KENNEDY MEADOWS

COMMUNITY WILDFIRE

PROTECTION PLAN

"If you chose to live in a place like this, you better be prepared to take care of yourself"

Delores Foster, May 28, 2006
Resident, Kennedy Meadows

KERN RIVER VALLEY FIRE SAFE COUNCIL

MISSION OF THE KERN RIVER VALLEY FIRE SAFE COUNCIL
"Private and Public Partners working together to preserve the Kern River Valley's natural resources by mobilizing Kern River Valley residents to make their homes, neighborhoods and communities Fire Safe."

KENNETH DELFINO
Registered Professional Forester # 506

Dr. CHRIS DICUS

January 2007

KENNEDY MEADOWS

Community Wildfire Protection Plan

Certification and Agreement

The Community Wildfire Protection Plan for Kennedy Meadows:

- Was collaboratively developed with the Kennedy Meadows Property Owners Association. Kern River Valley Fire Safe Council, USDI Bureau of Land Management USDA Forest Service and the Tulare County Fire Department were consulted.
- The plan provides an analysis of the fire/fuel situation in the community, community attitudes toward wildland fire, and information on the fire safe condition of 117 properties.
- The plan identifies fuel reduction projects for Kennedy Meadows.
- The plan provides recommendations on increasing information and communication on wildland fire issues and problems.
- The plan recommends that the most effective fire defenses are the actions of the residents of the community to improve the survivability of their properties.

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

Ed Royce, President
Kern River Valley Fire Safe Council

Kevin Chambers, Fire Management Officer
USDI Bureau of Land Management

Phil Brown, Battalion Chief
Tulare County Fire

Margie Clack
USDA Forest Service

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EXECUTIVE SUMMARY

Kennedy Meadows is an isolated community at the extreme southeast corner of a Central Valley county (Tulare County). It receives few public services that are common to most California property owners. Kennedy Meadows, with almost 200 habitable structures of which 45 are full time homes, is located miles from the nearest full services. Residents are in the unique position of having to take care of and protect themselves most of the time. Telephone service is the only public utility servicing the area. The community has no school, library or church and not a Starbucks within 50 miles. Tulare County provides garbage service at a central transfer station and the fire station and engine. Local residents are responsible for staffing the Volunteer Fire Department. Wildland fire protection is provided by BLM during the summer months only. Ambulance service is provided by Liberty Ambulance in Ridgecrest, approximately 60 minutes away. Air ambulance (helicopter) is provided by Mercy in Mojave, 45 minutes away (Watson, 2006). Law enforcement must come from Lake Isabella or across from the Kern River Canyon. This community is indeed isolated.

Fortunately, fire safe conditions within the Kennedy Meadows community are relatively good. Many properties had moderate to good fire safe clearance and most had done some improvement since the Manter Fire of July 2000. Most of the permanent residents and many part-timer owners were interviewed during three visits to the project area and they had a high level if interest and knowledge about wildfire conditions and fire safe principles. Most expressed serious concern about another fire and expressed that they were determined to protect themselves. They realize that they fire protection resources are scarce in this remote area and that engines and equipment may not be available during the initial stage of a fire.

This project involved the evaluation of 117 properties with a report prepared for each property. The section of this report "**Protect Your Property"** should be given to each owner along with the property evaluation. This information will greatly assist owners in improving their chance of survival when the next fire occurs. **Recommendation #1** describes what owners need to do.

Recommendations 2 and **3** describe fuel reduction and fire break projects that need to be installed. These improvements will improve the

capability of firefighters to protect developed areas in the community. **Recommendations 8, 10, 15** will increase information provided to residents and the public. **Recommendations 5, 16,** and **19** focuses on improving fire protection resources and deployment in the valley. The Bureau of Land Management needs to enhance their structural protection plan and their visibility in the community. The volunteer department needs more trained members.

A Wildland Fire Protection Plan for any community rests with the community members. The hard work needs to be done by local citizens. An outside consultant can create a framework plan but that plan will not work until it becomes the Kennedy Meadows Community Plan. The only way any plan succeeds is where locals have ownership and buy-in. The consultant can provide information, offer recommendations and point locals in a logical direction.

Success will be measured by how many recommendations the locals agree to implement. This is the heavy lifting that needs to be done for a plan to work.

Information on the **Purpose of the Project, Request for Proposal, Submitted Proposal,** and **Grant Tasks** is contained at the end of this report.

NEED

California and most other western states have experienced increasing losses from catastrophic wildfire in the past 20 years. Forest resources, watersheds, wildlife and valuable recreation resources have been damaged at an unprecedented rate. Not since the massive fires during the early 1900's, before the modern era of fire protection, has so much damage occurred. The cause of this increase in fire loss is complex and varies in different locations throughout the West. Increases in rural populations, climate change, increase in fuel loading because of past aggressive fire protection are some of the factors in the increasing fire loss.

Native forests, grasslands and brush lands in the west have evolved with fire and have the ability to recover over time, a process that has been occurring since the last ice age, 20,000 years ago. This evolutionary process continued until the intervention of humans about 8 to 10,000 years ago.

Indigenous peoples in the west learned to cope with this phenomenon and even used it to their advantage for hunting, food gathering and agriculture. Settlement of the west by European and Western cultures caused a significant change in land use and natural fire patterns. Mining, ranching and logging significantly altered landscapes and natural systems. Ranchers used fire to increase grazing; loggers created massive areas of flammable slash and carelessly let fires get out of control. Miners destroyed streams and in some places altered topography.

The modern wildland firefighting era started during the 1930's with the advent of the following:

- Civilian Conservation Corps hand crews
- Vehicles that could traverse steep terrain
- Efficient water pumps
- Cheap fire hose
- Aircraft for reconnaissance and water dropping
- Advent of professional wildland firefighting techniques

Firefighting efforts became highly successful from the 1950's through the 1970's, so successful that fuels, normally kept in check by historic natural fires, built up to unprecedented levels. Sierra Nevada mixed conifer forests, with an historic fire frequency of 20 to 40 years, became overstocked with shade tolerant species such as white fir and incense cedar. Concerns over logging, especially on public lands, decreased active forest management and funds for thinning and fuel projects have not kept up with the need.

The most significant factor affecting California wildland firefighting has been the influx of people moving into previously sparsely populated rural areas. Rural Sierra Nevada counties have been experienced some of the most rapid growth rates in California during the past 25 years. Communities like Kennedy Meadows, historically devoted to ranching and sparse weekend recreational cabins, have developed into permanent residential areas with many higher-end vacation and full-time homes.

Wildland fire agencies establish priorities for firefighting protection purposes as follows:

From a federal wildland fire policy review in 2001: "*The protection of human life is the single, overriding suppression priority. Setting priorities among protecting human communities and community infrastructure, other property and improvements, and natural and cultural resources will be done based on the values to be protected, human health and safety, and the costs of protection."*

From the BLM manual: "*Protection priorities are (1) human life and (2) property and natural/cultural resources. If it becomes necessary to prioritize between property and natural/cultural resources, this is done based on relative values to be protected, commensurate with fire management costs."* (Ryan, 2007)

For state and local fire agencies, priority is protection of life and safety of firefighters and the public. Second is the protection of improvements and third is protecting resources (forests, range and brush). As California's private foothill and mountain areas have blossomed in population, so have the problems of protecting that population and associated resources. Unfortunately, losing structures in wildfire has become common place, often with 200 or 300 structures lost or damaged on a single fire. This was uncommon, except in Southern California, until the mid 1970s.

The combinations of the increased forest fuels and expanding population have created situations that result in massive fires such as the Manter and McNally Fires. These catastrophic fires have been occurring throughout the western states for the past 20 years and can severely taxed fire protection agencies. Fire agencies cannot fight fires like they did in the 1950s and 1960s. Strategies and tactics have evolved to reflect changing demographics. These issues will be discussed in the chapters on the fire protection agencies.

Wildfires burned a record number of acres in the lower 48 states in 2006 and a record amount of money was spent to extinguish those fires. Forest Service accounting indicates that, ending September 30, 2006, fires cost more than $1.5 billion. As of the end of the federal 2006 fiscal year, more than 9.93 million acres have burned, the most burned since 1960 (this is before the "Day Fire" on the Los Padres National forest occurred in late 2006). The average acreage burned during the past 10 years has been 4.9 million acres. Six

hundred seventy-four residential homes burned as of the budget cutoff date (Bakersfield Californian, October 4, 2006).

With predictions of climate change toward warmer times, this trend is likely to continue. Protecting structures in rural forest and brush environments, also known as the "Wildland Urban Interface" has been a high priority for wildland fire protection agencies such as the California Department of Forestry and Fire Protection, USDA Forest Service and USDI Bureau of Land Management. Finding ways to protect small isolated communities like Kennedy Meadows is just as important as protecting large urban communities in San Bernardino and Riverside Counties.

Public apathy towards natural disasters is directly proportional to the likelihood of the disaster occurring. Rural communities subject to wildfire usually actively support fire agency resources such as fire stations and firefighting crews in close proximity to the threat. Personal efforts, such as fire safe construction and adequate clearance, unless required by law and backed by vigorous enforcement, appear to be a matter of choice by property owners and not a high priority by some. That is, until a fire occurs. Communities, such as Kennedy Meadows, that experience a significant and devastating wildfire in 2000 (Manter Fire), acquire a strong interest in supporting increased prevention efforts and better suppression resources.

OVERVIEW OF THE PROJECT AREA

History of Kennedy Meadows

The Kern Plateau region, which includes Kennedy Meadows, falls within the prehistoric territory of the Tubatulabal indigenous peoples. Tubatulabal territory is located in the far southern Sierra Nevada Mountains, beginning at the north and south fork drainages of the Kern River, near Mount Whitney, and ending below the confluence of the two forks in the Kern River Canyon. Although the Tubatulabal practiced a mobile hunting and gathering subsistence, they did establish permanent winter habitation sites. These sites were concentrated in the Kern River, the South Fork Kern River, and Hot Spring Valley.

Kennedy Meadows is located within a prehistoric travel corridor between the San Joaquin Valley and the Mojave Desert. Tubatulabal, Kawaiisu, and possibility other Native American groups traveled through the area as they acquired resources. While in the Kennedy Meadows area these groups would hunt game and collect Pinyon pine nuts as they ripened in the fall. It should also be noted that obsidian, the material most commonly used for stone tools among the Tubatulabal, occurs in the Coso Range of the Mojave Desert. Even today, obsidian flake scatter is common at many sites around Kennedy Meadows.

The name, Tubatulabal meaning "pine-nut eaters" was used both by the Tubatulabal and their neighbors, the Yokuts and the Kawaiisu. Their subsistence practices consisted of hunting, fishing, and gathering. Gathering practices focused primarily on collecting Pinyon nuts from the Sierra Nevada Mountains and acorns from the Greenhorn Mountains, in addition to supplemental berries, leaves and bulbs. The varied terrain of the Tubatulabal allowed for abundant food resources since they could hunt, fish, and gather plant foods in the valleys along the Kern River, as well as in the surrounding mountains. Prehistoric sites common to this region include pictograph and petroglyph rock art, bedrock mortar and milling stone food processing stations, lithic scatters, and village or hamlet midden sites (Cuevas, Kim. Archeologist, BLM 2006).

The first noted use of the area by non-native peoples are Basque sheep men in the 1870s. The first parcel to be filed for Homestead was at the head of

Nine Mile Canyon at Chimney Meadows. Before 1900 this meadow was owned by Tommy Smith and James Powers (Powers, 1999).

"Cap" Pasquale was the first American settler in Kennedy Meadows in 1918. William Snodgrass and his family homesteaded in 1920 follower by the Hawkins, Coleman, and Hunsinger families latter that same year. Coleman and Hunsinger built a small saw mill to produce boards for the first cabins.

Prior to 1918 Kennedy Meadows was free range land. Cattlemen were not too happy with the new settlers because of fencing of some of the best land. This area is still considered "Open Range" by Tulare County however the numerous fences contain cattle to a few areas.

A fire was noted in the vicinity of Eagle Mountain in the mid 1930s. CCC crews were sent to fight the fire but did little good. After six days the fire hit the creek and went out. The burned area known as "Burnt Canyon" became the best hunting grounds in the area for locals for many years.

Nine Mile Canyon Road, built in 1929, was a steep single track affair with a sand base (Snodgrass Cooper, 1994).

Settlement of these high remote valleys was slow, with ranching as the only viable economic activity. A few hearty hunters and fishermen would venture into the valleys each summer but there were few permanent or part time residents. Rustic cabins began appearing on divided parcels in the 1950s with increasing activity during the 1960s. Division of larger land parcels increased as mountain and desert vacation cabins and homes became popular and affordable. Many of the current 200+ owners in the Meadows were residents of Ridgecrest and associated with the China Lake Naval Air Weapons Station. Kennedy Meadows offered a welcome relief to the summer heat of the California desert. Most of the remaining full and part time owners are from the Bakersfield and the Southern California areas.

Setting

Kennedy Meadows is a small rural mountain community located east of the Kern Plateau in the southeast corner of Tulare County. The community lies in the valley of the south fork of the Kern River between the Kern Plateau to the west and the Sierra crest to the east. It is immediately adjacent to Inyo and Kern

Counties and distant (across the Sierra Nevada mountain range) from the Tulare County seat in Visalia. The South Fork of the Kern River is on the northwestern side of the community.

A planning area for this project was delineated by the KRVFSC which extends approximately 14 miles in a slightly southeast to northwest direction and ranges from about 3 miles to 7 miles wide in a generally east-west direction (Map 1). The planning area roughly encompasses the watershed boundaries of drainages that flow into the major meadows and includes approximately 44,500 acres. Elevations in the planning area range from 6000 to 7000 feet. Kennedy Meadows road (the only paved road) traverses the valley from the southeast to the northwest. Nine Mile Canyon Road enters Kennedy Meadows from the southeast via State Highway 395. Nine Mile Canyon Road becomes Kennedy Meadows Road at the Chimney Peak Road junction. This is the only year-round road access. Seasonal access is from Chimney Peak Road (maintained by BLM) via Highway 178 east of Onyx, and Sherman Pass road (Forest Service maintained) entering the valley from the northwest through Beach Meadows. Sherman Pass road originates south of Johnsondale in the Kern River Canyon and connects to Kernville (via county road M99) and California Hot Springs (via county road M50).

Private lands in Kennedy Meadows are surrounded by the Sequoia National Forest, Inyo National Forest and BLM lands. These lands include the Dome Land, Chimney Peak and Sacatar Trail Wilderness areas. Recreation facilities include the Chimney peak campground (BLM) to the south and Kennedy Meadows campground (USFS) to the north. Troy Meadows (closed for rehabilitation in 2006) and Fish Creek campgrounds are located several miles northwest on the Sherman Pass road toward the Forest Service Blackrock station. The Pacific Crest trail parallels Kennedy Meadows on the west side and the Kennedy Meadows store is a prime way-station for hikers along this popular trail. The South Fork of the Kern River is a popular fishing spot and is stocked with trout by the Department of Fish and Game throughout the summer months. All Terrain Vehicles (ATVs) are a popular recreation pursuit and can cause problems because of trespass on private lands in the valley. This abundance of

public lands, wilderness, streams and campgrounds focuses heavy recreation use in and around Kennedy Meadows.

The project area is considered open range by Tulare County for cattle ranching. Cattle ranching was extensive throughout the settlement history of the meadows and surrounding mountains but has decreased in the last 20 years. Cattle grazing is considered a nuisance by some current property owners however cattle graze native grass and generally decrease the amount of light flashy fuels which contribute to the spread of fire. Property owners wishing to exclude cattle must fence their property.

There are approximately three hundred private parcels in Kennedy Meadows, ranging from about 1 acre to over 2000 acres. Currently about 175 parcels have been identified with some type of improvements. These properties include expensive full time homes, vacation and weekend cabins, rustic cabins, RVs with and without add-ons, various out buildings and sheds, water systems, corrals, salvaged vehicles, abandoned mobile homes and trailers, and various piles of old building materials. Approximately 50 people permanently live in the project area on about 45 properties (Royce, Ed. 2006).

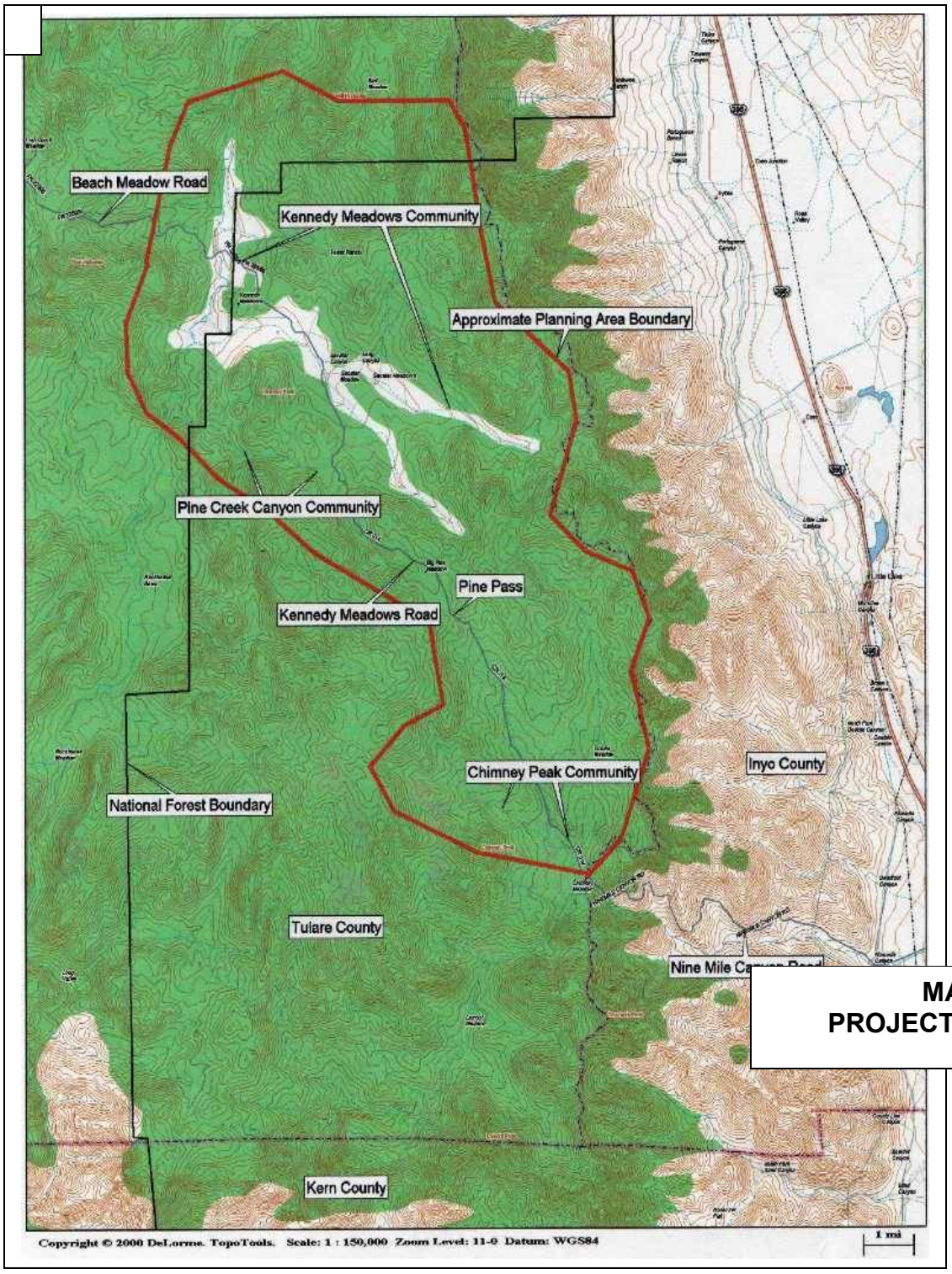
Property evaluations conducted in June and July found 38 full time properties, with additional 6 or 8 properties with full time residents that either denied access or did not meet the criteria for evaluation. The remainder is weekend and vacation homes. A few appear to have had little habitation for several years (abandoned).

There are several commercial businesses in the Meadows. These include the General Store and two eating/beverage businesses that are open part time. The largest commercial complex is the Ducor Telephone Company. Several residents offer services from their properties such as road building and grading, excavation, construction and miscellaneous trades.

All roads in the Meadows except the Kennedy Meadows Road and its extension as the Beach Meadow Road and the short segment of road to the county fire station/trash transfer facility are private. These roads are native materials (dirt) maintained by residents. Most roads are in good condition and drivable by standard vehicles during the dry season. Wet and/or winter

conditions sometimes require 4 wheel drive vehicles. Many of the access roads to residences are gated or blocked to public passage.

Kennedy Meadows Property Owners Association was formed before 1990, according to the current president. It is recorded with the California Secretary of State and IRS as a 501(c4) non profit corporation but has no Covenants, Conditions, and Restrictions (CC&Rs). Membership is voluntary and dues are collected from 70 current members. The Association has avoided taking a regulatory or enforcement role with property owners and has a desire to remain as an advocacy, informational and advisory organization (Royce, Ed. 2006).



MAP 1
PROJECT BOUNDRY

RECOMMENDED ACTIONS (First three recommendations are the highest priority, The remainder are in no special order)

1. Ultimate responsibility for protecting property rests with each owner. All property owners should seriously consider taking steps to improve their survivability from fire by taking actions suggested in the section "**PROTECT YOUR PROPERTY".** Taking the most drastic steps such as building with only fire safe materials, placing heavy shutters on windows, providing defensible space, keeping flammable material well away from structures, and having water and hydrants can almost guarantee that a structure can survive even the most severe wildfire. Most owners, lacking the funds or ability to achieve this level of protection, should take all the steps recommended that are within their capability. Each step taken will increase their chance of survival. One hundred and seventeen properties were evaluated and each evaluation is on an individual report. Each owner is encouraged to obtain their report from the KMPOA and undertake necessary improvements to protect their property. It is important to remember that fire protection resources in this area are thin. Response times are long and the local volunteer effort may not be available in a timely manner. Property owners and their neighbors need to be prepared to take care of each other by obtaining information, training and equipment (portable water pumpers).

2. Create firefighting safety zones and fire breaks by removing rabbit brush/sage along major roads. (See **Map 2** and **3**) These zones/breaks would provide firefighters the opportunity to safely defend major residential areas and keep fires from engulfing the entire valley. It is understood that most of this activity will occur on private lands beyond the legal dedicated road right-of-way and permission would need to be obtained from owners. The county and state would need to be cooperators along Kennedy Meadows Road. Where roads abut BLM lands, that agency could enter into a cooperative project with the community and may reduce the cost in certain locations.

Road Clearance Estimates

A 20 foot clearance on one side of a road = 2.43 acres per mile. Twenty feet on each side = about 5 acres per mile. It is estimated that it would cost about $1000 per acre or $5000 per mile with an average of 20 feet on each side. On the east-west roads it is recommended to clear 30 feet on the south side and 10 feet on the north side.

Highest priority
Kennedy Meadows Road – Approximately 5 miles starting one mile south of Ducor Telephone proceeding north to the junction with Beach Meadows Road; continuing northwest on Beach Meadows to the South Fork of the Kern River.

Roads that need treatment:

Up The Hill			
Sierra Meadows	2.0 mile	=	10,000
Red Bear			
Popular Lane			
The Other Road			
1. Dome View	0.2 mile	=	1,000
Pinion	0.4 mile	=	2,000
Sierra	0.1	=	500
Ponderosa	0.2	=	1,000
2. Lupine			
Conifer	0.5	=	2,500
Cedrus			
Deodar			
3. Sacatar Trail	0.6	=	3,000
Silver Spur	0.3	=	1,500
Long Canyon	1.0	=	5,000
Sacatar Ranch	1.2	=	6,000
Boggy Meadows	0.2	=	1,000
SUBTOTAL FOR # 1-4			33,500
Kennedy Meadows Road		=	25,000
		TOTAL	$58,000

Additional protection should be considered by individual property owners as follows:

- For additional protection, an additional 40 feet on the south and west sides of these road-ways could have fuel modification, thinning and pruning of ladder fuels. Fuel modification involves removal of over 50% of the brush vegetation and pruning of Pinyon pines up to 6 to 10 feet or 1/3 of their crown on shorter trees.

- On properties with moderate to heavy pine cover, owners should prune the lower branches of Pinyon trees (ladder fuels) at least 20 feet on main roads that are adjacent to their properties and do the same treatment on access roads and driveways.

3. Create two fire breaks/safety zones in the Rabbit brush/sage fuel type: (see Map #2)

a) In the main north/south valley along Kennedy Meadows Road, about 1500 feet north of the intersection of KM Road and Sacatar Ranch Road. This break would extend from the tree line in the east to the Manter burn in the west. Total length of the break would about 2000 feet or 2 acres.

b) In the east/west valley along Sacatar Ranch Road at approximately Silver Spur Road. This break would extend approximately 1500 feet or 1 ½ acre.

c) These breaks should be at least 40 feet wide and meander through the brush, not in straight lines. This effect will give a more natural appearance and may discourage ATVs from using the breaks as travel ways.

The main Kennedy Meadows valley should be the highest priority. This clearing can be accomplished by either or both of the following methods:

- Break up the RB/Sage vegetation type in KM with a masticator or brush hog. Thirty to 40 foot lanes should be cut in an east/west direction, not in straight lines, clear across the valley. These paths would create safety zones for firefighters for a fire coming from the southwest. Lanes would need to be retreated every 5 to 7 years.

- Use prescribed fire to create fuel breaks across the valleys. Using a tractor to crush the brush in narrow parallel lines approximately 40 feet apart, burning out the center when the prescription for Rabbit brush/sage is in "window".

This treatment will also provide wildlife habitat improvement for some species and increased water retention through improved snow collection. Invasion of cheatgrass *(Bromus tectorum)* into these disturbed areas should not be a problem since the low precipitation in this area limits the growth of this species to sparse individual stems (it has not significantly invaded the Manter burn area).

4. Annual property clearance inspections as required by California Public Resources Code 4291 (**Appendix I**) need to be done every year in late spring or early summer. BLM is responsible for this activity however inspections have not been done for several years. In the past BLM has sent a letter (May each year) to property owners advising of the need for weed and brush clearance. Either BLM needs to commit to this activity or they need to contract for inspections. Getting BLM fire crews into the community would increase their visibility and help spread the fire prevention message. As an alternative, KRVFSC might try to get a grant for this activity and use the contractor for Kennedy Meadows and for other mountain communities that also need inspections. (**Appendix II**, CDF inspection form LE – 100)

5. BLM, Tulare County Fire, the local Volunteers and the Forest Service should jointly create a "Pre-Attack/Structural Protection Plan" for KM properties. This plan should clearly state priorities for structural protection, travel routes, potential back-firing locations, staging areas, evacuation zones, deployment of fire protection resources, location of water sources, and much more. The last known Structure Protection Plan for Kennedy Meadows was written by the Sequoia National Forest, updated on July 25, 2000. This plan was updated in response to the approaching Manter Fire. Much has changed since that time. Many of the elements of the Pre-Attack plan are contained in the CWPP, including a delineation of protection groups (see **Structural Protection Groups** section of this report); however the actual plan needs to be created by the fire protection agencies, including the local volunteer department. It is their action plan for deployment of resources and these agencies must have ownership of any plan created. The plan should be up-dated annually as available resources change and the community develops. The plan should be circulated within the community so that property owners know what to expect when an emergency occurs.

6 (a). Chipper days should be sponsored each spring to dispose of vegetation removed for defensible space purposes. Currently brush and pruning material either remains on site or is piled and burned by the owner or is taken to the trash disposal site. The community may request the use of a BLM chipper for a community clean-up day (days) or they may request a grant to obtain a chipper for their community. A chipper was obtained for the Kern River Valley Community with a BLM grant and is maintained by Kern County Fire. Perhaps Kern County could loan the chipper to KM. Insurance and training would be needed. Using the local Volunteer Fire Department might provide this service.

6 (b). An alternative to a chipper would be to create a common burn pile site in the valley. This could be a large cleared area where residents could bring material throughout the year. The piles could be burned by the Volunteer Fire Department or BLM crews under safe conditions. The old land-fill site west of the county fire station might be an ideal site (if the site conditions are suitable). Air quality issues for burning need to be addressed. Kennedy Meadows is not restricted by the San Joaquin Valley Air Pollution Control District rules but may have an impact on the China Lake military facility.

7. BLM should install at least one Remote Automated Weather Station (RAWS) that would collect temperature, humidity, wind speed/direction and precipitation (some also collect fuel moisture). Weather information could be transmitted to BLM and the Forest Service. More precise fire predictions could be made for the valley with this information; posted information signs could indicate fire danger daily to residents and the public.

8. KMPOA should install a 1610 AM low wattage "Information Radio Station" to inform residents and recreation visitors of current fire conditions. This station

could also contain other information on activities in the valley. The station could be located at the General Store and operate during the daylight hours. Many resorts, National Parks, Cal Trans and airports use these stations to dispense information. This communication tool would be invaluable in the event of a fire. Tulare County Fire should be able to cover the cost of this facility. Systems can be operated on regular electrical current or with solar power and costs start at about $10,000. Information is located at www.theradiosource.com and in **Appendix III.**

9. A major effort should be undertaken to post address numbers on all properties that have structures. These addresses should be clearly visible from the main, non-gated roads and should be the required 4 inch reflective numbers. (Current law requires 4 inch reflective numbers).

10. Informational signs should be posted at both ends of the valley on the Kennedy Meadows Road. Signs should describe the Manter fire and carry a prevention message. They could also display daily fire hazard if the information was available from BLM.

11 (a). KMPOA should develop a homeowner's guide for Kennedy Meadows property owners that specifies fire safe measures specific to KM. The guide could be developed from the measures contained in the report section **"Protect Your Property"** and include structural and vegetation recommendations. Additional information could be provided on evacuation procedures, escape routes, safety zones, and how to handle domestic animals.

11 (b). Kennedy Meadows Property Owners Association should develop a plan to contact all owners with substandard roofing, flammable siding, unsafe decks, excessive flammable yard trash, and other deficiencies noted on the evaluation forms. Owners should be encouraged to upgrade their properties not only for their own protection but also for the protection of their neighbors. A volunteer group could be organized to assist owners unable to perform the work and devote one weekend day a month to this effort. KMPOA currently sponsors a road clean-up day during the Memorial Day week-end. This could be an expansion of that effort.

12. An area for the care and control of domestic animals during an emergency should be designated. This area should contain appropriate cages and corrals for animals in the valley. The most likely location might be on a ranch willing to donate the use of existing facilities and have adequate water. During the Manter Fire some domestic animals were removed to Ridgecrest. This is a viable alternative but may be too far removed for most emergencies.

13. Several demonstration properties should be established as examples of fire safe building materials and good defensible space practices. Information specific

to practices for Kennedy Meadows should be developed for each demonstration site. These properties should have good public access.

14. Additional water sources; (currently four, 2500 gallon tanks) 4 to 8,000 gallons should be installed, along the major intersections. Metal helicopter dip tanks should be installed adjacent to the water tanks that are located in helicopter accessible areas. The first four tanks were purchased by KMPOA using reserve funds saved over several years and installed by KMPOA and fire department volunteers. The tanks have been legally donated to Tulare County.

15. A reverse 911 telephone notification system should be created that will ring all phones in the valley in the event of a wildland fire. Ducor Telephone Company would need to determine if such a system is compatible with their equipment. They would also have information on the type of systems that are available and cost involved. An excellent explanation on these systems is contained in the "Alta Sierra Community Fire Safe Plan", 2004, on pages 184-185.

16. The Kennedy Meadows Fire Station (County/BLM facility) should be up-graded to current health and safety code standards for the following uses:

a) Create a central evacuation center at the KM Fire Station. The old landfill site could be used as a large parking area. This area is currently fire safe because of the proximity of the Manter Fire. New brush regrowth would need to be cleared every few years. The current fire station water system could be upgraded to drinking water standards. The community should request that Tulare County place a medical disaster stockpile at station.

b) Station one of the two BLM crews at the County/BLM fire station during the day on weekends and major holiday periods. This is a good contact point for BLM since almost all residents (full time and vacationers) travel to the fire station disposal site on weekends. BLM presence in the valley would be greatly enhanced since the current station at Chimney Peak is off the main road and few residents have a need to visit the facility.

c) An alternative would be to staff the facility on summer weekends and during the three major holiday periods (Memorial Day, July 4th, and Labor Day) with volunteers; however the staff person should be qualified to operate the engine and should have basic First Aid training.

17. Rural Fire Assistance (RFA) grants to communities are available for various materials such as radios and maybe surplus Personal Protection equipment (PPE). RFA grants have provided some materials and the community should continue trying for new grants. The low wattage radio station and a chipper might qualify for an RFA grant.

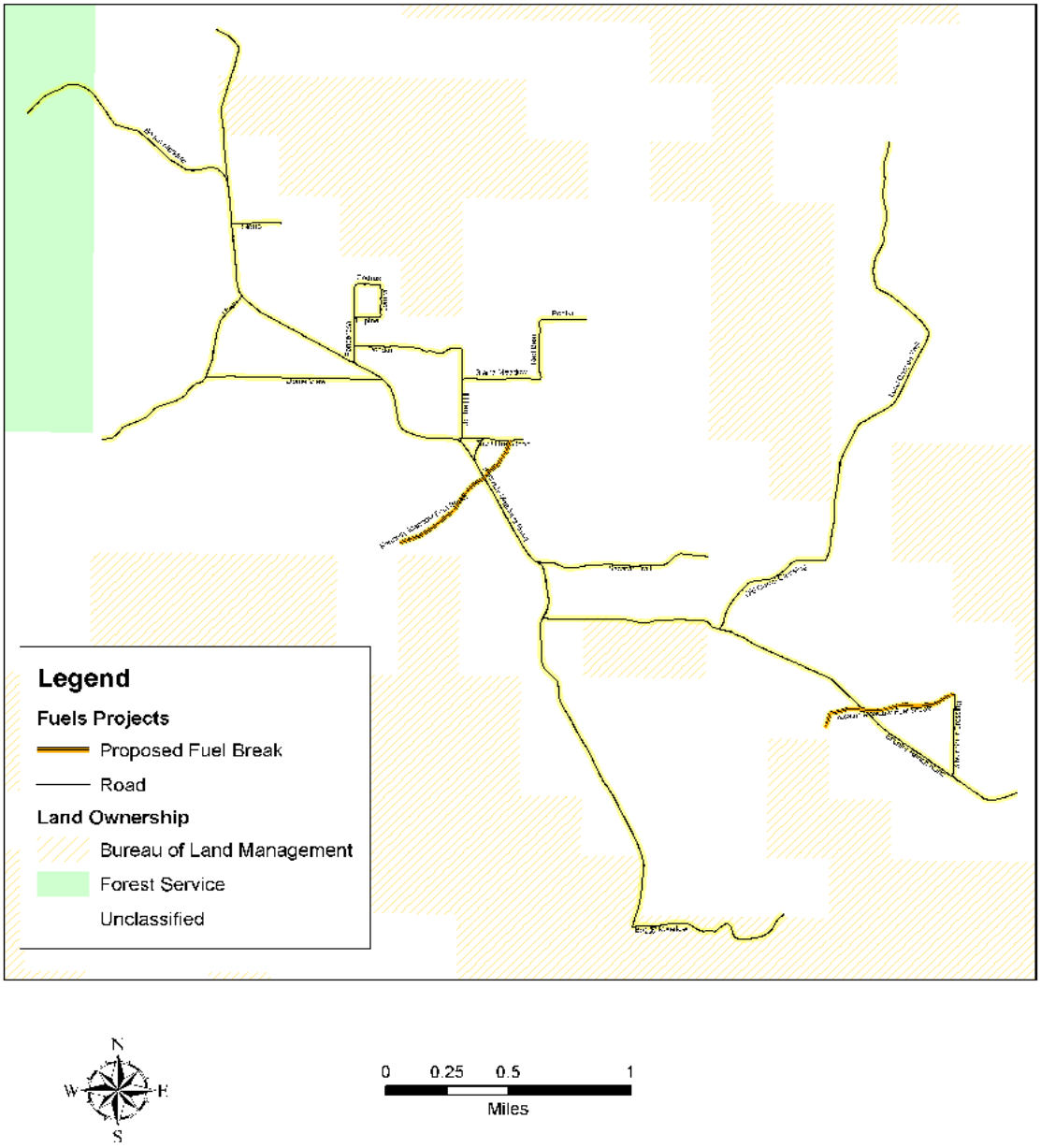
18. Residents should be encouraged to build water pump wagons (trailers). Five wagons are currently in the valley; owned by Williams, Sizemore, Lynton, Foster and Ducor Telephone Company. The wagons are 300 to 500 gallons with a pump and fire hose. Jerry Williams wagon was used recently on an escape burn pile. Two or three additional wagons scattered throughout the valley could be available to any resident with a vehicle capable of pulling the weight. Training on the use of the wagons could be done at POA meetings or at Volunteer Fire Training sessions.

19. The volunteer fire department should be expanded to 20 members. The Volunteer Fire Department should encourage the recruitment of new members, welcome them, and provide them with the training they need to become fully effective. The majority of these new members should be permanent residents. At least 3 to 5 should be qualified to operate the County engine. All volunteer meetings should be announced and open to the public, as space permits. Some community members who would not otherwise be qualified to be official volunteers might be interested in the volunteer's activities and might enjoy observing training exercises. This provides information to community members and expands the fire prevention message.

20. Fire risk is low in the Manter Fire area. Plans should be developed by BLM to maintain low fuel levels. Buffers along the Kennedy Meadows Road should be maintained by mechanical or herbicide treatment. Strategic areas along ridge lines should be burned periodically. Old dozer lines and fire breaks should be maintained where regulations allow (outside Wilderness Areas). Maintenance of low fuel areas in the burn would be relatively inexpensive for the next few years.

21. The Forest Service needs to fill their approved Campground Host position at the Kennedy Meadows campground. This person could help ensure that fires in the facility are safe. This is most critical in the Fire Safe areas along the river.

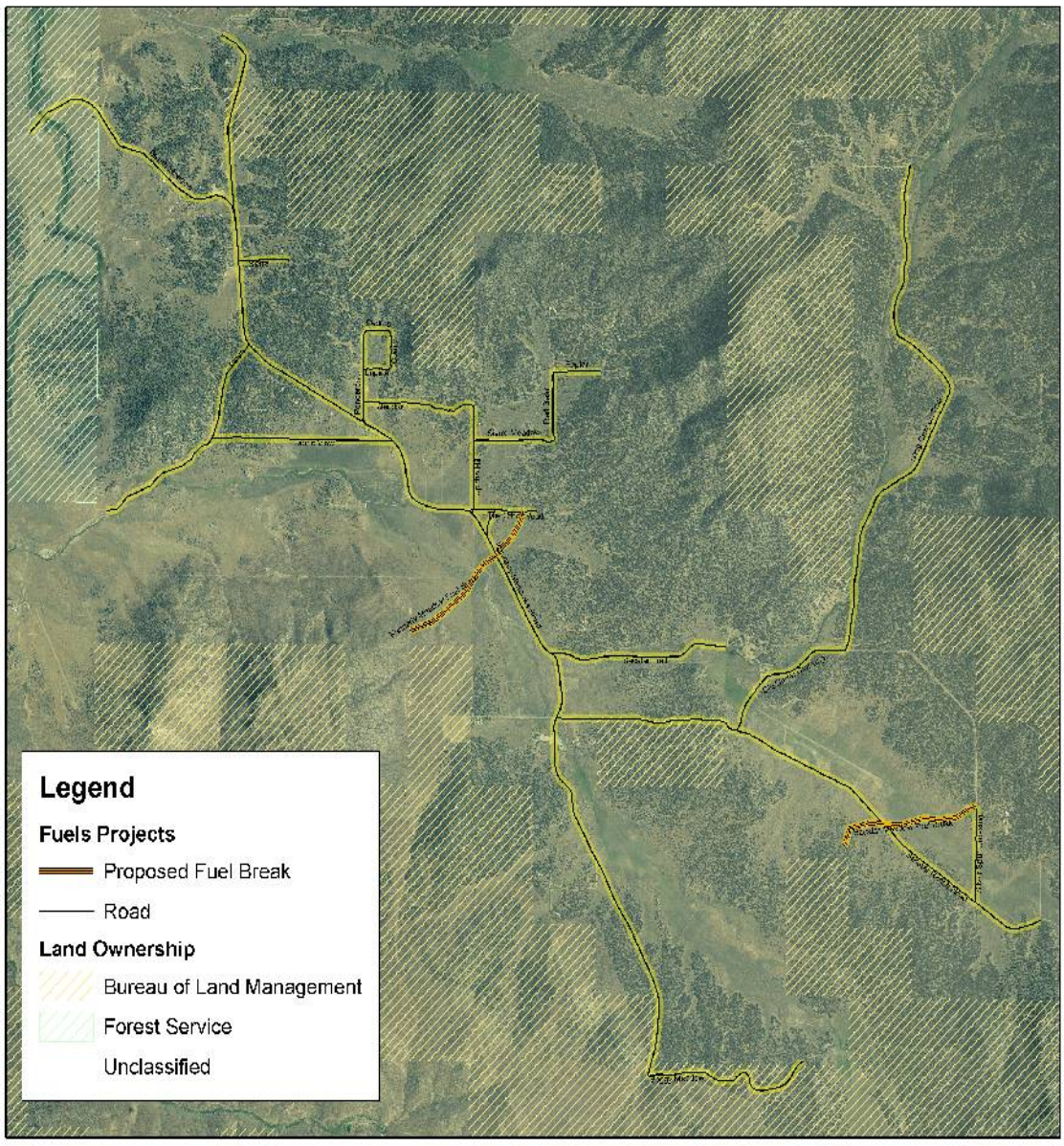
Kennedy Meadows
Proposed Fuels Projects - 2006



MAP 2

Roads shown are the proposed road clearing projects in **Recommendation 2**

Kennedy Meadows
Proposed Fuels Projects - 2006



MAP 3

FIELD ACTIVITIES

The project started with a pre-meeting in the community. This visit included Ken Delfino, contractor; Rich Olsen, grant coordinator for KRVFSC; Ed Royce, president of the KMPOA; and Jerry Williams, resident. During this meeting issues important to the community were expressed and valuable information was exchanged. Edward Royce issued a letter to all residents on April 20, 2006 announcing the project, naming the contractor and outlining the contractor's activities (**Appendix IV**). Owners were informed that "Fire Safe" evaluations were proposed for improved properties and advised that owners could opt out of these inspections. Ultimately six owners denied access. Ed also announced that the contractor would provide an overview of the project and take questions at the annual POA meeting on May 28.

The Bureau of Land Management (BLM) has primary responsibility for wildland fire protection in Kennedy Meadows. A meeting was held on April 26, 2006 with Kevin Chambers, Debbie Santiago and Ruth Ellison at the Bakersfield office. BLM provided assistance with aerial photo coverage, fire history, fire pre-attack planning, and archaeological information.

California Department of Forestry and Fire Protection (CDF) Battalion Chief Phil Brown is the State/County representative for Eastern Tulare County. During a May 12, 2006 meeting, Chief Brown provided valuable information regarding the county responsibility for structural fire protection for the Kennedy Meadows community. The county is responsible for fire protection building codes, road requirements and clearance requirements for rural areas (based on PRC 4291). County assessor information was obtained from the CDF/County headquarters in Visalia on June 15.

This contractor went to Kennedy Meadows on May 26 – 28. During this visit fuel plots were installed in various locations within the project area. A presentation on the project was made at the Kennedy Meadows Property Owners Association general meeting on May 28. A number of residents expressed their concerns and support during this session.

Kennedy Meadows POA meeting, May 28, 2006

Scott Williams, Fire Management Officer on the Kern River Ranger District of the Sequoia National Forest provided valuable information during a June 26 meeting.

A second visit to Kennedy Meadows occurred on June 26 – 30. During this visit several additional fuel plots were installed. A number of Pinyon stumps were examined to determine their age. This is basic information needed to determine fire frequency and recovery rates after catastrophic fire. Three days were spent with Jerry Williams and Ed Royce inspecting properties. Sixty two residential properties were inspected with a focus on construction and clearance.

A final visit occurred on July 27 – 31. Properties were evaluated in the south end of the project area. Fifty-five properties were evaluated between July 27 and July 31. Larry Watson was the escort on July 29, and Ed Royce assisted on July 30.

One-hundred seventy-four properties were identified with addresses by the county (one property on the list was outside the project area and two were duplicates). These were properties that have improvements recognized by the county tax assessor. An additional 9 properties were located and evaluated that were either new construction or not identified on the county list. One-hundred and seventeen were evaluated during June and July. Individual property evaluations have been provided to the KMPOA and will be distributed to owners upon request. A summary and analysis of all properties is located in the section titled "**Community-wide Evaluation of Hazards and Construction**".

Dr Chris Dicus visited the project on July 28. The purpose of his tour was to view the project and fuel types. Dr. Dicus created the "**Fuel Ignition Model**" section of this report.

ANALYSIS

Fire Safe Knowledge and Support in the Community

The proposal submitted for this project included a survey of community attitudes and knowledge of fire safe principles and knowledge. After reviewing surveys conducted by the contractor in the *Alta Sierra Community Fire Safe Plan,* a different approach was selected.

This project included considerable time in the field with the contractor and an owner escort during the property evaluation phase. This activity provided invaluable access to owners involved with living and working on their properties and provided information on the knowledge and attitudes of the community. There is no substitute for one-on-one interviews with owners.

During the course of the property evaluation phase of this project, 70% of the full-time residents and 30% of the part-time residents were contacted and interviewed (52 owners) either during the property inspection, at the fire station or in other situations. Owners were asked if they had an understanding of defensible space and fire safe construction. Observations were made of the condition of properties and assumptions were made about the owners concern. These discussions and observations provided a good overview on the attitudes

and knowledge of the Kennedy Meadows community on fire safety relating to their properties.

A few owners had extensive experience living in a fire hazardous area and were well aware of the precautions needed to protect their property. Other owners had little knowledge but were eager to learn and wanted information. Only two owners were encountered that expressed that they did not care or were unwilling to do those things that might protect there dwellings (they liked the natural look of the vegetation next to their house).

Responses to discussions and observations varied and for the purpose of this analysis are grouped into “good”, “moderate”, and “poor”. “Good” indicates that the owner fully understood the issue where “poor” indicated the respondent had little knowledge or little interest. Not all owners visited provided information to all issues. Only those issues that pertained to their unique situation are summarized. The following information was gained from those owners visited:

Structure	**GOOD**	**MODERATE**	**POOR**
Roof Material	48%	41%	11%
Siding	32%	45%	23%
Deck	24%	33%	44%
Chimney	50%	30%	20%
Posted Address	23%	42%	35%
Driveway access	25%	45%	30%
Firewood Stacks	20%	52%	28%
Defensible Space	48%	52%	0
Out Buildings	42%	42%	16%
Water Storage (Hydrants)	47%	40%	13%
Fire Service Availability	52%	48%	0

OBSERVATIONS

Roof Material: Few respondents understood the technical requirements of a "Class A" roof. Most structures had either metal or composition shingle roof materials. Most knew that the roof needed to be kept free of pine needles and leaves; however some had not preformed this task. Those with poor knowledge did not feel that the structure roof was that important for fire protection purposes.

Siding: Most structures had plywood siding in relatively good condition. They indicated that siding maintenance was more a matter of appearance rather than for fire safety. Few understood the relationship of siding flammability and distance from flammable vegetation. Those with log homes understood that this was a good fire safe material. Few understood the relationship of windows and radiant heat passing to furnishings inside the structure.

Deck: Decks exhibited the most lack of knowledge. Few understood that flammable material (old lumber, firewood) under decks was a danger and that patio furniture posed a threat. Fully sheeting low decks was not a high priority (lattice covering does not help) and few realized the protection provided by full sheeting.

Chimney: Most knew that tree branches should be kept away from chimney stacks. A minority of respondents understood the concept of creosote build-up in flues.

Posted Address: Few residents gave much thought to posted addresses. Most thought that local firefighters could easily find their homes. They did not project to the condition that firefighters from out-of-the area would use street signs and addresses to locate homes, especially those well off the main roads.

Driveway Access: Most properties had good access, although many did not connect this with a large fire engine coming to their property. Owners are familiar with the "Type 3" engines used by the Forest Service and BLM and don't understand that larger municipal engines might be called to protect structures

during a major fire. The few properties with poor access (steep and/or narrow) had other issues such as the expense of improving access or the environmental damage that might occur. Low quality bridges are not an issue; there are none.

Firewood Stacks: Wood is used to heat structures during all seasons at this elevation. Nights can get cold, even in the summer. Most owners want their wood stacks close, even on the deck (or under the deck). They were somewhat surprised to find that this is a dangerous practice.

Defensible Space: Almost all residents understood the concept of defensible space and most owners had made some effort to clear flammable vegetation.

Out Buildings: Most owners expressed little concern over their out buildings.

Water Storage: Water storage is considered a domestic supply issue by many owners. Over half the owners felt that fire engines carry their own water so that was not property issue. The lack of fire fighting hydrants indicates that this is a low priority.

Fire Service Availability: There was a high level of knowledge about who protected the area. Most residents realize that there may not be fire fighting resources during the early stages of a wildland fire in Kennedy Meadows.

Full-time versus Seasonal Residents

A property owner's decision to perform fire safe activities is influenced by a number of factors. These factors include, but are not limited to, value of property, location of property (in relation to fire risk), wealth of owner, physical ability of owner, perception of the fire risk, and the amount of aesthetic disturbance the owner is willing to sacrifice. Another important factor is peer pressure. One owner's lack of enthusiasm to perform fire safe activities may, and usually does, affect their neighbors, especially in a community like Kennedy Meadows. A house or trailer fire during an extreme fire weather event could spread and destroy the properties of owners miles away.

A recent community study in another state evaluated 12 fire safe activities including clearing, landscaping and construction and found a significant difference in attitudes between full-time and seasonal residents. Full-time owners were significantly more likely to believe and undertake fire safe activities. Their motivation was based on having a more safe fire condition, create a better looking neighborhood, and improve the value of their property. Full-timers expressed more sensitivity toward their condition since, for many, these homes were their only residences and if they were lost; they would have no place else to go. Part-timers were more likely to believe that performing these activities would require too much effort and expense and require removing vegetation that they prize. Part-timers had limited time to spend on their properties and valued the leisure activities over the labor required to accomplish fire safe conditions. In addition, these owners had one or more other homes and the loss of the vacation home, although devastating, was not the end-of-the-world. This study demonstrates that a person's attitude toward doing a task is the most important factor influencing the fire safe nature of the community (Bright and Randall, 2006)

This study is important to the Kennedy Meadows CWPP since approximately 75 percent of the properties in the study area are part-time residents.

Wildland Fire Fundamentals

A wildland fire is functionally the same as any fire in its chemical and physical properties. Fire needs three components in order for combustion to occur (Fire Triangle). It must have **HEAT**, **FUEL** and **OXYGEN**. Oxygen in the air can only be controlled by smothering (covering with dirt) or replacing the air with steam or an inert gas (CO_2). Wildland firefighting involves attacking the heat and/or the fuel side of the triangle.

Fuel is the vegetation, structures, vehicles and any other flammable material in the environment. Cutting fire breaks or dozer lines and backfiring remove fuel from the fire and assist in extinguishment. Fire Prevention techniques such as cutting fire breaks, creating Defensible Space Zones and using “Prescribed Fire” (Rx fire) can greatly assist firefighters when a fire occurs.

Heat is provided by lightning or some human cause, either accidental or intentional. Heat is transferred by conduction, convection and radiation. Conduction is the transfer on movement of molecules through a solid object and is not very important in wildland fire because forest fuels are poor conductors of heat. Convection is the movement of a heated air mass. Heated air rises and preheats fuels bringing them nearer to the point of ignition. On a slope, heated air moves up slope and is brought in contact with vegetation or structures by wind drafts that tend to hug the slope. As heated air rises, cooler air is drawn into the base of the fire providing fresh oxygen and added wind. Radiation refers to rays or waves of heat that move through the air and heat surfaces even in the absence of warm air (like the rays of the sun heating the earth). These rays can pass through transparent objects such as glass and ignite objects on the other side. Radiant heat can also ignite vegetation, decks and wood siding if the temperature reached the ignition point (about 500 degrees). Water, retardant, throwing soil or other methods can remove heat from a fire and assist in putting the fire out.

FIRE BEHAVIOR

A wildland fire environment has a triangle composed of **FUEL, TOPOGRAPHY** and **WEATHER.** These three elements constitute the science of **Fire Behavior** which is extremely important in the study of wildland firefighting.

Fuels found in Kennedy Meadows are discussed in detail in the section on the "**Fire Environment of Kennedy Meadows".**

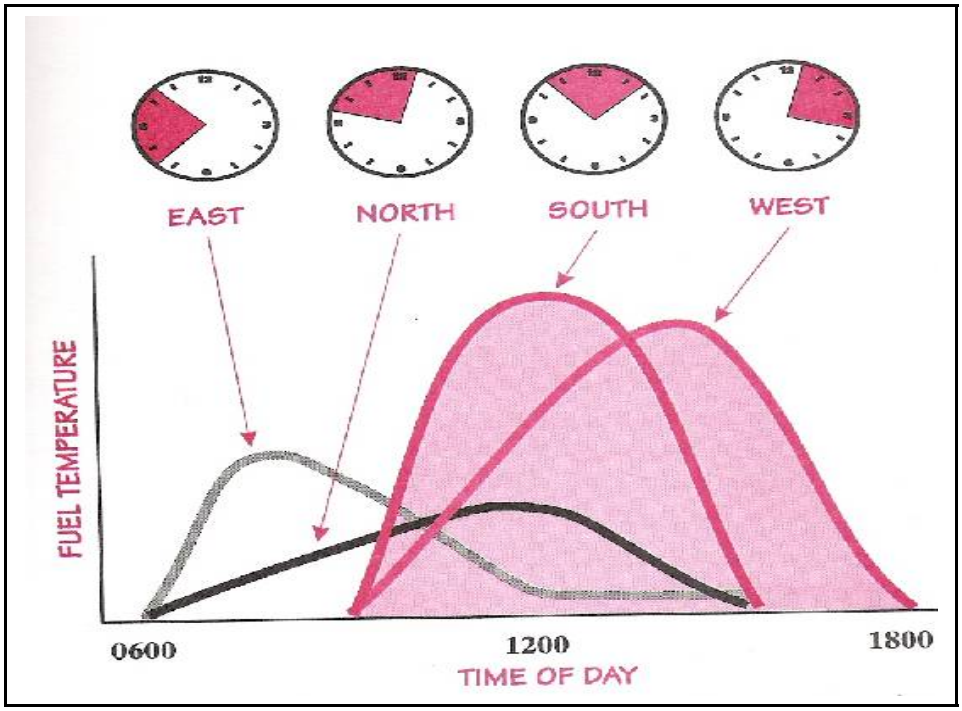
TOPOGRAPHY

Topography or "lay of the land" includes slope, aspect, elevation, canyons, saddles, ridges and all the geographic features. Topography changes slowly over time as mountains erode or grow, streams down-cut and valleys form, however some changes can happen quickly as during a volcanic eruption, earthquake or landslides. Landowners should consider topography when making building decisions. Roads located on steep slopes will be more difficult to maintain and may present a problem for firefighting vehicles. Structures should not be located in chimneys or on the edge of steep slopes. Firefighters cannot affect topography but must be acutely aware of the effect of topography on fire behavior.

Aspect

Aspect is the direction that the slope faces. This is an important factor when considering fire behavior. Aspect affects the spread of a fire in several ways. Vegetation growth is dependent on the amount of moisture and solar radiation received. Vegetation in the project area is more dependent on adequate moisture because of the influence of the dry desert climate. Fuels on north slopes are generally heavier in tons per acre but retain moisture longer seasonally and diurnally. Fuels on south-facing slopes have less volume per acre because moisture evaporates more quickly and are exposed to longer thermal heating by the sun, temperatures are higher and humidity is lower. Fuels are warmer and dryer during critical burning periods (afternoon). The following

chart indicates an important fire behavior feature -- fuel temperature rises during the day depending on aspect:



(Teie, 2001)

Slope

Slope affects a fire in two ways: by preheating fuels and structures as it moves up-hill and by creating a draft as heat rises. Fires spread significantly faster up-slope. Flames are closer to exposed fuel on the up-slope side of an approaching fire, depending on the direction of wind. Fuel is pre-heated and ignites quickly, increasing flame lengths and faster ignition. Fires create their own wind when spreading up-slope because of the physical phenomena of heat rising. Fire spread - slope effect is slight on slopes up to 5%, effective rate of fire spread is increased by a factor of X2 on slopes up to 30%, effective rate of spread doubles again when slopes reach 55%.

Slope has an effect on down-hill spreading fires because of gravity. Fires burn down-hill by spreading burning material such as pine cones, logs, and branches as they roll down-slope.

There is a structure in the center of the photo just below the far ridgeline. This structure is built on a point, up a steep narrow road and would be difficult to protect.

Elevation

Elevation affects fire behavior in several ways. Air moves from warmer valleys to cooler ridges during the day. Elevation affects fuel types, usually becoming lighter in higher elevations. Fire season is usually shorter in higher elevations.

Canyons, Saddles and Ridges

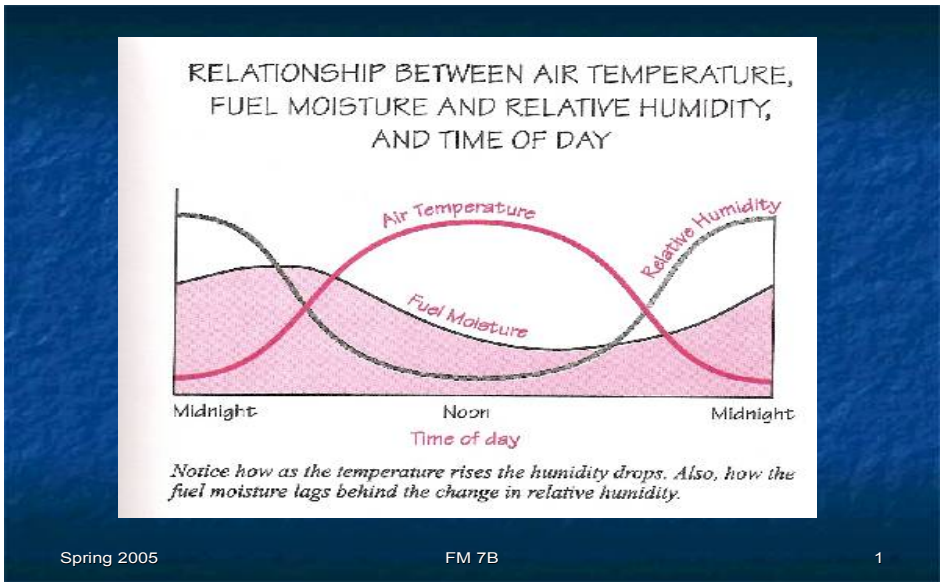
Canyons, saddles, and ridges have a direct influence on how fires burn primarily because of winds that tend to become erratic when these features are encountered. Narrow canyons channel winds and cause an increase in velocity when the canyon narrows. Wind eddies occur when canyons intersect with other features and these winds facilitate spotting by burning embers. Saddles provide a point where winds are increased during up-slope fires. Ridges divide terrain and often have different wind conditions on opposite sides although gentle rounded ridges often provide an ideal location for fire breaks. Chimneys are special features in steep, narrow draws with a saddle feature at the top. Winds can draw fire up a chimney feature just like the flue in a fireplace.

WEATHER

Weather has a significant influence on fire behavior and is a natural phenomenon that firefighters cannot influence. Weather factors that firefighters must consider and understand are temperature, wind (the least predictable factor), humidity, cloud cover and atmospheric stability. Unfortunately there is no weather station located in Kennedy Meadows so predictions of fire danger cannot be made with any accuracy.

Air temperature has a direct effect on how a fire will burn in several ways; first, high temperatures heat fuel and allow it to burn more readily; second, the warmer the air, the lower the humidity; third, warm temperatures affect firefighters ability to work. As the summer progresses, high temperatures during the day dry forest fuel and dryer fuel carries wildfire and increases the severity of fire behavior.

Relative Humidity (RH) is the amount of moisture present in the air. All air in the natural environment has some moisture ranging from dry (>10%) to wet (100%) during a rain or fog event. RH is a critical factor in wildland firefighting because it directly affects the amount of moisture of forest fuels. Dry fuels absorb moisture from high humidity air and dry air sucks moisture from wet fuels. This occurs in both live and dead vegetation although it is most critical in dead vegetation. Dryer fuels ignite more quickly and burn hotter. Fires generally burn more slowly at night when RH is higher and burn more vigorously as the day progresses.



If RH is 30% or less, fires will burn freely. When RH reaches 10%, fire danger is extreme and fire behavior will be extreme. (Teie, 2001).

FUEL

Fuel is all the vegetation, structures and other human made objects on the landscape that are flammable. Volume and condition of vegetation fuel is a critical factor in determining how fast and hot a wildland fire will burn (rate of spread and intensity). Fuels are classified several ways: as light, medium or heavy depending on the volume on the site; as ground, surface or aerial depending on their location; and as live or dead.

Fuel volume is usually measured in tons per acre. Light fuels consist of grass, dead leaves, pine needles, short brush (less than 2 feet tall) and small trees. Medium fuels are larger brush, trees up to 10-15 feet tall and down material up to about 3 inches in diameter. Heavy fuels are larger trees and down branches and logs more than 4 inches in diameter. The amount of fuel also depends on elevation and the amount of precipitation. Elevations above 6000 feet usually have lighter fuels than lower level forests. Precipitation determines how much vegetation can grow. Heavy rainfall areas have heavier vegetation than lighter rainfall areas.

Light fuels are fast burning but do not produce much heat. The small size of the stems allows fire to consume them quickly which produces a fire that is usually easier to suppress. Unfortunately fires in light flashy fuels result in many injuries because firefighters underestimate the speed and erratic nature of these fires. **Heavy fuels** are slower burning but produce more heat and longer flame lengths. They are more difficult to control because more material needs to be moved to create a fire break and more water or retardant is needed to cool the fuel. Light fuels dry more quickly during the day and gain moisture during the night if RH rises as it normally should (an exception is a condition of Santana or Mono winds that are heated by compression). Heavy fuels respond slowly to changes in humidity or precipitation. They dry slowly in the spring and early summer but the stay dry longer in the fall.

Fuel moisture in both dead and live fuels is a measure of the absolute volume of moisture in vegetation between its condition in the field and a “bone

dry" condition. This is expressed as a percentage of the weight of the bone dry condition. Vegetation is picked, weighted and heated in an oven until no more moisture can be driven off. It is re-weighted and the percentage of moisture is calculated. Dry fuel ignites more quickly and burns hotter than wet fuel.

Fuel temperature is influenced by ambient air temperature and the amount of solar radiation that reaches the fuel. Warm fuels lose more moisture and ignite more quickly. The figure under the section on **Aspect** provides information on the effect of solar radiation fuel temperature.

Fuel arrangement is the location of fuel in relation to the ground surface. **Ground fuels** are the leaves, needles, twigs, cones and short grass and weeds that are close the ground surface. This layer is usually referred to as duff or forest litter. Fire will burn slowly through this layer because it is usually closely compacted, has higher moisture content and has begun to decompose. It is easily removed for fire safe clearance and creating fire breaks.

Surface fuels consist of grass, weeds, short brush and small seedling and sapling size trees. Brush is usually less than 2 to 3 feet tall and trees are less than 5 to 7 feet tall. Fire burns quickly through this fuel arrangement because of the high ratio of surface area to exposure. Flame lengths can reach 2 to 3 times the height of the fuel and can ignite fuels higher in the tree or brush canopy. These fuels can present difficult control problems under extreme burning conditions which include moderate to high wind. Cutting fire lines through this material is moderately difficult depending on arrangement and volume.

Aerial fuels are those above the surface fuels and consist of taller brush and trees. These fuels catch fire from surface fuels (also called ladder fuels) and allow the fire to burn well above the ground. In taller timber stands these are called crown fires. Fires in aerial fuels are difficult to control because fire crews cannot attack them directly. Retardant and water drops can cool fires so that they drop back into surface fuels where they can be fought directly. Cutting fire breaks through aerial fuels is slow with hand crews because of the larger size of the material. Dozers are effective in this fuel type but there are many restrictions on their use. Fires in aerial fuels produce flame lengths that can reach over 100

feet above the forest canopy. Fires in aerial fuels produce flying embers that can spot well ahead of the main fire front.

EXTREME FIRE BEHAVIOR CONDITIONS

Extreme fire behavior conditions can occur when temperatures are high, humidity is low, winds are strong and sustained or erratic, weather is unstable, and vegetation is dry. This condition can occur in any terrain and in fuel types of moderate or heavy volume. Firefighters must be aware of conditions and be prepared to "back-off" when the following conditions occur:

- ✓ A rapid increase in fire intensity.
- ✓ High sustained rate of fire spread.
- ✓ Well-developed convection column.
- ✓ Long-distance spotting (over 600 feet).
- ✓ Fire whirlwinds or horizontal flame spread.
- ✓ Sudden calming of wind with unstable upper air conditions.
- ✓ The approach of a dry weather front. (Teie, 2001)

These conditions can occur at any time during the day or night. Extreme fire behavior occurred on the Manter Fire several times in 2000, especially as it entered Kennedy Meadows. Larry Watson reported flame lengths of 160 feet in the Pinyon pine forest in the valley.

FIRE HISTORY

A number of old fire scars are visible in the mountains surrounding the project area. Pinyon pine is slow to reforest naturally after a fire, especially if the fire acreage was large. Pinyon seeds are large and they are also a highly prized food source for most forest creatures, including humans. When the seeds are released from their cones they fall directly to the ground because of their size and weight. The only method of seed spread is by being carried by animals and dropped or buried, undamaged in a suitable spot. Consequently reintroduction of Pinyon into a burn area, without human assistance, might take hundreds of years. Old fire scars were observed that were devoid of Pinyon, surrounded by healthy forest. It is impossible to determine when these fires occurred. Upon

close examination no charred remnants of trees or brush are evident so the fires could have occurred 50 to several hundred years ago. Of the scars observed, all were small, less than 50 acres and were probably the result of lightning activity. Since they occurred before recorded history, they obviously self-extinguished. The lack of old large fire scars indicates that extensive fires such as the Manter and McNally that burn under extreme fire behavior conditions and cover thousands of acres are probably rare.

The last structure fire (mobile home) was in 1992. A fire at the Messic ranch occurred in 1991 or 1992. It destroyed several structures and 40 acres (Watson, Larry. 2006).

Old fire scar in Kennedy Meadows, no record of a fire in this location in historic times.

Manter Fire (see Map 11)

The Manter fire was discovered on July 22, 2000 at 7:30 in the morning in Manter Meadow, approximately 8 miles southwest of Kennedy Meadows. Although no cause was determined, the origin was at a public area within a wilderness and there was no lightning activity, consequently human cause is the only alternative. Fuel types at the origin were Jeffrey Pine, Pinyon Pine, sagebrush, dry logs and forest litter. Weather during this period was warm and

dry with temperatures in the high 80s to mid 90s during the day and 50s and 60s at night. Humidity's ranged from 8 to 20% in afternoons to 20 to 40% in the morning. Afternoon winds were southwest from 10 to 20 miles per hour. Kennedy Meadows was in the fourth year of a drought and vegetation was under stress.

Burning Indices calculated by the Forest Service were extreme at this location and the fire burned equally well on all aspects in a north/northeast direction. Rates of spread reached up to 6 miles per day. Significant runs were triggered by strong evening winds from the southwest, shifting to the northwest; in other words, erratic strong winds. These winds created extreme fire behavior with spotting up to a mile ahead of the fire front (USDA Forest Service.2000).

Sixty-seven thousand of the total 74,000 acres of the fire burned in the Dome Land Wilderness. This area consists of steep rocky ridges, deep canyons and a few meadow valleys. Firefighting activity in Wilderness is restricted to non-motorized equipment and natural burn areas are pre-established where lightning fires are allowed to burn. The Manter Fire did not fall within the parameters of a wilderness natural burn and was fought from the beginning. Retardant drops in wilderness must be either water or fugitive (retardant without dye). Chainsaws, dozers and engines (lack of roads) are not allowed without permission of some higher administrative authority (Field Office Manager or State Director [BLM], Forest Supervisor or Regional Forester [Forest Service] depending on the contents of the approved Wilderness Plan).

The Manter fire hit Kennedy Meadows on July 26 and 27, 2000. Eight structures were burned, three which were living units. Three structures that should have burned were saved by firefighters cutting brush, pruning trees and tossing yard debris out of the 30 foot protection zone. The fire had 160 foot flame lengths as it entered the Meadows and temperatures were in the high 80s with 12 mph winds. The fire came over the ridge line the first day and made a major run the second day coming from the southwest. On the second day one resident (Jerry Williams) reported glowing embers striking his metal roof and rolling onto his deck, over one mile from the fire front. A wind change on the afternoon of the second day, along with the valiant efforts of firefighters and residents, stopped the fire on July 27 (Watson, Larry. 2006). Containment of the

entire fire did not occur until August 9. Within the planning area of this project, 11,150 acres were burned, 1,760 acres of this area burn was private property.

This was an early season fire and much firefighting equipment was deployed. By the time the fire hit Kennedy Meadows there were 107 engines, 49 hand crews, 24 dozers, 19 water tenders, 10 helicopters and 6 air tankers with 2200 personnel. Most of this force was in Kennedy Meadows by July 26 at a massive Incident Base located at the site of the old air strip in Sacatar Meadow.

The eastern edge Manter Fire runs along the Kennedy Meadows road for several miles and crossed the road north of Pine pass. It is visible from most properties in the main meadow area because it covers most of the higher mountains to the southwest. Most of the charred Pinyon snags adjacent to the road are still standing, with less than 20 percent down during the 2006 inspection. Many of these snags will remain standing for 10 or more years. The majority of the burned Pinyon stands will not be reforested for several hundred years. Brush is returning to the burned area. The amount of re-growth is discussed in the section on “FUELS”.

Drought continued for 2 years after the fire and bark beetles were active in killing many more Pinyon. Large patches were killed, however there is little evidence currently because many property owners removed their dead trees and the snags in the deeper woods have lost their needles and blend into the background. Four years of average to above average precipitation has helped revive the pine forest but, unfortunately increased growth of brush and weeds has increased fuel loading.

Michael Fire

This 300 acre fire burned on the eastern side of the project area north of Scodie Meadow in mid September 2003. The cause of the fire was not determined but BLM suspected that aircraft activity from China Lake was the likely cause. Firefighters quickly brought this fire under control and there was no damage to improvements.

Pinyon snags with light brush re-growth.

Long Canyon looking southwest into Kennedy Meadows. Manter Fire visible on the mountains in the background. Bark beetle snags in foreground are no longer visible.

FIRE ENVIRONMENT OF KENNEDY MEADOWS

Wildland fire environments of Kennedy Meadows have the same elements as the Fire Environment Triangle and consist of **FUEL, TOPOGRAPHY** and **WEATHER.** Topography and weather are parts of the natural environment that humans can little influence. Fuels are also part of the environment; however humans can modify this element thereby modifying their fire environment.

FUELS

Vegetation has intrinsic properties that include the structure of the plant and its chemical properties. Stems, bark, leaves and reproductive elements are all combustible. Some plants are more combustible than others. Unfortunately the most common plant communities found in the project area are highly combustible. Pinyon pine has high pitch content and produces extreme heat when burned. Mountain sage, the principle component of the brush in the project area is also highly flammable. Rabbit brush, the other major brush component is slightly less flammable but in combination with sage produces tremendous heat.

Extrinsic fuel properties include the size, arrangement, ratio of dead to live and vertical arrangement. Unfortunately, in Kennedy Meadows, Pinyon/Rabbit brush/sage all fit the highly flammable category.

Wet meadow, Boggy Meadows area

Pinyon is a relatively short tree that retains all its lower branches which make an ideal ladder fuel for a crown fire. The Rabbit brush/sage grows to 3 feet tall in thick patches. After maturing, the individual plants retain dead branches along with new growth. It is common for a healthy sage to contain 50% dead material. Rabbit brush can be up to 70% dead. When ignited, this dead material becomes explosive.

There are three major and one minor fuel types within the project area. The minor type is the wet meadow grass/sedge found in the lowest areas of Kennedy, Big Pine, and Sacatar meadows. This fuel type is not a significant fire hazard and is not extensive within the project area.

Pinyon Pine with an understory of Rabbit Brush and Mountain sage is the most common fuel type occupying about 26,000 acres of the project area. This type ranges from almost pure stands of pine with very little brush and a moderate litter layer of needles, twigs, small branches and old pine cones; to light pine with scattered brush and large patches of exposed soil. A significant amount of bark beetle activity occurred during the two years after the Manter Fire. A drought period that preceded the Manter Fire (and facilitated its extreme fire behavior) continued for two more years, 2001 and 2002. Bark beetles quickly attacked the dying trees damaged by the fire and spread to the unburned drought stressed forest. Individual trees and patches up to ½ acre in size were killed. Some snags have been removed by owners but many remain on private lands and on all federal lands. These snags have lost their needles and smaller twigs and now blend into the forest cover. Snags are a dangerous fuel for two reasons. First, if hit by lightning, they tend to catch fire more easily and, second snags ignite quickly during a going fire and are responsible for spreading burning embers more efficiently than burning green trees.

Rabbit brush/sage is the second most common fuel type (7,000 acres in the project area) ranging from full thick patches up to 3 ½ feet tall to scattered plants with bare soil between plant clusters. All these natural brush patches have a high component of dead vegetation within the live plants. It appears that the lighter patches have been grazed by cattle or horses. Although cattle do not prefer the old brush, their movement through the brush searching for patches of grass tends to break up the patches. Horses will browse the brush and after a few years of browsing and trampling, almost all the brush is gone.

The last fuel type is the more than 11,000 acres of the Manter Fire in the western portion of the project area. This area is relatively fire safe at this time because of the slow re-growth of the brush species. However within the next 10 years, this fuel type will be as hazardous as the current Rabbit brush/sage patches.

FUEL PLOTS

Seventeen fuel plots were established in the project area. Plot locations were selected to represent the various fuel types that are present in Kennedy Meadows. Plots were established in **Pinyon Pine, Burned,** and **Rabbit Brush/Sage.** Details for each plot are in **Appendix V**.

Pinyon Pine Fuel Plots

Ten plots were established in the Pinyon Pine type. Most residential structures are located in this type and the Manter Fire burned thousands of acres of Pinyon Pine in Kennedy Meadows. This fuel type accounts for 26,000 acres or 58% of the project area. A summary of the ten plots follows:

Pinyon Pine Fuel type

Plot #	Trees/acre 2-9"/9"+ dbh	Total tons/acre of vegetation	% brush on plot covering ground	%litter covering ground	%Bare ground
12	280/110	67	0	85	15
8	290/100	63	10	40	60
5	360/90	61	6	80	20
10	150/60	52	2	40	40
16	250/20	50	3	70	30
13	250/50	42	10	40	60
6	190/20	33	20	97	6
7	150/12	29	2	95	10
1	70/10	15	80	70	60
11	70/10	13	13	30	70

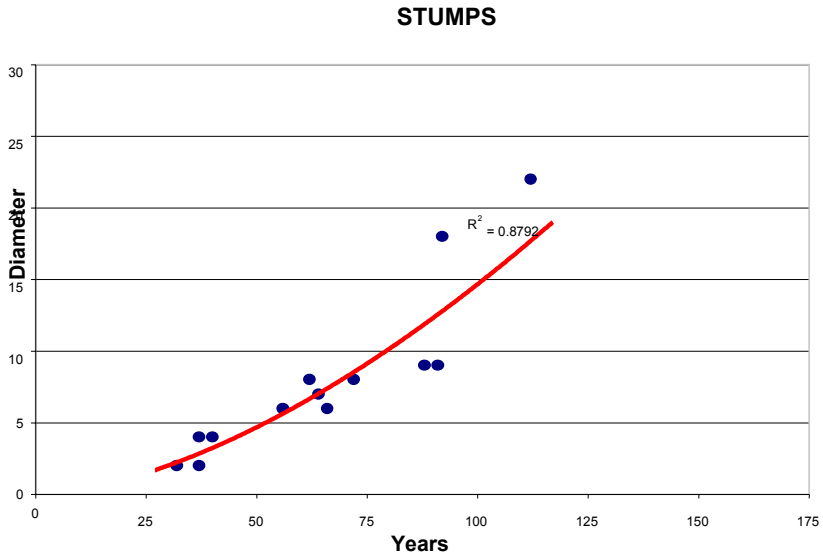
Density of Pinyon Pine stands ranged from almost 400 trees per acre in the heavy stands to less than 100 trees per acre in the light stands. Pinyon Pine forests tend to be short with stands in Kennedy Meadows ranging up to 40 feet tall for the largest trees (a few 60 foot tall trees were found on the best growing sites).

Some transition pine types had as few as 10 trees per acre up to 50 trees per acre. Most of these stands were classified as Rabbit Brush/sage fuel type rather than Pinyon Pine since the primary fuel for wildfire would be brush. Heavy pine stands tended to have little brush and the amount of brush increased as the density of the pine decreased. These trends vary depending on the aspect of the site and the amount of moisture available for plant growth. Litter covering the ground surface varied from 30% to almost 100%. There was little correlation between the density of the stand, aspect or amount of brush cover to the amount of litter covering the ground. Litter layers tended to be thin except directly under trees where the amount of cones, twigs and needles developed into a layer 2 to 4 inches deep. Bare ground ranged from 10% to 70%. Fire in the litter layer would not be a major factor moving fire through a forest.

Litter in the Pinyon forest

Pinyon pine tends to retain branches down to ground level, even on large old trees. This condition provides ladder fuels that allow fires to crown into the tree canopy. It appears that crown fires were the major factor in moving the Manter Fire through most of Kennedy Meadows.

Counting tree rings on stumps of various sizes indicates that Pinyon Pines at 6000 feet are slow growing. This condition indicates that recovery of pine after a fire will take a long time, maybe hundreds of years after large fires.



Burned Fuel Plots

Four fuel plots were established in the area of the Manter Fire of 2000. This fire consumed 11,150 acres within the project area. Three of the plots had been moderate to heavy Pinyon Pine cover; one plot had been predominately Rabbit Brush/Sage with a scattering of Pinyon Pine. Fuel plots had the following characteristics:

Burned Fuel Type

Plot #	Trees/acre 2-9”/9”+ dbh	Total tons/acre - vegetation	New growth - Brush - ground cover - %	Grass/ Forbs – ground cover - %	Bare Ground %
4	120/70	16	10	80	20
17	190/70	12	2	70	25
3	40/30	6	5	10	80
2	30/0	2	3	20	80

The heaviest burned plots have about the same volume of vegetation (tons/acre) as the lightest **Pinyon Pine plots**. Trees per acre are less on the burned plots as the smaller trees have almost disappeared. Standing snags have lost all their twigs and retain only their major branches. Needles and cones were consumed in the fire. Consequently the volume of material is drastically less after 6 years than before the fire. Down snags ranged from 10 to 20% through the burned area. Most standing snags appeared to be well anchored

and the rate of fall will be slow for the next 4 or 5 years. Most of the standing snags (2006) should be down by 2015.

Brush in the pre-fire area was completely consumed during the Manter fire. Brush root crown stobs were evident in the burn but were only a few inches high. The fire was hot enough to completely remove all brush and re-sprouting has been slow.

Brush is starting to reoccupy most sites, especially in the southwest end of the burn area. New brush growth will quickly take over the burn and occupy 80 to 100% of the area within the next 5 to 10 years, depending on the amount of precipitation.

Grass and forbs present little fire danger because of their sparse growth and low volume. Locals report that this is the first year in their memory that grass and forbs have emerged to this extent in the burn area. The last two years of above average precipitation have contributed to this abnormal growth.

Fire danger in the burn area is relatively low at this time but will increase as brush continues to re-grow.

Rabbit Brush/Sage Fuel Plots

Three plots were established in the Rabbit Brush/Sage fuel type. This type accounts for 7,000 acres or 16% of the project area. These fuel plots had the following characteristics:

Rabbit Brush/Sage Fuel type

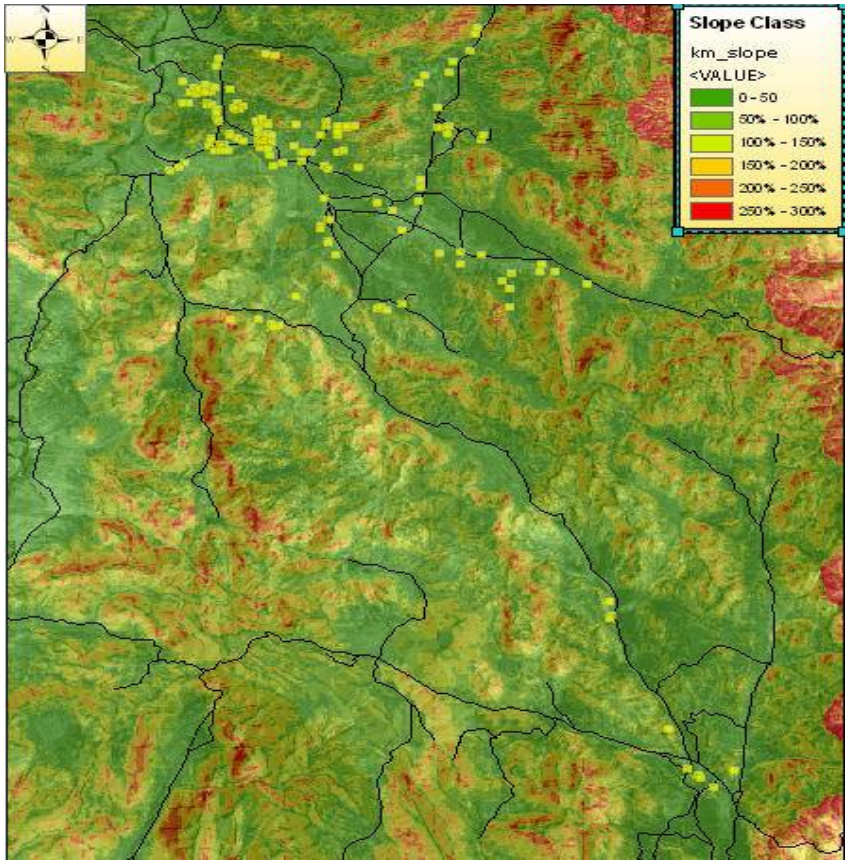
Plot #	Total tons/acre - vegetation	RB % cover	Sage % cover	Live/dead Ratio - RB	Live/dead Ratio - Sage	Bare Ground %
9	9	45	55	65	50	0
18	8	30	35	25	40	35
15	4	5	55	10	15	40

Although the total volume per acre in this fuel type is relatively low, this fuel burns hot and quickly. Plants ranged from 18 inches high up to 4 feet on the better sites. Sage has high oil content, ignites easily, and burns quickly. Rabbit

Brush burns slower and cooler than sage. The combination of the sage and Rabbit Brush, with their high ratio of surface area and abundance of dead material within the live plants, provide a highly flammable fuel bed that can produce flame lengths 2 to 3 times as high as the plants. Wind driven fires in this fuel type can advance several miles per hour. Rabbit Brush plants deteriorate and disappear quickly after death, usually after two or three years. Sage has large stems that persist after death in the dry climate of Kennedy Meadows. Skeletal sage plants were observed that had likely been dead for 10 to 15 years. Plots averaged about 5% dead plants of both species.

TOPOGRAPHY

Most of the developed properties in the project area are located on relatively flat ground with just a few structures on steeper slopes. All aspects are represented. The major valley runs about 315 degrees, northwest, that parallels the Kennedy Meadows road. Sacatar Canyon is 300 degrees, west-northwest and Long Canyon is 30 degrees, north-northeast. Elevations range from 6,000 to 7,000 feet. Implications of various topographic features are discussed in the "Wildland Fire Fundamentals" section of this report.



MAP 4 *

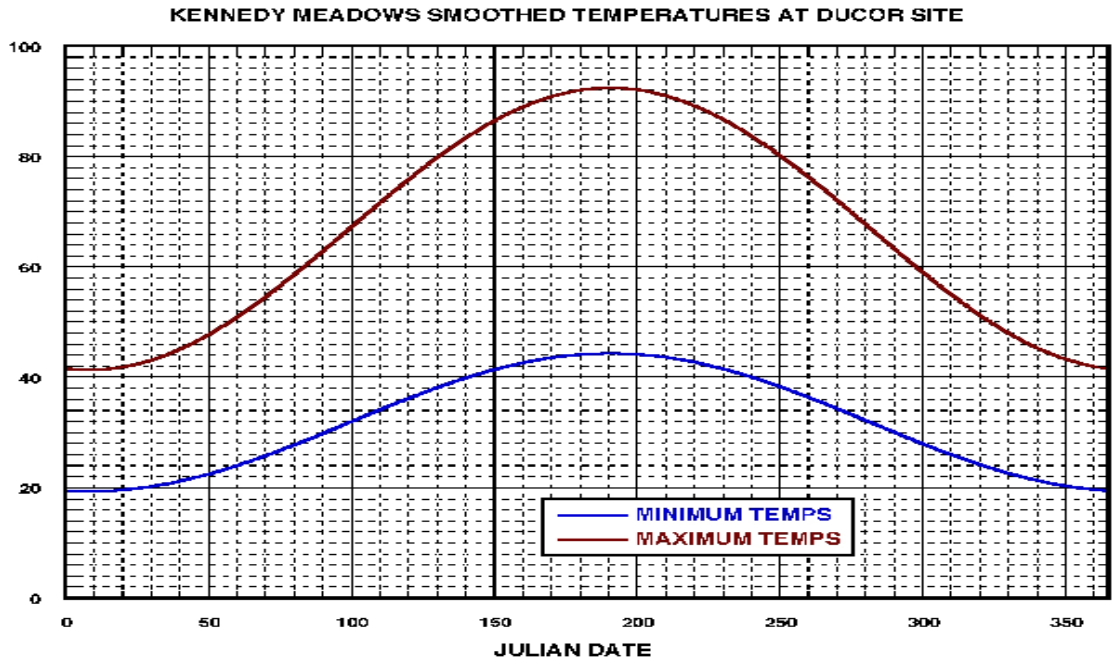
Slopes in the project area

* Some roads on map do not exist on the ground, structures are offset GIS errors.

WEATHER

There are no permanent weather stations in Kennedy Meadows. Some data is gathered by the Forest Service at Blackrock Station however this station is in a different environment and higher elevation than the project area. Weather data from the BLM station at Chimney Peak is sporadic and not reliable. This lack of information limits the extent of fire environment analysis that can be done for the project area.

Average maximum and minimum temperatures have been recorded by employees of the Ducor Telephone Company for the last several years.



High temperatures range above 85 degrees from early June through the end of August. Although no humidity data is available, it is assumed that afternoon humidity's would be low in this semi-desert environment. Wind data is lacking however locals report moderate southeast winds almost every afternoon.

The Kern Plateau is subject to frequent summer thunderstorms, often occurring without precipitation. BLM and Forest Service firefighters usually search for lighting down-strikes that are reported from the Bald Mountain Lookout.

Total precipitation information is not available. Pinyon pine requires a minimum of 5 inches per year to survive so it must be assumed that precipitation is more than 5 inches (Sudworth, 1967). The following information was obtained from the internet that describes the general condition of Kennedy Meadows:

> **Pinyon-juniper woodland** clothes the desert side of the mountains, generally the eastern slopes of north-south trending ranges and the northern slopes of east-west trending ranges, at elevations from about 5000' to 8000'-9000', extending from the Tehachapi Mountains southward and including the higher mountains of the Mojave Desert. This vegetative community is typically sandwiched between either sagebrush scrub or joshua tree woodland and yellow pine forest. Average annual precipitation is between 12" and 20", and some of that is in the form of snow, so obviously this is a much drier environment. As the name suggests, the dominant trees are *Pinus monophylla* (single-leaf pinyon pine) and *Juniperus californica* and *osteosperma* (California and Utah juniper), along

with *Quercus turbinella* (desert scrub oak), *Q. john-tuckeri* (Tucker's oak), *Q. cornelius-mulleri* (Muller's oak), *Yucca shidigera* and *baccata* (Mojave and banana yucca), *Purshia mexicana* and *tridentata* (cliff rose and bitterbrush), *Fallugia paradoxa* (apache plume), *Cercocarpus ledifolius* (curlleaf mountain mahogany), and most of the shrubs that make up sagebrush scrub which will be discussed next. (Charters, Michael, 2005)

This information suggests that Kennedy Meadows probably receives between 9 and 15 inches of precipitation per year. This low amount of moisture qualifies this area as a desert environment.

FIRE BEHAVIOR

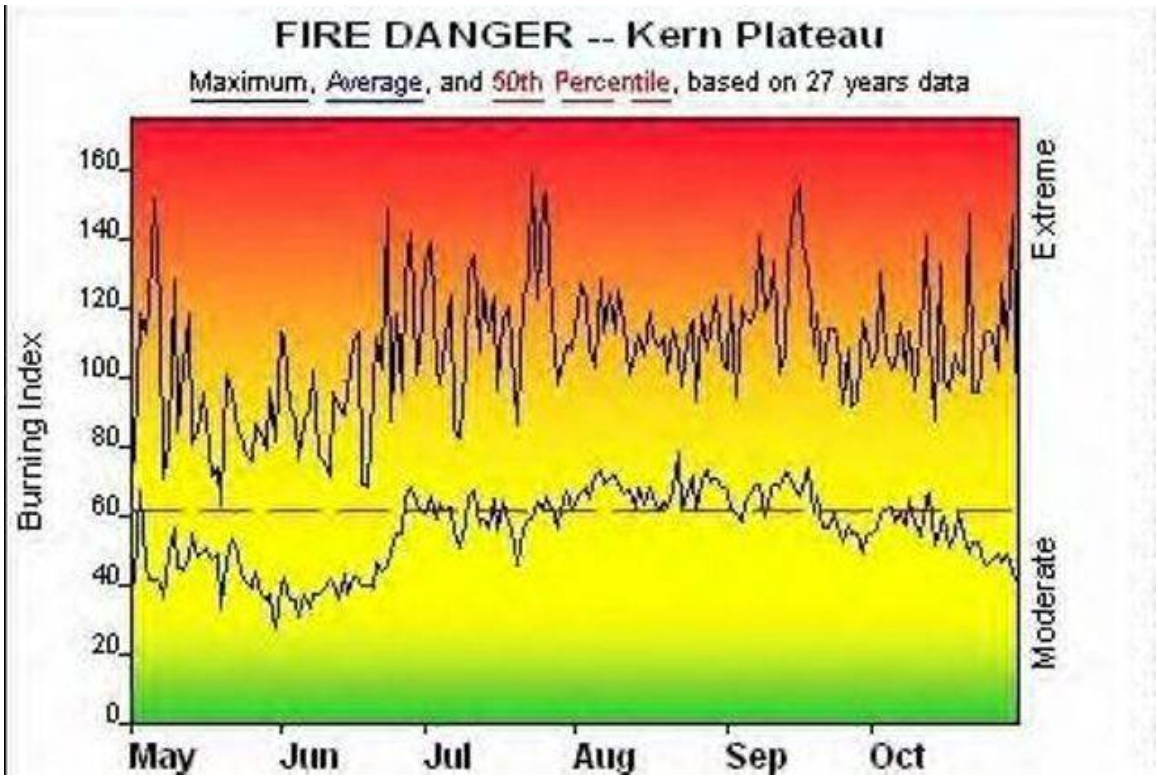
Fire season on the Kern Plateau is shorter than most other parts of Central and Southern California. It starts in early June, peaks in late July to early August and is usually ended by early September when nighttime temperatures dip into the mid to high 30s.

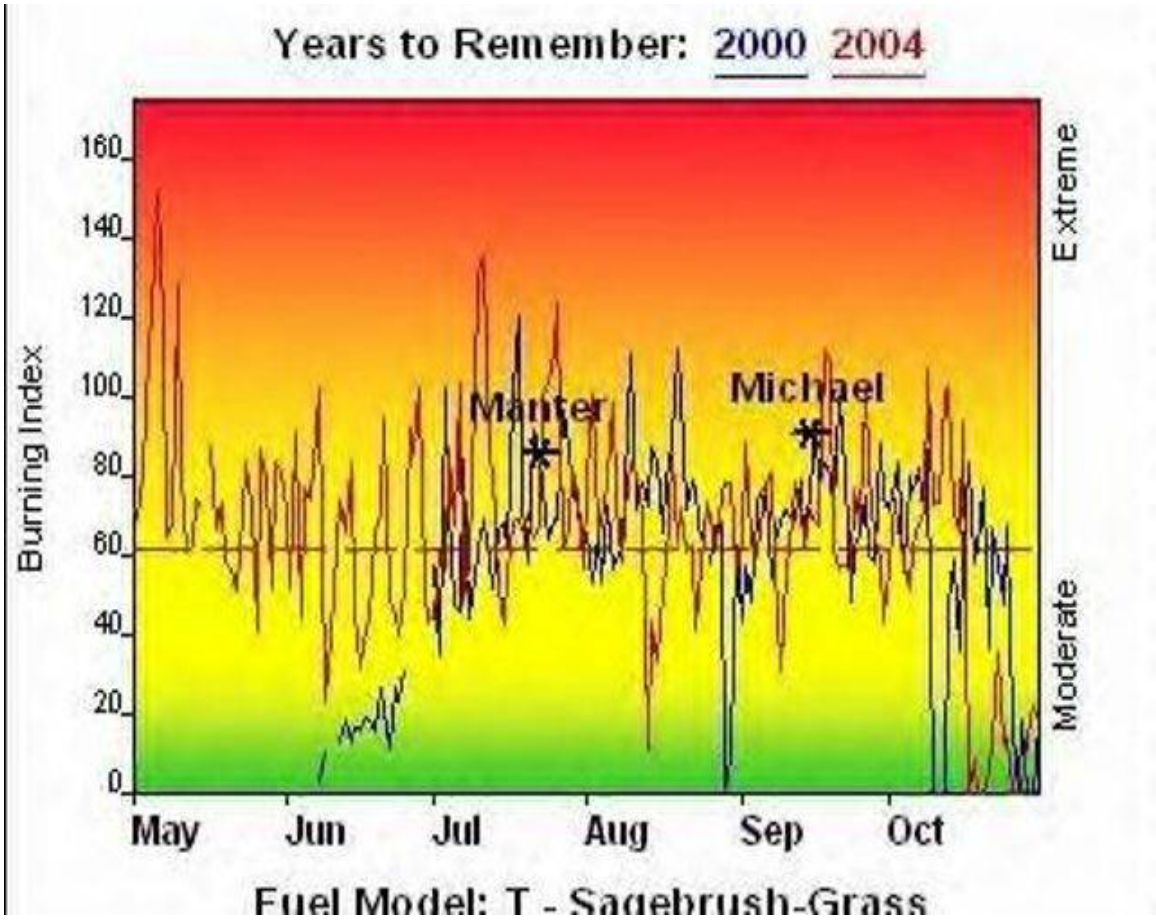
A fire danger rating known as Burning Index is used by the Forest Service and BLM. This is a prediction based on weather, fuel conditions. .

Burning Index charts (www.famweb.nwcg.gov/pocketcards/kern.html). Burning Index gives day-to-day fluctuations calculated from 2:00 p.m. which includes temperature, humidity, wind, daily temperature and humidity ranges and precipitation duration. “Fire Family Plus” analysis (the model program) shows fires start to occur when the Burning Index exceeds 60. Burning Index figures during the Manter and Michael fire exceeded 100. The Burning Index card contains the following warning:

Watch out when wind speed is over 22 mph, relative humidity is less than 18%, temperature is over 81 degrees and 10 hour fuel moisture is less than 3%. (10 hour fuels are dead twigs and branches ¼ to 1 inch in size)

The following charts are examples of conditions that apply to Kennedy Meadows


FIRE DANGER -- Kern Plateau
Maximum, Average, and 50th Percentile, based on 27 years data
Burning Index
160
140
120
100
80
60
40
20
0
May
Jun
Jul
Aug
Sep
Oct
Extreme
Moderate


Years to Remember: 2000 2004
Burning Index
160
140
120
100
80
60
40
20
0
Extreme
Moderate
Manter
Michael
May
Jun
Jul
Aug
Sep
Oct
Fuel Model: T - Sagebrush-Grass

STRUCTURE PROTECTION GROUPS

A "Pre-Attack/Structural Protection Plan" as suggested in **Recommendation #5** needs to be created for the Kennedy Meadows community. One of the first planning tasks that are integral to this plan is the geographic division of the community into structural protection groups. An attempt was made to divide the community into logical units that represent geographic areas and numbers of structures that need protection. The Kennedy Meadows community is diverse with most of the structures concentrated in a few localized areas with a sparse dispersal of structures over wide areas. Map 6 covers the entire project area; Map 5 is the north area in the most structurally dense community. The following is a description of the structural protection groups:

Protection Zone #1. Twelve homes west of KM Road on Dome View Avenue and Pinon Drive are in this unit. Most of these structures are in moderate to heavy Pinyon Pine forest fuel type. There are few addresses posted and some of the homes are located on private driveways a short distance from the main roads. These homes may be difficult to find, especially at night.

Protection Zone #2. This zone has 40 homes along KM Road north of Pinon Road including Sierra Trail, Glimpse Avenue, and Pine Mt. Trail. Also included are the roads that intersect with Beach Meadows Road; Pinon Village Road, and River View Lane. The homes along Kennedy Meadows Road and West of KM Road are in the Rabbit Brush/Sage or light Pinyon forest fuel types. The homes east of KM Road are in light to moderate Pinyon forest fuel type. Most of these structures are easily accessible from the main paved road except for a couple of homes up-hill on steep private driveways.

Protection Zone #3. Twenty-one homes in this zone are located on Long Canyon Trail and the intersecting Tubatulabal Trail, North Hills Road, BSB Road and Mahogany Trail. A few of the homes are on the fringe of the

Rabbit Brush/Sage – Pinyon forest fuel type. Homes off Long Canyon Trail are in moderate to heavy Pinyon forest fuel type. Homes in this group are widely dispersed and many are on gated private driveways.

Protection Zone #4. This zone has 57 homes, the highest concentration zone in Kennedy Meadows. These homes are located on Ponderosa Road, Main Road, Cedrus Road, Conifer Road Lupine Road, Deodar Road, Up The Hill Road, Sierra Meadows Road, Pinon Ridge Road, The Other Road, and Atamian Road. Most of the homes are adjacent to the named roads or on short driveways. Only a couple are on gated driveways or steep access roads. Structures near the flatter meadows are in Rabbit Brush/Sage fuel type. Homes in the upper areas are in light to moderate Pinyon forest.

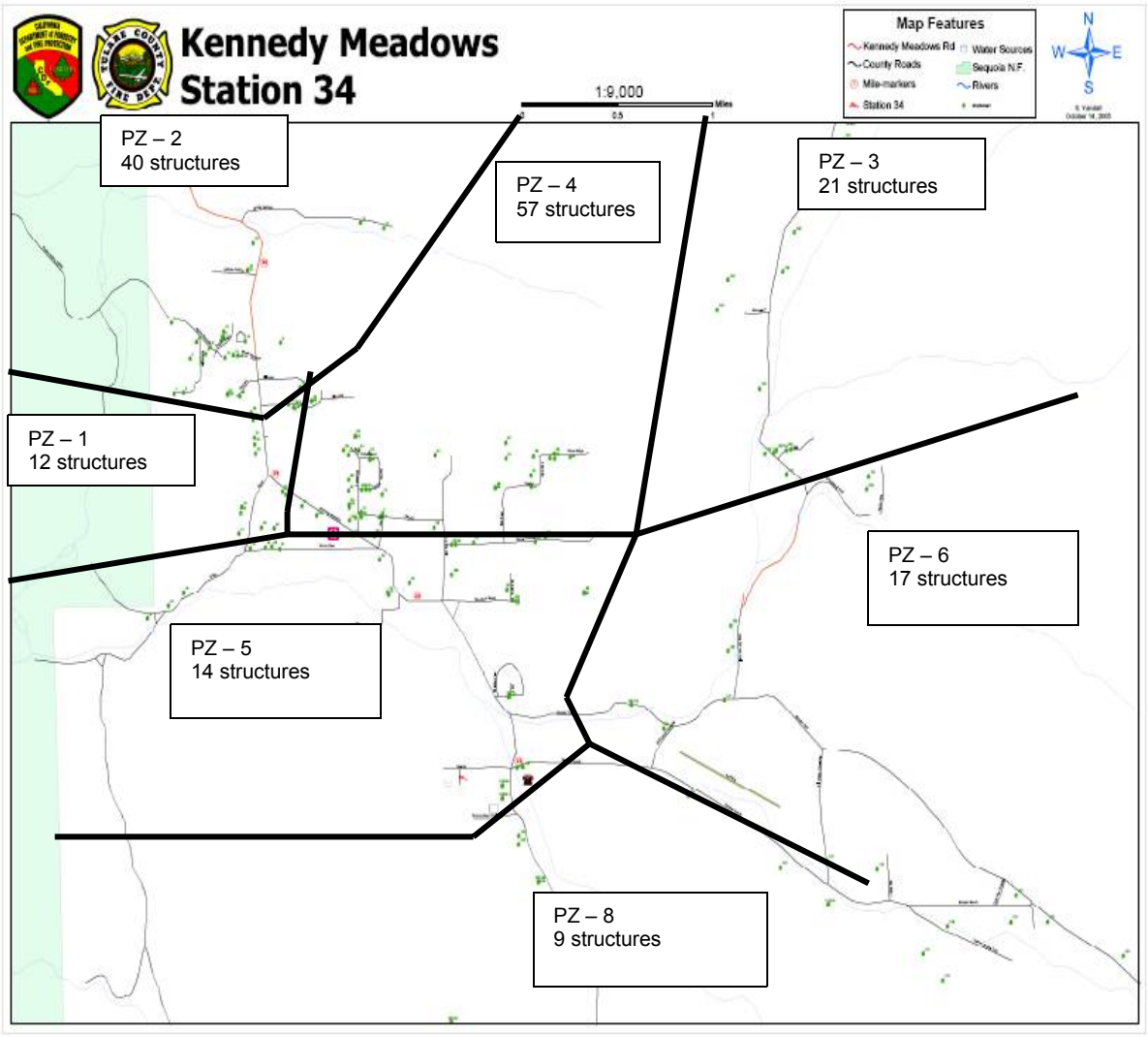
Protection Zone #5. Zone 5 includes the fire station, Ducor Telephone Company, Grumpy Bears and 11 structures. Structures are on Indian Trail, Grumpy Bear Trail, Sacatar Ranch Road near the intersection of KM Road and along Kennedy Meadows Road south of Grumpy Bear. Except for two structures on Grumpy Bear Trail (not on the county map list) all are easily accessed from Kennedy Meadows Road. The structures on Grumpy Bear Trail are in light Pinyon forest fuel type. The remainder of the properties are in Rabbit Brush/Sage fuel type.

Protection Zone #6. This zone is a large area of scattered structures located on Sacatar Ranch Road, Old Sacatar Trail, Silver Spur Crossing, Red Ryder Road, and Yellow Coyote Trail. There are 17 structures, most on private drives behind gates. Most structures are on the fringe of the Rabbit Brush/Sage fuel type with a few in light Pinyon fuel type.

Protection Zone #7. There are only 9 structures in this zone that extends from the south end of the project area up to Pine Pass. All are adjacent to or a short driveway from Kennedy Meadows Road. One structure is about a mile north on Scodie Meadow Trail behind a locked gate. The Michael

Fire of 2003 occurred on the north end of this property about a mile from the structure. Most of the structures are on the fringe of the Rabbit Brush/Sage fuel type.

Protection Zone #8. Ten structures in this zone are in two separate locations. One area includes Cresent Moon Lane, Lovell Lane, and Boggy Meadow Road. These structures are accessible and in light Pinyon forest fuel type. The Manter Fire was stopped just south and east of this small group of structures. Pine Creek Canyon Road is west of Kennedy Meadows Road and was burned in the Manter Fire. There is no access to this area and Pinyon snags is the fuel type. Some brush is reinvading in some locations.

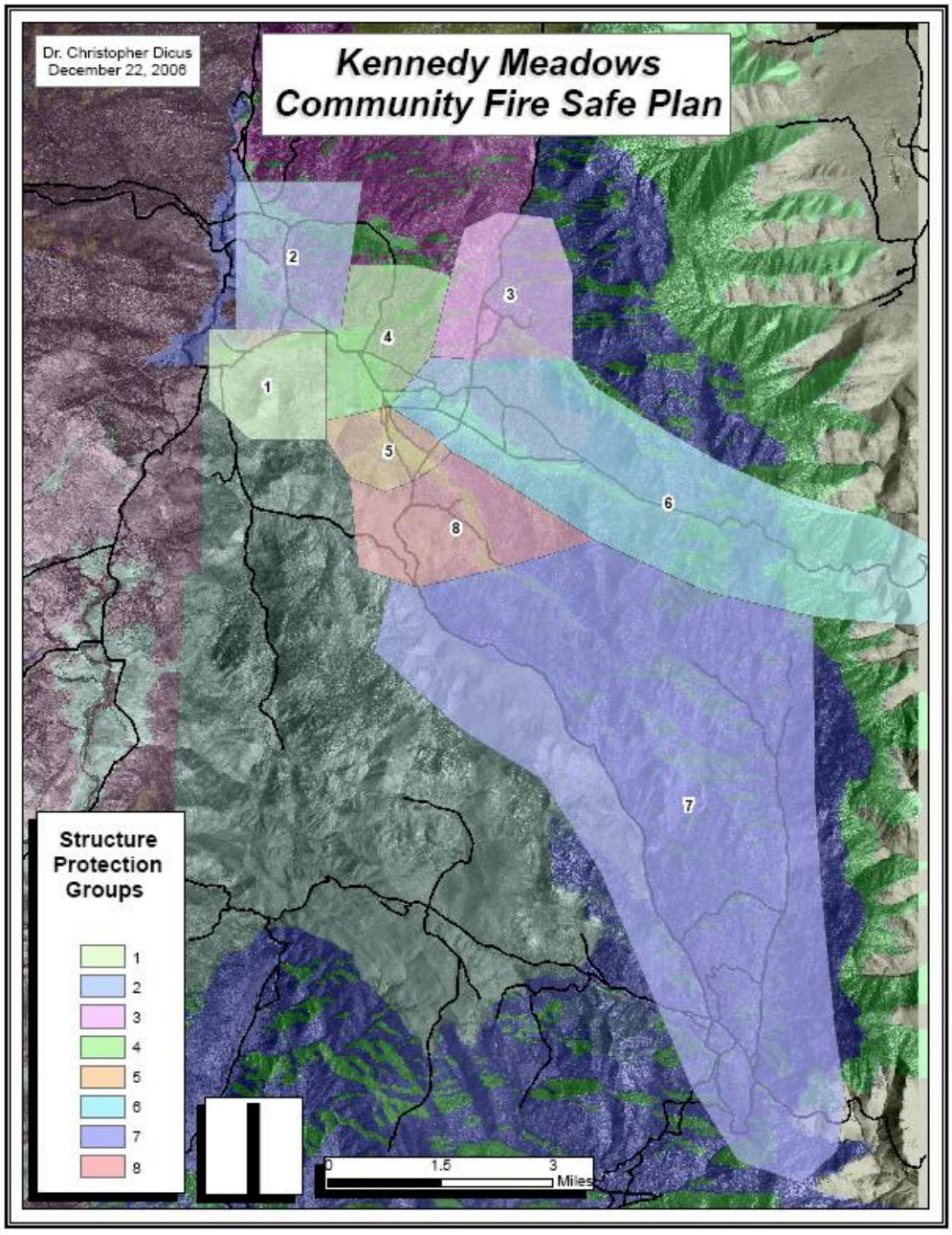


MAP 5

Structure Protection Groups*

North End of Kennedy Meadows

*Structures shown are off-set because of GIS errors



MAP 6*

Structure Protection Zones

Project Area

*Some roads on map do not exist on the ground, GIS errors.

FIRE IGNITION MODELS

How fires generally occur in an area is an important consideration for protecting against wildfire and building a fire plan. Wildfire in Kennedy Meadows will start from one of the following sources:

- ✓ Lightning – probably the most common source of fires on the Kern Plateau during the summer months. Past fire scars (pre-European settlement) indicate a pattern of lightning strikes.
- ✓ Roadside fires – cigarettes thrown from vehicles, vehicles with mechanical problems, vehicle collisions, vehicles pulling off the road onto dry grass or brush – ignition from hot exhaust.
- ✓ Burn piles – property owners burning trash, brush, dead trees. These burn piles can escape control if they are not properly cleared and monitored or if unexpected winds arise.
- ✓ Recreation users – escaped campfires are rare in designated campgrounds but campers sometimes camp in undesignated areas or hunters and fishermen may build warming fires in hazardous locations.
- ✓ Structure fires – structures catch fire for a variety of reasons and these fires can spread to forest fuels. Defensible space is not just to protect the structure from an approaching wildfire; this space also helps prevent a structure fire from spreading to surrounding vegetation. Protection around generator sheds is important because of the generator fuel, hot exhaust and electrical fuses and circuits.
- ✓ Arson – a common cause of wildland fires, this source is difficult to predict or prevent. Nationally, about 30% of all wildland fires are caused by arson.

The FlamMap fire simulation program (version 3) was utilized to assess potential fire behavior in the Kennedy Meadow region. FlamMap incorporates gridded, GIS-data to provide various fire behavior outputs, including fire-line intensity, flame length, rate of spread, crown fire activity, and others for any point on a given landscape for a user-defined set of conditions. It incorporates many fire behavior mathematical models into each simulation, including surface fire

behavior (Rothermel 1972), crown fire initiation (Van Wagner 1977), crown fire spread (Rothermel 1991), and dead fuel moisture (Nelson 2000).

Gridded raster data are necessary for FlamMap simulations. Across the Kennedy Meadows area, the landscape was gridded into 30m × 30m sections. Utilizing multiple remote sensing techniques, each gridded section was assigned a specific value for multiple raster "layers" necessary for fire behavior simulations (e.g., Figure 1). For every single gridded section, a specific value was assigned for

- Topography
  - Elevation: height above sea level
  - Slope: steepness of landscape
  - Aspect: cardinal direction landscape faces

- Fuels
  - Fuel model: designation of vegetation for fire behavior purposes
  - Canopy coverage: amount of sunlight able to hit surface fuels
  - Stand height: height of tree canopies
  - Canopy bulk density: amount of combustible materials in a given volume of tree canopy

Elevation was obtained from a Digital Elevation Model (DEM) provided by the Bureau of Land Management. Slope and aspect files were then derived from the DEM with ESRI® ArcMap™ (version 9.1). All fuel files were obtained from staff on the Southern Sierra Geographic Information Cooperative (http://ssgic.cr.usgs.gov/); fuel models utilized in fire behavior simulations were developed by Scott and Burgan (2005). Raster data was converted to ASCII format for use in FlamMap.

It should be noted that fuel models shown in Map 7 represent how live and dead configurations of vegetation potentially burn and do not necessarily reflect a specific vegetation type. For example, while the stands of Pinyon pine in Kennedy Meadows are a type of timber, however they naturally burn most similarly to the Grass-Shrub 2 fuel model and was thus classified as such.

Weather and Wind files were also created for the fire behavior predictions and were meant to reflect conditions during the 2000 Manter Fire, which burned into the project area and remains in the minds of many Kennedy Meadows residents. Initially, specific weather data, which is regularly recorded for major fire events, was sought for the Manter Fire. Unfortunately, only general weather conditions could be found regarding temperature, relative humidity, and winds during the Manter Fire; however, a specific "Burning Index" (BI; a measure of a fire's difficulty of control) was attained, which aided in the creation of weather inputs for the fire behavior simulations. Alternatively, historic weather from a nearby Remote Automated Weather Station (RAWS) was sought. However, no such RAWS station existed until after the Manter Fire and that station has recorded precipitation only.

Therefore, weather had to be recreated so as to mimic that which was experienced during the Manter Fire. To that end, "FireFamily Plus" climatology software (version 3.05) was utilized. Within "FireFamily Plus", different temperature, relative humidity, wind, and fuel moisture conditions were explored that would result in the specific BI that was reported during the Manter Fire.

After obtaining results that seemed reasonable for the area and that fit within the general range reported during the Manter Fire, wind and weather files were created and then calibrated within FARSITE fire simulation software (version 4.1.03). FARSITE simulates fire spread across a given landscape under user-defined weather and wind conditions (Finney 1999). FARSITE uses the same spatial and weather data as FlamMap and was thus deemed a reasonable way to calibrate subsequent FlamMap simulations. Utilizing the newly created weather and wind files, fire spread and behavior in the FARSITE simulations were very close to actual fire spread recorded during the Manter Fire and were thus considered appropriate for subsequent FlamMap simulations. See Figure 2 for specific weather, wind, and initial fuel moisture utilized in FlamMap simulations

It must be noted that Figure 2 depicts how temperature and relative humidity changes throughout the day, which is necessary for "conditioning" (calibrating) fuel moistures across the landscape due to differences in elevation, aspect, overstory canopy shading, etc. across the study area (Nelson 2000).

However, potential fire behavior was simulated at the most extreme part of the day. Additionally, winds are considered to be 20' above the standing vegetation. Mid-flame windspeed, the winds at which the fire will be burning, are reduced in the program at a given point dependant on the value of canopy coverage assigned to the point. In general, areas with greater canopy coverage (i.e., trees) will reduce the 20' windspeed to a greater extent than will areas with a low canopy coverage (i.e., grass).

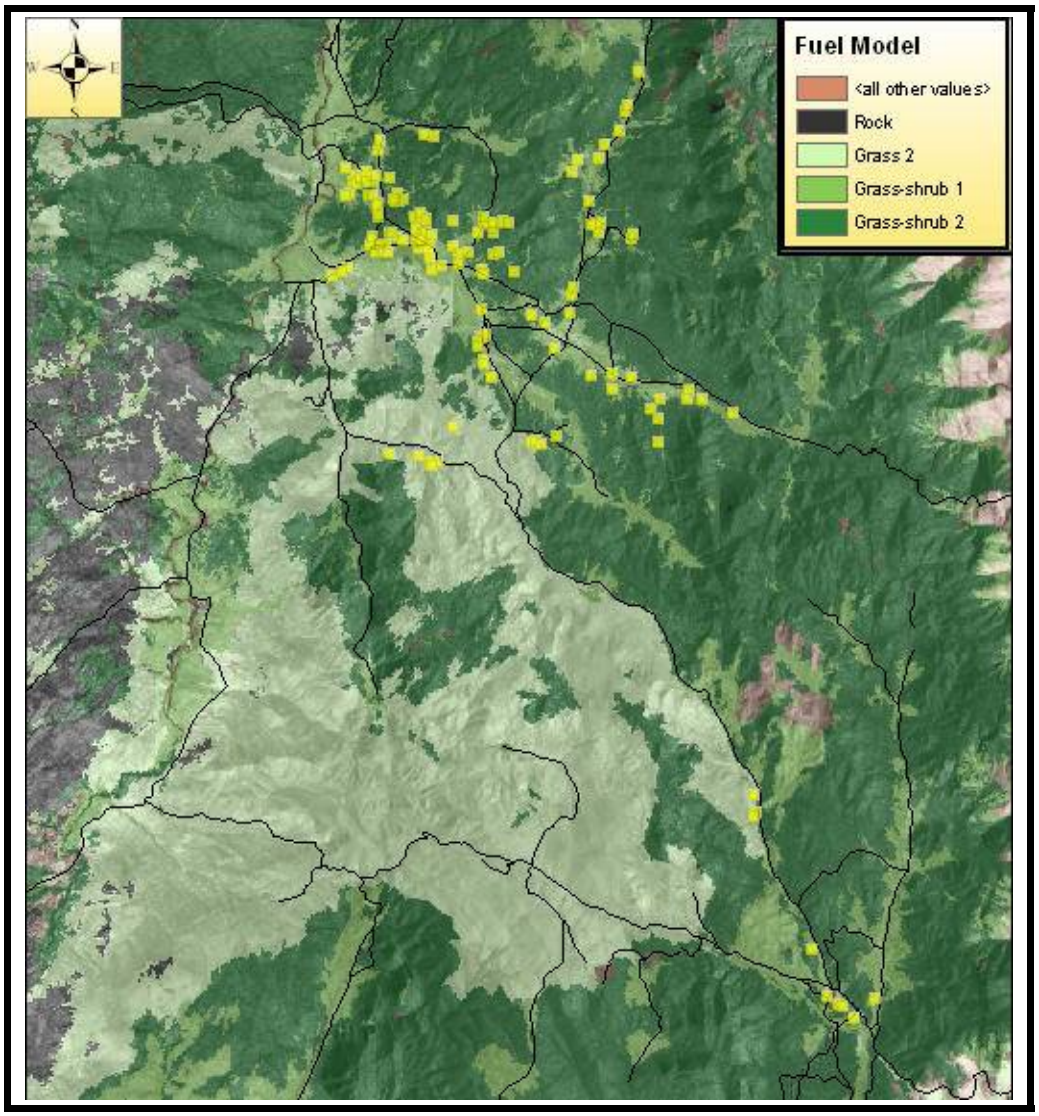
FlamMap differs from FARSITE in that it does not simulate fire spread and growth across a landscape, but instead calculates potential fire behavior at any given point on the landscape. Because FlamMap doesn't predict fire movement across the landscape, but rather examines the potential fire behavior for an entire landscape, it is generally considered superior to FARSITE for evaluating potential areas of risk (Stratton 2004).

FlamMap outputs of Flame Length (feet) and Rate of Spread (feet per minute) are depicted in Map 8 and 9, respectively. Flame lengths across the Kennedy Meadow are depicted in 5 feet incremental categories. Thus, all areas in green represent areas where flame lengths are projected to be 5' or less, all areas shaded yellow are projected to have flame lengths 5'-10', etc. Similarly, all areas with simulated rates of spread between 1'to 50' per minute were shaded green; all areas with simulated rates of spread 50' to 100' per minute were shaded orange, etc. It must be noted that fire behavior simulations were calibrated for weather that was experienced during the 2000 Manter Fire. Thus, users must are cautioned to be guarded in their interpretation of fire behavior outside the modeled parameters.

However, as shown, except in areas burned during the 2000 Manter Fire, there is substantial potential for another relatively fast-moving, high-intensity wildfire in Kennedy Meadows. Due to lack of firefighting infrastructure, many structures in the Kennedy Meadow area will at risk in the first hours after ignition. Thus, it is imperative that residents modify vegetation and structures so as to stand alone in the absence of firefighting resources.

Further, as some experienced during the Manter Fire, there is a high potential for long-range lofting of burning embers, which research has shown to ignite more homes than direct flame impingement (Cohen 2000). Thus,

structures in the Kennedy Meadows area should be designed and constructed in such a way that it impedes ignition from embers. Such modifications should include non-combustible roofs or decks, screened vents to keep embers from the attic, cleaning out gutters, etc. Further, during the fire event residents should remove any combustible materials such as deck furniture from the structure, which could serve as an ignition source to an adjacent structure.



MAP 7*
Fuel Models

*Some roads on map do not exist on the ground, structures are offset GIS errors.

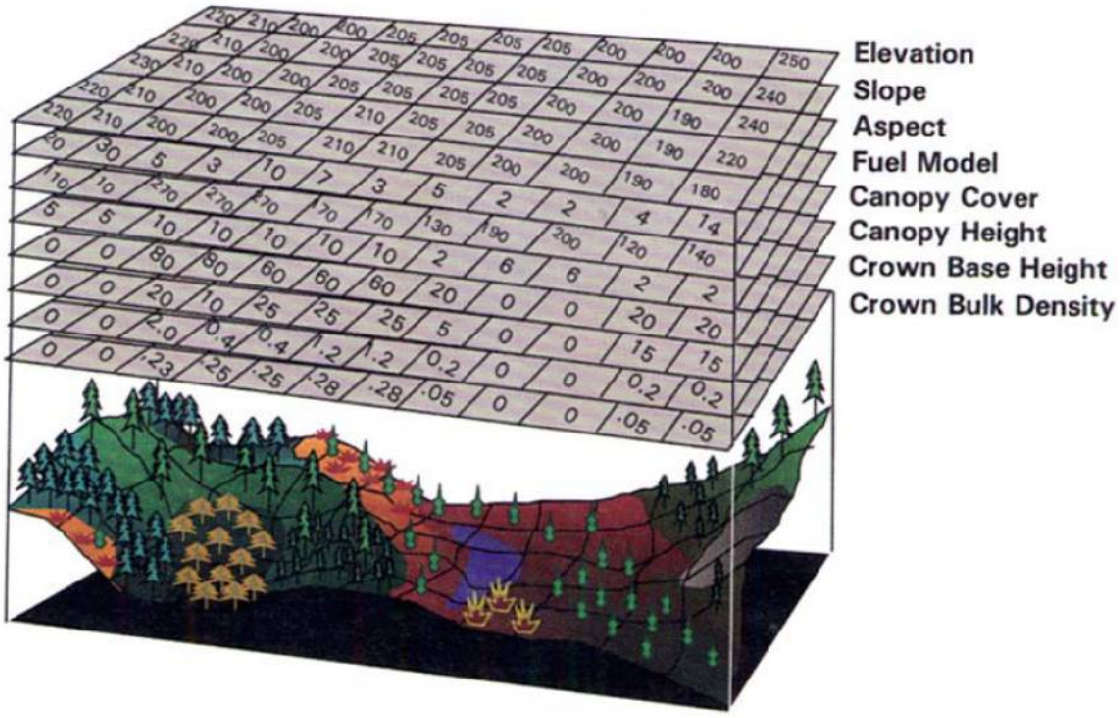
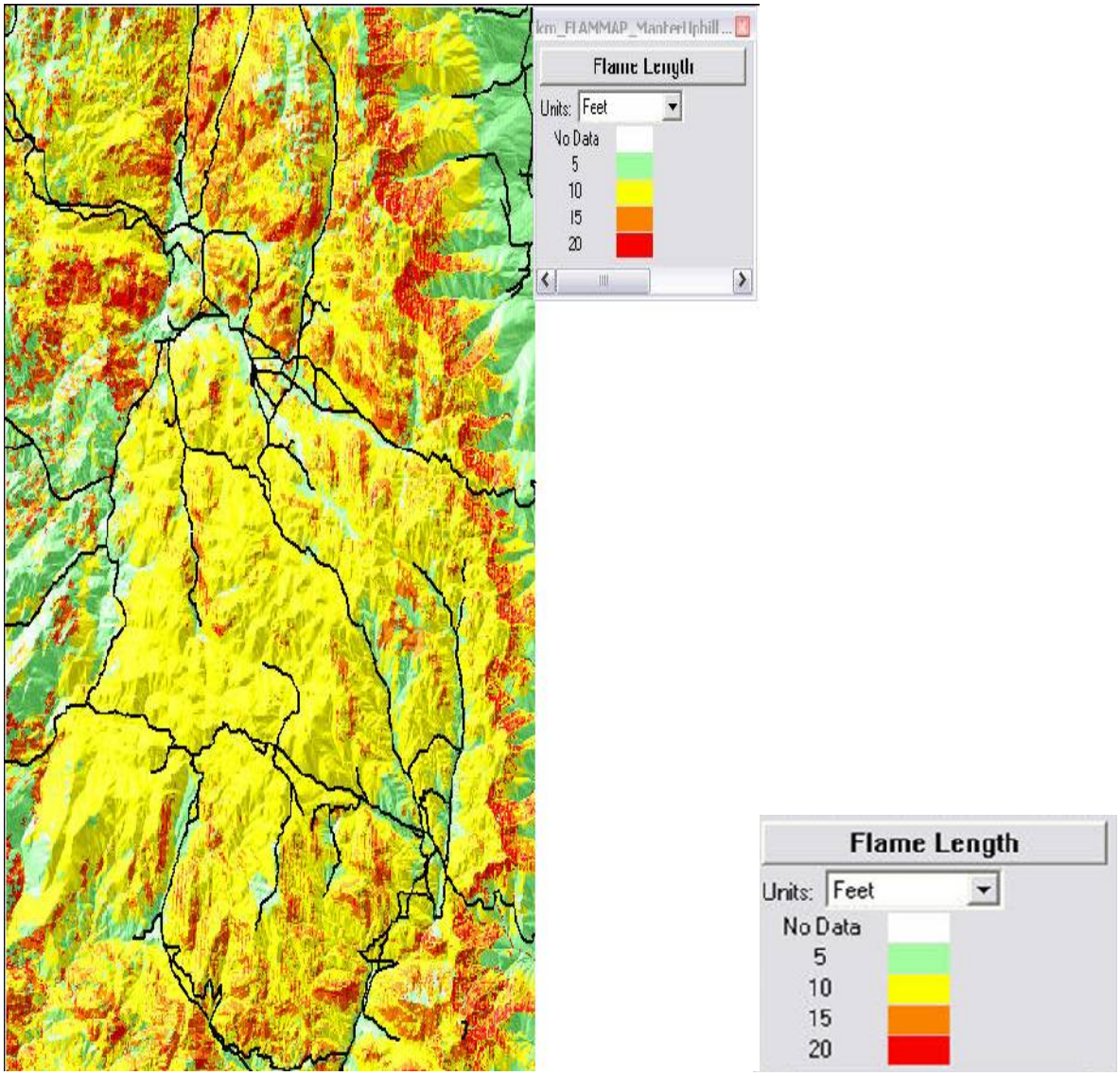
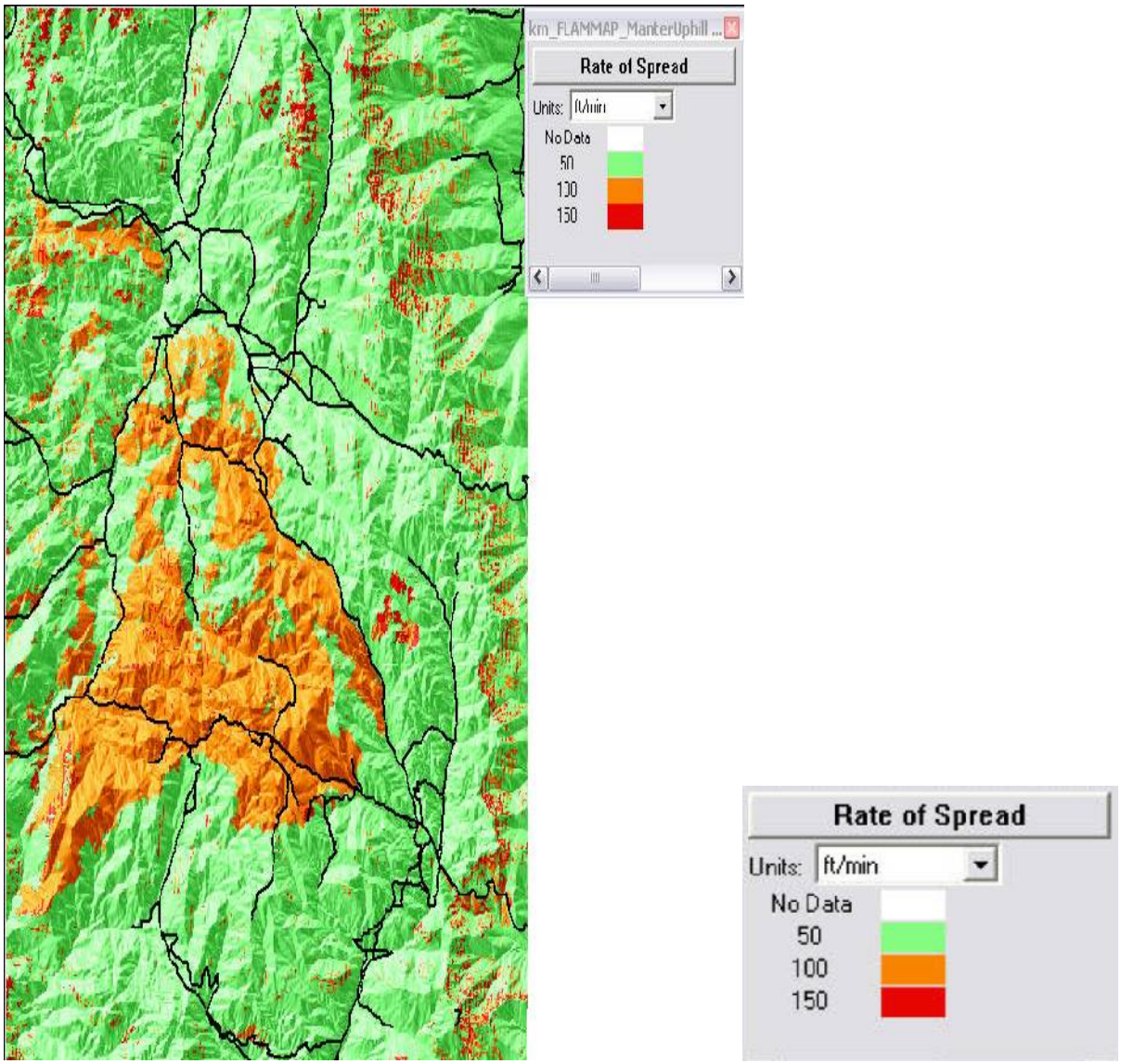


Figure 1. Example of how a hypothetical landscape is gridded into multiple raster data layers for fire behavior simulations (From Finney 1998).



MAP 8.* Potential flame lengths for Kennedy Meadows area as calculated by FlamMap. Flame lengths are categorized by 5' increments, meaning that all areas shaded in green are between 0.1' and 5'.

* Some roads on map do not exist on the ground, GIS errors.

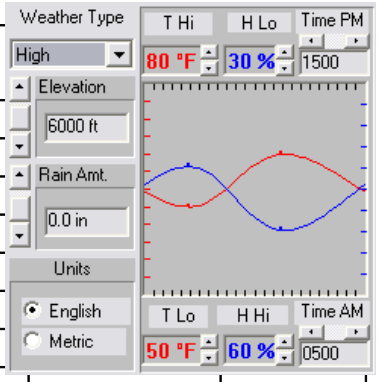


MAP 9. * Potential rates of spread for Kennedy Meadows area as calculated by FlamMap. Rates of spread are categorized by 5' increments, meaning that all areas shaded in green are between 0.1' and 5'.

* Some roads on map do not exist on the ground, GIS errors.

Figure 2. Weather, wind, and initial fuel moistures utilized in FlamMap simulations of Kennedy Meadows area.

TEMPERATURE & RELATIVE HUMIDITY					
Time	**Temperature**	**RH**			
5 AM	55ºF	30%			
3 PM	95ºF	10%			
20' Winds:					
15 mph from SW					
Initial Fuel moisture					
Fuel model type	Dead <¼"	Dead ¼"-1"	Dead 1"-3"	Live Herbaceous	Live Woody
Non-timber	4%	5%	6%	60%	75%
Timber	6%	7%	8%	60%	75%



FIRE PROTECTION RESOURCES - General outlook

Wildland fire is similar to many other natural disasters such as floods, tornadoes and hurricanes in that it can be predicted for certain areas with a significant level of confidence. Damage produced from these events can be analyzed for different levels of severity for given events. As with all natural disasters, precautions can be taken to minimize the damage or at least anticipate possible consequences. Protection agencies approach wildland fire through direct response to the incident when it occurs and through a variety of prevention measures taken in risk areas where a fire is likely to occur.

Unfortunately funding for proactive (prevention) efforts, such as the grant for this project, lag behind funding for suppression efforts by a ratio of 4:1. In 2005, $475 million in federal funds was appropriated for prevention efforts such as thinning, prescribed fire, information and education and state prevention grants. Approximately $1.8 billion was appropriated for preparedness and suppression (USDA Forest Service 2004). In addition to appropriated funds, state and federal agencies have access to additional Emergency Fire Fighting funding which may come from other resource programs such as prevention. These additional funds are requested during any year where actual wildland fires exceed expected conditions. This has occurred almost every year over the past 20 years.

Fire suppression agencies are risk adverse when it comes to their efforts to protect life and property. Any hint that extraordinary efforts were not extended to protect private property would bring blame and recriminations on the fire fighters involved and the political bodies that provide the resources (funding) for these efforts. Consequently expensive air tankers, expensive helicopters, engines and hand crews are supplied, to the extent they are available, throughout the United States to fight fire with little regard to the cost or sometimes even the value of the resource being protected. Many resources (engines) are diverted to protecting structures in wildland urban interface areas at the expense of containing the fire and preventing additional resource damage. From a political perspective, this is a wise choice; from an economic perspective this may not be the best choice. Extra effort on the fire perimeter during the early

stage of a fire in a wildland urban interface area might succeed in containing a fire at a small acreage. When resources are diverted to protecting structures, the fire continues to grow. Expanding urban interface zones in California have exacerbated this problem.

Kennedy Meadows is an isolated community with limited fire protection resources. There are four agencies that have some involvement with wildland and structural fire protection. Tulare County has primary responsibility for structural fire protection within the county boundaries. Wildland – brush and forest lands that are privately owned are classified as State Responsibility Area (SRA) by the California Legislature and fall under the jurisdiction of the California Department of Forestry and Fire Protection (CDF). Federal lands classified as National Forests are the responsibility of the Forest Service and federal lands classified as Bureau of Land Management are protected by the BLM. All these conditions exist in the project area.

Specific roles for each agency are as follows:

Tulare County

Tulare County is responsible for structural protection in Kennedy Meadows. They have provided a Type 2 engine (Engine 34) and a Fire Station. This is an all volunteer station with support from various county (CDF) fire staff. A Fire Captain or Engineer visits the community for training and other support throughout the year. Phil Brown, the County Battalion Chief responsible for the eastern side of Tulare County tries to visit the community three or four times a year. County budget resources for the area have historically been about $4,400 per year for miscellaneous supplies and repairs. Currently it is about $2,500 per year but the County does not budget specific amounts for areas such as Kennedy Meadows so the exact amount is not known and varies from year-to-year depending on the needs of the community. (Brown)

Larry Watson is currently the Volunteer Fire Chief (summer 2006) and is the only individual trained and qualified to operate Engine 34. He has a portable radio that is activated from a repeater on Bear Mountain. Three other volunteers have these radios. Of the nine active volunteers, five are permanent residents.

The volunteer department should have 10 permanent members. This would provide at least five members on the engine for optimal operation. (Watson)

On July 1, 2007 Tulare County is terminating its 50 year contract (Schedule A) with CDF for county structural protection and is forming a fully independent County Fire Department. Under the historic contract, Tulare County paid CDF to provide fire staffing for county owned equipment and stations. After the transition all staff will be county employees. CDF will continue providing protection for SRA lands within the county. This change should have little effect on structural protection services in Kennedy Meadows.

California Department of Forestry and Fire Protection (CDF)

Private lands in Kennedy Meadows classified as SRA are protected by BLM through long standing agreements with CDF. Historically, private in-holdings surrounded by National Forest and BLM lands have been protected by the respective federal agencies. Isolated National Forest and BLM lands on the fringes of larger federal land blocks were protected by CDF. These operational protection decisions were made to eliminate protection gaps where it would not be cost effective to build state or federal fire stations with small areas to protect and eliminate overlapping protection areas. Consequently BLM protects private lands in Kennedy Meadows. Protection practices among the various agencies are similar; consequently it is not especially important which agency provides protection. Federal policies on structural protection are slightly different from state policies. They are allowed to suppress fires on a structure from the exterior to prevent resource damage, but will not enter a structure for life or property protection. Federal firefighters can rescue people from structures at the discretion of the lead person on the fire (see section on Forest Service below for details). CDF and county firefighters are trained to aggressively attack structure fires and enter structures as necessary. Federal policies on structural protection may come under critical review because of the recent tragic loss of five Forest Service firefighters protecting a structure in Southern California.

Bureau of Land Management

BLM protection is provided by a station at Chimney Peak, approximately 10 miles from the general center of the community (which is the location of the Ducor Telephone Company). This station is staffed by two crews with two type 4 engines during the summer only. These crews provide initial attack throughout the area unless they are out of the area on other fires. Their initial response time is under 30 minutes to the most remote properties. These crews are a state and national resource and can be called to fires in other locations. There may be times when there are no BLM fire crews in Kennedy Meadows although BLM attempts to provide back-up coverage if the resources are available.

BLM receives a letter from the Tulare/CDF Unit each year designating BLM as the responsible Fire Warden agent for Kennedy Meadows, which includes enforcement and inspections of all state ordinances and requirements for “Fire Safe” and other state fire laws. BLM crews at Chimney Peak are responsible for enforcing state and county fire ordnances and laws. BLM issues burning permits during periods when permits are required; however they have limited staff and resources to do this task. An inspection of individual properties for “Fire Safe” requirements has not occurred in recent times. They have issued an annual spring “clean-up” letter to property owners advising of “Fire Safe” requirements but they are considering other methods of notification.

BLM does not have a formal “Pre-attack Plan” for Kennedy Meadows. “Run cards” are utilized by both Forest Service and BLM at the joint command center in Porterville and list all interagency resources that will respond to various types of incidents. In the BLM Fire Management Plan, Kennedy Meadows is treated as a separate planning unit. It is identified as a Wildland Urban Interface unit due to the community presence. The Dome Land unit south of Kennedy Meadows is designated for Wildland Fire Use (WFU), although BLM has to complete more pre-planning before utilizing this option. BML hopes to coordinate these planning efforts with the Forest Service. They discussed having all of the Dome Land Wilderness available for WFU, but chose not to pursue this because it is adjacent to the Kennedy Meadows community and the presence of private in-holdings in this area.(Ryan, Chris. 2007)

Forest Service

There is little the Forest Service can do to provide initial attack in Kennedy Meadows. Their Blackrock Station is 16 miles away on a narrow, slow speed road (Beach Meadows/ Sherman Pass Road). Blackrock is staffed during the fire season with one Type 3 engine (5 personnel) but only 5 days a week. This engine is not available when it is on a fire assignment elsewhere on the Sequoia Forest or on other state or national fire assignments. There is a Type 3 engine at Johnsondale and a Type 2 helicopter at Peppermint (on the west slope of the Sierra Nevada). They have 2 more engines in the Kern River Valley plus one Type 1 hand crew and a Type 2 helicopter. There are additional Forest Service and Kern County resources scattered around the South Sierras but their response times to Kennedy Meadows would be hours rather than minutes. (Williams)

FS and BLM have a unified command center in Porterville. They are well coordinated with CDF (Visalia) and Kern County (Bakersfield) on all incidences. FS is limited in their emergency response capabilities (as well as BLM). Congress only allows them to protect natural resources on federal lands. However, they can and will extinguish fires on structures if there is a threat to FS wildlands. Their policies on structures are vague but well understood in this area. They will enter a burning structure to rescue a person if the firefighter feels that he/she has the appropriate training and it is a critical situation (they have Self Contained Breathing Apparatus however they are to be used only in Haz Mat or toxic smoke situations). (OHSA has an exemption from safety rules for human rescue). Forest Service engines on the Sequoia carry full turnout Fire Fighting Personal Protection Equipment.

FS will respond to almost any emergency when requested by CDF, Tulare County Fire and Sheriff or other responsible jurisdiction. They will not play a lead role, only support, unless it is a wildland fire within FS responsibility area. (Williams)

The Forest Service wants to coordinate Fire Used for Resource Benefit with BLM. This is the new terminology for Prescribed Natural Fire and Let Burn. They only adopted this policy upon the adoption of their new Fire Management Plan in 2003. They had the Hooker Fire in 2003 and the Craig Fire in 2005 under

this new plan. They want to expand this for protection of the Kern Plateau. They are also using Prescribed Fire under their SPLATS (Strategic Area Treatment) program. The Cannell Meadows project will cover 4700 acres (burned about 300 acres so far). (Williams)

Bald Mountain Lookout, located approximately seven miles west of Kennedy Meadows, has visual surveillance of Kennedy Meadows. This is the only remote view of Kennedy Meadows for fire protection. Bald Mt. is staffed by the Forest Service and BLM during the fire season (Chambers)

Recreation uses from the Forest Service side is heavy at Kennedy Meadows Campground and along the South Fork of the Kern River. These sites are north of the KM community and present little danger under normal conditions because prevailing winds during the summer are from the southwest. Hunting season in late September could present some problems because early fall winds can come from the north and northeast. Most of the recreation users in this area are “traditional”, in that they respect their camp fires and usually leave little trash. Most recreation users return year after year and are well familiar with fire safe requirements. There has never been a reported escape fire from the KM Campground or from river campsites. A “Campground Host” should be assigned to the Kennedy Meadows Campground. This position has been authorized but never filled. A Host provides a margin of protection and might provide early detection of a fire in this portion of the project area.

COMMUNITY MEDICAL TEAM

The "Kennedy Meadows Community Volunteer First Aid Team" (KMCVFAT) was formed in 2004 after people found themselves inadequately prepared to assist a heart attack victim -- a well-liked member of the community. The group has some 20 members, about a dozen of whom are active responders. Almost all responders are full time residents.

All local responders and a few others are on a broadcast phone tree, so that any call to 850-HELP results in the phones in the homes of all of these responders ringing simultaneously, allowing everyone who picks up to talk with the caller and to each other. The system works well, and Ducor Telephone Company does not charge for providing this service. This backbone could be expanded to provide emergency communications to other selected individuals. The first aid team also has eight radios for communications in the field, hand-me-downs from the China Lake Mountain Rescue Group.

All of responders have been trained in first aid at the American Red Cross "Responding to Emergencies" level and most have had the American Heart Association "Fundamentals of BLS for Healthcare Providers", and intensive training in CPR. All of the new recruits to the volunteer fire department started out with the first aid team and are still active with the team.

Through bake sales, garage sales and donations at the community pot luck dinners, the group has raised some $5000 over the last two years. Most of this money has been used to buy supplies such as backboards, c-collars, splints, CPR devices, and the usual first aid supplies -- also to license radios and for the costs of incorporation. The team has one AED donated by San Joaquin Hospital. These materials are cached in three locations in the community, mostly in the small storage building adjacent to the County Fire Station. Additionally, all responders carry personal kits in their vehicles, with everything from dressings to splints to CPR masks.

The first aid team has informal arrangements with Liberty Ambulance and Mercy Air to call the team on 850-HELP so that they can get to the scene ahead of them and/or help them find the scene (once this season from Liberty). Both have conducted on-site familiarization with their requirements for Kennedy Meadows; the helicopter landed at the old dump site. Where an emergency is

found, they call Liberty directly (twice this season) – they also have access to Mercy Air through 911 but have not actually done so (Royce, Ed. November 5, 2006).

EVACUATION PLAN

Evacuation is the voluntary or mandatory removal of residents, visitors, and other non-emergency-response people from an area that is threatened by a natural disaster; in this project area the most likely evacuation would be from a wildfire. Voluntary evacuation is often requested when a fire threatens a populated area, especially for people who are in the area for recreational purposes (campers, hunters, curious fire watchers). Residents are usually not asked to evacuate unless or until a situation becomes critical. Authorities are hesitant to ask residents to leave an area during an emergency, often with drastic consequences (i.e. Hurricane Katrina). Mandatory evacuations are a last resort that can only be ordered by law enforcement authorities such as the County Sheriff, Highway Patrol, National Guard (if authorized by the Governor) and some law enforcement officers of the various fire agencies. Evacuation authority rests in various sections of the State Penal Code (Sections 148, 402, 409.5) and can be imposed when a situation becomes critical. Firefighters cannot order evacuations, they can only advise people to leave.

Evacuation from Kennedy Meadows during a wildfire is problematic. In addition to permanent and full time residents, summer time recreation users need to be considered. There are only three access and egress choices for people in the Meadows.

Nine Mile Canyon Road, to the southeast, is the only practical evacuation route. This is a paved, mostly two lane road that connects to State Highway 395. Unfortunately it is a steep, winding road that, in the event of a wildfire, would be the main access for fire equipment. The Manter Fire crossed the Kennedy Meadows Road in several places in 2000 and would have made evacuation via Nine Mile Canyon Road difficult and dangerous.

Beach Meadows/Sherman Pass road exits Kennedy Meadows from the northwest and is paved. Unfortunately this road is narrow and requires climbing over the 9,000 foot Sherman Pass and a long, winding and somewhat dangerous

route to the Kern River Canyon. This is not a practical evacuation route but could be used if an approaching wildfire is entirely to the south or east of Kennedy Meadows.

Individual property owners may refuse an evacuation order and may be required to sign a waiver, although few law enforcement authorities carry such a form in the normal course of business. Evacuations under Marshal Law can require forced evacuations and arrest people who resist (PC 148) but these actions are seldom enforced on residents to that degree in normal natural disasters. Arrests (looters) can and do occur for anyone in an evacuation area who is not a resident or on official business such as utility workers.

The most benefit from an evacuation order is the exclusion of people from entering the area. Fires draw curious visitors that can interfere with firefighting activities and may cause unnecessary exposure or injury. Under an evacuation order, law enforcement authorities can restrict assess to the evacuation area, even to legal residents. The only exception is the "Media" which can enter a disaster area under supervision. Road closure teams need to be established on the three access routes; Nine Mile Canyon Road at Highway 395, Sherman Pass Road in the Kern River Canyon and Chimney Peak Road at Highway 178. These closures can be staffed by county (Kern, Tulare or Inyo), state or federal authorities. Road closure teams must be provided with instructions and information on who is excluded and who can be admitted to the area.

When an evacuation order is issued, the issuing authority must be prepared to follow a number of procedures. They should be prepared with the following:

- ✓ Have local Evacuation Centers been established? Evacuations should never be ordered unless a staging area or evacuation center has been established.
- ✓ Authority for issuing the evacuation order.
- ✓ Process to determine how evacuees are to be notified, such as the "Reverse 911" system, phone tree, individual contact, and/or a check list on addresses, camp sites and any other places people may be located.

- ✓ Contact log maintained by each evacuation notification officer to verify who has been notified.
- ✓ A reporting-back mechanism to fire authorities on how the evacuation is proceeding (Firefighters need to know which, if any, residents refuse an evacuation order and remain to protect their properties).
- ✓ Instructions on where to proceed to the local Evacuation Centers or evacuation staging area.
- ✓ Can transportation assistance be provided for evacuees?
- ✓ Insure that the local Red Cross Disaster relief team been notified and is prepared to assist evacuees.
- ✓ Establish a process to keep evacuees informed of the situation. There is nothing more frustrating for evacuated residents than not knowing where the fire is burning or if their homes are safe. Fire authorities often fail to keep people informed. Up-dates should be provided every hour, 24 hours a day during the evacuation period.
- ✓ Establish Evacuation Center phone numbers where evacuees can call and others can check on the status of evacuees. This duty can usually be turned over to the local Red Cross Disaster Relief Teams, if they have been pre-established.
- ✓ Provide information on where domestic animals may be housed.

COMMUNICATIONS

Communications involves several elements:

1. Residents' ability to communicate with public agencies.
2. Public agencies ability to communicate with the public during emergencies.
3. Public agencies ability to communicate with each other during an emergency.
4. Dissemination of routine information to the public, including recreation users, about events and conditions that may affect their safety.

1. Kennedy Meadows has a modern telephone system provided by the Ducor Telephone Company that serves almost every improved property in the project area. All service lines are underground and relatively safe from damage by wildland fire. Telephone communication is the most efficient method for the public to contact public agencies.

Telephone Numbers

Porterville Dispatch:	**911**
Joint Dispatch Center – Forest Service/BLM	**(599) 782-3120**
Chimney Peak Fire Station (BLM)	**(559) 850-2737**
Kennedy Meadows Fire Station (not staffed)	**(559) 850-3473**
Kennedy Meadows First Aid Team	**(559) 850-HELP** **850-4357**
Kern River Ranger District (Forest Service)	**(760) 379-5646**
Bureau of Land Management – Bakersfield	**(661) 391-6000**
Tulare County Fire/CDF – Visalia	**(559) 732-5954**
-Terra Bella	**(559) 535-4411**

Tulare County Fire splits from CDF July 1, 2007

Kern County Fire Department	**(661)861-2540 (non-emergency)**
Tulare County Sheriffs Department	**(661)861-3110**
Liberty Ambulance	**(760) 375-6565**

2. Public agencies normally use the media to communicate with the public during emergencies. This is problematic in Kennedy Meadows. There is no radio or television reception for the community. Acoustical warning devices such

as sirens would not be effective because of the diverse nature of the community. One solution for this is to install a reverse 911 telephone system contained in **Recommendation 15.** As a practical matter, news appears to travel quickly within this community. A wildland fire would be noted by most people rather quickly. Unfortunately getting good information out on the nature of the emergency is difficult during the early stages of an incident. It is critical that fire agencies establish an information center as quickly as possible where the public can get reliable information.

3. Public fire agencies are well coordinated for emergency response activities. The implementation of the Incident Command System **(ICS)** by all California fire (Wildland) agencies in the mid 1970s mostly solved the radio communications compatibility issue. Modern programmable radios allow adequate communication between fire engines and firefighters using hand held equipment. "Clear text" speech (no more 10-code jargon) and standardization of resource (equipment and duties) terminology greatly assisted in the coordinated and cooperative efforts of federal, state and local wildland firefighting agencies.

4. Getting information to the public on routine fire prevention and fire danger ratings is achievable by implementing **Recommendations 8 and 10.** A low wattage 1610 radio system could be used to provide tips on fire safety and current fire danger conditions. Prevention signs would provide additional information. These efforts are aimed at visitors and receptionists.

COMMUNITY-WIDE EVALUATION OF HAZARDS AND CONSTRUCTION

One of the most critical tasks required for this project was to evaluate the private structures within the project area. This was the most time consuming effort in the field and could not have been accomplished without the assistance of several local residents. The prospect of conducting these evaluations was a serious concern among some residents. A letter was sent to all residents in May,

2006 announcing the project and noting that any resident could request that their property not be inspected. This letter is contained in Appendix IV. All property evaluations are to be kept confidential and not published in the final project report. Two copies of the evaluations have been made, one for KRVFSC and one for the president of the Kennedy Meadows Property Owners Association. Individual evaluation records will be supplied to owners upon request to KMPOA.

June 28, 29, and 30 were spent with Jerry Williams and Ed Royce inspecting 62 residential properties. Fifty-five properties were evaluated between July 27 and July 31. Larry Watson was the escort on July 29, and Ed Royce assisted on July 30. Evaluations were completed on July 31. A format was developed on an excel worksheet for each of the properties evaluated (APPENDIX VI).

One-hundred seventy-four properties were identified with addresses by the county as shown in Appendix VII (one property on the list was outside the project area and two were duplicates). These were properties that have improvements recognized by the county tax assessor. Nine additional properties were located and evaluated that were either new construction or not identified on the county list. One-hundred and seventeen were evaluated during June and July.

The following is a summary of the property evaluations:

PROPERTY EVALUATION

Inspected	117
Travel trailers/not inspected	24
Vacant or minimal improvements	27
No access	11
Denied access	6
TOTAL	185

Thirty-eight of the evaluated properties are occupied full time. Part-timers and vacation owners occupy 116 properties. Thirty-one properties had no livable structures or their status could not be determined. There are more than 38 properties occupied full time, however access was denied on several full time properties and some travel trailers have full time occupants. Most trailers that did not have permanent attached structures were not evaluated. Probably 45 properties are occupied full time (Royce, 2006).

PROPERTY STATUS

Full time resident	38
Part time/vacation	116
Not habitable	31
TOTAL	185

PROPERTY ADDRESSES

Having posted addresses is an important issue for protecting residents of Kennedy Meadows. Thirty-nine properties had addresses posted that could be seen from the main roads; only one property had an address posted with the required 4 inch high reflective numbers. One-hundred forty-two properties had no address posted and four properties addresses did not need to be posted (General store, Ducor Telephone, Grumpy Bears, County Fire Station).

Many of the structures cannot be seen from the main roads and firefighters from out of the area would not know how to locate structures that might needed protection. Most of the road maps are not adequate for finding structures. In a few instances it was difficult for resident escorts to identify where properties were located.

Address posted	39
Address not posted	142
Address not needed	4
TOTAL	184

PROPERTY ADDRESSES

ROAD AND DRIVEWAY ACCESS

Getting fire apparatus to a structure during an emergency is critical to saving life and property. All fire protection services arrive via some type of vehicle. BLM crews at Chimney Peak station utilize Type 4 engines. Engine 34 located at the County Fire Station is a Type 3 engine.

Tulare County has requirements for roads and driveways for all new construction in rural areas (Tulare County, 2004). Those specifications include:

- New driveways/streets are limited to 15% grades with all weather surfaces. Grades to 20% are allowed if paved. Surface must be capable of supporting 40,000 lbs.
- Driveways require a minimum of 10 ft. wide (except commercial parcels) and have a minimum of 15 ft. vertical clearance.
- Driveways over 150 ft. must provide a turnout capable of allowing free passage of a vehicle and a Fire Engine.
- Gates must be set back at least 30 ft. from a main road to allow a Fire Engine to open the gate without blocking the road.

Kennedy Meadows/Beach Meadows road is the only paved road in the project area. All other roads are private with native material surfaces and maintained by residents. Fortunately all the main roads within the developed area are well signed. In some locations it is difficult to determine where a main road ends and a driveway begins. Many driveways are gated and locked, in some places with multiple gates. These conditions, along with the lack of street addresses, would make the protection of structures in some locations difficult.

Determining safe access for a fire engine was one of the evaluation criteria. Larry Watson, the volunteer Fire Chief assisted in this effort. He has driven all the roads in the valley with the county fire engine and is familiar with most all the structures. Unfortunately, during an emergency, engine operators' from out of the area may not be familiar with these conditions and may hesitate to take their apparatus into some locations. Of the properties evaluated, 89 had good fire engine access, 20 had moderate access and 8 had poor access.

FIRE ENGINE ACCESS

Good access	89
Moderate access	20
Poor access	8
TOTAL	117

PARCEL FUEL TYPE

Fuel as defined in wildland fire is all vegetation, dead or live that is available to burn under the proper conditions. A discussion of the specific fuel types in Kennedy Meadows is contained in the chapter on the FIRE ENVIRONMENT TRIANGLE. Each evaluated property was assessed for the general fuel condition on the parcel. It is not indicative of the fire defense safety of the structure. Fuel type, density and arrangement vary across the landscape, even on a relative small parcel. A 5 acre parcel can have 2 or three fuel types and a 40 acre parcel can have even more. This evaluation was an attempt to identify the most common vegetation in the general proximity of the primary structure.

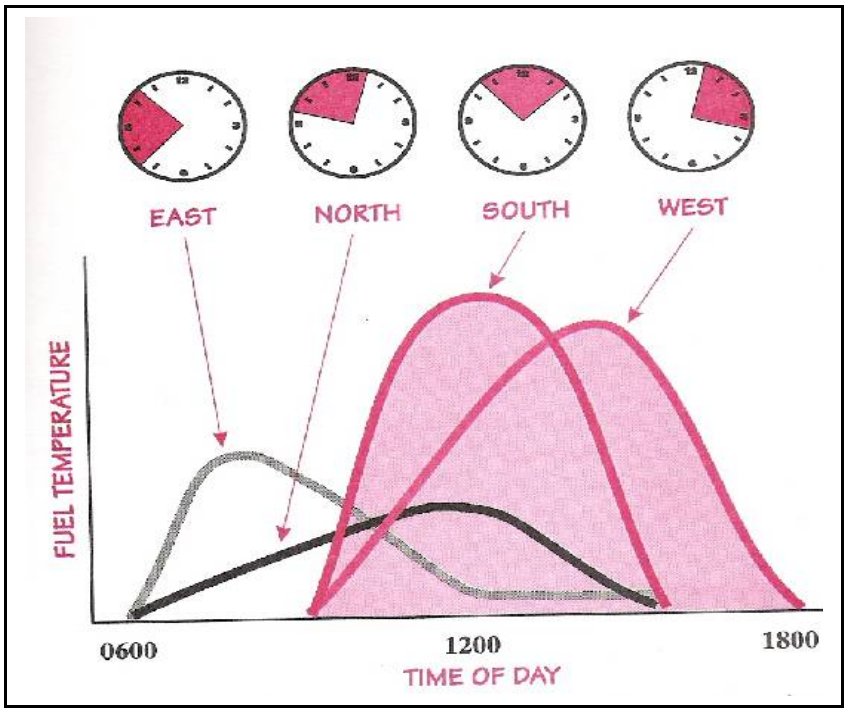
FUEL TYPE/PROPERTIES

Heavy Pine	5
Medium Pine	11
Light Pine	14
Heavy Brush	3
Medium Brush	7
Light Brush	7
Scattered Pine and Brush	59
Medium Pine and Brush	10
Meadow	1

ASPECT

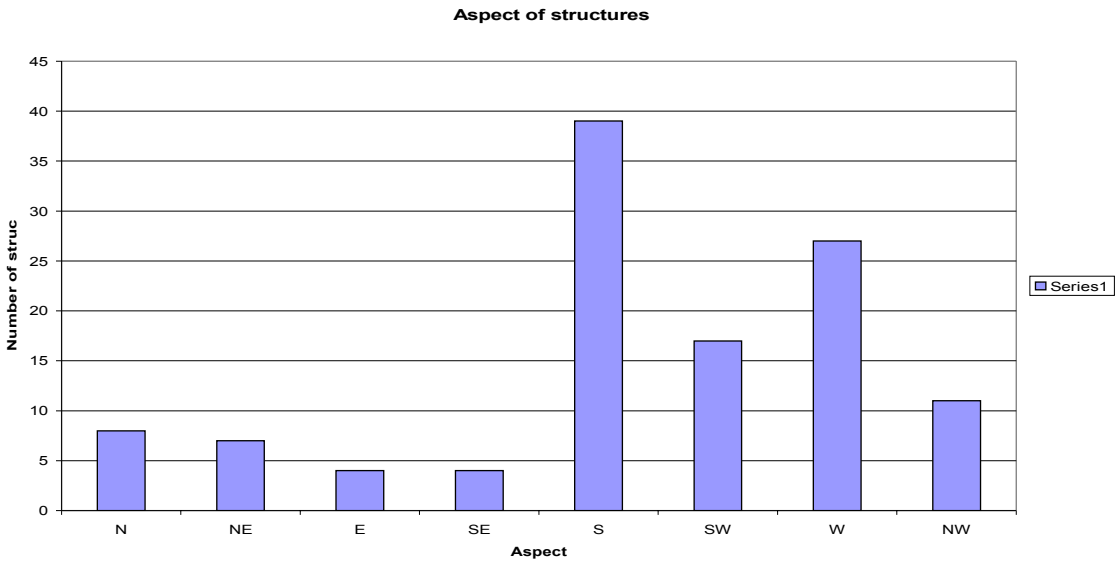
Aspect is the direction that the slope faces. This is an important factor when considering fire behavior. Aspect affects the spread of a fire in several ways. Vegetation growth is dependent on the amount of moisture and solar radiation received. Vegetation in the project area is more dependent on adequate moisture because of the influence of the dry desert climate. Fuels on north slopes are generally heavier, in tons per acre, but retain moisture longer

diurnally and seasonally. Fuels on south-facing slopes have less volume per acre because moisture evaporates more quickly and they are exposed to longer thermal heating by the sun, temperatures are higher and humidity is lower. Fuels are warmer and dryer during critical burning periods (afternoon). The following chart indicates an important fire behavior feature -- fuel temperature rises during the day depending on aspect:



(Teie, William. 2005)

Aspect was determined for each evaluated property and was measured at the primary residential structure. Some larger properties have variable aspect directions, such as properties with a ridge feature or in a canyon.



The majority of structures evaluated in Kennedy Meadows are located on south, south-west and west slopes. This is a function of where the private property is located and available building sites. Unfortunately this places many of the properties on the warmest and driest sites. In addition this places many structures at the head of a fire that moves from the south-west to the north east. This is the direction that the Manter fire was moving. Nothing can be done to change the aspect of a property; however, owners can increase vegetation clearances and thin vegetation on hazardous slopes in the direction that a fire may approach their property.

ASPECT OF PROPERTIES

North	8
North-east	7
East	4
South-east	4
South	39
South-west	17
West	27
North-west	11
TOTAL	117

SLOPE

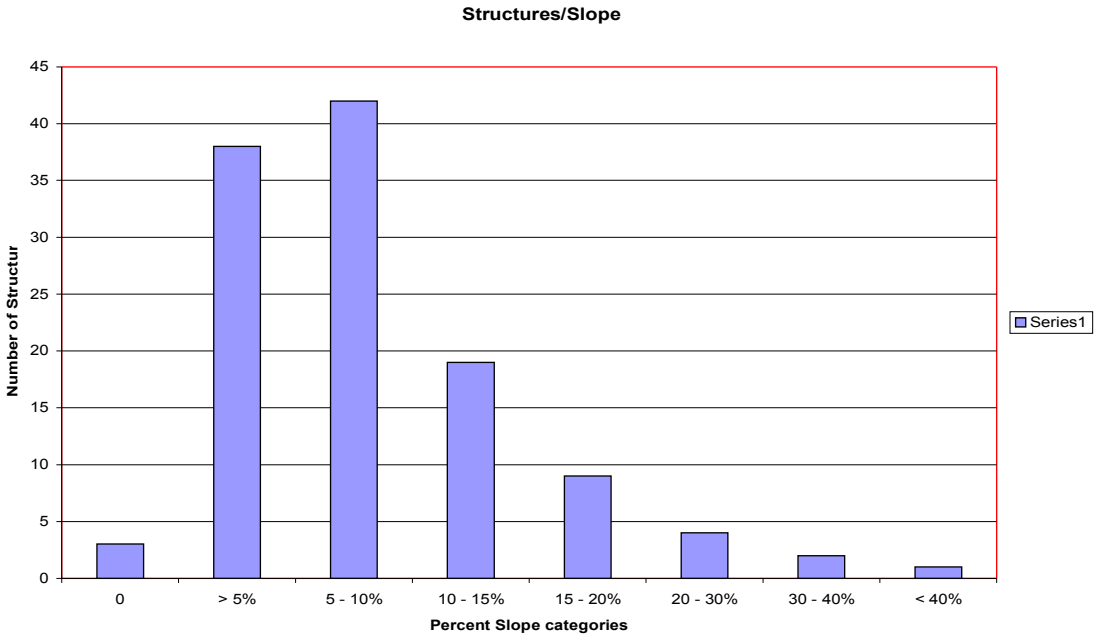
Slope affects a fire in two ways; by preheating fuels and structures as fire moves up-hill and by creating a draft as heat rises. Fires spread significantly faster up-slope. Flames are closer to exposed fuel on the up-slope side of an approaching fire, depending on the direction of wind. Fuel is pre-heated and ignites more quickly, increasing flame lengths and faster ignition. Fires create their own wind when spreading up-slope because of the physical phenomena of heat rising. Fire spread effect is slight on slopes up to 5%, rate of spread is increased by a factor of 2 on slopes up to 30%, rate of spread doubles again on slopes up to 55%.

Slope has an effect on down-hill spreading fires because of gravity. Fires burn down-hill by spreading burning material such as pine cones, logs, and branches as they roll down-slope.

Slope was determined for each property, facing down-hill from the structure (the direction which most fires will approach a structure). Slopes varied on many properties located on ridges, canyons, and swales.

Fortunately most properties in the project area are located on relatively gentle slopes, mostly less than 10%. This low slope percent helps mitigate he unfavorable effect of the aspect in Kennedy Meadows properties.

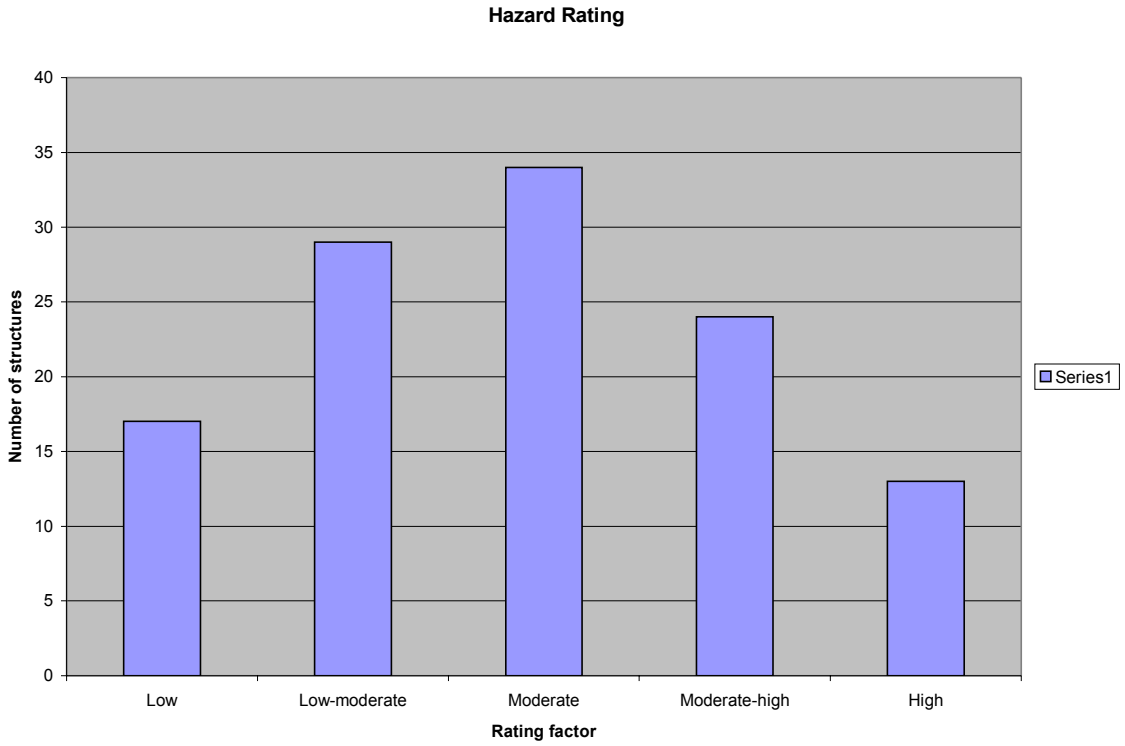
Slopes for the project area are shown on Map 4 and slope at the location of structures in the following chart.



OVERALL HAZARD RATING

In a wildland urban interface environment such as Kennedy Meadows, fuel also includes all structures, vehicles, fences and any materials on the property that are combustible. The ***Overall Hazard Rating*** is an estimate of factors such as slope, aspect, native vegetation, accessibility by fire crews, location of structures, building materials of structures, clearance of native vegetation, and materials scattered around the property (lumber piles, firewood piles, old cars, discarded appliances, debris [junk] and any other flammable material imported by owners). Categories were developed depending on the conditions found in the project area and included:

- **Low** - properties that could easily be protected during an emergency.
- **Low-Medium** – properties that could be protected with a little effort.
- **Medium** - properties that need a moderate amount of clean-up or clearance for adequate protection.
- **Medium-high** – properties that need considerable clearance or clean-up for protection.
- **High** – properties that cannot be saved by normal protection services (sacrifice).



These ***Overall Hazarding Ratings*** reflect the reality that fire agencies must face when large fires occur. When a fire is running in an area where hundreds of structures are threatened, and few engines are available for protection, choices must be made on where resources will be deployed. Property owners that have made an effort to protect their properties will receive preference for protection. Properties that do not have adequate clearance or have debris scattered around may be passed by. Protecting structures during an extreme emergency is an individual decision process undertaken by fire officials. The will attempt to protect structures where they have a chance of succeeding. They may not make waste scarce fire resources where the property owner does not appear to have made much effort to protect themselves.

LOW	17
LOW-MEDIUM	29
MEDIUM	34
MEDIUM-HIGH	24
HIGH	13
TOTAL	117

ROOF MATERIALS

A roof is a critical element in protecting a structure from wildland fire. Many structures are destroyed because the roof ignites from air borne embers that may be blown well ahead of a fire. Jerry Williams reported that glowing embers were falling on his metal roof during the Manter fire, which was almost one mile away.

Current law requires a “class A” roof for all new construction in fire hazard areas, including Kennedy Meadows. Recently state building codes have changed from detailed specifications for each class of roof material and application to a requirement that each manufacture create specifications that meet fire resistant standards (Rhoden, Gary. 2006). Engineering requirements are included during the plan/check phase of obtaining a building permit. Those requirements are provided by the manufacture of the roofing product. It is impossible to determine if an existing roof meets “class A” requirements without examining those specifications. Those specifications were not available during this evaluation.

The following roof materials were found on structures:

ROOFING MATERIAL

Composition shingle	58
Metal	52
Rolled asphalt roofing	4
Plywood	1
Wood shingle	1
none	1
TOTAL	117

Metal roofs most likely meet “Class A” requirements if properly installed. It is impossible to determine how many of the roofs made of composition shingle meet the “Class A” requirement without having access to the manufactures specifications. Owners of older (more than 10 years) comp/shingle roofs need to have their roof inspected by a roofing professional to determine if they are safe and meet current code requirements. The 7 structures with other roof types

including role asphalt, plywood and “unable to determine” should have them replaced with fire safe roofing.

SIDING/CONSTRUCTION OF STRUCTURES

Most structures evaluated were regular “California Stick” construction. Structures are built with 2x4 or 2x6 studs over a concrete foundation and wood floor. Thirteen structures are some form of log construction over foundations of concrete or concrete block. Some structures are manufactured homes, mobile homes and Recreation Vehicles set on semi-permanent foundations. A few Recreation Vehicles (trailers) are set up in semi-permanent with gable roof structures, room additions with fixed water connections, but retain their mobile wheels for tax purposes. Fire safe requirements for siding materials vary depending on the distance from the property line and clearance of fuels for fire safe requirements. Generally any siding material is allowed if the property set-back is over 30 feet. If the set back is less than 30 feet Building Code requires a non-flammable “one hour” siding as specified in the State Uniform Building Code (Rhoden, Gary. 2006).

Plywood was the most common siding material found and ranged from well maintained to deplorable. Well maintained structures had paint and/or weather treatment. Poorly maintained plywood structures exhibited; no surface treatment, dry wood, de-lamination, rough patch jobs, holes or missing sections and frizzing of the surface.

The following siding types were found:

STRUCTURE SIDING

Plywood	45
Log	13
Tongue and Grove - wood	6
Board and Bat - wood	7
Ship Lap – wood	4
Shingle - wood	2
Stucco	5
Composition fiber/cement	4
Composition shingle	4
Metal	3
Mobile - metal	9
- vinyl	1
- wood	2
- composition fiber	4
RV with structure	6
RV with add-on	2
TOTAL	117

The most fire resistant materials found are the composition/fiber/concrete, metal, stucco, composition asphalt shingle (if properly installed as “class A”), and log. The most hazardous siding material found was wood shingle and all the wood products such as plywood, tongue & grove, board and bat and ship lap that have not been properly maintained. One new structure has wood shingle siding and it most likely was pressure treated with fire retardant. Unfortunately this treatment only lasts a short time, maybe only a year according to the Tulare County Fire Marshall. Some structures had open spaces under the structure (between the pier supported floor joists and the ground). Frequently these spaces have become storage for old lumber and other household items. This is

a dangerous situation since fire brands/embers get sucked into these spaces and find fertile ground for ignitions.

Log home with good clearance, space under shed should be sheeted.

Structure pictured has good clearance, non-flammable siding, metal roof, composite deck, and emergency water supply with hydrant.

DECKS

Eighty-one properties evaluated (69%) had some kind of a deck. Most all decks were constructed with a wood support structure and most had wood planking for the deck surface. Two decks were supported with metal posts and wood joists. The most common decking was a 2x6 wood plank with railings of 2x4 or 4x4 wood posts. Some have been treated to prevent water damage. Several decks have been sheeted with plywood. Six structures were decked with a new composite material made of wood fiber, resins and binders. This material (Trex?) is rated as fire resistant.

The following table indicates the condition of the decks found:

DECK CONDITION

Deck condition – good	38
Deck condition – fair	31
Deck condition – poor	12
No deck	36
TOTAL	117

Decks are a common feature on homes, especially in mountainous regions. They provide extra outdoor living space and an opportunity to take advantage of views. Unfortunately, unless properly constructed and maintained, decks provide a great opportunity for blowing fire embers to find a home and destroy the entire structure. Decks have a high surface to volume ratio, are usually extremely dry, are usually not treated with fire resistant materials and present a great opportunity for fire ignitions. An additional hazard is presented because decks are usually built on the down slope side of a structure to take advantage of views. This presents the deck as the first opportunity for a fire to establish a foot-hold and destroy a structure.

Great care must be taken to construct and maintain decks so that they do not contribute to the flammability of a structure. Supports and joists should be inspected periodically to insure that animals (birds and rats) have not made nests in connecting joints. These nests provide kindling for embers. Decks built less

than 5 feet off the ground should be fully skirted so that embers cannot blow under and find a home. Lattice skirting is not adequate since embers can blow through the lattice interspaces. Old lumber, building materials and firewood should never be placed under or on top of a deck. These materials provide a great opportunity for fire embers to ignite a structure. Another common problem is patio furniture stored on decks. Patio furniture, unless made entirely of non-flammable materials, provides an ignition source for fire. Wood chairs, plastic chair cushions, toys, and BBQ equipment can provide a home for blowing embers. Decks, after roofing materials, are probably the most fire hazardous elements of a structure.

CHIMNEYS

Chimneys are present on almost every structure evaluated in Kennedy Meadows except for older trailers and Recreation Vehicles (even some of these have wood stoves added). No electrical or natural gas service is available in Kennedy meadows so almost everyone uses wood to provide their primary heating source. Almost all of the chimneys observed during the inspections qualified as fire safe with the required ¼ inch mesh over the exteror flue opening. Chimney flues were not inspected so fire-safe maintenance could not be determined. A few structures were observed that had defective flue caps or corroded flue cap mesh. Two cautions need to be emphasized for chimney flues:

1. Flues should be inspected and cleaned annually to prevent chimney fires. Most property owners use native Pinyon pine as their primary fuel source. Pinyon pine has high pitch content and tends to build up creosote in the flue during burning. This material accumulates in the flue and will, at some point, ignite and could create a house fire.
2. Chimney flue caps should have a minimum of a ¼ inch mesh and be free from any flammable materials for at least 15 feet (tree branches, pine needles leaves).

FIREWOOD PILES

Firewood for heating is a critical resource for the property owners of Kennedy Meadows. Pinyon wood is abundant and available to almost every owner. Most owners have an overabundance of pine wood because of clearing, pruning and removal of dead trees. Pinyon pine is an excellent fuel source because of its high choleric heat content (much pitch).

Firewood stacks were observed on almost every property and were not noted on the evaluation reports unless they presented a specific fire hazard. Firewood stacks placed next to a structure, on a deck or under a deck, were noted on the inspection reports. These stacks are a hazard and should be removed to outside the 50 foot zone of a structure for fire safe protection. During the winter firewood stacks can be moved to a more convenient location on decks or next to structures, however, these stacks must be removed to over 50 feet away from structures and decks during the fire season.

Firewood stacks are one of the worst nightmares for firefighters. When protecting a structure, wood piles must be thrown as far away from a structure as possible because of the danger of ignition and threat to a structure. This effort requires considerable effort and if firewood stacks are a considerable significant problem; this might be a deciding factor for the protection of a structure during a conflagration.

Deck with firewood, space under deck fascia should be protected.

VEGETATION CLEARANCE

Clearing flammable vegetation from structures is the most important activity that should occur annually to provide fire safety. Fire spreads through vegetation by radiant heat transfer, flame impingement and burning embers falling on unburned plants. Fire breaks are created by firefighters so that the spread of the fire can be contained; the wider the fire break, the better chance of containing the fire. The same principle applies to structural protection. The wider the fire-break between the structure and the approaching fire, the better the chance of saving the structure. Defensible space guidelines designate two zones, 30 feet and 100 feet from a structure. These zones provide protection from a wildfire burning under mild to moderate fire behavior. For protection from a more active fire, the 100 foot zone should be expanded to 150 feet. Structures built on a slope should have vegetation on the down-hill side up to 200 feet.

30 FOOT DEFENSIBLE SPACE ZONE

This “Defensible Space Zone” should be kept free of native grass, weeds, and most brush. Specimen brush plants may be retained if all dead material is removed and the plants are separated by 5 to 10 feet, depending on the size of the specimen. Pine trees should be thinned to 10 to 20 foot spacing, again depending on their size. Pines should be pruned up to about 1/3 (at least 6 to 10 feet) of their total crown. Pinyon pines in this area tend to retain all their branches down to ground level. These branches may be dead or live, but have many dead twigs and provide an ideal ladder fuel for a fire to reach the crown of the tree. All dead trees and down logs should be removed. Irrigated landscape plants should be low-growing and free of any dead branches and leaves. Old lumber, construction materials and firewood piles should be removed from this zone. Bare mineral soil, gravel or pavement is the best ground cover material in this zone. Several structures evaluated had driveways and parking completely surrounding the structure. This is excellent protection.

Fifty-five properties had good 30 foot defensible space clearance, 48 had moderate clearance and only 14 had poor clearance. The spring of 2006 was a little unusual in that a crop of annual weeds emerged, not a usual occurrence in this area. This light flashy fuel usually does not usually grow in the valley and many owners did not recognize the hazard this light vegetation posed.

The following clearance conditions were found on properties evaluated:

Good clearance in this zone is where all weeds, grass, and dead vegetation had been removed; brush removed or appropriately thinned; pines thinned and pruned; and all lumber, firewood piles and flammable materials are outside this zone.

Moderate clearance is where a few weeds and grass need to be cleared, brush has been thinned but needs more thinning or removal of dead branches and twigs. Pine trees are well spaced and have some pruning but need more pruning. Old lumber piles, fire wood and yard junk need attention.

Poor clearance is where the owner has done nothing. Dead weeds and grass are next to the structure and decks, brush is too thick and pines need thinning and pruning. In some cases the volume of yard junk would make protection of the structure difficult.

30 FOOT ZONE

Good clearance	28
Moderate clearance	71
Poor Clearance	17
TOTAL	117

100 FOOT WILDLAND FUEL REDUCTION ZONE

This zone needs to be managed with reduced fuel loads. Firefighters need this zone in order to provide a safe environment as a wildfire approaches a home and, if properly planned and maintained, will reduce fire intensity and flame lengths as the fire approaches.

Brush should be thinned to a spacing of about 10 feet and all dead vegetation should be cleaned out. Pine trees should be pruned up 6 to 10 feet or 1/3 of their crown. Ground litter (duff) which includes dead needles, leaves, pine cones and twigs can remain as a soil erosion measure. Litter material (branches) larger than 2 inches in diameter should be removed. If a structure cannot achieve this 100 foot zone because of the proximity of a property line, they should work with their neighbor to allow the clearance.

Twenty-eight properties had good clearance; 71 had moderate clearance and 17 were poor.

Good wildland fuel reduction clearance on a property is where all weeds, grass, and dead vegetation had been removed; brush thinned to 10 foot spacing; pines pruned 6 to 10 feet or 1/3 of their crown; and clearings around all lumber and firewood piles.

Moderate clearance is where brush has been thinned but needs more thinning, pine trees are well spaced and have some pruning but

need more pruning. Old lumber piles, fire wood and yard junk needs clearance of weeds and grass.

Poor clearance is where the owner has done nothing. Dead weeds and grass are in the zone, brush is too thick and pines need thinning and pruning.

100 FOOT ZONE

Good clearance	55
Moderate clearance	48
Poor clearance	14
TOTAL	117

PROPANE AND FUEL STORAGE TANKS

Almost all properties in Kennedy Meadows have propane storage on their property to provide cooking and heating fuel. Propane tanks should have 25 to 30 foot clearance of all weeds and brush and pine trees should be well pruned. Modern propane tanks are relatively safe if installed with required pressure relief valves. Older tanks, such as those on older trailers might present a real hazard to firefighters if they are not fitted with pressure relief valves. Propane tank clearances observed during evaluations ranged from safe to hazardous.

Automotive fuel is not commercially available in Kennedy Meadows and many owners have fuel deliveries made to above ground tanks on their property. Requirements for above ground tanks and dispensers (nozzles) are carefully specified in various fire and environmental codes. Commercial fueling suppliers are not allowed (by law) to fill a tank that does not meet minimum safety standards. It is assumed that all storage tanks meet these requirements or they could not be filled. For wildfire protection, above ground fuel tanks should meet the same clearance requirements as propane tanks (Rhoden, Gary. 2006).

OUTBUILDINGS

Outbuildings are all those other structures located on parcels. Most of these buildings are near the main living structure, however several properties had various outbuildings scattered throughout their parcel.

Outbuildings included generator sheds, pump houses, garages, shops, bunk houses, steel shipping containers, barns, and various old travel trailers or mobile homes used for storage. Siding and roofing on the numerous outbuildings was not summarized. Most outbuildings had siding and roofing matching the primary structure. Other materials found included metal, roll tar paper, scrap wood, old plywood, native wood slabs and concrete block. One common problem with outbuildings is that they had space between the floor joists and the ground. Old lumber, weeds, wood rat nests and other flammable material tend to accumulate in these spaces and provide an opportunity for burning embers to ignite the building. Any building with space between the ground and the floor should be skirted to the ground to prevent embers from entering.

Outbuildings should have vegetation clearance, depending on the use of the building. Storage sheds, generator sheds, pump houses should have 10 to 20 feet clearance. Any building containing hazardous materials (including fuel) should be posted on the outside and have 20 foot clearance. Barns, especially those containing hay, should have a minimum of 30 foot clearance.

WATER STORAGE

Adequate available water is an important consideration for fire fighting. Type 3 engines (wildland engines) usually carry 500 gallons of water. This supply can be easily depleted during a short fire fight. Having available water might be the determining factor in saving a structure. Being able to access this water is critical. Having a 2 ½ or 4 inch hydrant connection is a great advantage. Even a hose faucet is some advantage. A parked engine can attach two or three garden hoses to their tank and keep it topped off during the fire fight. Gravity tanks are the best since no power or pumps are necessary to access the water. The following water storage and hydrants were found on the evaluated properties:

WATER STORAGE AND HYDRANTS

Water Storage	# Properties	**Hydrant**	# Properties
None or could not find	18	None	84
Less than 1000 gal.	12	2 ½ ‘” or 4”	33
1000 to 2000 gal.	19	TOTAL	117
2000 to 4000 gal.	31		
4000 to 8000 gal.	27		
More than 8000 gal.	6		
Pressure system	4		
TOTAL	117		

PROSPECT FOR FUTURE SUCCESS

The purpose of this project is to protect the safety of the people residing and recreating in Kennedy Meadows, reduce damage to private property and structures and protect and manage the natural resources of this unique environment. Most of the burden of this effort, rightly so, is the responsibility of the property owners within the project area. **Recommendation 1** suggests that property owners bare the responsibility of improving the survivability of their homes and investments. All owners must be active participants in maintaining a way-of-life that they expect to enjoy in this mountain environment.

Several recommendations require funding that might be obtained from grants or other programs. A number of sources of funding are available; several have been utilized by the KRVFSC and the KMPOA. The "*Kern River Valley Community Fire Safe Plan"* (pages 97-108) provides a comprehensive list of available grant resources and those programs will not be repeated in this report.

State Clearing House

In California, agencies have pooled their "National Fire Plan" funding into a one-stop shop to help simplify the process of finding and applying for grants which improve California's community wildfire preparedness. This one-stop shop is located on the internet and hosted by the California Fire Safe Council (FSC). The FSC hosts this web application site in cooperation with members of the California Fire Alliance. The following is the process for applying for grants:

- ✓ Register with the clearing house
- ✓ Create & complete concept paper
- ✓ Submit to Clearinghouse
- ✓ Clearinghouse routes to appropriate grant programs
- ✓ Project selection
- ✓ Applicants notified funding decision has been made
- ✓ Clearinghouse creates applications for selected projects
- ✓ Applicants fill out application

- ✓ Submit to Clearinghouse
- ✓ Clearinghouse coordinates with funder(s) & applicants to fund projects
- ✓ Organizations with projects funded through the California Fire Safe Council fill out progress reports in grants clearinghouse

Some State Programs are not funded through the Clearing house.

State funding: Department of Forestry and Fire Protection (www.fire.ca.gov)

- The **Vegetation Management Program (VMP)** is a cost-sharing program that focuses on the use of prescribed fire, and mechanical means, for addressing wildland fire fuel hazards and other resource management issues on State Responsibility Area (SRA) lands. The use of prescribed fire mimics natural processes, restores fire to its historic role in wildland ecosystems, and provides significant fire hazard reduction benefits that enhance public and firefighter safety. VMP allows private landowners to enter into a contract with CDF to use prescribed fire to accomplish a combination of fire protection and resource management goals. Implementation of VMP projects is by CDF Units. The projects which fit within a unit's priority areas (e.g., those identified through the California Fire Plan) and are considered to be of most value to the unit are those that will be completed. The Vegetation Management Program has been in existence since 1982 and has averaged approximately 35,000 acres per year since its inception.
- CDF has begun implementation of a new fuels reduction program funded by **Proposition 40**, the California Clean Water, Clean Air, Safe Neighborhood Parks, and Coastal Protection Act of 2002. The goal of the CDF Proposition 40 Fuels Reduction Program is to reduce wildland fuel loadings that pose a threat to watershed resources and water quality (a perfect match for the South Fork of the Kern River). The links on this page will provide qualified landowners with the information necessary to apply for Prop. 40 funds. Nonfederal lands in 15 Sierra Nevada counties are eligible for the Prop. 40 Reduction Program: Butte, Plumas, Sierra, Yuba,

Nevada, Placer, El Dorado, Amador, Alpine, Calaveras, Tuolumne, Madera, Mariposa, Fresno, and **Tulare**. Eligible participants may be either government agencies or nonprofit organizations. Per the Public Resources Code, Section 30910(c) "Nonprofit Organization" means any California corporation organized under Section 501(c)(3) of the federal Internal Revenue Code. CDF has developed maps to aid in the identification of high priority areas for fuels reduction projects to protect watersheds and water quality. These county-based maps are based on California Fire Plan data that indicate watershed and water quality assets at risk of being adversely impacted by wildfire.

- The **California Forest Improvement Program** (CFIP) was created as a cost-share program to encourage improvement of management of forestlands. Eligible landowners can receive technical and financial assistance for forest management plans, **fuels management**, wildlife habitat improvement, and reforestation. State funds can provide up to 75% funding for certain projects.
- CDF's 1996 California Fire Plan included the **Prefire Management Initiative** which coordinates a number of land use planning, fire prevention, management and forest improvement programs. Forest and brush lands are assessed to determine risk to catastrophic wildfire. Priorities are established and fuels management and grant funding may be available. This process is conducted by the CDF Tulare Unit.

PURPOSE OF THE PROJECT

The purpose of this grant is to develop a Community Wildfire Protection Plan for Kennedy Meadows and adjacent developed areas. The plan provides the basis for future efforts by the Kern River Valley Fire Safe Council and the community to improve the survivability of the Kennedy Meadows to wildfire.

Kennedy Meadows was not identified as a project in the 2002 *KERN RIVER VALLEY COMMUNITY FIRE SAFE PLAN;* however the California Fire Alliance has designated Kennedy Meadows as a community at risk and thereby qualified the community to received a planning grant from the Bureau of Land Management for this plan. Part of the reason Kennedy Meadows was identified

is high risk was because of the 74,000 acre Manter Fire of July 2000 which burned over 11,000acres in Kennedy Meadows area and destroyed 8 structures (3 were residential structures).

REQUEST FOR PROPOSAL

The Kern River Valley Fire Safe Council issued a Request for Proposals to develop a Community Wildfire Protection Plan for the Kennedy Meadows community on November 30, 2005.

The Request for Proposal (RFP) called for the following:

1. A community-wide evaluation of hazards and construction types throughout the Kennedy Meadows Community. Where individual property owners give permission, this will be based on a parcel-by-parcel inventory.
    a) Assessment of both vacant and improved properties
    b) Assessment of building material types and construction features
    c) Assessment of vegetation on each parcel and the threat from adjacent parcels
2. Complete a community structure protection and evacuation plan.
3. Prepare a Kennedy Meadows Communication Action Plan to be used to convey risks and proposed hazard reduction activities.
4. Complete a survey of fire safe knowledge and support within the community and present a summary of the results.
5. Evaluation the current existing fire protection capabilities.
6. Develop a set of recommendations to improve fire safety in Kennedy Meadows, including a summary of community-wide structure ignitability and fuels management issues.
7. Identify future funding sources for plan implementation.

SUBMITTED PROPOSAL

The project was awarded on March 17, 2006. Kenneth Delfino, a Registered Professional Forester (retired from the California Department of Forestry and Fire Protection) from Bakersfield was given the award. Dr. Chris Dicus, Professor of Wildland Fire at California Polytechnic State University, San Luis Obispo performed fuels analysis and fire modeling.

GRANT TASKS:

1. **Community-wide Evaluation of Hazards and Construction.** See section on “Community-wide Evaluation of Hazards and Construction”, page 82.
2. **Evacuation plan.** See “Protect Your Property”, page 114 , and “Evacuation Plan”, page 78.
3. **Evaluation of the current protection capabilities.** See “Fire Protection Resources”, page 71.
4. **Recommendations for improvement of existing conditions including a community-wide summary of structure ignitability and fuels management issues.** See “Recommendations”, page 16.
5. **Identify funding sources for plan implementation.** See “Prospect for Future Success”, page 106.

Acknowledgments

Assistance on this project was provided by a number of individuals within the Kennedy Meadows community. A special thanks to Ed Royce for his gentle prodding on several key issues and reviewing recommendations and drafts. Jerry Williams was an excellent tour guide and his wife Kay provided great hospitality. Larry Watson served as a tour guide and provided valuable information on the Volunteer Fire Department activities. Kevin Chambers, Debbie Santiago, and Chris Ryan provided information on BLM fire protection services in Kennedy Meadows. BLM GIS specialists Larry Vredenburgh provided hard copies of orthophoto maps and spent several hours crafting the fuel project maps contained in the report. Scott Williams, Fire Management Officer on the Kern River Ranger District of the Sequoia National Forest assisted with fuels information and federal fire protection policies and procedures. CDF Battalion Chief Phil Brown and Paul Marquez, Fire Investigator, CDF/Tulare County, explained the state/county involvement in the Kennedy Meadows community. Paul provided the legal requirements for “Fire Safe” clearances around structures. Gary Rhoden, Deputy Fire Marshall for Tulare County supplied information on county building codes and planning requirements for rural development. A special thanks to John Bryant, retired Forest Service Fire Liaison Officer for Southern California. John provided valuable advice and reviewed much of the document. A very special thanks to my wife Rosemary for putting up with the mess in the office and reviewing drafts of materials.

ABOUT THE AUTHORS

Kenneth Delfino, the primary consultant for this project, conducted the field work and authored most of the report. Ken is a Registered Professional Forester (#506) licensed by the State of California. After graduation from Humboldt State University in 1965 Ken worked for the Los Angeles County Fire Department for 7 ½ years operation forestry facilities in the Santa Monica and San Gabriel Mountains and in various administrative capacities in the Department headquarters. During these years Ken worked on numerous fires within the county.

In 1973 Ken moved to the California Department of Forestry and Fire Protection serving in a number of field and administrative functions in a region from Kern to El Dorado Counties. Ken was a statewide administrator in the Departments Sacramento Headquarters for 18 years, the last 13 as Deputy Director for all the departments' natural resource programs.

Since retirement in 1997 Ken has been active in the Tree Foundation of Kern and Executive Director of the Cal Poly (San Luis Obispo) Urban Forest Ecosystem Institute. Ken holds an Adjunct Professor position at Cal Poly teaching a graduate seminar on the conservation of natural resources and as an instructor at Bakersfield College teaching Wildland Fire Management.

Dr. Chris Dicus serves as the Coordinator for the Wildland Fire & Fuels concentration of the Forestry & Natural Resources major at Cal Poly, where he teaches seven classes on various aspects of wildland fire management. He serves on the Board of Directors for the Association of Fire Ecology (international) and the San Luis Obispo County FireSafe Council and is also the current President of the Los Padres Chapter of the Society of American Foresters. His research focuses on fire in the wildland-urban interface, how various forestry practices affect fuels and potential fire behavior, and forest regulation. He has authored or co-authored numerous manuscripts, including the first Fire Management Laboratory Manual ever published in the United States. He also, at times, is called on by government agencies to serve as a fire behavior specialist during wildfires.

Dr. Dicus came to Cal Poly after an appointment as a Gilbert Research Fellow at Louisiana State University, where he also received his Ph.D. in Forestry. He received an M.S. in Forest Resources from Utah State University and a B.S. in Forestry-Wildlife from Louisiana Tech University, where he graduated summa cum laude.

Dr. Dicus authored the section on "Fire Ignition Models" and crafted most of the GIS maps for the report.

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PROTECT YOUR PROPERTY

Fire is a part of our natural environment. Our forests and range lands have adapted to a fire environment and have been burning in California long before the settlement of Kennedy Meadows. Some of the structures in Kennedy Meadows have been built and maintained without regard to the wildfire setting. Every structure evaluated during the summer of 2006 needed some improvement in order to be protected from fire.

Protecting your property involves several elements:

1. Structure
2. Clearance zones/landscape
3. Adequate emergency water supply
4. Access
5. Fire protection resources

Of these factors, the first four are under the control of the property owner and the chance of surviving a wildfire will be improved with each incremental constructive step taken.

A structure can be built that will survive even the most severe wildland fire. People have been building them in the Mediterranean regions of Italy, France and Spain for hundreds of years. The climate and fuels of this region are similar to much of the western states and they have frequent large wildfires, but lose few structures. Construction of the structures is the major difference. Residential and commercial structures in European fir prone areas are built with stone, concrete or concrete block. Roofs are covered with fired tile, concrete tiles or slate. Eaves are covered with tile, stone or stucco and windows have heavy, closing wood shutters. Most decks are made of stone or concrete, however some do have flammable wood railings. There is little exposed flammable surface and when a fire occurs, residents close the house and go to town for the duration. Another interesting difference is that little clearance of native vegetation occurs. Many houses have lawn and irrigated landscape but native

plants are preferred. Utilizing European construction techniques would drastically reduce structural loss from wildfires in the Western United States.

All structures used for human habitation should be equipped with a modern smoke alarm and that should be tested annually. Fire departments recommend that batteries be changed annually on the same day as the day-light-savings time change in the fall.

STRUCTURE – Roof

Roofs should be covered with a "Class A" non combustible material such as metal, clay tile, concrete tile or slate. Many composition asphalt shingles meet the "Class A" requirement if certified by the manufacturer and properly installed. If a structure has an asphalt shingle roof and the owner is not certain that it meets the "Class A" requirement, it should be inspected by a qualified roof inspector. Asphalt shingles more than 25 years old should be replaced with a "Class A" roof. Chimney caps must be covered with certified spark arrestors and inspected annually when the flue is cleaned. Most people in this area use native Pinyon Pine for fire wood. Pine has high pitch content and tends to build-up creosote in the flue. Creosote can cause a serious chimney fire if not cleaned annually. Roof and attic vents should be covered with ¼ inch galvanized mesh and inspected periodically. Embers can get sucked into vents and start attic fires. Rain gutters, if installed, must be cleaned several times during the year and kept free of needles, leaves and other debris.

Remove all dead tree branches hanging over the roof and any branches touching the roof structure. Keep all tree branches at least 15 feet from all chimneys. Clean all dead needles and leaves from the roof, especially in valleys where they tend to accumulate.

STRUCTURE - Siding

Siding should be non-flammable or capable of withstanding one hour of flame or high heat. Stucco, stone, concrete block and concrete fiber materials meet this requirement. Log homes also meet the requirement if the log joints are well chinked and no vegetation debris is allowed to accumulate in or around log joints. Most of the structures evaluated have plywood siding of some type. Well

maintained and protected plywood should provide adequate protection under all but the most extreme conditions. Structures sided with wood shingles present a significant fire risk.

Structures should be fully protected to ground level. Concrete, stone and concrete block foundations provide excellent protection if crawl space openings are protected by solid doors or ¼ inch steel mesh. Foundation vents should also be covered with mesh. Some structures are supported with wood or concrete block piers. The space between the ground and structural siding should be completely sealed. Many structures were found with this material missing and various building materials and household goods stacked under the structure floor. This is an extremely dangerous practice which provides a perfect entry for blowing embers to catch fire.

STRUCTURE – Windows

Windows in a structure provide an entry point for fire in two ways; first by allowing radiant heat to penetrate and catch curtains and furniture on fire and second, windows can shatter because of excessive heat or blowing debris, allowing embers to enter the structure and ignite interior objects. Triple pane windows with UV protection generally prevent radiant heat from penetrating. Double pane windows with a reflective shield (tint or aluminum foil) provide almost equal protection. Single pane windows provide little protection unless vegetation clearance is performed and flames remain well away from the structure. The best solution for all window openings is to install metal or wood shutters. Shutters prevent heat radiation into the structure and protect glass from heat shatter or wind borne objects from breaking the glass. If wood shutters are used, they should be at least ¾ inch thick and sealed or painted. Shutters should be equipped with solid fasteners that will hold the shutters closed even with strong winds. Of course, the shutters should be closed if a fire is approaching.

DECKS

Decks should be well maintained with paint or water seal. Older decks with weathered and split decking should be repaired or replaced. Replacement material should be composite wood fiber; it resists flame and requires little

maintenance. Fire wood should not be stored on or under decks during the fire season. The most dangerous area of a deck is the under-structure. If the deck is less than five feet off the ground, it should be completely sheeted to prevent embers from entering. Lattice work sheeting is not adequate because it allows embers to enter. The space under decks should not be used for storage of lumber, firewood or other household items unless the deck is fully sheeted. Decks over five feet above the ground need to have the under-structure inspected frequently to prevent birds and rodents from building nests. Any openings between the deck and the structure should be covered. If a fire is approaching (or residents are away for long periods during the fire season) all patio furniture and other flammable materiel should be removed and stored inside or moved outside the defensible space zone.

OUTBUILDINGS

Outbuildings include all other structures located on parcels that are not the primary living unit. Most of these buildings are near the main living structure, however several properties had outbuildings scattered throughout the parcel.

Outbuildings included generator sheds, pump houses, garages, shops, bunk houses, steel shipping containers, barns, and various old travel trailers or mobile homes used for storage. Siding and roofing on the numerous outbuildings varies from non-combustible to highly flammable. Most outbuildings had siding and roofing matching the primary structure. Other materials found included metal, roll tar paper, scrap wood, old plywood, native wood slabs and concrete block. One common problem with outbuildings is that they had space between the floor joists and the ground. Old lumber, weeds, wood rat nests and other flammable material tend to accumulate in these spaces and provide an opportunity for burning embers to ignite the building. Any building with space between the ground and the floor should be skirted to the ground to prevent embers from entering.

Outbuildings should have vegetation clearance, depending on the use of the building. Storage sheds, generator sheds, pump houses should have 10 to 20 feet clearance. Any building containing hazardous materials should be posted

on the outside and have 20 foot clearance. Barns, especially those containing hay, should have a minimum of 30 foot clearance.

WATER STORAGE

Adequate available water is an important consideration for fire fighting. Type 3 engines (wildland engines) usually carry 500 gallons of water. This supply can be easily depleted during a fire fight. Having available water might be the determining factor in saving a structure. Being able to access this water is critical. Having a 2 ½ or 4 inch hydrant connection is a great advantage however the hydrant should be clearly marked. A red arrow with the word "HYDRANT" should be located within three feet of the hydrant so that it can be easily located by firefighters. Even a hose faucet is some advantage. A parked engine can attach two or three garden hoses to their tank and keep it topped off during the fire fight. Gravity fed hydrants are best since no power or pumps are necessary to access the water.

FIRE TOOLS

Every house should have a readily available fire tools and all occupants of the house should know where they are located. Fire tools include the following:

- A fire extinguisher with "A, B, and C" capabilities. The extinguisher should be in a prominent location and additional extinguishers should be located in outbuildings, such as shops, garages and generator sheds.
- A ladder long enough to reach the roof in case of a roof fire. In the event of an approaching fire, the ladder should be placed against the roof so that it can be used by firefighters.
- One hundred feet of pre-connected garden hose or 100 feet of fire hose if a hydrant is available. In the event of an approaching fire the fire hose should be connected to the hydrant. Several 3 to 5 gallon buckets should be located on near water faucets and on decks. All hoses should have an attached nozzle with a variable adjustment and shut-off capabilities.

- Hand tools such as a shovel, rake, axe and/or Pulaski, hoe and/or McLeod, and a pry bar capable of removing burning siding or decking should be available.

DEFENSIBLE SPACE

"*Defensible space is the area around a building that has been significantly modified to reduce a wildfire's intensity enough to prevent the fire from igniting the house. The defensible space will also allow firefighters to more safely defend the house. It can also help prevent a house fire from spreading to surrounding vegetation."* (Slack, 2000).

30 FOOT DEFENSIBLE SPACE ZONE

This "Defensible Space Zone" should be kept free of native grass, weeds, and most brush. Specimen brush plants may be retained if all dead material is removed and the plants are separated by 5 to 10 feet, depending on the size of the specimen. Pine trees should be thinned to 10 to 20 foot spacing, again depending on their size. Pines should be pruned up to about 1/3 of their total crown (6 to 10 feet). Pinyon pines in this area tend to retain all their branches down to ground level. These branches may be dead or have many dead twigs and provide a perfect ladder fuel for a fire to reach the crown of the tree. All dead trees and down logs should be removed from this zone. Irrigated landscape plants should be low growing and free of any dead branches and leaves. Bare mineral soil, gravel or pavement is the best ground cover. Old lumber, construction materials and firewood piles should be removed from the zone. Several structures evaluated had driveways and parking completely surrounding the structure. This is excellent protection.

100 FOOT WILDLAND FUEL REDUCTION ZONE

This zone needs to be managed with reduced fuel loads. Firefighters need this zone in order to provide a safe environment as a wildfire approaches a home. If the zone is properly planned and maintained, it will reduce fire intensity and flame lengths as the fire approaches.

Brush should be thinned to a spacing of about 10 feet and all dead vegetation should be cleaned out. Pine trees should be pruned up 6 to 10 feet or 1/3 of their crown. Ground litter (duff) which includes dead needles, leaves, pine cones and twigs can remain as a soil erosion measure as long as they are not more than two inches deep and evenly scattered. Litter material (branches) larger than 2 inches in diameter should be removed. If a structure cannot achieve this 100 foot zone because of the proximity of a property line, they should work with their neighbor to allow the clearance.

BEYOND 100 FEET – PROTECTION ZONE

Clearance beyond 100 feet may be necessary depending on the slope of the land on which the structure is built. On slopes up to 20% (includes 94% of the properties evaluated) a 100 foot zone is usually adequate. Clearance on slopes 21% to 40% with should be 150 to 200 feet and slopes over 40% need at least 200 feet of clearance.

PROPANE AND FUEL STORAGE TANKS

Almost all properties in Kennedy Meadows have propane storage on their property to provide cooking and heating fuel. Propane tanks should have 25 to 30 foot clearance of all weeds and brush. Any pine trees should be well pruned. Modern propane tanks are relatively safe if installed with required pressure relief valves. Older tanks, such as those on older trailers might present a real hazard to firefighters if they are not fitted with pressure relief valves. Propane tank clearances observed during evaluations ranged from safe to hazardous.

Automotive fuel is not commercially available in Kennedy Meadows. Many owners have fuel deliveries made to above ground tanks on their property. Requirements for above ground tanks and dispensers (nozzles) are carefully specified in various fire and environmental codes. Commercial fueling suppliers are not allowed (by law) to fill a tank if it does not meet minimum safety standards. It is assumed that all storage tanks meet these requirements or they could not be filled. For wildfire protection, above ground fuel tanks should meet the same clearance requirements as propane tanks (Rhoden, Gary. 2006).

ROAD AND DRIVEWAY ACCESS

Getting fire apparatus to a structure during an emergency is critical to saving life and property. All fire protection services arrive via some type of vehicle. BLM crews at Chimney Peak station utilize Type 4 engines. Engine 34 located at the County Volunteer Fire Station is a Type 3 engine.

Tulare County has requirements for roads and driveways for all new construction in rural areas (Tulare County, 2004). Those specifications include:

- New driveways/streets are limited to 15% grades with all weather surfaces. Grades to 20% are allowed if paved. Surface must be capable of supporting 40,000 lbs.
- Driveways require a minimum of 10 ft. wide (except commercial parcels) and have a minimum of 15 ft. vertical clearance.
- Driveways over 150 ft. must provide a turnout capable of allowing free passage of a vehicle and a Fire Engine.
- Gates must be set back at least 30 ft. from a main road to allow a Fire Engine to open the gate without blocking the road.
- Clear flammable vegetation at least 10 feet from roads and 5 feet from driveways.
- Cut back overhanging tree branches above roads and driveways.
- Post the house address so that it is visible from the main traveled road. The address should be numbers 4 inches high and reflective at night.

Kennedy Meadows/Beach Meadows road is the only paved road in the project area. All other roads are private with native material surfaces maintained by residents. Fortunately all the main roads within the developed area are well signed, however in some locations it is difficult to determine where a main road ends and a driveway begins. Many driveways are gated and locked, in some places with multiple gates. These conditions, along with the lack of street addresses, would make the protection of structures difficult in some locations.

WHEN A FIRE APPROACHES

Wildfires will occur in Kennedy Meadows. Pre-planning will save lives and property. Therefore, this plan must be communicated to family members, friends and neighbors. Evacuations may be ordered by the county sheriff however property owners may stay to protect their property. If owners decide to stay it is critical that their plan include measures to protect life in the event of a blow-up. The following measures are recommended by the Kern River Fire Safe Council, Forest Service, BLM and the Kern County Fire Department (assume that Tulare County Fire has the same recommendations):

- ✓ Evacuate, if possible, all family members not essential to protecting the house. Evacuate pets as well.
- ✓ Contact a friend or relative and relay your plans.
- ✓ Make sure family members are aware of a prearranged meeting place or evacuation center.
- ✓ Tune into a local radio station and listen for instructions.
- ✓ Place vehicles in the garage or next to the house, have them facing out towards the main road with the windows rolled up.
- ✓ Place valuable papers and mementos in the car.
- ✓ Close the garage door and leave it unlocked.
- ✓ Remove all patio furniture and other combustible items from the deck or next to the house. Place them inside the structure or move them outside the 30 foot Defense Protection Zone.
- ✓ Shut off the propane at the tank.
- ✓ Wear only cotton or wool clothes. If firefighting Nomex clothing is available, wear that. Proper attire includes long pants, long sleeved shirt or jacket, and boots. Carry gloves, a handkerchief to cover your face, and goggles.
- ✓ Have adequate water on hand to drink.
- ✓ Close all exterior vents, exterior doors and windows.
- ✓ Prop a ladder against the house so that firefighters have access to the roof.
- ✓ Make sure that all garden hoses are connected to faucets and attach a nozzle set on “spray”. If a hydrant and fire hose are available, connect them for use by firefighters. Be careful not to overuse water in advance of the fire. Conserve water as it may be needed by firefighters.
- ✓ Soak rags, towels, or small rugs with water to use in beating out embers or small fires.

- ✓ Inside, fill bathtubs, sinks, and other containers with water. Outside, do the same with garbage cans and buckets. Remember that the water heater and toilet tank are available sources of water.
- ✓ Close all interior doors.
- ✓ Open the fireplace and wood stove damper but place a screen over the fireplace opening to prevent embers from entering the house. Opening these dampers helps equalize the air pressure inside the house and helps to prevent embers from getting sucked into the house.
- ✓ Leave a light on in each room.
- ✓ Remove lightweight and/or non-fire resistant curtains and other combustible materials from around windows, unless they are covered by shutters.
- ✓ Move overstuffed furniture (e.g. couches, easy chairs, etc.) to the center of the room.
- ✓ If available, close fire resistant drapes, shutters, or Venetian blinds. If there is time and nothing else is available, tape aluminum foil over the windows. Attach pre-cut plywood panels to the exterior of windows and glass doors.
- ✓ Turn off all pilot lights.
- ✓ Keep wood shake or shingle roofs moist by spraying water. Conserve water and do not do this until embers are blowing in the surrounding area. If water is abundant and gravity fed, consider placing sprinklers on the roof peak.
- ✓ Monitor the roof, attic and deck for embers, smoke and fire.

These steps are critical to prevent injury to property owners and firefighters. It is important that each step is preplanned and communicated to family, friends and neighbors. It would be useful to keep a check-list handy in several locations in the house and when a fire occurs each item can be checked off as it is accomplished. Forgetting one important step can result in the loss of your house and possible injury to the occupants.

Two Web-based tools are now available for homeowners to evaluate the wildfire threat they face and determine what they can do to improve the safety of their home. The “Homeowner’s Wildfire Mitigation Guide” is a structure fire hazard evaluation program that can be performed by the homeowner, this guide can be found online at – http://groups.ucanr.org/HWMG/index.cfm

The “Fire Information Engine Toolkit” located at – http://firecenter.berkeley.edu/toolkit/ has a parcel-level structure vulnerability assessment and ranking approach based on the latest science. This approach goes beyond the current wildfire hazard assessment methods by focusing on fire brand or ember ignition – which is increasingly seen as the wildfire attack mechanism that leads to the most structure damage – and spatial interactions between threats (such as stressed vegetation in relation to deck and roof structures). Fire embers are a critical threat in fires that will occur in Kennedy Meadows. This Web-site contains the following tools:

- An online, science-based, wildfire vulnerability self-assessment for homeowners that returns a customized “report card” with tips for improving their chance of surviving a wildfire. Homeowners in Kennedy Meadows can use their property evaluation (available from the KMPOA) to complete their assessment.
- An extensive guide to mitigating wildfire hazards.
- Up-to-the-minute wildfire news.
- Interactive maps of active fires in California.

APPENDIX I Public Resource Code 4291

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

(a) Maintain around and adjacent to the building or structure a firebreak made by removing and clearing away, for a distance of not less than 30 feet on each side of the building or structure 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 that 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 the building or structure additional fire protection or firebreak made by removing all brush, flammable vegetation, or combustible growth that is located within 100 feet from the building or structure or to the property line or at a greater distance if required by state law, or local ordinance, rule, or regulation. This section does not prevent an insurance company that insures a building or structure from requiring the owner of the building or structure to maintain a firebreak of more than 100 feet around the building or structure. Grass and other vegetation located more than 30 feet from the 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 that extends within 10 feet of the outlet of a chimney or stovepipe.

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

(e) Maintain the roof of a 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 a 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) Prior to constructing a new building or structure or rebuilding a building or structure damaged by a fire in such an area, the construction or rebuilding of which requires a building permit, the owner shall obtain a certification from the local building official that the dwelling or structure, as proposed to be built, complies with all applicable state and local building standards, including those described in subdivision (b) of Section 51189 of the Government Code, and shall provide a copy of the certification, upon request, to the insurer providing course of construction insurance coverage for the building or structure. Upon completion of the construction or rebuilding, the owner shall obtain from the local building official, a copy of the final inspection report that demonstrates that the dwelling or structure was constructed in compliance with all applicable state and local building standards, including those described in subdivision (b) of Section 51189 of the Government Code, and shall provide a copy of the report, upon request, to the property insurance carrier that insures the dwelling or structure.

(h) 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 or she may vary the requirements respecting the removing or clearing away of flammable vegetation or other combustible growth with respect to the area surrounding those structures.

No exemption or variance shall apply unless and until the occupant thereof, or if there is not an occupant, the owner thereof, files with the department, in a form as the director shall prescribe, a written consent to the inspection of the interior and contents of the structure to ascertain whether this section and the regulations adopted under this section are complied with at all times.

(i) The director may authorize the removal of vegetation that is not consistent with the standards of this section. The director may prescribe a procedure for the removal of that vegetation and make the expense a lien upon the building, structure, or grounds, in the same manner that is applicable to a legislative body under Section 51186 of the Government Code.

(j) As used in this section, "person" means a private individual, organization, partnership, limited liability company, or corporation.

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).

APPENDIX II - LE - 100

STATE OF CALIFORNIA
DEPARTMENT OF FORESTRY AND FIRE PROTECTION
NOTICE OF DEFENSIBLE SPACE INSPECTION
LE-100 (NEW – 3/2006)

113251

NOTICE OF DEFENSIBLE SPACE INSPECTION

SHADED BOXES ***MANDATORY*** - ALL OTHERS OPTIONAL

1. INSPECTOR'S FULL NAME (FIRST, M.I., LAST)	2. INSPECTOR'S TITLE	3. BADGE NUMBER	4. INSPECTOR'S AGENCY	5. INSPECTION DATE (MM/DD/YYYY)

6. PROTECTION RESPONSIBILITY	SRA	LRA	FRA
BIA	☐	☐	☐
BLM	☐	☐	☐
CDF	☐	☐	☐
Contract County	☐	☐	☐
USFS	☐	☐	☐
Other	☐	☐	☐

7. UNIT ID	8. BATTALION NUMBER	9. STATION NUMBER
10. AP BOOK	**11. AP PAGE**	**12. AP PARCEL #**
13. LATITUDE (Datum = WGS84) (Decimal Degrees; ex: 38.5761)	**14. LONGITUDE** (Datum = WGS84) (Decimal Degrees; ex: 121.4969)	

15. If mailing address for notices is other than inspection location, check here: ☐ and write complete address in comments section.

INSPECTEE

16. NAME (LAST, FIRST)		
17. ADDRESS		
18. CITY	19. STATE CA	20. ZIP
21. PHONE NUMBER #1	22. PHONE NUMBER #2	23. E-MAIL ADDRESS

24. COMMENTS:

25. VIOLATION REINSPECTION? ☐ YES ☐ NO	26. INSPECTION # ☐ ☐ ☐ 1 2 3	27. CITATION # ☐ ☐ ☐ 1 2 3	28. FOLLOW-UP INSPECTION DATE: (MM/DD/YYYY) ☐ N/A

29. ☐ No violations observed. (check if applicable)

30. ☐ Alternative practices approved having same practical effect. See comments section above (14 CCR 1299b) (check if applicable)

32.

☐ Violations were observed. Additional clearance is needed for the following areas: (check applicable sections)

☐ 30 foot zone ☐ Grass ☐ Brush ☐ Trees ☐ Shrubs

☐ Reduced Fuel Zone (30' – 100') ☐ Grass ☐ Brush ☐ Trees ☐ Shrubs

☐ Dead and dying woody surface fuels

☐ Remove portion of any tree that extends within 10 feet of the outlet of a chimney or stovepipe

☐ Maintain any tree adjacent to or overhanging a building free of dead or dying wood

☐ Maintain the roof of a structure free of leaves, needles, other dead vegetation

☐ Provide and maintain at all times a screen over the outlet of every chimney or stovepipe that is attached to a 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.

31. ACTIONS TAKEN

☐ Left information material
☐ Discussed clearance with resident
☐ Left copy of this inspection notice
☐ Citation issued
☐ Recommend citation to prevention

33. GENERAL BUILDING CONSTRUCTION TYPE

☐ Wood Siding
☐ Wood Roof
☐ Non-combustible siding
☐ Manufactured (Mobile) Home
☐ Metal
☐ Concrete/Block
☐ Other _____

Deck Present ☐ YES ☐ NO

34. FOR ADDITIONAL INFORMATION ON HOW TO COMPLY WITH DEFENSIBLE SPACE CLEARANCE REQUIREMENTS, PLEASE VISIT:
WWW.FIRE.CA.GOV

APPENDIX III – Information Radio Systems

First licensed by the Federal Communications Commission in 1977 as a "Travelers Information Station," the ISS Information Station is now the most installed 10-watt, AM station in the United States — with more than a thousand locations licensed to date! Its popularity stems from its versatility and affordability in a patented package that makes installation and operation simple. Today the Information Station serves a broader array of interests than originally envisioned in 1977. ISS has developed 2 models to meet customer needs — Multi- and Single-Message Editions — and is the sole provider in the United States.

Multi-Message Edition

The "Multi-Message Edition" Information Station works well for operators with a frequent need to update broadcast programs. It features up to 250 variable-length messages that can be recorded, monitored or erased independently. Choose which to broadcast and which to store for future use. The Multi-Message Edition allows you to create up to 20 playlists for quick retrieval and provides the ability to change message patterns automatically on a regular basis. Standard recording time is 7 minutes with an option for up to 14 minutes. A week of rechargeable battery backup protects messages during power failure.

Single-Message Edition

The economical "Single-Message Edition" Information Station is designed for users who require just a single variable-length broadcast message. The Single Message Edition comes with 6 minutes of recording time and up to 48 minutes optional. Its "flash" message memory enables placement in remote locations where AC power may be compromised regularly. Both the the Multi-Message and the Single Message Editions allow complete broadcast recording and control by telephone.

Who Operates Information Stations?

The Federal Communications Commission (FCC) licenses the Information Station to federal, state and local governmental entities (see the list below) for broadcasting travel, safety, weather, traffic directions/detours, touring, historical and event information. The primary audience? Motorists in a 3-5-mile radius area from the station's center point. Broadcasts are voice-only, noncommercial, and are controlled locally by telephone (analog audio transfers via phone for digital storage and replay — see more about equipment below). Operators commonly include...

- Airports.
- Attractions (concerts, ski areas, zoos in partnership with communities).
- Convention centers.
- Historic sites.
- Industries (in partnership with communities).
- Interpreters.
- Municipalities (boroughs, cities, counties, towns, villages).
- Parks & other outdoor recreation areas (national, state & local).
- Scenic byways.
- Tourism departments (visitor bureaus & chambers of commerce.

Frequency and Licensing Considerations

On a first-come-first-served basis, the FCC licenses stations to open AM-band frequencies between 530 and 1700 kHz. ISS can help you find an available frequency and apply for a FCC license. Just complete and return the questionnaire (linked on the right) to get started.

Equipment Array

The Information Station comes complete from ISS, ready to install. Included are the transmitter, antenna, patented factory-assembled groundplane, digital message programmer, lightning arrestors, batteries, all cables, connectors, mounts, hardware and illustrated instructions. The housing is a weatherproof cabinet, designed for pole or wall mounting. For details, see "Multi- or Single-Message Edition Technical Specifications" (both linked on the right). Options include expanded recording time (to 14.3 minutes total), Workstation Audio Control and Flashing ALERT Signs to notify motorists of your signal at key locations along roadways within range of the station. The flashing signs are triggered via communities' own 2-way radio systems.

Installation Styles

Pick the style of installation that fits your situation: The Information Station may be installed at a building with the equipment safely indoors and the antenna located on a steel roof (steel-roof style) or pole-mounted (yard style) nearby. At remote locations, the entire station may be installed on a pole and provided with power and telephone service (isolated style). An available option is the _____
disturbance for yard- and isolated-style installations. This attractive antenna system and pole-in-one solution requires only one square foot of ground area, no external conduit or wiring to encourage vandalism. It offers low installation cost and is easy to move.

Services

As you would expect, ISS provides a full menu of technical services to help put and keep your Information Station on the air. This includes frequency and site selection, field surveys, FCC licensing, installation and training, which can be quoted as needed. Personal planning assistance is free. Email (link on right) or call us at 616.772.2300. *The Source Advisory Radio Communique* offers online case studies, news and technical tips that will keep you abreast of issues that affect station operation. See case studies, news brief and technical tips there (linked on the right).

Budget

Equipment and services for the popular Multi-Message Edition (including licensing, installation and ground freight in the contiguous United States) typically total $10-13,000, depending on options chosen and installation variables. At no charge, _____
application and provide a formal quote.

Purchase includes, at no extra charge, initial preparation of a professional recording, based on your script, so your broadcast is ready to air, as soon as you turn on your station. And Illustrated instruction manuals come with every Information Station.

ISS offers technical support for the life of the product 24/7 at no extra charge.

APPENDIX IV – Letter to property owners

20 April, 2006

KERN RIVER VALLEY FIRE SAFE COUNCIL
POST OFFICE BOX 633
KERNVILLE, CALIFORNIA 93238

KENNEDY MEADOWS PROPERTY OWNERS AND ASSOCIATES INC
2B8 KENNEDY MEADOWS ROAD
INYOKERN, CALIFORNIA 93527

Dear Kennedy Meadows property owner

As you know, there have been two major wildfires in the Kennedy Meadows area in the last five years, the Manter and McNally fires. Kennedy Meadows was partially evacuated during the Manter fire. More recently, the Kern River Valley Fire Safe Council, working with the Kennedy Meadows Property Owners and Associates (KMPO&A), concluded that the Kennedy Meadows community could take additional measures to protect itself from possible damage or destruction from a future wildfire.

The Fire Safe Council has obtained a grant from the Bureau of Land Management (BLM) for a contractor to prepare what is known as a "Fire-Safe Plan" or a "Community Wildfire Protection Plan" (CWPP). The contractor that has been selected for this work is Kenneth Delfino from Bakersfield. Ken will be working in Kennedy Meadows this coming summer. He will be available at the "Memorial Day" meeting of the KMPO&A to discuss the project and to answer any questions you may have. The meeting will be on Sunday, May 28th, at noon at the Kennedy Meadows fire station.

The Fire Safe Council is a non-profit partnership between community organizations and property owner associations. The KMPO&A is a member of the Fire Safe Council. The Council is assisted by the Forest Service, BLM and county agencies but is not itself a government agency. It has secured numerous grants that have supported fire-safe planning and fuel reduction efforts in the Kern River Valley area around Lake Isabella and conducts educational programs on fire safety.

The plan that is to be prepared will characterize the wildland fire hazards the Kennedy Meadows community faces and recommend what can be done to reduce these hazards. In characterizing the fire hazards faced by the community, one of the contractor's efforts will be to evaluate all structures in the community in terms of their ability to withstand an approaching wildfire. All information developed in the creation of the plan will become the property of the Fire Safe Council. Information regarding specific properties will not be published; the report will only present trends and commonalities. Recommendations for improvements will not mention individual properties or property owner's names.

Private property rights will be respected. Any property owners that choose not to have their property entered and fire hazards on the property evaluated may make those wishes known to Ed Royce or to the contractor.

A critical component of wildfire safety is the creation of defensible space around structures, in order to assist fire fighters in protecting the structure. The plan will recommend how homeowners can create such defensible space around their homes. The plan can also be expected to address evacuation routes, and local fire fighting, water supply, and emergency response capabilities.

It is recognized that there is no way to stop a wildfire with a strong wind behind it. However, under more common, less extreme conditions, fuel breaks can substantially assist fire fighters in stopping a wild fire. The CWPP that is developed may also recommend where fuel breaks should be placed to help fire fighters protect groups of structures or major parts of the Kennedy Meadows community. "Shaded fuel breaks" such as have been constructed around communities in the Lake Isabella area involve leaving trees in place, but with their lower branches removed and most brush cleared. This type of fuel break might be created in the Kennedy Meadows area with future grant funds.

The contractor can be reached as follows:

Kenneth Delfino
7816 Davin Park Drive
Bakersfield, CA 93308
661-399-7066
kendelfino@aol.com

Ed Royce can be reached at:

Kennedy Meadows 2C4, 101686 Mahogany Trail
Inyokern, CA 93527
559-850-8500
ebroyce@psln.com

Marcine Hughes, President
Kern River Valley Fire Safe Council

Ed Royce, President
Kennedy Meadows Property Owners and Associates

APPENDIX V

FUEL PLOTS

All fuel plots were established in various fuel types to represent vegetation types, densities, slopes and aspects typical in the developed portion of Kennedy Meadows. All plots are circular 1/10 acre (4,356 square feet) and established in a random manner by selecting an azimuth direction and distance from a given point after careful observation of fuel types. Plots were not established on the steeper hillsides away from development. Plots are ordered from the highest to the lowest loading of total above ground biomass for each fuel type. Fuel types measured are: **Pinyon Pine**; **Pinyon Pine Burned** (Manter Fire); **Rabbit Brush/Sage**.

All plots were measured during May and June, 2006.

PINYON PINE FUEL PLOTS

Plot # 12 Mahogany Tr. [Fuel type JP13]*
Heavy Pinyon Pine with scattered old dead sage
Aspect – South Slope – 5%

Pinyon	>2”	2-6”	6-10”	10-14”	14+”
# trees	15	11	6	7	
height	5-8’	9-15’	16-25’	26-40’	
One Pinyon snag – 5” x 12’ tall					
Scattered old dead sage – mostly on the ground					
Total plant cover = 60% of plot					
Litter and duff covering ground = 85%					
Bare soil = 15%					
No grass or forbs					

Volume of vegetation in tons per acre for this fuel type

Pinyon	Brush	Litter	**Total**
62	0	5	67 tons/acre

Plot # 8 Ridge above Long Canyon [Fuel type JP13]
Heavy Pinyon Pine – scattered Juniper - scattered sage
Aspect – North & South Slope – 35%

Pinyon	>2”	2-6”	6-10”	10-14”	14+”
# trees	14	14	9		
height	5-6’	7-15’	16-20’		
Pinyon snag - 4” dbh** x 10’ tall					
Juniper – 1 @ 4’ dbh x 10’ tall, 1 @ 21’ dbh x 20’ tall					
Scattered sage – 2’ hi, 3’ spread= 10% plot 50%dead					
Total plant cover = 65% of plot					
Litter and duff covering ground = 40%					
Bare soil % rock = 60%					
No grass or forbs					

Volume of vegetation in tons per acre for this fuel type

Pinyon/ juniper	Brush	Litter	**Total**
58	2	3	63 tons/acre

Plot # 5 Southwest of Co. Fire Station [Fuel type JP 10]
Dense Pinyon Pine with light sage
Aspect –Northwest Slope – 15%

Pinyon	>2”	2-6”	6-10”	10-14”	14+”
# trees	25	11	4	3	2
height	5-6’	7-12’	13-20’	21-29’	30’
Pinyon 10 to 30% dead branches					
Scattered dead sage – 3% plot					
Scattered live sage 3’ hi, 3’ spread, 50% dead – 3% plot					
Total plant cover = 75% of plot					
Litter and duff covering ground = 80%					
Bare soil = 20%					
Annual grass and forbs 6-12” hi over 80% of plot**					

Volume of vegetation in tons per acre for this fuel type

Pinyon	Brush	Litter	**Total**
55	1	5	61 tons/acre

** Plot is near Manter Fire area and may have been over-seeded as a post fire erosion control treatment.

Plot # 10 Long Canyon Road [Fuel type JP 13]
Moderate Pinyon Pine with light sage
Aspect – Southeast Slope – 25%

Pinyon	>2”	2-6”	6-10”	10-14”	14+”
# trees	7	6	7	2	
height	5-6’	7-12’	13-18’	19-25’	
One Juniper – 10” dbh – broken top – 10 feet tall					
Scattered sage – 2’ hi, 3’ spread= 2% plot 50%dead					
Total plant cover = 60% of plot					
Litter and duff covering ground = 40%					
Bare soil = 40%					
Grass and forbs – light - covering ground40%					

Volume of vegetation in tons per acre for this fuel type

Pinyon	Brush	Litter	**Total**
48	>1	3	52 tons/acre

Plot # 16 East of Big Meadow [Fuel type JP10]
Heavy Pinyon Pine with scattered sage and light Mt. Mahogany
Aspect – West Slope – 5%

Pinyon	>2”	2-6”	6-10”	10-14”	14+”
# trees	7	8	11	1	1
height	5-6’	7-12’	13-18’	19-22’	26’
Pinyon dead & down – 9” x 24’ long – recent blow-down					
Scattered sage – 2’ hi, 3’ spread= 3% plot 30%dead					
Mt Mahogany – 4’ hi, 3’ spread = 1% plot					
Total plant cover = 40% of plot					
Litter and duff covering ground = 70%					
Bare soil = 30%					
No grass or forbs					

Volume of vegetation in tons per acre for this fuel type

Pinyon	Brush	Litter	**Total**
44	1	5	50 tons/acre

Plot # 13 Sacatar Cyn. Rd. at Silver Spur Cs. [JP 09]
Moderate Pinyon Pine with scattered sage
Aspect – East Slope – 10%

Pinyon	>2”	2-6”	6-10”	10-14”	14+”
# trees	15	5	4	1	2
height	5-6’	7-12’	13-18’	19-22’	26’
Pinyon dead & down – none					
Scattered sage – 2’ hi, 3’ spread= 10% plot 40%dead					
Total plant cover = 35% of plot					
Litter and duff covering ground = 40% - light					
Bare soil = 60%					
No grass or forbs					

Volume of vegetation in tons per acre for this fuel type

Pinyon	Brush	Litter	**Total**
39	2	1	42 tons/acre

Plot # 6 East side of Long Canyon [Fuel type JP 05]
Moderate Pinyon Pine with Rabbit brush/sage and light Mt. Mahogany
Aspect – West Slope –15%

Pinyon	>2”	2-6”	6-10”	10-14”	14+”
# trees	11	8	1	1	
height	5-6’	7-12’	13-18’	19-22’	
Sage – 4’ hi, 4’ spread= 10% plot - 50%dead					
Rabbit brush – 3’ hi, 3’ spread = 10% plot – 80% dead					
Mt Mahogany – 3’ hi, 3’ spread – 80% dead = 1% plot					
Total plant cover = 70% of plot					
Litter and duff covering ground = 97%					
Bare soil = 3%					
No grass or forbs					

Volume of vegetation in tons per acre for this fuel type

Pinyon	Brush	Litter	**Total**
25	3	5	33 tons/acre

Plot # 7 East of Long Canyon [Fuel type JP 11]
Light Pinyon Pine with insect killed snags and down logs**
Aspect – East Slope – 10%

Pinyon	>2”	2-6”	6-10”	10-14”	14+”
# trees	3	1		1	
height	5-10’	11-20’		35	
8 Pinyon snags – 6” - 14” dbh, 8 - 24’ hi					
4 down trees- 6 – 14” with branches up to 6’ vertical					
Scattered Rabbit brush – 4’ hi, 4’ spread= 1% plot 60%dead					
Total plant cover = 20% of plot					
Litter and duff covering ground = 95%					
Bare soil = 10%					
Grass and forbs covering 50% of plot					

Volume of vegetation in tons per acre for this fuel type

Pinyon	Brush	Litter	**Total**
21	>1	7	29 tons/acre

**Insect kill occurred in 2001 and 2002 after the Manter Fire

Plot # 1 Northwest of the County Fire Station [Fuel type JP 10]
Light Pinyon Pine with rabbit brush/sage. Manter Fire is 100’ south and East of plot.
Aspect – North Slope – 5%

Pinyon	>2”	2-6”	6-10”	10-14”	14+”
# trees	3	2	2		1
height	5-6’	7-12’	13-18’		30’
Scattered sage – 3’ hi, 3’ spread = 60% of plot, 20%dead					
Rabbit brush – 4’ hi, 3-5’ spread = 20% of plot, 60% dead					
Total plant cover = 80% of plot					
Litter and duff covering ground = 70%					
Bare soil = 60%					
Light forbs					

Volume of vegetation in tons per acre for this fuel type

Pinyon	Brush	Litter	**Total**
8	3	4	15 tons/acre

Plot # 11 Mahogany Tr. South of Long Canyon [Fuel type JP 10]
Light Pinyon Pine with scattered sage and Antelope brush
Aspect – Southeast Slope – 10%

Pinyon	>2”	2-6”	6-10”	10-14”	14+”
# trees	6		1	1	
height	5-6’		20’	40’	
One Juniper – 21” dbh – 30’ tall					
Scattered sage – 3’ hi, 3’ spread= 10% plot 30%dead					
Three Antelope brush – 2’ hi – 3’ spread – 3% of plot					
Total plant cover = 30% of plot					
Litter and duff covering ground = 30%					
Bare soil = 70%					
No grass or forbs					

Volume of vegetation in tons per acre for this fuel type

Pinyon/juniper	Brush	Litter	**Total**
9	2	2	13 tons/acre

PINYON PINE BURNED PLOTS

Plot # 4 ½ mile Southwest of County Fire Station
Burned Plot – Pinyon pine type
Aspect - Northeast Slope – 5 – 10%

Pinyon snags	Up to 6”	7-14”	15 – 24”
# trees	12	9	1
height	10’	15’	25’
Pinyon down	2 – 15”	16 - 24”	
# trees	1	2	
Sage – 1’ hi; – 1’ spread ---- Covering 1% of plot. **New growth**			
Rabbit brush – 1’ hi; – 18” spread --- Covering 1% of plot. **New growth**			
Flannel bush – 5’ hi; - 2’ spread --- two plants. **New growth**			
Annual grass and forbs – 1’ hi; - > 80% of plot			
Open ground – bare soil –20% of plot			

Volume of vegetation in tons per acre for this fuel type

Pinyon	Brush	Grass/forbs	Liter	**Total**
15	0.2	0.3	>0.1	16

Plot # 17 1/4 mile west of Pine Pass
Burned Plot – Pinyon pine type
Aspect - Northeast Slope – 10 - 15%

Pinyon snags	Up to 6”	7-14”	15 – 24”
# trees	9	6	0
height	12’	15’	
Pinyon down	2 – 15”	16 - 24”	
# trees	11	1	
Sage – 1’ hi; – 1’ spread ---- Covering >1% of plot. **New growth**			
Rabbit brush – 1’ hi; – 18” spread --- Covering >1% of plot. **New growth**			
Annual grass and forbs – 1’ hi; - > 70% of plot			
Open ground – bare soil – 25% of plot			

Volume of vegetation in tons per acre for this fuel type

Pinyon	Brush	Grass/forbs	Liter	**Total**
11	> 0.1	0.3	>0.1	12

Plot # 3 1/4 mile west of County Fire Station
Burned Plot – Pinyon pine type
Aspect - East Slope – 5 – 10%

Pinyon snags	Up to 6”	7-14”	15 – 24”
# trees	3	1	2
height	12’	15’	25’
Pinyon down	2 – 15”	16 - 24”	
# trees	0	1	
Sage – 2’ hi; – 2’ spread ---- Covering 2% of plot. **New growth**			
Rabbit brush – 1’ hi; – 18” spread --- Covering 1% of plot. **New growth**			
Flannel bush – 5’ hi; - 2’ spread --- one plant. **New growth**			
Annual grass and forbs – 1’ hi; - > 10% of plot			
Open ground – bare soil – 80% of plot			

Volume of vegetation in tons per acre for this fuel type

Pinyon	Brush	Grass/forbs	Liter	**Total**
5	0.5	>0.1	>0.1	6

Plot # 2 200 feet north of old landfill, vicinity of Fire Station
Burned Plot – Pinyon pine - brush type
Aspect – North Slope – 5%

Pinyon snags	Up to 6”	7-14”	15 – 24”
# trees	1	2	0
height	8’	15’	
Pinyon down	2 – 15”	16 - 24”	
# trees	0	0	
Sage – 2’ hi; – 2’ spread ---- Covering 2% of plot. **New growth**			
Rabbit brush – 1’ hi; – 18” spread --- Covering 1% of plot. **New growth**			
Annual grass and forbs – 2’ hi; - 20% of plot			
Open ground – bare soil – 80% of plot			

Volume of vegetation in tons per acre for this fuel type

Pinyon	Brush	Grass/forbs	Liter	**Total**
1	0.5	0.2	>0.1	>2

RABBIT BRUSH/SAGE PLOTS

Plot # 9 East of Long Cyn. Rd. [Fuel type SWSB 11]
Rabbit brush/sage
Aspect - South Slope – Flat

Species	height	spread	% cover of plot	live/dead ratio	dead plants
Sage	3 – 4’	4’	55%	50%	5%
Rabbit brush	3’	3’	45%	65%	5%
Riparian area near plot = willow					
Short grass in open areas under brush					
Evidence of cattle grazing in the plot					

Volume of vegetation in tons per acre for this fuel type

Sage	Rabbit brush	other	Grass/forbs	**Total**
5	4		>0.1	9

Plot # 18 Sacatar Ranch Rd. at Red Rider Rd. [Fuel type SWSB 04]
Rabbit brush/sage
Aspect - none Slope – Flat

Species	height	spread	% cover of plot	live/dead ratio	dead plants
Sage	3’	3’	35%	40%	5%
Rabbit brush	3’	3’	30%	25%	5%
Bare soil = 35% of plot					
Short grass in open areas under brush					
Evidence of cattle grazing in the plot					

Volume of vegetation in tons per acre for this fuel type

Sage	Rabbit brush	other	Grass/forbs	**Total**
4	3.5		>0.5	8

Plot # 15 Sacatar Ranch Road [Fuel type SWSB 11]
Rabbit brush/sage
Aspect - Northeast Slope – 5 – 10%

Species	height	spread	% cover of plot	live/dead ratio	dead plants
Sage	18”	18”	55%	15%	5%
Rabbit brush	18”	18”	5%	10%	0
Two bushy Pinyon – 2’ tall and 8’ tall – one antelope bush 2’ hi					
Bair soil in plot – 40%					
Evidence of cattle grazing in the plot					

Volume of vegetation in tons per acre for this fuel type

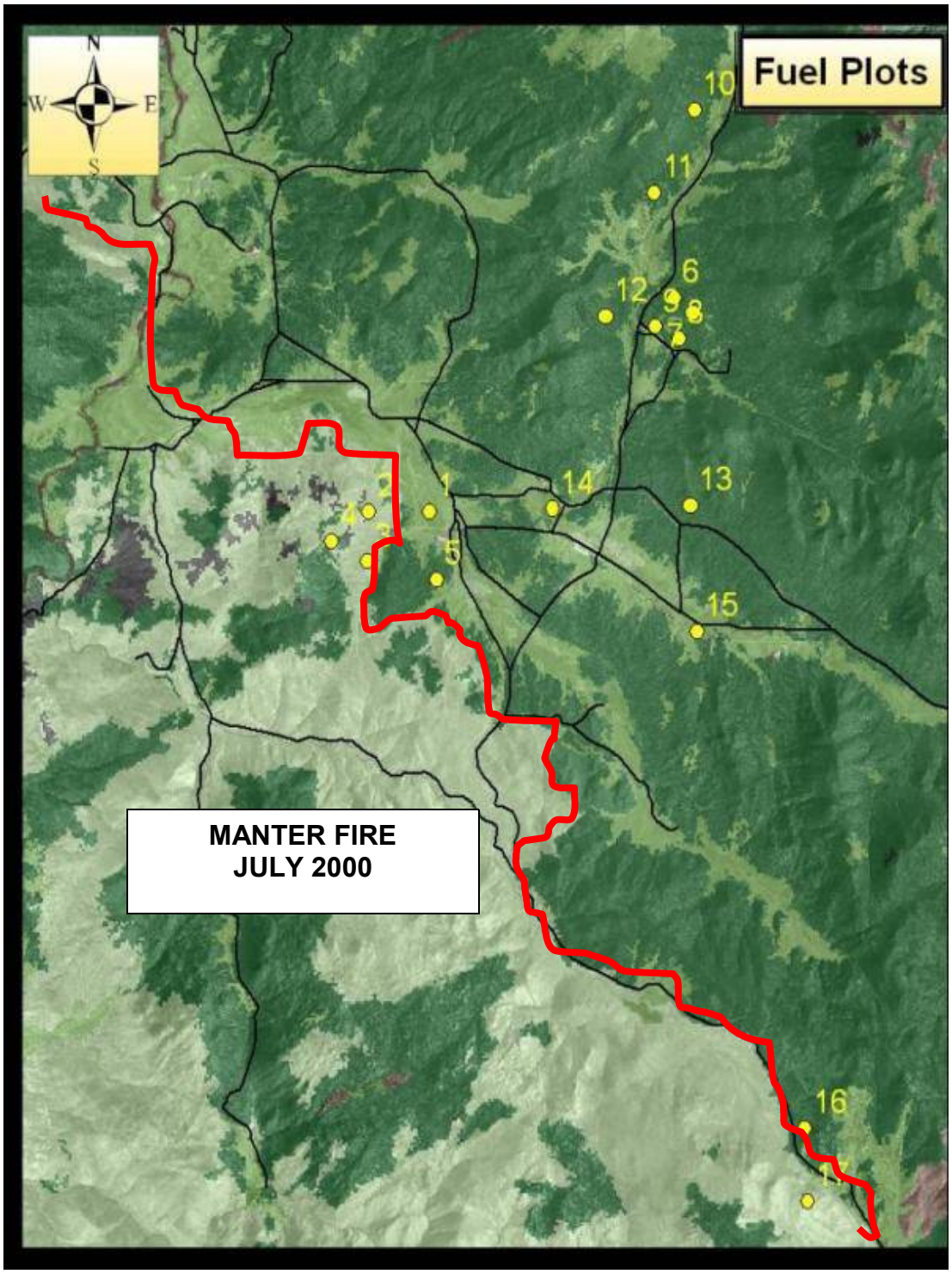
Sage	Rabbit brush	other	Grass/forbs	**Total**
3	0.5	0.5	>0.1	4

* Fuel types and volume estimates are derived from: “*Stereo Photo Series for Quantifying Natural Fuels – Volume IV: Pinyon-Juniper, Chaparral, and Sagebrush Types in the Southwestern United States”.* National Wildfire Coordinating Group. (PMS 833, NFES 1084) September 2000

* * All tree measurements were made at 4.5 feet above ground level on the high side of the slope; this is also known as dbh – diameter breast high.

MAP 11*

Fuel Plot Locations



*Some roads on map do not exist on the ground, GIS errors.

APPENDIX VI – Property Evaluation Format

KENNEDY MEADOWS STRUCTURE AND PROPERTY INSPECTION			
Map Number		APN	
Aspect		Slope	
Name		Resident Status	
Address			
Access (engine)			
Fuel type			
Overall hazard rating	Low — Low/medium — Medium — Medium/high — Hig		
STRUCTURE			
Roof		Gutters	
Siding/construction			
Deck			
Chimney			
Fire wood piles			
CLEARANCE			
30 foot			
100 foot			
Other considerations			
OUT BUILDINGS			
Type and construction			
Water storage		Hydrants	
NOTES:			

APPENDIX VII – Property Addresses (names have been omitted)

Kennedy Meadows Addressing Project

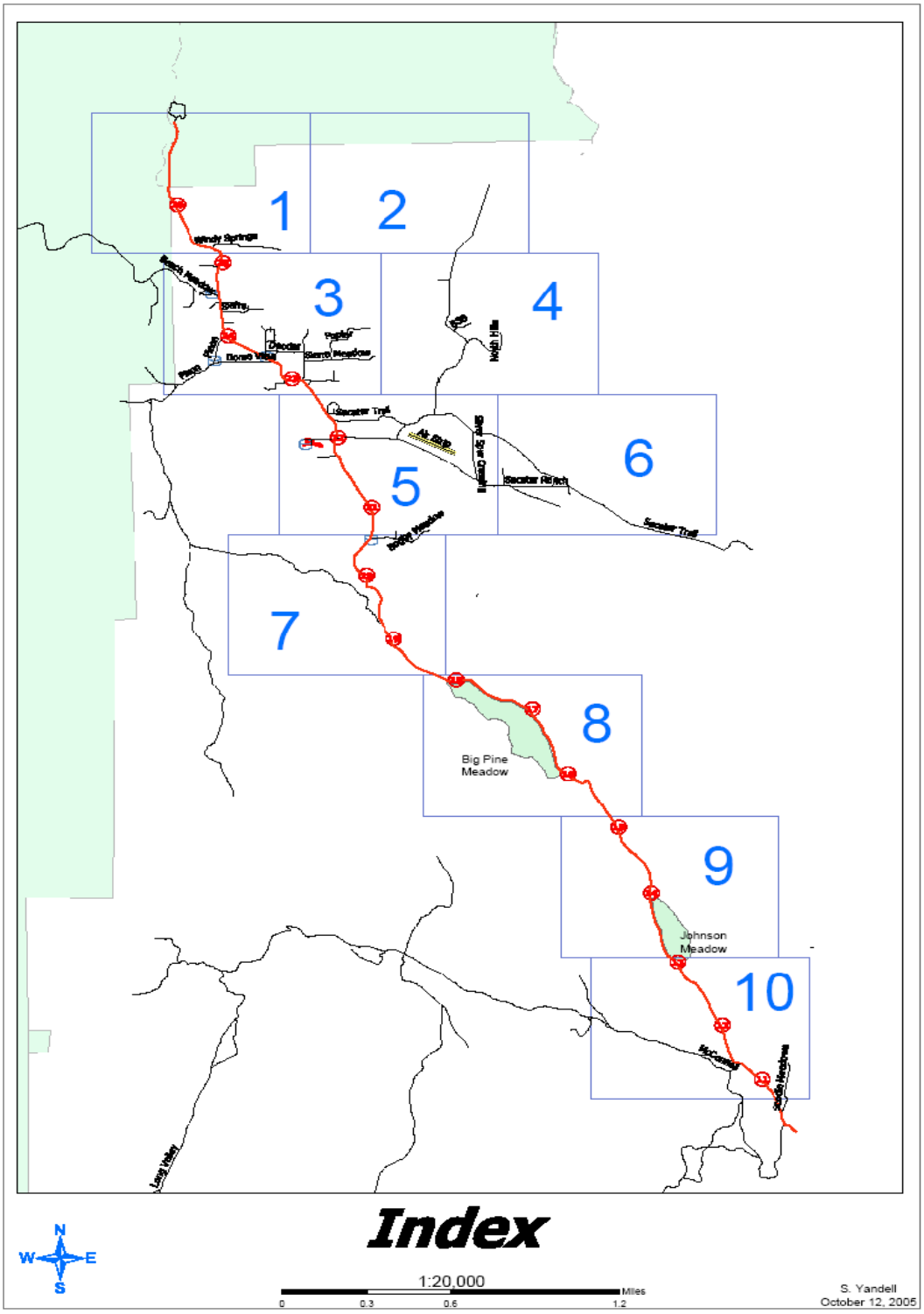
October 14, 2005

ID	NAME	Numerical	Street	Lattitude	Longitude	Water
1		96415	Beach Meadow Rd.	36° 01.2470'	118° 07.7600'	
2		96520	River View Ln.	36° 01.1030'	118° 07.6600'	
3		96300	River View Ln.	36° 00.9700'	118° 07.7000'	
4		96288	River View Ln.	36° 00.9660'	118° 07.7530'	
5		96501	Beach Meadow Rd.	36° 01.1690'	118° 07.6230'	
6		96585	Pinon Village Rd.	36° 01.1200'	118° 07.5720'	
7		96561	Pinon Village Rd.	36° 01.0880'	118° 07.5950'	
8		96486	Pinon Village Rd.	36° 01.1470'	118° 07.5450'	
9		96467	Pinon Village Rd.	36° 01.1580'	118° 07.1500'	
10		96478	Pinon Village Rd.	36° 01.1720'	118° 07.4830'	
11		96443	Pinon Village Rd.	36° 01.1860'	118° 07.4710'	
12		96403	Pinon Village Rd.	36° 01.2070'	118° 07.4690'	
13		96561	Beach Meadow Rd.	36° 01.1110'	118° 07.3910'	
14		96440	Beach Meadow Rd.	36° 01.1140'	118° 07.4170'	
15		96201	Beach Meadow Rd.	36° 01.1040'	118° 07.4630'	
16		96880	Windy Springs Rd.	36° 01.6230'	118° 06.6890'	
17		96978	Windy Springs Rd.	36° 01.5990'	118° 06.5580'	
18		98484	Kennedy Meadows Rd.	36° 01.5520'	118° 07.2940'	
19		98564	Kennedy Meadows Rd.	36° 01.4450'	118° 07.3280'	
20		98565	Kennedy Meadows Rd.	36° 01.4450'	118° 07.3280'	
21		46868	Kennedy Meadows Rd.	36° 01.1650'	118° 07.3480'	
22		97102	Glimpse Ave.	36° 00.9810'	118° 07.0440'	
23		96834	Pine Mountain Tr.	36° 00.9630'	118° 07.4470'	
24		96840	Pine Mountain Tr.	36° 00.9580'	118° 07.4540'	
25		97272	Sierra Tr.	36° 00.9260'	118° 06.9810'	
26		97278	Sierra Tr.	36° 00.9260'	118° 06.9810'	
27		97226	Sierra Tr.	36° 00.8980'	118° 07.0260'	
28		97174	Sierra Tr.	36° 00.9000'	118° 07.0760'	
29		97123	Sierra Tr.	36° 00.9040'	118° 07.0830'	
30		97145	Sierra Tr.	36° 00.9140'	118° 07.1120'	
31		97040	Kennedy Meadows Rd.	36° 00.7870'	118° 07.3070'	
32		97190	Kennedy Meadows Rd.	36° 00.7230'	118° 07.3010'	
33		97352	Kennedy Meadows Rd.	36° 00.5730'	118° 07.1530'	
34		97446	Kennedy Meadows Rd.	36° 00.5140'	118° 07.0450'	
35		96939	Kennedy Meadows Rd.	36° 00.9520'	118° 07.3830'	
36		96997	Kennedy Meadows Rd.	36° 00.8860'	118° 07.3220'	
37		97020	Kennedy Meadows Rd.	36° 00.8570'	118° 07.3100'	yes
38		97113	Kennedy Meadows Rd.	36° 00.7600'	118° 07.3050'	
39		97513	Kennedy Meadows Rd.	36° 00.5600'	118° 07.1330'	
40		97525	Kennedy Meadows Rd.	36° 00.4750'	118° 06.9640'	
41		97695	Kennedy Meadows Rd.	36° 00.3960'	118° 06.7610'	
42		97135	Pinon Dr.	36° 00.5160'	118° 07.3840'	
43		97110	Pinon Dr.	36° 00.4920'	118° 07.3890'	
44		97034	Pinon Dr.	36° 00.4120'	118° 07.4020'	
45		96700	Pinon Dr.	36° 00.1830'	118° 07.7180'	
46		96614	Pinon Dr.	36° 00.1340'	118° 07.8050'	
47		96501	Pinon Dr.	36° 00.0880'	118° 07.9240'	
48		97264	Dome View Ave.	36° 00.3520'	118° 07.3390'	
49		97330	Dome View Ave.	36° 00.3540'	118° 07.2550'	
50		97356	Dome View Ave.	36° 00.3580'	118° 07.2180'	
51		97390	Dome View Ave.	36° 00.3470'	118° 07.1750'	
52		97259	Ridge Ave.	36° 00.4300'	118° 07.2040'	
53		97201	Ridge Ave.	36° 00.4320'	118° 07.2750'	
54		97735	Ponderosa Rd.	36° 00.4550'	118° 06.7790'	
55		97778	Ponderosa Rd.	36° 00.5030'	118° 06.7790'	
56		97791	Ponderosa Rd.	36° 00.5160'	118° 06.7800'	
57		97845	Ponderosa Rd.	36° 00.5700'	118° 06.7810'	
58		97881	Ponderosa Rd.	36° 00.6130'	118° 06.7800'	

59		97977	Ponderosa Rd.	36°	00.7110'	118°	06.7790'	
60		97812	Maine Rd.	36°	00.7300'	118°	06.8060'	
61		98006	Cedrus Rd.	36°	00.7290'	118°	06.7200'	yes
62		98028	Cedrus Rd.	36°	00.7840'	118°	06.7400'	
63		98029	Cedrus Rd.	36°	00.7840'	118°	06.7400'	
64		98042	Conifer Rd.	36°	00.7150'	118°	06.6620'	
65		98016	Conifer Rd.	36°	00.6910'	118°	06.6600'	
66		97891	Lupine Rd.	36°	00.5720'	118°	06.7080'	
67		97911	Lupine Rd.	36°	00.5740'	118°	06.6840'	
68		97928	Lupine Rd.	36°	00.5710'	118°	06.6630'	yes
69		97745	Deodar Rd.	36°	00.4640'	118°	06.7450'	
70		97763	Deodar Rd.	36°	00.4650'	118°	06.7120'	yes
71		97768	Deodar Rd.	36°	00.4850'	118°	06.7120'	
72		97861	Deodar Rd.	36°	00.4700'	118°	06.5970'	
73		97852	Deodar Rd.	36°	00.4640'	118°	06.6120'	
74		97840	Deodar Rd.	36°	00.5520'	118°	06.5930'	
75		97951	Deodar Rd.	36°	00.2020'	118°	06.4490'	yes
76		97841	Kennedy Meadows Rd.	36°	00.2970'	118°	06.6140'	
77		98030	Kennedy Meadows Rd.	36°	00.1580'	118°	06.5660'	
78		97737	Sumac Rd.	36°	00.3900'	118°	06.6420'	
79		98031	Kennedy Meadows Rd.	36°	00.1670'	118°	06.5720'	
80		98409	Up the Hill Rd.	36°	00.4160'	118°	06.3050'	
81		94640	Up the Hill Rd.	36°	00.7020'	118°	06.2920'	
82		98422	Sierra Meadows Rd.	36°	00.3490'	118°	06.2090'	
83		98443	Sierra Meadows Rd.	36°	00.3490'	118°	06.1860'	
84		98501	Sierra Meadows Rd.	36°	00.3540'	118°	06.0850'	yes
85		98675	Sierra Meadows Rd.	36°	00.3520'	118°	05.7380'	
86		98740	Sierra Meadows Rd.	36°	00.3730'	118°	05.6810'	
87		98832	Sierra Meadows Rd.	36°	00.1470'	118°	05.4680'	yes
88		98831	Sierra Meadows Rd.	36°	00.1470'	118°	05.4680'	
89		98730 A	Poplar Ln.	36°	00.5680'	118°	05.9570'	yes
90		98730 B	Poplar Ln.	36°	00.5680'	118°	05.9570'	
91		98886	Dome Ln.	36°	00.6830'	118°	05.8940'	
92		98944	Dome Ln.	36°	00.7440'	118°	05.8940'	
93		98893	Poplar Ln.	36°	00.5700'	118°	05.7560'	
94		98824	Atamian Rd.	36°	00.6140'	118°	05.7560'	yes
95		99014	Pinon Ridge Rd.	36°	00.6890'	118°	05.7400'	yes
96		99073	Pinon Ridge Rd.	36°	00.6770'	118°	05.6210'	yes
97		99090	Pinon Ridge Rd.	36°	00.6810'	118°	05.6470'	yes
98		99104	Pinon Ridge Rd.	36°	00.6970'	118°	05.6210'	
99		99132	Pinon Ridge Rd.	36°	00.6830'	118°	05.5340'	
100		98228	The Other Rd.	36°	00.2300'	118°	06.2110'	
101		98458	The Other Rd.	36°	00.1660'	118°	05.9010'	
102		98484 A	The Other Rd.	36°	00.1250'	118°	05.8690'	
103		98484 B	The Other Rd.	36°	00.1250'	118°	05.8690'	
104		98484 C	The Other Rd.	36°	00.1250'	118°	05.8690'	
105		98577	Indian Tr.	35°	59.7470'	118°	05.8970'	yes
106		98545	Indian Tr.	35°	59.7440'	118°	05.9050'	
107		99208	Old Sacatar Tr.	35°	59.7030'	118°	05.2140'	
108		99075	Gorman Rd.	35°	58.4730'	118°	06.2560'	yes
109		98953	Sacatar Ranch Rd.	35°	59.4660'	118°	05.8610'	yes
110		98985	Sacatar Ranch Rd.	35°	59.4680'	118°	05.8280'	
111		99681	Sacatar Ranch Rd.	35°	59.3410'	118°	04.9030'	
112		199484	Silver Spur Crossing	35°	59.0700'	118°	04.1310'	yes
113		100037	Sacatar Ranch Rd.	35°	59.0490'	118°	04.3930'	
114		100273 A	Sacatar Ranch Rd.	35°	58.9010'	118°	04.1280'	
115		100701	Red Ryder Rd.	35°	59.0350'	118°	03.8500'	yes
116		100273 B	Sacatar Ranch Rd.	35°	58.9010'	118°	04.1280'	
117		100801	Yellow Coyote Tr.	35°	58.6990'	118°	03.5990'	
118		100931	Yellow Coyote Tr.	35°	58.5900'	118°	03.4920'	
119		101158	Yellow Coyote Tr.	35°	58.3480'	118°	03.4830'	
120		100791	Sacatar Ranch Rd.	35°	58.8030'	118°	03.4610'	
121		101149	Sacatar Ranch Rd.	35°	58.8140'	118°	03.1040'	

122		101302	Old Sacatar Tr.	35°	58.9180'	118°	03.0720'	
123		101449	Old Sacatar Tr.	35°	58.8110'	118°	02.8980'	
124		101813	Old Sacatar Tr.	35°	58.6700'	118°	02.4760'	
125		99208	Old Sacatar Tr.	35°	59.7030'	118°	05.2140'	yes
126		99583	Old Corral Crossing	35°	59.6060'	118°	05.0340'	
127		99858	Long Canyon Tr.	35°	59.7130'	118°	04.6910'	yes
128		100033	Long Canyon Tr.	35°	59.9060'	118°	04.6660'	
129		100120	Long Canyon Tr.	36°	00.0040'	118°	04.6480'	yes
130		101184	North Hills Rd.	36°	00.5280'	118°	03.8710'	yes
131		101230	North Hills Rd.	36°	00.5780'	118°	03.8590'	yes
132		100949	BSB Rd.	36°	00.6790'	118°	04.3910'	
133		100962	BSB Rd.	36°	00.6870'	118°	04.3750'	
134		101000	BSB Rd.	36°	00.6880'	118°	04.3180'	
135		101023	BSB Rd.	36°	00.6920'	118°	04.2920'	
136		100830	Long Canyon Tr.	36°	00.5940'	118°	04.3200'	
137		100943	Long Canyon Tr.	36°	00.6760'	118°	04.4390'	yes
138		101205	Long Canyon Tr.	36°	00.9330'	118°	04.4630'	
139		101654	Long Canyon Tr.	36°	01.3920'	118°	04.3210'	
140		101733	Long Canyon Tr.	36°	01.5450'	118°	04.2520'	
141		101988	Long Canyon Tr.	36°	01.6840'	118°	04.0480'	
142		102195	Long Canyon Tr.	36°	01.9010'	118°	03.9650'	
143		102250	Long Canyon Tr.	36°	01.9700'	118°	03.9400'	yes
144		102624	Long Canyon Tr.	36°	02.3340'	118°	03.8000'	
145		101575	Mahogany Tr.	36°	01.3650'	118°	04.6300'	yes
146		101686	Mahogany Tr.	36°	01.2460'	118°	04.6940'	
147		99075	Goman Rd.	35°	58.4730'	118°	06.2560'	yes
148		98887	Kennedy Meadows Rd.	35°	59.3970'	118°	05.9470'	
149		98890	Kennedy Meadows Rd.	35°	59.3970'	118°	05.9470'	
150		98937 A	Grumpy Bear Tr.	35°	59.3470'	118°	05.9480'	
151		98937 B	Grumpy Bear Tr.	35°	59.3470'	118°	05.9480'	
152		99100	Kennedy Meadows Rd.	35°	59.1980'	118°	05.8590'	
153		99125	Kennedy Meadows Rd.	35°	59.1650'	118°	05.8610'	
154		99205 A	Kennedy Meadows Rd.	35°	59.0150'	118°	05.7530'	
155		99205 B	Kennedy Meadows Rd.	35°	59.0150'	118°	05.7530'	
156		99205 C	Kennedy Meadows Rd.	35°	59.0150'	118°	05.7530'	
157		100248 A	Cresent Moon Ln.	35°	58.3270'	118°	05.1960'	
158		100248 B	Cresent Moon Ln.	35°	58.3270'	118°	05.1960'	
159		100292	Lovell Ln.	35°	58.3430'	118°	05.1470'	
160		100388	Pine Cone Dr.	35°	58.3030'	118°	05.0730'	
161		100492	Boggy Meadow Rd.	35°	58.3860'	118°	04.8710'	yes
162		99840	Pine Creek Canyon Rd.	35°	58.1000'	118°	06.4720'	
163		99771	Pine Creek Canyon Rd.	35°	58.1050'	118°	06.5770'	
164		99750	Pine Creek Canyon Rd.	35°	58.0670'	118°	06.5390'	
165		99555	Pine Creek Canyon Rd.	35°	58.1700'	118°	06.7360'	
166		99258	Pine Creek Canyon Rd.	35°	58.1710'	118°	07.1140'	
167		103600	Kennedy Meadows Rd.	35°	52.8870'	118°	01.3460'	
168		104160	Kennedy Meadows Rd.	35°	54.5500'	118°	02.1330'	yes
169		104350	Kennedy Meadows Rd.	35°	54.3570'	118°	02.1130'	
170		104387	Kennedy Meadows Rd.	35°	54.3160'	118°	02.1280'	
171		106432	Kennedy Meadows Rd.	35°	52.8870'	118°	01.3460'	
172		106943	Kennedy Meadows Rd.	35°	52.3820'	118°	01.1140'	
173		107069	Kennedy Meadows Rd.	35°	52.3060'	118°	00.9680'	
174		107024	Kennedy Meadows Rd.	35°	52.2700'	118°	00.9210'	
175		107192	Kennedy Meadows Rd.	35°	52.1460'	118°	00.7520'	yes
176		108140	Scodie Meadow Tr.	35°	52.3630'	118°	00.4850'	
177		103294	Sterling Ranch Wy.	35°	49.6300'	118°	02.8050'	

APPENDIX VIII – Parcel Location Index, Map 10



MAP 10
Property Location Index (Map pages not shown except on CD version)

APPENDIX IX – Pinyon – Juniper Vegetation type

California Wildlife Habitat Relationships System
California Department of Fish and Game

Pinyon-Juniper William F. Laudenslayer Jr. and Jerry R. Boggs

Vegetation

Structure-- Pinyon-juniper (PJN) habitat typically is an open woodland of low, round crowned, bushy trees (Lanner 1975) that are needle-leaved, evergreen, and depending on site suitability, range from less than 10 m (30 ft) (Küchler 1977) to 15 m (50 ft) (Tueller and Clark 1975) in height. Crowns of individual trees rarely touch and canopy cover generally is less than 50 percent (Larson 1980). These open groves of overstory trees often have a dense to open layer of shrubs reaching heights of 1.5 m (5 ft) (Küchler 1977). Low herbaceous plants may also be present in this habitat (Küchler 1977). Stand structure varies depending on site quality and elevation. On favorable sites with little disturbance, pinyon-juniper forms dense cover; whereas on drier sites, spacing between trees increases and tree size decreases (Lanner 1975). At low elevations, pinyonjuniper
stands are rather open, becoming denser at higher elevations. At maximal elevations, this habitat grades rapidly into adjacent habitats (Zarn 1977).

Composition-- Overstory species composition at lower and mid-level elevations ranges from pure stands of pinyon, either singleleaf or Parry, to stands of pinyon mixed with juniper (western, Utah, or California), oaks (shrub live, California scrub, or canyon live), or Mojave yucca (Bradley and Deacon 1967, Munz 1974, Cheatham and Haller 1975, Küchler 1977, Vasek and Thorne 1977, Larson 1980, Paysen et al. 1980, Parker and Matyas 1981). At higher elevations, ponderosa and Jeffrey pine may be found in this habitat (Parker and Matyas 1981). Shrub-size plants in the subcanopy include small individuals of the overstory species, especially California juniper, as well as big sagebrush, blackbrush, common snakeweed, narrowleaf golden bush , Parry nolina, curlleaf mountain mahogany, antelope bitterbrush, Parry rabbitbrush, chamise, and redshank (Cheatham and Haller 1975, Küchler 1977, Vasek and Thorne 1977, Larson 1980, Parker and Matyas 1981). Grasses and forbs associated with this habitat include western wheatgrass, blue grama, and Indian ricegrass (Larson 1980). Vasek and Thorne (1977) describe in great detail pinyon-juniper vegetation elements found in various locations within California.

Other Classifications-- Other names for pinyon-juniper habitat include Singleleaf Pinyon Series, Singleleaf Pinyon-Utah Juniper Series (Parker and Matyas 1981), Pinyon Pine Series (Paysen, et al. 1980) Juniper-Pinyon Woodlands-28 (Munz and Keck 1970), and Pinyon-Juniper Woodlands-7.2 (Cheatham and Haller 1975). Cheatham and Haller (1975) further divide Pinyon-Juniper Woodlands into Nevadan Pinyon-Juniper Woodland-7.212, Mojavean Pinyon-Juniper Woodland-7.22, and Baja California Pinyon-Juniper Woodland-7.23.

Habitat Stages

Vegetation Changes-- 1;2-5:S-D. After disturbance or following an invasion, pinyonjuniper
habitats slowly proceed through the successional sequence. Initial establishment is by seedling pinyons and junipers. Dispersal of the wingless pinyon seeds may be largely by animals, especially birds. Seeds of the closely related Colorado pinyon

generally are dispersed by pinyon jays (Balda and Bateman 1971, Ligon 1978) and Clark's nutcracker (VanderWall and Balda 1977). Some junipers also appear to depend on vertebrates to aid in seed dispersal (Salomonson 1978). Shade is important for the establishment of young pinyons; older trees become shade intolerant (Tueller and Clark 1975). Following establishment, pinyons and junipers proceed through sapling to mature stages. Pinyon-juniper is a climax vegetation type (Larson 1980). As such, most stands become multiple-aged through time. Pinyon-juniper habitats are expanding into savannah, grassland, and shrub steppe areas in the intermountain west (West et al. 1975). Tree densities in pinyon-juniper habitats have increased in the past 100 years at the expense of the formerly more abundant shrub and herbaceous understory (West et al. 1975). These changes in successional patterns probably result from complex interactions between unrestricted livestock grazing (until about 1935), a warmer and wetter climatic period (1880-1940), and control of natural fire (West et al. 1975).

Duration of Stages-- Pinyon pines may well be the slowest growing group of pines. Junipers also are slow growers (Tueller and Clark 1975). As a result, the successional sequence requires a relatively long period. The actual time necessary to proceed through the various successional stages is not known, but probably is quite variable and may well depend on climatic and soil factors. Tueller and Clark (1975) found that seedlings up to 30 cm (12 in) in height with a basal diameter of 1 cm (0.4 in) averaged 7 years of age. Similarly, apparently mature old trees 3 to 6 m (11 to 20 ft) in height with a basal diameter of 15 to 36 cm (6 to 14 in) had a mean age of 102 years (Tueller and Clark 1975). Pinyon longevity may exceed 1000 years (West et al. 1975). However, stands usually range in age from 100 to 225 years (Tueller and Clark 1975).

Biological Setting

Habitat. Pinyon-juniper habitat generally occurs at middle elevations adjoining a number of other wildlife habitats. At lower elevations, pinyon-juniper may interface with habitats such as Joshua tree and desert scrub. At higher elevations, habitats such as eastside pine, perennial grass, and Jeffrey pine border on pinyon-juniper. At similar elevations in more southerly latitudes, sagebrush, mixed chaparral, and chamise-redshank chaparral are found adjacent to pinyon-juniper. In several Mojave Desert locations, pinyons and junipers are found with white fir (Henrickson and Prigge 1975) as mixed conifer.

Wildlife Considerations. Characteristic species of this habitat include pinyon mouse, bushy-tailed woodrat, pinyon jay, plain titmouse, and bushtit. Both pinyon nuts and juniper berries are important food sources and many wildlife species serve as dispersal agents for these plants (Frischknecht 1975). Aldon and Springfield (1973) and West et al. (1973) provide bibliographies which address the biology and management of pinyonjuniper
systems.

Physical Setting

Pinyon-juniper habitats generally are found on slopes that are steep, rocky (West et al. 1975), dry, and face east (Parker and Matyas 1981). Soils are mostly residual or recently weathered (Fowells 1965), typically rocky, coarse, porous (Fowells 1965), and well drained (Cheatham and Haller 1975). Pinyon-juniper may exist on deeper valley soils, but tree size and density increase as elevation increases and soil depth decreases (Vasek and Thorne 1977). Characteristic landforms include gently rolling hills to steep mountain slopes, rocky canyons, and narrow ridges (Bradley and Deacon 1967). Climatic conditions include low precipitation and relative humidity, hot summers with high

evapotranspiration rates, and clear weather with intense sunlight (Larson 1980). Annual precipitation ranges from 17.5 cm (7 in) (Rowlands et al. 1982, P. G. Rowlands, pers. comm.) to 50 cm (20 in) (Munz 1974). Pinyon and juniper growth conditions are best when precipitation ranges from 30 to 45 cm (12 to 18 in) (West et al. 1975). Winter temperatures are cool, with lowest January temperatures ranging between 13 and 1 C (9 and 30 F) (Rowlands et al. 1982, P. G. Rowlands, pers. comm.). Potential evapotranspiration in from one to four times as great as precipitation (Rowlands et al. 1982, P. G. Rowlands, pers. comm.).

Distribution

Elevation of the pinyon-juniper habitat varies with latitude. This habitat is found from 1980 to 2745 m (6000 to 9000 ft) in the Sierra Nevada, 1220 to 2440 m (4000 to 8000 ft) in the Mojave Desert, and 1070 to 1680 m (3500 to 5500 ft) in the San Jacinto and Santa Rosa Mountains (Cheatham and Haller 1975). Most pinyon-juniper habitats are found east of the Sierra Nevada, although some one-leaved pinyons are found within 30 km (20 mi) of the Pacific Ocean in Santa Barbara County (West et al. 1975 Paysen et al. 1980).

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APPENDIX X – Sagebrush Vegetation type

California Wildlife Habitat Relationships System
California Department of Fish and Game
California Interagency Wildlife Task Group

Sagebrush Donald L. Neal

Vegetation

Structure-- Sagebrush stands are typically large, open, discontinuous stands of big sagebrush of fairly uniform height. Big sagebrush tends to have a single short, thick, stem that branches into a nearly globular crown. Plant heights range from 0.5 to 3 m (1.6 to 9.8 ft) and density ranges from very open, widely spaced, small plants to large, closely spaced plants with canopies touching. In addition to a deep root system, big sagebrush has a well developed system of lateral roots near the soil surface. Consequently, the plants almost completely use the edaphic potential of a site, excluding most other plants in an area up to three times their crown area. This produces stands with shrubs of very uniform size and spacing. Sagebrush is often mixed with other species of shrubs of similar form and growth habit. In better sites, sagebrush stands have an understory of perennial grasses and forbs. At higher elevations, big sagebrush occurs as an understory in conifer stands.

Composition-- Often the habitat is composed of pure stands of big sagebrush, but many stands include other species of sagebrush, rabbitbrush, horsebrush, gooseberry, western chokecherry, curlleaf mountain mahogany, and bitterbrush. Munz (1959)(No Munz 1959 in Habitat Lit Cite. I put Munz and Keck 1959 in Lit Cite at end.) lists 15 species and 6 subspecies of sagebrush as occurring in California. The subspecies differences are manifested in minor morphological and adaptive characteristics. As topography, soil composition, and moisture change through the sagebrush type, the dominant species of sagebrush changes. On low flats with shallow soils and restricted drainage low sagebrush is dominant. Where the soil remains saturated through the spring, silver sagebrush dominates. Black sagebrush dominates sites with soils high in gravel and carbonates. In communities not fully occupied by sagebrush, various amounts of herbaceous understory are found. Idaho fescue, bluebunch wheatgrass, several species of needlegrass, squirreltail, Sandberg bluegrass, and Great Basin wildrye are among the more common grasses found in the habitat. After disturbance and during years with excess moisture, annual grasses such as cheatgrass and medusahead invade sagebrush stands. At higher elevations sagebrush occurs as an understory with mountain mahogany, pinyon, juniper, and ponderosa pine.

Other Classifications-- This type coincides fairly well with the Sagebrush Scrub plant community described by Munz and Keck (1970)(No Munz and Keck 1970 in Habitat Lit Cite. I put Munz and Keck 1973 in Lit cite at end.). Young et al. (1977) include all but the highest elevations of the habitat in their description of the Sagebrush Steppe. It combines the Sagebrush Steppe, Juniper Shrub Savanna, and the Blackbrush Scrub types of Küchler (1977) and the Sagebrush, Basin Sagebrush, and Blackbrush types of Parker and Matyas (1979) .

Habitat Stages

Vegetation Changes-- 1;24:S-D. The sagebrush habitat can exist in any of the structural stages. The most common disturbance factors are wildfire, prescribed burning, seeding to grasses, livestock grazing, and defoliation by larvae of the sagebrush defoliator

moth. Stable sagebrush habitats with little herbaceous understory are relatively fire resistant. However, stands subjected to heavy grazing are often invaded by annual grasses and are highly flammable. Stands killed or severely damaged by the larvae of the sagebrush defoliator moth are also subject to wildfire. The effects of fire in the sagebrush habitat have been well documented by several authors including Blaisdell (1953) and Young and Evans (1974). Big sagebrush does not sprout after burning but most of the other shrubs common to the type do. The result for as long as 20 years after fire may be a community dominated by rabbitbrush, horsebrush, and grasses. A very hot fire in a degraded site may result in a seral community dominated by annual grasses and forbs. Perennial bunchgrasses frequently survive fires and become dominant. Short-lived perennial grasses, such as bottlebrush squirreltail and Sandberg bluegrass, may be the next seral stage after disturbance, depending on conditions. Under protection or moderate grazing these seral communities are usually replaced by climax perennial bunchgrasses and open stands of sagebrush. Man has frequently changed succession in this habitat with prescribed burning or mechanical removal of sagebrush, followed by seeding of introduced bunchgrasses to improve the carrying capacity for livestock.

Duration of Stages-- Sagebrush usually reaches a fairly stable dominance in 10 to 20 years after disturbance, with or without an understory of perennial bunchgrass. Sagebrush usually remains dominant indefinitely or until the next disturbance.

Biological Setting

Habitat-- Sagebrush occurs at a wide range of middle and high elevations. At lower elevations and on drier sites, it gives way to such species as saltbrush, greasewood, creosotebush, and winterfat. At mid-elevations and on more mesic sites the habitat meets bitterbrush, curlleaf mountain mahogany, and western serviceberry. At high elevations it intergrades with Ponderosa Pine (PPN) and even with Aspen (ASP) habitat types.

Wildlife Considerations-- The Sagebrush type is very important to wildlife because it serves as habitat for some of the more important game animals and occupies such a vast area. It is a major winter-range type for migratory mule deer, and many herds summer in Sagebrush-Ponderosa Pine complexes at middle and high elevations. The sagebrush and its included Low Sagebrush and Bunchgrass types are the principal habitats for pronghorns. The sage grouse is dependent on various successional stages of the type all year. It is also occupied by jackrabbits, cottontail rabbits, ground squirrels, least chipmunk, kangaroo rats, wood rats, pocket mice, deer mice, grasshopper mice, sagebrush vole, and the California bighorn sheep. Birds of the sagebrush type include the chukar, black-billed magpie, gray flycatcher, pinyon jay, sage thrasher, and several sparrows, and hawks. Maintenance of the type is essential for many of these species. Some can benefit from the increased diversity and forage created by the careful use of fire, mechanical brush removal, seeding, or grazing (Urness 1976 (No Urness 1976 in Habitat Lit Cite. I put Urness 1979 for Lit cite at end.), Neal 1981). Endangered species found in the Sagebrush type include the peregrine falcon, bald eagle, Lost River sucker, shortnosed sucker, Owens River pupfish, and Owens tui chub. Threatened species are the Lahontan and Paiute cutthroat trouts.

Distribution

The Sagebrush habitat is a discontinuous strip along the east and northeast borders of California south to the 37th parallel. It occupies dry slopes and flats from about 500 m (1600 ft) to 3200 (10,500 fl) in elevation.

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