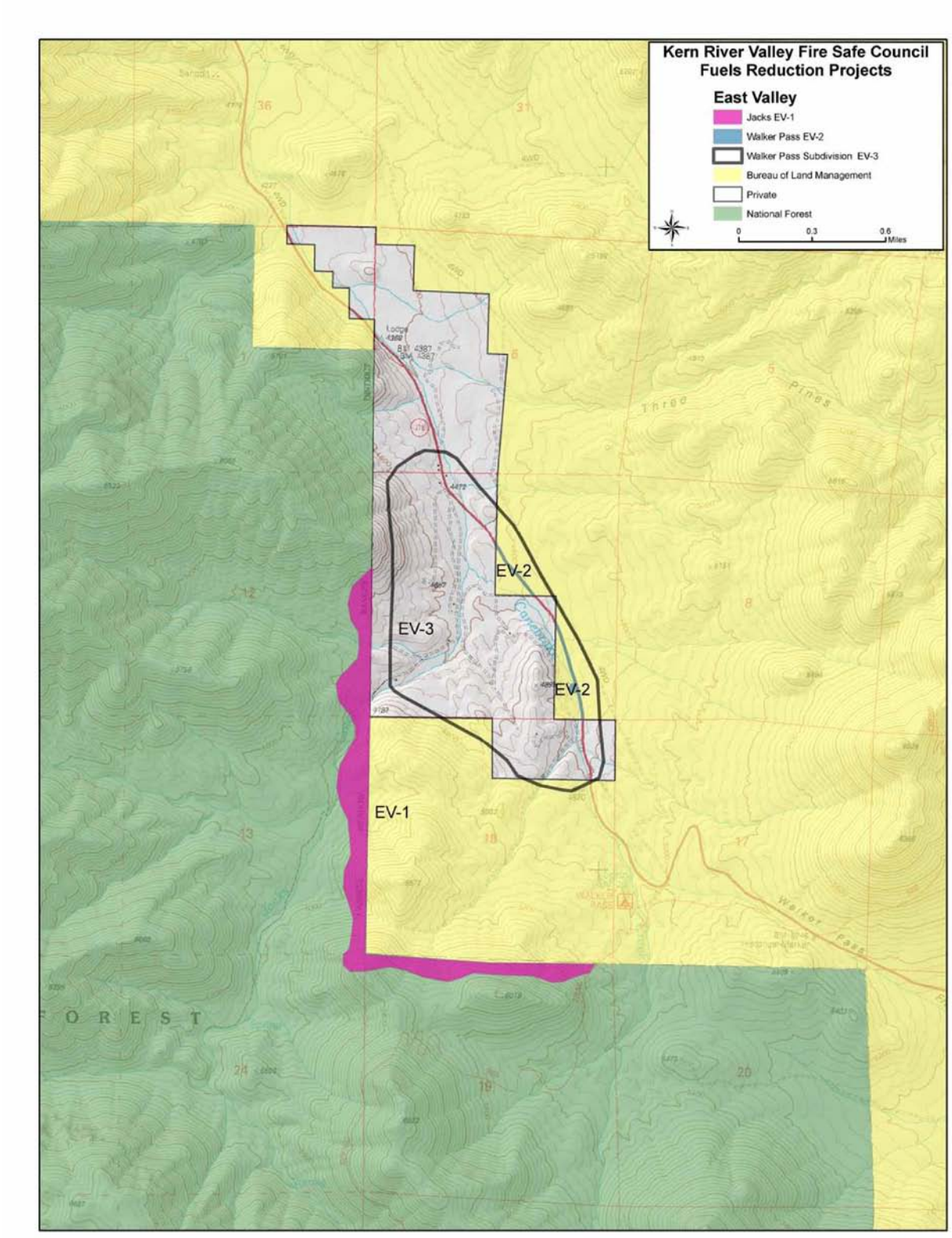

Mountain Shadows Community Defense
2011 Project
Planned 2011 Project
1:24,000
KCFD GIS
ATP 12-23-10
Cane Peak
Regan Mine
Water Tank
Tillie
Creek
Rattlesnake
Live Oak Campground
Picnic Area
Trailer Park
Boat Ramps
Spring
BOUNDARY
STATE
ROAD

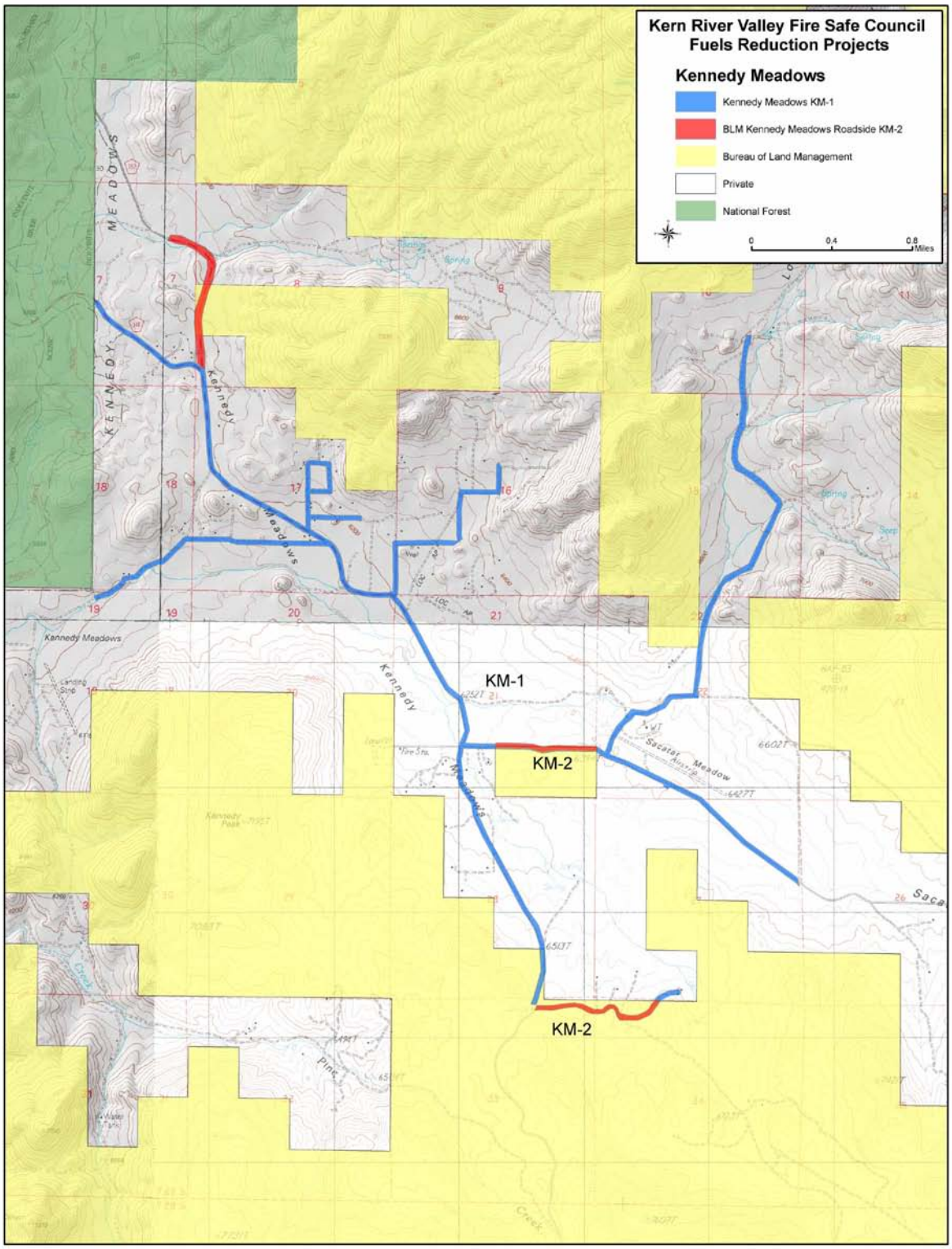

Kern River Valley Fire Safe Council
Fuels Reduction Projects
Kernville
Burma Extension KV-1
Plater Road KV-2
Frontier Homes KV-3
Grandview KV-4
Kernville/Riverkern, Bowman-Luxton KV-5
Kernville/Riverkern, Burma Unit KV-5
Kernville/Riverkern, Riverkern Units KV-5
RodgersRoad KV-6
Tollefson KV-7
Bureau of Land Management
Private
National Forest
0
0.4
0.8
Miles
KV-1
KV-1
KV-1
KV-2
KV-3
KV-4
KV-5
KV-5
KV-5
KV-6
KV-7
Camp Owens
Kernville
SEQUOIA

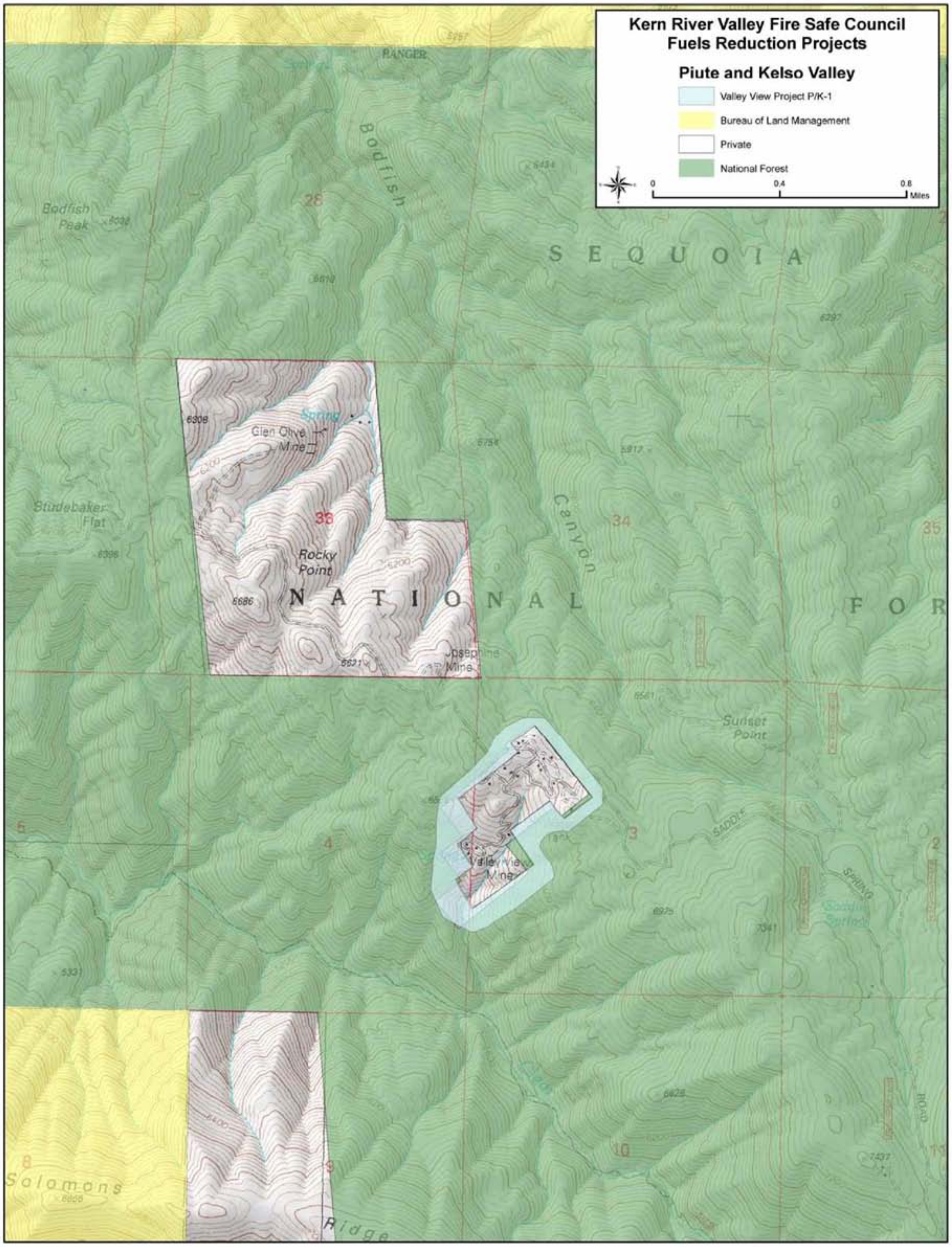

Kern River Valley Fire Safe Council
Fuels Reduction Projects
Lake Isabella
Bodfish Canyon LI-1
Erskine LI-2
Lynch Canyon LI-3
Meyers Canyon LI-4
Squirrel Valley LI-5
Yankee Canyon LI-6
Lk Isabella LI-7
Bureau of Land Management
Private
National Forest
0
0.5
1
Miles
LI-6
LI-7
LI-5
LI-3
LI-2
LI-1
LI-1
LI-1
LI-1
LI-4
Lake Isabella
Bodfish

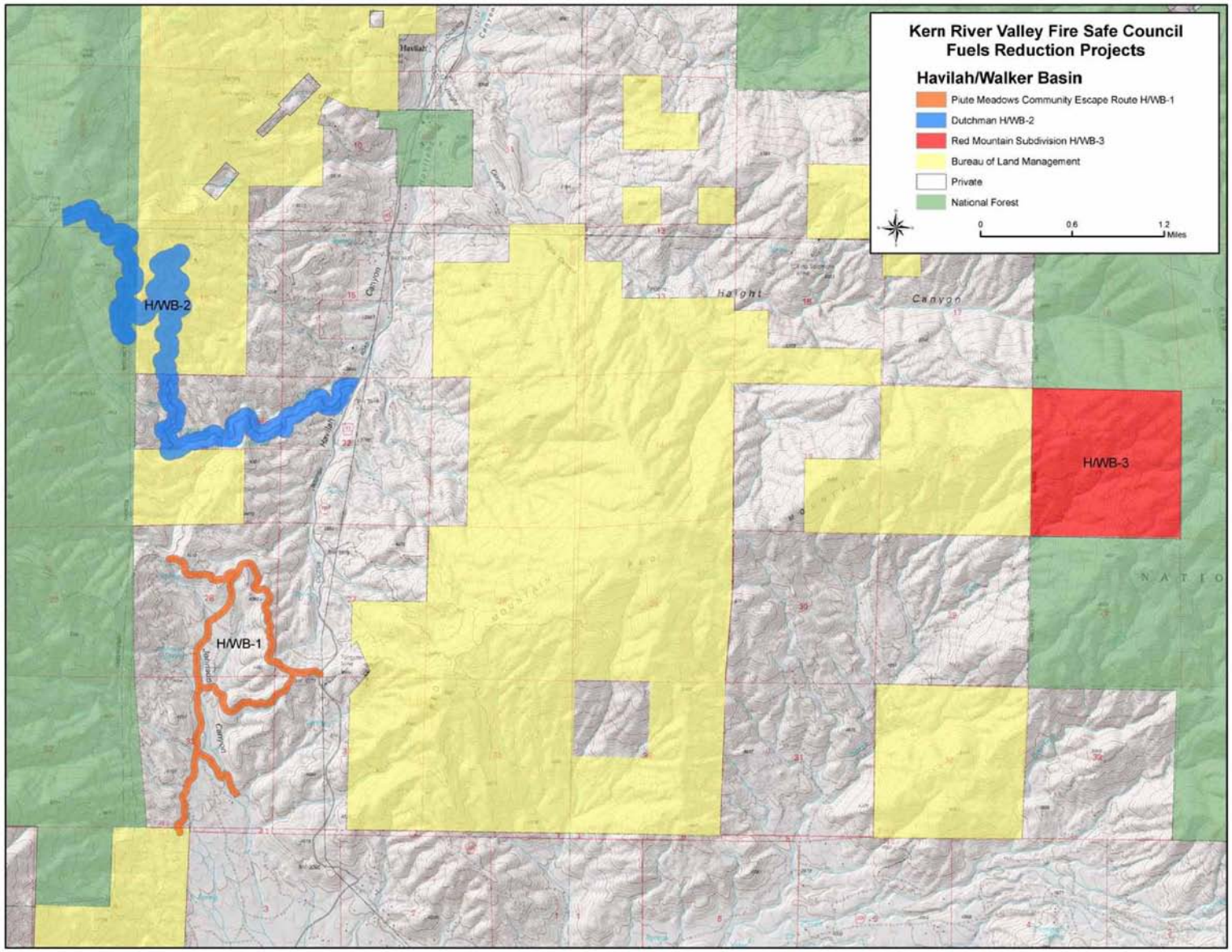

Lake Isabella Community Defense Zone
Proposed 2011 Project
Proposed Fuel Break
Isabella Lake Quadrangle
1:24,000
KCFD GIS
ATP 2-16-10
N
Lake Isabella
Scovern Hot Springs
Hot Spring Valley
Water Tank
Uffert Park
Borrow Pit
Erskine
Erskine Creek Cave
Radio Facility
Lookout Tower
Main Dam Campground
Gaging Station
Trailer Park
Substation
Control Tower
Table 2940
Well 2501
Wallace School
Kern Valley HS
Flume
Spring

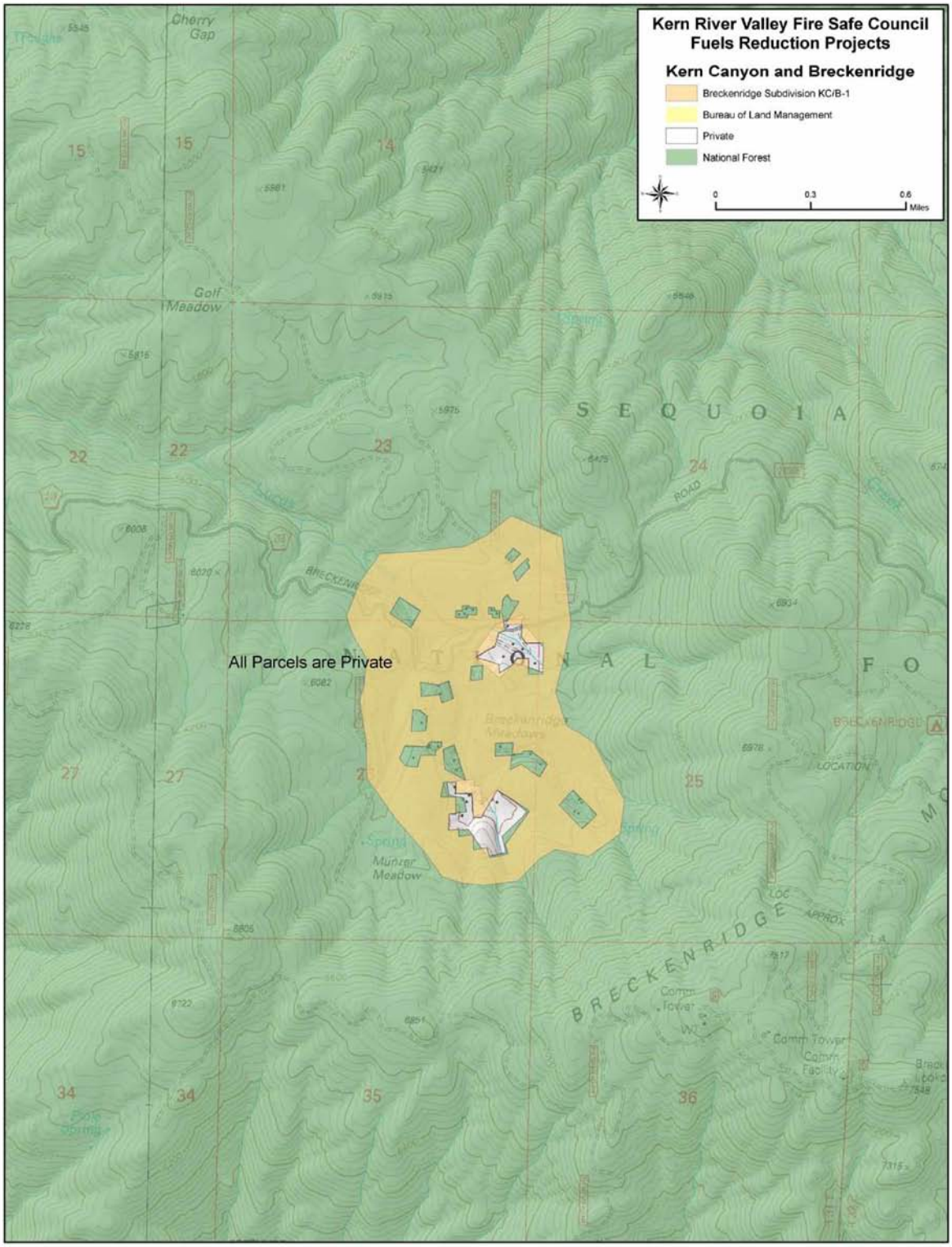

Kern River Valley Fire Safe Council
Fuels Reduction Projects
East Valley
Fay Ranch EV-4
Bureau of Land Management
Private
National Forest
0
0.5
1
Miles
EV-4
Burnt Canyon
DOME LAND
WILDERNESS
SOUTH FORK
KERN RIVER VALLEY
Weldon
Bella Vista


Kern River Valley Fire Safe Council
Fuels Reduction Projects
East Valley
Jacks EV-1
Walker Pass EV-2
Walker Pass Subdivision EV-3
Bureau of Land Management
Private
National Forest
0
0.3
0.6
Miles
EV-2
EV-3
EV-2
EV-1
Three Pines
Walker Pass
FOREST


Kern River Valley Fire Safe Council
Fuels Reduction Projects
Kennedy Meadows
Kennedy Meadows KM-1
BLM Kennedy Meadows Roadside KM-2
Bureau of Land Management
Private
National Forest
0
0.4
0.8
Miles
KM-1
KM-2
KM-2


Kern River Valley Fire Safe Council
Fuels Reduction Projects
Piute and Kelso Valley
Valley View Project P/K-1
Bureau of Land Management
Private
National Forest
0
0.4
0.8
Miles
S E Q U O I A
N A T I O N A L
F O R
Bodfish Peak
Bodfish
Studebaker Flat
Glen Olive Mine
Rocky Point
Josephine Mine
Canyon
Sunset Point
Valley View Mine
Solomons
Ridge
RANGER


Kern River Valley Fire Safe Council
Fuels Reduction Projects
Havilah/Walker Basin
Piute Meadows Community Escape Route H/WB-1
Dutchman H/WB-2
Red Mountain Subdivision H/WB-3
Bureau of Land Management
Private
National Forest
0
0.6
1.2
Miles
H/WB-1
H/WB-2
H/WB-3


Kern River Valley Fire Safe Council
Fuels Reduction Projects
Kern Canyon and Breckenridge
Breckenridge Subdivision KC/B-1
Bureau of Land Management
Private
National Forest
0
0.3
0.6
Miles
All Parcels are Private
Cherry Gap
Golf Meadow
Munzer Meadow
SEQUOIA
BRECKENRIDGE
ROAD
LOCATION
Comm Tower
Comm Facility