EAST MOUNTAIN AREA
COMMUNITY WILDFIRE PROTECTION PLAN

Prepared for

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EXECUTIVE SUMMARY

Wildland fire is a natural part of the environment in the East Mountain area near Albuquerque, New Mexico. It has assisted in developing the forests, woodlands, and grasslands valued by residents and visitors alike. These vegetative communities have been significantly altered by drought, infestation, suppression protocols, and encroachment, resulting in increased fuels and greater risk to humans and infrastructure. In addition, contemporary population growth has led to increased development close to the wildland urban interface and increased the number of residents and structures at risk from wildfire. To address these issues, a group of multi-jurisdictional agencies (federal, state, and local), organizations, and residents have completed an arduous and awarding process to develop the East Mountain Area Community Wildfire Protection Plan (CWPP).

The purpose of the East Mountain CWPP is to assist in protecting human life and reducing property loss due to wildfire in the communities of the East Mountains and the surrounding areas. Although reducing the risk of wildfire is the principal motivation behind the development of this CWPP, managing the lands for hazardous fuels and wildfire and the protection of individual homes by implementing Firewise measures and defensible space are important components of the plan. Residents and visitors are interested in preserving the diversity and uniqueness of the forests and wildlands within the East Mountains to promote sustainability and maintain a valued way of life.

The East Mountain Area CWPP is the result of a community-wide wildland fire protection planning process and the compilation of documents, reports, and data developed by a wide array of contributors. This plan was compiled in 2006 in response to the federal Healthy Forests Restoration Act (HFRA) of 2003.

The East Mountain Area CWPP meets the requirements of the HFRA by:

1) having been developed collaboratively by multiple agencies at the state and local level in consultation with federal agencies and other interested parties;
2) prioritizing and identifying fuel reduction treatments and recommending the types and methods of treatments to protect at-risk communities and pertinent infrastructure;
3) suggesting multi-party mitigation, monitoring, and outreach;
4) recommending measures and action items that residents and communities can take to reduce the ignitability of structures; and
5) facilitating public information meetings to educate and involve the community to participate in and contribute to the development of the CWPP.

The wildfire threat to the residents and communities of the East Mountains is manageable if multi-jurisdictional agencies continue to work together in cooperation with residential and community-based treatments. Local and state fire agencies, as well as community fire protection groups, are excellent resources for information and assistance. A combination of homeowner and community awareness, public education, and agency collaboration and treatments will assist in reducing wildfire risk. These elements are part of the East Mountain Area CWPP, and will be important in maintaining the ideas and priorities of the plan in the future.

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1.0 INTRODUCTION

The forests, woodlands, and grasslands of the East Mountain area of New Mexico are fire-adapted ecosystems. Most East Mountain residential development lies within piñon-juniper and ponderosa forest types that once experienced frequent, low-intensity fires. Historically, fires occurred every 2–10 years in southwestern ponderosa pine forest and less frequently, every 10–30 years in piñon-juniper woodlands (Fletcher 1998). Tree-ring research conducted in the Sandia and Manzanita Mountains indicates pre-settlement mean fire intervals ranging from 4.5 to 12.5 years (Baisan and Swetnam 1997).

As the area has become a popular recreation and residential destination, fire has been removed from the system. During the last century, fire was treated solely as a destructive force, and as a result, fires were suppressed whenever possible. A dramatically reduced fire interval has resulted in increased understory and brush growth. Stands are generally much denser than they were a century ago, often with several times as many trees per acre as the historical condition.

An estimated 180 million acres of federal land are currently at risk of unusually severe wildfires (National Fire Plan 2002). The summer of 2000 demonstrated how devastating severe wildfires could be. In response to that landmark season, the National Fire Plan (2002) was established to develop a collaborative approach to the threat among various governmental agencies, followed in 2002 by the 10-Year Comprehensive Strategy Implementation Plan. The goal of the plan is to address the risk of wildland fire to communities and the environment as a result of a "high level of growth in the wildland urban interface that is placing more citizens and property at risk of wildland fire." The three principles of this plan are collaboration, priority setting, and accountability (Cibola National Forest Management Plan 2006).

In recognition of widespread declining forest health, the Healthy Forest Restoration Act (HFRA) was passed in 2003 to expedite the development and implementation of hazardous fuel reduction projects on federal land. A key component of the HFRA is the development of Community Wildfire Protection Plans (CWPPs) as a mechanism for public input and prioritization of fuel reduction projects. In addition, communities with CWPPs in place will be given priority for funding of hazardous fuels reduction projects carried out under the auspices of the HFRA. Although the HFRA and the specific guidelines are new, the principles behind the CWPP program are not. The National and State Fire Plans, the Western Governors' 10-Year Comprehensive Strategy, and the Federal Emergency Management Agency Disaster Mitigation Act of 2000 all mandate community-based planning efforts with full stakeholder participation, coordination, project identification, prioritization, funding review, and multi-agency cooperation.

The East Mountain Area CWPP addresses the CWPP requirements of collaboration, prioritized fuel reduction, and treatment of structural ignitability, with special attention to the desires and needs of the local communities.

2.0 CWPP PROCESS

2.1 Project History

The process of creating a CWPP for the East Mountain area was initiated in April 2003 by Ciudad Soil and Water Conservation District (SWCD), which had been conducting forest fuels treatment projects in the area for several years. The East Mountain Interagency Fire Protection Association (EMIFPA) joined forces with Ciudad SWCD to seek funding to develop a CWPP for communities in the Sandia and Manzanita Mountains. Attendees at an organizational meeting in May of 2003 identified a list of entities and officials who were subsequently invited to participate. The effort accelerated with the award of a grant from the New Mexico Association of Counties in July 2005 to match funding provided by the state legislature.

2.2 Core Team

The first step in the CWPP process was to bring together stakeholders, representing both agency and private interests, to form a Core Team. Agency members were easily identified and contacted. Private homeowners were brought into the process through the umbrella group that links neighborhood associations within the area and by word of mouth. Several environmental organizations operating in the area were also invited to send representatives to the table.

Initially, the Core Team consisted of about 15 people. The group met for the first time on 5 June 2005. Since then, the team has met monthly to set the direction for the plan and process. After receipt of the grant and several weeks of consideration, the group decided to hire a contractor to work with the Core Team and specifically to facilitate the public involvement process, develop the risk assessment, and produce the CWPP document. A Request for Proposals was advertised, and a broad-based subcommittee evaluated offers. A team led by SWCA Environmental Consultants (SWCA), in combination with the expertise of Forest Fitness LLC and Wildland Fire Associates, was awarded the contract in December 2005. Between 10 and 20 Core Team members, including the SWCA Team, have continued to meet monthly. The Core Team mailing list now has approximately 50 members.

2.3 Project Boundary

One of the first tasks of the Core Team was to establish the boundaries of the geographical area to be included in the CWPP. The group wanted to use physical boundaries that encompassed the majority of at-risk communities within the East Mountain area while still remaining a manageable size for planning and meeting purposes. The establishment of a project boundary took several months, as different land management agencies were contacted and the pros and cons of inclusion were discussed. Two land grants and a pueblo are located within the wildland urban interface; the governing bodies of all three of these entities elected to set the project boundary at the outside of their borders, but asked to continue to be kept abreast of discussions and decisions via the Core Team.

The final boundary of the East Mountain Area CWPP (Figure 1 and Figure 2) was based on a combination of jurisdictional and topographic parameters. The ridgeline of the Sandia and Manzanita Mountains was chosen as the western boundary to include not only all of the residential areas, but also any in-holdings and most of the recreational sites. The eastern boundary is the Bernalillo/Torrance County line, which straddles the eastern edge of the foothills. The northern boundary is just north of La Madera, and the southern boundary is just below Escabosa.

2.4 Media Relations

In order to increase awareness of the CWPP process and spread the word about the first community forum, a media event was held on 1 February 2006. Several Core Team members spoke about the progress to date on the CWPP and the future of the project. The project area and the contract award to the SWCA team were also formally announced. The event received moderate coverage by both television and newspaper outlets and provided some exposure for the CWPP. In addition, newspaper coverage was received preceding and following the public meetings.

2.5 Public Involvement

The public involvement process commenced with the first community forum held on 8 February 2006 at the Los Vecinos Community Center in Tijeras. Approximately 350 residents were notified of the event by e-mail, and over 700 flyers announcing the event were distributed throughout the area. The event was also announced and described in detail in both local newspapers. Approximately 75 residents attended the forum. Upon entering, attendees were asked to mark the location of their residence on the project area map. Based on the distribution of the stickers placed, most communities were represented at the meeting.

The Core Team and the contractors designed the event based on the concept of an "open house" rather than an "open mic." After a brief presentation on the CWPP process and goals, residents were asked to write comments on a series of flip charts arranged around the room, each one with a different title or category to help organize the comments. A Core Team member was stationed at each chart to answer questions and help respondents frame their comments. Categories were:

- Fighting the Fire
- Protecting My Home
- Protecting My Community
- Reducing the Threat of Wildfire Throughout the East Mountains
- Are We Prepared?
- Forest Management
- What Information Do You Want?
- What Do You Need?

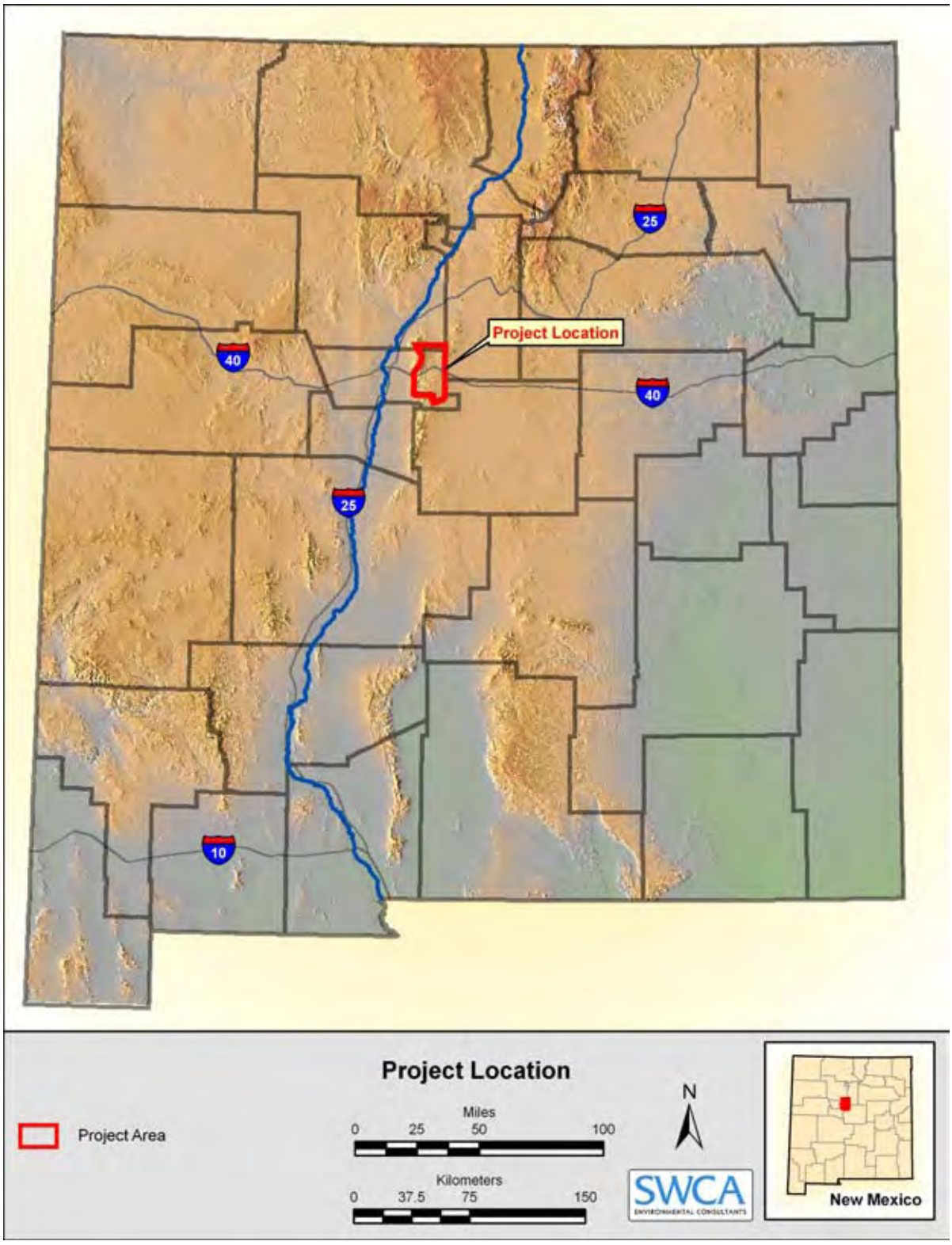

Figure 1. Project location map.

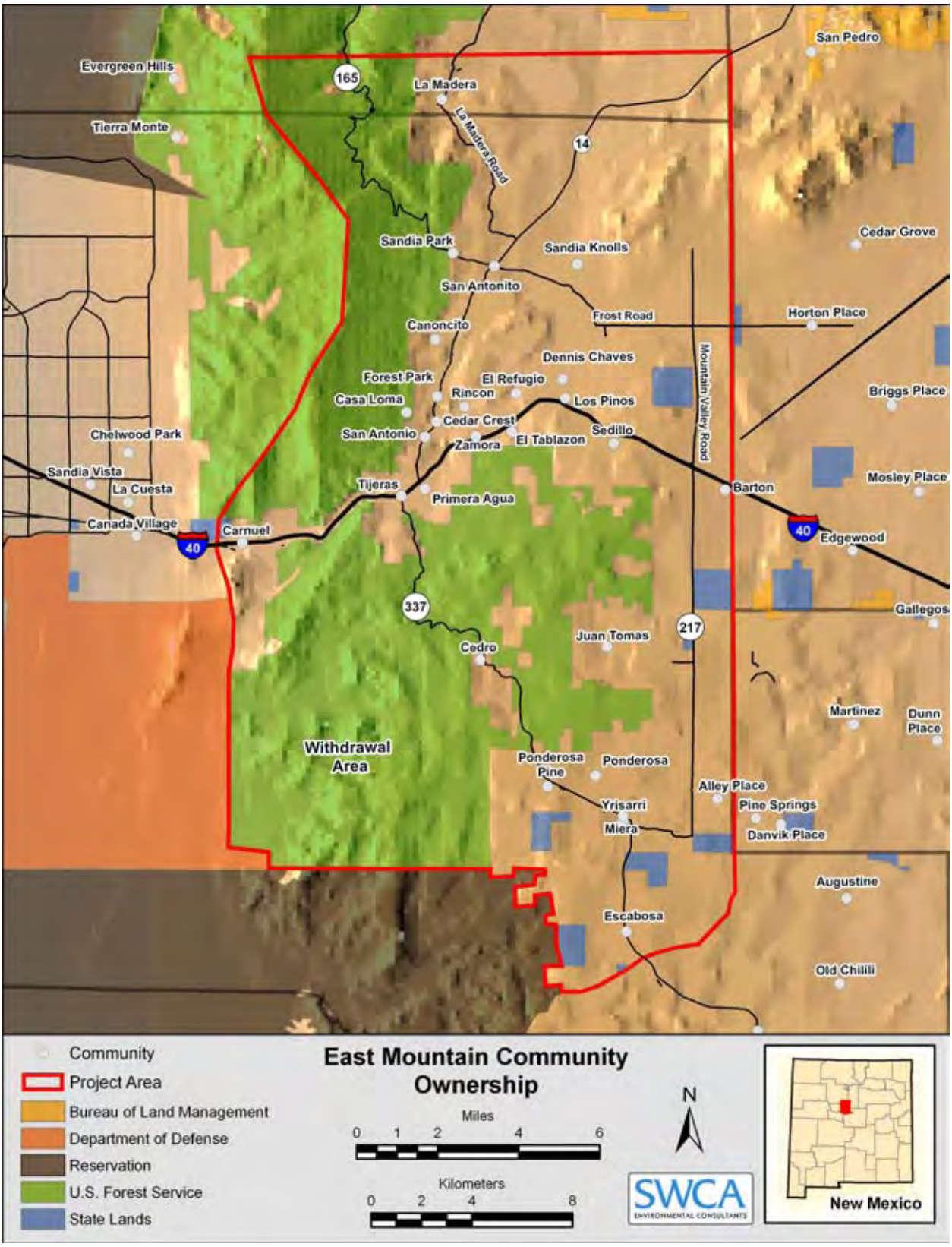

Figure 2. Project area land ownership.

Responses listed on the flip charts are included in their entirety in Appendix A. Each original category is listed, as well as specific details and new master categories that were assigned based on common themes.

Following the community forum, the Core Team decided to distribute a questionnaire by e-mail to solicit responses from those community members unable to attend the meeting. The Community Comment Form (Appendix B) was distributed to approximately 400 residents by e-mail and was posted on the project website. Approximately 20 residents responded to the survey form.

A second community forum was held on 3 May at the Los Vecinos Community Center in Tijeras. Approximately 500 residents were notified of the event by e-mail, and about 200 flyers were distributed throughout the area. Announcements of the meeting appeared in at least two area newspapers. Approximately 30 residents attended the event. In addition to members of the Core Team, Bernalillo County and U.S. Forest Service (USFS) representatives were available to discuss water resources for firefighting and fuel treatment projects. Again, the meeting began with a presentation of the CWPP process and goals. The presentation also included a fire behavior overview to provide residents with some background about the hazard assessment process. Residents were asked to break into working groups based on the community zone map (Figure 3). The zones were based on physical boundaries, community characteristics, and vegetation. Zone 5 was the only zone not represented at the meeting.

Each working group was tasked with completing the Values at Risk and Mitigation forms provided (Appendix B). The responses provided by the groups are included in Appendix A. These responses, along with comments received at the previous public forum and those received by mail, were used to develop the Action Items and Recommendations table in Chapter 7.

CWPP maps and information displayed at a booth during the East Mountains Celebration the following week drew a good amount of interest but no additional responses.

2.6 Website

Based on a need for improved communication and dissemination of information, the Core Team decided that a website specific to the project should be created. The website, established in early February 2006, included:

- CWPP overview and history
- Schedule of upcoming events
- Community feedback forms
- Project area map
- Examples of other CWPPs
- Informational articles and scientific papers to help increase awareness and understanding of forest health and hazard mitigation
- Links to relevant agency websites and helpful information sources such as the Firewise program website

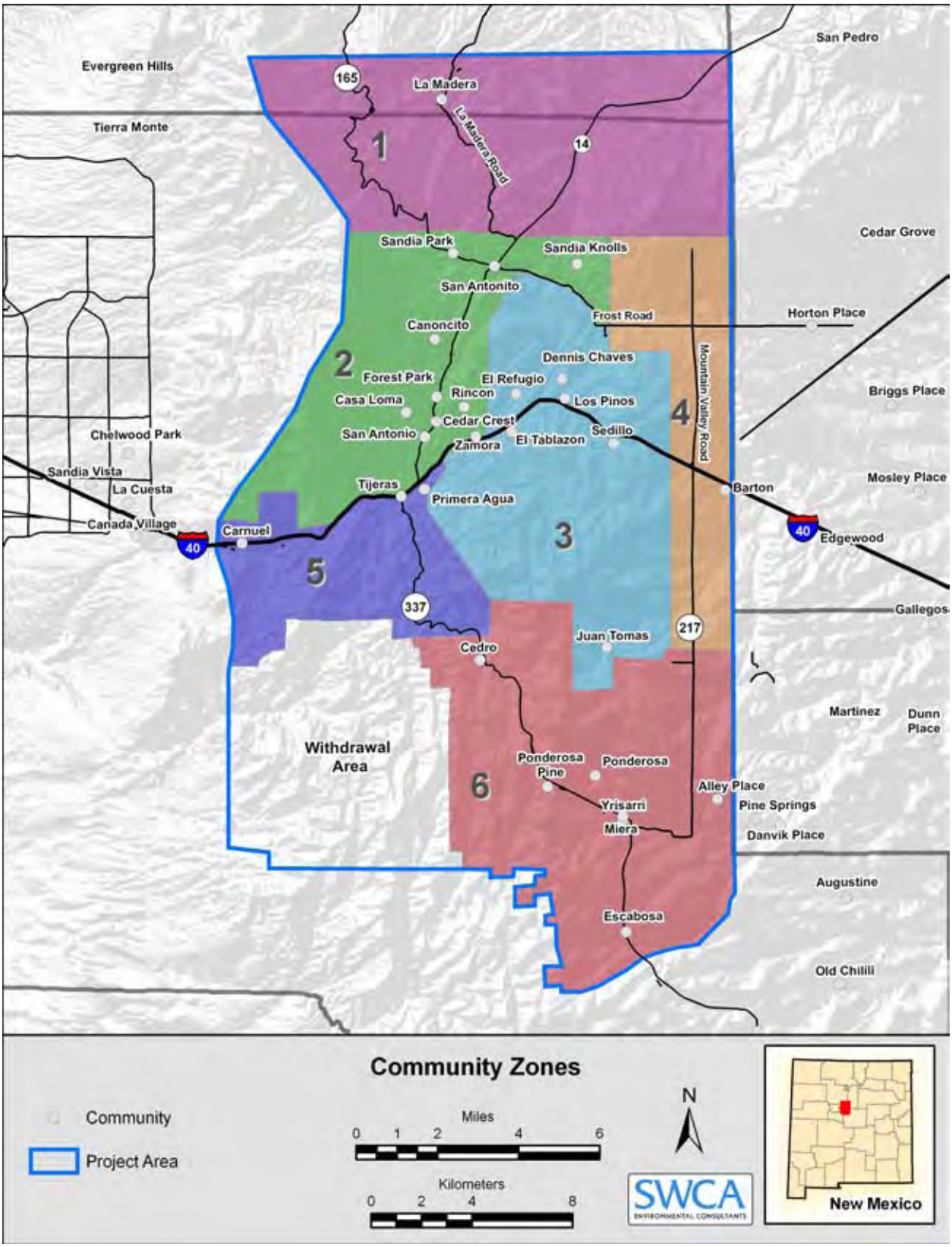

Figure 3. Map of community zones.

The website was maintained throughout the project and was an important arm of the public outreach effort for the East Mountain Area CWPP. Bernalillo County provides a link on their website to the project website. In addition, Channel 7 provided a link to the project website following their newscast related to the project.

3.0 COMMUNITY CONTEXT

3.1 Definition of the Wildland Urban Interface

The wildland urban interface (WUI) is commonly defined as the zone where structures and other human development meet and intermingle with undeveloped wildland or vegetative fuels (NMEMNRD 2004). Home construction within or adjacent to the WUI increases the potential for wildland fire ignitions and the corresponding loss of life, property, and infrastructure. However, experience has proven that these losses usually do not occur as readily in areas within the WUI where wildfire fuels are managed effectively by homeowners.

3.2 Location and Geography

The East Mountain Area CWPP project is located in central New Mexico on the east side of the north-south-trending Sandia and Manzanita Mountains. Albuquerque, New Mexico's largest city, lies on the west side of these mountains. The approximate project boundaries are the town of La Madera on the north, the Chilili Land Grant on the south, the crest of the Sandia and Manzanita Mountains on the west, and the Bernalillo/Torrance County lines on the east.

The project area includes 27 communities located in portions of Bernalillo and Sandoval Counties. The main local transportation corridors include Interstate 40, which bisects the project area from east to west; historic Route 66, which parallels Interstate 40; and Highway 14/337, which runs north to south through the project area. There are two National Scenic Byways in the East Mountain area: the Turquoise Trail and Route 66. Access to the area consists of narrow winding roads, including maintained two-lane roads, some one-lane gravel roads, and multiple dead-end roads.

A nationally important wildlife corridor is located within the East Mountain project area. This corridor runs perpendicular to Interstate 40 and extends from Carnuel (Exit 170) to Tijeras (Exit 175) (Tijeras Canyon Safe Passage Coalition 2005). The wildlife corridor connects the 65-mile long Sandia, Manzanita, and Manzano mountain ranges. Wildlife most affected by this corridor includes mule deer, black bear, mountain lion, coyote, bobcat, and skunk. Past and current research has established that this transportation corridor presents a deadly hazard to wildlife attempting to cross the corridor and to unsuspecting motorists traveling at high speeds.

3.3 Population

The East Mountain communities are growing at a faster rate than any other area in Bernalillo County (Bernalillo County 2006). The recent growth in the area is mostly a result of suburban expansion, with most residents relying on Albuquerque for employment and services. Population growth is increasing at approximately the same rate both north and south of Interstate 40. The current estimated population of 17,826 people is a 339.6 percent increase since 1970 and a 42.8 percent increase since 1990. Forecast data suggest that by the year 2015, the population of the East Mountain communities will increase by 3,233 people, or another 18 percent, to a total of 21,059. Although the character of the East Mountain communities has changed dramatically over the past 30 years, the rural nature of the area remains very important to its residents.

Until the mid-1900s, descendants of land grant heirs and homesteaders predominantly populated the East Mountain area. The typical East Mountain community member can be characterized as relatively young and affluent. In 2000, over 60 percent of the population was between 18 and 65 years old. North of Interstate 40, the percentage of individuals whose 2000 income was below the poverty level was 4.6 percent, and south of the freeway it was 8.7 percent. These figures are much lower than either the 13.7 percent of Bernalillo County residents or the 18.4 percent of New Mexico residents who live below the poverty line.

In 2000, the major East Mountain area employers included the GCC Cement Plant; Albuquerque Public Schools; local, state, county, and federal government offices; and the Sandia Peak Ski Company.

3.4 History and Land Use

The East Mountain area has a long and diverse history, which is summarized very briefly here. Approximately 900 years ago, Native Americans were known to occupy canyon villages in the East Mountain area, some of which were occupied when the Spanish arrived in the eighteenth century (Bernalillo County 2006). By 1865, the Spanish had established permanent settlements in the area, including Tablazon, Zamora, Yrisarri, and Cedro. Pioneers moving west from the United States began to settle the area in 1848.

Agriculture played an important role in the early physical, social, and environmental development of the East Mountain communities. Residents grew beans, corn, garden vegetables, and wheat. They also raised sheep, goats, and cattle in mountain pastures; labored at local mines, sawmills, and railroads; worked for the U.S. Forest Service; and manufactured bootleg whiskey, among other things.

Current landowners within the project area include the U.S. Forest Service, the New Mexico State Land Office, the City of Albuquerque, the County of Bernalillo, and private entities. The Cibola National Forest, Sandia Ranger District (RD) manages the Sandia and northern Manzanita Mountains, which comprise approximately 40 percent of the project area. These lands provide a wide range of active and passive recreational uses, including hiking, mountain

biking, and bird watching. The City of Albuquerque and Bernalillo County own relatively small parcels of land in the area. The City of Albuquerque maintains most of its land as open space and manages it to conserve natural and archaeological resources and provide outdoor education and low-impact recreation opportunities.

The southern portion of the Manzanita Mountains was withdrawn from USFS use in 1943. This Withdrawal Area is used by the Department of Energy (DOE), the Department of Defense (DOD), and the U.S. Air Force's Kirtland Air Force Base (AFB) for testing, storage, and safety buffer activities. The area is currently jointly managed by DOE, DOD, and USFS.

Nearly half of the land in the East Mountain area is under private ownership. The area has developed primarily as large-lot, low-density residential subdivisions, although there are some subdivisions of small, medium-density lots. Most of the vacant land currently is zoned for agricultural and large-lot residential development.

4.0 FIRE ENVIRONMENT

4.1 Fire History

4.1.1 Fire Suppression History

The U.S. Forest Service was founded in 1905 in response to the nation's need for quality water and timber, formalizing a national approach to wildland protection. Fire posed a threat to water resources and timber stands, so fires were extinguished as quickly as possible. From the beginning, the approach to wildland fire leaned heavily toward suppression.

Over the years, most Federal agencies adopted fire suppression as the proper means of protecting the nation from wildfire. Thus, for the better part of the last century, wildfires were suppressed, leading to the overcrowding, meadow encroachment, and reduced wildlife habitat that now characterize national forests. Over the last 10 years, wildfires have become increasingly dangerous, and more and more acres of forest have been burned.

Although fire suppression is still aggressively practiced, using fire as a management technique has also become more common. Because of the large number of people who essentially live in the forest, suppression will always have to be a priority. However, the more that fire is used in fuel and ecosystem management, the closer we can come to re-establishing a natural fire regime and reducing the chances of catastrophic wildfires.

The Sandia Ranger District of the Cibola National Forest has a policy of aggressively suppressing all fire starts. This is illustrated by records for 18 fires in 2002, 21 fires in 2003, 8 fires in 2004, and 21 fires in 2005. Most of these fires burned 1 acre or less because of the aggressive action taken when they were first detected.

Fire causes within the Sandia RD are roughly split with 48 percent caused by human activities and 52 percent ignited by lightning. The Coyote Canyon fire, which started in the Withdrawal

Area in 1999, burned 350 acres and created havoc for the nearby residents. The Cooper fire in 1998 burned 120 acres but did not threaten any homes.

The responsibility for initial fire attack in the East Mountain area outside of USFS land falls under New Mexico State Forestry, Bernalillo County, and local fire departments. However, in reality most fires are responded to by all agencies, per mutual aid agreements. Kirtland personnel perform initial attack within the Withdrawal Area. Under an agreement with the USFS, Kirtland will call on USFS fire personnel for assistance, if needed.

4.1.2 Historic Fire Behavior

Fire behavior in the West, including the CWPP area, has changed dramatically within the past 10–20 years. Previously, wildfires tended to be small and of low intensity. In addition, the fires would stay close to the ground, where fire suppression tactics could be effective. However, changing conditions such as very dense timber cover with touching tree crowns, an abundance of brush and small trees to act as ladder fuels, drought conditions, massive tree mortality due to insects and diseases, global warming, and an increasing number of houses being built in forested areas have created major changes. Many recent fires have exhibited rapid growth and intense fire behavior, which render most fire suppression tactics ineffective.

The most relevant example of this change is the Cerro Grande fire near Los Alamos, New Mexico, in 2000. This fire consumed 43,000 acres and damaged or destroyed 112 Los Alamos National Laboratory facilities and 235 residential structures (USDI NPS 2006). The towns of Los Alamos and White Rock were evacuated, and the fire burned for 11 days before it was contained. Another example is the Hayman fire in Colorado in 2002. This fire raced 19 miles in one day, burned for 10 days, and eventually consumed 138,000 acres and 132 homes. Suppression costs totaled 42 million dollars. An even more-recent example is the Rodeo-Chediski fire that burned over 467,000 acres in Arizona in 2002. In most cases, these large fires will continue to burn until the fuels, topography, or weather conditions change and allow firefighters to safely carry out successful suppression activities.

4.1.3 Fire Management History

Fire and fuels management on the Sandia RD is governed by the guidelines set in the Cibola NF Fire Management Plan (2006). A primary feature of the plan is the recognition that the Sandia RD has two unique features: the Sandia Mountain Wilderness and the Kirtland Military Withdrawal Area. The Sandia Wilderness has one set of guidelines, while the remainder of the district is governed by a different set of guidelines.

The non-wilderness area component of the Sandia RD falls within a constrained Fire Management Unit (FMU). This FMU includes district lands and the Withdrawal Area, discussed in more detail below. The actions taken during a wildfire in the constrained FMU are dictated by a highly developed wildland urban interface area and extensive developed recreation areas and dispersed recreation uses. The fire strategies call for:

1) Suppression of all fires using appropriate management responses to protect resources and prevent spread into private lands

2) Use of prescribed fire and mechanical treatments to reduce fuel hazards
3) Development of cooperative agreements with local fire agencies and private landowners

4.1.3.1 Kirtland Withdrawal Area

The 18,675-acre Withdrawal Area is currently used for a variety of storage, testing, and safety buffer activities (Bernalillo County 2006). The ignition potential is greater within this area due to unexploded ordinance and live munitions activities that are conducted there. In recognition of the risk, the fire danger ratings used for the Withdrawal Area are always one level higher, or more severe, than those displayed by the USFS. This policy helps to ensure that activities with high ignition potential are limited during dry periods.

Projects within the Withdrawal Area require involvement and planning from Kirtland AFB, the DOE, the DOD, and the USFS. The DOD and DOE hold responsibility for compliance with the National Environmental Policy Act (NEPA), but the USFS is actively involved and provides input when needed. A Memorandum of Understanding is currently in progress to formalize the current agreement that Kirtland will perform initial attack activities on Withdrawal Area land and will call on USFS personnel for assistance if needed. Access to the Withdrawal Area is very limited and must be approved and facilitated by Kirtland personnel.

4.1.3.2 Sandia Mountain Wilderness

The wilderness component falls into a "desired" FMU and has its own specific policy. Generally, this policy allows for naturally ignited fires (lightning) to burn as a wildland fire-use fire under certain constraints. Wildland fire use is defined as allowing an unplanned natural ignition to burn to meet predetermined resource objectives.

Wildland fire use is not considered appropriate at this time on the Sandia Ranger District due to increasing numbers of wildland urban interface homes and the lack of vegetation data to support predictive models. The Cibola National Forest is currently completing vegetation surveys of the Sandia RD to consider treatments at the stand level, which may or may not include designated wilderness areas. Any proposed treatments will follow the required NEPA planning process. In wilderness areas, the Cibola National Forest Supervisor must approve helicopter use, portable pumps, chainsaw use, and helispot construction. The Southwestern Regional Forester must approve use of motorized vehicles and bulldozer line construction. Fire strategies call for:

- Restoring fire to the ecosystem
- Use of prescribed fire to reduce fuel hazards
- Management of wildland fires so that air quality issues are compatible with local, state, and federal laws
- Ensure appropriate management responses are conducted to minimize suppression impacts to the wilderness as well as impacts to the surrounding area

4.2 Climate

New Mexico has a mild, arid to semiarid, continental climate characterized by abundant sunshine, light total precipitation, low relative humidity, and relatively large annual and diurnal temperature ranges (New Mexico Climate Center 2006). The average hours of annual sunshine range from nearly 3,700 hours in the southwest portions of the state to 2,800 hours in the north-central portions. The freeze-free season ranges from more than 200 days in the southern valleys to less than 80 days in the northern mountains, where some high mountain valleys have freezes in the summer months.

A wide variation in annual precipitation totals is characteristic of arid and semiarid climates (Wilcox and Breshears 1994). Generally, July and August are the rainiest months of the year, with 30 to 40 percent of the state's annual precipitation falling at this time. Summer rains fall almost entirely during brief, frequently intense thunderstorms. The moisture associated with these storms originates in the Gulf of Mexico. Spring and summer rains often encourage the growth of fine fuels such as grasses and forbs. Late in the season or the following year, these fine fuels can be very dry and actively carry a ground fire.

Winter is the driest season in New Mexico. During this season, precipitation is primarily a result of frontal activity associated with Pacific Ocean storms that move across the country from west to east. Much of this precipitation falls as snow in mountain areas. Snowpack provides water for tree growth and has broad-reaching effects on overall forest health. In years with low snowpack, soil and fuels have more time to dry out before the fire season begins, which can result in more extreme fire behavior. In years with high snowpack, the onset of the fire season may be delayed due to high soil and fuel moisture.

Wind speeds across New Mexico are usually moderate, although relatively strong winds often accompany frontal activity during the late winter and spring. In the East Mountain area, winds generally originate from the west, with northwest winds more common in the winter and southwest winds slightly more typical in the summer (New Mexico Climate Center 2006). However, local surface wind directions vary with topography. For example, canyon winds are common in the East Mountains, where wind speeds generally reach their peak at canyon mouths.

4.3 Weather

Elevation in the project area ranges between approximately 6,000 and 10,000 feet; therefore, weather in the project area can vary widely. To address this altitudinal gradient, a range of temperature and precipitation values is used to describe weather in the project area. Tijeras Ranger Station weather data were used to represent lower elevation areas in the project area. Data from the Sandia Crest weather station were used to represent higher elevation areas.

July is the warmest month of the year in the East Mountain communities, with average temperatures ranging from 87ºF in Tijeras to 65ºF at Sandia Crest (Western Regional Climate Center 2006a,b). The coldest month of the year is January, with an average temperature of 16ºF at lower elevations and 12ºF at the Crest.

In the upper elevations of the project area, July and August are the wettest months of the year, with approximately three inches of average total precipitation in each month. At lower elevations, September and October are the wettest months of the year, with total annual rainfall averaging approximately 2.5 inches. In addition, an average of 44 high-intensity, short-duration thunderstorms occur during July and August (Hacker 1977). The average annual snowfall in the project area ranges from 13.8 inches in Tijeras to 116.2 inches at Sandia Crest. New Mexico has been experiencing very dry conditions for much of the last seven years. During 2005–2006, the project area experienced the eighth driest year on the 1895–2006 historical record (National Climatic Data Center 2006). In addition to its severity, the current winter drought is notable for being preceded by two wet winters. Swetnam and Betancourt (1998) used the Palmer Drought Severity Index to analyze fire occurrence in the Southwest from 1700 to 1900 using a network of fire-scarred trees and tree-ring reconstructions; their work shows that the largest fire years (in terms of spatial extent) occur during severe drought years that have been preceded by one to three wet years.

4.4 Topography

The Sandia, Manzanita, and Manzano Mountains, which bound the East Mountain Area CWPP on the west, form the most prominent feature in central New Mexico (Williams 1986). The Sandia Mountains are a single very large fault block that has been raised highest on the west side (Chronic 1987). The sloping east side is the top of the tilted block, where canyons are significant landscape features. The maximum elevation in the project area is 10,678 feet, at the top of the Sandia Mountains. The minimum elevation of approximately 6,000 feet occurs in the southwestern portion of the project area.

4.5 Vegetation

4.5.1 Current Conditions

The plan area currently encompasses a wide array of vegetation types. The current conditions, however, are a snapshot of vegetation and do not reflect the historic conditions of the past, which are discussed in a later section.

Vegetation zones are primarily a function of elevation and therefore moisture regimes. Grasslands and oneseed juniper savanna habitats dominate the eastern side of the project area, at an elevation of around 6,500 feet. Pure grasslands are relatively uncommon.

At higher elevations, the open savannas transition into woodlands. Here grass is uncommon, and the sites are dominated by piñon (*Pinus edulis*), oneseed juniper (*Juniperus monosperma*), Rocky Mountain juniper (*Juniperus scopulorum*), and Gambel oak (*Quercus gambelii*). This is the predominant vegetation type in the CWPP area and is where most homes and structures are located. Tree density is high, with basal areas of 160 square feet per acre being common. Local woodlands have been devastated by an intensive infestation of the pine bark beetle between 2000 and 2004. Consequently, many areas have seen a conversion from piñon-juniper to monotypic

juniper. Abundant moisture in 2005 led to a significant drop in the bark beetle population. In the current year, 2006, although there may be some decline, bark beetles are still active in both piñon pine and firs, and mortality occurred at all elevations this spring. The combination of drought and insect infestation is not unusual in the Southwest, and in time, these areas likely will return to a more balanced state. In fact, careful examination reveals a healthy understory of small piñon seedlings left untouched by the bark beetle that will eventually replace the surrounding dead trees.

At an elevation of about 7,000 feet, the woodlands transition into the ponderosa pine forest type. Although there are large stands of ponderosa pine (*Pinus ponderosa*) in certain lower-elevation areas (such as Oak Flat Picnic Area at an elevation of approximately 7,400 feet), most of the ponderosa pines in the East Mountains are found at higher elevations.

The ponderosa pine type quickly changes to mixed conifer forest at an elevation of 8,000 feet. Species found here include ponderosa pine, white fir (*Abies concolor*), and Douglas fir (*Arceuthobium douglasii*), with some Gambel oaks on the south-facing slopes. These stands are very dense, with some thickets of large trees having a basal area density of over 250 square feet per acre.

The spruce/fir type begins at an elevation of about 10,000 feet and continues up to Sandia Crest at an elevation of 10,678 feet. Species in this ecozone include Engelmann spruce (*Picea engelmannii*), white fir, Douglas fir, corkbark fir (*Abies lasiocarpa*), and quaking aspen (*Populus tremuloides*). This sub-alpine timber type is unique in the Southern Rockies.

The heaviest fuel loadings in the plan area occur in the mixed conifer and spruce/fir forests. The combination of high tree density and large amounts of dead and down trees can raise the fuel loadings to 50 tons per acre. These heavy fuel loads, in combination with steep slopes, create the highest fire hazards. Historically, fires in the spruce/fir forest occur less frequently than in other forest communities, but the high volumes of fuel typically generate more intense, stand-replacing fires.

Finally, there is a rare but important vegetative type within the study area—the riparian zones. There are very few perennial streams in the area, among them Tijeras Creek, Cedro Creek, and Cienega Canyon. In addition, there are scattered springs that flow most or all of the year. Most of the riparian areas are found along intermittent stream channels, that is, streams that flow only during snowmelt in the spring or after heavy monsoon rains in the summer.

4.5.2 Changes to Historic Fire Regime

4.5.2.1 Succession

Succession occurs naturally in all landscapes and is determined by both natural processes and the influence of humans. As mentioned earlier, current vegetation in the East Mountains does not reflect past conditions.

An example of natural succession can be found in the grasslands and old agricultural fields. Without mowing and other farming practices, these areas were left unattended and were gradually invaded by oneseed juniper. Over the last 20–30 years, some of these fields have

become completely dominated by junipers. Juniper, classified as an invader, can survive on very little water and will outcompete grass for growing space.

Another example is the aspen stands at high elevations in the Sandia Mountains. Aspens come in after a disturbance such as wildfire. Aspen trees require full sunlight to develop and will thrive until they reach 50–60 years of age. During this time, a young forest of more shade-tolerant conifers may develop and begin to shade the ground. As the older trees die, the aspen sprouts cannot establish in the shade of the conifers, and the forest changes from an aspen stand to a conifer stand. Only a large-scale disturbance such as fire or heavy cutting can reverse this situation.

Over the past few centuries, humans have changed the fire-adapted ecosystem in the Southwest. Before 1900, periodic low-intensity fires burned throughout the landscape at the surface level, removing brush, small trees, and debris. These fires also burned the lower branches on the larger trees. Thus, the forests were kept open and free of fuel buildup, supporting healthy forests and allowing wildlife to flourish. Tree-ring research has shown that ponderosa forests periodically burned every 2–10 years, grasslands every couple of years, and piñon-juniper every 10–40 years (Fletcher 1998; Smith 2000). These fires were ignited by both humans and lightning. A major shift occurred around the turn of the twentieth century, when wildfire was viewed as a destructive force and was put out whenever and wherever possible. Ranchers feared the loss of grazing grass from prairie fires, and forest fires threatened houses and timber resources. By the 1940s, introduction of better fire fighting equipment and increased manpower had effectively eliminated most wildfires. The unforeseen consequences of the successful suppression of natural, periodic fires have been excessive regeneration and a buildup of fuels beneath the forest canopy across the entire Western United States.

In a study titled *Changes in Southwestern Forests: Stewardship Implications*, Johnson (1993) looked at changes in forest structure across the Southwest between 1962 and 1986. Aspen stands in the region decreased by 46 percent. The total number of conifer trees between 3 and 17 inches in diameter at breast height (DBH) increased from 132 to 195 trees per acre (48%), and the number of trees per acre over 1 inch DBH increased from 234 to 294 (26%). The number of large trees remained constant. This study illustrates that there are many more trees per acre now, and that they are much smaller in diameter than in the past.

In a study entitled *Dynamics of a Pinyon-Juniper Stand in Northern Arizona: A Half Century History*, Folliot and Gottfried (2002) evaluated a two-acre piñon-juniper stand that was measured in 1938 and again in 1991 near Flagstaff, Arizona. The total number of trees within the area increased from 597 to 717. The proportion of piñon trees increased from 25 percent to 36 percent, while juniper numbers declined. Though junipers are often the first to invade an area, they are often replaced by piñons. Photo points in 1938 showed grasslands with scattered small trees. In 1991, 53 years later, there were many large trees obscuring the view from the same points.

This same phenomenon is not unusual in the East Mountains. Many homes that were built with a breathtaking view of distant mountains 15–20 years ago now have those views blocked by a dense forest.

4.5.2.2 Non-Native Species

Non-native plant species and noxious weeds in particular should be addressed in fuel reduction programs, and attention should be given to using practices that limit the spread and establishment of problem species. One such species that deserves special mention with regard to wildfire is cheatgrass (*Bromus tectorum*). Invasion of cheatgrass can increase the frequency of fire to the point that native shrub species cannot recover, giving cheatgrass a further competitive advantage (Brooks et al. 2004). The establishment of a weed management area that encompasses the East Mountains would help to facilitate cooperation among land managers and owners to manage common weeds and limit the spread of invasive species.

There are three classes of noxious weeds, A, B and C, as described in the New Mexico State University cooperative extension services publication, *New Mexico's Invasive Weeds* (Lee 1999).

Class A Weeds are not native to an ecosystem and have limited distribution within the state. Preventing new infestations and eliminating existing infestations are the highest priorities in management. Some species in this class are not presently found in the state but are threatening to invade.

Class B Weeds are not native to the ecosystem and are presently limited to particular areas within the state. The management priority is to contain them within their current area. Preventing new infestations should also be a priority for weeds in this class.

Class C Weeds are not native to the ecosystem but are widespread throughout the state. Long-term programs of management and suppression are encouraged.

Noxious weeds that may exist in portions of Bernalillo County and Sandoval County and have been identified within the boundaries of the East Mountain Area CWPP are listed below.

Class A:
- Camelthorn (*Alhagi pseudalhagi*)
- Hoary cress (*Cardaria draba*)
- Purple loosestrife (*Lythrum salicaria*)
- Perenial pepperweed (*Lepidium latifolium*)
- Dalmatian toadflax (*Linaria genistifolia*)
- Canadian thistle (*Cirsium arvense*)
- Scotch thistle (*Onopordum acanthium*)

Class B:
- Russian knapweed (*Acroptilon repens*)
- Musk thistle (*Carduus nutans*)

Class C:
- Field bindweed (*Convolvulus arvensis*)
- Jointed goatgrass (*Aegilops cylindrical*)

4.6 Insects and Disease

Forest pests are defined as forest insects that will in some way degrade the overall plant health of the forest. Of primary interest are those that attack tree species. It should be noted that many trees that are weakened or dying are victims of the prolonged drought or mechanical damage due to home construction or other activities, not insects. As trees die from insects, drought, and other causes, they become part of the fuel loading and increase the fire hazard.

Bark Beetles (*Ips* spp., *Scolytus* spp,. and *Dendroctonus* spp.). *Ips* beetles, also called engraver beetles, attack ponderosa and piñon pines as well as other conifers. They are responsible for the huge piñon die-off within the range of the East Mountain Area CWPP over the last four years. *Dendroctonus* beetles attack medium to large ponderosa pines, blue spruce, Engelmann spruce, and Douglas firs. In this area, *Scolytus*, or fir engraver beetles, attack white fir. Each of these species creates egg galleries, distinct to that species, that eventually girdle the infected tree. The tree's natural defense is to "pitch out," or excrete sap into the entrance holes, covering the beetle with sap and killing the invader. Trees are most likely to be successful at this strategy when they are not stressed by high tree density or drought. Once a tree has been colonized, it cannot be saved. In addition, beetles create opportunities for blue stain fungus to infect trees. This fungus blocks sap flow and eventually kills the tree.

Twig Beetle (*Pityophthorus* spp.). The twig beetle is currently the second most damaging insect in the CWPP project area. Twig beetles frequently attack piñon pines as well as other conifers. High beetle populations develop in drought-stressed and otherwise injured trees. Breeding is restricted to twigs and small branches. Fading branches throughout the crown and tan sawdust around the attack site can identify trees attacked by the twig beetle. Hand pruning and vigorous watering can sometimes control attacks.

Piñon Needle Scale (Scale) (*Matsucoccus acalyptus*). Scale is a native sap-sucking insect found in the Southwest. Feeding by scales weakens trees by killing needles over one year old. Sometimes small trees are killed by repeated attacks, and larger trees are weakened to such an extent that they fall victim to attack by bark beetles. Repeated, heavy-scale infestations leave trees with only a few needles alive at the tips of the branches. Scales appear as small, black, bean-shaped objects on the needles of the trees. Destroying the eggs before they hatch can greatly reduce potential damage.

Piñon Spindle Gall Midge (*Pinyonia edulicola*). Midges produce a spindle-shaped swelling from the needle base that is about one-half inch long. This insect is a common forest pest that rarely causes serious damage. Control is usually not necessary.

Piñon Needleminers (*Coleotechnites edulicola, C. ponderosae*). Needleminers are locally common on piñon and ponderosa pines. Species resemble one another in appearance and damage but have different life cycles. Damage first becomes evident as foliage browns. Closer examination reveals hollowed-out needles. Early needle drop, reduced growth, and tree mortality can result from needleminer infestation. Trees normally recover from needleminer damage without suffering serious injury, but the current drought can change this.

Roundheaded and Flatheaded Wood Borers (Family *Cerambycidae* and *Buprestidae*). Roundheaded and flatheaded wood borers attack recently cut or dead and dying trees, often riddling them with tunnels. Roundheaded borers are the most destructive, tunneling deep into the wood. Fresh-cut logs in the woods or firewood stored at a home are common infestation sources. These borers are most prominent after a wildfire. They may also spread into vigas in homes.

Juniper Borers (*Callidium* spp.). Several wood borers are aggressive pests in drought-stressed junipers in the CWPP project area. Damage can be extensive before symptoms are apparent. Usually a large portion of the tree or the entire tree dies before the insects' exit holes are noticed. Larvae bore beneath the bark, making galleries and tunneling deep into the wood to spend the winter. Borer damage has been frequently noticed in some of the larger junipers around homes.

Tree diseases such as parasitic plants, fungi, and bacteria can also affect the forest in the CWPP project area. These diseases impact forest systems by degrading the productivity and health of the forest. Some of the more common forest diseases that are found in the plan area are described below. Trees that are killed by disease also add to fuel loading and increase fire hazards.

Mistletoe (*Arceuthobium* spp., *Phoradendron* spp.). Mistletoe is common in the plan area. Mistletoes are parasitic plants that gradually degrade tree vigor and may eventually kill their hosts over a long period. Essential water and nutrients are diverted from the host plant to the mistletoe, thus depriving the host of needed food. Dwarf mistletoe is found on piñon pines, ponderosa pines, and firs. It is host-specific, that is, the species that infects piñon does not infect other tree species and so on. True mistletoe is common on junipers in the Southwest. Both types of mistletoe spread from tree to tree and are difficult to control. Dwarf mistletoes spread by shooting wind-borne spores, and birds spread seeds of true mistletoes. In residential areas pruning can sometimes be effective on smaller trees. Heavy infestations in large trees can be controlled only by cutting down the trees and removing them to stop the spread of the mistletoe to other trees nearby.

Fir Broom Rusts (*Melampsorella caryophyllacearum*). Broom rusts are primarily a forest problem on white firs at higher elevations in the Sandias. There is also a species that is found on Engelmann spruce, but it is less common. These infections cause growth loss, top kill, and eventually tree mortality. Both species require alternate hosts to complete their life cycle. There is no chemical or biological control for the broom rusts.

Needle Cast (*Elytroderma deformans*). Needle cast affects piñon and ponderosa pines in the plan area. It can be damaging because it invades twigs and needles and persists for several years. Symptoms occur in the spring when all the year-old needles turn brown 6–12 mm from the needle base. Incidence of this disease is low.

Douglas Fir Tussock Moth (*Orgyia pseudotsugata*). The Douglas fir tussock moth is an important defoliator of Douglas firs and true firs in New Mexico. Moth eggs overwinter on fir needles. Larvae emerge and begin feeding on foliage in the spring causing it to shrivel and die. The flammable red needles that remain on the tree for a period of weeks may alter fire behavior within heavily infested stands. The 2006 infestation is considered both severe and widespread (Terry Rodgers 2006, personal communication).

5.0 WILDLAND HAZARD ASSESSMENT

Although many definitions exist for *hazard* and *risk*, for the purposes of this document these terms follow the definitions used by the firefighting community. *Hazard* is a fuel complex, defined by kind, arrangement, volume, condition, and location, forming a special threat of ignition and resistance to control. *Risk* is the chance of a fire starting as determined by the presence and activity of causative agents (National Wildfire Coordinating Group 1998). Hazard assessments were performed on wildland and urban fuels within the boundaries of the East Mountain Area CWPP in two separate efforts. The urban hazard assessment is discussed in Chapter 6, Community Zone Assessment.

To determine relative wildfire hazard across the East Mountain area, features affecting fire spread were evaluated along with factors related to the difficulty of suppression. Although the wildland fire environment consists of three factors that influence the spread of wildfire—fuels, topography, and weather—only fuels and topography are included in the hazard analysis. Weather is a key determinant of fire behavior but it is highly variable and does not exhibit any consistent, large-scale trends across the project area. Predictive fire behavior modeling, on the other hand, incorporates weather as a critical component.

The wildland hazard assessment was performed by developing a spatially weighted overlay model using geographic information system (GIS) technology to integrate the individual datasets into a comprehensive map of hazard (Price 2003; Northwest Regional Planning Commission 2005; Pratt 2005). Data were gathered from all relevant agencies, and the most current data were used. A weighted overlay must use data sets that are ranked with the same number of classes; for example, this project used four classes, with 1 the lowest hazard and 4 the highest hazard for each layer. After all data sets are ranked with the same scale, weighted overlays can be processed out of the data sets. A weighted overlay takes data with the same scales and combines them with user-defined weights for each data set so that its influence is related to its importance in the output. The outputs will be on the same scales as the inputs. Table 1 lists the individual datasets, the classes assigned to the data, and the relative weights assigned within the modeling framework.

After initial review of the draft hazard assessment, the Core Team decided that maps of the individual components of the hazard analysis would be helpful in visualizing the steps used in the model. The development of the individual maps was particularly important for the second public meeting. By presenting the modeling components separately, the black box scenario was avoided and participants could see how the comprehensive model was created. The weighting of each layer is explained below as part of the discussion of the maps representing separate components of the model.

Table 1. East Mountain Area CWPP Hazard Analysis Layers, Data Sources, and Weights Used in Model (1 = lowest hazard, 4 = highest hazard)

Layer	Source	Year	Weight (%)	Category
Fuel model	Bernalillo County vegetation	2000	45	1: water, urban, rock outcrops
				2: grassland, prairie, fields
	Sandoval County – Southwest Regional Gap land cover			3: piñon-juniper shrubland, ponderosa
				4: mixed conifer
Slope	National Elevation Dataset USGS	2003	30	1: < 10 %
				2: 10–20 %
				3: 20–40 %
				4: > 40 %
Proximity to fire station	Bernalillo County	2001	5	1: < 2 miles
				2: 2–5 miles
				3: 5–10 miles
				4: > 10 miles
Proximity to water sources for firefighting	Bernalillo County hydrants and tanks	2006	10	1: < 500 feet
				2: 500–1000 feet
	Sandoval County	2003		3: 1000–5000 feet
				4: > 5000 feet
Proximity to roads	E911 Roads	2001	5	1: < 50 feet
				2: 50–100 feet
				3: 100–200 feet
				4: > 200 feet
Dead-end roads	E911 Roads	2001	5	1: > 0.25 mile from dead-end road
				4: < 0.25 mile from dead-end road

5.1 Fire Behavior Overview

5.1.1 Wildland Fuels

Figure 4 depicts the hazard assessment based solely on vegetation and slope characteristics, the two most important of the three contributors to hazard. In the wildland environment, vegetation is synonymous with fuels, and topography affects direction and rate of spread of wildfire.

The vegetation of an area determines critical fire characteristics such as flame length and rate of spread. It is important to recognize the limitation of the available data in predicting detailed characteristics of the vegetative fuel in the CWPP project area. Assumptions can be made about the relative fuel loading in different vegetative communities, but many other factors can be highly variable across the same general fuel type. The volume of dead and downed fuel, for example, is not part of the available data. Also, the horizontal and vertical continuity of the fuel can vary greatly based on aspect, soils, and other site-specific variables. For the purposes of this project, the assessment was based on the best available data combined with professional knowledge of field conditions in the project area. Because the fuel is such a large contributor to the hazard assessment outcome, more detailed fuel information could improve the accuracy of this assessment. The USFS is in the process of collecting detailed fuel bed and fuel-loading information for the Sandia Ranger District. Ultimately, the data will be used in detailed analysis of fire behavior using predictive software such as FARSITE. While an updated hazard assessment performed with the USFS data could be useful in the future, the data currently available for Bernalillo and Sandoval Counties were used to assign categories to vegetative communities based on expected fire behavior in a general sense.

Mixed conifer communities were assigned the highest or extreme hazard rating based on the loading or volume of both live and dead fuels. This vegetation type is most common within the high-elevation, forested areas of the Sandia and Manzanita Mountains. A hazard rating of high was assigned to both piñon-juniper and ponderosa communities. Although piñon-juniper would typically fall into a lower hazard rating, the volume of dead standing and downed piñon as a result of the *Ips* bark beetle infestation has changed the fuel complex across much of the East Mountains.

Grassland, prairies, and fields were rated as moderate hazard in this analysis because although fires may move very quickly through these fuel types, flame lengths generally allow for direct attack by suppression crews. Rock, water, and urban cells were assigned a low hazard level because of the inflammability of these materials. Urban fuels are difficult to characterize within a coarse-scale aerial analysis. Many urban areas have significant open areas of bare soil, concrete, and other inflammable materials. However, they may also contain homes, wood decks, firewood, and other highly flammable elements. For this reason, residential communities were assessed separately and are discussed in the following chapter. Approximately 7 percent of the project area was classified as urban.

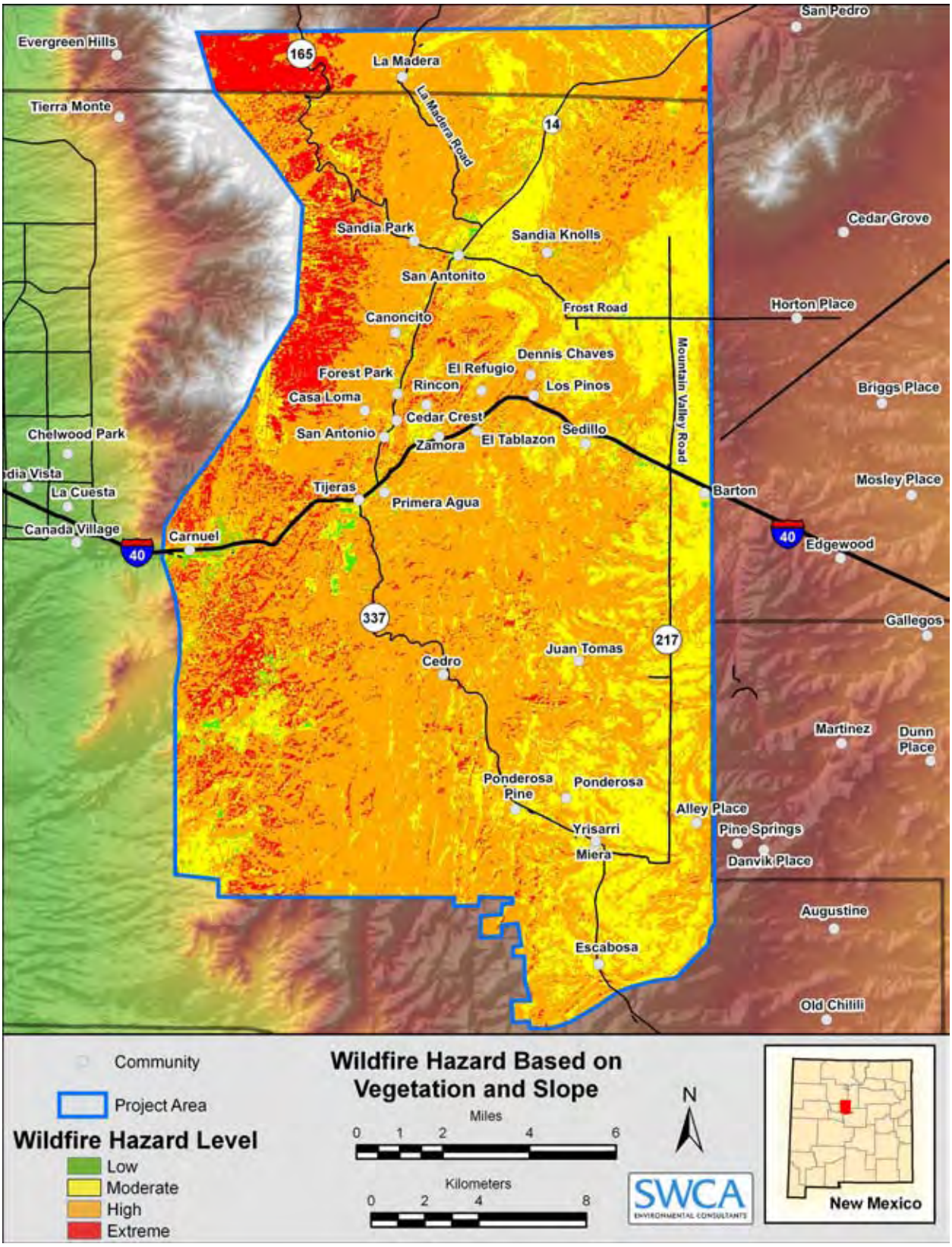

Figure 4. Wildfire hazard based on vegetation and slope.

5.1.2 Topographic Features

This analysis provides only an overview of topographic features that contribute to fire spread. Certain topographic features, such as slope, are readily assessed with GIS, while others, such as the presence of box canyons, require more detailed analysis. Therefore, this assessment provides only a broad overview of hazard, and a more detailed analysis of topography is required to predict the rate or direction of spread in the event of a wildfire.

Steepness of slope is an important determinant of fire spread and was therefore weighted heavily in the assessment. Wildfire tends to spread more quickly uphill due to the preheating of uphill fuels by the flame. Firebrands can roll more readily on steep hills and ignite lower portions of the hill. The steepest slopes were given the highest hazard rating in the analysis. Southern aspects may be more fire-prone due to drying of fuel, and northern aspects may support greater tree densities within the same fuel type. However, given the various ways that aspect can affect fire behavior, this topographic element was excluded as a component in this model.

5.2 Suppression Resources

In addition to the characteristics of the wildland fire environment discussed above, factors contributing to the difficulty of suppression were also included in the hazard assessment. Figure 5 shows the locations of fire hydrants, large water storage tanks, and fire stations in the East Mountains. Proximity to these suppression resources was rated, as was the proximity to roads and the presence of dead-end roads. The categories assigned to the suppression-related layers are detailed in Table 1, above.

Proximity to fire hydrants and large water storage tanks that are accessible to fire engines was included in the hazard assessment used to develop the comprehensive hazard ratings (see Figure 6). The availability of water is both variable and somewhat problematic for fire fighting in the East Mountains. The most effective kinds of equipment for fighting fire in the WUI are small engines or brush trucks, which can carry only a limited volume of water. Many neighborhoods in the East Mountains lack hydrants, so firefighters have limited options in refilling their engines. Even in places where hydrants are available, water pressure may be insufficient for rapid filling. Other resources such as portable, inflatable water storage tanks or large water tender trucks may be needed to provide adequate water capacity for firefighting.

5.3 Risk of Ignition

As mentioned previously, ignition sources for fires on the Sandia Ranger District are about evenly split, with 48% human caused, and 52% lightning caused. As a result, the risk of ignition was assumed to be equally likely across the planning area. The analysis assumed that a fire was as likely to start along a roadside as it was to be ignited by lightning along a ridge top and therefore did not rate risk differently for any area.

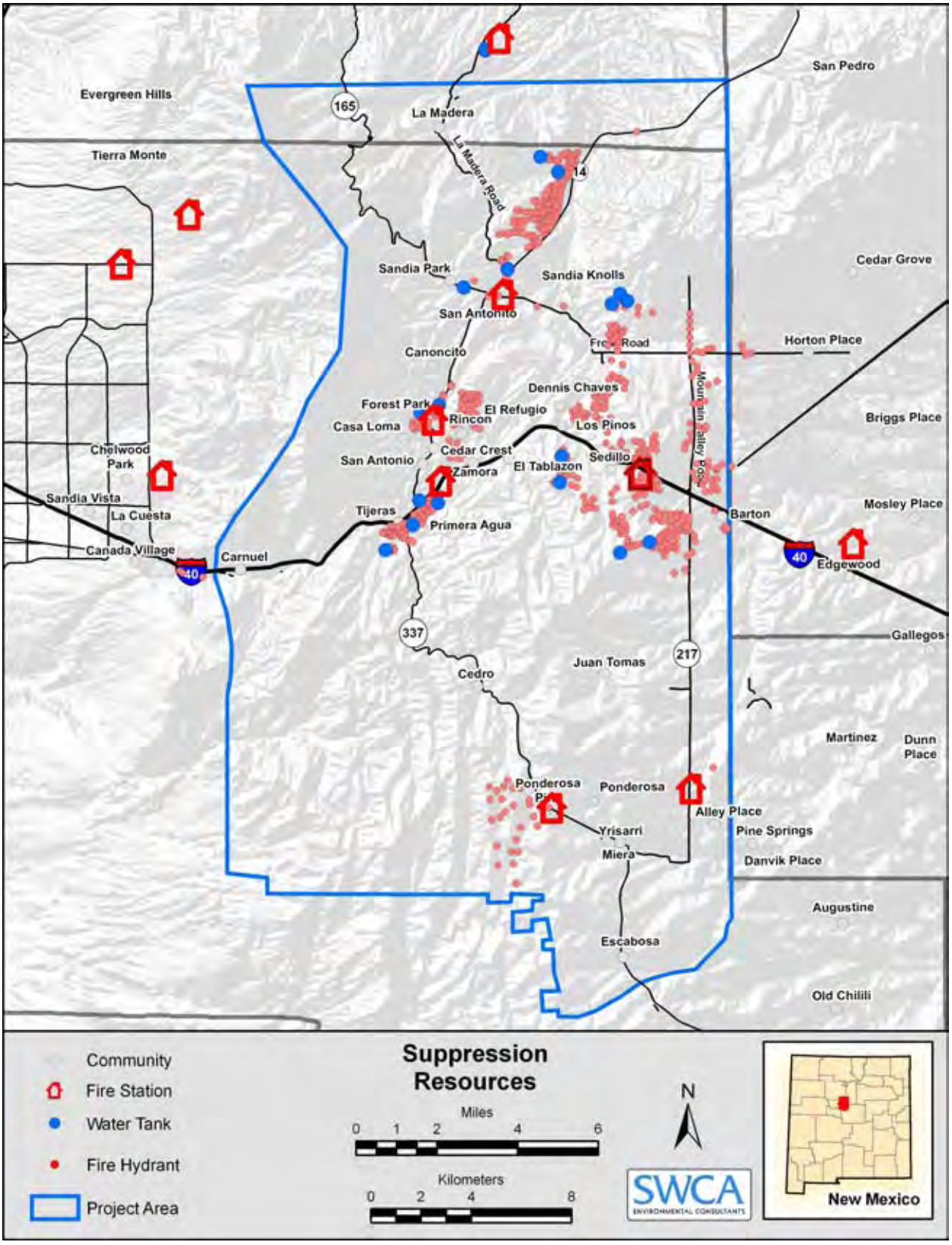

Figure 5. Location of suppression resources.

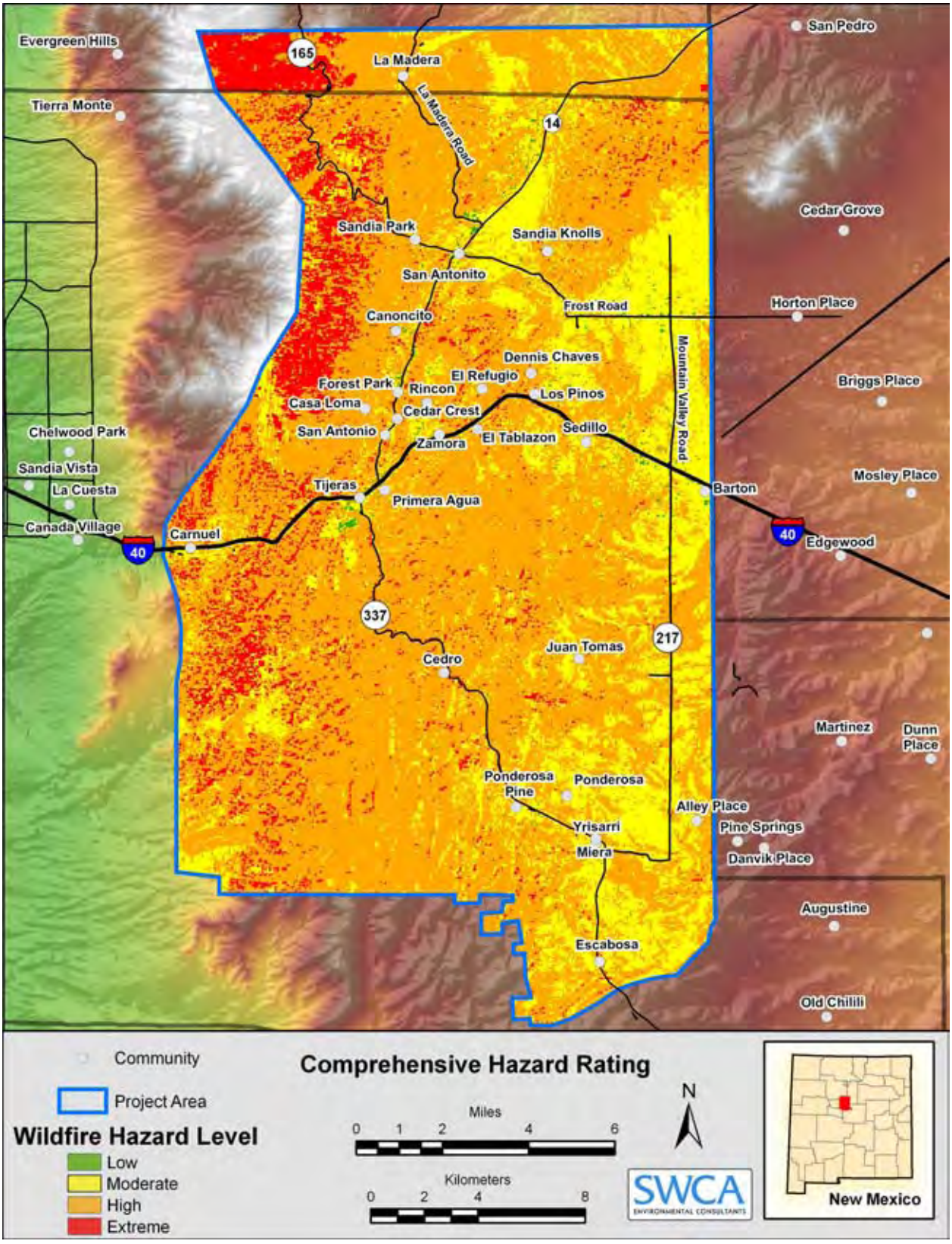

Figure 6. Comprehensive hazard rating map.

6.0 COMMUNITY ZONE ASSESSMENT

In addition to the GIS hazard assessment, a field crew used the East Mountain Community Assessment Field Sheet (Appendix B) to assess the vulnerability of homes within individual neighborhoods across the area. The goal was not to conduct a house-by-house assessment but rather to get a general sense of community vulnerability to wildfire. The effort verified and updated the WUI Inventory Assessments from Bernalillo County (Gober et al. 2002) and Sandoval County (Barz et al. 2004). Unlike the detailed county assessments, however, this effort did not assign hazard rating scores to individual neighborhoods. The vulnerability of individual homes varied greatly within most neighborhoods. However, trends were observed, such as a prevalence of automatic gates or unmarked dead-end roads within a given area.

Based on observed vegetation and community characteristics, the planning area was divided into six zones for organizational purposes (see Figure 3). The zones provide a method for breaking the area into discussion categories for both public input and discussion within this document. However, the zones are not intended to be used for project planning purposes.

The following section provides details on the Community Assessment and also lists community values at risk and mitigation actions suggested by community members at the second public forum. All comments from the forum are provided in Appendix A.

Community Zone 1

Geographic Area: East and west of Highway 14 North, from the junction of North 14 and La Madera north to the planning area boundary

Includes: La Madera, Paako, San Pedro Creek, and San Pedro Overlook

Vegetation*:* Piñon-juniper woodland and juniper savanna

Vegetation Condition: High piñon mortality, some areas with closed canopy and dense fuels. Several homes across the area have completed thinning projects. In addition, there is a cluster of thinned properties located within the densely vegetated Cañon Madera neighborhood.

Community of La Madera

Typical Construction: Paako and San Pedro Creek homes are adobe or stucco. Homes in La Madera are manufactured homes or finished with adobe, stucco, wood siding, or brick. Roofs across area are constructed with metal, asphalt shingles, tile, or are flat with asphalt and gravel.

Access and Egress: Locked and automatic gates without emergency access provisions are a problem throughout the area. La Madera has one way in and out with narrow, steep roads and unmarked dead ends. However, many dead-end roads in the area have turnarounds.

Community Values*:* Safety of inhabitants; school and community center; La Madera fire department; electrical and phone grid; housing; amenities, aesthetics, quality of life, views, etc.; livestock; archaeological and cultural sites; ski area, picnic area, campgrounds, Paako golf course and club house.

Community Suggestions for Risk Reduction and Mitigation*:* Thinning; prescribed burns; turn Sulphur WUI Project from planned to done; thinning, prescribed burn, National Forest East 165 and road to crest (e.g., Palomas Peak, Tecolote Peak); develop evacuation plan for area (especially La Madera); inventory available water supplies, add new water supplies where inadequate for fish and wildland fires; establish green waste center; fix green waste problem at transfer center; buy more chippers (commercial chipper can be had for ~ $10,000); more information and education efforts for local residents; encourage all homeowners to thin their own lots; provide assistance to ground (e.g., lend chippers); encourage all homeowners to do risk assessments around the home; encourage residents to number their houses in large, visible numbers (address in evacuation plan).

Additional Comments*:* Defensible space should be improved across this zone.

Community Zone 2

Geographic Area: East and west of Highway 14 north, from Interstate 40 north to La Madera Road

Includes: Sandia Park, Sandia Knolls, Piñon Ridge, Canoncito, Forest Park, Hobbies , Mountain Homes Estates, Cañon Estates, Sierra Vista

Vegetation*:* Mostly piñon-juniper, some ponderosa pine forest, particularly around Sandia Park. Some grassland and juniper savanna also scattered throughout zone.

Vegetation Condition: Piñon mortality evident in most areas to varying degrees. Some areas have closed-canopy woodlands with dense ladder fuels. In most communities, some homes have completed thinning projects.

Homes in Sandia Park

Typical Construction: The majority of homes in the area have wood siding. There are also adobe, stucco, brick, and manufactured homes across the area.

Access and Egress: Most residential developments in this area have only one-way in and out. Roads can be steep and narrow, but most dead ends are marked. Automatic gates without emergency access provisions are a problem throughout the area.

Community Values*:* One road in and out of neighborhoods; wildfire; general landscape; homes; watershed; views, scenery; healthy forest in wilderness; thin wilderness areas; congressional action; safety of kids, pets, livestock; education for all on forest health protection; more communication in neighborhoods, East Mountain area; schools, daycare, businesses, and our community; establish tentative evacuation centers for domestic animals; wildlife safety and enjoyment; having dependable neighbors, neighborhoods; hydrants; notification, good communication; rural culture; more community fire protection; trucks, tanks, hydrants – visible.

Community Suggestions for Risk Reduction and Mitigation*:* Create/assure emergency egress from every neighborhood; wildlife corridors; defensible spaces all around, including non-resident owners; chipping, thinning, slash disposal, neighborhood based, accessible for neighborhoods; high school/community "volunteers," work parties, etc.; know how to contact neighbors/increased communications, neighborhood organizations; tentative (or sample) evacuation plans; education for forest safety, health, evacuation, community organization.

Additional Comments*:* Homes with trees and shrubs growing up against the wood siding and up under the deck are common. Improved defensible space would reduce home vulnerability across the zone. Refer to the "Sierra Land Grant Community Coalition Fire Plan" for specific fire prescriptions.

Community Zone 3

Geographic Area: North and south of Interstate 40, east of Tijeras, west of Mountain Valley Road and Highway 217

Includes: Sedillo, Juan Thomas, El Tablazon, Rincón Loop, Gutierrez Canyon, El Refugio, Woodlands

Vegetation*:* Mostly piñon-juniper woodland and juniper savanna with some pockets of ponderosa forest and grassland

Vegetation Condition: Some areas with dense, closed-canopy woodland. Dog hair thickets with dense trees of the same age are also common.

Rincon Loop area

Typical Construction: There are adobe, stucco, brick, wood, and manufactured homes across the area. Metal or asphalt shingle roofs are most common, but there are also homes with tile or flat roofs.

Access and Egress: Steep, narrow gravel roads with unmarked dead ends are common throughout area. Some communities have multiple access routes, but others have only one way in and out.

Community Values*:* Safety and welfare of residents, because of single entrance, dense forest around perimeter, and amount of fine fuels; the forest and surrounding areas are the attraction and value of the area; old historic and prehistoric settlements; solitude.

Community Suggestions for Risk Reduction and Mitigation*:* Public lands need fuel reduction and altering fuel ladder structure; open lands for wood cutting, carefully; private landowners mow fine fuels; better control of fine fuels along all roads.

Additional Comments*:* No other issues.

Community Zone 4

Geographic Area: East and west of Mountain Valley Road and Highway 217

Includes: Barton, Sandia Mountain Ranch, Frost Road, Mountain Valley Road

Vegetation*:* Piñon-juniper woodland, juniper savanna, and grassland

Vegetation Condition: Vegetation varies across area from open grassland to dense, closed canopy piñon-juniper woodland.

East Frost Road area showing variable vegetation.

Typical Construction: Homes in the area are finished with wood, adobe, stucco, brick, and metal siding. Metal and asphalt shingle roofs are most common, but there are also homes with tile or flat roofs.

Access and Egress: Locked and automatic gates without emergency access provisions are a problem throughout the area. Unmarked dead ends occur across area.

Community Values*:* Homes and further development; commercial development – Old Route 66; propane retail outlet; Route 66 Elementary; loss of life – secondary to communication and homebound residents; pets and livestock; loss of access – Frost Road, 217/Man Valley, I-40; loss of aesthetic value; gas pipeline; continued utility services – electrical, water, communication; Entranosa headquarters; two fire substations with apparatus; more rolling rather than steep slopes; piñon-juniper and grassland; better access with larger tributaries; Entranosa on generator power; water issues without power; general apathy of the public and residents.

Community Suggestions for Risk Reduction and Mitigation*:* Reduce human error and possible cause of wildfire through regulations, restrictions, education; highlight major event with media and how the plan would work; covenants and rules should encourage defensible space.

Additional Comments*:* Vulnerability of individual homes in this zone varies from low to high, depending mostly on defensible space and the type of vegetation close to the house.

Community Zone 5

Geographic Area: North and south of Interstate 40 from east edge of Albuquerque west past Tijeras

Includes: Carnuel, Tijeras, and Primera Agua

Vegetation*:* Mostly piñon-juniper woodland and juniper savanna with patches of sage scrubland and riparian corridors

Vegetation Condition: Some piñon mortality across zone. Riparian areas include dead and down fuels.

Primera Agua near Tijeras

Typical Construction: There are adobe, stucco, brick, wood, log, and manufactured homes across the area. Common roof types include flat, metal, and asphalt shingles.

Access and Egress: Dead-end roads are common; some have turnarounds, some do not. Many areas have one way in and out.

Community Values*:* East Mountain Public Library, A. Montoya Elementary School, Roosevelt Middle School, Tijeras Municipal Building, Santo Niño historic church, GCC Cement Plant

Community Suggestions for Risk Reduction and Mitigation*:* Continue free trash and greenwaste disposal on "Clean Up Saturdays"

Additional Comments*:* Density of homes is more of an issue in this zone than in others. Although many neighborhoods are not within dense vegetation, defensible space is still an issue because fire could potentially move from house to house.

Community Zone 6

Geographic Area: Both sides of Highway 337 south to planning area boundary

Includes: Cedro, Alley Place, Yrisarri, Ponderosa Pines, Escabosa

Vegetation*:* Much of the area is piñon-juniper woodland or ponderosa forest. Juniper savanna and grassland vegetation is scattered throughout the area

Vegetation Condition: Contiguous vegetation, with a closed canopy and ladder fuels, is common. All communities contain homes that have completed thinning projects.

Juan Tomás area, showing juniper savanna and woodland habitats.

Typical Construction: There are adobe, stucco, brick, wood, and manufactured homes across the area. Metal or asphalt shingle roofs are most common, but there are also homes with wood shingle roofs.

Access and Egress: Many communities have more than one way in and out. Many narrow, steep roads and unmarked dead ends exist. Turnarounds are inadequate or nonexistent in many cases.

Community Values*:* Narrow roads, rural character; ecological continuity; private initiative; individual responsibilities; forest, watershed; develop business providing fire-resistant building materials and appliances such as individual roof sprinklers; better understanding of ecological dynamics, e.g., do junipers crowd out other species; people (and their animals as much as possible); homes/structures—include stores, fire stations; roads; ideally protect the forest as much as possible; natural water sources—streams, creeks, and springs; people – including those needing assistance; animals, pets, wild animals; the forest; conservation of "stream" in David Canyon; watershed serving community – Tranquillo Pines water supply; awareness of what individuals can do; rural character preserved; more signage; Fire Station 11; forest; one way in–one way out; real estate value; wildlife; the biggest threat of wildfire to community values is encouraging urbanization by creating demand for broad roads, turn-around, hydrants on water systems, and government responsibility for putting out fires instead of individual responsibility.

Community Suggestions for Risk Reduction and Mitigation*:* Education and training including on-site demonstration projects and organized community thinning and slash removal days; fuel reduction; signage – no smoking, don't throw butts; financial assistance for thinning and slash removal; more signage around Exit 175 – north and south; education; encourage thinning/ defensible space by individual owners; publicize availability of government funds for thinning; financial assistance; neighborhood groups work together; individual responsibility – stored water and roof sprinklers; require real estate brokers to disseminate information as to personal responsibility (roof sprinklers, etc.); define "forest health" as a means of determining which type of thinning is appropriate where; building codes that provide for fire-resistant materials and individual fire prevention.

Additional Comments*:* This is the only area where wood shingles were observed.

7.0 RECOMMENDATIONS AND ACTION ITEMS

The recommendations and ideas presented in this section are based on community feedback, agency input, and the results of the hazard assessment. The categories described below, based primarily on the items identified as most important by community members, include hazardous fuel reduction, education, reduction of home vulnerability, and suppression resources. While the ultimate responsibility for protecting private property lies with individual homeowners, these activities are meant to facilitate and encourage those actions. Table 2 provides a summary of proposed projects. Only those projects that serve to protect communities and essential infrastructure were included in the table. Priority levels were assigned based on the number of public comments identifying the activity in a general way. Community recommendations regarding other goals and values are listed in Appendix A.

Table 2. Recommendations and Action Items

Category	Project	Goals and Objectives	Priority Level	Potential Agencies or Groups
Hazardous Fuel Reduction	Greenwaste Pick-Up	Facilitate greenwaste removal by picking up and hauling away slash throughout the area	High	Bern. Co., EMIFPA, Village of Tijeras
Hazardous Fuel Reduction	Community Chipper Days	Purchase chipper with operators and make available with two hired operators throughout the year to neighborhood associations	High	EMIFPA, Ciudad SWCD, Village of TIjeras
Hazardous Fuel Reduction	Greenwaste Disposal at Bernalillo County Transfer Station	Obtain funding to allow free greenwaste disposal and assist Bernalillo County with processing greenwaste at East Mountain transfer station	High	EMIFPA, Ciudad SWCD, NMAC
Hazardous Fuel Reduction	Clean Up Saturdays in Tijeras	Obtain funding to continue and expand Clean Up Saturdays to facilitate greenwaste and trash removal in and around Tijeras	High	Village of Tijeras, EMIFPA, Bern. Co.
Hazardous Fuel Reduction	Private Land Thinning Assistance	Increase funding to assist homeowners with thinning on private land	High	EMIFPA, Ciudad SWCD, NMAC, NM State Forestry
Hazardous Fuel Reduction	High School Community Service Project	Provide free assistance to help residents move brush away from house	Medium	East Mountain High School
Hazardous Fuel Reduction	Boy and Girl Scouts Community Service Project	Provide free assistance to help residents move brush away from house	Medium	Local Boy and Girl Scout Troops
Hazardous Fuel Reduction	Roadside Mowing Program	Reduce flammable fuels along roadsides	High	NMDOT, Bern.Co., Neighborhood Assoc.
Hazardous Fuel Reduction	La Madera Fuel break	Create shaded fuel break by thinning and limbing up along La Madera Road	Medium	NM State Forestry, Sand. Co.
Hazardous Fuel Reduction	Sulphur WUI Project	Reduce fuel loading along WUI area	Medium	USFS
Education	Homeowner's Guide Publishing	Produce the CWPP Homeowner's Guide (Appendix C), distribute a copy to all East Mountain residents, and provide copies to the Chamber of Commerce for future residents	High	EMIFPA, Ciudad SWCD, NMAC, Bern. Co., Village of Tijeras
Education	East Mountain Area CWPP	Produce copies of the CWPP on CD to distribute to interested parties	High	EMIFPA

Table 2. Recommendations and Action Items (continued)

Category	Project	Goals and Objectives	Priority Level	Potential Agencies or Groups
Education	Highway Signage Installation	Educate visitors traveling to national forests about wildfire risk by installing at least two permanent signs, one on North 14, one on 337	High	EMIFPA, USFS, NM Department of Transportation
Education	Fire Curriculum Integration	Encourage collaboration between fire scientists and local teachers to continue to integrate fire into school curricula at all possible age levels	Medium	EMIFPA, USFS, Bern. Co., Sandoval Co., NM State Forestry, all schools within planning area
Education	Forest Health Workshop	Use the Backyard Tree Farm Program to expand homeowner understanding of forest health issues and silviculture treatments	High	EMIFPA, USFS, Ciudad SWCD, NM State Forestry
Education	Fire Prevention Specialist	Establish funding and hire an interagency fire prevention specialist to organize public education and outreach activities and coordinate with all local agencies to deliver a consistent message	Low	EMIFPA, Ciudad SWCD, NMAC, Bern. Co., USFS
Reduction of Home Vulnerability	Firewise Community Recognition	Encourage participation of local neighborhoods with Firewise U.S.A. through NM State Forestry	Medium	NM State Forestry, Neighborhood Assoc.
Reduction of Home Vulnerability	Defensible Space Workshop	Provide at least two detailed defensible space workshops each season to educate residents about specific recommendations for improved defensible space	High	NM State Forestry, USFS, EMIFPA, Ciudad SWCD, Bern. Co., Sand. Co.
Reduction of Home Vulnerability	Address Number Giveaway	Use handout of free, reflective, 3" address numbers to raise awareness of fire preparedness issues	Low	EMIFPA, Bern. Co., Neighborhood Assoc.
Suppression Resources	Community Water System Collaboration	Compile information on community water system capacity and accessibility. Encourage installation of fittings on accessible infrastructure to allow efficient firefighting access.	Medium	Bern. Co., community water systems, Village of Tijeras, Sand. Co., Village of Tijeras, Entranosa water utility
Suppression Resources	Brush Trucks	Purchase additional brush trucks for wildland urban interface firefighting	Medium	USFS, Bern. Co., NM State Forestry, Village of Tijeras

7.1 Education

Agencies and community members alike have stressed a need for greater public education. There is a general feeling that many local residents are simply not informed about the risks associated with residing in a fire-adapted ecosystem. Most residents and agency representatives agree that more education across age groups is needed.

One long-term approach would be to work with local schools to further integrate wildfire education into existing school curricula and develop fire awareness in local youth. Opportunities for collaboration between educators and agencies should be encouraged.

Although many residents are already familiar with Firewise, many others could benefit from increased exposure to Firewise guidelines. Workshops demonstrating and explaining Firewise principles have been suggested to increase homeowner understanding of home protection from wildfire. New Mexico State Forestry administers a program to recognize Firewise Communities within the state. Information about the program is available at http://www.firewise.org/usa/index.htm. Greater participation in the Firewise Communities U.S.A. program could improve local protection and preparedness.

Another educational event that could complement Firewise activities is a fire behavior workshop for homeowners. This event would be held at a demonstration site where a fuel reduction project has already been completed. Participants would examine the completed project, talk to a forester about how and why the prescription was developed, and how the prescription relates to expected fire behavior. The workshop would help to illustrate the differences between a vulnerable forest and a fire-resilient forest.

Many community members stressed a need for more signs throughout the area to increase awareness of wildfire risk for residents and tourists. Installing signs on Highway 14 north and Highway 337 south would inform recreationists en route to the Cibola National Forest. Flashing electric signs, like the solar-powered signs used by the New Mexico Department of Transportation to advise motorists, would be most effective because they are more eye-catching and could provide up-to-date information. In addition, it might be useful to rent billboards along Interstate 40 during particularly bad fire seasons for maximum information exposure.

7.2 Fuel Reduction

Fuel reduction is a critical activity for reducing the risk of wildfire throughout the East Mountain area. The goal of fuel management is to preemptively modify wildfire behavior by altering the fuel complex (Finney 2001). These alterations generally focus on reducing overall fuel loading and continuity of fuels. The design of large-scale wildland fuel treatments considers stand structure, seral stage, density, insect infestations, disease, mortality, and wildlife habitat, among other issues. Because of the complex nature of large treatments on public land, the discussion that follows is limited to general goals and concepts.

Table 3 outlines completed and planned fuel reduction treatments on public land. Each land management agency has a different set of policies governing the planning and implementation of projects. Treatments on federal land require intensive NEPA analysis. Specific stand treatments and silviculture prescriptions are developed based on current conditions and wide-ranging management objectives. All possible treatments must be analyzed conjunctively and compared for optimal achievement of agency objectives. At a minimum, NEPA analysis of the Sandia Ranger District can be expected to take two years.

Table 3. Agency Activities

	Agency	Project Name	Year	Area (acres)	Treatment Method
Federal	U.S. Forest Service	Hondo	Planned FY07	1400 (analysis area)	Possible treatments could include fuel breaks, thinning, and habitat improvement
	U.S. Forest Service	Las Huertas	Planned FY08/09	316 (analysis area)	Possible treatments could include fuel breaks, thinning, and watershed restoration
	U.S. Forest Service	Sulphur	Planned FY07	1900 (analysis area)	Possible treatments could include fuel breaks, thinning, and habitat improvement
	U.S. Forest Service	FR 462	Planning complete, implementation in progress	130	Create fuel break by thinning from below and pile burning
	U.S. Forest Service	Armijo	2001	130	Fuel break created by thinning from below and pile burning
	U.S. Forest Service	Bonito Canyon	In planning	300	Possible treatments include prescribed burning and fuelwood harvesting
			2003	300	Prescribed burn
				25	Meadow restoration
	U.S. Forest Service	Burton	Planned FY08/09	2000 (analysis area)	Possible treatments could include fuel breaks, thinning, and habitat improvement
			1997–2004	50	Aspen regeneration
	U.S. Forest Service	David Canyon	1994–2002	1172	Thinning, pile burning, and fuelwood harvesting
	U.S. Forest Service	Heatherland Hills	2001–2002	50	Fuel break, pile burning
	U.S. Forest Service	Oak Flat	Planning complete	71	Prescribed burn
	U.S. Forest Service	Otero	1999–2002	25	Fuel break
			1999–2002 1999	130	Fuelwood harvest
				65	Prescribed burn
				15	Meadow maintenance
	U.S. Forest Service	Tablazon	2002–2004	28	Fuel break
	N.M. State Land Office	Edgewood Firewood Area	Completed Spring 2006	30	Meadow restoration
				28	Thinning from below
				234	Fuelwood harvest, thinning, and meadow restoration
State	N.M. State Land Office	Apple Valley Fuels Project	Completed 2003–2006	294	Thinning and habitat improvement
	Bernalillo County Open Space	Carlito Springs Thinning Project	Completed Spring 2006	30	Thinning
County	City of Albuquerque Open Space	Carolino Canyon	2006	22	Thinning
City	City of Albuquerque Open Space	Juan Tomás	2007	25	Thinning/fuel break
	City of Albuquerque Open Space	San Antonito	2006	22	Thinning

Table 3. Agency Activities (continued)

	Agency	Project Name	Year	Area (acres)	Treatment Method
City (cont.)	City of Albuquerque Open Space	Gutierrez Canyon	2007	30	Thinning
	Village of Tijeras	Riparian areas and arroyos within Village	2007–2010	~ 2 stream miles; acreage unknown	Thinning
	Carnuel Land Grant	South A. Montoya	2007–2009	53	Thinning

Treatments on private property should follow New Mexico State Forestry and Firewise guidelines. General recommendations are given in the Homeowner's Guide in Appendix C. In addition, prescription recommendations for the Carnuel community are described in the "Sierra Land Grant Community Coalition Fire Plan" (Appendix D). As discussed previously, education is crucial to help homeowners understand what needs to be done, how to do it, and why fuel reduction is so important. Programs such as Firewise provide excellent educational resources and training. However, even after individuals understand the need for fuel reduction, physical, financial, or logistical constraints may prevent good implementation. Community programs can assist residents by helping to find hazard mitigation grants that may be available. The Ciudad Soil and Water Conservation District has provided 70/30 matching grants to treat 500 properties in the East Mountains since 2001, and interest in the program is on the rise.

Community groups can also facilitate action by sponsoring neighborhood workdays, providing a free chipper day, or assisting in greenwaste hauling and disposal. Another option to explore is the possibility of establishing a location where greenwaste could be staged and then periodically burned under appropriate conditions.

7.2.1 Prescribed Fire

The idea of using fire as a tool is not a new one. People have used fire to modify the landscape for thousands of years. During the prehistoric periods, Native American hunters used fire to drive mammoths into streams, where they were killed for food and materials (Dobyns 1989). Hunter-gatherers also used fire to remove dead biomass from wetlands and improve habitat for game animals and birds (DeBano and Neary 1996). In modern land management and fuel treatment, fires can be deliberately set (prescribed burns), or naturally occurring fires can be controlled to achieve management goals.

The goal in conducting a prescribed burn is to use climatic and fuel conditions to generate a fire that burns cool, remains mainly on the surface, and consumes understory vegetation. Most large, mature trees in fire-adapted ecosystems are little affected by such fires. Because much of the vegetation is not consumed by these low-intensity burns, the overall result is a mosaic pattern across the landscape: a forest that still contains many mature trees, some small trees and shrubs, and often for the first time in many years patches of sunlight in open ground where grasses and forbs can colonize. Many of the herbaceous plant species of western forests have evolved to cope

with the frequent disturbance of fire. Following a fire, grasses will often be the first plants to sprout from the charred soil, followed by flowering annuals and perennials. These open areas will be maintained only with the return of fire to the system; otherwise, they will fill with saplings once again.

One factor to take into consideration when using prescribed fire is that there is generally less predictability in post-treatment stand structure than there is with mechanical thinning. However, prescribed fire is a useful tool that can effectively influence fuelbed characteristics by reducing fine fuel loading, large woody fuels, rotten material, and so forth, thus eliminating a large component of the materials that act as fuel to a wildfire (Graham et al. 2004). Prescribed fire is often far more economical, acre for acre, than mechanical thinning.

7.2.2 Mechanical Thinning

Unlike prescribed fire, mechanical thinning allows a forest manager to be more precise in creating a specific stand structure. Because individual trees and shrubbery can be targeted by chainsaws or machinery, a specific stand density is relatively easy to achieve (Figure 7). If mechanical thinning is the primary source of fuel reduction, the removal of smaller trees and shrubs can be emphasized, reducing the vertical fuel continuity that aids in the creation of a crown fire. The overall result of reducing ladder fuels is a reduction of crown fire potential.

Figure 7. After a thinning operation in piñon-juniper.

A drawback of mechanical thinning as the primary fuel reduction method is that it does little to beneficially affect surface fuels. This can be changed by adding mastication, chipping, or crushing of thinned material to the thinning process (Figure 8). Using these methods, surface

fuels are not necessarily eliminated, but they are rearranged on the forest floor. The addition of woody mulch may help to maintain some soil moisture, but it does not provide the same nutrients that are produced by fire.

Overall, whenever mechanical fuel reduction is used, a great deal of preparation and planning go into a project, and a site-specific mechanical fuels treatment plan should be developed. Having a plan in place will ensure that the project will operate as smoothly, efficiently, and cost-effectively as possible.

7.2.3 Thinning and Prescribed Fire Combined

Studies have shown that the most effective fuel treatments are those that combine both mechanical thinning and prescribed fire (Graham et al. 2004). Of course, results depend on the density of the understory and mid-canopy trees, as well as the amount of surface fuel present. For example, forests that have not had a fire in many years may require multiple fuel treatments to achieve the desired fuel conditions. Thinning followed by a prescribed burn reduces canopy, ladder, and surface fuels, thereby providing maximum protection from severe fires as well as improving the health of the forest through nutrient recycling and natural vegetation succession.

Figure 8. Thinning using a masticator.

7.3 Monitoring, Maintenance, and Evaluation

Two often-ignored but critical components of fuels treatment are maintenance and monitoring. Every fuel treatment project plan should include guidelines for ongoing maintenance. Without maintenance, a treated forest can generate high densities of small trees quickly under the right conditions.

It is important to evaluate whether fuel treatments have accomplished the defined objectives and whether any unexpected outcomes have occurred. Adaptive management is a term that refers to adjusting future management based on the effects of past management. Monitoring is required to gather the information necessary to inform future management decisions. Economic and legal questions may also be addressed through monitoring. In addition, monitoring activities can provide valuable educational opportunities for students.

The most important consideration when choosing a monitoring program is the selection of a method appropriate to the people, place, and available time. The following list outlines several levels of monitoring activities that meet different objectives, have different levels of time intensity, and are appropriate for different groups of people.

- ***Minimum–Level 1:*** Pre-treatment and post-treatment photos of project
  Appropriate for many individual homeowners who conduct fuel reduction projects on their property. Aerial photos may also be used for this purpose in some situations.

- ***Moderate–Level 2:*** Multiple permanent photo points
  Permanent photo locations are established (e.g., with rebar or wood posts), and photos are taken on a regular basis. Ideally, this process would continue over several years. This approach might be appropriate for more enthusiastic homeowners or for agencies conducting small-scale, general treatments.

- ***High–Level 3:*** Basic vegetation plots
  A series of plots can allow monitors to evaluate vegetation characteristics such as species composition, percent cover, and frequency and record site characteristics such as slope, aspect, and elevations. Parameters would be assessed pre-treatment and post-treatment. Plot protocols should be established by the monitoring agency, based on the types of vegetation and level of detail needed to analyze the management objectives.

- ***Intense–Level 4:*** Basic vegetation plus dead and downed fuels inventory
  Protocol would include the vegetation plots described above but would also add more details regarding fuel loading. Crown height or canopy closure might be included for live fuels. Dead and downed fuels could be assessed using Brown's transects (Brown 1974) or an appropriate photo series (Ottmar et al. 2000).

7.4 Local Covenants

Many neighborhoods in the East Mountains have covenants that may prevent homeowners from creating defensible space or otherwise reducing home vulnerability to wildfire. As part of the CWPP, it is recommended that all covenants prohibiting water storage tanks or tree removal be amended. It is also recommended that building codes and subdivision guidelines consider adoption of an urban interface code.

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APPENDIX A

COMMUNITY COMMENTS

COMMUNITY COMMENTS

Comments from EMCWPP Public Forum, February 8, 2006

Master Category	Original Category	Detail	Question or Comment
Communication and Suppression Response	Are we Prepared?	Agency Comm.	Interagency communications.
			Interagency relationships.
		Water supplies	Does the fire department know where all the water tanks are located—put on master maps and GPS units (are they available)?
			Are fire hydrants checked and maintained?
			Hardware/adapters so fire department can use Entranosa and/or fire tanks.
	Fighting the Fire	Agency Comm.	Are all agencies in the same communication link?
			Is a master controller designated?
			Are the mutual aid agreements in place and up to date?
		Water supplies	Can we input GPS coordinates to the fire department?
			We have no fire hydrants—where will the water come from?
	Protecting my Home	Water supplies	Cisterns for emergency use.
			Local station 11 needs water tank, maybe done.
	What do you Need?	Water supplies	Ways to encourage rainwater harvesting, county/state tax rebates, other incentives?
	What Information Do You Want?	Water supplies	Grant money for water storage tanks for subdivisions.
Emergency Access	Fighting the Fire	Access	Fire access to subdivisions with single access.
			Equipment ability to traverse steep grades?
	Protecting my Home	Access	Improve road access, private and county.
	Reducing the Threat of Wildfire throughout the East Mountains	Access	Spread word—do access roads permit fire department vehicles

Evacuation and Emergency Preparedness	Are we Prepared?	Evacuation plans	Evacuation plans—kids at home, animals, etc.
			How to get emergency info out to residents?
	Fighting the Fire	Evacuation plans	Is there an evacuation plan and how is it disseminated?
		Policies and procedures	Will we be allowed to access our property if we not at home when a fire breaks?
			Will electricity lines be shut off, preventing us any chance of saving our homes?
	Protecting my Home	Evacuation plans	Develop evacuation routes across private properties.
	What Do You Need?	Evacuation plans	Community plan for livestock evacuation—coordination of transportation, where to go, agreement between different areas, fairgrounds?
			Emergency exit routes.
		Policies and procedures	What happens to loose livestock?
	What Information Do You Want?	After a fire	Plans for those displaced from homes.
		Evacuation plans	Evacuation info/notice of fire.
			Evacuation for each neighborhood area/subdivision.
			What's the plan for schools if fire was to break out and keep children from getting home?
			What agencies are working with schools right now to make sure we have a plan in place?
			Point of contact (person/agency) before/during/after evacuation.
			Where do you get radio set (weather alert) over which evacuation notices will be broadcast?

Fire Prevention and Education	Are we Prepared?	Fire restrictions & regulations	Do we expect to have the same restraints on fireworks this year?
	Fighting the Fire	Fire restrictions and regulations	Will there be a fire watch during high fire days (e.g., lookouts at the crest)?
			Is there sufficient control (money for enforcement) of forest during restrictions?
		Homeowner fire preparation and prevention	Will my house burn down if I don't firewise it?
	Forest Management	Fire prevention along roads	What can we do in areas in areas near roads of South 14 where cigarette butts can cause fire—clean side of road?
		Fire restrictions and regulations	Signs flashing/marquee near roads—South 14 to I-40
			City Open Space—they are not represented. Ways to police their area (clean area).
	Protecting my Community	Fire restrictions and regulations	Citizen arrest of violators— a hot line for dangerous behavior close-by—Tijeras FS office, county sheriff?
	Protecting my Home	Fire restrictions & regulations	Enforce codes for fire safety.
		Homeowner fire preparation and prevention	Use metal cans for ashes and make sure they are out.
			Control fine grass and weeds around house.
	Reducing the Threat of Wildfire throughout the East Mountains	Fire prevention along roads	Educate Albuquerque residents and businesses about fire risk and cigarettes—one business set fire with cigarette across from us - add statistics about this.
		Fire restrictions and regulations	Ban outside fires (barbeque, trash, fields).
			Ban off-road driving - exhaust and catalytic converters hot enough to start grass.
			Ban fireworks.
	What do you Need?	Education	Better education of forest users, especially occasional user from out of town who may not realize the severity of the situation.
			Create a on-line GIS website that shows risks, data layers, and modeled areas of high risks.
		Fire restrictions and regulations	Consistent, reliable involvement of zoning department to enforce offences that relate to fire (trash, etc).
			Closure of picnic grounds and high risk areas.
			Better signage—flashing, up-to-date off Highway 536.
		Homeowner fire preparation and prevention	Fire retardant gel—cost? Where can people get it? Is there help to pay for it?
			Access to information, forest management and home protection.

Fuel Management	Are we Prepared?	Fire prevention along roads	Roadside clearance—can the community help?
	Fighting the Fire	Fuel breaks	Fuel breaks in subdivision backed up to public lands and around subdivisions.
	Forest Management	Biomass disposal	Deadwood—how can be better utilized?
		Controlled burns	Lots more small controlled burns—remove slash.
		Fuel breaks	What will be done on FS land against boundary of homeowners?
			Create a thinned strip (firebreak) within forest along entire FS boundary where it abuts private land. Do work with volunteers and grants. Do an EA (CEQ guidelines say 15 pages + appendices). Not a cumbersome EIS.
	Protecting my Community	Fuel breaks	Is there a master plan for a fire break system based on fuel, prevailing winds, topography, etc? Private property as well as forests.
	Protecting my Home	Fire prevention along roads	Organize a clean-up of dry grasses adjacent to South 14 to prevent fire from cigarette butts.
	Reducing the Threat of Wildfire throughout the East Mountains	Controlled burns	Do more small controlled burns.
		Fire prevention along roads	Clear a wider path along side the roads (cigarettes).
		Thinning	We need to thin our trees.
			Get goats.
	What do you Need?	Thinning	We need information on individual tree care (arboriculture) after the thinning is finished. It is not a landscape, not so much a forest.
	What Information Do You Want?	?	What's the potential for fire in different locations under different conditions?
		Biomass disposal	Need less expensive, more accessible for do-it-yourselfer to dispose cutting/slash.
			Problem at transfer station with mixing treated lumber with green waste.
		Homeowner fire preparation and prevention	Info on defensible space, thinning, individual preparation for fire.
		Thinning	Money and advice to help with thinning.
			Are there plans to do any thinning of national forests face to the community? N-14 and S-14 corridor?
Miscellaneous	Forest Management	Miscellaneous	Enforcement of laws governing landscape.
			I would like to see less modern technology toys in the forest, ATVs out of forest, more "tree cops," increase volunteer recruitment to police the trails.
	Protecting my Home		Developing a new urban wildland interface code.

Comments Regarding Community Values, May 3, 2006

Zone	Comment
1	Amenities, aesthetics, quality of life, views, etc.
	Archaeological and cultural sites
	Housing
	Livestock
	Safety of inhabitants
	School and community center; La Madera fire department, electrical and phone grid
	Ski area, picnic area, campgrounds, Paako golf course and club house
2	Congressional action
	Education for all on forest health, protection
	Establish tentative evacuation centers for domestic animals
	General landscape
	Having dependable neighbors, neighborhoods
	Healthy forest in Wilderness
	Homes
	Hydrants
	More communication in neighborhoods, EM Area
	More community fire protection; trucks, tanks, hydrants - visible
	Notification, good communication
	One road in and out of neighborhoods
	Rural culture
	Safety of kids, pets, livestock
	Schools, daycare, businesses and our community
	Thin wilderness areas
	Views, scenery
	Watershed
	Wildfire
	Wildlife safety and enjoyment
3	Old historic and prehistoric settlements
	Safety and welfare of residents, because of single entrance, dense forest around perimeter, and amount of fine fuels
	Solitude
	The forest and surrounding areas are the attraction and value of the area
4	Better access with larger tributaries
	commercial development - Old 66
	Continued utility services - electrical, water, communication
	Entranosa headquarters
	Entranosa on generator power
	Gas pipeline
	General apathy of the public and residents
	Homes and further development
	Loss esthetic value
	Loss of access - Frost road, 217/Man Valley, I-40
	Loss of life - secondary to communication and homebound resident; pets & livestock

4, cont.	More rolling rather than steep slopes
	PJ and grassland
	Propane retail outlet
	Route 66 Elementary
	Two fire substations with apparatus
	Water issues without power
6	Animals - pets, wild animals
	Awareness of what individuals can do
	Better understanding of ecological dynamics - e.g. do junipers crowd out other species
	Conservation of "stream" in David Canyon
	Develop business providing fire-resistant building materials and appliances such as individual roof sprinklers
	Ecological continuity
	Fire station 11
	Forest
	Forest, watershed
	Homes/structures - include stores, fire stations
	Houses
	Ideally protect the forest as much as possible
	More signage
	Narrow roads - rural character
	Natural water sources - streams, creeks, springs
	One way in - one way out
	People - including those needing assistance
	People (and their animals as much as possible)
	Private initiative; individual responsibilities
	Real estate value
	Roads
	Rural character preserved
	The biggest threat of wildfire to community values is encouraging urbanization by creating demand for broad roads, turn-around, hydrants on water systems, and government responsibility for putting out fires instead of individual responsibility
	The forest
	Watershed serving community - Tranquillo Pines water supply
	Wildlife

Comments Regarding Mitigation, May 3, 2006

Zone	Comment
1	Assist home owners to do risk assessments around the home
	Buy more chippers (commercial chipper can be had for around $10,000)
	Create fuel breaks along La Madera road and road to crest +165 (involve Paako and La Madera)
	Develop evacuation plan for area (especially La Madera)
	Encourage all home owners to thin their own lots; provide assistance to ground (e.g. lend chippers)
	Encourage residents to number their houses in large visible numbers (address in evacuation plan)
	Establish green waste center
	Fix green waste problem at transfer center
	Inventory available water supplies, add new water supplies where inadequate to fish and wildland fires
	More information and education efforts for local residents
	Prescribed burns
	Thinning
	Thinning, prescribed burn, national forest east 165 and road to crest (e.g., Palomas Peak, Tecolote peak area)
	Turn sulfur from planned to done
2	Chipping, thinning, slash disposal, neighborhood based, accessible for neighborhoods
	Create/assure emergency egress from every neighborhood
	Defensible spaces all around, including non-resident owners
	Education for forest safety, health, evacuation, community organization
	High school/community "volunteers," work parties, etc.
	Know how to contact neighbors / increased communications, neighborhood organizations
	Tentative (or sample) evacuation plans
	Wildlife corridors
3	Better control of fine fuels along all roads
	Open lands for wood cutting, carefully!
	Private landowners mow fine fuels
	Public lands need fuel reduction and altering fuel ladder structure
4	Covenants and rules should encourage defensible space
	Highlight major event with media and how the plan would work
	Reduce human error and possible cause of wildfire - regulations, restrictions, education
6	Building codes that provide for fire-resistant materials and individual fire prevention
	Define "forest health" as a means of determining which type of thinning is appropriate where
	Education
	Education and training including on-site demonstration projects and organized community thinning and slash removal days
	Encourage thinning/defensible space by individual owners, publicize availability of government funds for thinning
	Financial assistance
	Financial assistance for thinning and slash removal

6, cont.	Fuel reduction
	Individual responsibility - stored water and roof sprinklers
	More signage around Exit 175 - north and south
	Neighborhood groups work together
	Require real estate brokers to disseminate information as to personal responsibility (roof sprinklers, etc.)
	Signage - no smoking, don't throw butts

Responses to Community Comment Form

Question	Response
What information would you most like to have regarding fire in our community?	A list of fire hazards common to most property.
	Emergency phone numbers and fire evacuation routes. Checklist in case of emergency.
	Escape routes (plus alternate routes)
	Evacuation plan (routes, what to expect while in transit, etc).
	How tight is the local water supply? E.g., would the Tranquillo Pines Water Coop supply run dry during a fire? What would be the long-term effect of depleting this local water supply (which relies on finite pockets of water)? Would it ever recover from an emergency such as wildfire?
	How to balance having living greenery around the house with clearing a free zone for fire protection
	Maps showing relative fire hazard area and recommended evacuation routes and destinations.
	What about the area beyond the "defensible space" on our private properties - should we rake it up?
	What is the advance warning system if a fire occurs?
	Who's available to help put out fires? How do you contact them?
What actions could our community take to be more prepared for wildfire?	Clean as much brush off our property as one can.
	Clearing of dead trees. Provide aid to homeowners in clearing trees and brush. Provide a free area that....
	Create a program allowing tree cutters free removal of dead trees for firewood on private and public land.
	Encourage tree thinning, keep roadway shoulders mowed, close forest early this year.
	Get more people to thin - require it. People just are not doing it. If one person thins, she's still a sitting duck if all around her are overgrown lots.
	Have grants for thinning touch ups; I thinned four or five years ago, but the oak has regrown to create a new hazard. Also, when I thinned, the thinner would not haul away or chip a pile of old brush. I don't have a truck or trailer. How do I get rid of my brush pile affordably? Because even if you hire a thinner who runs a chipper to process the slash, there is annual maintenance to keep your property fire safe. That almost always means creating another brush pile. If brush isn't chipped immediately - and not many people have chippers - it's never a candidate for chipping. It must be hauled.
	Help with brush clearing; e.g., chippers or dump trucks in neighborhoods to deal with brush.
	How to accomplish roadside clearing?
	I am VERY interested in helping plan and implement such projects, including grant writing, matching people to areas that need to be thinned, ad organizing neighborhoods for chipping/hauling days.
	Make re-thinning and old-brush hauling affordable. Perhaps organize free county sponsored brush pick-ups once a month - pick up, not drop offs because everyone doesn't have a truck or trailer. Get a county owned trash compacter truck to make the rounds monthly year round.

What actions could our community take to be more prepared for wildfire? (cont.)	Make sure the fire department knows of all water sources; e.g., 1 have a 1000 gal. tank and 4500 gal. pool.
	More thinning.
	More tree thinning - including on public lands.
	Neighborhood meetings and plans for notification of people away from home if a fire starts and evacuation is necessary.
	Offer water catchments education and grants. I'd like to do this, but I don't really know where to start and I can't afford the full cost of several tanks and filtration system. If people only catch water, which then becomes stagnant, that becomes a health problem.
	Publish and post in news media, in post offices, and with flyers, the answers to these and other questions. 1) What should homeowners do on their own property? 2) What's the best way to protect valuables (is a one-hour fireproof safe good enough? Should it be waterproof?)? 3) What protections should be put in place if owner will be absent for several days? 3) What are the various neighborhoods' evacuation plans? 4) Can fire crews get through our locked gates? 5) Will there be traffic control to help us evacuate neighborhood roads onto the main arteries (N&S 14)?
	Take some kind of action on residents that are leaving so many dead trees on their lots. Especially the developers that refuse to clean up the lots they still own.
	To come together in neighborhoods to address the issues through awareness.
	Would like to know how to mitigate the actions of building contractors who throw out cigarette butts and cook their lunch on grills at home sites? Community signage?
	Would like to know more. We already have e-mail contact and are in the process of setting up a phone tree.
What could you do to help protect your home and community?	Clear dead trees and maintain a 30' clear zone around my house.
	Get a handle on my re-growing yard, get rid old brush piles, set up water catchment system if the latter were affordable.
	I have thinned and will clear fine fuels near the house. I will also help organize my neighborhoods phone tree and evacuation plan.
	If everyone would just clean and trim brush, grass and trees up that would help. We have been working on it for three years and still going.
	Keep my property free of fire hazards. Also, keep a lookout for fires starting.
	Make sure trash has not accumulated - thin brush.
	Remind neighbors, keep an eye on others property since I'm home all day, help clear "common" area.
	Try to make my own piece of property as fireproof as possible, so I won't be a cause of any fire or spreading.
	We have already cleared out over 200 dead trees. We have hoses stretched throughout our property and have cleared away all underbrush.
	We have already thinned vegetation and our neighbors are also doing so. We are setting up a telephone tree for possible evacuation.

What role do neighboring private landowners and land management agencies play in reducing the threat of wildfire?	Would like a professional to give their opinion as to what I can do to enhance my property against a fire.
	Both need to thin forests and reduce fuels, with private landowners giving access to public lands where needed.
	Cooperative land management - hopefully.
	Don't smoke and throw cigarette butts out on our roads, maybe post some fire danger warning signs.
	Give us info about what we can do to help prevent, alert, fires.
	I know they can't clean the land up, but they could at least make and maintain a firebreak.
	Keeping their property free of fire hazards.
	Perhaps thinning should not be voluntary. People who don't thin could be responsible - and liable - for taking out a whole neighborhood.
	Remove dead trees and plant seedlings. Post no-smoking signs at trailheads. Ban fireworks.
	Take care of their own property.
	They have not done much as of right now.
	Thinning.
	When the county clears right-of-ways for visibility, they should remove the cut branches instead of leaving.
What would you like fire emergency service agencies and personnel to know about protecting your neighborhood from wildfire?	Be aware of homes with elderly or disabled people that might require assistance on an evacuation.
	I believe they already know. They can put out a fire but it is up to the community and each of us to protect our own by cleaning up our properties.
	I live in Canyon Estates (which is essentially a box canyon) and would be very difficult to escape from if a fire broke out. I would like to see an emergency road cut through from the trailhead area that would allow an escape route - something wide enough to drive vehicles through. Also the trailhead attracts a lot of visitors and I worry about people illegally camping and campfires or tossing cigarettes out their window as they drive by. There needs to be more signs posted warning and educating.
	Know what we are doing and help us learn more.
	Our neighborhood has only one-way in and out - Pinon Ridge in Cedar Crest.
	Prepare map atlas books (11 x 17 size) that show county roads on air photo base map. In Torrance County, maps should show both E-911 road names (usually the largest ranch on the road) and the old number system (County Road A052). ArcView GIS files of streets exist for both Bernalillo and Torrance Counties, so this should be an easy task for Bernalillo County Planning's GIS department or a private cartographer.

What would you like fire emergency service agencies and personnel to know about protecting your neighborhood from wildfire? (cont.)	That we will watch out for fires and notify agencies ASAP provided we know how to contact them. And any suspicious activity will be taken seriously when reported.
	The fire department could start an inventory and map of properties that are less fire-prone (including properties that are thinned and maintained, have metal roofs, have a 30 foot safety zone, have fire resistant siding (stucco or concrete, fire-resistant paint), proximity to community hydrants or auxiliary water supply (pond, tanks, etc.).
	We have many water sources and we have evacuation routes across private lands that are not actual roads - please contact me for details.
	We once tried to get a list together for emergency personnel listing animals/pets and special needs/housebound.
	Where large reservoirs of water are; e.g., community water supply tanks, ranch ponds, etc. and how they…. More communication about their capacity: what actually can they do? What do the expect us to do?
	Where the nearest fire hydrants are located (Kuhn Rd, for example, has hydrants because of the Trail).
Other questions or comments?	How about setting up a website to distribute and collect information?
	How can I learn more?
	I would assume that roads serviced by large garbage trucks and propane trucks could also accommodate fire vehicles.
	I would like to see agencies educate the public through mass media in order to reach people who remain unaware of making their property fire hazard free. Perhaps even working with law enforcement to enforce safety.
	In the past we had a radio to listen to emergency calls - police, etc. Is there a frequency for the fire department or forest service?
	More awareness of animals that could be trapped in houses, barns, fences. Need a set fire suppression process for saving - or at least freeing them to save themselves. Most homeowners are in town 25 miles away during peak fire hours and can't tend to their animals.
	My neighborhood is the south end of Skyland (off Raven Rd which is off S-14), between Carolino Canyon and David Canyon. We have done a lot of thinning (although some people don't believe in it) but there is a tremendous amount left to do, especially in the national forest between the David Canyon fuel break and our properties. I believe we can get access across neighborhood properties if we can get permission to allow people in to take firewood.
	One concern I have is the burning of trash or whatever else some people choose to burn. Is there a law against burning trash?
	People are still using chain saws and smoking at building sites. I think they need more monitoring with the contractors.
	The rates to dump green waste are too high at the East Mountain Convenience Center. If they were lowered or eliminated, I believe that it would help to encourage residents to clear their property.
	We need information as soon as possible.

Other questions or comments? (cont.)	What priorities exist for fire response? And the "redline" question needs to be answered and addressed.
	Which radio stations would be designated for emergency information?
	Will there be free days at the transfer station to bring tree trimmings and other yard clippings?
	Would it be possible to have some stickers designed that people could place on their window designating how many pets they had inside and a phone number they could be reached at in case of a burning fire?

Comments Regarding CWPP Document

- The report seems very thorough and I appreciate the effort of the team. However, I think it may be important to request the cooperation and commitment of related county departments like zoning, to enforce regulations that already exist to hold homeowners to compliance when there are violations to hazardous conditions that put neighbors at risk for fire.

- RE: Section 7.0, Table 2 - The following idea was not suggested during the input session, but I would like to recommend its inclusion in the final plan. The plan currently recommends firewise community recognition and a defensible space workshop. I would also like to recommend that EMIFPA and other appropriate agencies recommend to Bernalillo County that the county building code be amended to require that all future new homes, at least in the East Mountain Area, be built to Firewise defensible space requirements, as well as all current building codes. Why don't we build such preventive measures right into our building codes for all future home construction in the East Mountains?

- RE: Section 7 and Section 7.2, Table 2 and specifically the recommendation to create a fuel break along La Madera Road. I have learned that Campbell Ranch and the Paako developers donated right of way lands to Bernalillo County along the first few miles of this road, starting at Highway 14. Thus, to create this fuel break, at least for the first few miles, requires no cooperation or approval by any private landowners. This should simplify the undertaking. Further, I understand federal grant money could be available through the Healthy Forest Initiative and other sources. Thus lack of funds for the county is potentially not a problem. Therefore, I hope you will consider making this a high rather than a medium priority, in the final plan and recommend the county apply for federal grant money to fund this project. Though this is a selfish recommendation, it would also increase the protection for East Mountain High School and Vista Grande Community Center.

- The plan looks very good. I support the idea of a firebreak between public and private lands to protect neighborhoods from fire.

- Appears to be accurate and complete. It reflects the thoughts expressed at the public meetings I attended.

- Fuel Reduction Recommendation – especially those ranked "high" - are GREAT – making it possible making it more possible for residents to do work to decrease danger is SUPER

- I agree with this comment. Now we need to move these items from plan to happen.

- This plan has great potential in the re-creation of community in our neighborhoods. Adults as well as children could learn by doing - feeding the chipper, yard thinning, education about the place of fire in forest ecosystems - part of a natural cycle. We need to mimic nature - or substitute our human hand for the work that fire does. Understanding the relationship between drought, bugs, susceptibility to lightning, etc. If we all, different ages, can come together it will recreate community. We will all be involved and know a lot about the world around us.

- Appendix C - Great Job! We are already using this in Paako.

- Chippers - distribute 3–4 throughout area and truck shreds out (or back to transfer station)

- Title should be EM Area CW Mitigation Plan

- Glossary

- Who are "Core team" – list

- MONEY – "Research" grants to try various approaches.

- Greetings all,

  I'm sorry I missed last night's meeting. Sounds like much ground was covered.

  As I'm referenced in this email, I am replying to all recipients. Without a hard copy of the fire plan, I've only skimmed it online. However, what I saw in my review, I found encouraging, realistic, and sensitive to needs I've experienced as an EMA homeowner — especially the priorities list which puts fire mitigation equipment (crews, chipper) affordably onsite where it is needed ASAP. Bernalillo County — more of a problem than a solution — certainly hasn't lifted a finger in this regard and shows no inclination to address the issue except to politicize it.

  Frankly I perused this fire plan with a great sigh of relief after working on the EMAP.

  If the fire plan recognizes suburban sprawl as the problem, then I applaud it, whatever the semantics. Sprawl within the overgrown, steeply sloped wildland-urban interface (WUI) is almost synonymous with major fire. Granted, county officials either don't know this fact or prefer it not to be known, but fire experts recognized it as far back as the 1970s. It's also not just a local or even a regional problem. As farms, orchards, and ranches nationwide are sold, subdivided, and developed, WUI fire has become a serious national problem.

  The house-to-house spread comment is information from an interview I had recently with a national expert and author of numerous books on the topic. Houses (hand-built or manufactured) are more combustible, burn hotter, and cause fire to spread faster and

more effectively than would trees or vegetation growing in the same footprint. Clustered housing and houses on small lots accentuate this effect.

Thus, I think large lots that are thinned with fire-wise homes built far apart is much more fire safe scenario. And that is also what the majority of EMA-survey respondents said they preferred for quality of life.

In all fairness, however, be advised I did not ask anyone to volunteer that or any other information as fire plan input. I sent my comments directly to emcwpp by email.

My one major suggestion is that emcwpp put free hard copies of the plan in the hands of citizens. It's too expensive to print out a long document at home ($30 per 500-page cartridge), and one cannot mark up the library copy. Personal hard copies would greatly boost substantive citizen feedback.

- Sorry -- I'm a day late and a dollar short in getting my comments to you.

  BUT, thought it would be important to add that on Carlisle Road (off of Oak Flat Road) there are now FOUR 1600 gallon water storage tanks, and there may be an additional 1100 gallon tank (when we get it hooked up to collect rainwater.)

  Since wells are not very reliable in our area, I would think Fire Station 11 would want to have these tanks listed in the Plan.

  One other matter --- The question of whether spreading chips is good for the forest is in serious doubt. Research testing three treatments 1) chips 2) straw mulch, and 3) no treatment (I don't recall if they added waterbars or not, but I don't think so), has demonstrated unequivocably that NOT putting chips on for mulch results in better recovery of native species. This research was presented, I believe, at the Southwest Vegetation Management Meeting either last November, or the November before that. We have seen the same thing on our property: Where chips were spread, even shallowly, NOTHING is growing after 8 years, whereas where they were not (most of our property--we stopped spreading chips right away), we are getting excellent recovery of grasses and wildflowers. (It just takes time- our land had lost a lot of topsoil before we acquired it, and we still have more thinning to do--we have 10 acres).

  Spreading chips is standard practice for the Ciudad Thinning Program. While I strongly support thinning, I do NOT support spreading chips, based on the above. They can be used to create paths, stacked for accelerated decomposition, or hauled off. I think the chip spreading has been for expediency, not for forest health.

  I think my other concerns can be addressed in the implementation phase of the program.

  Whoever characterized those of us who live in the Section 6 did a pretty good job of it!

- Hello--I have just reviewed the East Mountain Community Wildfire Protection Plan and commend you all on your hard work. Thank you for all of your efforts. I live in Zone 3, off of El Refugio. I'm sorry I will be out of town during the Aug. 2 meeting.

  I think the overall plan is very good, and extremely relevant. For the most part, I think community concerns were addressed in the recommendations. There is one area I don't see addressed, and I'm not sure anything can legally be done about it. And this was mentioned as a problem by community members. . . In our situation, we thinned our five acres several years ago with the help of one of the wonderful grants. In addition, we continue to thin and clear as things grow. However, there are no homes on the properties immediately surrounding our land. Therefore, the owners of those properties seem to have no interest or need or incentive to thin their land. This, of course, keeps our home at risk regardless of the efforts we've made, and particularly since our home sits near the edge of our five acres, not protected in the middle of it. Maybe there is no solution for this, but it would sure be nice to find a way to address it.

  Thanks again for your important work on the plan. Regards.

- Review of East Mountain Area Community Wildfire Protection Plan

  I learned quite a bit at the Wednesday Aug. 2 meeting, noting that the "Plan" is only a grant proposal to fund certain commercial entities and/or new NGOs, and that "public input" was only a requirement of the grant process. In fact, it finally sank in ("Oh, the name of the CWPP cannot be considered for change, it isn't ours") that the grant proposal itself is essentially a "franchise" operation. It is this sort of disingenuous process, becoming institutionalized in government now at all levels, that introduces the very sort of community cynicism which discourages "public input" and allows individuals ('leaders"), groups (esp. if established by governments) and organizations to be self-justifying and act in complete disregard of the communities they purport to "represent." Communities gradually fade away and die as a result of ennui caused by such processes. Your responsibility in the process is noted.

  The approach to fire protection taken by the plan is backwards. It proposes to change the conditions of the EMA to obviate wildfire and promote further fire danger from development rather than what it should do: offer fire protection methodologies appropriate to the unique conditions of the EMA which include reducing the impact of fire protection systems and equipment on the natural and rural environment by downsizing equipment to fit the community rather than paving the community to fit the equipment, encouraging (even subsidizing) individual protection technologies such as adequate local water supplies as a responsibility of individual land owners, appropriate individual protection technologies such as roof sprinkler systems, and local availability of appropriate building materials and methodologies which would also stimulate the local economy and, particularly, be more effective that any other methodology in heightening awareness of local problems. PLEASE (do not despair) SEE SPECIFIC COMMENTS UNDER "HOMEOWNERS GUIDE" BELOW.

You describe the current fire conditions of the EMA in terms of historic approaches to fire suppression and mention obliquely, rather than emphasizing, that urbanization and uncontrolled population growth for the sake of profits to non-resident developers has resulted in a logarithmic increase in the likelihood of human–started fires, rather than merely an increase of risk to property. Of course, this growth has also resulted in development of an ecology- and community-divisive broad system of paved roadways that facilitate wildfire suppression (if not entirely eliminating its possibility), but that cannot be taken to be a responsible method of stopping fires without recognizing its own destructive value. Note also that basing a local economy on tourism instead of locally-relevant businesses (see below) makes the area an attractive nuisance for individuals not familiar with (or prone to understand) the sorts of individual responsibility necessary to maintain the heath and welfare of the area.

You mention "bringing together stakeholders" [special interests] and failure to involve the entire community, as evidenced by the poor attendance at your meetings. Clearly the entire community, which has not bought into your attempts to frighten the citizenry into overreacting and destroying itself ("rural character") in the process, has voiced its opinion on the issue in a recent survey related to the EMA Plan (700+ respondents) wherein they expressed significantly greater interest in preserving "rural" values of their own definition that in running for cover in fear of fire. To the best of my knowledge, none of the individuals instrumental in developing that monumental survey (we persevered even while realizing that the survey was just meant to be "window-dressing" for an already decided plan) were explicitly contacted for participation in your planning efforts, but politically-appointed individuals supposedly chosen to represent the most densely developed EMA "neighborhoods" (which, by your own admission, comprise only 7% of the area of the EMA), which should be making their own plans rather than relying on government handouts, seem to have been relied upon.

This is especially disturbing when the e-mail addresses of involved and interested individuals were readily available from the County, especially of survey respondents requesting to be involved in planning for the EMA. A "core team of 10 -20 individuals" with a mailing list of a mere 50 individuals cannot be considered representative at all. If we could arouse 700 persons to express their interest, the "core team" could have done the same, at the very least. I note that the "team" has had my addresses (e-mail and snail-mail) for some time and I can verify that I personally have not been contacted as one of those 50 individuals.

Your comment solicitations (preset topics) were clearly concentrated on typical and inappropriate fire suppression techniques and scare tactics taken completely out of context of the desires of the community at large, as if asking people to comment on HOW they want their highways paved rather than WHETHER they want governments to rip their community apart with highways and urban fire suppression techniques.

Insufficiently emphasized in the process of "selling" the fire issue was "selling" of individual responsibility (e.g., you live here, you must take responsibility for your own property).

You mention that “recent growth in the area is mostly a result of suburban expansion” when in fact it is the result of artificial stimulation of demand by speculators (owners of large properties interested exclusively in personal profits). These same “developers” are not interested in what happens in their “suburbs” once they have sold out and particularly do not inform purchasers of the risks they should be required to accept, such as water shortages, wildlife incursions, and fire risk. Thus, new residents of these artificially created “suburbs” (most of the “27 communities” you mention) think that the same conditions as in their former urban environments should apply in the EMA and look to already overburdened government agencies (some seeking rationales for their own existence, apparently) to supply them with the desired niceties and “safety.”

Note also that the low 2000 poverty levels you state have been achieved by the pandering of developers to ever-wealthier new residents with increasingly expensive construction and do not excuse consideration in planning of the once majority low-income residents. A large number of small residential lots have been owned a long time by people who cannot afford to build on them due to the expenses incurred by meeting building regulations and the lack of sensitive subsidization programs. You mention government agencies and “private interests” as landowners in the EMA without detailing the amount of land owned by speculators solely for the purpose of multiplying the population of the EMA for personal profit.

Your “climate” and “weather” sections are repetitive and should be combined. You mention that “heavy fuel loads, in combination with steep slopes, create the highest fire hazards” when in fact residences create the highest fire hazards. Fire in rural areas tends to spread from house-to-house rather than being spread BY intervening vegetation (reference on request from K. Beebe). You mention that “With the current drought spring and stream flows have been reduced drastically” when in fact that reduction is more a direct result of depletion of the groundwater by development demand which has increased its pace despite perceptions of a “drought” (a normal condition for this area, incidentally).

Your identification of juniper as an invasive and pervasive plant is greatly appreciated, as people tend to enjoy viewing dense stand of trees without recognizing their unhealthiness. Demonstration thinning projects (perhaps along roads like Oak Flat Road) favoring Ponderosa and isolated stands of oaks would be effective and community participation in those projects (perhaps appealing to personal greed for facilitation) would broaden understanding and cohesiveness.

You do not the mention the recent and spreading invasion of Siberian elms which are actually adapted to extreme conditions and drought as well as capable of further depleting the water supply and even crowding out junipers. Did you also consider Russian olive, which is similarly problematic? You imply that Pinon pines may also be invasive, which may well be true in places more conducive to Ponderosa growth. Distinguishing separate areas most appropriate to each may be appropriate, except when it is clear that mixed stands are necessary because one species may not survive future climate conditions at all and must accede to the other (or to juniper, perhaps). Again, tree-stress by “drought”

creating susceptibility to disease may be the result of artificial diversion of water supplies to human consumption (including agriculture). Note that "thinning" does not mean removing all trees and shrubs with small diameter trunks. A mix of varieties and sizes is necessary.

You mention that "the wildland fire environment consists of three factors that influence the spread of wildfire: fuels, topography, and weather", but leave out the most influential factor: residential density. People cause fires in populated areas far more frequently than lightening, and lightening-started fires are far less likely to threaten human property in those areas, and "property" provides far more "fuel" for fire than forest litter. It stands to reason, then, that the most effective means of maintaining a wildfire-free region would be to constrain dense development, especially in naturally-dense "forest", and to establish construction requirements related to individual-initiative fire suppression on new building. And it stand to reason that the most effective means of satisfying the "desires and needs of the local communities" (7% of the area) is to assist them to provide "special attention" to their own situations, community by community, without assuming that the entire EMA should conform to those particular locally perceived urban "desires and needs."

The one thing most residents object to most strenuously (except for residents of the 7% of "urban" developments of course), is the conspicuous posting of addresses, which locates their properties for harassment by thieves, solicitors and the like. When you think about it, it is absurd relative to fire containment: by the time fire vehicles are near enough to read addresses they will observe smoke and/or "wildfire", most likely not immediately or specifically related to individual properties except in the case of internal house fires.

You have to explicitly recognize the unique situation of the Cerro Grande fire, which was started by the Forest Service under uniquely unfavorable conditions and not in a home or by lightening and was already extreme and uncontrollable when it reached residences. The Coyote Canyon fire was also started by inadvisable and risky activities of the Federal government and if anything "created havoc for the nearby residents" it was panic incited by local officials over time.

Surprise: many of your general recommendations are excellent, except that awareness needs to be increased to the extent that individual property owners and communities contribute to their own "defensive" strategies instead of relying upon broad taxpayer support of government services. Hand out address plaques and inform residents to post them at the time they call for fire suppression assistance. Outside of urbanized "neighborhoods" and "suburbs" already having water systems (only 7% of the EMA) distribute plans for individual property protection responsibility and encourage a local industry in individualized fire suppression appliances and building materials.

"Public education" about fire must be included in broad-interest information packets which also discuss the natural environment as an amenity (including wildlife) and describe the fragility of the limited water supply and the need for individual initiative in problem solving. Public awareness-heightening must be a cooperative venture between

all agencies concerned and residents—fragmentation of problem-solving between special interests (e.g. separate agencies) results in misunderstandings, conflicting recommendations, and/or duplication of effort. It should be required that such packets be distributed to all potential purchasers of property in the EMA and made available to visitors to the area.

The sort of signage programs you propose to affect human behaviors (e.g. billboards, road signs, etc.) will do more to instill panic and paranoia than solve the sort of problems you address, and they, frankly, insult the intelligence of residents. Those problems can only be addressed by making people capable of understand their individual responsibility in controlling their own properties and talking about the area with visitors (which real estate developers and agents should be more responsible about).

MONITORING AND EVALUATION: Change wording slightly: "It is important to evaluate whether fuel treatments have accomplished the defined objectives and whether any unexpected outcomes have occurred, ESPECIALLY DAMAGE TO THE NATURAL ENVIRONMENT AND INSTITUTIONALIZATION OF URBANIZING AMENITIES LEADING TO EVENTUAL DESTRUCTION OF "RURAL CHARACTER."

HOMEOWNERS GUIDE:

Reducing structural ignitability: Government agencies and "neighborhoods" MUST take a leading role in stimulating a local economy based on the provision of appropriate building materials, fire-preventative and protective appliances (e.g., roof sprinkler systems, fire-triggered), water storage and pumping systems (there from, in case of fire), and local (individual) provision and treatment of potable water supplies and sewage effluent treatment (including newly developed technologies, such as sufficient treatment of the latter to build up a fire-fighting supply of stored water).

To meet your suggestion that "the propane tank should be located at least 30 feet from any structure" perhaps requiring propane companies to locate original tanks thusly and share (or assume) the expense of relocating ALL inappropriately-located tanks would be appropriate. Since the propane companies essentially created the hazard in the first place, they (not the property owners) should be responsible for mitigating it.

Note what you are requiring when you propose 30' dead zones around homes: a typical home might have been 1500 sq. feet in size (dead space) up until recent "sore thumb" developments took off in earnest. Considering that to be about 30' by 50', adding another 30' feet of dead space perimeter brings the total "dead space" on each lot up to 60' x 80' = 4,800 sq. feet. For a 100' "defensible space", you have 130' by 150' which = a dead zone of 19,500 sq. ft. which is almost one-half acre. Those are quite large disruptions of an already fragmented environment and absolutely intolerable relative to environmental and "rural character" survival.

REQUIRING less flammable construction materials, individualized water storage, and roof sprinklers (and other evolving technologies) would be more practical that perpetuating this sort of disruption. Of course, fire-spread in the dense communities to which you ascribe "special attention" (7% of the EMA) will be little different than that in the City of Albuquerque, where there are no constraints on house-vegetation proximity. Also, urban road networks provide quite adequate access to prevent house fires from becoming "wildfires." Fire-break perimeters AROUND dense neighborhoods, of course, will prevent entry of "wildfires" as well as ubiquitous urbanization.

Lest your comments about removing pine needles be misunderstood and overly applied, note the fact that trees dropping them do so to insulate roots from extremes of ground heat and cold, which can kill them. Also, new seedlings will not sprout except in such protected ground.

Removing limbs of trees to a height of 6-10 feet can be problematic. Certain species (notably Pinon pine) have trunks which are extremely heat-sensitive, inhibiting sap-flow, and continuous exposure to sun will make such species highly susceptible to insect damage. There are some such stands now along Hwy. 217 which can be studied to see whether deleterious effects develop.

Mention of fire retardants is appreciated and must be included in any information brochures distributed. Obviously, local business must be stimulated to carry such materials, and residents must be shown how to obtain specific information about such products (e.g., Internet search key-words).

There are many practical and affordable innovative fire-fighting appliance types, such as roof-sprinkler systems, that are now available and will become available (and affordable innovative building materials as well). The most important thing any local fire-concerned organization can do is to continually research such materials and continually update information brochures and Websites, as well as stimulate local sales of such products.

Since people do not want their properties to be identified for the purposes of solicitation and burglary and have moved to the EMA to avoid such problems, it should be stated that address placards need to be posted in emergencies (once-in-a-lifetime, if that) at the time emergency assistance is requested from a particular address. Using fear of fire as an excuse to unnecessarily urbanize the entire area makes such fire planning highly suspect as to its motives and thus unlikely to be respected.

Some alternative to 45-foot-diameter turn-arounds has to be considered, especially when paving is suggested. Such an extreme construction for a once-in-a lifetime emergency (if any at all) is very destructive to rural character and the environment. Adequate local fire-fighting storage tanks have been cited as one alternative. The same applies to narrow roads. Thus smaller localized fire-fighting equipment is necessary (certainly equipment narrower than 12-feet is obtainable and certainly more practical. Urbanized communities (7% of the EMA) need to develop their own internally located "volunteer" fire departments funded by their community.

I did not see mention of temporary conversion of local government offices (e.g., community centers, fire stations depopulated of trucks, sheriff substation outbuildings, etc.) or organization of church buildings as emergency shelters, and there would be a particular need for shelters of pets indoors and livestock (rodeo grounds, play fields, etc.).

A “reverse 911” system that cannot leave messages is very inefficient and could be redesigned.

APPENDIX B

FORMS

East Mountain Community Assessment Field Sheet

Community Name: _____ Date: _____

Coordinates: Easting_____ Northing_____

Location Description:

Vegetation Types:	
	Grassland
	Sage scrubland
	Juniper savanna
	Pinon-juniper woodland
	Ponderosa forest
	Mixed conifer
	Riparian

Vegetation Attributes:	
	Dog hair thicket
	Closed canopy
	Dense ladder fuels
	High mortality
	Abundance of dead and downed fuel
	Evidence of thinning

Road Material:	
pavement	
gravel	
dirt	

Typical House Materials:	
adobe/stucco	
wood siding	
log	
manufactured/mobile	
brick/stone	

Yard Features:	
wood outbuildings	
woodpiles	
aboveground propane tanks	
wood fence	
wood deck	

Typical Roofs:	
wood shingles	
asphalt shingles	
gravel and asphalt (flat)	
metal/ ProPanel	
other	

Hydrants?

Are there any large open fields or other areas that could serve as safety zones or staging areas (> 2 acres)?

Specific Hazards (e.g. narrow or steep roads, houses surrounded by dense vegetation, propane tanks against houses)

Commments:

Community Comment Form

The questions on this form are intended only as a guide. Please share your thoughts, questions, and concerns to help develop a community plan that is helpful and relevant for all of us.

East Mountain
Community
Wildfire
Protection
Plan

Please send in this form by March 8th to: **Email: emcwpp@comcast.net**

Mailing Address: EMCWPP
c/o SWCA
7001 Prospect Pl., Ste 100
Albuquerque, NM 87110

Electronic version of form available at www.ciudadswcd.org

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1. What information would you most like to have regarding fire in our community?

2. What actions could our community take to be more prepared for wildfire?

3. What could you do to help protect your home and community?

continued on reverse

4. What role do neighboring private landowners and land management agencies play in reducing the threat of wildfire?

5. What would you like fire emergency service agencies and personnel to know about protecting your neighborhood from wildfire?

6. Other questions or comments?

Community Values

- Please list any areas, structures or things that you value and feel should be protected from the threat of wildland fire.
- No agreement within the group is needed, just put down what each person feels is important.
- Examples could include historic sites, real estate value, scenery or views, hiking trails, or businesses.

Risk Reduction/ Mitigation

- Try to reach a consensus in the group as to the single most important action that could be taken to reduce the threat of wildfire to the community.
- If the group cannot identify one most important action, just leave that section blank and list all of the suggestions under the “other ways to reduce risk” section.
- Examples of ways to reduce risk could include improved defensible space, forest thinning, creation or improvement of a fuel break, or better public education.

Best way to reduce the risk of wildfire to community values:

Other ways to reduce the risk of wildfire:

Neighborhood Details

East Mountain Community Wildfire Protection Plan

Please send in this form by April 1st to: Email*: emcwpp@comcast.net

Any additional information or maps you could attach would be very helpful.

Mailing Address: EMCWPP
c/o SWCA
7001 Prospect Pl., Ste 100
Albuquerque, NM 87110

** To submit by email, please answer the questions and save the form as an MSWord document. Then attach the document to an email.*

Name of person filling out this form:

Phone: **Email:**

Neighborhood or Community:

WATER SUPPLIES

What system provides water to your community?

How would you rate the reliability of the water supply? low ☐ moderate ☐ high ☐

Do you have hydrants in your neighborhood?
If yes, approximately how many?
Are the hydrants gravity fed ☐ or pressurized ☐?

Does the water system have storage tanks in your community?

Is the supply gravity fed ☐ or pressurized ☐?

General location of tanks:

What is the total storage capacity of the tanks?

Do the water tanks have access points or fittings for firefighting equipment?

Are there any other water supplies in your neighborhood such as swimming pools or ponds that could be used for firefighting?

Who would need to provide permission for access and use?

General location:

TYPES OF FUEL HAZARDS

Please mark the most common type of roofing material in your neighborhood:
Wood shingles ☐ Asphalt shingles☐ Gravel and asphalt (flat) ☐ Metal/ ProPanel☐

APPENDIX C

HOMEOWNER'S GUIDE

HOMEOWNER'S GUIDE

This guide has been developed in response to community feedback regarding a lack of detailed, site-specific information on wildfire in the East Mountains. In public meetings and written comments, residents expressed a need for better information on reducing wildfire risk and what to do in the event of a wildfire. This document is intended to meet these expressed needs of the community, as well as to fulfill requirements for the East Mountain Area Community Wildfire Protection Plan. This guide (1) suggests specific measures that can be taken by homeowners to reduce structure ignitability and (2) enhances overall preparedness in the planning area by consolidating preparedness information from several local agencies and departments.

The recommendations provided in this guide are based on the best information available at the time of publication. Local emergency response agencies are constantly evaluating and modifying emergency preparedness information. More information can be found at the following websites:

New Mexico State Forestry
http://www.emnrd.state.nm.us/emnrd/forestry/index.cfm

Firewise
http://www.firewise.org/index.php

New Mexico Fire Information
http://www.nmfireinfo.com/

Bernalillo County Fire and Rescue
http://www.bernco.gov/live/departments.asp?dept=2332&submenuid=7746

BEFORE THE FIRE – PROTECTION AND PREVENTION

The East Mountain area of New Mexico is a great place to enjoy a rural lifestyle, spectacular scenery, and proximity to outdoor activities. Unfortunately, the same attributes that make the area a desirable place to live also make it a precarious place to live. The reality is that a wildland environment is a fire environment. Accepting that fire is a member of the neighborhood means taking steps to prepare for a wildfire event and prevent home ignitions. Homes are part of the fuel complex. Protecting homes from wildfire requires reducing flammable vegetation and addressing flammability of the homes themselves.

REDUCING STRUCTURE IGNITABILITY

Structural Materials

Roofing—The more fire-resistant the roofing material, the better. The roof is the portion of the house that is most vulnerable to ignition by falling embers known as firebrands. Metal roofs are common in the East Mountain Area and afford the best protection against ignition from falling embers. Slate or tile roofs are also non-combustible, and Class-A asphalt shingles are

recommended as well. The most dangerous type of roofing material is wood shingles. Removing debris from roof gutters and downspouts at least twice a year will help to prevent fire along with keeping them functioning properly.

Siding—Non-combustible materials are ideal for the home exterior. Preferred materials include stucco, aluminum, cement, cement board, block, brick, and masonry.

Windows—Double-pane windows are most resistant to heat and flames. Smaller windows tend to hold up better within their frames than larger windows. Tempered glass is best, particularly for skylights, because it will not melt as plastic will.

Fencing and trellises—Any structure attached to the house should be considered part of the house. A deck, wood fence or trellis can carry fire to your home siding or roof. Consider using non-flammable materials or use a protective barrier such as metal or masonry between the fence and the house. Metal flashing should be used where flammable deck material meets the exterior wall of the house.

If you are designing a new home or remodeling your existing one, do it with fire safety as a concern. Use non-flammable or fire resistant materials and have the exterior wood treated with UL approved fire retardant chemicals. More information on fire-resistant construction can be found at www.firewise.org.

SCREEN OFF EMBER ACCESS POINTS

The area below an aboveground deck or porch can become a trap for burning embers or debris, increasing the chances of the fire transferring to your home. Screen off the area using screening with openings no larger than 1/8 inch. Keep the area behind the screen free of all leaves and debris.

Also use 1/8-inch metal screen mesh in attic vents and other openings to prevent embers from entering the structure.

FIREWOOD, KINDLING, AND OTHER FLAMMABLES

Although convenient, stacked firewood on or below a wooden deck adds fuel that can feed a fire close to your home. Be sure to move all wood away from the home during fire season. Stack all firewood uphill, at least 30 feet and preferably 100 feet from your home.

When storing flammable materials such as paint, solvents, or gasoline, always store them in approved safety containers away from any sources of ignition such as hot water heaters or furnaces. The fumes from highly volatile liquids can travel a great distance after they turn into a gas. If possible, store the containers in a safe, separate location away from the main house.

POWER LINES

PNM does not have sufficient crews to inspect with great frequency all the high voltage powers lines. If you have high voltage lines running near your property take a moment to inspect them

and ensure that no tree branches are in close proximity to the towers or lines. If there is any situation that could be a fire hazard contact PNM Customer Service at 246-5700.

CHIMNEYS AND FIREPLACE FLUES

Inspect your chimney and damper at least twice a year and have the chimney cleaned every year before first use. Have the spark arrestor inspected and confirm that it meets the latest safety code. The fire department will have the latest edition of National Fire Prevention Code 211 covering spark arrestors. Make sure to clear away limbs from within 15 feet of chimneys and stovepipes

FIREPLACE AND WOODSTOVE ASHES

Never take ashes from the fireplace and put them into the garbage or dump them on the ground. Even in winter, one hot ember can quickly start a grass fire. Instead, place ashes in a metal container, and as an extra precaution, soak them with water. Cover the container with its metal cover and place it in a safe location for at least two days. Then either dispose of the cold ash with other garbage or bury the ash residue in the earth and cover with at least 6 inches of mineral soil.

PROPANE TANKS

Your propane tank has many hundreds of gallons of highly flammable liquid that could become a very explosive, incendiary source in the event of a fire. The propane tank should be located at least 30 feet from any structure. Keep all flammables at least 10 feet from your tank. Learn how to turn the tank off and on. In the event of a fire, you should turn the gas off at the tank before evacuating, if safety and time allow.

SMOKE ALARMS

A functioning smoke alarm can help warn you of a fire in or around your home. Install smoke alarms on every level of your residence. Test and clean smoke alarms once a month and replace batteries at least once a year. Replace smoke alarms once every 10 years.

FIRE-SAFE BEHAVIOR

If you smoke, always use an ashtray in your car and at home.
Store and use flammable liquids properly.
Keep doors and windows clear as escape routes in each room.

DEFENSIBLE SPACE

The removal of dense, flammable foliage from the area immediately surrounding the house reduces the risk of structure ignition and allows firefighters access to protect the home. Steep slopes require increased defensible space because fire can travel quickly uphill. Generally, modifying vegetation within a 30–100 foot radius to create a safety zone is recommended. However, actual treatment sizes may vary according to site-specific variables. Contact New Mexico State Forestry or Bernalillo County to schedule a defensible space evaluation of your home.

Within the safety zone, plants should be limited to fire-resistant trees and shrubs. Focus on fuel breaks such as concrete patios, walkways, rock gardens, and irrigated garden or grass areas within this zone. Use mulch sparingly within the safety zone and focus use in areas that will be watered regularly. In areas such as turnarounds and driveways, non-flammable materials such as gravel are much better than wood chips or pine needles.

Pine needles provide important erosion protection for soil but also may carry a surface fire. It is simply not feasible to remove all the pine needles around your property. However, it is a good idea to remove any accumulations of pine needles or cones within the safety zone and extending out as far as possible. This is particularly important if pine needles tend to build up alongside your house or outbuildings. Removing needles and leaves and exposing bare mineral soil or using non-flammable mulch is recommended in a 2-foot-wide perimeter along the foundation of the house. Also, be sure to regularly remove pine needles and debris from gutters, especially during summer months.

Trees within the safety zone should have lower limbs removed to a height of 6–10 feet. Remove any branches within 15 feet of your chimney or overhanging any part of your roof. Ladder fuels are short shrubs or trees growing under the eaves of the house or under larger trees. Ladder fuels carry fire from the ground level onto the house or into the tree canopy. Be sure to remove all ladder fuels within the safety zone first. The removal of ladder fuels within about 100 feet of the house will help to limit the risk of crown fire around your home. More information about defensible space is provided at www.firewise.org.

FIRE RETARDANTS

For homeowners who would like home protection beyond defensible space and fire-resistant structural materials, fire retardant gels and foams are available. These materials are sold with various types of equipment for applying the material to the home. They are similar to the substances applied by firefighters in advance of wildfire to prevent ignition of homes. Different products have different timelines for application and effectiveness. The amount of product needed is based on the size of the home, and prices may vary based on the application tools. Prices range from a few hundred dollars to a few thousand dollars. An online search for “fire blocking gel” or “home firefighting” will provide a list of product vendors.

ADDRESS POSTING

Locating individual homes in the East Mountains is one of the most difficult tasks facing emergency responders. Every home should have the address clearly posted, with numbers at least 3 inches in size. The colors of the address posting should be contrasting or reflective. The address should be posted so that it is visible to cars approaching from either direction.

ACCESS

Unfortunately, limited access may prevent firefighters from reaching many homes in the East Mountains. Many of the access problems occur at the property line and can be improved by homeowners. First, make sure that emergency responders can get in your gate. This may be important not only during a fire but also to allow access during any other type of emergency

response. If you will be gone for long periods during fire season, make sure a neighbor has access, and ask them to leave your gate open in the event of a wildfire in the area.

Ideally, gates should swing inward. A chain or padlock can be easily cut with large bolt cutters, but large automatic gates can prevent entry. Special emergency access red boxes with keys are sold by many gate companies but are actually not recommended by emergency services. The keys are difficult to keep track of and may not be available to the specific personnel that arrive at your home. An alternative offered by some manufacturers is a device that opens the gate in response to sirens. This option is preferred by firefighters but may be difficult or expensive to obtain. Another option is to provide your gate code using the Bernalillo County CARE form. The code remains confidential but is provided through the 911 system to personnel responding to an emergency at your home.

Beyond your gate, make sure your driveway is uncluttered and at least 12 feet wide. The slope should be less than 10 percent. Trim any overhanging branches to allow at least 13.5 feet of overhead clearance. Also make sure that any overhead lines are at least 14 feet above the ground. If any lines are hanging too low, contact the appropriate phone, cable, or power company to find out how to address the situation.

If possible, consider a turnaround within your property at least 45 feet wide. This is especially important if your driveway is more than 300 feet in length. Even small fire engines have a hard time turning around and cannot safely enter areas where the only means of escape is by backing out. Any bridges must be designed with the capacity to hold the weight of a fire engine.

NEIGHBORHOOD COMMUNICATION

It is important to talk to your neighbors about the possibility of wildfire in your community. Assume that you will not be able to return home when a fire breaks out and may have to rely on your neighbors for information and assistance. Unfortunately, it sometimes takes tragedy to get people talking to each other. Don’t wait for disaster to strike. Strong communication can improve the response and safety of every member of the community.

Phone Trees

Many neighborhoods use phone trees to keep each other informed of emergencies within and around the community. The primary criticism is that the failure to reach one person high on the tree can cause a breakdown of the system. However, if you have willing and able neighbors, particularly those that are at home during the day, the creation of a well-planned phone tree can often alert residents of the occurrence more quickly than media channels. Talk to your neighborhood association about the possibility of designing an effective phone tree. Another option may be to designate a block leader who serves as a primary communication link and is aware of the individual needs of each neighbor.

Neighbors in Need of Assistance

Ask mobility-impaired neighbors whether they have filed a CARE form with Bernalillo County. This form notifies emergency responders of the presence of limited-mobility residents. It is also a good idea for willing neighbors to commit to evacuating a mobility-

impaired resident in the event of an emergency. Make sure that a line of communication is in place to verify the evacuation.

Absentee Owners

Absentee owners are often out of the loop and in many cases do not maintain contact with their neighbors. If a home near you is unoccupied for large portions of the year, try to get contact information for the owners from other neighbors or your neighborhood association. Your neighbors would probably appreciate notification in the event of an emergency. Also, you may want to contact them to suggest that they move their wood pile or make sure that the propane line to the house is turned off.

HOUSEHOLD EMERGENCY PLAN

A household emergency plan does not take much time to develop and will be invaluable in helping your family deal with an emergency safely and calmly. One of the fundamental issues in the event of any type of emergency is communication. Be sure to keep the phone numbers of neighbors with you rather than at home.

It is a good idea to have a contact for your family who lives out of state. When disaster strikes locally, it is often easier to make calls to a different area code than local calls. Make sure that everyone in the family has the contact phone number and understands why they need to check in with that person in the event of an emergency. Also, designate a meeting place for your family. Having an established meeting site helps to ensure that family members know where to go, even if they can't communicate by phone.

Children

Local schools have policies for evacuation of students during school hours. Contact the school to get information on how the process would take place and where the children would likely go.

The time between when the children arrive home from school and when you return home from work is the most important timeframe that you must address. Fire officials must clear residential areas of occupants to protect lives and to allow access for fire engines and water drops from airplanes or helicopters. If your area is evacuated, blockades may prevent you from returning home to collect your children. It is crucial to have a plan with a neighbor for them to pick up your children if evacuation is necessary.

Pets and Livestock

Some basic questions about pets and livestock involve whether you have the ability to evacuate the animals yourself and where you would take them. Planning for the worst-case scenario may save your animals. An estimated 90 percent of pets left behind in an emergency do not survive. Don't expect emergency service personnel to prioritize your pets in an emergency. Put plans in place to protect your furry family members.

PETS

Assemble a pet disaster supply kit and keep it handy. The kit should contain a two-day supply of food and water, bowls, a litter box, and a manual can opener if necessary. It is also important to have extra medication and medical records for each pet. The kit should contain a leash for each dog and a carrier for each cat. Carriers of some kind should be ready for birds and exotic pets. In case your pet must be left at a kennel or with a friend, also include an information packet that describes medical conditions, feeding instructions, and behavioral problems. A photo of each pet will help to put the right instructions with the right pet.

In the event of a wildfire, you may be prevented from returning home for your animals. Talk to your neighbors and develop a buddy system in case you or your neighbors are not home when fire threatens. Make sure your neighbor has a key and understands what to do with your pets should they need to be evacuated.

If you and your pets were evacuated, where would you go? Contact friends and family in advance to ask whether they would be willing to care for your pets. Contact hotels and motels in the area to find out which ones accept pets. Boarding kennels may also be an option. Make sure your pets' vaccinations are up-to-date if you plan to board them.

Once you have evacuated your pets, continue to provide for their safety by keeping them cool and hydrated. Try to get your pets to an indoor location rather than leaving them in the car. Do not leave your pets in your vehicle without providing shade and water. It is not necessary to give your pets water while you are driving, but be sure to offer water as soon as you reach your destination.

LIVESTOCK

Getting livestock out of harm's way during a wildfire is not easy. You may not be able or allowed to return home to rescue your stock during a wildfire evacuation. Talk to your neighbors about how you intend to deal with an evacuation. If livestock are encountered by emergency responders, they will be released and allowed to escape the fire on their own. Make sure your livestock have some sort of identification. Ideally, your contact information should be included on a halter tag or ear tag so that you could be reached if your animal is encountered.

If you plan to evacuate your livestock, have a plan in place for a destination. Talk to other livestock owners in the area to find out whether they would be willing to board your stock in the event of an emergency. For instance, horse owners along the Rio Grande may appreciate a reciprocal agreement with East Mountains residents to board horses in case of a fire evacuation in either location. Often in large-scale emergencies, special accommodations can be made at rodeo and fairgrounds but personal arrangements may allow you to respond more quickly and efficiently.

If you do not own a trailer for your horses or other livestock, talk to a neighbor who does. Find out whether they would be willing to assist in the evacuation of

your animals. If you do own a trailer, make sure it is in working condition with good inflated tires and functioning signal lights. Keep in mind that even horses that are accustomed to a trailer may be difficult to load during an emergency. Practicing may be a good idea to make sure your animals are as comfortable as possible when loading into the trailer.

House and Property

Insurance companies suggest that you make a video that scans each room of your house to help document and recall all items within your home. This video can make replacement of your property much easier in the unfortunate event of a large insurance claim. See more information on insurance claims in the After the Fire section below.

Personal Items

During fire season, items you would want to take with you during an evacuation should be kept in one readily accessible location. As an extra precaution, it may be a good idea to store irreplaceable mementos or heirlooms away from your home during fire season.

It is important to make copies of all important paperwork such as birth certificates, titles, and so forth and store somewhere away from your home such as a safe deposit box. Important documents can also be protected in a designated fire-safe storage box within your home.

IN THE EVENT OF A FIRE

NOTIFICATION

In the event of a wildfire, announcements from the local Emergency Management office will be broadcast over local radio and television stations. Media notification may be in the form of news reports or the Emergency Alert System. On the radio, the AM station 770 KOB generally provides frequent updates. On television, the emergency management message will scroll across the top of the screen on local channels. The notice is not broadcast on non-local satellite and cable channels.

One good way to stay informed about wildfire is to use a National Oceanic and Atmospheric Administration weather alert radio. The radios can be purchased at most stores that carry small appliances, such as Target, Sears, or Radio Shack. The radio comes with instructions for the required programming to tune the radio to our local frequency. The programming also determines the types of events you want to be alerted for. The weather alert radio can be used for any type of large incident (weather, wildfire, HAZMAT, etc.), depending on how it is programmed. Local fire personnel can assist with programming if needed.

Bernalillo County uses a reverse 911 system to notify residents in the event of an evacuation. The system calls every land line in the area intermittently. The system cannot leave a message but repeats frequently. The caller ID for the reverse 911 system appears as Bernalillo County 7000. The reverse 911 system does not call cell phones.

Sirens, once used for emergency notification, are no longer employed in this area. Today's homes are better insulated, and the thicker walls prevent sirens from being audible inside most homes. Sirens can also create panic because the public is unaware of just what the danger is.

WHEN FIRE THREATENS

Before an evacuation order is given for your community, there are several steps you can take to make your escape easier and to provide for protection of your home. When evaluating what to do as fire threatens, the most important guideline is: DO NOT JEOPARDIZE YOUR LIFE.

Back your car into the garage or park it in an open space facing the direction of escape. Shut the car doors and roll up the windows. Place all valuables that you want to take with you in the vehicle. Leave the keys in the ignition or in another easily accessible location. Open your gate.

Close all windows, doors, and vents, including your garage door. Disconnect automatic garage openers and leave exterior doors unlocked. Close all interior doors as well.

Move furniture away from windows and sliding glass doors. If you have lightweight curtains, remove them. Heavy curtains, drapes, and blinds should be closed. Leave a light on in each room.

Turn off the propane tank or shut off gas at the meter. Turn off pilot lights on appliances and furnaces.

Move firewood and flammable patio furniture away from the house or into the garage.

Connect garden hoses to all available outdoor faucets and make sure they are in a conspicuous place. Turn the water on to "charge" or fill your hoses and then shut off the water. Place a ladder up against the side of the home, opposite the direction of the approaching fire, to allow firefighters easy access to your roof.

EVACUATION

When evacuation is ordered, you need to go ***immediately***. Evacuation not only protects lives, it also helps to protect property. Many roads in the East Mountains are too narrow for two-way traffic, especially with fire engines. Fire trucks often can't get into an area until the residents are out. Arguably the most important tool in the wildland urban interface toolbox is aerial attack. Airplanes and helicopters can be used to drop water or retardant to help limit the spread of the fire, but these resources cannot be used until the area has been cleared of civilians.

Many East Mountain residents are frustrated by the lack of a detailed evacuation plan for the area. However, the lack of an evacuation map is deliberate on the part of emergency management agencies because of the geography and special situations existing in our wildland urban interface. Because wildfire could occur throughout most of the East Mountain area, it is difficult to determine an established evacuation route. If a wildfire threatens and evacuation is necessary, emergency managers will determine the best evacuation route based on the location and direction of spread of the fire and the optimal combination of getting residents out of and firefighters into the area. Rather than relying on predefined routes, officials stress that residents

must rely on the information and instructions given during the evacuation. Use the methods described above in the Notification section to receive information on where and how to evacuate.

Despite the lack of a formal evacuation plan, it is a good idea to give evacuation some thought. Think about your personal evacuation route options in relation to the meeting location established by your family Household Emergency Plan. Cooperation by neighborhood members can help to establish emergency egress options through private property.

Expect emergency managers to designate a check-out location for evacuees. This process helps to ensure that everyone is accounted for and informs emergency personnel as to who may be remaining in the community. Every resident should check out at the designated location before proceeding to any established family meeting spot.

Keep in mind that in some cases evacuating may not be the safest thing to do. If your escape route goes into the fire, you cannot be sure where the fire is through the thick smoke, or the route is choked with traffic, you might be safer remaining in your or your neighbor's home. This option is safe only in homes that have non-combustible siding and roofing materials and where all combustible materials have been moved away from the house. Evaluate the safety of your home and talk to your neighbors before fire threatens. If you must take shelter in the home, the preparations described in the previous section, When Fire Threatens, still apply.

AFTER THE FIRE

RETURNING HOME

First and foremost, follow the advice and recommendations of emergency management agencies, fire departments, utility companies, and local aid organizations regarding activities following the wildfire. Do not attempt to return to your home until fire personnel have deemed it safe to do so.

Even if the fire did not damage your house, do not expect to return to business as usual immediately. Expect that utility infrastructure may have been damaged and repairs may be necessary. When you return to your home, check for hazards such as gas or water leaks and electrical shorts. Turn off damaged utilities if you did not do so previously. Have the fire department or utility companies turn the utilities back on once the area is secured.

INSURANCE CLAIMS

Your insurance agent is your best source of information as to the actions you must take in order to submit a claim. Here are some things to keep in mind. Your insurance claim process will be much easier if you photographed your home and valuable possessions before the fire and kept the photographs in a safe place away from your home. Most if not all of the expenses incurred during the time you are forced to live outside your home could be reimbursable. These could include, for instance, mileage driven, lodging, and meals. Keep all records and receipts. Don't start any repairs or rebuilding without the approval of your claims adjuster. Beware of predatory contractors looking to take advantage of anxious homeowners wanting to rebuild as quickly as

possible. Consider all contracts very carefully, take your time to decide, and contact your insurance agent with any questions.

POST-FIRE REHABILITATION

Homes that may have been saved in the fire may still be at risk from flooding and debris flows. Burned Area Emergency Rehabilitation, or BAER, teams are interdisciplinary teams of professionals who work to mitigate the effects of post-fire flooding and erosion. These teams often work with limited budgets and manpower. Homeowners can assist the process by implementing treatments on their own properties as well as volunteering on burned public lands to help reduce the threat to valuable resources. Volunteers were instrumental in implementing many of the BAER treatments following the Cerro Grande fire. Volunteers can assist BAER team members by planting seeds or trees, hand mulching, or helping to construct straw-bale check dams in small drainages.

Volunteers can help protect roads and culverts by conducting storm patrols during storm events. These efforts dramatically reduce the costs of such work as installing trash racks, removing culverts, and rerouting roads.

Community volunteers can also help scientists to better understand the dynamics of the burned area by monitoring rain gauges and monitoring the efficacy of the installed BAER treatments.

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APPENDIX D

SIERRA LAND GRANT FIRE PLAN

AND

CARNUEL THINNING PRESCRIPTION

THINNING PRESCRIPTION

Prepared for Carnuel Grant

September 21, 2005

Description:

The treatment area is approximately 53 acres of piñon-juniper located south of Montoya Elementary School and north of the cement plant. The area requires thinning to prevent a wind-driven fire from threatening the school or the cement plant. The restoration plan for the area is as follows:

1) Remove all the insect kill trees except for a few large dead trees that can selectively be left as wildlife trees.

2) Remove all small, young-growth trees up to three inches DBH; except in small area where that is all there is, they should be spaced to 12 feet apart.

3) Larger trees should be spaced 16 feet apart.

4) In the entire area, there should be set-aside areas of 1/4 acre each. A minimum of five areas should be left untouched for wildlife use. These areas should be selectively designated.

5) All green slash up to 3 inches shall be chipped, to include old slash from previous activity Slash larger than 3 inches shall be bucked to 18 inches long and left for locals to use for firewood .Some of the slash will have to be dragged to the chipping area.

6) Chips should be scattered in cleared areas to prevent erosion and promote grass growth and restoration.

Cost estimate:

Thinning cost is estimated at approximately $800.00 to $900.00 per acre for the complete job, plus consultant fee of $1,402.00,

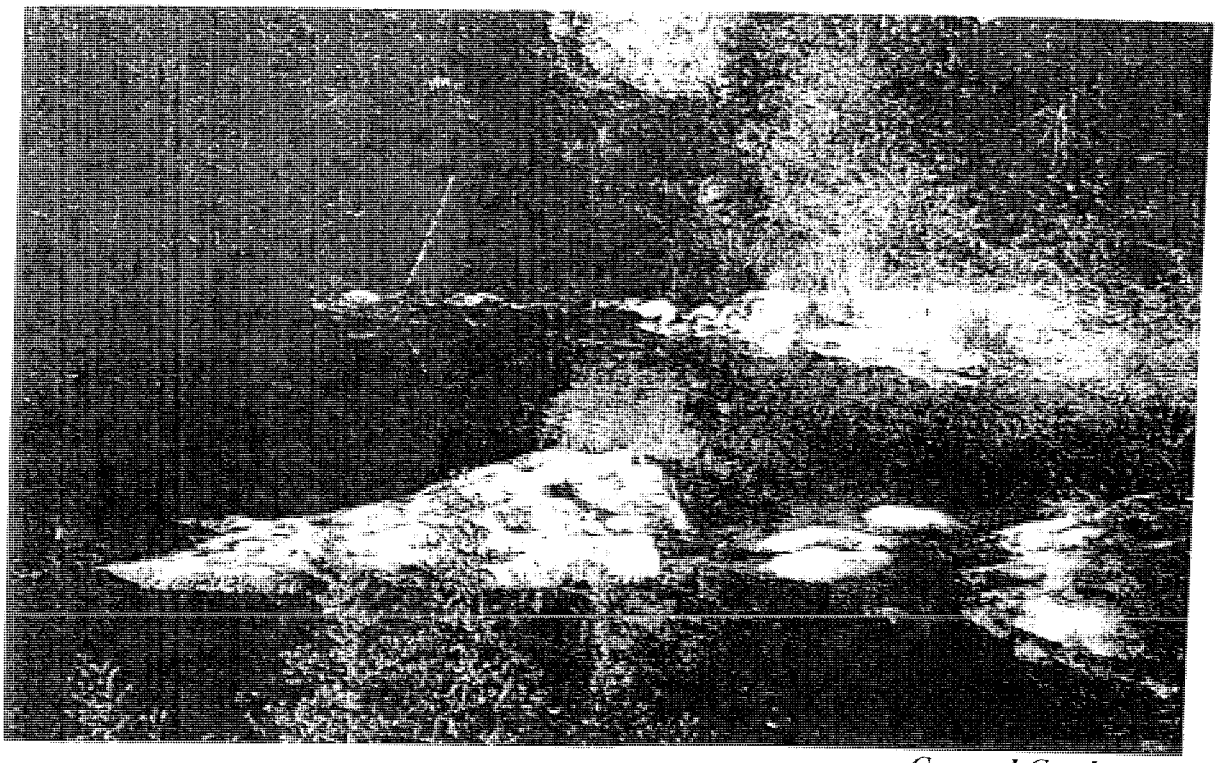
It is recommended the work be done in the fall to prevent any further insect infestation.

Prepared by:

Orlando Romero
Forest Guild

Sierra Land Grant Community Coalition

Fire Plan



Carnuel Creek pond

July 2002

Prepared By
The Forest Trust
P.O. Box 519
Santa Fe, NM 87504

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SIERRA LAND GRANT COMMUNITY COALITION
FIRE PLAN

INTRODUCTION

The Sierra Land Grant Community Coalition is comprised of traditional communities in the East Mountain Range of the Sandia and North Manzano Mountains in the Cibola National Forest. Specifically, the coalition is composed of the Chilili Land Grant, the Cañon de Carnue Land Grant, the Concilio de San Pedro, and the Acequia Madre de Carnuel, all of which are adjacent to the Cibola National Forest. These communities have always maintained a connection to the local ecology, predating the establishment of the National Forest, and have utilized the mountain for hunting, grazing, fuel, and the gathering of medicine plants.

Since the 1950's, when much of their traditional land base became part of the national trust lands, the land grant communities' relationship to the land has been significantly altered. Many of the traditional uses have been restricted, and urban sprawl has encroached into the East Mountain area, detracting from the overall land base. Over the same period of time, an increase in small diameter fuels in the watershed has drastically reduced the water quantity and quality in the San Antonio and Carnuel Acequias while posing a fire threat. While some of the strategies outlined will benefit all of the coalition communities given overlapping interests and proximity, the focus of this fire management plan is on the Chilili Land Grant and the Acequia Madre de Carnuel Grant.

PURPOSE OF THE PLAN

This plan will develop the following strategies:

1. Establish a community cooperative amongst the Sierra member communities engaged in exploiting the economic potential of small diameter timber from the Cibola National Forest adjacent to the San Pedro, Carnuel, and Chilili Land Grants.

2. Improve water yields and watershed health of the Acequia of Carnuel through proper ecosystem management. Auxiliary to this is the identification of opportunities to improve or expand existing water diversion ponds for wildfire fighting efforts.

3. Reduce wildfire risk on land grant properties in Carnuel and Chilili adjacent to United States Forest Service (USFS) and private lands via improved ecosystem management. Geographic Information System (GIS) databases will be developed to assist in this effort.

4. Re-institute the use of USFS lands to sustain local livestock herds by establishing a sheep or goat husbandry cooperative. The use of an associated, sustainable grazing plan can improve the biological diversity and ecological health of the implicated

forests. Currently, there are many individuals who raise sheep and goats but have difficulty finding sufficient grazing land. The development of this goal will also serve to identify the potential and limitations of animal husbandry in the area.

5. Identify areas of improvement to achieve a level of adequate fire protection in Carnuel and Chilili via infrastructural development.

6. Revitalize or identify current, traditional cultural activities, such as the collection of botanical resources for medicinal purposes, that could further improve forest health and biological diversity.

BACKGROUND

Both members of the Sierra Land Grant Community Coalition, the Chilili Grant and the Carnuel Grant lands differ in size, tree species composition and use.

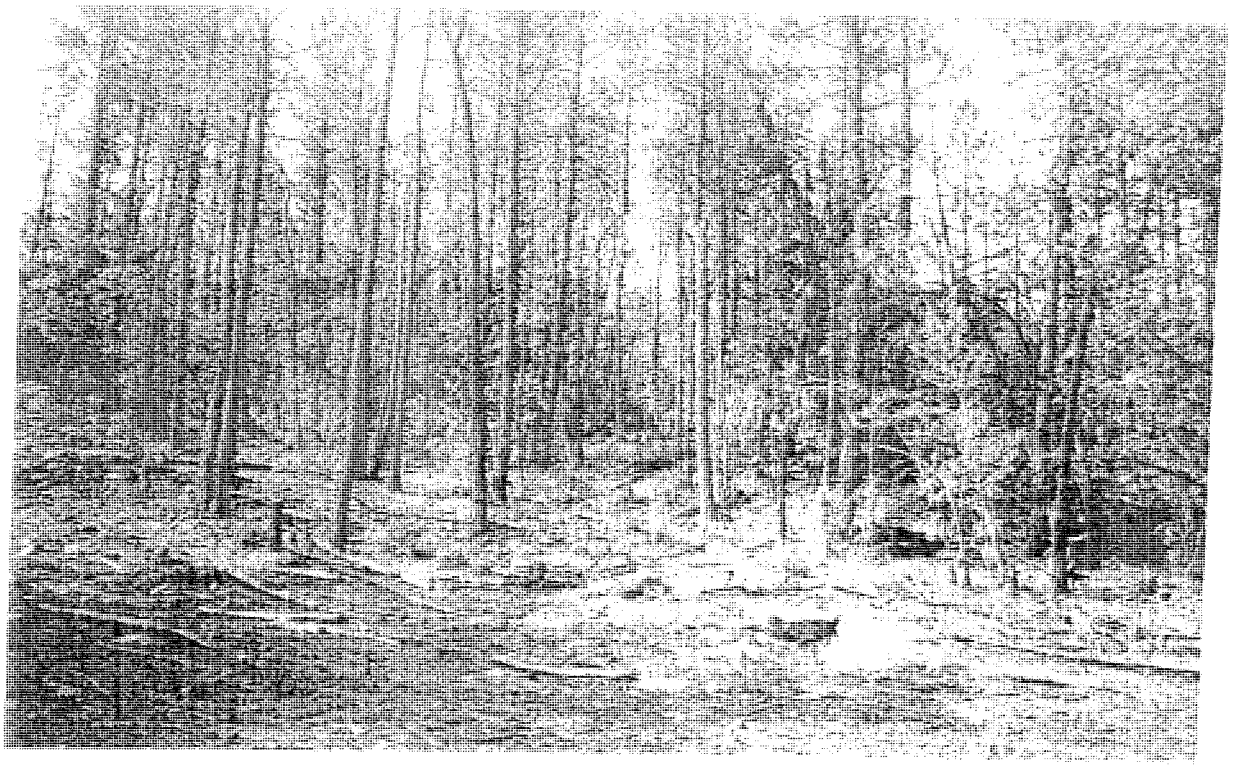
Chilili Grant

The Chilili Land Grant is bounded by the USFS Mountainair Ranger District to the south and west, the Isleta Indian Reservation to the Northwest, and by private land to the north and east. Approximately 10,000 acres of the Chilili Grant is forested with ponderosa pine. The remaining 30,000+ acres of the grant is dominated by a piñon-juniper association with scattered ponderosa pine present along the canyons. There are approximately 300 heirs who live throughout the land grant, mostly among the piñon-juniper stands. They use the land grant primarily as a source of fuelwood and cattle pasture. The majority of the fuelwood is harvested from ponderosa pine stands.

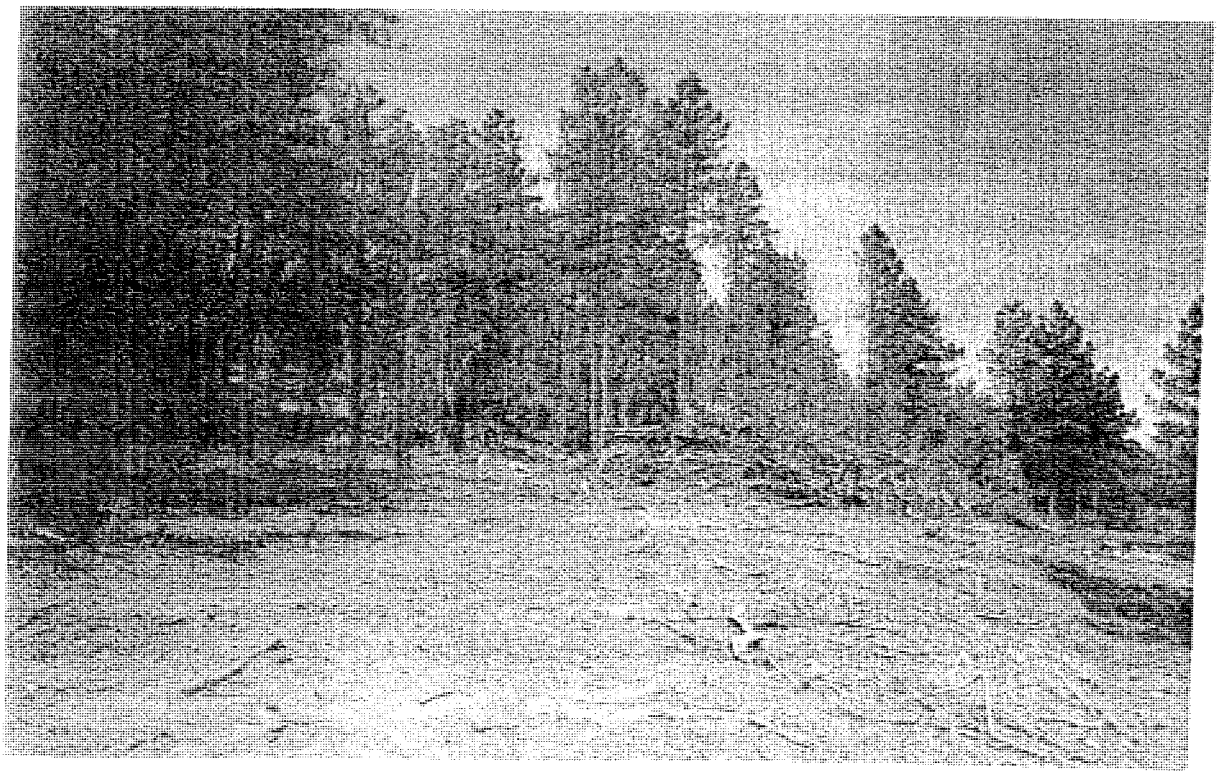
The grant is accessible from Highway 337, which crosses through the grant from north to south. The grant community maintains several miles of high clearance road for access, patrol routes and fire suppression activities. Traffic within the land grant is controlled by entrance gates and land grant officials who patrol the ground.

Land History and Status

Logging activities in the 1930's removed the majority of the overstory from the ponderosa pine stands. Presently this area is characterized by dense, pole-sized stands of 800-1000+ trees per acre of secondary growth. Within the stand, downed slash, consisting of broken treetops, slash pipes and lopped slash from timber sales or woodcutters, averages between 15 to 20 tons per acre. Slash poles can also be found along the recently constructed gas line that runs from west to east through the pine stands. Machine piles have been left from timber sale near the road and in clearings; some of these piles are near live trees. Downed treetops and 15 to 20 foot tall snags resulting from an ice storm suffered by a ponderosa pine stand a little over a year ago also contribute to the fuel load.



Photograph 1 - Downed slash in logged area in Chilili Grant

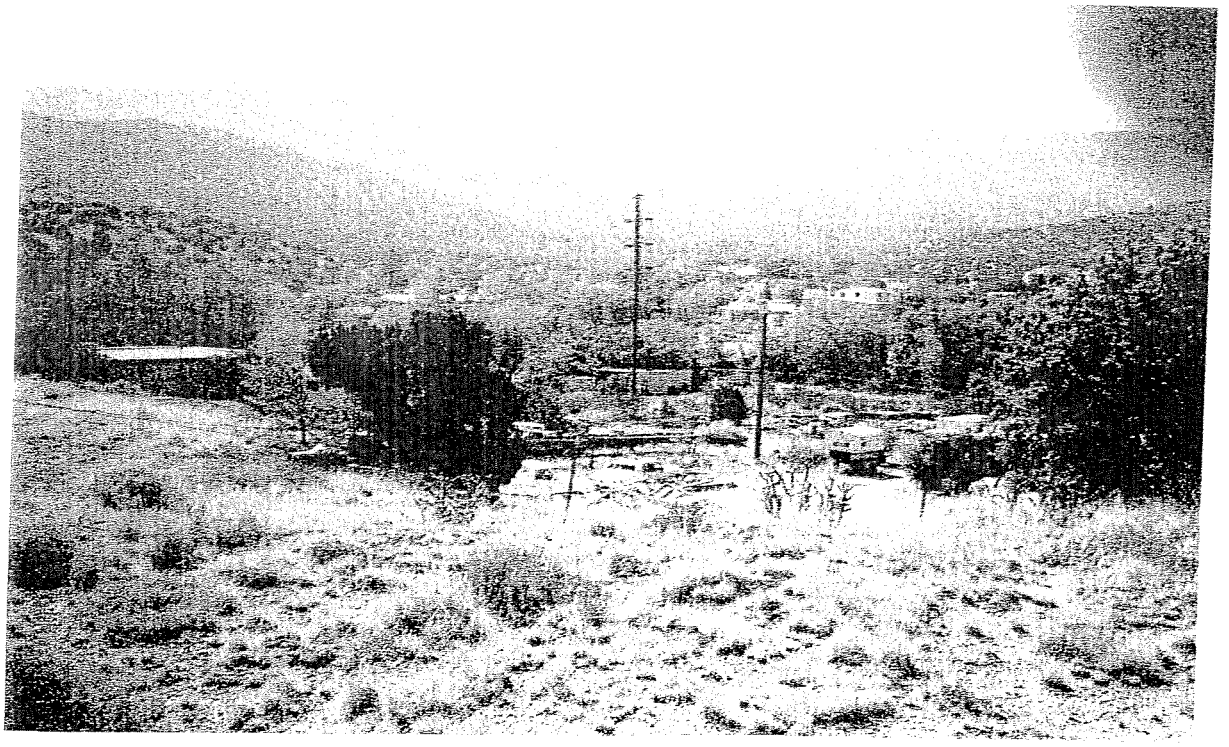


Photograph 2 - Slash piles pushed against remaining stand in Chilili Grant

Fuel Rating and Water Sources

All of the ponderosa pine stands are rated high fire hazard, while the piñon-juniper associations are a low to moderate risk. Many of the homes within the piñon-juniper forests are close to the stands. Water reservoirs are scattered throughout the grant. The reservoirs gather mostly surface water for cattle and wildlife, but all of the reservoirs are presently empty due to the current drought. The grant is also home to many springs, but like the reservoirs, some are a mere trickle while others have dried up completely. The present drought and fierce botanical water competition resulting from high tree densities are the main, contributing factors.

Carnuel Grant

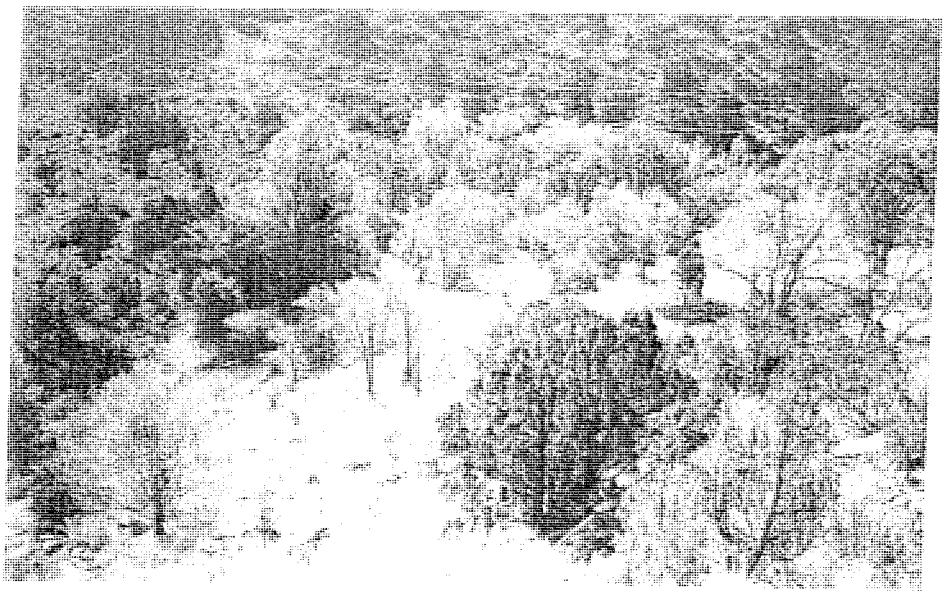


Photograph 3 - Town of Carnuel

The Carnuel Grant consists of approximately 900 acres between Cedar Crest and the Sandia foothills along the Tijeras drainage basin and Interstate 40. Piñon-juniper is the primary forest type here, while the Tijeras canyon riparian zone supports a mixture predominantly composed of willow, cottonwood, and elm (see map, Appendix VI).

Land History and Status

For a good account of the Carnuel Grant's rich history, see the Heritage Resource Report No. 2002-03-008 March 15, 2005 (Appendices I and II). Evidence of a fish hatchery, an associated fishing reservoir, and a cement plant are the primary legacies. The hatchery



Photograph 4 - Proposed campground area, site of former fish hatchery

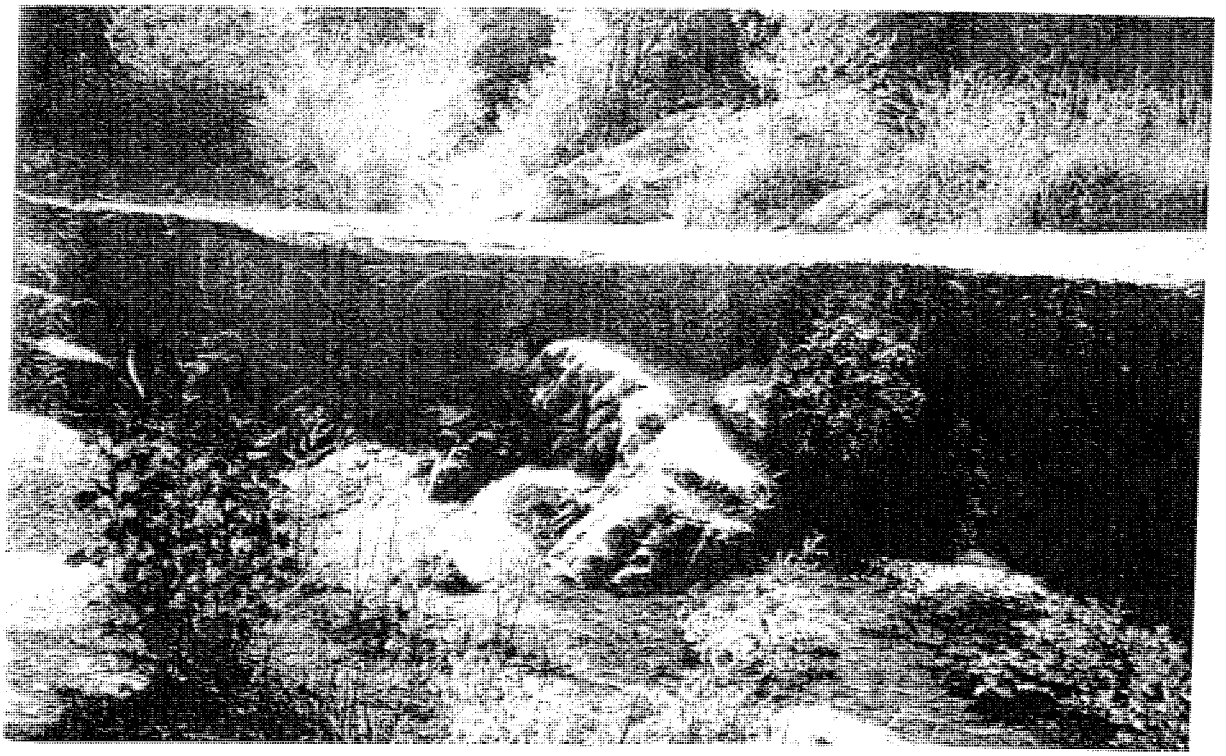
facility is not currently serviceable, but it does hold the potential to be revitalized for future use. The cement plant, which has been in operation for several years and promises to remain so for years to come, is located at the southeast end of the land grant. Rapid water quality tests conducted nearby the plant reflect that pollution from the plant is minimal. Another industrial consideration for the grant is that it has also permitted a gravel screening plant to operate within its boundaries. The gravel plant is located along the creek in the section of the grant east of the defunct fishery. There is some evidence of pollution from its activities.

Photograph 5 - Gravel pit drainage area

Fuel Rating

The grant's piñon-juniper forests rate as a low to moderate fire hazard. Moderate ratings apply to areas where the stand is particularly dense, and where it is susceptible to strong, prevailing winds. Because of the ignition threat associated with children walking to and from school, stands immediately adjacent to schools within the grant require special attention. Dead material currently littering the riparian zones should also be addressed.

Water Resources



Photograph 6 - Spring water replenishes Carnuel Creek, July 2002

The Sandia Mountain watershed feeds a creek, which drains into Carnuel and is the source for two to three springs. Several earthen dams and their associated reservoirs may also be found in the grant. Typically, the creek evinces a consistent and strong flow throughout the year, and the springs are prolific enough to fill some of the reservoirs. This year, however, the drought has forced the creek to flow underground in some places, has emptied all of the reservoirs, and has substantially reduced the flow of many of the springs. Headwater yields at Sandia Crest could be improved by thinning the stands along the drainage path (Appendix III). Such a project, however, would require the permission and cooperation of the USFS and would be labor intensive. A more detailed study is necessary before any work should be planned.

Grant heirs primarily use water within the grant for lawn and garden irrigation, and for other similar activities. The grant is in the process of redoing some of the acequias, the means by which local communities irrigated their land and which evidence indicates were destroyed during highway construction, to better utilize available water. There also exists the potential to improve irrigation and fire suppression water efficiency by developing or ameliorating existing water facilities. For instance, a two-tank reservoir system, which would not be possible in Chilili, could be established within the Carnuel Grant because of the grant's generally consistent water supply.

Finally, the community reportedly bases its sewage system on septic tank use. While preliminary research found no evidence of seepage, a more comprehensive study should be conducted to assess the health and water quality of local wells.

Other Management Goals

Grant members have also expressed an interest in improving lands both within their grant and currently administered by the USFS. Project suggestions target meadow restoration to provide forage for goat and sheep and fuelwood management. These projects could be realized with the cooperation of the USFS, especially if National Forest Restoration Program funds are acquired.

FUEL MANAGEMENT PRESCRIPTIONS

Work priorities for the Chilili Grant and the Carnuel Grant are discussed separately. The Chilili Grant is sub-divided to address specific, heterogeneous needs within the grant and for future management (Appendix IV).

Chilili Grant

One necessary operation for the grant as a whole is to dispose of the machinery piles along the pipeline and on and adjacent to past logging sites. These piles can be burned or shredded on site.

Unit 101

The highest priority for Chilili is to construct a fuelbreak along the USFS boundary to the west and south and continuing north toward Highway 337 along the Isleta Pueblo and private lands (see attached map, Appendix V). The break will help contain fires on either side of the grant boundary, inhibiting them from becoming catastrophic in nature. This project will also serve as a safeguard until the ponderosa pine stands are thinned and their fuel loads reduced.

The total land area to be treated is 156 acres: 100 acres along the USFS boundary; 25 acres that border the Isleta Pueblo Indian Reservation; and 31 acres that abut private land. The fuelbreak will encircle the ponderosa pine stands and should be no less than 300 feet wide. The grant's proposed contribution to the fuelbreak width is 100 feet with some variation to

account for specific landscape contouring and features. This assumes that the Isleta Pueblo Reservation and private landowners agree to establishing a 200 foot-wide fuelbreak on the edges of their properties. If they do not, the Chilili Grant will have to absorb the additional work and acreage. The USFS and the Mountainair Ranger District plan to construct their side of the fuelbreak as soon as funding is acquired, which could be as early as this fall.

The fuelbreak will be open; the crowns of the remaining trees will not touch with the possible exception of a few, small tree groups that might be left for site-specific, ecological purposes. The grant will also construct a ten-foot wide road where possible along the fuel break for fire access. Trees to be excluded from this treatment are the dominant ponderosa pines in the ≤11-inch dbh (diameter at breast height) class. Timber created by the project will be sold for vigas, poles, firewood, posts or chips. If a market for wood chips cannot be found, excess wood will simply be chipped on site.

Units 1-19

These units have not been logged since the 1930's and are over-dense with large second-growth stands and thick pole-sized stands. The understories of these units need to be thinned down to basal areas of 60-70. The thinning operations will financially benefit the community, but this treatment should not reduce the canopy cover of the stands to less than 80%. The harvest could be done by the grant if they are able to purchase their own equipment through supplemental or state funding, or alternatively by a private contractor.

If the grant executes the operation, they could establish a rotation cycle that will allow these stands to supply an annual yield in perpetuity. The Chilili Grant and its neighboring communities' economies would benefit from the sustained yield. One possible rotation begins at the western end of the fuelbreak and follows it to the east with each successive cut. If, however, the grant opts to use a private contractor, larger sub-units should be harvested to minimize the frequency of logging events. The grant should individually mark the trees to be thinned and closely administer the sale to ensure that no other trees besides those that were selected are felled.

Within the piñon stands, the grant, with the assistance of the state forestry office or other organizations, should focus on establishing adequate defensible space around their residences. A second project to restore grasslands in specific areas within the grant is also recommended. Improved grass production in selected sub-units would not only reduce the overall fire risk on grant lands, but it would also increase forage for grant livestock and wildlife.

Unit 20-23

The forests in these units have been logged more heavily than they should have been within the last couple of years. For this reason, fire treatment requirements are limited to thinning small pockets of pole-sized stands. The slash should be disposed through prescribed burning or chipping.

Carnuel Grant

The following prescription recommendations apply to the Carnuel Grant as a whole.

1. Grant management efforts should emphasize the efficient use and expansion of its water resources. One possible strategy is to thin the areas surrounding the headwaters of the grant to free up water currently used by trees. The specifics of such a project, however, need to be determined by an intensive, long-term study that would involve USFS cooperation.

2. The piñon stands surrounding the schools should be thinned. Although initial observations found that fine fuels are lacking, additional precautions are recommended given the ignition risk associated with school-aged children walking to and from school. The removal of a few of the larger trees and the subsequent opening of the stand would most likely restore grass as the dominant ground cover, thus reducing fire risk. It is also suggested that grant and/or school personnel create environmental trails to address ignition threat issues. The trails would educate students about the environment, instilling a greater awareness of potential degradation and environmental hazards. Educational trails could incorporate historical information at various observation stops, instructing students about the grant's history as well.

3. Dead slash, cottonwood regeneration and Russian elm trees should all be cleaned from the Tijeras riparian zone. Management goals for the riparian zone should focus on promoting native species. Russian elm is an exotic and needs to be thinned or removed to open the creek to more sunlight. Elms can be replaced with transplanted cottonwoods from within the same area.

4. The defunct fish hatchery pond should be removed while the existing, neighboring pond is enlarged. This larger pond could then serve as a reservoir for fire fighting and fishing. The water, however, may have to be filtered to sustain a fresh water fish population.

5. The area westward of and immediately surrounding the hatchery pond could be developed for recreational vehicle parking. Educational trails should be built to educate patrons of the campground, and a fee could be levied that would finance maintenance and generate income for the grant economy.

6. Other water holes can be built along the main drainage route of the grant to supply water for irrigation and fire suppression. The storage facilities would be stocked during years of heavy run off and tapped during drought years.

7. Grassland restoration within forest lands adjacent to the grant will need to be a cooperative effort between the grant and the USFS. This will allow for the coordination of project goals and aid in the identification of funding sources. The goal

is to augment grass production to decrease the risk of catastrophic fire while increasing available forage for grant livestock and wildlife.

RECOMMENDATIONS

Based on current conditions of the grants, the Forest Trust makes the following, prioritized recommendations:

Chilili Grant

1. Dispose of all mechanical brush piles prior to any additional, slash-creating activity.

2. Coordinate with the current USFS and Mountainair Ranger District fuelbreak efforts and acquire funding to realize the 100-foot wide fuelbreak within the grant. Also, continue negotiations with the Isleta Pueblo Indian Reservation and private landowners to agree upon respective responsibilities for fuelbreak width.

3. Obtain funding for logging, thinning and processing equipment to establish a timber enterprise beneficial to the local economy. If this is unfeasible, then small, carefully administered sales should be considered. Revenues from the sales would finance future thinning and slash removal operations, thus reducing the existing, overall fire hazard.

4. Devise a fire plan for defensible space for all grant residences. If the drought continues, this plan should be implemented by the summer of 2003.

5. Maintain springs and water tanks for livestock and use against fires.

6. Continue road maintenance and strategically timed closures for use in fire prevention and wildfire suppression.

7. Perpetuate the area's volunteer fire department and explore means to upgrade the equipment used to fight structure and forest fires.

Carnuel Grant

1. Thin the piñon stands around grant schools and work with them to construct environmentally and historically education trails.

2. Clean the riparian zones by removing dead material and thinning some of the pole-sized cottonwoods. These can then be transplanted into vacancies left by cleared Russian elms. Russian elm trees are invasive in nature and should be removed in favor of native species.

3. Construct a new acequia to replace the one buried by the highway. It will be used primarily for irrigation.

4. Coordinate with the USFS and the Sandia Ranger Station to monitor spring water yields for the Sandia headwaters. Concurrently, formulate thinning strategies for Hondo, Cañoncito and other implicated canyons to increase the water yields of grant springs.

5. Remove the fish hatchery tank and enlarge the nearby reservoir to double its present size. The resultant water cache can be used for fire suppression and recreational fishing.

6. Level the areas south and west of the former fish hatchery to develop an RV campground. Also, construct a recreational loop trail along the drainage basin with scenic viewing stops. The campground and trail will provide economic benefits to the grant community.

7. Remove the gravel pit operation and construct a second water reservoir in its stead, which could be incorporated into the campground trail.

8. Test the community drinking water to ensure that there is no septic tank seepage compromising public health.

9. Begin coordinating with the USFS and the Sandia Ranger Station to delineate areas targeted for grassland restoration. The project will increase forage for livestock and wildlife, provide firewood for the community, and reduce the risk of wildfire.

10. Establish a storage and distribution area, assuming the Chilili Grant decides to process its own wood products. One suggested location is a site near the school. As this area is a section of the grant closest to Albuquerque and other smaller cities and communities, it would be strategic for distribution.

11. Introduce utilization of goats for future restoration projects.

12. Coordinate water projects planned within the wilderness area with the Forest Service and the general public. Train work crews in this area according to established policies for wilderness areas.

APPENDIX E

GLOSSARY

GLOSSARY

Bark Beetle – An insect that bores through the bark of forest trees to eat the inner bark and lay its eggs.

Canopy – The more or less continuous cover of branches and foliage formed collectively by the crowns of adjacent trees.

Conifer – A tree that produces cones, such as a pine, spruce, or fir tree.

Crown – The part of a tree or other woody plant bearing live branches and foliage.

Crown Fire – A fire that advances through the crown fuel layer, normally in direct conjunction with a surface fire.

Density – The number of trees growing in a given area, usually expressed in terms of trees per acre.

Diameter at Breast Height (DBH) – Tree diameter, measured 4.5 feet above ground.

Direct Attack – A fire-fighting technique in which a line is constructed adjacent to the fire perimeter. Usually the preferred method, because of immediate access to escape routes and safety zones. Used when fire behavior, weather and fuel permit. Directly related to individual experience, escape routes and safety zones.

Ecosystem – A functional unit consisting of all the living organisms in a given area, and all of the non-living physical and chemical factors of their environment, linked together through nutrient cycling and energy flow. An ecosystem can be of any size, but it always functions as a whole unit.

Escape Route – A means to access a safety zone.

Extreme Fire Behavior – "Extreme" implies a level of fire behavior that ordinarily precludes methods of direct control. One or more of the following is usually involved: high rate of spread, prolific crowning and/or spotting, presence of fire whirls, strong convection column. Predictability is difficult because such fires often exercise some degree of influence on their environment and behave erratically, sometimes dangerously.

Fine Fuels – Fast-drying fuels, generally with a comparatively high surface area–to–volume ratio, which are less than 1/4 inch in diameter and have a time lag of one hour or less. These fuels ignite readily and are rapidly consumed by fire when dry.

Fire Behavior – How fire reacts to the influences of fuel, weather, and topography.

Fire Intensity – A general term relating to the heat energy released by a fire.

Fire Risk – The probability or chance of a fire starting, determined by the presence and activities of causative agents.

Fire Suppression (Fire Control) – All of the work and activities connected with fire-extinguishing operations, beginning with discovery and continuing until the fire is completely extinguished.

Forb – A plant with a soft rather than permanent woody stem, that is not a grass or grass-like plant.

Forest Health – The condition in which forest ecosystems sustain their complexity, diversity, resiliency, and productivity while providing for human needs and values.

Fuel – Combustible material that includes vegetation such as grass, leaves, ground litter, plants, shrubs, and trees. Includes living plants, dead, woody vegetative materials, and other vegetative materials that are capable of burning.

Fuel Break – A zone in which fuel quantity has been reduced or altered to provide a position for suppression forces to make a stand against wildfire. Fuel breaks are designated or constructed before the outbreak of a fire. Fuel breaks may consist of one or a combination of the following: natural barriers, constructed fuel breaks, man-made barriers.

Fuel Loadings – The oven dry weight of fuels in a given area, usually expressed in tons per acre. Fuel loadings may be referenced to fuel size or time lag categories; and may include surface fuels or total fuels. The amount of fuel present expressed quantitatively in terms of weight of fuel per unit area.

Fuel Reduction – Manipulation, including combustion or removal of fuels, to reduce the likelihood of ignition and/or lessen potential damage and resistance to control.

Geographic Information System (GIS) – Computer software that provides database and spatial analytic capabilities.

Hazard – In firefighting, a fuel complex, defined by kind, arrangement, volume, condition, and location, forming a special threat of ignition and resistance to control.

Initial Attack – An aggressive suppression action consistent with firefighter and public safety and values to be protected.

Ladder Fuels – Fuels that provide vertical continuity between strata, so that fire is able to move upward by convection from the surface fuels into the crowns with relative ease.

Live Fuels – Living plants, such as trees, grasses, and shrubs, in which the seasonal moisture content cycle is controlled largely by internal physiological mechanisms, rather than by external weather influences.

Native Species – Species that are indigenous to a region, not introduced or exotic.

Prescribed Fire – The intentional application of fire to wildland fuels in either their natural or modified state under conditions that will allow the fire to be confined to a predetermined area and at the same time to produce the intensity of heat and rate of spread required to further certain planned objectives (i.e., silviculture, wildlife management, etc.). Any fire ignited by management actions under certain, predetermined conditions to meet specific objectives related to hazardous fuels or habitat improvement. A written, approved prescribed fire plan must exist, and NEPA requirements must be met, prior to ignition.

Project – An organized effort to achieve an objective, identified by location, activities, outputs, effects, time period, and responsibilities for execution.

Riparian – A geographic area containing an aquatic ecosystem and adjacent upland areas that directly affect the ecosystem. Includes floodplains, woodlands, and all areas within a specified distance from the normal line of high water of a stream channel, or from the shoreline of a standing body of water.

Risk – The chance of a fire starting, as determined by the presence and activity of causative agents.

Safety Zone (SZ) – Areas that are fuel-free zones, thus incapable of burning. They afford a very high degree of firefighter safety from advancing wildfire. They can be natural or human-made fire-resistant areas such as lakes, dirt, gravel or asphalt parking lots, roads, and areas burned to secure line.

Suppression – The act of extinguishing or confining a fire.

Understory – The portion of vegetation that is underneath the dominant tree canopy.

Watershed – The drainage basin to a stream, lake, or river, contributing water, organic matter, dissolved nutrients, and sediments.

Wildland Fire – A non-structure fire, other than prescribed fire, that occurs in the wildland. Any fire originating from unplanned ignition.

Wildland Urban Interface (WUI) – Includes those areas of resident human population at imminent risk from wildfire, and human developments having special significance. These areas may include critical communications sites, municipal watershed, high-voltage transmission lines, observatories, church camps, scout camps, research facilities, and other structures that, if destroyed by fire, would result in hardships to communities. These areas encompass not only the sites themselves, but also the continuous slopes and fuels that lead directly to the sites, regardless of the distance involved.