CHAVES COUNTY
COMMUNITY WILDFIRE PROTECTION PLAN

Prepared for

CHAVES COUNTY
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List of Acronyms

°F	degrees Fahrenheit
BAER	Burned Area Emergency Rehabilitation
BLM	Bureau of Land Management
BNSF	Burlington Northern Santa Fe
BTU/ft/sec	British Thermal Units per feet, per second
CARs	Communities at Risk
CCCWPP	Chaves County Community Wildfire Protection Plan
CFRP	Collaborative Forest Restoration Program
ch/h	chains per hour
County	Chaves County
CVAR	Community Value at Risk
CWPP	Community Wildfire Protection Plan
EPA	U.S. Environmental Protection Agency
FD	fire department
FEMA	Federal Emergency Management Agency
FIREMON	Fire Effects Monitoring and Inventory System
FRCC	Fire Regime Condition Class
FRI	fire-return intervals
FSA	Farm Service Agency
GIS	geographic information system
gpm	gallons per minute
GPS	global positioning system
HFRA	Healthy Forests Restoration Act
HIZ	Home Ignition Zone
ICC	International Code Council
ISO	International Standards Organization
JPA	Joint Powers Agreement
MFI	mean fire interval
MOU	Memorandum of Agreement
NFP	National Fire Plan
NFPA	National Fire Protection Association
NIFC	National Interagency Fire Center
NMAC	New Mexico Association of Counties
NM-FPTF	New Mexico Fire Planning Task Force
NMSFD	New Mexico State Forestry Division
NRCS	Natural Resources Conservation Service
PNM	Public Service Company of New Mexico
RAW	remote automated weather
SAF	Society of American Foresters
SWCD	Soil and Water Conservation District
SWCA	SWCA Environmental Consultants
USDA	U.S. Department of Agriculture
USDI	U.S. Department of Interior

List of Acronyms, continued

USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
VFD	volunteer fire department
WUI	Wildland Urban Interface

Executive Summary

For millennia fire has been an integral process in the maintenance of grassland ecosystems, but with the growth of communities into the wildland urban interface, fire is increasingly seen as a threat to life and property. In recent years a number of large grass fires have destroyed homes throughout the Southwest, raising public awareness for the need to mitigate fire effects and plan for improving a community's resilience to this natural phenomenon.

This document has been developed to address wildfire threat to communities in Chaves County, New Mexico, and it provides recommendations to abate catastrophic wildfire and minimize its impacts to communities. Chaves County is a sparsely populated region that has a well-preserved, large-scale ranching background combined with agricultural-based communities. Although much of Chaves County's population has become fully aware of the prevalence of fire in these grassland ecosystems, the poorly perceived low risk of fire in grasslands makes some communities ill-equipped in the event of a large-scale fire event. The importance of public education and outreach in conjunction with recommended physical actions to reduce hazardous fuels are highlighted in this plan. A group of multi-jurisdictional agencies (federal, state, and local), organizations, and residents have joined together as a Core Team to develop this plan, the Chaves County Community Wildfire Protection Plan (CCCWPP).

The purpose of the CCCWPP is to assist in protecting human life and reducing property loss due to wildfire throughout Chaves County. The plan 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 2010 in response to the federal Healthy Forests Restoration Act (HFRA) of 2003.

The CCCWPP meets the requirements of the HFRA by:

1) Having been developed collaboratively by multiple agencies at the state and local levels 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.
5) Facilitating public information meetings to educate and involve the community to participate in and contribute to the development of the CCCWPP.

The planning process has served to identify many physical hazards throughout Chaves County that could increase the threat of wildfire to communities. The public also has helped to identify community values that it would most like to see protected. By incorporating public and Core Team input into the recommendations, treatments are tailored specifically for Chaves County to be sensitive to local agricultural and ranching practices. The CCCWPP emphasizes the importance of collaboration among multi-jurisdictional agencies in order to develop fuels mitigation treatment programs to address wildfire hazards. Chaves County has a committed team

of volunteer firefighters, who work arduously to protect the life and property of Chaves County citizens, but without homeowners taking on some of the responsibility of reducing fire hazards in and around their own homes, these resources are severely stretched. A combination of homeowner and community awareness, public education, and agency collaboration and treatments are necessary to fully reduce wildfire risk. It is important to stress that this document is an initial step in educating the public and treating areas of concern, and should serve as a tool in doing so. The CCCWPP should be treated as a *live document* to be updated approximately every two years. The plan should be revised to reflect changes, modifications, or new information that may contribute to an updated CCCWPP. These elements are essential to the success of mitigating wildfire risk throughout Chaves County and will be important in maintaining the ideas and priorities of the plan and the communities in the future.

1.0 INTRODUCTION

With increasing frequency, the national news media report tragic stories of communities impacted in the latest wave of severe wildfire. These fires are affecting not only forested landscapes but are becoming common events in grassland ecosystems across the Southwest. In order to mitigate fire impacts, communities in fire-prone environments need to have a plan to prepare for, reduce the risk of, and adapt to wildland fire events. Community Wildfire Protection Plans (CWPPs) help accomplish these goals. A CWPP provides recommendations that are intended to reduce, but not eliminate, the extreme severity or risk of wildland fire.

This CWPP, entitled the Chaves County CWPP (CCCWPP), is a countywide plan that evaluates wildfire threat to communities and infrastructure and identifies measures that homeowners, land managers, and fire departments can take to reduce the impact of wildfire to life, property, and other community values at risk (CVARs). The plan provides background information, a risk assessment, and recommendations. Section 1 provides an overview of CWPPs and describes Chaves County's (hereafter referred to as the County) need for a plan, Section 2 provides demographic and background information about the County, Section 3 gives an overview of the fire environment, Section 4 describes the methodology for the risk assessment and the results in detail, and Section 5 provides recommendations that incorporate action plans for reducing fuels, initiating public education and outreach, reducing structural ignitability, and improving fire response capabilities. The CCCWPP does not require implementation of any of the recommendations; however, these recommendations may be used as guidelines for the implementation process if funding opportunities become available. The recommendations for fuels reduction projects are general in nature, meaning site-specific planning that addresses location, access, land ownership, topography, soils, and fuels would need to be employed upon implementation. Also, it is important to note that the recommendations are specific to wildland urban interface (WUI) areas and are expected to reduce the loss of life and property. Recommendations for the restoration of ecosystems and the role that fire plays in ecosystems are distinct from recommendations for WUI areas and are not addressed in detail in this plan.

1.1 OVERVIEW OF COMMUNITY WILDFIRE PROTECTION PLANS

In response to a landmark fire season in 2000, the National Fire Plan (NFP) was established to develop a collaborative approach among various governmental agencies to actively respond to severe wildland fires and ensure sufficient firefighting capacity for the future. The NFP was followed by a report in 2001, entitled *A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment: A 10-year Comprehensive Strategy*, which was updated in 2002 to include an implementation plan. This plan was updated once more in 2006, with a similar focus on using a collaborative framework for restoring fire-adapted ecosystems, reducing hazardous fuels, mitigating risks to communities, providing economic benefits, and improving fire prevention and suppression strategies. The 2006 implementation plan also emphasizes information sharing and monitoring of accomplishments and forest conditions, a long-term commitment to maintaining the essential resources for implementation, a landscape-level vision for restoration of fire-adapted ecosystems, the importance of using fire as a management tool, and continued improvements to collaboration efforts (Western Governors' Association 2006). Progress reports and lessons learned reports for community fire prevention are provided annually (Western Governors' Association 2010).

In 2003 the U.S. Congress recognized widespread declining forest health by passing the Healthy Forests Restoration Act (HFRA), and President Bush signed the act into law (Public Law 108–148, 2003). The Act was revised in 2009 to address changes to funding and provide a renewed focus on wildfire mitigation (H.R.4233- Healthy Forest Restoration Amendments Act of 2009). The HFRA expedites the development and implementation of hazardous fuels reduction projects on federal land and emphasizes the need for federal agencies to work collaboratively with communities. A key component of the HFRA is the development of CWPPs, which facilitates the collaboration between federal agencies and communities in order to develop hazardous fuels reduction projects and place priority on treatment areas identified by communities in a CWPP. A CWPP also allows communities to establish their own definition of the WUI. In addition, communities with an established CWPP are given priority for funding of hazardous fuels reduction projects carried out in accordance with 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 (FEMA) 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 New Mexico State Forestry Division (NMSFD) has statutory responsibilities for cooperation with federal, state, and local agencies in the development of systems and methods for the prevention, control, suppression, and use of prescribed fires on rural lands and within rural communities on all non-federal and non-municipal lands in the state (New Mexico Statutes Annotated 1978, Section 68-2-8). As a result, NMSFD is involved in the CWPP planning process. The New Mexico Fire Planning Task Force (NM-FPTF) was created in 2003 by New Mexico legislature to identify the state's WUI areas, or Communities at Risk (CARs), that are most vulnerable to wildland fire danger. The NM-FPTF updates its CARs list annually, reviews completed CWPPs, and approves those that are compliant with the HFRA. The 2007 Communities at Risk Plan identifies 300 CARs, an increase from the previous year's estimate of 234 CARs (NMSFD 2007). Additionally, CARs identified in the annual plan are updated federally from the January 2001 Federal Register listing for CARs (NMSFD 2007).

New Mexico CWPPs are a mix of county- and city-level plans, and some CARs are represented in more than one plan. The NM-FPTF has adopted the International Code Council (ICC) WUI Code (NMSFD 2007) for identifying CARs and WUI areas.

1.2 NEED FOR CWPP

The County is rural, surrounded by shortgrass prairie grassland, agricultural land, and ranchland. The majority of the population lives in the municipal areas of Roswell, Dexter, Hagerman, and Lake Arthur, with scattered ranches and homes along the Pecos River valley and in the Sacramento Mountains along the Rio Peñasco. These communities are served solely by volunteer fire departments (VFDs) and emergency response staff. While the County does not exhibit the typical characteristics of communities that are highly prone to fire, such as steep slopes or dense timber, these grassland areas experience strong winds and are currently undergoing prolonged drought, making them extremely prone to high-severity wildland fire.

Grasslands have often been perceived as being at lower risk of wildland fire, particularly in relation to forested regions. Although fire services are well developed in the County, particularly when compared to surrounding counties, some communities are still poorly prepared for potentially large-scale fires. Sadly, catastrophic losses have occurred recently throughout southwestern grassland areas because communities have been ill-equipped to mitigate or respond effectively to fires. In December 2005, a devastating wildfire ripped through the town of Cross Plains, Texas, destroying 85 single family homes and 25 mobile homes, while killing 2 firefighters and 17 citizens. This town is not the mountain community packed in against dense forest stands and steep inaccessible terrain that people typically expect fires to overtake; Cross Plains is a community in the northern plains of Texas. This area is characterized predominantly by flat grassland and agricultural land use very similar to that found in Chaves County. Furthermore, structures were consumed not by the flaming front of the fire but by embers that burned after the main fire had passed, which ignited subsequent fires. The embers had passed through open vents, collected in unscreened foundations, or smoldered beneath wooden decks. This community, like several other communities scattered throughout the grasslands of the County, is as much at risk of wildland fire as its forested counterparts.

Fire is one of the most important ecological processes in grasslands and occurred naturally for millennia and, more recently, as a result of anthropogenic practices such as land clearing by Native Americans and early pioneers (Rickel 2005). Fires helped rejuvenate the land, recycling nutrients and increasing productivity. However, as grasslands became increasingly settled, many landowners feared fire damage and fire suppression became a dominant practice. This altered the natural fire frequency and fire regime of New Mexico's eastern grasslands; species composition shifted in many areas, and grass-dominated landscapes gave way to shrubs and trees (Rickel 2005). Over the last decade, fire rarely has been applied as a management tool, largely due to the prevalence of drought. Ranchers depend on spring rains to replenish grasses and grazing, and wildfire puts fodder production at risk. As a result fires continue to be suppressed in the County and throughout New Mexico.

The County is located in the southeast plains of New Mexico, where grasses are the predominant fuel type and flat and rolling topography facilitates high-speed wind events. Rainfall in the summer often leads to increased fuels, and drought experienced in the fall or winter leaves these fuels dry and prone to ignition. With continuous fuels and high winds, fire can spread rapidly.

Grassland fires can be difficult to maintain. They move quickly across the landscape due to the speed and fire behavior with which these light, flashy fuels burn. Many factors contribute to fires in grassland ecosystems, including:

- Annual and seasonal fluctuations in precipitation;
- Increased fuel loading resulting from set-aside programs and shifting land use practices;
- Expansion of roads and railroad through grassland areas, which provide sources of ignition;
- Growing WUI, which is encroaching into a fire-dependent ecosystem; and
- The number of animals carried on the land.

Grass fuel loads, even those associated with lawns and suburban landscapes, experience a vigorous growing season in the spring and summer, particularly if increased rainfall occurs. These urban fuel loads are subject to human activity, such as lawn maintenance in the home ignition zone (30 feet surrounding the house). The WUI zone is also at high risk because more sources of human ignition can be found there.

1.3 GOAL OF CWPP

A CWPP enables local communities to improve their wildfire mitigation capacity and work with government agencies to identify high fire risk areas and prioritize areas for mitigation, fire suppression, and emergency preparedness. The minimum requirements for a CWPP, as stated in the HFRA, are as follows:

1. **Collaboration:** Local and state government representatives, in consultation with federal agencies or other interested groups, must collaboratively develop a CWPP (Society of American Foresters [SAF] 2004).
2. **Prioritized Fuel Reduction:** A CWPP must identify and prioritize areas for hazardous fuels reduction and treatments; furthermore, the plan must recommend the types and methods of treatment that will protect at-risk communities and their essential infrastructures (SAF 2004).
3. **Treatments of Structural Ignitability:** A CWPP must recommend measures that communities and homeowners can take to reduce the ignitability of structures throughout the area addressed by the plan (SAF 2004).

The CCCWPP addresses all the requirements for completion of a CWPP outlined in the HFRA, paying special attention to the desires and needs of the communities and multiple jurisdictions throughout the planning area. Goals specific to this CWPP are listed below:

- Provide for public and firefighter safety at all times;
- Reduce the threat of wildland fire to communities in the WUI;
- Protect all CVARs of wildfire; and
- Move plant communities towards a more natural fire regime wherever possible and reduce the invasion of exotic species.

1.4 PLANNING PROCESS

The SAF, in collaboration with the National Association of Counties, the National Association of State Foresters, the Western Governors' Association, and the Communities Committee, developed a guide entitled *Preparing a Community Wildfire Protection Plan: A Handbook for Wildland-Urban Interface Communities* (SAF 2004) to provide communities with a clear process to use in developing a CWPP. The guide, which can be accessed at http://www.safnet.org/policyandpress/cwpphandbook.pdf, outlines eight steps for developing a CWPP and has followed in preparing the CCCWPP:

Step One: Convene Decision-makers. Form a Core Team made up of representatives from the appropriate local governments, local fire authorities, and state agencies responsible for forest management.

Step Two: Involve Federal Agencies. Identify and engage local representatives of the U.S. Forest Service (USFS) and the Bureau of Land Management (BLM). Contact and involve other land management agencies as appropriate.

Step Three: Engage Interested Parties. Contact and encourage active involvement in plan development from a broad range of interested organizations and stakeholders.

Step Four: Establish a Community Base Map. Work with partners to establish a base map(s) defining the community's WUI and showing inhabited areas at risk, wildland areas that contain critical human infrastructure, and wildland areas at risk for large-scale fire disturbance. (Please see Appendix A for a series of base maps that informed the final risk assessment.)

Step Five: Develop a Community Risk Assessment. Work with partners to develop a community risk assessment that considers fuel hazards; risk of wildfire occurrence; homes, businesses, and essential infrastructure at risk; other CVARs; and local preparedness capability. Rate the level of risk for each factor and incorporate this information into the base map as appropriate.

Step Six: Establish Community Priorities and Recommendations. Use the base map and community risk assessment to facilitate a collaborative community discussion that leads to the identification of local priorities for treating fuels, reducing structural ignitability, and other issues of interest, such as improving fire response capability. Clearly indicate whether priority projects are directly related to protection of communities and essential infrastructure or to reducing wildfire risks to other community values.

Step Seven: Develop an Action Plan and Assessment Strategy. Consider developing a detailed implementation strategy to accompany the CWPP, as well as a monitoring plan that will ensure its long-term success.

Step Eight: Finalize Community Wildfire Protection Plan. Finalize the CWPP and communicate the results to community and key partners.

1.5 CORE TEAM

The first step in the CWPP process was to bring together a broad group of stakeholders representing both agency and private interests to form a Core Team. An extensive distribution list (Appendix B) was developed to invite as many stakeholders to join the Core Team as possible. Private landowners were also invited through the public outreach process. The first Core Team meeting was held on February 17, 2010, a second meeting was held on April 16, 2010, and the final meeting is planned for May 17, 2010. Average attendance at Core Team meetings was approximately 12 people. SWCA Environmental Consultants (SWCA) also presented the CWPP planning process to the Chaves County Commissioners at their monthly meeting on February 18, 2010.

1.6 PROJECT AREA

This CWPP is a countywide plan, so the planning area boundary coincides with the County boundary (Figure 1.1).

1.7 PUBLIC INVOLVEMENT

Engaging interested parties is critical in the CWPP process; substantive input from the public will ensure that the final document reflects the highest priorities of the local community. A key element in the CWPP process is the meaningful discussions it generates among community members regarding their priorities for local fire protection and forest management (SAF 2004).

The public involvement process commenced with the release of the community survey, posted on the County webpage. Georgianna Hunt, the County's Fire Services Administrator, produced a press release and made a radio announcement on a local radio discussing the CWPP and the public outreach efforts. In addition, SWCA held a booth at the biannual Hagerman Old Timers Day event, which the Core Team agreed would be a good venue for reaching members of the public in the most at risk areas for wildfire. The event was publicized throughout the County, and attendance at the event was announced through flyers and the local media. At the event SWCA provided the draft risk assessment for public review and answered questions regarding the CWPP and fire prevention projects. SWCA also gathered public comments through the community survey. In addition to the Hagerman Old Timers Day outreach effort, SWCA also distributed surveys at a local feed store (Roswell Livestock and Farm Supply) frequented by members of the rural County population. Core Team members also distributed flyers and surveys throughout their jurisdictions. The public are encouraged to provide comments on the Draft CWPP, which will be posted on the County website (http://www.co.chaves.nm.us) and available for a 15-day public review period. (Public comments on the Draft CWPP will be provided in the Final CWPP in Appendix C.)

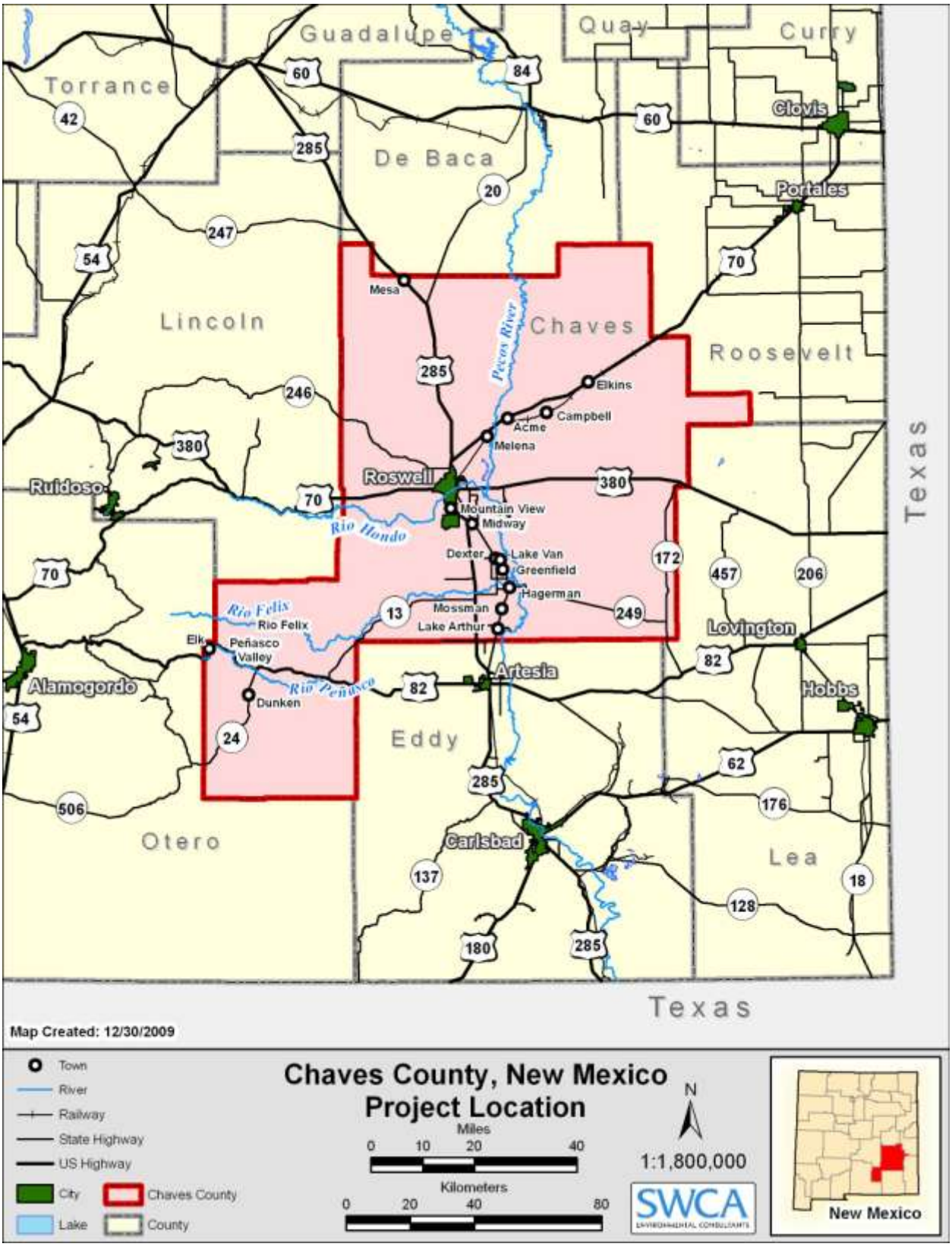


Figure 1.1. Project location map

2.0 CHAVES COUNTY BACKGROUND

2.1 LOCATION AND GEOGRAPHY

The County is in southeast New Mexico and was created by Territorial Legislature on February 25, 1889, out of land from Lincoln County. The County comprises an area of 6,071 square miles and is the fourth largest county in the state. The county seat is Roswell, situated in the center of the County. The Pecos River is the most prominent topographic feature of the County and is responsible for the fertile soils that support the extensive agriculture (Chaves County 2004). The surrounding area is made up of gently undulating hills, low mesas, and tributary canyons that drain into the Pecos River (Kemrer 1994).

The Pecos River valley provides irrigation for the surrounding area, so farming has long been a dominant component of the County's economy. A mosaic of land ownership exists throughout the County (Table 2.1) with the majority being private land and the remainder managed by the BLM, the State of New Mexico, the USFS, the Bureau of Reclamation, and the U.S. Department of Defense (Figure 2.1). The Pecos River bisects the County from north to south, and the majority of the population in the County live along the Pecos River valley. A prominent feature southeast of Roswell is Bottomless Lakes State Park, and northeast of Roswell is the Bitter Lake National Wildlife Refuge.

Table 2.1. Land Ownership

Land Ownership	Acres
BLM	1,239,932.17
State of New Mexico	1,019,652.71
Private	1,756,951.54
USFWS	24,216.78
USFS	23,556.05
Bureau of Reclamation	2,724.82
U.S. Department of Defense	492.88
Total	**4,043,310.17**

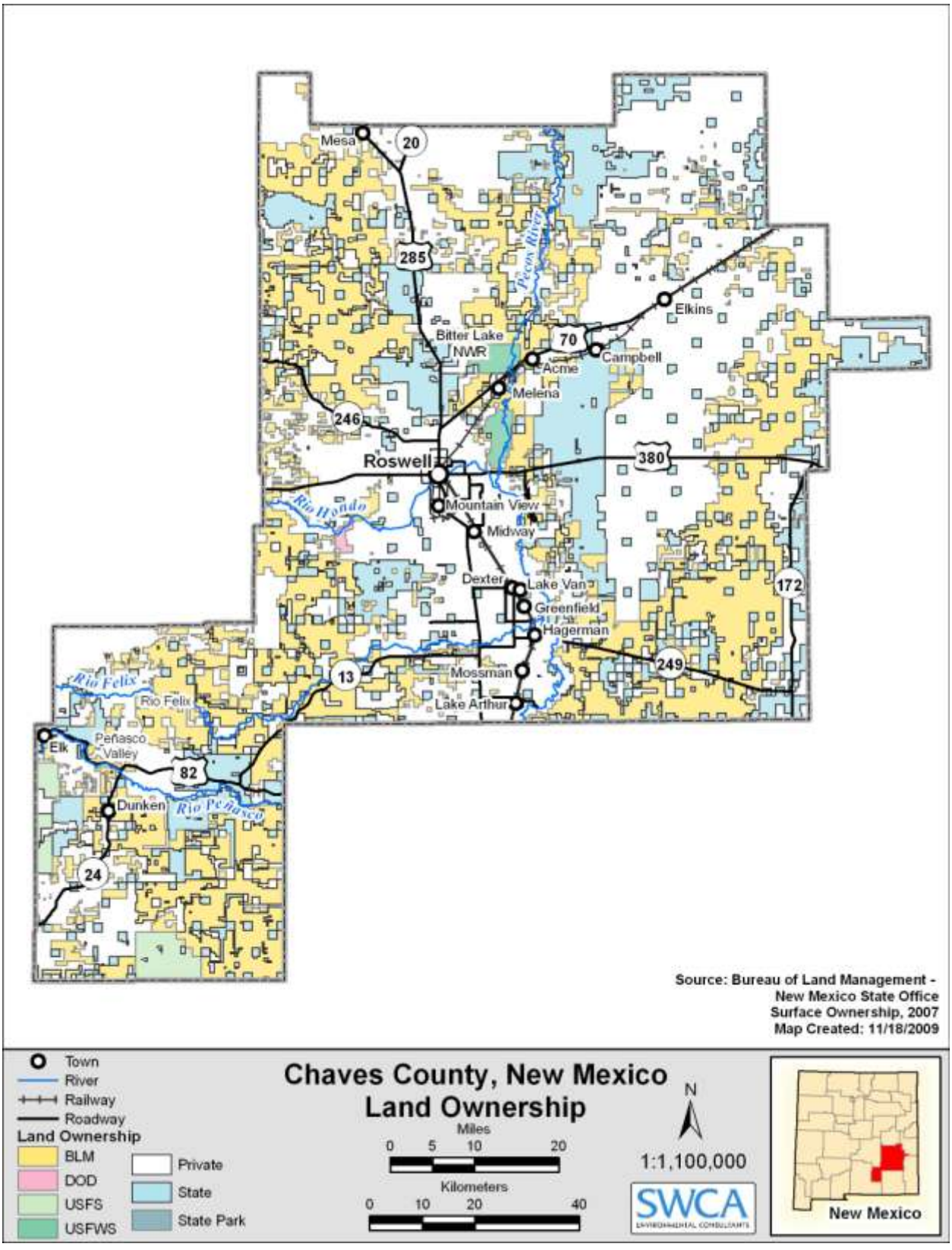


Figure 2.1. Chaves County land ownership.

2.2 POPULATION

The following population information is drawn primarily from the 2000 U.S. Census data (U.S. Census Bureau 2000). The 2000 Census lists the County's population as 61,382 people, 22,561 households, and 16,085 families. The population density is listed as 10 people per square mile. In 2000 the County had a median income of $28,513, and 73% of the County's population live within the county seat of Roswell, which has a population of 45,293 and a population density of 667.9 individuals per square mile. Roswell is a center for irrigation, farming, dairying, ranching, manufacturing, distribution, and petroleum production. Roswell is most popularly known for having its named attached to the 1947 Roswell UFO incident. Other smaller towns, all of which lie south of Roswell, include Dexter, with an area of 0.8 square mile and a population of 1,235; Hagerman with an area of 1.4 square miles and population of 1,168; and Lake Arthur, with an area of 0.6 square mile and a population of 432 (U.S. Census Bureau 2000). Other smaller localities include Dunken, Elk, Elkins, Greenfield, Mesa, and Midway.

Approximately 25,647 are housing units in the County (U.S. Census Bureau 2000), 80% of which are located within municipal boundaries—Roswell, Dexter, Hagerman, and Lake Arthur. In total, 5,298 homes are situated in unincorporated areas, which are of particular importance in terms of fire risk and the WUI. The majority of homes in the County are single-family detached dwelling units, accounting for 72.1% of all housing in the County (Chaves County 2004). Approximately 14% of homes are manufactured homes, which have particular implications in terms of structural ignitability.

The main local transportation corridors include U.S. 70, which runs from the northeast corner of the County to Roswell and west from Roswell; U.S. 285, which runs from the northwest corner to Roswell and south of Roswell; U.S. 380, which runs east to west through Roswell; and U.S. 82, which runs through the southern portion of the County. Large adjacent communities are Artesia and Carlsbad in neighboring Eddy County, Ruidoso in Lincoln County, Portales in Roosevelt County, and Alamogordo in Otero County.

The Burlington Northern Santa Fe (BNSF) Railway passes through Roswell and the other incorporated communities to the south. The Roswell International Air Center provides passenger and cargo air transportation and is on the south side of Roswell.

2.3 NEW MEXICO 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 southwestern portions of the state to 2,800 hours in the north-central portions. The frost-free season ranges from more than 200 days in the southern valleys to fewer than 80 days in the northern mountains, where some high mountain valleys have freezes in the summer months.

In New Mexico, July is generally the warmest month of the year, with average monthly maximum temperatures ranging from 90 degrees Fahrenheit (ºF) at lower elevations to 75ºF to 80ºF at higher elevations. A preponderance of clear skies and generally low relative humidity

permit rapid cooling after sundown, resulting in comfortable summer nights. Generally, January is the coldest month, with average daytime temperatures ranging from the mid-50s ºF to the mid-30s ºF. Minimum temperatures below freezing are common throughout the state, but subzero temperatures are rare outside high mountain habitats.

A wide variation in annual precipitation totals is characteristic of arid and semiarid climates. The climate of the Southwest shows strongly seasonal patterns both within and between years. Drought cycles are common and most annual precipitation comes in the course of a summer rainy season. Generally, July and August are the rainiest months of the year, contributing 30% to 40% of the state's annual precipitation. These rainfall events are often associated with brief but intense thunderstorms driven from unstable southeasterly air flows out of the Gulf of Mexico, as well as thunderstorms that develop from the west. Lightning fires are common during this period but are typically small due to the generous precipitation (Pyne 1982). Winter is the driest season in New Mexico; precipitation primarily results from 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.

Wind speeds across New Mexico are usually moderate. However, relatively strong and sometimes unpredictable winds can accompany frontal activity during the late winter and spring. Wind direction is typically from the southwest.

2.4 CHAVES COUNTY CLIMATE

According to Roswell climate records that span from 1920 to 2009, the County experiences a mild, semiarid climate with annual average maximum temperatures of 75.1°F and annual minimum temperatures of 46.6ºF (Western Regional Climate Center 2010). The highest temperatures are experienced from June through August and lowest temperatures from November through February (Figure 2.2). The average total annual precipitation is 12.84 inches, with an average annual snowfall of 11.4 inches. The majority of precipitation is received from June through September (Figure 2.3).

Like much of New Mexico, the County has been in a period of prolonged drought for the last few years (New Mexico Drought Task Force 2008). During such periods, wildfire disasters are more likely, and firefighting resources are placed under considerable strain.

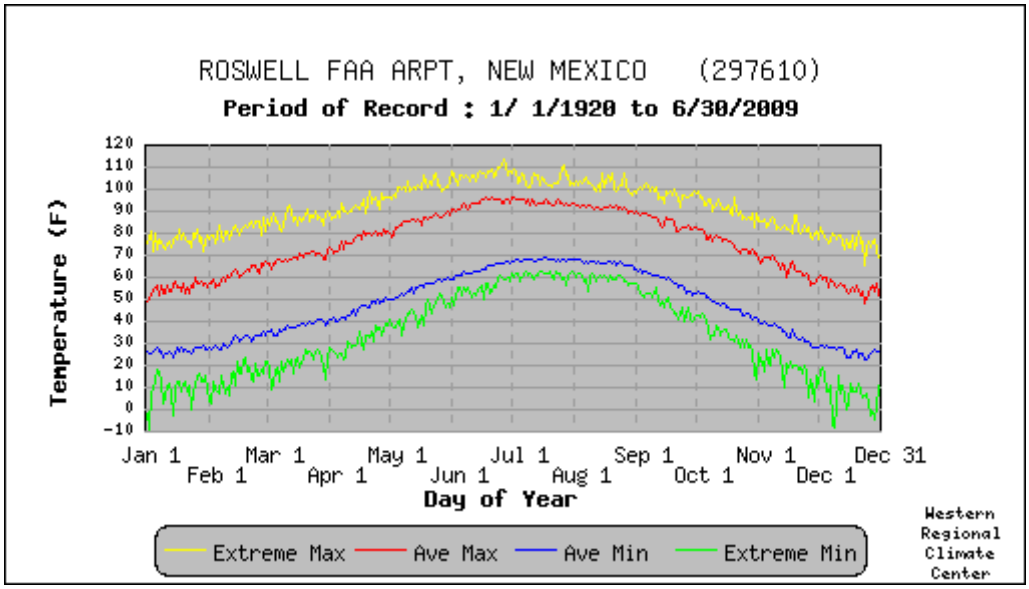


Figure 2.2. Daily temperature averages and extremes for Roswell Airport (Western Regional Climate Center Data, retrieved December 2009).

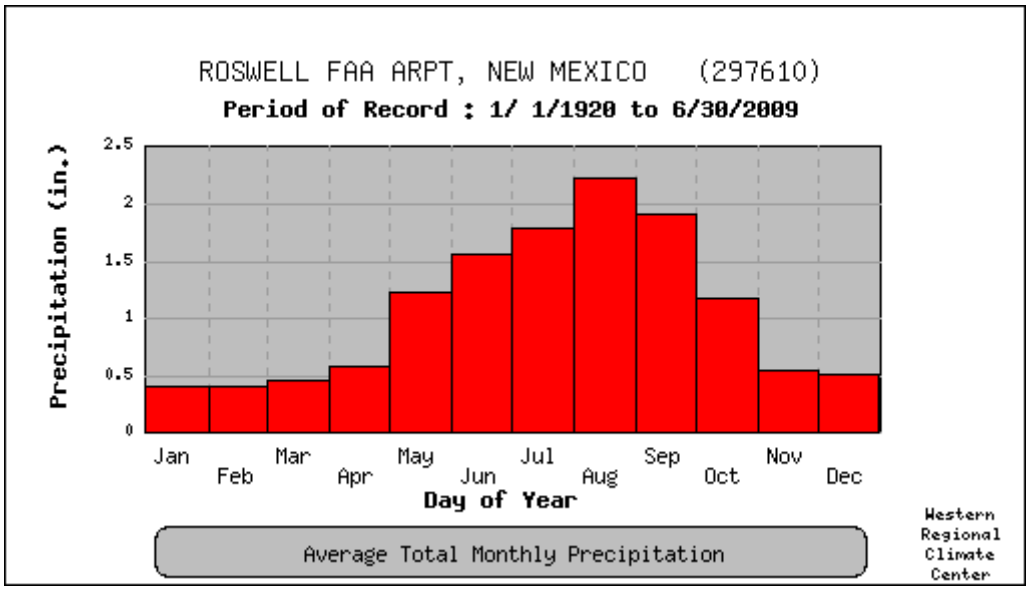


Figure 2.3. Monthly average total precipitation for Roswell Airport (Western Regional Climate Center Data, retrieved December 2009).

2.5 VEGETATION

Vegetation is variable across the County. The U.S. Environmental Protection Agency (EPA) classifies the County into four eco-regions (Griffith et al. 2006): the central zone is classified as Chihuahuan Desert, the periphery of the County as Southwest Tablelands, the eastern edge as High Plains, and the southwest tip as Arizona/New Mexico Mountains. The specific vegetation types associated with these regions are described by Dick-Peddie (1993). The central Chihuahuan Desert zone is further broken down into Desert Grasslands—which consist primarily of alkali sacaton (*Sporobolus airoides*), western wheatgrass (*Agropyron smithii*), blue grama (*Bouteloua gracilis*), and galleta grass (*Hilaria jamesii*)—and Chihuahuan Desert Scrub, which consists of creosotebush (*Larrea tridentata*) and mixed shrub series (Dick Peddie (1993). The High Plains region on the eastern edge of the County is classified as Plains-Mesa Sand Scrub, which is made up of species that are deep-sand tolerant or sand adapted (Dick-Peddie 1993). Sand sagebrush (*Artemisia filifolia*) is the dominant species in sand scrub communities in association with small soapweed (*Yucca glauca*), leadplant (*Amorpha canescens*), and shinnery oak (*Quercus havardii*). The periphery of the County, which is classified as Southwest Tablelands (Griffiths et al. 2006), is described by Dick-Peddie (1993) as Plains-Mesa Grassland, the most extensive grassland in the state. Blue grama is the most common species of this grassland type and is co-dominant with buffalograss (*Buchloe dachtyloides*). The southwest tip of the County moves into the Arizona-New Mexico Mountains region (Griffiths et al. 2006), which is principally juniper savanna, typically vegetation of widely scattered one-seed juniper (*Juniperus monosperma*) and a grass matrix of *Bouteloua* species (Dick-Peddie 1993).

In these plains-mesa grassland regions, the basic fine fuel is grass. The grasses, when not checked by fire, transition into desert succulents and woody species in some bottomland or lower elevation areas or are scattered across the plains. During drought years, grass fuels are reduced and give way to desert species that limit the transmission of fire. When rainfall replenishes the grassland, however, the fine fuel mass becomes more continuous across the landscape and risk of fire increases.

2.5.1 AGRICULTURE—CULTIVATED CROPS AND IRRIGATED AGRICULTURE

Dairy, with 86,000 milk cows, is the largest agricultural production of the County (Figure 2.4), raising over $272 million in income per year. The County is home to the world's largest mozzarella cheese factory and is also known for production of alfalfa, pecans, and chile (Chaves County Extension 2009). Fire occurrence within this land cover type is most typically human induced by agricultural burning and does not exhibit a typical fire behavior pattern.

Figure 2.4. Dairy production in Chaves County.

2.5.2 DEVELOPED

Developed land is situated around Roswell and down the south-central portion of the County. Developed is another generic vegetation type that describes human-made, developed areas and can include structures, parking lots, dirt lots, and roads. Although these areas are not typically described in a natural fire regime, the structures built there can be a receptive fuel, so developed areas are typically central to WUI areas of concern.

2.5.3 OTHER LAND COVER TYPES

Other land cover types are combined as a comprehensive category for vegetation types that exist within the County. This category accounts for 18 other land cover types that include riparian areas along streams, rivers, and lakes; other shrub- and herbaceous-dominated vegetation types; areas of introduced species; barren areas; and open water.

2.6 HISTORIC CONDITIONS AND PRESENT CHANGES IN FIRE-ADAPTED ECOSYSTEMS

During the past few centuries, humans have altered the fire-adapted ecosystem in the Southwest. Prior to 1900, periodic, low-intensity surface fires burned through much of the landscape. This process reduced fuel loads by removing dense brush cover and encroachments of small trees. Thus, in the past, these fire-adapted ecosystems were routinely renewed, which supported healthy ecosystems.

Many different vegetation communities have been converted from their historic conditions, and native grasslands cover the majority of the County. These ecosystems contain native bunch grasses, such as various grama species. Current conditions have been altered by past and

continuous intensive grazing, which has denuded native grasslands. In some areas native grasses exist in sparse, patchy stands and are encroached upon by mesquite trees. Prior to European settlement, fire ignited by various Native American groups and lightning-caused fires were common and removed encroaching shrubs, forbs, and trees and promoted vigorous grassland vegetation (Pyne 1982). Juniper savannas and piñon-juniper woodlands have also changed over time and have expanded above their historic range and densities as a result of livestock grazing, fire suppression, and climatic variation (Allen and Breshears 1998; Swetnam et al. 1999).

2.6.1 Non-native and Invasive Species

Fire-tolerant, flammable, non-native species now exist within cottonwood (*Populus* sp.) and willow (*Salix* sp.) stands along the Pecos River corridor. One species that deserves special mention with regard to wildfire is the non-native phreatophyte saltcedar (*Tamarix* sp.). This species, also referred to as tamarisk, is common along the Pecos River and occurs within the CCCWPP planning area. Programs to reduce saltcedar have already been implemented in the County, including the activities of the Non-Native Phreatophyte Management Program administered by Carlsbad Soil and Water Conservation District (SWCD). These efforts include aerial spraying or ground application on 3,718 acres in the County (Carlsbad SWCD 2008) and have had proven success. Additionally, 496.04 acres have undergone post-treatment restoration efforts carried out by the Carlsbad SWCD, which include extraction of treated saltcedar (Carlsbad SWCD 2009). These efforts should continue in the future to ensure the control of this invasive species (Figure 2.5).

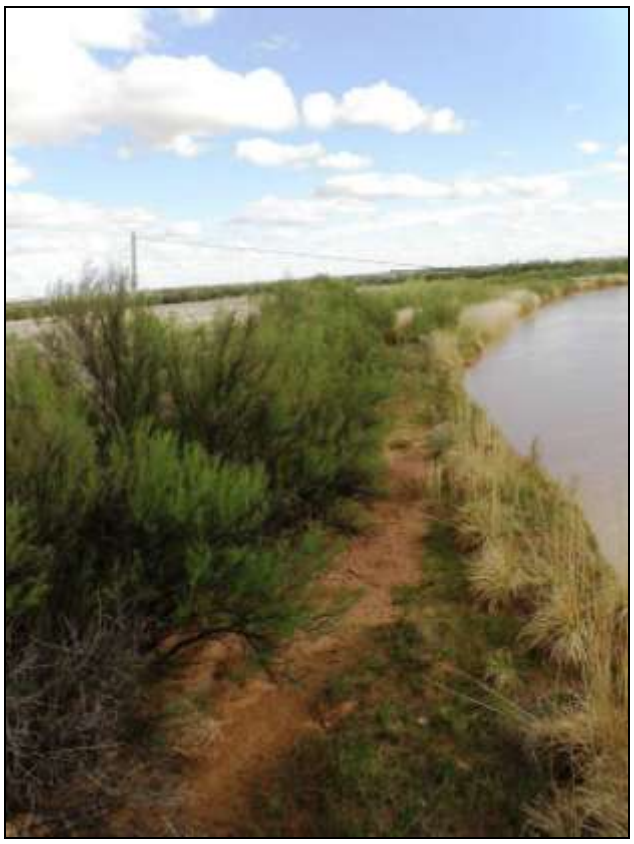


Figure 2.5. Saltcedar along the Pecos River.

Native cottonwood trees and willows are not fire adapted and thus are less capable of recovering from the effects of fire than non-native saltcedar and Russian olive (*Elaeagnus angustifolia*) (Stromberg et al. 2002). Extensive bosque fires could result in further shifts away from diverse mesic native plant communities to more xeric non-native woodlands and shrublands.

Once established, saltcedar can obtain water at deeper groundwater levels and has higher water-use efficiency than native riparian trees in both mature and post-fire communities (Busch and Smith 1993; Busch 1995). One of the major competitive advantages of saltcedar is its ability to sprout from the root crown following fire or other disturbances (e.g., flood, herbicides) that kill or severely injure aboveground portions of the plant (Brotherson and Winkel 1986; Brotherson and Field 1987; Smith et al. 1998). Saltcedar flammability increases with the buildup of dead and senescent woody material within the dense bases of the plant (Busch 1995). Saltcedar can also contribute to increased canopy density, which creates volatile fuel ladders and increases the likelihood of wildfire (Stuever et al. 1997). Other non-native species, such as Russian olive and Siberian elm (*Ulmus pumila*), also exist along the Pecos River and have created similar problems, although not as extensive, to those created by saltcedar.

Saltcedar and Russian olive are on the state list of noxious weeds for New Mexico (U.S. Department of Agriculture [USDA] 2010). For more information on noxious weeds, refer to USDA noxious species lists by state, which can be found at http://plants.usda.gov/.

2.7 HISTORY AND LAND USE

The following is taken from *Chaves County (Images of America)* by John Lemay (2009):

> In 1889, Roswell patriarch Capt. Joseph C. Lea, Pat Garrett (the former sheriff who shot Billy the Kid), and land developer Charles B. Eddy ventured to the territorial council and house in Santa Fe to petition for the creation of two new counties from the massive Lincoln County in southeastern New Mexico. The request was granted and Chaves County officially came into being on February 25, 1889. Today, 120 years later, Chaves County still thrives with a population of more than 60,000 people and is the dairy capital of the Southwest, producing around 1.7 billion pounds of milk annually.

The Pecos River valley has a long and diverse history. Human occupation is believed to date from the Late Pleistocene about 10,000 years ago, during the Paleoindian period (ca. 10,000–6000 B.C.). Most archaeologists believe that bands of mobile hunter-gatherers (Paleoindians) living during this time subsisted primarily on large game and Late Pleistocene megafauna, which was supported by the cooler, wetter environment of that era (Wase et al. 2003). Agriculture-based subsistence began in the Ceramic period (A.D. 600–1300). Mobility decreased and farming hamlets appeared, according to the archaeological record (Kemrer 1994). In A.D. 1600–1860, the Pecos River valley saw a transition from an aboriginal population to Euro-American occupation.

Spanish settlement began in the region around 1821 with Luis C. Chaves, who petitioned for a land grant on the Upper Pecos. A gradual settlement during the nineteenth century occurred as the Spanish crown encouraged colonization of its new lands with land grants and other inducements. Following the Mexican–American War in 1846 to 1848, Euro-American

occupation and use of the Pecos River valley intensified because of the political and military presence in the region.

Chaves and surrounding counties have a long history of cattle driving. Charlie Goodnight and Oliver Loving were two well-known Texan cattle traders who took advantage of the military installments along the Pecos River and began regular cattle drives from Fort Worth, Texas, north up the river, to Fort Sumner. Their trail, which eventually extended to Santa Fe and later to Pueblo and Denver, Colorado, became known as the Goodnight–Loving Trail. The County's ranching background (Figure 2.6) and rich heritage (Figure 2.7) illustrate the cultural importance of protecting such historic features from wildfire; this need for protection is recognized in the recommendations in this CWPP.

Figure 2.6. Chaves cattle and rangelands.

Figure 2.7. Historic Chaves County Courthouse (Courtesy of Epodunk).

Rangelands have been subjected to various environmental pressures and influences, both natural and unnatural, because of their large extent and cultural importance in New Mexico (Finch and Dahms 2004). Traditionally, the most common uses of fire in livestock management are to eradicate noxious weeds, convert brush to pastureland, and retard the encroachment of woody species (Allen 1996). Once established, pasturelands tend to experience a gradual reduction in the use of broadcast burning in favor of mechanical and chemical vegetation management, and lands become stocked with agricultural crops, including species that are neither native nor fire adapted. Much of the eastern plains have therefore undergone widespread cover type conversion. However, with more intensive management and expansion of urban areas, fire has begun to disappear from ranching lands. Roads and development have broken up the continuity of the grassland fuels into a new mosaic. Heavy demand on grasses through grazing may have acted to reduce grassland fuel loads in many areas to a point where fire may be difficult to propagate. Similarly, urban lots and cultivated lawns may have reduced fuel loads, making some people feel that fire is not a risk to them. Rural declining population has meant that some areas have been taken out of production, which could provide increased fuel loads that threaten communities.

In the 1940s the U.S. Government established Walker Air Force Base in Roswell, which led to a rapid growth rate in the County. Walker Air Force Base closed in 1967 and caused rapid depopulation of its surrounding areas. Over the last few decades, the oil and gas industry has made a significant contribution to the County's economy, and the high quality of the County's alfalfa has attracted the state's largest dairy industry. As such, the County has once again seen an increase in population since the 1967 decline (Chaves County 2004). Furthermore, the Chaves County Comprehensive Plan (Chaves County 2004) emphasizes the importance of protecting the County's agricultural base and ranching culture.

3.0 FIRE ENVIRONMENT

3.1 WILDLAND URBAN INTERFACE

The WUI is composed of both interface and intermix communities and is defined as areas where human habitation and development meet or intermix with wildland fuels (U.S. Department of the Interior [USDI] and USDA 2001:752–753). Interface areas include housing developments that meet or are in the vicinity of continuous vegetation and consist of less than 50% vegetation. Intermix areas are those areas where structures are scattered throughout a wildland area of greater than 50% continuous vegetation and fuels and meet or exceed a minimum of one house per 40 acres. Depending on the surrounding fuel conditions, topography, and present structures, wildland areas of up to 1.5 miles from structures may be included in the WUI (Stewart et al. 2007).

The WUI creates an environment in which fire can move readily between structural and vegetative fuels, increasing the potential for wildland fire ignitions and the corresponding potential loss of life and property. Human encroachment upon wildland ecosystems within recent decades is increasing the extent of the WUI and is therefore having a significant influence on wildland fire management practices (Figure 3.1). Combined with the collective effects of past fire management policies, resource management practices, land use patterns, climate change, and insect and disease infestations, the expansion of the WUI into areas with high fire risk has created an urgent need to modify fire management practices and policies and to understand and manage fire risk effectively in the WUI (Pyne 2001; Stephens and Ruth 2005). Mitigation techniques for fuels and fire management have been strategically planned and implemented in WUI areas and have proven effective; however, it is important to note that all WUI mitigation focus areas will be different and should be planned for accordingly.

A CWPP offers the opportunity for collaboration of land managers to establish a definition and a boundary for the local WUI; to better understand the unique resources, fuels, topography, and climatic and structural characteristics of the area; and to prioritize and plan fuels treatments to mitigate for fire risks. At least 50% of all funds appropriated for projects under the HFRA must be used within the WUI area.

The Core Team has decided to delineate the WUI as an area 1 mile from the edge of an at-risk community. Because of the rural nature of the County, at-risk communities are in turn defined as all communities on the edge of urban areas. Much of this land encompasses agricultural lands with scattered homes. The WUI boundary has been therefore delineated as a 1-mile buffer extending from either the edge of urban-classified lands and/or 1 mile extending from the edge of agricultural lands. A 0.5-mile buffer is also delineated either side of all major roads. This would act as a fuel break from ignitions on the highways, as well as protection so that roads may serve as escape routes in the event of a wildfire (Figure 3.2).

Figure 3.1. Typical WUI in Chaves County.

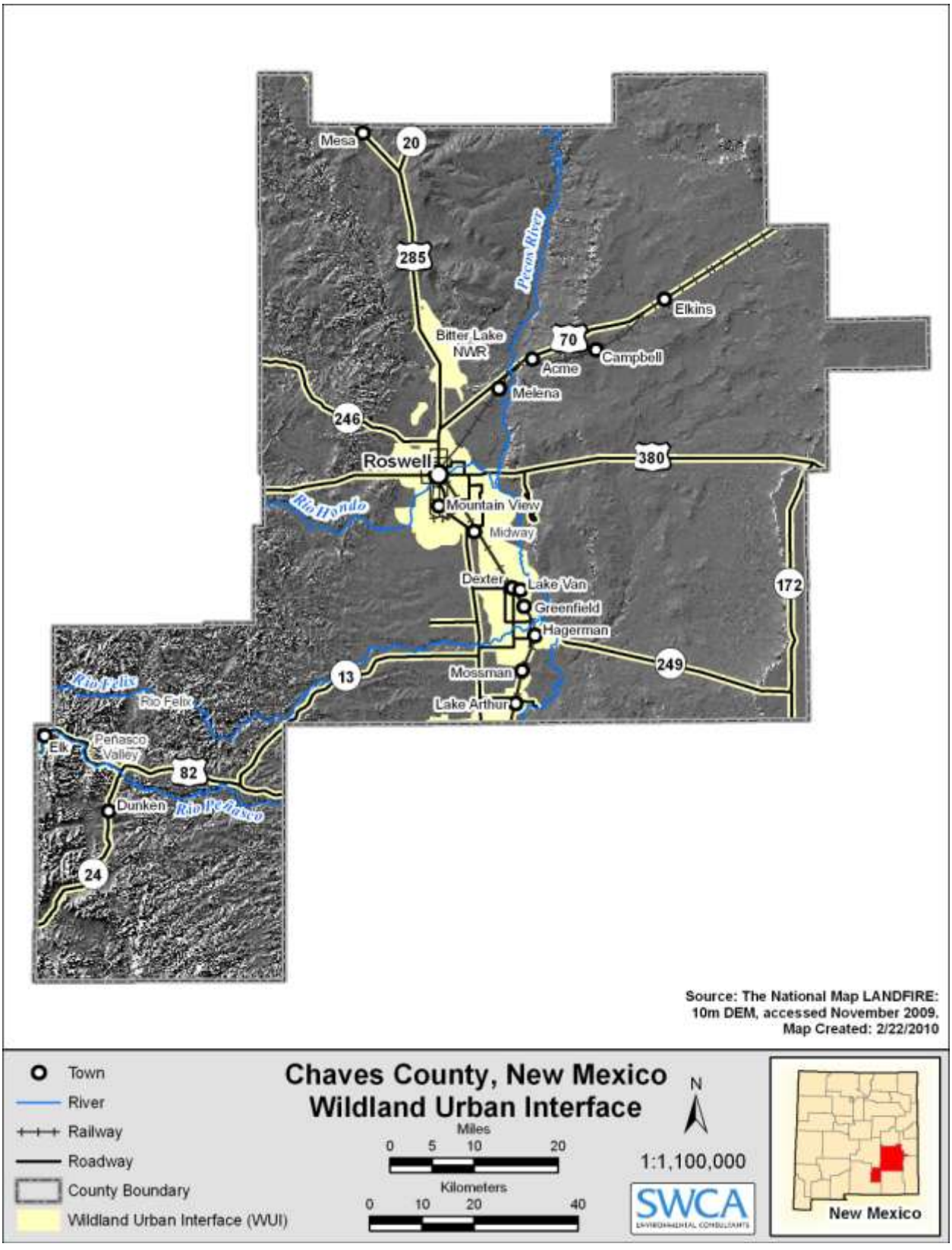


Figure 3.2. Chaves County WUI.

3.2 FIRE HISTORY

Most fire suppression experts believe that the threat of massive damage to human lives, private property, and natural resources is increasing throughout North America (National Fire Protection Association 1987; Arno et al. 2000). Wildland fires have become a major concern throughout New Mexico in recent decades for a number of reasons: 1) human activity patterns have changed the landscapes over the past three decades, 2) natural resources are now highly valued and protected against widespread wildfire, 3) national wildland firefighting budgets are shrinking, 4) more people are escaping the cities into the wildlands, 5) many rural areas are dependent on VFDs that have insufficient funds and resources to fight large conflagrations, and 6) climatic conditions such as drought can be like a match to volatile fuels.

3.2.1 PAST FIRE MANAGEMENT POLICIES AND LAND MANAGEMENT ACTIONS

Prior to European settlement throughout the West in the 1800s, lightning- and human-ignited fires burned more frequently and less intensely. After that time, a dramatic increase in livestock grazing, fire suppression, and other human-related activities tended to alter the landscape and the associated fire regimes. Some species of non-native vegetation were also introduced during that time period and eventually invaded many native landscapes across the West, altering natural fire-disturbance processes.

Beginning in the early 1900s, the policy for handling wildland fire, initiated by the USFS, leaned heavily toward suppression. Over the years, other agencies, such as the BLM, the Bureau of Indian Affairs, and the National Park Service, followed the lead of the USFS and adopted fire suppression as the accepted means for protecting the nation from wildfire. As a result, many areas now have excessive fuel buildups, dense and continuous vegetative cover, and tree and shrub encroachment upon open grasslands. This impacts local ranchers by reducing effective area for fodder and raises fire risk by increasing woody fuels. Grassland communities are usually influenced by seasonality and frequency of fire due to their evolutionary adaptations to particular habitat features and conditions (Ford and Johnson 2006). The fuels of semiarid grassland may support high rates of fire spread when cured (Rothermel 1983) or may conversely be too discontinuous or actively growing to carry a fire (Andrews 1986).

3.2.2 HISTORICAL FIRE REGIMES AND PRESENT CHANGES

Fire occurrence and behavior in the West have changed dramatically within the past several decades. Historically, frequent low-intensity surface fires burned throughout many areas within the County, creating a mosaic of different stages of vegetative structure across the landscape. For the most part, these fires helped to maintain an open vegetative community structure by consuming fuels on the ground surface, which maintained open grasslands, and by clearing them of encroaching vegetation.

Grasslands

Historic fire regimes in grasslands are not well understood, and obtaining historic fire samples within these habitat types is difficult. Many authors have suggested that the mean fire-return intervals (FRI) (the arithmetic average of all fire frequencies for a specific study site) for grasslands throughout the seventeenth to early nineteenth centuries are thought to have been every five to 10 years (Leopold 1924; Swetnam et al. 1992; McPherson 1995). Fire suppression

policies may have contributed to declining fire frequency in this cover type, but other interacting factors also contribute. It is thought that about the time of the Civil War, intensive livestock grazing was responsible for a decline in grassland fires (West 1984). Heavy grazing reduced the fuel available to propagate fire spread and also reduced competition with herbaceous plants, tipping the balance in favor of the woody species. Woodland encroachment, increased tree density, and altered fire behavior characterize many former grasslands of the Southwest. Frequent fire plays a significant role in grassland nutrient cycling and successional processes, and long-term exclusion may produce irreversible changes in ecosystem structure and function (McPherson 1995).

Shrublands

Piñon-juniper savannas are found in some western portions of the planning area and are associated with deep soils. Most of the precipitation occurs during the summer monsoon season. Juniper savanna, the most common savanna in New Mexico, consists of widely scattered trees in a grass matrix (Dick-Peddie 1993). Similar to grasslands, the range of savannas has decreased as tree density has increased, but the mechanisms for the tree expansion are complex and the subject of current research. There is significant scientific debate currently over the natural FRI for savannas, but most experts agree that fire was more frequent in savannas than in modern times.

Riparian Areas

Although most of the County exhibits decreased occurrence of wildland fires compared to historical conditions, some areas within the County are actually experiencing an increase in fire occurrence and severity. Riparian ecosystems along the Pecos River were historically shaped by natural hydrologic regimes. Native riparian vegetation is not adapted to fire, and fires did not typically occur within this ecological zone. As a result, fire can actually influence the composition and structure of riparian ecosystems (Ellis 2001). The ecology of this habitat type has changed significantly over time, as fire-adapted invasive species such as saltcedar and Russian olive have invaded many areas. Once saltcedar has been established at a location, it increases the likelihood that the riparian area will burn and, as a result, alter the natural disturbance regime. Saltcedar and Russian olive both sprout readily after fire, and although cottonwood will also regenerate after fire, it typically has limited survival of resprouting individuals. Studies have found that the density of saltcedar foliage is higher at burned sites than unburned sites within riparian areas (Smith et al. 2006).

3.2.3 Recent Fire Occurrence in the Chaves CWPP Planning Area

Ignition Sources in Chaves County

While the majority of fires in the County are less than 1 acre, just over half of the fires in the County are caused by human ignitions (BLM 2010), and the remainder is lightning caused. Human starts are often associated with roadside equipment or agricultural ditch or field burning. Lightning is common throughout monsoon season, which typically takes place from April through August. Most of these fires are detected early and suppressed before they gain acreage; however, given the right conditions, these fires may grow large and become difficult to suppress. Human ignitions are starting to increase, particularly in the WUI, with the development and improvement of roads, railroads, residences, and recreational opportunities into wildland areas.

Hay barn fires are also common in the County due to the large number of dairy operations and large volumes of hay stored for cattle feed. These fires gain size rapidly and have proven difficult and costly to suppress.

Recent Fire History

Wildfires can occur throughout the year and are typically suppressed before they gain any acreage. NMSFD records document 1,066 fires in the County from 1981 to 2009. Most of these fires are quickly contained and are less than 100 acres in size (See Appendix A, Map 2). Within that period however, 131 wildfires grew to greater than 100 acres in size (Figure 3.3).

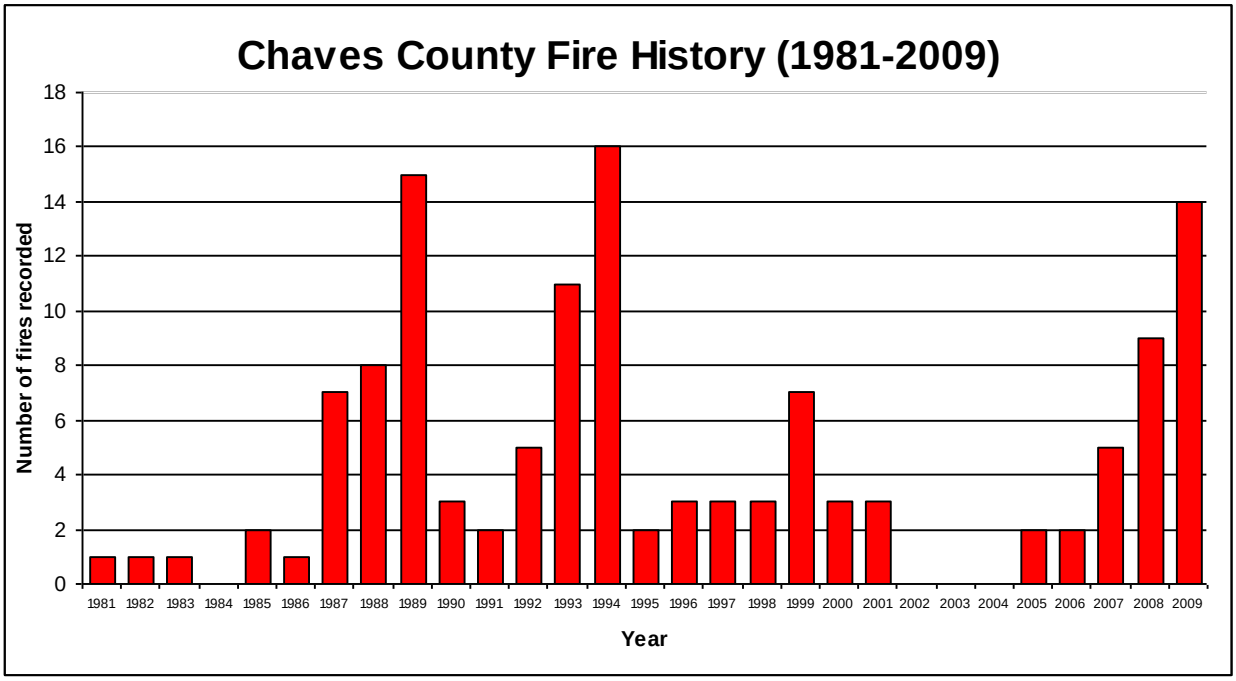


Figure 3.3. Graph shows 131 fires in Chaves County that grew to greater than 100 acres. The period of record was 1981–2009 *Note: fires <100 acres are not represented.*

From the period of record available (1981-2009) it is clear that peak fire years occurred in 1989, 1993, 1994, 1999, 2008, and 2009 (Figure 3.3). According to climate summaries (Western Regional Climate Center 2010), these years experienced lower than average precipitation and higher than average temperatures. Wildfires are now possible in any season; however, the months of March and June have the highest occurrence (BLM 2010). The onset of the summer monsoons limits fire numbers in August and September.

Between 1981 and 2009 there were 40 fires recorded that grew to over 1,000 acres (Table 3.1). These were split between human and lightning caused. With all the data, it is possible that not all fires were reported to NMSFD and are therefore not included in this record.

Table 3.1. Large Fires (>1,000 acres) Reported to NMSFD within Chaves County. Period of record is 1981–2009.

Incident Name	Acres Burned	Cause	Cover Type	Year
Plainsman	1,080	Human	Grass	1985
Well	1,355	Human	Grass	1987
Felix	2,300	Human	Grass	1987
Campbell	1,160	Human	Grass	1988
McIntyre	1,920	Human	Grass	1988
Moore	1,300	Lightning	Grass	1988
Caprock	12,000	Human	Grass	1989
Hagerman	2,000	Human	Grass	1989
Lecanon	1,500	Lightning	Grass	1989
Partner	2,040	Lightning	Grass	1989
Hagerman	2,300	Lightning	Grass	1990
Salt	1,280	Human	Grass	1993
Lavade	3,500	Lightning	Grass	1993
Meredith	1,400	Lightning	Grass	1993
Cotton II	3,641	Human	Grass	1994
Shearing	3,255	Lightning	Grass	1994
Draper	1,480	Lightning	Grass	1994
House	1,200	Lightning	Grass	1994
Crosby	2,000	Lightning	Grass	1994
Hazel	1,000	Lightning	Grass	1994
Eppers	5,847	Lightning	Grass	1994
Hernandez	2,500	Not disclosed	Grass	1995
Breezy	1,000	Lightning	Grass	1995
Garcia Flat	1,636	Not disclosed	Grass	1998
Garcia Flat	1,075	Not disclosed	Grass	1999
El Paso	2,733.6	Not disclosed	Grass	1999
Cherry Cyn	2,397	Not disclosed	Grass	1999
Sandhill	1,522	Human	Grass	2000
Yellowlake	1,948	Not disclosed	Grass	2000
Little Eagle	4,693	Not disclosed	Grass	2001
Eppers	1,400	Lightning	Grass	2006
Old Chisum	1,500	Human	Grass	2007
Silverweed	1,923	Human	Grass	2007
Ponderosa	3,420	Human	Grass	2008
Choctaw	1,500	Human	Grass	2008
West	1,437	Lightning	Grass	2008
Picacho	16,141	Human	Grass	2009
Four Mile	29,952	Lightning	Grass	2009
Cato	55,080	Lightning	Grass	2009
Star Grass	1,036	Lightning	Grass	2009

3.3 CHALLENGES FOR FUTURE RESTORATION EFFORTS

In the past few years, fires have grown to record sizes and are burning earlier, longer, hotter, and more intensely than they have in the past (Westerling et al. 2006). According to the National Interagency Fire Center (NIFC), occurrence of catastrophic wildfires has greatly increased over the last 20 years. Westerling et al. (2006) claim that a study of large (>1,000 acres) wildfires throughout the western United States for the period 1970 to 2003 saw a pronounced increase in frequency of fire since the mid-1980s (1987–2003 fires were four times more frequent than the 1970–1986 average). The length of the fire season was also observed to increase by 78 days, comparing 1970–1986 to 1987–2003. Within just the last 10 years, a record number of acreages have burned, and numbers are continually getting larger (NIFC 2010).

Changes in relative humidity are blamed for many of these conditions, as increased drying over much of the Southwest has led to an increase in days with high fire danger (Brown et al. 2004). Advanced computer models are now making national-scale simulations of ecosystems, providing predictions of how fire regimes will change in the twenty-first century (Neilson 2004). Western grasslands are predicted to undergo increased woody expansion of piñon-juniper associated with increased precipitation during typical wet seasons. Summer months are predicted to be hotter and longer contributing to increased fire risk (Neilson 2004). Under greater climatic extremes widely predicted throughout the United States, fire behavior is expected to become more erratic, with larger flame lengths, increased torching and crowning, and more rapid runs and blowups associated with extremely dry conditions (Brown et al. 2004).

Although fire suppression is still aggressively practiced, fire management techniques are continually adapting and improving. Due to scattered human developments (homes, ranches, and farms) and values (residential and commercial structures, historic and natural values) throughout the WUI, suppression will always have to be a priority. However, combining prescribed fire and managing wildland fire for resource benefit with effective fuels management and restoration techniques have been proven to help re-establish natural fire regimes and reduce the potential for catastrophic wildfires on public lands. The use of prescribed fire on private land is a decision to be made by the rancher, and it is acknowledged that given the prevailing drought such a management technique may not be feasible in the County.

3.4 FIRE REGIMES AND FIRE REGIME CONDITION CLASSES

Methods to assess the condition of wildland areas have been developed to help classify, prioritize, and plan for fuels treatments across a fire management region.

3.4.1 FIRE REGIMES

A natural fire regime, or historic fire regime, is a general classification of the role fire would play throughout a landscape in the absence of modern human intervention, including the influence of aboriginal burning (Agee 1993; Brown 1995). Natural fire regime reference conditions have been developed for vegetation fuel class composition, fire frequency, and fire severity for the biophysical settings at a landscape level for the Southwest and most other parts of the United States (Hann et al. 2003).

The following five fire regime classifications are based on average number of years between fires (fire frequency or mean fire interval [MFI]), combined with the severity (amount of vegetation replacement) of the fire and its effect on the dominant overstory vegetation (Hann et al. 2003):

I 0–35 year frequency and low (mostly surface fires) to mixed severity (less than 75% of the dominant overstory vegetation is replaced).

II 0–35 year frequency and high severity (more than 75% of the dominant overstory vegetation is replaced).

III 35–200 or more year fire frequency and mixed severity (less than 75% of the dominant overstory vegetation is replaced).

IV 35–200 or more year fire frequency and high severity (more than 75% of the dominant overstory vegetation is replaced).

V 200 or more per year frequency and high severity (more than 75% of the dominant overstory vegetation is replaced).

3.4.2 Fire Regime Condition Class

The Fire Regime Condition Class (FRCC) is a measure of the degree of departure from reference conditions, possibly resulting in changes to key ecosystem components such as vegetation characteristics (species composition, structural stage, stand age, canopy closure, and mosaic pattern); fuel composition; fire frequency, severity, and pattern; and other associated disturbances, such as insect and disease mortality, grazing, and drought (Hann et al. 2003).

The three FRCC rankings are as follows:

FRCC 1 No or low departure from the central tendency of the reference conditions.

FRCC 2 Moderate departure from the central tendency of the reference conditions.

FRCC 3 High departure from the central tendency of the reference conditions.

3.4.3 Fire Regime and Condition Classifications in Chaves County

Grasslands and shrublands within the planning area typically have an FRCC of 2 or 3 for the majority of the area (see Appendix A, Map 3, for an FRCC classification map of the County). The historical fire regime in the County (prior to 1860) was of frequent moderate intensity grass fires, with fire return intervals of 0 to 35 years (BLM 2010). Fire suppression has resulted in the deviation from this natural regime.

3.5 Fire Management Policy

The primary responsibility for WUI fire prevention and protection lies with property owners and state and local governments. Property owners must comply with existing state statutes and local regulations. These primary responsibilities should be carried out in partnership with the federal government and private sector areas. The current Federal Fire Policy states that protection priorities are 1) life, 2) property, and 3) natural resources. These priorities often limit flexibility in the decision-making process, especially when a wildland fire occurs within the WUI.

Wildland fire suppression resources must be diverted to protect property, often of less value, when adjacent to intermixed natural resources.

There are many existing Joint Power Agreements (JPAs) and Memorandums of Understanding (MOUs) between the federal, state, and county agencies with jurisdictions within the County. The "Joint Powers Agreement between the Energy, Minerals and Natural Resources Department, Forestry Division and the United States Departments of Agriculture, Energy and Interior for Interagency Wildland Fire Protection" is an agreement between the federal wildland fire management agencies and NMSFD to coordinate wildland fire management activities (State of New Mexico 2003). Under this JPA, New Mexico is divided into initial response areas in which one agency assumes responsibility for initiating response efforts regardless of ownership. This provides equitable exchange of workload and employs the "closest forces" concept for fire suppression (BLM 2010). The BLM Roswell Field Office has an existing MOU with Bitter Lake National Wildlife Refuge to provide fire personnel and equipment across agency boundaries to assist in wildfire management activities.

Each agency has its own fire management policies and protocols. The reader should refer to the individual agency Fire Management Plans or equivalent documents for specific details regarding agency fire management.

3.6 FIRE RESPONSE CAPABILITIES

In areas of dense rural residential settlement, residential structures can add to the grassland fuel load available to a wildfire, increasing its size and magnitude. Many rural residents are ill-equipped to mitigate the effects of a wildland fire and instead rely on fire organizations such as VFDs for fire protection. Chaves County has eight VFDs that consist of 15 individual fire stations (Table 3.2). In addition, the County had four municipal fire departments: Roswell, Dexter, Hagerman, and Lake Arthur. Table 3.2 below includes International Standards Organization (ISO) ratings. ISO collects information on municipal fire protection efforts in communities throughout the United States. In each of those communities, ISO analyzes the relevant data using a Fire Suppression Rating Schedule. Communities are then assigned Public Protection Classifications from 1 to 10. Class 1 represents exemplary public protection, and Class 10 indicates that the area's fire suppression program does not meet ISO's minimum criteria (ISO 2010). Many of the departments in the County have been successful in lowering their ISO ratings through investing in new equipment, training, or resources like water storage.

The County is also served by a variety of federal fire fighting agencies including BLM, USFWS and USFS.

Appendix D provides a list of firefighting resources for the County fire departments.

Table 3.2. Chaves County Firefighting Resources

Fire Department	Serves	Number of Firefighters	Number of Stations	(ISO) Rating
Berrendo	Central, northwest of Roswell	23	3	6/9
District 8	Central, south of Roswell	20	1	6/9
Dunken	South Chaves County	23	1	7
East Grand Plains	East of Roswell	22	2	6/8b
Midway	South of Roswell	20	2	–
Peñasco	Peñasco Valley	22	2	9
Rio Felix	West Chaves County	8	1	9
Sierra	Central	21	3	7/9

3.7 INTERNATIONAL URBAN-WILDLAND INTERFACE CODE OF THE INTERNATIONAL CODE COUNCIL

The County has the ability to adopt the International Urban-Wildland Interface Code to carry out enforcement of building regulations that would better meet structural ignitability standards and fire safety standards in the WUI. It is recommended that the County government learn more about the code and its potential application for planning in the WUI. A copy of the code may be obtained from http://www.iccsafe.org.

3.8 FEDERAL TREATMENTS

Table 3.3 lists federal treatments planned on BLM and USFWS lands within the County over the next year. All fuel treatments on federal lands must assess the impacts on Threatened and Endangered (T&E) Species. Table 3.4 lists the T&E Species that could occur in the County.

Table 3.3. BLM and USFWS planned Fuel Treatments in Chaves County 2010-2011

FY	Landownership	Projects	WUI?	Acres	Type Name	Latitude	Longitude
2010	BLM	Theobold/Lynch	No	350	Chem/Machine Pile Burn	33.6341	-104.3596
2010	BLM	Garcia Flats	Yes	180	Chem/Machine Pile Burn	33.6269	-104.4475
2010	BLM	North Malena	No	300	Chemical	33.5186	-104.3875
2010	BLM	Cooper	No	364	Chemical	33.8077	-104.2951
2010	BLM	Cliet	No	120	Chemical	33.5278	-104.4525
2011	USFWS	Middle Tract	Yes	400	Wetlands prescribed burn	-	-
2011	USFWS	Piles and Debris	Yes	50	Pile burning	-	-
2011	USFWS	South Tract	Yes	200	Farm burn	-	-
2010-11	USFWS	Refuge	Yes	1875	Salt cedar removal-mechanical	-	-
2010-11	USFWS	Refuge	Yes	320	Salt cedar removal-chemical	-	-

Table 3.4. Threatened and Endangered Species List for Chaves County

Status	Common Name	Scientific Name	Occurrence
T/NME/DCH	Pecos sunflower	*Helianthus paradoxus*	resident
FSC/NME	Wright's marsh thistle	*Cirsium wrightii*	resident
NME	Wrinkled marsh snail	*Stagnicola caperata*	resident
E/NME/PCH	Pecos assiminea snail	*Assiminea pecos*	resident
E/NMT/PCH	Koster's spring snail	*Juturnia kosteri*	resident
E/NME/PCH	Roswell spring snail	*Pyrgulopsis roswellensis*	resident
E/NME/PCH	Noel's amphipod	*Gammarus desperatus*	resident
NMT	Mexican tetra	*Astyanax mexicanus*	resident
T/NME	Pecos bluntnose shiner	*Notropis simus pecosensis*	resident
CS/NMT	Pecos pupfish	*Cyprinodon pecosensis*	resident
E/NME	Pecos gambusia	*Gambusia nobilis*	resident
NMT	Greenthroat darter	*Etheostoma lepidum*	resident
NMT	Bigscale logperch	*Percina macrolepida*	resident
T/NME	Arkansas river shiner	*Notropis girardi*	introduced
NMT	W. ribbon snake	*Thamnophis proximus diabolicus*	resident
DS/NME	Brown pelican	*Pelicanus occidentalis*	migrant
NMT	Neotropic cormorant	*Phalacrocorax olivaceus*	migrant
DS/NMT	Am. peregrine falcon	*Falco peregrinus anatum*	migrant
DS/NMT	Bald eagle	*Haliaeetus leucocephalus*	migrant
E/NME	Interior least tern	*Sterna antillarum*	breeding
E/NME	SW willow flycatcher	*Empidonax traillii*	migrant
NMT	Baird's sparrow	*Ammodramus bairdi*	migrant
CS	Yellow-billed cuckoo	*Coccyzus americanus*	resident
NMT	Least shrew	*Cryptotis parva*	resident
CS	Black-tailed prairie dog	*Cynomys ludovicianus*	resident
FSC	Pecos muskrat	*Ondatra zibethicus ripensis*	resident

NOTE: E-federal endangered, T-federal threatened, PE–federal proposed as endangered, DCH-federally listed species with designated critical habitat, PCH-federally listed species with proposed critical habitat, FSC-federal species of concern, CS-federal candidate species, DS-federally de-listed species (5 year monitoring), NME-New Mexico endangered species, NMT-New Mexico threatened species.

4.0 RISK ASSESSMENT

4.1 PURPOSE

The purpose of developing the risk assessment model described here is to create a unique tool for evaluating the risk of wildland fires to communities within the WUI areas of the County. Although many definitions exist for hazard and risk, for the purpose of this document these definitions follow those used by the firefighting community. *Hazard* is a fuel complex defined by kind, arrangement, volume, condition, and location that forms a special threat of ignition and resistance to control. *Risk* is defined as the chance of a fire starting as determined by the presence and activity of causative agents (National Wildfire Coordinating Group 1998). The risk assessment is twofold and combines a geographic information system (GIS) model of hazard based on fire behavior and fuels modeling technology (Composite Risk/Hazard Assessment) and a field assessment of community hazards and values at risk (Community Risk/Hazard Assessment).

From these assessments, land use managers, fire officials, planners, and others can begin to prepare strategies and methods for reducing the threat of wildfire, as well as work with community members to educate them about methods for reducing the damaging consequences of fire. The fuels reduction treatments can be implemented on both private and public land, so community members have the opportunity to actively apply the treatments on their properties, as well as recommend treatments on public land that they use or care about.

4.2 FIRE BEHAVIOR MODEL

4.2.1 OVERVIEW

The wildland fire environment consists of three factors that influence the spread of wildfire: fuels, topography, and weather. Understanding how these factors interact to produce a range of fire behavior is fundamental to determining treatment strategies and priorities in the WUI. In the wildland environment, vegetation is synonymous with fuels. When sufficient fuels for continued combustion are present, the level of risk for those residing in the WUI is heightened. Fire spreads in three ways: 1) surface fire spread—the flaming front remains on the ground surface (in grasses, shrubs, small trees, etc.) and resistance to control is comparatively low; 2) crown fire—the surface fire "ladders" up into the upper levels of the forest canopy and spreads through the tops (or crowns) independent of or along with the surface fire, and when sustained is often beyond the capabilities of suppression resources; and 3) spotting—embers are lifted and carried with the wind ahead of the main fire and ignite in receptive fuels; if embers are plentiful and/or long range (>0.5 mile), resistance to control can be very high. Spotting is often the greatest concern to communities in the path of a wildland fire. In areas where homes are situated close to bosque fuels and/or denser shrubs and trees, potential spotting from woody fuels to grassland fuels should be acknowledged.

Treating fuels in the WUI can lessen the risk of intense or extreme fire behavior. Studies and observations of fires burning in appropriately treated areas have shown that the fire either remains on or drops to the surface, thus avoiding destructive crown fire. Also, treating fuels decreases spotting potential and increases the ability to detect and suppress any spot fires that do

occur. Fuels mitigation efforts therefore should be focused specifically where these critical conditions could develop in or near communities at risk.

4.2.2 Fire Behavior Model Components

For this plan, an assessment of fire behavior has been carried out using well-established fire behavior models: FARSITE, FlamMap, BehavePlus, and FireFamily Plus, as well as ArcGIS Desktop Spatial Analyst tools. Data used in the Composite Risk/Hazard Assessment is largely obtained from LANDFIRE.

LANDFIRE

LANDFIRE is a national remote sensing project that provides land managers a data source for all inputs needed for FARSITE, FlamMap, and other fire behavior models. The database is managed by the USFS and the USDI and is widely used throughout the United States for land management planning. More information can be obtained from http://www.landfire.gov.

FARSITE

FARSITE is a computer model based on Rothermel's spread equations (Rothermel 1983); the model also incorporates crown fire models. FARSITE uses spatial data on fuels, canopy cover, crown bulk density, canopy base height, canopy height, aspect, slope, elevation, wind, and weather to model fire behavior across a landscape. In essence, FARSITE is a spatial and temporal fire behavior model. FARSITE is used to generate fuel moisture and landscape files as inputs for FlamMap. Information on fire behavior models can be obtained from http://www.fire.org.

FlamMap

Like FARSITE, FlamMap uses a spatial component for its inputs but only provides fire behavior predictions for a single set of weather inputs. In essence, FlamMap gives fire behavior predictions across a landscape for a snapshot of time; however, FlamMap does not predict fire spread across the landscape. FlamMap has been used for the CCCWPP to predict fire behavior across the landscape under extreme (worst case) weather scenarios.

BehavePlus

Also using Rothermel's (1983) equations, BehavePlus is a multifaceted fire behavior model and has been used to determine fuel moisture in this process.

4.2.3 Fire Behavior Model Inputs

Fuels

The fuels in the planning area are classified using Scott and Burgan's (2005) Standard Fire Behavior Fuel Model classification system. This classification system is based on the Rothermel surface fire spread equations, and each vegetation and litter type is broken down into 40 fuel models. This classification has been selected because of the amount of herbaceous fuel in the planning area. These herbaceous fuels have a dynamic fuel moisture component that affects the intensity at which they would burn based on the degree of pre-fire curing. The Scott and Burgan (2005) system acknowledges this feature of herbaceous fuels and classifies them accordingly.

The general classification of fuels is by fire-carrying fuel type (Scott and Burgan 2005):

(NB) Nonburnable
(GR) Grass
(GS) Grass-Shrub
(SH) Shrub
(TU) Timber-Understory
(TL) Timber Litter
(SB) Slash-Blowdown

A more detailed breakdown of the fuel types present in the planning area is presented in Table 4.1.

Table 4.1. Fuel Model Classification for CCCWPP Planning Area

1.	**Nearly pure grass and/or forb type (Grass)**
i.	**GR1:** Grass is short, patchy, and possibly heavily grazed. Spread rate is moderate (5–20 chains/hour); flame length low (1–4 feet); fine fuel load 0.40 (ton/acre).
ii.	**GR2:** Moderately coarse continuous grass, average depth about 1 foot. Spread rate high (20–50 chains/hour); flame length moderate (4–8 feet); fine fuel load 1.10 (tons/acre).
iii.	**GR4:** Moderately coarse continuous grass, average depth about 2 feet. Spread rate very high (50–150 chains/hour); flame length high (8–12 feet); fine fuel load 2.15 (tons/acre).
2.	**Mixture of grass and shrub, up to about 50% shrub cover (Grass-Shrub)**
i.	**GS1:** Shrubs are about 1 foot high, low grass load. Spread rate moderate (5–20 chains/hour); flame length low (1–4 feet); fine fuel load 1.35 (tons/acre).
ii.	**GS2:** Shrubs are 1–3 feet high, moderate grass load. Spread rate high (20–50 chains/hour); flame length moderate (4–8 feet); fine fuel load 2.1 (tons/acre).
3.	**Shrubs cover at least 50% of the site; grass sparse to nonexistent (Shrub)**
i.	**SH1:** Low shrub fuel load, fuelbed depth about 1 foot; some grass may be present. Spread rate very low (0–2 chains/hour); flame length very low (0–1 foot); fine fuel load 1.7 (tons/acre).
ii.	**SH2:** Moderate fuel load (higher than SH1), depth about 1 foot, no grass fuels present. Spread rate low (2–5 chains/hour); flame length low (1–4 feet); fine fuel load 5.2 (tons/acre).
iii.	**SH5:** Heavy shrub load, depth 4–6 feet. Spread rate very high (50–150 chains/hour); flame length very high (12–25 feet); fine fuel load 6.5 (tons/acre).
iv.	**SH6:** Dense shrubs, little or no herb fuel, depth about 3 feet. Spread rates high (20–50 chains/hour); flame length high (8–12 feet).
v.	**SH7:** Very heavy shrub load, depth 4–6 feet. Spread rate lower than SH5, but flame length similar. Spread rate high (20–50 chains/hour); flame length very high (12–25 feet); fine fuel load 6.9 (tons/acre).
4.	**Grass or shrubs mixed with litter from forest canopy (Timber-Understory)**
i.	**TU1:** Fuelbed is low load of grass and/or shrub with litter. Spread rate low (2–5 chains/hour); flame length low (1–4 feet); fine fuel load 1.3 (tons/acre).
ii.	**TU5:** Fuelbed is high load conifer litter with shrub understory. Spread rate moderate (5–20 chains/hour); flame length moderate (4–8 feet).
5.	**Dead and down woody fuel (litter) beneath a forest canopy (Limber Litter)**
i.	**TL1:** Light to moderate load, fuels 1–2 inches deep. Spread rate very low (0–2 chains/hour); flame length very low (0–1 feet).
ii.	**TL3:** Moderate load. Spread rate very slow (0–2 chains/hour); flame length low (1–4 foot); fine fuel load 0.5 (ton/acre).
iii.	**TL8:** Moderate load and compactness may include small amounts of herbaceous load. Spread rate moderate (5-20chains/hour); flame length low (1–4 feet).
6.	**Insufficient wildland fuel to carry wildland fire under any condition (Nonburnable)**
i.	**NB1:** Urban or suburban development; insufficient wildland fuel to carry wildland fire.
ii.	**NB3:** Agricultural field, maintained in nonburnable condition.
iii.	**NB8:** Open water.
iv.	**NB9:** Bare ground.

Notes: Based on Scott and Burgan's (2005) 40 Fuel Model System.
Climate is arid to semiarid for all fuel types.
Only categories present on the CCCWPP fuel maps are presented above. For more information refer to Scott and Burgan (2005).

Map 4 in Appendix A illustrates the fuels classification throughout the planning area. The dominant fuel type in the area is classified by Scott and Burgan (2005) as GR2 in the western half and GS1 and GS2 in the eastern half of the County. GR2 is a moderately coarse continuous grass fuel with a depth of approximately 1 foot. Spread rate in these fuels is high (20–50 chains per hour [ch/h]) and flame lengths are low to moderate (2–8 feet). This fuel type is dominant in the western portion of the County where the vegetation consists of grassland steppe with interspersed scrub and shrub. Scattered around Elk and the boundary with Otero County in the south are areas of shrubland fuels such as SH5 and SH6, which would exhibit very high flame lengths (12–25 feet) and spread rates (50–150 ch/h). GS1 and GS2 fuels are most common in the eastern portion of the County and around most of the municipalities. GS1 fuels are dry climate grass-shrub fuels with shrub heights about 1 foot, with a moderate spread rate (5–20 ch/h) and low flame lengths (1–4 feet). GS2 fuels are made up of shrubs that are 1 to 3 feet high with a moderate grass understory. Spread rates and flame length are higher than the GS1 fuels. GR4 fuels are found scattered throughout the central portion and adjacent to the Pecos River valley. These fuels are moderate-load, coarse, continuous grasses with a depth of 2 feet that exhibit very high rates of fire spread (50–150 ch/h) and high flame lengths (8–12 feet). The bosque fuels are classified as moderate-load litter fuels (TL3) and low-load, dry-climate, timber-grass-shrub fuels (TU1); both these fuel types exhibit low spread rates (2–5 ch/h) and low flame lengths (1–4 feet).

Non-combustible fuels are also present throughout the planning area, with urban fuels (NB1) dominant throughout communities. Most of the communities are surrounded by agricultural lands classified as NB3. These fuel types are considered non-combustible when input into the fire behavior model. This is important to note when determining risk in more rural areas, as fire risk associated with crop lands will vary seasonally. It is important to recognize that fuels are dynamic in nature and therefore the fire risk is not static and should be reassessed on a regular basis.

Topography

Topography is important in determining fire behavior. Steepness of slope, aspect (direction the slope faces), elevation, and landscape features can all affect fuels, local weather (by channeling winds and affecting local temperatures), and rate of spread of wildfire. The topography in the planning area is relatively uniform, with the greatest variation occurring around the Peñasco Valley. Aspect and slope can assert significant influence on fire behavior, so where topography does fluctuate, flame lengths and rate of spread could vary considerably. Other topographic features that could be significant are arroyos and tributaries that may funnel fire and intensify fire behavior. Narrow river channel width and presence of vegetated islands are also topographic features that could influence fire spread in bosque areas.

Weather

Of the three fire behavior components, weather is the most likely to fluctuate. Accurately predicting fire weather remains a challenge for forecasters, particularly during drought conditions. As spring and summer winds and rising temperatures dry fuels, particularly on south-facing slopes, conditions can deteriorate rapidly, creating an environment that is susceptible to wildland fire. Fine fuels (grass and leaf litter) can cure rapidly, making them highly flammable in as little as one hour following light precipitation. Low live fuel moistures (typical in drought conditions throughout New Mexico) of shrubs and trees can significantly contribute to fire

behavior in the form of crowning and torching. With a high wind, grass fires can spread rapidly, engulfing communities, often with limited warning for evacuation. The creation of defensible space is of vital importance in protecting communities from this type of fire. For instance, a carefully constructed fuel break placed in an appropriate location could protect homes or possibly an entire community from fire. This type of defensible space can also provide safer conditions for firefighters, improving their ability to suppress fire and protect life and property.

One of the critical inputs for FlamMap is fuel moisture files. For this purpose weather data have been obtained from FAMWEB (National Wildfire Coordinating Group 2010), a fire weather database maintained by the National Wildfire Coordinating Group. With guidance from Chuck Maxwell, U.S. Fish and Wildlife Service (USFWS) meteorologist at the Southwest Area Coordination Center, a remote automated weather (RAW) station was selected (at 8 mile, Chaves County) and data was downloaded from the website. The RAW station was selected based on the period of record (1986–2006), the reliability of the data, and the likelihood that data represented weather in the planning area.

Using an additional fire program (FireFamily Plus) with the RAW station data, weather files that included prevailing wind direction and 20-foot wind speed were created. Fuel moisture files were then developed for downed (1 hour, 10 hour, and 100 hour) and live herbaceous and live woody fuels. These files represent weather inputs in FlamMap.

4.2.4 Fire Behavior Model Outputs

The following is a discussion of the fire behavior outputs from FlamMap.

Flame Length

Map 5 in Appendix A illustrates the flame length classifications for the County. Flame lengths are determined by fuels, weather, and topography. Flame length is a particularly important component of the risk assessment because it relates to potential crown fire (particularly important in riparian areas) and suppression tactics. Direct attack by hand lines is usually limited to flame lengths less than 4 feet. In excess of 4 feet, indirect suppression is the dominant tactic. Suppression using engines and heavy equipment will move from direct to indirect with flame lengths in excess of 8 feet.

Flame lengths classified as high (>8 feet) are associated primarily with heavier shrub fuels (SH7) in the boot heel area of the County around Peñasco. Patches of predicted extreme flame lengths (>11 feet) are found along the Pecos River in the bosque fuels, which are classified as timber overstory-litter understory (TL3) and timber overstory/shrub and grass understory (TU1) fuels. Moderate flame lengths (4–8 feet) are predicted in the grass and shrub fuels (GS2) that are found in the east and north east part of the County. Low flame lengths (0–4 feet) are predicted among the GR2 fuels, which are characteristic of the shortgrass prairie.

Fireline Intensity

Map 6 in Appendix A illustrates the predicted fireline intensity throughout the planning area. Fireline intensity describes the rate of energy released by the flaming front and is measured in British Thermal Units per foot, per second (BTU/ft/sec). This is a good measure of intensity, and suppression activities are planned according to it. The expected fireline intensity throughout the

County is similar in pattern to the predicted flame length, as fireline intensity is a function of flame length. High fireline intensity is predicted to occur in the shrubland communities (SH7 and SH6) in the boot heel area and in additional shrub communities scattered throughout the planning area. Fireline intensities would be low in the grass-dominated fuels.

Rate of Spread

Map 7 in Appendix A illustrates the rate of spread classifications for the planning area. The most extreme rates of spread (> 40 feet/minute) are expected to occur in the grass shrub (GS2) and shrub fuels (SH7) in the boot heel and the riparian areas. High rates of spread (15–40 feet/minute) are also predicted throughout the grassland shrub areas (GS1 and GS2) throughout much of the eastern portion of the County. These spread rates could impact communities from Lake Arthur north to Roswell and homes along the U.S. 285, 380, 249, and 70 corridors. The western portion of the County is expected to exhibit moderate rates of spread (5–15 feet/minute) with patches of high and extreme as fuels transition from shortgrass prairie to heavier shrub mixes. Some of the far eastern portions of the County are predicted to burn with low rates of spread (0–5 feet/minute), associated with the GR1 fuel type, which is short, sparse, dry climate grasses. Agricultural and urban areas are clearly delineated in this model by their low rate of spread and are evident in the valley communities and around Roswell.

Crown Fire Potential

Map 8 in Appendix A illustrates the predicted crown fire potential throughout the planning area. Crown fire activity in the County is confined to areas of timber-litter fuel (TL1, TL3, and TL8). These areas are primarily in the bosque, in arroyos, and along the extreme western boundary of the boot heel. The remainder of the planning area is likely to witness surface fire.

Fire Occurrence/Density of Starts

Map 2 in Appendix A illustrates the fire occurrence density for the planning area. Fire occurrence density has been determined by performing a density analysis on fire start locations with ArcGIS Desktop Spatial Analyst. These locations have been provided by NMSFD, the USFS, the BLM, and LANDFIRE Rapid Refresh as GIS points, and combined the points showed the location of fire starts within the project area over the last 21 years (1987–2008). The density analysis has been performed over a 5-mile search radius. The density of previous fire starts is used to determine the risk of ignition of a fire. Map 2 in Appendix A reveals a definite pattern of fires close to populated areas and along all highways. High fire density is observed throughout the central core of the County, with the greatest density (> 1 fire/square mile) northeast of Roswell and high density (0.2–1.0 fire/square mile) extending south of Roswell through the areas with the heaviest rural population.

It may be argued that areas that have burned previously are less likely to burn in the immediate future due to lowered fuel loads, but post-burn regrowth in grassland fuels is often rapid, and dead and downed fuels in bosque and shrubland settings can contribute to increased fire risk in these previously burned areas. The fuels assessment used to determine the fuel models takes into account the fuel loading of recently burned areas, as it is developed from 2009 imagery. Furthermore, the fire occurrence maps are used to provide information on areas where human- and lightning-ignited fires are prevalent and hence could be more prone to fire in the future.

4.2.5 GIS OVERLAY PROCESS

All data used in the risk assessment have been processed using ESRI ArcGIS Desktop and the ESRI Spatial Analyst Extension (Barz et al. 2004, Fluder and Timmons 2008). Information on these programs can be found at http://www.esri.com. Data have been gathered from all relevant agencies, and the most current data have been used.

All fire parameter datasets have been converted raster format (a common GIS data format comprising a grid of cells or pixels, with each pixel containing a single value). The cell size for the data is 30 × 30 m (98 × 98 feet). Each of the original cell values have been reclassified with a new value between 1 and 4, based on the significance of the data (1 = lowest, 4 = highest). Prior to running the models on the reclassified datasets, each of the input parameters have been weighted; that is, they are assigned a percentage value reflecting that parameter's importance in the model. The parameters are then placed into a Weighted Overlay Model, which "stacks" each geographically aligned dataset and evaluates an output value derived from each cell value of the overlaid dataset in combination with the weighted assessment. The resulting dataset contains only values 1 through 4 (1 = low, 2 = medium, 3 = high, 4 = extreme) to denote fire risk. This ranking shows the relative fire risk of each cell based on the input parameters (Fluder and Timmons 2008). Figure 4.1 illustrates the individual datasets and the relative weights assigned within the modeling framework.

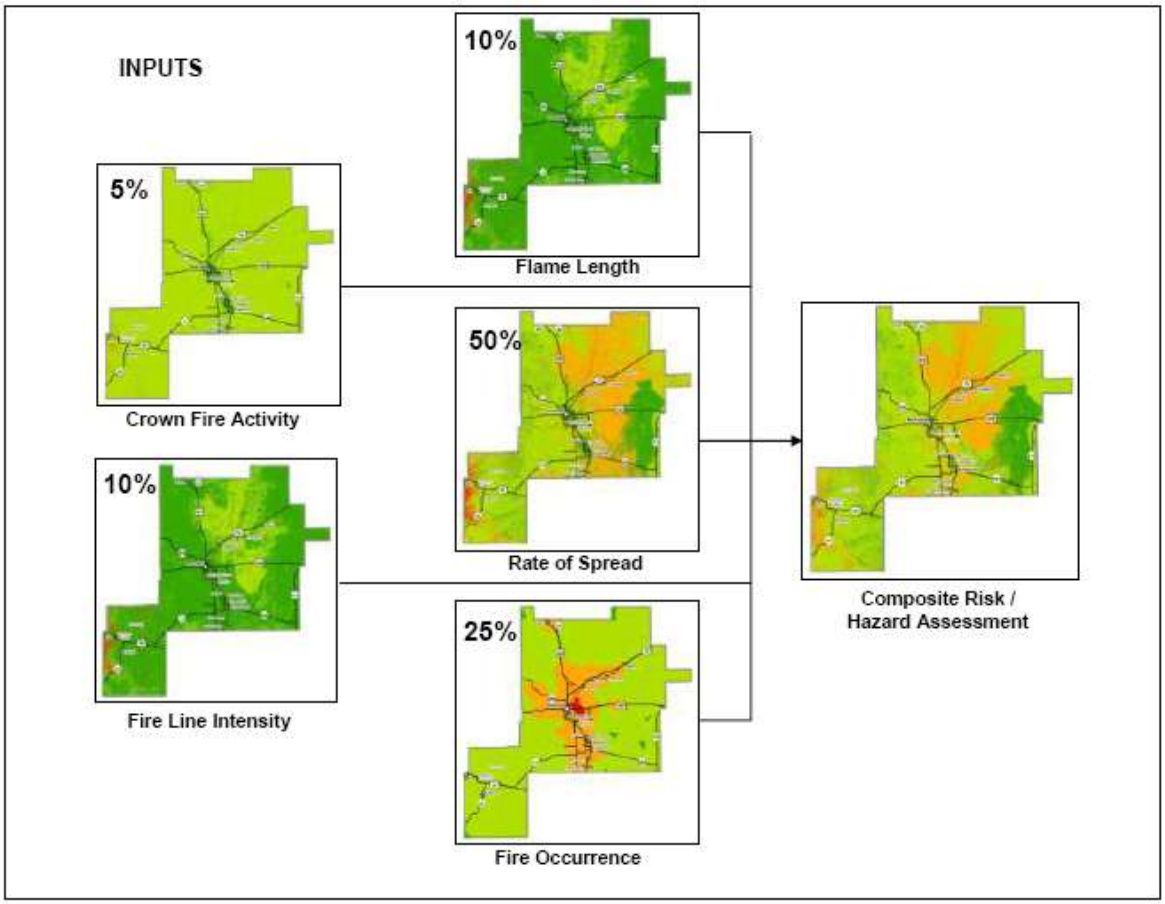


Figure 4.1. Composite Risk/Hazard Assessment overlay.

4.3 COMPOSITE RISK/HAZARD ASSESSMENT

Figure 4.2 is the risk assessment for the planning area; it combines all the fire behavior parameters described above. The risk assessment classifies the planning area into low, moderate, high, and extreme risk categories.

The risk assessment depicts risk in the County as largely moderate and high, with patches of extreme. The majority of the Pecos River valley and central core of the County is classified as high risk; however, the areas closest to the active channel are classified as extreme risk due to the presence of thick thickets of saltcedar. The remaining areas are predominantly moderate risk with extreme risk isolated to arroyos and other riparian areas. The landscape around Dunken and Peñasco is largely high risk influenced by the topography in that region. Some agricultural areas are classified as moderate risk but these areas would undergo seasonal fluctuations in terms of their fire risk because of changes in irrigation, curing, and harvesting. The high risk areas are associated with grass-shrub fuel loads as classified using the Scott and Burgan (2005) system as GS2. These fuels generate high rates of spread and moderate flame lengths. The greatest concentration of extreme risk is found in the timber bosque fuels, which generate slower rates of spread by intense fire activity and flame lengths. These areas are and should continue to be the focus of fuels treatment. The southeast portion of the County is currently depicted as low risk because this area has recent fire activity that reduced the fuel loading; the lower risk is a consequence of the lower rates of spread and flame lengths predicted to occur in these shortgrass fuels. Because of the rapid response of grasslands post-fire however, this area should be closely observed for fuel loading.

The reader should also refer to the New Mexico Statewide Natural Resources Assessment and Strategy and Response Plan for a statewide assessment of fire risk (NMSFD 2010). Map 9 Appendix A is a copy of the Fire Spread Map for the Capitan District from the Statewide Assessment Project.

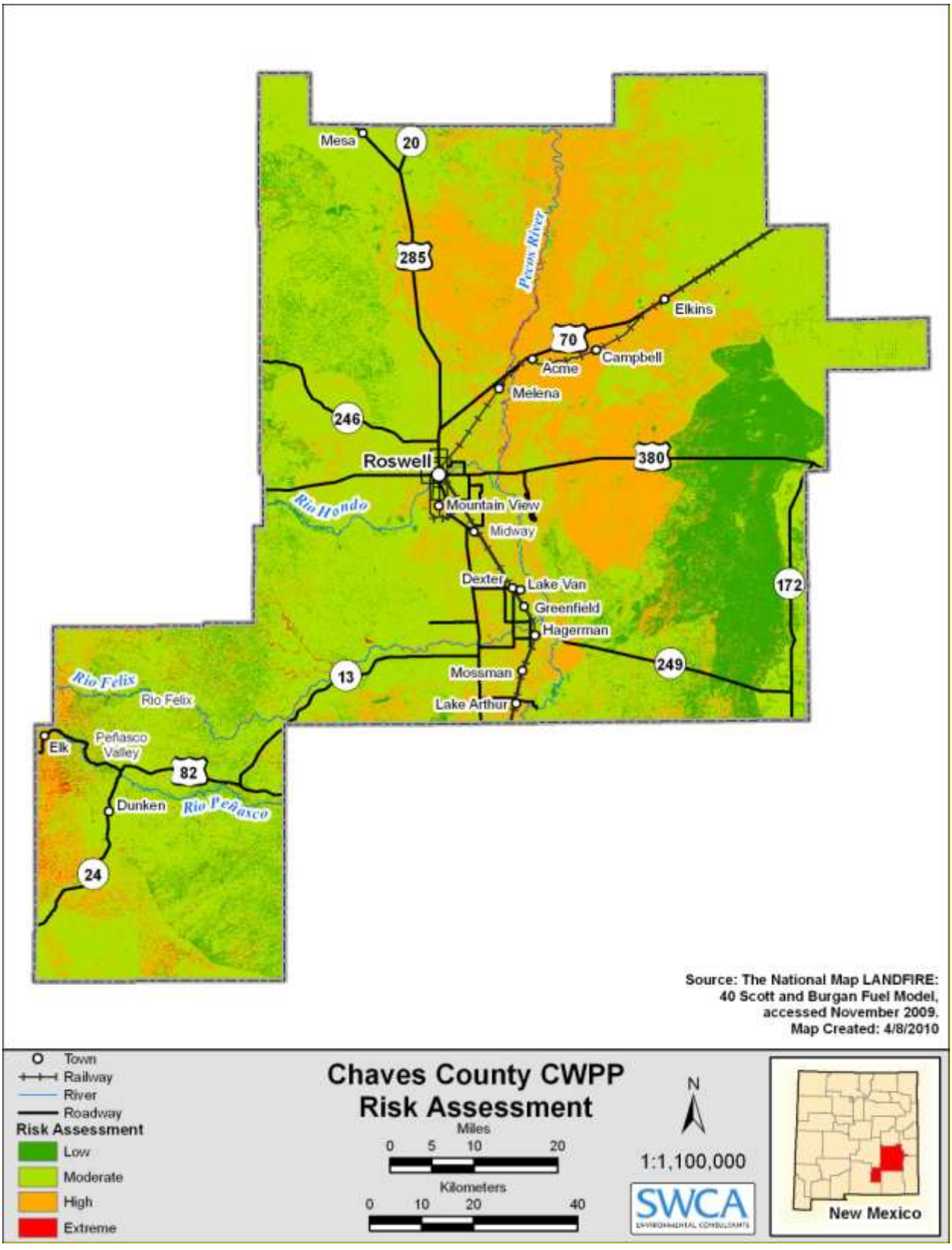


Figure 4.2. Composite Risk/Hazard Assessment map.

4.4 COMMUNITY RISK/HAZARD ASSESSMENTS

As part of the planning process, the Core Team has compiled a list of communities within the planning area. In order to properly assess the hazards in and around these communities, a series of field days have been implemented to carry out community assessments. Please note that the assessments are carried out at a range of scales; for example, Peñasco Valley assesses the wider Peñasco area, up to the Lincoln County boundary. However, where FD (fire department) is included in the naming convention, this is an assessment of just the fire department building and defensible space, e.g., Peñasco 2 FD.

The purpose of the community WUI assessment and subsequent hazard ratings is to identify fire hazard and risks and prioritize areas requiring mitigation and more detailed planning. These assessments should not be seen as tactical pre-suppression or triage plans. The community assessment helps to drive the recommendations for mitigation of structural ignitability, community preparedness, and public education. The assessment also helps to prioritize areas for fuels treatment based on the hazard rating (Table 4.2).

Table 4.2. Community Hazard Ratings

Community/ Fire Department	Score	Hazard Rating
Peñasco Valley	85	High
Northeast Roswell	80	High
Lake Arthur	74	High
Midway	72	High
Rio Felix FD	65	Moderate
Hagerman	61	Moderate
Peñasco 2 FD	58	Moderate
Peñasco 1 FD	57	Moderate
Southwest Roswell	57	Moderate
Dexter	57	Moderate
North Roswell	55	Moderate
District 8	55	Moderate
Dunken	54	Moderate
East Roswell	54	Moderate
West Roswell	51	Moderate
East Grande Plains	50	Moderate
Dunken/Peñasco School	49	Moderate
Northwest Roswell	49	Moderate
South Springs Acres	49	Moderate
Country Club	42	Moderate
Lake Van	42	Moderate
South Roswell	41	Moderate

Risk Rating Classification:
<40 = Low
40–69 = Moderate
70–111 = High
>112 = Extreme

The community assessment has been carried out using the National Fire Protection Association (NFPA) Wildland Fire Risk and Hazard Severity Form 1144 (Appendix E). This form is based on the NFPA Standard for Reducing Structure Ignition Hazards from Wildland Fire 2008 Edition, which was in turn developed by the Technical Committee on Forest and Rural Fire Protection and issued by the Standards Council on June 4, 2007. The NFPA standard focuses on individual structure hazards and requires a spatial approach to assessing and mitigating wildfire hazards around existing structures. It also includes ignition-resistant requirements for new construction and is used by planners and developers in areas that are threatened by wildfire and is commonly applied in the development of Firewise Communities (for more information, see www.firewise.org).

The assessment was conducted on January 27, 2010, and completed with assistance from Georgianna Hunt, Chaves County Fire Services Administrator. Each community was rated based on conditions within the community and immediately surrounding structures, including access, adjacent vegetation (fuels), defensible space, adjacent topography, roof and building characteristics, available fire protection, and placement of utilities. Where a range of conditions was less easily parsed out, a range of values was assigned on a single assessment form. Each score was given a corresponding adjective rating of low, moderate, high, or extreme. An example of the assessment form used in this plan can be found in Appendix E.

4.4.1 PEÑASCO VALLEY AND PEÑASCO FDS 1 AND 2

Peñasco is broken into three pieces for the assessment: Peñasco FD 1, Peñasco FD 2, and the wider Peñasco Valley.

Peñasco FD 1 is rated as moderate using this risk assessment protocol. The station is easily accessible since it is located on surfaced roads along U.S. 82. Peñasco FD 1 is situated close to steeper topography, though fuels remain light in its vicinity. Water supply is provided through a 25,000 gallon tank and hydrant, and the department also has a vacuum tanker to draw water from the nearby Rio Peñasco. The station is working on constructing platforms along the river to facilitate this process. Due to the steeper terrain, the station also houses a Hummer to access steeper areas. The station currently had aboveground fuel storage, which poses a fire risk; however, this will be mitigated once the Dunken FD has established its fuelling station. Opposite the station is an area of value to the community, the Runyan Ranch (Figure 4.3), with a store, fruit orchard, campground, fishing area, and petting zoo. The Runyan Ranch is in more heavy riparian fuels and in steep topography, and this area is a priority for fire mitigation.

Rating: 57/112 (Moderate)

Figure 4.3. Runyan Ranch store.

Peñasco FD 2 is rated as moderate using this risk assessment protocol. The existing station is being replaced by a new station on an adjacent site (Figure 4.4). This new station will be larger in order to accommodate a tanker and for training use. The new site will also have a water storage tank. Both the existing and new stations are located in heavier fuels along the riparian corridor and are backed by stepper rolling terrain. Peñasco FD 2 has good accessibility and communications aided by the proximity of a repeater tower. The department is in the process of upgrading the tower with additional bandwidths, and firefighters have an agreement in place to allow the BLM and NMSFD to put repeaters on it if needed.

Rating: 58/112 (Moderate)

Figure 4.4. The current Peñasco FD 2.

The Peñasco Valley is rated as high using this risk assessment protocol. The valley has the greatest concentration of WUI communities in the County, since many residents are scattered along the Rio Peñasco riparian corridor. There is also a heavier concentration of CVARs throughout the area, including agricultural lands, orchards, tourist sites, cemeteries, and churches. The Peñasco Valley is served by both Peñasco FDs 1 and 2, as well as adjacent Mayhill FD in Otero County. The valley has some areas of steep terrain and heavier fuels made up of a piñon-juniper forest type (Figure 4.5). At higher elevations, timber with oak understory poses a particular fire threat, particularly from the adjacent Lincoln National Forest. Canyon winds and fuels combine to create high risk of rapid fire spread both up and down canyon.

Homes tend to be located in the valley bottom among mature cottonwood and riparian vegetation or on the valley sides in the grass/piñon-juniper fuel mix. There are heavy concentrations of dead and downed fuels in some areas, and many homes have insufficient defensible space or turnaround space for fire trucks (Figure 4.6). Furthermore, some homes are difficult to access down long unsurfaced driveways with limited ingress/egress, even though U.S. 82 is surfaced. Some home construction is rated high risk due to combustible siding and roofs.

Rating: 85/112 (High)

Figure 4.5. **Heavier fuels throughout the Peñasco Valley.**

Figure 4.6. Minimal defensible space around some valley homes.

4.4.2 RIO FELIX

Rio Felix was rated as moderate risk using this fire risk assessment protocol. The risk assessment was carried out in and around the fire station (Figure 4.7). Population is sparse in the area with most residents living on large tracts of ranchland. Most structures have sufficient defensible space with minimal heavy fuels. The topography is gently rolling with some steeper arroyos and canyons that may transmit fire through thicker fuels. The Rio Felix fire department is manned by 13 local residents, many of whom are members of the same family. The station is thought to be a priority site because there are long response times between it and the next closest station, District 8 (97 miles away). The station is located on a dirt road and is surrounded by light grass and scrubland fuels, most of which are grazed. The arroyos are thick with saltcedar and Russian olive, which raise the fire risk rating due to potential for intense fire behavior. During recent fires direct attack using aerial slurry drops has been the approach used to attack fire in riparian areas.

The station is currently in the process of expanding, and personnel plan to set up a 30,000-gallon tank for water storage. Currently the main water sources are stock tanks, wells, and the intermittent Rio Felix. One of the highest priorities for the Rio Felix fire department is strategic placement of water sources for wildland firefighting. In addition, the station needs more accessible forms of firefighting training; many of the trainings are remote and volunteer firefighters do not have the time or funds to attend. The fire department would like to pursue remote forms of training, for example online or video seminars. For people unfamiliar with the area, the Rio Felix station is remote and can be difficult to locate particularly in the dark. Because of the nature of the roads and land ownership in the area, local resources are critical to the effective operation of this fire department, as can be seen by the generational nature of the firefighters. The Rio Felix fire department has an ISO rating of 9, which is likely to be lowered to an 8 once the water storage tank is in place.

Rating: 65/112 (Moderate)

Figure 4.7. Rio Felix fire station.

4.4.3 DUNKEN

Dunken is rated as moderate using this fire risk assessment protocol. The risk assessment was focused on the fire station and surrounding structures, which include the Chaves County Roads Department buildings, a church, and one residence. The fire department is currently being expanded into a new building (Figure 4.8), and the existing building will then be turned into a tire repair shop and fueling station. The County is obtaining funding to establish this new setup. The Dunken fire department currently has an ISO rating of 7, attributed mostly to the church, which serves the whole boot heel area. The church is identified as a CVAR. The Dunken area has a limited WUI with most residents residing on large tracts of ranchland. Fuels are light and scrubby, but the area is prone to large grassfires as experienced in 2009. Dry lightning fires are common and the rural nature of the area means many reach a large size before they can be contained. The station is located on a surfaced road and has water storage capabilities.

Rating: 56/112 (Moderate)

Figure 4.8. Future site of the new Dunken fire station with a church in the background.

4.4.4 DUNKEN ELEMENTARY SCHOOL

The elementary school at Dunken (Figure 4.9) is rated as moderate using this fire risk assessment protocol. The school had good access via surfaced roads at the junction of U.S. 24 and 82 and has non-combustible construction. Vegetation is predominantly light grasses, although the rear of the structure backs onto an arroyo with heavier riparian fuels. This area is well maintained with defensible space, courtesy of the local Dunken fire department. Although the school does not have independent water storage supply for firefighting, modifications could be made to the well to facilitate water use. During recent fires the students were evacuated from the school, so an evacuation plan is already in place.

Rating: 49/112 (Moderate)

Figure 4.9. Elementary school at Dunken.

4.4.5 DISTRICT 8

The District 8 fire department is located at the state correctional facility south of Roswell and is staffed by a 20-man inmate crew, as well as correctional officers acting as officers for the fire department. The station (Figure 4.10) is rated as moderate risk using this risk assessment protocol. The District 8 station has good accessibility and turn-around space and is surrounded by light fuels with considerable defensible space, but there is a history of large intense fires in the area. The station has access to water storage from the correctional facility and has hydrants. The station has an ISO rating of 6/9, and District 8 fire department is planning on developing the station to include a fire station house this year.

Rating: 55/112 (Moderate)

Figure 4.10. District 8 fire department.

4.4.6 HAGERMAN

The Hagerman area is rated as moderate using this risk assessment protocol. Access is rated as good, and the area is surrounded by light fuels, irrigated agricultural lands, and minimal slope (Figure 4.11); however, structural ignitability potential is rated higher due to some wood construction, particularly sidings and decks around homes. There are some derelict lots that may contribute to fuel loading in the event of a fire, since grass and landscaping has not been maintained. The area is served by the Hagerman fire department, which has some water storage facilities.

Rating: 61/112 (Moderate)

Figure 4.11. Hagerman south side.

4.4.7 LAKE ARTHUR

Lake Arthur is rated as high risk using this risk assessment protocol. The town is small with minimal growth, and properties tend to have concentrations of heavier fuels in yards with little, if any, defensible space. There are a number of derelict properties that could contribute to fuel loading in the event of a fire (Figure 4.12). The area is served by the Lake Arthur fire department, but there are limited water supplies. In order to access the town from U.S. 2, one would need to cross over the railroad, which may impede ingress/egress. The town is surrounded predominantly by wildland fuels with some grazed grasslands. The wildland fuels are heavier and shrubby in nature than neighboring communities (Figure 4.13). Some homes are wood construction and have roofs classified with higher risk ratings; structural ignitability potentials are therefore high.

Rating: 74/112 (High)

Figure 4.12. Derelict property with overgrown grounds.

Figure 4.13. Heavier fuels on the edge of Lake Arthur.

4.4.8 DEXTER

Dexter is rated as moderate using this risk assessment protocol. The town is rated lower than neighboring communities because it is almost entirely surrounded by irrigated agriculture, scattered farms, cattle grazing, and crop production (Figure 4.14). The town scores low risk for access, topography, and fuels. There are some heavier fuels around homes that may pose a fire risk in the event of a fire, and there are some homes that exhibit combustible construction, though roof construction is generally rated a low risk. The area is served by the Dexter fire department, which has some water storage facilities. Also located in Dexter is the USFWS Dexter hatchery. The hatchery has good defensible space and is surrounded by light fuels.

Rating: 57/112 (Moderate)

Figure 4.14. Irrigated agriculture near Dexter.

4.4.9 LAKE VAN

Lake Van is rated as moderate using this risk assessment protocol. The town scores low for accessibility, fuels, and defensible space, and most homes had irrigated maintained lawns with minimal landscaping fuels. The area is surrounded by agricultural lands with just a few areas of longer ungrazed grassland on the south of town. Structural ignitability scores are low in terms of fire risk due to the use of brick or non-combustible construction materials. There are a large number of hydrants throughout the area and the lake provides an additional water source. The area is served by the Dexter fire department, which is less than 1 mile from the lake. Lake Van itself is a CVAR since it provides recreational opportunities to the community, as well as ecological benefits to wildlife (Figure 4.15).

Rating: 42/112 (Moderate)

Figure 4.15. Lake Van.

4.4.10 MIDWAY

Midway is rated as high using this risk assessment protocol. Accessibility is rated low risk; however, many homes are older and have poor defensible space, and many of the structures had combustible construction sidings and roofs (Figure 4.16). The fuels surrounding the community are predominantly light with agriculture intermixed with wildland fuels; fuels in and around homes tend to be heavy and scrubby in nature. There are a number of vacant lots with trash accumulation that adds to the fuel loading. In addition to homes, the Midway area has additional fire hazards like dairy operations, hay barns, and manure piles, and the area has experienced a number of hay barn fires in recent years. The area is served by the Midway fire department, but water, which is sourced from the Cumberland Water Pipeline, is variable in supply.

Rating: 72/112 (High)

Figure 4.16. Midway properties and trash pile burning.

4.4.11 EAST GRANDE PLAINS

East Grande Plains is rated as moderate using this risk assessment protocol. The area is rated low for accessibility issues and is surrounded by lighter fuels with agriculture and wildland intermixed. Heavier fuels tend to be focused around homes where there are more mature, larger trees, which contribute to a higher fuel loading. There are also some derelict homes and vacant lots that are not maintained and have trash and fuel accumulated, including large volumes of tumbleweeds along fence lines. The area also has a large number of dairy operations and pecan orchards, both of which are considered CVARs and have inherent fire hazards associated with them. The area is prone to hay barn fires, which could spread to adjacent orchards (Figure 4.17). Many of the homes in the area are newer construction and have reasonable defensible space. The area is served by two fire departments, which have some water storage capacity.

Rating: 50/112 (Moderate)

Figure 4.17. Hay barn in East Grande Plains.

4.4.12 SOUTH SPRINGS ACRES

South Springs Acres is rated as moderate using this risk assessment protocol. This community is made up of larger homes with well-maintained yards. Wildland fuels directly surrounding the community are scrubby in some areas, but beyond them are agricultural lands that are irrigated. Most homes have considerable defensible space and irrigated lawns. The area scores lower risk for access because there are a number of access routes and the roads are surfaced with space for turn-arounds. The community has hydrants distributed throughout and is within 1.3 miles of the Midway fire department. Home construction tends to be of non-combustible materials, and many homes have sprinkler systems.

Rating: 49/112 (Moderate)

4.4.13 COUNTRY CLUB

The Country Club area is rated as moderate using this risk assessment protocol. This community is made up of larger houses interspersed among pecan orchards and other agricultural lands (Figure 4.18). The community rates low risk in terms of access, fuels, defensible space, and topography. Construction materials tend to be non-combustible, with many homes constructed from brick. Homes tend to be on larger plots with well-maintained yards. The pecan orchards themselves may pose a fire risk in terms of aboveground fuel loading; however ground fuels are minimal and during the growing season the orchards are well irrigated. During the fall and winter, slash piles from orchard maintenance may pose a slight fire risk but continuity of fuels is minimal (Figure 4.19).

Rating: 42/112 (Moderate)

Figure 4.18. Country Club community.

Figure 4.19. Pecan orchard and slash.

4.4.14 ROSWELL

The Roswell area has its own WUI communities around the outskirts of the city. In order to carry out the risk assessment in these communities, the city is broken into North, Northeast, East, South, Southwest, West, and Northwest regions. Southeast Roswell is incorporated into the Midway assessment.

4.4.15 NORTH ROSWELL

This northern area of the city is rated as moderate using this risk assessment protocol. The area is predominantly industrial with a number of homes and agricultural lands interspersed (Figure 4.20). The extreme edge of the community is flanked by ranchlands with light fuels. The area rated low risk for access, fuels, topography, and defensible space, but slightly higher risk for home construction. Lot sizes tended to be large with good defensible space. The area is served by the Roswell city fire departments.

Rating: 55/112 (Moderate)

Figure 4.20. Northern edge of Roswell.

4.4.16 NORTHEAST ROSWELL

Northeast Roswell was rated as high using this risk assessment protocol. This area, which includes the WUI close to the Bitter Lake National Wildlife Refuge, is made up of homes with larger lots and some heavier fuel conditions. The community rates high risk in terms of fuels between homes, minimal defensible space, sometimes minimal separation of adjacent structures, combustible construction, and unmaintained empty lots (Figure 4.21). The area is close to Roswell city fire departments and has some hydrants present. The community is at risk from fire spread from the east where the Bitter Lake National Wildlife Refuge is composed of wildland fuels (Figure 4.22). There is a history of fires in this area.

Rating: 80/112 (High)

Figure 4.21. Northeast Roswell, wildland fuels close to homes.

Figure 4.22. Bitter Lake National Wildlife Refuge, adjacent to the Northeast Roswell community.

4.4.17 EAST ROSWELL

The East Roswell community rated as moderate using this risk assessment protocol. This community is predominantly agricultural with interspersed homes. The community scored low risk in terms of access, fuels, and defensible space. Most homes are surrounded by irrigated vegetation (Figure 4.23); however, in non-irrigated areas fuels become heavy and continuous. The area would be served by the Roswell fire departments and East Grand Plains fire department.

Rating: 54/112 (Moderate)

Figure 4.23. East Roswell.

4.4.18 SOUTH ROSWELL - ROSWELL INTERNATIONAL AIR CENTER

South Roswell comprises the area around the air complex. This area rated as moderate using this risk assessment protocol and low for access, fuels, and topography, as well as construction materials and water supply. Although the airport is surrounded by grass fuels to the south the defensible space and urban fuels associated with it lower the fire risk.

Rating: 41/112 (Moderate)

4.4.19 SOUTHWEST ROSWELL

Southwest Roswell rated moderate using this risk assessment protocol. This community is made up of smaller lots and some older homes. The wildland meets agricultural lands at the community's edge, which lowers the risk rating associated with fuels. The community scores low risk for access and topography but high for fire occurrence. Being on the southwest edge of town increases the risk rating slightly because the prevailing winds are from the southwest, and fire spread from wildland fuels to the south would be directed towards the community. The community also scores high for lack of defensible space and combustible home construction. Many of the homes are older and there are a number of vacant unmaintained lots (Figure 4.24). The community is served by Roswell city fire departments.

Rating: 57/112 (Moderate)

Figure 4.24. Unmaintained vacant lot with heavy fuels.

4.4.20 WEST ROSWELL

West Roswell rates moderate using this risk assessment protocol. This area is made up of smaller lots in subdivisions, with some industrial and commercial properties intermixed. Some subdivisions back directly onto wildland fuels (Figure 4.25), but the fuels are very short with some barren lands. There is slightly more topography in the area, raising that risk rating slightly. Some homes are set close to the edge of the slope with some having minimal defensible space. The area scores low on access and proximity to fire departments. Home construction tends to score lower because most homes are newer construction and part of a maintained subdivision.

Rating: 51/112 (Moderate)

Figure 4.25. West Roswell.

4.4.21 NORTHWEST ROSWELL

Northwest Roswell rates moderate using this risk assessment protocol. This community is made up of some larger ranch properties interspersed with smaller lots. Many of the homes have good defensible space and good separation between structures. There are some shrubbier fuels interspersed with grassland that could pose a fire risk. Most homes have non-combustible construction with some brick properties (Figure 4.26). The area rates low risk for access, topography, and construction. The area would be served by the Berrendo VFD.

Rating: 49/112 (Moderate)

The community risk assessments and input from the public and Core Team have been used to compile a table of CARs as required by the NM-FPTF. A copy of this list can be found in Appendix F. *NOTE: The risk assessment and CAR list does not discriminate between communities based on the value of homes or land.*

Figure 4.26. Non-combustible construction.

4.5 COMMUNITY VALUES AT RISK

Earlier compilation of the critical infrastructure in the planning area, coupled with the community assessments, public outreach, and Core Team input, has helped in the development of a list of community values that are at risk from wildland fire (CVARs). The WUI boundary has been developed and expanded to encompass the majority of these CVARs. CVARs are split into natural, social, and cultural classes. It is important to note that although an identification of CVARs can inform treatment recommendations, a number of factors must be considered in order to fully prioritize areas for treatment; these factors include appropriateness of treatment, land ownership constraints, locations of ongoing projects, available resources, and other physical, social, or ecological barriers to treatment.

The scope of this CWPP does not allow determination of the absolute natural, socioeconomic, and cultural values that could be impacted by wildfire in the planning area. In terms of socioeconomic values, the impact due to wildfire would cross many scales and sectors of the economy and call upon resources locally, regionally, and nationally. To understand the breadth of such an impact, land agencies and local communities may guide efforts towards completing a comprehensive economic and demographic analysis in relation to wildfire impacts. This CWPP may be used to identify priority areas and communities that could experience the greatest economic strain. It is suggested that communities included in the CCCWWP achieve a finer-grained analysis of the smaller jurisdictional and community wildfire concerns by pursuing further funding to complete a community-level CWPP.

4.5.1 NATURAL CVARS

The public outreach has emphasized the importance of natural/ecological values to the general public. Examples of natural values identified by the public and the Core Team include:

- Pecos River ecosystem
- Bitter Lake National Wildlife Refuge (Figure 4.27)
- Bottomless Lakes State Park (Figure 4.28)
- Native species
- Wildlife habitat
- Water resources
- Ranchland
- Air quality
- Open country
- USFWS Dexter National Fish Hatchery
- Threatened and Endangered Species (Refer to Table 3.4)
    - Pecos sunflower (*Helianthus paradoxus*)
    - Prairie chicken (*Tympanuchus* sp.)

  - Sand dune lizard (*Liolaemus multimaculatus*)
  - Pecos bluntnose shiner (*Notropis simus pecosensis*)
- Caves and karst landscapes (BLM Roswell Caves Complex Area of Critical Environmental Concern

Figure 4.27. Bitter Lake National Wildlife Refuge.

Figure 4.28. Bottomless Lakes State Park.

4.5.2 SOCIOECONOMIC CVARS

Social values include population, recreation, infrastructure, agriculture, and the built environment. Much of the built environment in the planning area falls within the WUI zones. Examples include the following:

- Agricultural lands
- Churches
- Dairy farms
- Ranchlands
- Leprino Cheese factory
- Utility lines, infrastructure, etc.
- Fire departments
- Railroad bridges
- Highways
- Pipelines and infrastructure (oil and gas)
- Wind energy (alternative energy)
- Water storage
- Roswell Industrial Air Center
- Eastern New Mexico University, Roswell Campus

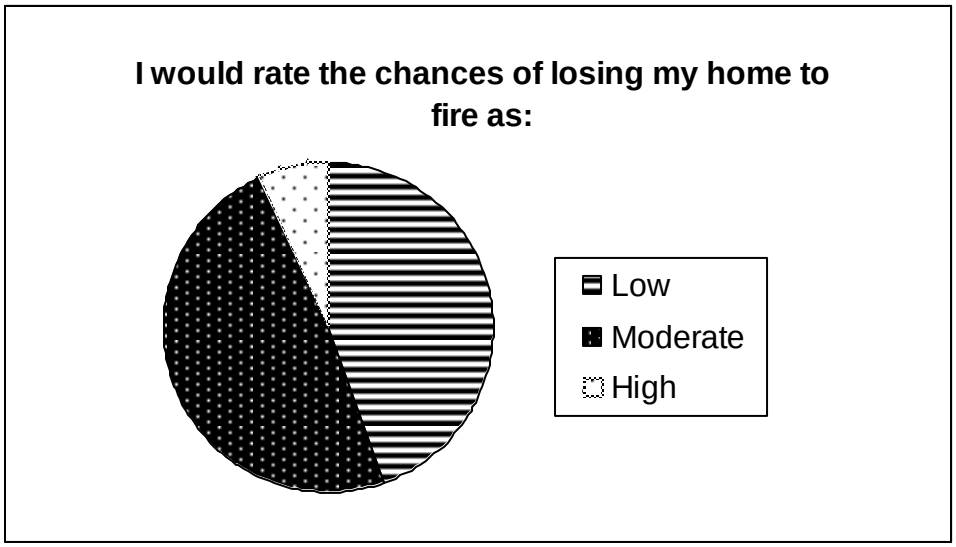
4.5.3 CULTURAL CVARS

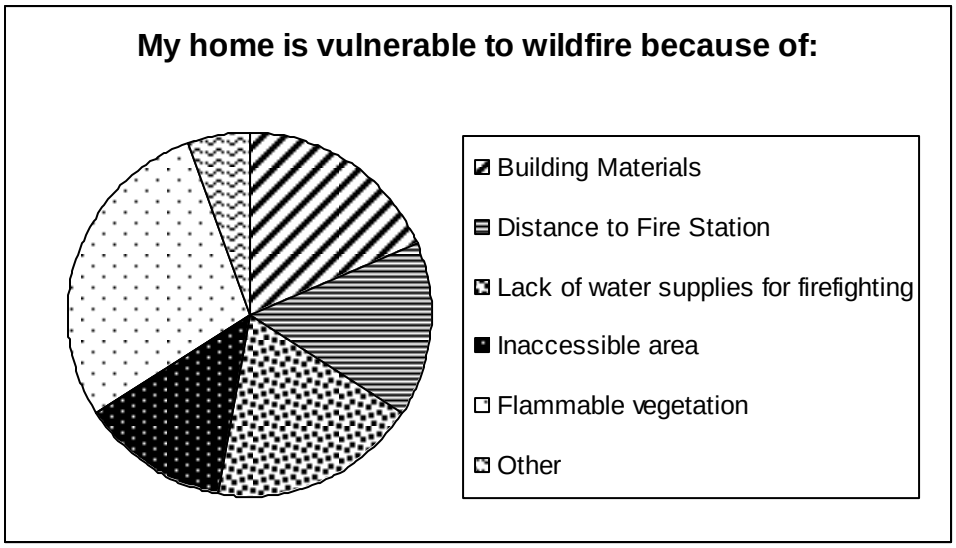
Many historical landmarks are scattered throughout the County. Particular CVARs that have been identified by the Core Team and the public are:

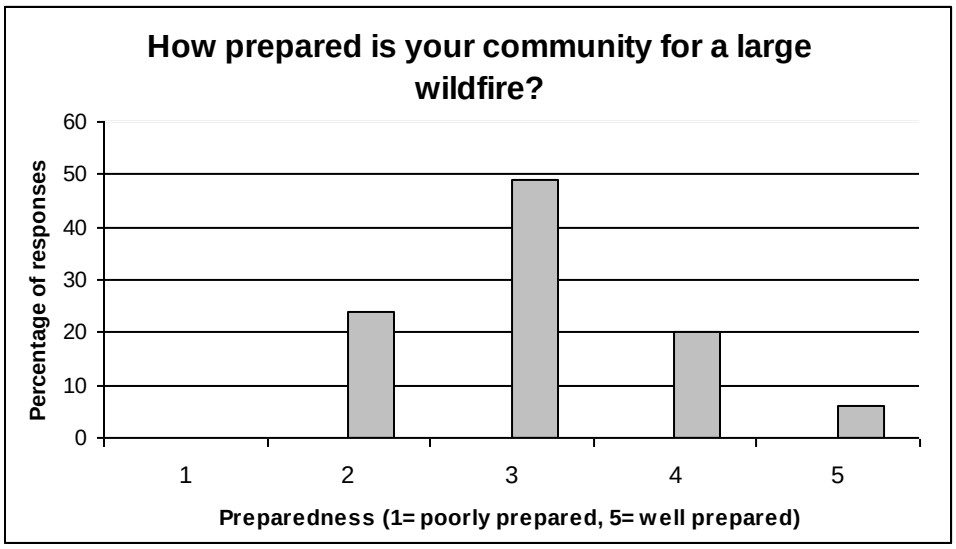
- All existing archaeological sites
- Blackdom (old town site)
- Old homesteads
- Old schoolhouses
- Historic buildings
- County Courthouse (trees on the property are "historic")

4.6 PUBLIC OUTREACH

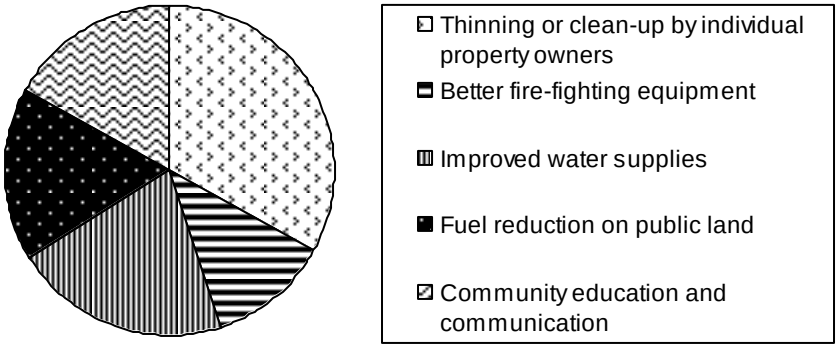
Over 30 surveys have been received as part of the public outreach effort for the CCCWPP. Respondents are residents of Roswell, Hagerman, Dexter, and Lake Arthur. The results of these surveys are as follows (n=31):


I would rate the chances of losing my home to fire as:
Low
Moderate
High

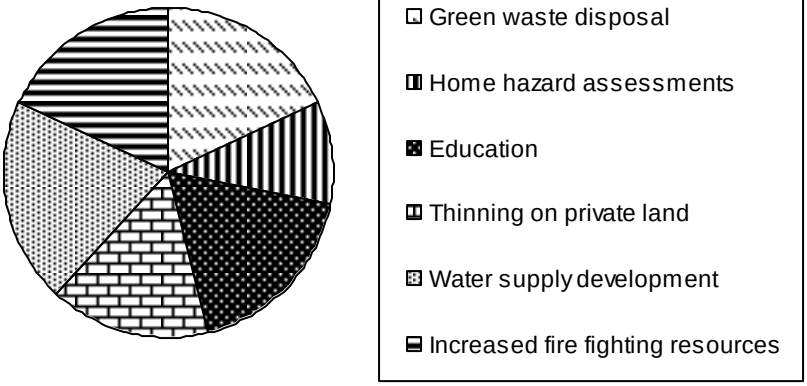

My home is vulnerable to wildfire because of:
Building Materials
Distance to Fire Station
Lack of water supplies for firefighting
Inaccessible area
Flammable vegetation
Other


How prepared is your community for a large wildfire?
Percentage of responses
60
50
40
30
20
10
0
1
2
3
4
5
Preparedness (1= poorly prepared, 5= well prepared)

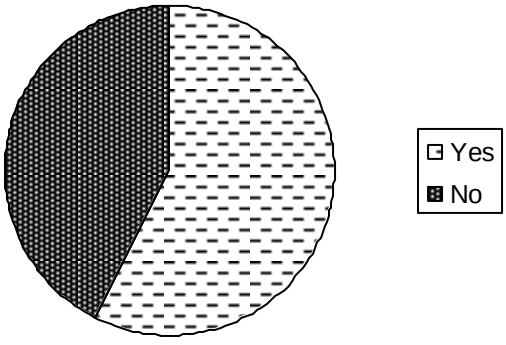
How could your community become better prepared for wildfire?



I would be most interested in funding to help my community with:



I have made efforts in the last 5 years to mitigate fire risk to my home:



These results (from 31 respondents) suggest that although people only perceive their homes to be at low to moderate risk from wildfire they are still interested in mitigating fire hazards to their communities through a variety of means, both on public and private lands. Over half of those surveyed have already made measures on their own properties to reduce fire risk. Additional comments that have been collected through the public outreach process are listed below:

- *The County needs to enforce a **ban against people burning debris** in their yards.*
- *My biggest challenge to protecting my home **is surrounding vegetation on neighboring properties**.*
- *I have carried out **thinning** on my property and **replaced combustible building materials**.*
- *I have **cleaned up yard debris** at my home.*
- *I have added a **waterline and faucet** to the outside of my home.*
- *I moved my **wood pile** and improved the **landscaping** around my home.*
- *I have **trouble convincing my neighbors** to keep down their weeds.*
- *The greatest risk to my home are **fields nearby if wind is blowing in the direction of town** (Hagerman).*
- *The biggest challenge to making my home more fire safe is **no way to irrigate**.*
- *My home is vulnerable to wildfire because of **abandoned farmland**.*
- *I mitigate fire risk by **regularly mowing** my property.*
- *My biggest challenge to making my home fire safe is **not having enough time** for all the preparation.*
- *I mitigated fire hazards around my home by **moving fuel and fire extinguishers** to a safe accessible location.*
- *My biggest challenge to making my home more fire safe is **educating the kids**.*
- *I mitigated fire hazards around my home by **building a fireline** around the property.*
- *The biggest threat to my home is **fireworks**. The County needs to **improve enforcement** against fireworks.*
- *My home is vulnerable to wildfire because of **weeds and wild-grasses**.*

The results of the public outreach help to drive the priorities for treatment and are used to formulate recommendations and action items.

5.0 RECOMMENDATIONS AND ACTION ITEMS

This chapter addresses four different types of recommendations: 1) fuels reduction projects, 2) public education and outreach, 3) actions homeowners and communities can take to reduce structural ignitability, and 4) actions to improve firefighting capability. These recommendations are based on Core Team input, public outreach, the Composite Risk/Hazard Assessment, and the Community Risk/Hazard Assessment. The recommendations are general in nature to provide maximum flexibility in implementation. Potential funding opportunities that may be used for implementation of the recommendations are found in Appendix G.

5.1 RECOMMENDATIONS FOR FUELS REDUCTION PROJECTS

The purpose of any fuels reduction treatment is to protect life and property by reducing the potential for catastrophic wildfire, as well as to restore landscapes to a sustainable and healthy condition. Moderating extreme fire behavior, reducing structural ignitability, creating defensible space, providing safe evacuation routes, and maintaining all roads for firefighting access are methods of fuels reduction likely to be used around communities located in a WUI zone. Use of multiple treatment methods often magnifies the benefits.

As discussed in Chapter 4, the fuels within the County are predominantly composed of semiarid shortgrass prairie vegetation, which consists almost entirely of native grasses. Fire behavior in this fuel model will vary based on weather conditions, the vegetative life stage, and the density and structure of the existing vegetation. Spotting is not generally a problem in this fuel type since the fire activity remains mainly on the ground surface and it typically burns cooler than vegetation types with heavier fuels. The main objective of fuels treatment in this fuel type is to reduce fuels in areas where they have built up in order for engines and firefighters to be able to safely suppress the fire. Shrubs also represent a significant percentage of the vegetative cover within this ecosystem, and fuels treatment in shrublands should be a focus for the County.

Table 5.1 summarizes the types of treatments recommended throughout the planning area. The majority of the treatments are focused on high or extreme risk areas, as defined by the Composite Risk/Hazard Assessment, Core Team collaboration, and public input. Many of these treatment recommendations are general across the communities because similar conditions and concerns were raised for all communities that border wildland areas. Specific action recommendations are highlighted in Table 5.1, which also addresses the requirement for an action plan and assessment strategy by providing monitoring guidelines and a timeline for implementation. This timeline is obviously dependent on available funding and resources, as well as National Environmental Policy Act protocols.

The treatment list is by no means exhaustive and should be considered purely a sample of required projects for the future management of the County. Fire management cannot be a one-size-fits-all endeavor; this plan is designed to be flexible. Treatment approaches and methods will be site-specific and should be adapted to best meet the needs of the landowner and the resources available. Moreover each treatment recommendation should address protection of CVAR particularly the protection of threatened and endangered species like the Lesser Prairie Chicken and Sand Dune Lizard. It is the intent of this plan to be an evolving document that will incorporate additional areas of the County as they change in risk category over time.

Table 5.1. Fuels Reduction Treatment Recommendations

Project	Location	Land Ownership/ Management	Method	Serves To	Timelines for Implementation	Priority (H,M,L)	Monitoring	Contact
Defensible space cost-sharing programs	All private land within CCCWPP planning area would be eligible; priority areas: Lake Arthur, Northeast Roswell, East Roswell, Midway, Hagerman, Peñasco Valley	Private	Selective thinning; pruning (to about 25% of tree/shrub height); chip and/or remove debris; provide adequate defensible space.	Protect life and property by reducing spread of fire from wildland fuels to urban structures. Also improve vehicle access, increase tree health/vigor, and give firefighters a margin of safety.	Spring 2011	H	Conduct on-site inspections with owners; consider photo documentation of pre- and post-treatment; apply adaptive management from best available information; determine if Firewise Communities techniques are being applied.	SWCDs already offer these programs. Extra funding would help in their efforts.
Defensible space assessments	All private land within CCCWPP planning area would be eligible	Private	Firewise Community-based assessments of individual homes. The professional assessment would help identify the most critical actions that an individual could take. Assessments could also include marking trees and shrubs suggested for removal.	Reduce risk of home ignitions. Empower homeowners to take the most effective actions. Allow funding to address a larger number of homes.	Fall 2011	H	Conduct on-site inspections with owners; identify and mark trees or shrubs for removal within the 100-foot safety zone.	NMSFD, New Mexico Association of Counties (NMAC), rural schools - Title III funding opportunities for Firewise programs
Create fuel breaks on the south/ southwest edge of communities	All private land within CCCWPP planning area would be eligible; priority areas: Dexter, Hagerman, Lake Arthur, Northeast Roswell, Southwest Roswell	Private/Public lands where appropriate	Strategic placement of treatments on private land will improve effectiveness. Fuel break prescriptions should be site-specific, depending on fuel type, topography, soils, and adjacent land management practices. Examples include mowing and blading strips along fence lines.	Help mitigate extreme fire behavior and provide an area from which firefighters can safely suppress a fire.	Spring 2011	H	Regular maintenance needed to ensure access is clear of vegetation or obstructions. Monitoring should occur prior to fire season (February) and in the fall (October).	NMSFD, BLM, State Land Office, SWCDs

Table 5.1. Fuels Reduction Treatment Recommendations, continued

Project	Location	Land Ownership/ Management	Method	Serves To	Timelines for Implementation	Priority (H,M,L)	Monitoring	Contact
Bosque thinning, saltcedar reduction	All riparian areas throughout the County; priority areas: Rio Felix, Bitter Lake National Wildlife Refuge, Peñasco Valley, Pecos River corridor, Bottomless Lakes State Park.	Private and public	Removal of saltcedar by cut and stump treatment or entire root extraction. Thin-from-below treatments in cottonwood to raise crown base height to >8 feet. This helps to reduce potential crown fire in cottonwood. Slash removal and disposal. Selective removal of other non-natives from bosque ecosystem.	Help mitigate extreme fire behavior in timber fuels and reduce potential spread to communities adjoining the bosque.	Spring 2011	H	Monitor effects on wildlife populations, soils, understory vegetation, invasive species, and water yield. Potential for community monitoring programs that include schools and youth groups. Refer to Chapter 6, Levels 1–4.	USFWS, Natural Resources Conservation Service (NRCS), SWCDs, NMSFD Possible cooperation between use of flood control funds for saltcedar extraction in the County, prioritizing areas at risk of wildfire
Collaborative Forest Restoration Program (CFRP) project for saltcedar reduction; Bitter Lake National Wildlife Refuge, Bottomless Lakes State Park, BLM, and private landowner collaboration	Biter Lake National Wildlife Refuge, Bottomless Lakes State Park, and adjoining BLM and private lands within the Pecos River corridor.	Private and public (funding can only be used on public lands)	Collaborative response to removal of saltcedar within the Pecos River Corridor. Cut and stump treatments or extraction and mulching with removal.	Reduce the fire hazard associated with dense stands of saltcedar currently established in riparian areas.	Proposals due March 2011; core group should be established by Fall 2010	H	CFRP projects require extensive monitoring of thinning effects. Monitoring plans would be developed by the multi-party group	SWCA, USFWS, BLM, NMSFD, USFS CFRP coordinator, Save Our Bosque Taskforce, BLM Restore New Mexico program

Table 5.1. Fuels Reduction Treatment Recommendations, continued

Project	Location	Land Ownership/ Management	Method	Serves To	Timelines for Implementation	Priority (H,M,L)	Monitoring	Contact
Remove abandoned structures and clean up yard debris	All communities	Private	Conduct mechanical thinning and manual clearing. Develop program of enforcement for the County. Begin plans to implement ICC code in part or full to enforce building regulations in the WUI zone.	Protect life and property by preventing spread of fire from wildland to structural fuels. Improve firefighter safety by providing clear access to structures in the WUI.	By Fall 2011	H	Develop a community taskforce to carry out assessments.	County to enforce
Mow and remove invasive species along railroad	Railroad throughout extent of County; priority areas: Dexter, Hagerman, Lake Arthur	Private, state, BLM, BNSF	Mow a 70-foot buffer along edge of railroad. Regularly remove invasive species and shrub encroachment.	Protect ranchland and communities from potential ignition from railroad.	Spring 2011	H	Regular maintenance needed to ensure clearance of vegetation and reduced fuels density. Monitoring should occur prior to fire season (February) and in the fall (October).	BNSF, BLM, State Land Office
Mow along major highway right-of-way	State and federal highways	Public	Extend mowing width. Mow to fence line.	Protect life and property from fire spread from potential ignition source; protect evacuation routes in event of wildfire.	Spring 2011	H	Regular maintenance needed to ensure clearance of vegetation and reduced fuels density Monitoring should occur prior to fire season (February) and in the fall (October).	New Mexico Department of Transportation Explore option of using prison crews, or Chaves County Court Compliance Division Community Service Program for mowing and maintenance of right-of-way.

Table 5.1. Fuels Reduction Treatment Recommendations, continued

Project	Location	Land Ownership/ Management	Method	Serves To	Timelines for Implementation	Priority (H,M,L)	Monitoring	Contact
Remove mesquite and Shinnery Oak (following guidelines for protection of T& E Species- i.e. the Lesser Prairie Chicken and Sand Dune Lizard)	Private ranchland	Private	Conduct mechanical clearance of mesquite and pile burning to remove residual slash. In areas of potential soil erosion, some residual slash should remain on the ground to reduce wind erosion.	Protect grassland ecosystem health by removing encroaching shrubland. Mitigate extreme fire behavior—rate of spread and flame length.	Spring 2011	H	Monitoring for soil erosion. Pre- and post-treatment monitoring and continued monitoring twice a year are needed.	NRCS, Farm Service Agency (FSA), State Land Office, Restore New Mexico (BLM funding program for brush removal)
Protect power lines and communication lines	All private land within CCCWPP planning area	Utilities company/ private	Maintain clearance under power lines and around posts.	Prevent destruction of energy or communications infrastructure in event of fire.	Fall 2011	H	Regular maintenance needed to ensure lines are clear of vegetation.	Utility companies
Mow around southwest fence lines	Grassland areas on state land	State land	Mow a 70-foot buffer around ownership boundary.	Protect life and property by slowing the rate of spread to adjoining grasslands and communities in event of grassland fire.	Spring 2011	H	Monitor effects of treatments on species dynamics and species composition, particularly invasion of exotic species. Monitor regrowth and erosion and maintain clearance. Refer to Chapter 6, Levels 1–4. Monitoring should be carried out prior to fire season (February) and in the fall (October).	State Land Office
Mow/Blade firebreaks on private lands	Grassland areas on private land	Private	Mow a 70-foot buffer around inside of ownership boundary.	Protect life and property by slowing the rate of spread to adjoining grasslands and communities in event of grassland fire.	Spring 2011	H	Monitor effects of treatments on species dynamics and species composition, particularly invasion of exotic species and soil erosions. Monitor regrowth and erosion and maintain clearance. Refer to Chapter 6, Levels 1–4. Monitoring should be carried out prior to fire season (February) and in the fall (October).	Private landowners, NMSFD

Table 5.1. Fuels Reduction Treatment Recommendations, continued

Project	Location	Land Ownership/ Management	Method	Serves To	Timelines for Implementation	Priority (H,M,L)	Monitoring	Contact
Fire effects monitoring	Entire CCCWPP planning area	Private and public	Carry out fuels monitoring and fire effects monitoring following wildfire and/or prescribed fire in grassland, shrubland, and riparian areas.	Improve understanding of the effectiveness of fuels treatments on fire behavior and provide an inventory of fuels loading to direct treatment.	Ongoing	H	Monitoring should be carried out for multiple (>3) years post-burn (both prescribed fire and wildfire) to assess vegetation response, wildlife response, soils, and hydrology. Refer to Chapter 6, Levels 1–4.	BLM, SWCD, NMAC, Youth Conservation Corps, local high schools, NMSFD
Create local fuels reduction task force/WUI working group	Landscape scale	Private and public	Formulate a task force of local practitioners who could develop best management practices for fuels treatment in grass and shrublands, particularly in the WUI. Create demonstration sites and workshops to inform local ranchers.	Protect community and infrastructure by empowering local landowners to create mechanism to protect their own properties.	Ongoing	M	Monitor effects of treatments on species dynamics and species composition, particularly invasion of exotic species. Monitor regrowth and erosion, and maintain clearance. Refer to Chapter 6, Levels 1–4. Monitoring and maintenance should occur prior to fire season (February) and in the fall (October).	Collaboration of land managers in County to improve fire planning
Prescribed Fire (following guidelines for the protection of the Lesser Prairie Chicken and Sand Dune Lizard)	Public lands	Public	Burn thin strips to act as fuel break when conditions allow.	Create a fuel break to slow the spread of grassland fires.	Ongoing	M	Monitor effects of treatments on species dynamics and species composition, particularly invasion of exotic species. Monitor re-growth and erosion, and maintain clearance. Refer to Chapter 6, Levels 1–4. Monitoring and maintenance should occur prior to fire season (February) and in the fall (October).	NMSFD

Table 5.1. Fuels Reduction Treatment Recommendations, continued

Project	Location	Land Ownership/ Management	Method	Serves To	Timelines for Implementation	Priority (H,M,L)	Monitoring	Contact
Preplanned fire breaks	Areas of stable soils	Public and private	Identify areas on public and private lands that would be appropriate for fire breaks. Select areas where soils are less erodible since all vegetation will be removed. On implementation, landowner or agency should chisel the land to retain root structure and prevent soil erosion.	Protect life and property in the event of a wildfire by having a preplanned area that could withstand fire break construction.	Ongoing	M	Would be a one-time-only treatment in response to wildfire.	Collaboration of land managers in County to improve fire planning. Could be an activity of the WUI Working Group.

5.2 FUELS TREATMENT METHODS

Since specifics of the treatments are not provided in detail in Table 5.1, different fuels reduction methods are outlined in the following narrative

Strategic timing and placement of fuels treatments is critical for effective fuels management practices and should be prescribed based on the conditions of each particular treatment area. Some examples of this would be to place fuel breaks in areas where the fuels are heavier and in the path of prevailing winds and to mow grasses just before they cure and become flammable. Also, burning during the hotter end of the prescription is important since hotter fires are typically more effective at reducing heavy fuels and shrub growth. In areas where the vegetation is sparse and not continuous, fuels treatments may not be necessary to create a defensible area where firefighters can work. In this situation, where the amount of fuel to carry a fire is minimal, it is best to leave the site in its current condition to avoid the introduction of more flammable, exotic species such as cheatgrass (*Bromus tectorum*).

5.2.1 MOWING

Mowing of fuel breaks and around perimeters should take place at least once every growing season depending on the regrowth of vegetation over the course of the fire season. It is acknowledged that this may not be viable for all producers, in which case focus should be placed on areas that would pose greatest risk to life and property (e.g., the southwest edges of communities). Areas with cheatgrass or weeping lovegrass (*Eragrostis curvula*) should be mowed in the early spring and later in the season, depending on the amount of regeneration that takes place throughout the course of the season. Although mowing will not permanently remove stands of exotics, limiting the production of seedheads will help control their density and spread over time.

In areas of encroaching shrubs or trees, more intensive fuels treatments may be necessary to keep the fire on the ground surface and reduce flame lengths. Within the fuel break, shrubs should be removed, and trees should be pruned to a height of 4 to 8 feet, depending on the height of the fuel below the canopy, and thinned with a spacing of at least two to three times the height of the trees to avoid movement of an active fire into the canopy.

5.2.2 PRESCRIBED BURNING

Prescribed burning is also a useful tool to reduce the threat of extreme fire behavior by removing excessive standing plant material, litter, and woody debris while limiting the encroachment of shrubby vegetation such as broom snakeweed (*Gutierrezia sarothrae*), piñon pine (*Pinus edulis*.), juniper (*Juniperus* sp.), and other woody species into the grasslands. Similar to mowing, prescribed fires should be conducted along roads surrounding the WUI and around the particular areas at risk. On private lands the use of prescribed fire is likely to be limited due to concerns for fodder production and risk of escape. Where possible, prescribed fire could occur on public lands since fire is ecologically beneficial to the grassland community and wildlife habitat (Figure 5.1). Some areas, particularly along roadsides, may be susceptible to the invasion of exotic species, so this practice should be carried out with management of invasive species in mind.

Figure 5.1. Prescribed burn for wildlife habitat benefit at Bitter Lake National Wildlife Refuge.

Using prescribed burns can initiate regeneration of grasslands and rangelands, as fire facilitates natural ecosystem dynamics, such as nutrient and water cycling, which increase variability in vegetation composition and density. Grasslands across the Southwest are threatened by woody encroachment, which shades out desirable plant species and uses large amounts of water. Grasslands have adapted to fire, and fire can be used periodically to remove unwanted trees. Fires provide restoration of productivity and diversity of grasslands, while controlling non-native or undesirable plant species and woody invasions.

Following any type of fuels reduction treatment, post-treatment monitoring should continue to ensure that management actions continue to be effective throughout the fire season. Vegetation in a grassland community can change rapidly in response to drought or moisture from year to year and during the course of the season, so fuels treatments should be adjusted accordingly.

5.2.3 Management of Non-native Plants

Like many ecosystems throughout New Mexico, the County landscape is undergoing gradual degradation as a result of infestation by non-native species (Parker et al. 2005). These species have contributed to changing fire regimes in the County, heightening the risk of fire. A number of methods have been developed for removal of non-natives; the appropriate technique will depend on the infestation density, management objectives, environmental concerns, costs, and social considerations (Parker et al. 2005). The USDA maintains a list of noxious weeds rated from A to C based on the current degree of infestation of the species and the potential for eradication (USDA 2010).

Treatments for Saltcedar Infestation

Riparian areas throughout the County have in recent years become overrun by saltcedar. A vigorous program of removal is ongoing and showing success in many areas. Despite this, the eradication and control of saltcedar and long-term commitment are challenging, and multiple techniques are required to reduce its extent and minimize its spread. Techniques used for the management of saltcedar include mechanical, chemical, and biological methods. The current saltcedar removal programs should be used as a model for future treatments.

Mechanical treatments, such as hand-pulling and cutting, can be used for smaller stands of young saltcedar saplings, but these treatments become expensive and ineffective within large stands of shrub-sized individuals (Parker et al. 2005). Root cutting and bulldozing can be effective, but the benefits may not outweigh the problems resulting from soil damage and the expense of this method. Fire has been used with some success, but because saltcedar is fire adapted, the species readily resprouts. Flooding can also be used to control saltcedar if root crowns remain submerged for at least three months. Resprouting is likely to occur after using any of these methods, so it is highly recommended to combine methods and follow-up treatments to continue control of this species.

Chemical control is typically the most effective method used for saltcedar; however, application of herbicides should be site-specific. Aerial applications of imazapyr or an imazapyr and glyphosphate mixture should occur from late August through September. This method is slow-acting, and treated trees should not be removed for up to three years after the treatment to ensure root kill. It is important to only use herbicides that are approved for application near water.

Biological control methods have also shown some success. One such method is the use of saltcedar leaf beetle (*Diorhabda elongate)*, which asserts physiological stress on the tree through defoliation. This treatment, coupled with burning in the summer months under intense prescribed fire prescription, has been successful in some saltcedar stands. Significant damage to the root crown is required for high mortality; this may require supplementing fuel loading, particularly around the root crown. The combination of cutting and/or chemical application to cut stumps or small-diameter whips is one of the most common management techniques used for saltcedar. The methods used will depend on the size of the saltcedar stand, the characteristics of the riparian area, and the distance to a community. Saltcedar eradication has been ongoing in the County on BLM, state, and USFWS lands, but collaborative efforts are lacking. Sharing experiences and working across agency boundaries could aid in enhancing this ongoing effort.

5.2.4 FUEL BREAKS

The topography across the region is largely flat or slightly rolling. Fuels treatment will vary depending on each specific targeted area, but mowing and prescribed burning are generally the most common methods for creating fuel breaks. Fire behavior in the County has been modeled using FlamMap. This assessment provides estimates of flame length and rate of spread; the information should be used by land managers when prescribing treatments. Based on this assessment, in areas exhibiting extreme fire behavior (e.g., the Rio Peñasco area), more intensive fuels treatments such as fire breaks (cut fuels to mineral soil) may be required. However, given the high erodibility of soils in the County, it is recommended that, where possible, fuels breaks (reduce fuel loading by cutting or mowing) are employed instead of fire breaks to maintain some

vegetation cover. Land managers are cautioned, however, that neither fire breaks nor fuel breaks will stop a fire under extreme fire behavior or strong winds; these should only be seen as a mitigating measure and not a fail-safe method for fire containment. Furthermore, fuel break utility is contingent upon regular maintenance, as regrowth in a fuel break can quickly reduce its effectiveness.

Within a fuel break, shrubs should be removed where they would generate high-severity fire behavior. In bosque areas, trees should be pruned to a height of 8 to 16 feet (depending on the height of the fuel below the canopy) to address FlamMap outputs that show high flame lengths along the Pecos River corridor. It is not possible to provide a standard treatment prescription for the entire landscape because fuel break dimensions should be based on the local fuel conditions and prevailing weather patterns. For example, in some areas, clearing an area too wide could open the landscape to strong winds that could generate more intense fire behavior and/or create wind throw.

Strategic placement of fuel breaks is critical to prevent fire from moving from wildland fuels into adjacent neighborhoods. A fuel break of 100 to 300 feet in shrubland should modify fire behavior significantly enough to allow suppression by firefighters. It is important to note, however, that shrub fuels are often replaced by grassland fuels in shrubland fuel breaks; flame lengths and rates of spread could be faster in these grassland fuels, but fireline intensity (heat produced per unit area) will be reduced, allowing more effective suppression. For effective management of most fuels, fuel breaks should be prescribed based on the conditions in each particular treatment area. Some examples of this would be to place fuel breaks in areas where fuels are heavier or in areas with easy access for fire crews. Because of the dominant wind patterns in New Mexico (i.e., out of the southwest), fuel breaks are recommended on the south and west sides of communities. In areas where the vegetation is discontinuous, fuel treatments may not be necessary. In this situation it is best to leave the site in its current condition to avoid the introduction of more flammable, exotic species like Russian thistle (*Salsola tragus)* and cheatgrass, which respond readily following disturbance.

It is the responsibility of local governments to gather input from affected stakeholders, then determine which method(s) will safely accomplish the fuels management objectives for a given area. Well-managed fuels reduction projects often result in ecological benefits to wildlife and watershed health. Simultaneously, planning and resource management efforts should occur when possible while reducing fuels to ensure that the land remains viable for multiple uses in the long term. The effectiveness of any fuels reduction treatment will increase over time with a maintenance and monitoring plan. Monitoring will also ensure that objectives are being met in a cost-effective manner.

5.3 RECOMMENDATIONS FOR PUBLIC EDUCATION AND OUTREACH

Needs for public education and outreach have been emphasized throughout the CCCWPP process by all participating parties. The Core Team has consistently commented on the need for better education of the public for fire preparedness, and discussions with community members during public outreach have indicated that most people are unaware of the danger of wildland fire in grassland communities and could be better informed of effective mitigation options. Over 20% of people surveyed have stated that they would like more information and education

regarding how they can reduce the risk of fire to their families and property, and 18% of people do not know what they needed to do in order to reduce fire risk. Table 5.2 lists recommendations for improving public education and outreach.

The people of the County have grown up with wildfire; however, it is important to continually raise awareness of fire risk and improve fire education (Winter and Fried 2000; McCaffrey 2004). One problem in reaching rural communities is that many local residents do not consider themselves to be part of any particular community. It is difficult to communicate with a large but diffuse population that is generally not organized into units such as townships or even neighborhood associations. Organizations that regularly communicate with landowners, such as the local SWCD, Farm Service Agency (FSA) office, Natural Resources Conservation Service (NRCS), and State Land Office, arguably are the most effective conduits for reaching the diverse population. Churches and schools may be other possible targets to help reach out to community members. The recruitment of volunteer neighborhood leaders to participate in planning efforts or attend workshops on fire behavior and defensible space may provide another option to disseminate available information.

Although many residents are familiar with Firewise Communities, many others could benefit from greater exposure to this program. Workshops demonstrating and explaining Firewise Communities principles have been suggested to increase homeowner understanding of home protection from wildfire. NMSFD 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 program could improve local understanding of wildfire and, in turn, improve protection and preparedness.

Other methods to improve public education could include providing signs indicating fire danger level (low, moderate, high, extreme) to be displayed in highly visible areas where they do not already exist; increasing awareness about fire department response and fire department resource needs; developing fire evacuation plans; providing workshops at demonstration sites showing Firewise Communities landscaping techniques or fuels treatment projects; organizing community cleanups; publicizing availability of government funds for thinning; and, most importantly, improving communication between homeowners and local land management agencies to improve and build trust.

Table 5.2. Recommendations for Public Outreach and Education

Project	Description	Presented By	Target Date	Resources Needed	Serves To
Targeted wildfire info sessions	Fund development of materials and presentations to highlight how a fire might affect particular groups within the community, such as realtors, ranchers, acequia communities, and real estate developers.	Community fire representative or agency outreach personnel	Spring 2011	Funding for research, writing, and presentation of detailed information on how large-scale wildfire would affect the target audience and the measures that could be taken to reduce the threat. Flyers could be sent out with utility bills or other community mailings.	Deliver a clear and consistent message that impacts of wildfire are far-reaching and that it is in the best interest of a diverse set of stakeholders to become involved in planning and preparing for fire.
VFD open invitation days	Raise awareness of the fire departments through open house and tours of equipment. Coordinate with Sierra fire department to utilize their public outreach displays.	VFDs	Annually	Advertising, refreshments, handouts.	Protect communities and infrastructure by potentially increasing recruitment and financial support for the fire service.
Neighbors for defensible space	Organize a community group made up of residents and agency personnel to develop materials and communicate relevant defensible space messages. Could coordinate with fire departments, for example the Sierra fire department has a Sparky the Fire Dog display and the USFWS has a Smokey the Bear display.	SWCDs, BLM, NMSFD, local residents	2011	Funding to help cover costs of materials and participation.	Engage diverse stakeholders in reaching out to community members and encourage defensible space practices. Over 20% of people surveyed in the County requested education and public outreach as a means for them to reduce their wildfire risk.
Coordination between VFDs and local ranchers	Identify community members that have available equipment and skills so VFDs know what equipment is available on each privately owned parcel of land.	VFDs, FSA	Annually	FSA members lists, contact information, meeting place.	Protect communities and infrastructure through increasing available resources and reducing response times.
Media involvement	Develop a local newspaper column that provides fire safety information, promotional information for VFDs, fire announcements, and emergency planning.	Chaves County/Roswell Newspaper	Weekly column year-round	Columns, information, and articles to be provided by VFDs, NMSFD, BLM, State Land Office, FSA, NRCS, County.	Protect communities and infrastructure through increasing public awareness and providing a channel for information regarding emergency fire response.
Involvement of railroad in fire and emergency planning	Increase coordination with railroad representatives to increase awareness of the ignition potential of the railroad and improving fire mitigation in the railroad corridor.	BNSF, County, state and federal agencies	Summer 2011	Meeting venues, coordination, and facilitation.	Protect communities and infrastructure through uniting land managers in a plan to limit ignition potential and risks posed by the BNSF Railway.

Table 5.2. Recommendations for Public Outreach and Education, continued

Project	Description	Presented By	Target Date	Resources Needed	Serves To
Increase signage	Increase fire prevention signage along highways to reduce human ignitions. Also, post more signs with County Road numbers.	New Mexico Department of Transportation	Summer 2011	Signs, posts, people to post signs.	Protect communities and infrastructure by raising awareness of local citizens and those traveling in the County about actions that can prevent fire.
Improve enforcement of burn bans	Implement burn ban enforcement and raise public awareness of the ban.	County	Summer 2011	Funding for increased numbers of enforcement officers.	Raise awareness of the dangers of burning on private property and emphasize that burning is illegal and will be punished.
Strengthen ordinances to allow enforcement of trash and debris clean-up on private property	Implement enforcement of clean-up and raise public awareness of the County code.	County	Summer 2011	Funding for increased numbers of enforcement officers. Incentives to encourage property owners to clean-up their properties. This is Goal 5.12, Objective 5.12.A and 5.12 B in the Chaves County (2004) Comprehensive Plan.	Raise awareness of the dangers of trash and debris build-up on properties and the risk that yard waste and debris fuels can pose for fire danger. Many people surveyed commented that their properties were threatened by fire because of debris, weeds, and trash in their neighbors' yards.
Increase the use of prescribed burning as a fuels reduction method	Gain support for using prescribed burns to reduce fuel loads and to improve ecosystem health, where grazing needs allow.	BLM, other applicable agencies, private landowners	Summer 2011	Prescribed burn prescription, type-6 engines, hand crews, equipment.	Protect communities and infrastructure by reducing fuel loads.
Homeowner's Guide	Develop a handbook that gives locally relevant and detailed information to help residents be more prepared for wildfire, including a defensible space checklist specific to local structural and wildland fuel considerations. Refer to Appendix H.	SWCDs, local fire departments, State Cooperative Extension agents	2011	Funding to develop and print copies of the handbook. Volunteers to help distribute and explain the document.	Give residents detailed and locally specific tools that they can use to improve preparedness.
Emergency preparedness meetings	Use American Red Cross volunteers and other preparedness experts. Attend community functions and hold special meetings to provide guidance for creating household emergency plans.	American Red Cross, County personnel	Ongoing	Written materials.	Improve preparedness by facilitating the communication between family members and neighbors about what procedures to follow in the event of a wildfire.
Defensible space workshops	Attend all possible community meetings and hold additional workshops to educate homeowners about why and how to create effective defensible space.	Community fire representative or agency outreach personnel	Summer 2011, ongoing	Written materials, trained personnel. Consider applying for Title III Secure Rural Schools funding for Firewise work.	Empower homeowners to make affordable and effective changes to reduce the vulnerability of individual homes.

Table 5.2. Recommendations for Public Outreach and Education, continued

Project	Description	Presented By	Target Date	Resources Needed	Serves To
Improved understanding of grass fire risk	Provide education and information about the risks associated with grass fires. Dispel misunderstanding that wildland fires affect only communities surrounded by timber.	VFDs, fire specialists, NRCS, BLM, private landowners	Summer 2011	Information about the risks associated with grassland fires and examples of communities affected by grassland fires.	Protect communities and infrastructure through increased awareness.
Plan evacuation routes and inform communities	Work with emergency management officials to plan evacuation routes and then inform the public about the routes.	Emergency management officials	Fall 2011	GIS software or maps.	Protect communities and infrastructure through increased awareness.
Implement Firewise Communities programs	Work with communities to participate in Firewise Communities and prepare for fire events. Hold Firewise booths at local events, for example, the County Fair, Party on the Pecos, Chile Festival, or UFO Festival.	NMSFD, USFS, Sierra fire department (has a train the trainer booth), USFWS (has a Smokey the Bear booth).	Fall 2011	Firewise Communities educational materials.	Protect communities and infrastructure through increased awareness and defensible space.

5.4 RECOMMENDATIONS FOR REDUCING STRUCTURAL IGNITABILITY

Table 5.3 provides a list of community-based recommendations to reduce structural ignitability that should be implemented throughout the CCCWPP planning area. Reduction of structural ignitability depends largely on public education that provides homeowners the information they need to take responsibility for protecting their own properties. Below is a list of action items that individual homeowners can follow (Section 5.4.1). Carrying out fuels reduction treatments on public lands may only be effective in reducing fire risk to some communities; however, if homeowners have failed to provide mitigation efforts on their own land, the risk of home ignition remains high and firefighter lives are put at risk when they carry out structural defense. Many committed members of the County serve their neighbors as volunteer firefighters, but these firefighting resources are continually stretched, particularly during a widespread wildfire. Preparing for wildland fire by creating defensible space around the home is an effective strategy for reducing structural ignitability. Studies have shown that burning vegetation beyond 120 feet of a structure is unlikely to ignite that property through radiant heat (Cohen and Butler 1996), but fire brands that travel independently of the flaming front have been known to destroy houses that had not been impacted by direct flame impingement. Education about managing the landscape around a structure, such as removing weeds and debris within a 30-foot radius and keeping the roof and gutters of a home clean, are two methods for creating defensible space. Educating people about the benefits of cutting trees and using Firewise Communities landscaping methods on their property is also essential for successful household protection.

It is important to note that no two properties are the same. Homeowners and communities are encouraged to research which treatments would have the most effect for their properties. Owners of properties on steep slopes, for example, should be aware that when constructing defensible space they have to factor in slope and topography, which would require extensions to the conventional 30-foot recommendations. A number of educational programs are now available to homeowners through local fire departments or NMSFD; Firewise Communities is one example of such a scheme (www.firewise.org). More detailed information on structural ignitability can also be found in Appendix H (Homeowner's Guide).

Some structural ignitability hazards are related to homes being in disrepair, vacant or abandoned lots and minimal yard maintenance. In order to influence change in homeowner behavior County ordinances may be needed. The following information is drawn from the Chaves County Comprehensive Plan (Chaves County 2004).

Weed and junk accumulation is a problem in the County that is recognized in the Chaves County Comprehensive Plan and also identified during the CWPP community assessments. Enforcement is difficult for the County, due to its size and the lack of enforcement officers, and many homeowners do not agree on what is junk and whether it is a bad thing. The overall feeling from homeowners is that the County is infringing on property rights, plus most people do not have the equipment or the money to clean up their properties.

Abandoned buildings are recognized as a hazard to health, safety, and the welfare of a community. There are many abandoned properties throughout the County that are owned by absentee property owners, and it is difficult to coordinate with them to do clean-ups. Property owners are often indifferent about their dilapidated properties or disagree with the County. Some

owners do not have the resources to keep their properties clean and in good repair either because they are elderly, in ill health, or do not have the funds.

To resolve these issues the County has considered two options (Goal 5.12 and Policy 5.12; Section 5-24 of the Chaves County Comprehensive Plan [Chaves County 2004]):

Objective 5.12A: Create an incentive program for property owners to voluntarily remove weeds and junk from their properties and to repair or remove abandoned or dilapidated structures.

Objective 5.12B: Strengthen the ordinances so that Code Enforcement will have a better tool to enforce the removal of weeds, junk, and abandoned or dilapidated structures.

Table 5.3. Recommendations for Reducing Structural Ignitability

Project	Private Lands/ Homeowner	Public Lands	Programs Available	Description	Possible Contacts for More Information	Priority
Offer fire protection workshops	All residents would be encouraged to participate	None	Community fire liaison, agency outreach personnel	Offer hands-on workshops to highlight individual home vulnerabilities and teach how-to techniques to reduce ignitability of common structural elements. Examples include installing metal flashing between houses and fences or decks, and installing wire mesh over eaves, vents, and under decks.	State Firewise Communities personnel, NRCS, fire chiefs	High
Strengthen building codes for new development	County	None	International Wildland-Urban Interface Code	ICC enforces building codes and ordinances for new development in the WUI.	State fire marshal, NMSFD	Moderate
Construct defensible space	All residents would be encouraged to participate	None	Firewise Communities, NMSFD, local fire department liaison	Educate homeowners about defensible space practices. Remove all but scattered trees within 30 feet of structures. Keep grass mown and green within 100 feet of structures. Keep flammable materials at least 30 feet from structures. Surround foundations with rocks or gravel to a width of 1 foot.	www.firewise.org or local NMSFD Firewise Communities-trained personnel; possible land ownership assistance program through NMSFD-sponsored program; requires preparation of a Wildfire Mitigation Cost Share Assistance Application	High
Participate in defensible space cost-sharing programs	All private land within the CCCWPP area would be eligible	None	SWCD in other counties are already offering these programs and could be used as a model	This project would provide additional funding to SWCDs to expand existing program and target new participants.	SWCD managers	High
Implement community chipper days	All residents would be encouraged to participate	None	NMSFD	A chipper and operator would be provided free of charge in a central location for residents to bring small trees and brush. Chips could remain at chipper location or be utilized by participants.	NMSFD	High
Assess and improve accessibility to property	All residents would be encouraged to participate	None	Fire departments, code enforcement officers	Inform homeowners about the importance of keeping driveways accessible to fire trucks and emergency responders.	Local fire departments	Moderate
Provide a list of mitigation measures to homeowners with different scales of actions	All residents would be encouraged to participate	None	Fire departments, Firewise Communities, NMSFD literature, USFS literature, academic and peer-reviewed literature	See list of action items below (Section 5.4.1).	SWCDs, NMSFD, fire departments	High

5.4.1 Action Items for Homeowners to Reduce Structural Ignitability

Low or No Cost Investment (<$50)

- Regularly check fire extinguishers and have a 100-foot hose available to wet perimeter.
- Maintain defensible space for 30 feet around home (see Table 5.3). Work with neighbors to provide adequate fuels mitigation in the event of overlapping property boundaries.
- Make every effort to keep lawn mowed and green during fire season.
- Screen vents with non-combustible meshing with mesh opening not to exceed nominal ¼-inch size.
- Ensure that house numbers are easily viewed from the street.
- Keep wooden fence perimeters free of dry leaves and combustible materials. If possible, non-combustible material should link the house and the fence.
- Keep gutters free of vegetative litter. Gutters can act as collecting points for fire brands and ashes.
- Store combustible materials (firewood, propane tanks, BBQs) away from the house; in shed, if available.
- Clear out materials from under decks and/or stacked against the structure. Stack firewood at least 30 feet from the home, if possible.
- Reduce your workload by considering local weather patterns. Since the prevailing winds in the area are often from the southwest, consider mitigating hazards on the southwest corner of your property first, then work around to cover the entire area.
- Seal up any gaps in roofing material and enclose gaps that could allow fire brands to enter under the roof tiles or shingles.
- Remove flammable materials from around propane tanks.

Minimal Investment (<$250)

- When landscaping in the Home Ignition Zone (HIZ) (approximately 30 feet around the property), select non-combustible plants, lawn furniture, and landscaping material. Combustible plant material like junipers and ornamental conifers should be pruned and kept away from siding. If possible, trees should be planted in islands and no closer than 10 feet to the house. Tree crowns should have a spacing of at least 18 feet when within the HIZ. Vegetation at the greatest distance from the structure and closest to wildland fuels should be carefully trimmed and pruned to reduce ladder fuels, and density should be reduced with approximately 6-foot spacing between trees crowns (Figure 5.2).
- Box in eaves, attic ventilation, and crawl spaces with non-combustible material.
- Work on mitigating hazards on adjoining structures. Sheds, garages, barns, etc., can act as ignition points to your home.
- Enclose open space underneath permanently located manufactured homes using non-combustible skirting.

- Clear and thin vegetation along driveways and access roads so they can act as a safe evacuation route and allow emergency responders to access the home.
- Purchase or use a National Oceanic and Atmospheric Administration weather alert radio to hear fire weather announcements.

Figure 5.2. Structure requiring defensible space and fuels mitigation.

Moderate to High Investment (>$250)

- Construct a non-combustible wall or barrier between your property and wildland fuels. This could be particularly effective at mitigating the effect of radiant heat and fire spread where 30 feet of defensible space is not available around the structure.
- Construct or retrofit overhanging projections with heavy timber that is less combustible.
- Replace exterior windows and skylights with tempered glass or multilayered glazed panels.
- Invest in updating your roof to non-combustible construction. Look for materials that have been treated and given a fire-resistant roof classification of Class A. Wood materials are highly combustible unless they have gone through a pressure-impregnation fire-retardant process.
- Construct a gravel turnaround in your driveway to improve access and mobilization of fire responders.
- Treat construction materials with fire-retardant chemicals.
- Install a roof irrigation system.
- Replace wood or vinyl siding with nonflammable materials.
- Relocate propane tanks underground.

5.5 RECOMMENDATIONS FOR IMPROVING FIREFIGHTING CAPABILITIES

Chaves County is served by eight County fire departments (Berrendo, District 8, Dunken, East Grande Plains, Midway, Peñasco, Rio Felix and Sierra) and 4 municipal fire departments. Despite the fact that the majority of these stations are served by volunteers, each of these departments have been proactive in seeking funds to support their services. Educating the public so they can reduce its dependence on fire departments is essential because these resources are often stretched thin during fire season. Greater emergency planning for communities is necessary, particularly those communities in areas where response times for emergency services may be greater than in municipal zones. Table 5.4 provides recommendations for improving firefighting capabilities.

Table 5.4. Recommendations to Improve Firefighting Capability

Project	Fire Department	Possible Solution	Timeline	Contact
Continue to overhaul maps used by fire responders	All fire departments	Seek funding to aid the overhaul of County maps, and make them available in GIS and global positioning system (GPS) for fire responders. This should include providing GPS coordinates of County Section corners to aid navigation. Update home occupancy information on an annual basis, and input information on maps.	Spring 2011	County Manager and rural addressing
Increase VFD recruitment (diversify age classes)	All fire departments	Target fire education in schools to encourage younger generations to become interested in firefighting. Carry out recruitment drives through open house and mailings.	Annually	Fire department chiefs, school districts; Sierra fire department already has a schools program from which other fire departments could build
Increase funds for VFDs	All fire departments	1) Maintain contact with state fire marshals and regularly seek grant money. 2) Implement regular evaluations of resource needs for each VFD and make available to public to raise awareness of shortages. 3) Maintain updated list of fires in County and provide to NMSFD. 4) Use local media to inform public of fire resources situation. Work with local newspaper editor to have a year-round column that documents fire department activities. 5) Apply for Rural Fire Assistance Program grants. 6) Improve ISO ratings.	Monthly review of grant opportunities	Fire department chiefs, County emergency managers, Fire Services staff, and County Managers to approach County Commissioners to raise the issue in commissioner meetings
Train volunteer firefighters	All fire departments	1) Research into funds that could provide stipend to volunteer firefighters to improve participation in training course. 2) Seek funding to hire trainers to come to VFDs to do training 3) Research online training classes for volunteer firefighters	Spring 2011	Fire Services staff, fire department chiefs
Improve emergency medical assistance	All fire departments	Need more trained emergency medical technicians and American Red Cross-certified people in the County who could be called on in for emergencies.	Fall 2011	County Emergency Manager
Increase availability of tanker trucks for VFD's	All fire departments	Regular communication with BLM and other federal agencies who may be de-commissioning old trucks/tankers that could be acquired by VFDs.	Ongoing-quarterly	Fire Services Administrator
Provide adequate water supplies at fire stations	All fire departments	Obtain funding to improve water supply systems at fire stations.	Summer 2011 (this is an ongoing process)	Fire department chiefs, County Commissioners

Table 5.4. Recommendations to Improve Firefighting Capability, continued

Project	Fire Department	Possible Solution	Timeline	Contact
Increase water sources and water delivery systems, particularly in areas adjacent to WUI	All fire departments	1) Obtain funding to purchase equipment and to implement rainwater harvesting or similar systems on all VFD stations. 2) Obtain portable dip tanks for fire departments; request for one for Dunken fire department. 3) Strategically locate water storage on private lands with prior agreement from landowner to maintain water supply. Fire departments would have permission to access tanks in the event of wildfire.	Summer 2011 (this is an ongoing process)	Fire department chiefs
Regularly seek funding to purchase improved equipment	All fire departments	Obtain funding to purchase equipment or continue to make trade agreement with other fire stations.	Fall 2011 (this is an ongoing process)	Funding agencies
Map water supplies	All fire departments	Use GPS to map all available water supplies.	Spring 2011	Fire department chiefs, Fire services staff, County emergency managers, and County managers to approach County about potential funding
Build helipad at Dunken fire department	Dunken	Seek funding for development of a helipad area at the new Dunken fire department.	Fall 2010	Fire Services Administrator, Dunken fire department chief
Create tire changing stations	Dunken, Rio Felix, Peñasco	Continue to pursue funding to develop a tire changing station at fire departments to alleviate travel time required for tire replacement.	Fall 2010	Fire Services Administrator, fire department chiefs
Create fueling station	Dunken	Continue to pursue funding to develop a fueling station at the new Dunken fire department to serve the Dunken station, other fire departments, and state, County, and municipal emergency responders.	Fall 2010	Fire Services Administrator
Establish additional MOUs with neighboring landowners	County and municipal fire departments, BLM, state, and USFWS	Strengthen or build new MOUs between emergency responders on adjacent lands to facilitate more effective fire response.	Ongoing	Fire Services Administrator, BLM, USFWS, State Land Office, State Parks Department

6.0 MONITORING AND IMPLEMENTATION

Developing an action plan and an assessment strategy that identifies roles and responsibilities, funding needs, and timetables for completing highest-priority projects is an important step in organizing the implementation of the CCCWPP. Table 5.1 in the previous section identifies tentative timelines and monitoring protocols for fuels reduction treatments, the details of which are outlined below.

An often overlooked but critical component of fuels treatment is monitoring. It is important to evaluate whether fuels treatments have accomplished their defined objectives and whether any unexpected outcomes have occurred. In addition to monitoring mechanical treatments, it is important to carry out comprehensive monitoring of burned areas to establish the success of fuels reduction treatments on fire behavior, as well as monitoring for ecological impacts, repercussions of burning on wildlife, and effects on soil chemistry and physics. 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 monitoring of each fuels reduction project would be site-specific, and decisions regarding the timeline for monitoring and the type of monitoring to be used would be determined by project. Monitoring and reporting contribute to the long-term evaluation of changes in ecosystems, as well as the knowledge base about how natural resource management decisions affect both the environment and the people who live in it.

The most important part of choosing a monitoring program is selecting a method appropriate to the people, place, and available time. Several levels of monitoring activities meet different objectives, have different levels of time intensity, and are appropriate for different groups of people. They include the following:

Minimum—Level 1: Pre- and Post-project Photos

Appropriate for many individual homeowners who conduct fuels reduction projects on their properties.

Moderate—Level 2: Multiple Permanent Photo Points

Permanent photo locations are established using 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, percentage of cover, and frequency. Monitors then can record site characteristics such as slope, aspect, and elevation. Parameters would be assessed pre- and

post-treatment. The monitoring agency should establish plot protocols based on the types of vegetation present and the level of detail needed to analyze the management objectives.

Intense—Level 4: Basic Vegetation Plus Dead-and-downed Fuels Inventory

The protocol for this level would include the vegetation plots described above but would 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 other methods, such as Brown's transects (Brown 1974), an appropriate photo series (Ottmar et al. 2000), or fire monitoring (Fire Effects Monitoring and Inventory System [FIREMON]) plots.

6.1 IDENTIFY TIMELINE FOR UPDATING THE CCCWPP

While a specific timeline for updating the CCCWPP has not been determined as part of this document, the Core Team should continue to communicate after the plan is completed to discuss the best method for making revisions to reflect changing conditions. The HFRA allows for maximum flexibility in the CWPP-planning process, permitting the Core Team to determine the timeframe for updating the CWPP. It is suggested that the plan be revised at least every two years.

6.2 IMPLEMENTATION

The CCCWPP makes recommendations for prioritized fuels reduction projects as well as measures to reduce structural ignitability and carry out public education and outreach. Implementation of fuels reduction projects need to be tailored to the specific project and will be unique to the location depending on available resources and regulations. On-the-ground implementation of the recommendations in the CCCWPP planning area will require development of an action plan and assessment strategy for completing each project. This step will identify the roles and responsibilities of the people and agencies involved, as well as funding needs and timetables for completing the highest-priority projects (SAF 2004). Information pertaining to funding can be found in Appendix G.

6.3 CONCLUSION

The CCCWPP has been developed to meet the requirements of a CWPP as specified in the HFRA (as amended). The plan addresses how to prepare for wildland fire throughout the County and assesses the risk of this type of fire event creating damage to communities in WUI areas. Although there is growing acknowledgement of the risk of fire among grassland residents, many still perceive grassland areas to be at a lesser risk of fire than their forest neighbors. This plan highlights that although grassland fuels are often not rated as severely in fire behavior models, additional parameters contribute to the risk associated with fire in grassland WUIs. The CWPP risk assessment illustrates the high fire risk that can be attributed to the rapid rates of spread observed by emergency responders and residents in the County.

The planning process emphasizes public participation and collaborative planning among federal, state, County, and local governments and other contributing agencies. The document makes recommendations for fuels reduction treatments, educational outreach activities, firefighting

capabilities, and reduction of structural ignitability. The recommendations are based on a Composite Risk/Hazard Assessment, individual Community Risk/Hazard Assessments, identification of CVARs, and comments from the Core Team and community members. The recommendations are general in nature to provide high levels of flexibility in the implementation phase. The public has provided input that is used to develop the recommendations through filling out surveys and talking with members of the Core Team. The public is aware of the need to implement mitigation measures around each individual's homes, but many are often not sure what they could do for lasting fire protection in a dynamic grassland ecosystem.

The goal of the CCCWPP is to reduce the risk for catastrophic wildfire throughout the County by providing specific information regarding what is most at risk and how to protect these places and community values from future fires. Because fuels reduction is difficult in grassland areas, most emphasis is placed on the reduction of structural ignitability and action items that homeowners can take to reduce the risk of fire to their property. Most communities throughout the County are dependent on volunteer firefighting; with limited resources and funds, personnel become stretched particularly during fire season. The County is made up of a mosaic of private lands and federally managed lands; much of the implementation recommended in this plan falls to both private landowners, federal agencies and the County. It will be important for land management agencies to provide knowledge, skills, and funding assistance to these private landowners so that sufficient fire mitigation measures can be made. Moreover, collaboration between public and private entities is important in order to provide continuous landscape treatments to protect WUI communities. Lastly, the CCCWPP is a living document and should be revised as environmental conditions change or social issues arise.

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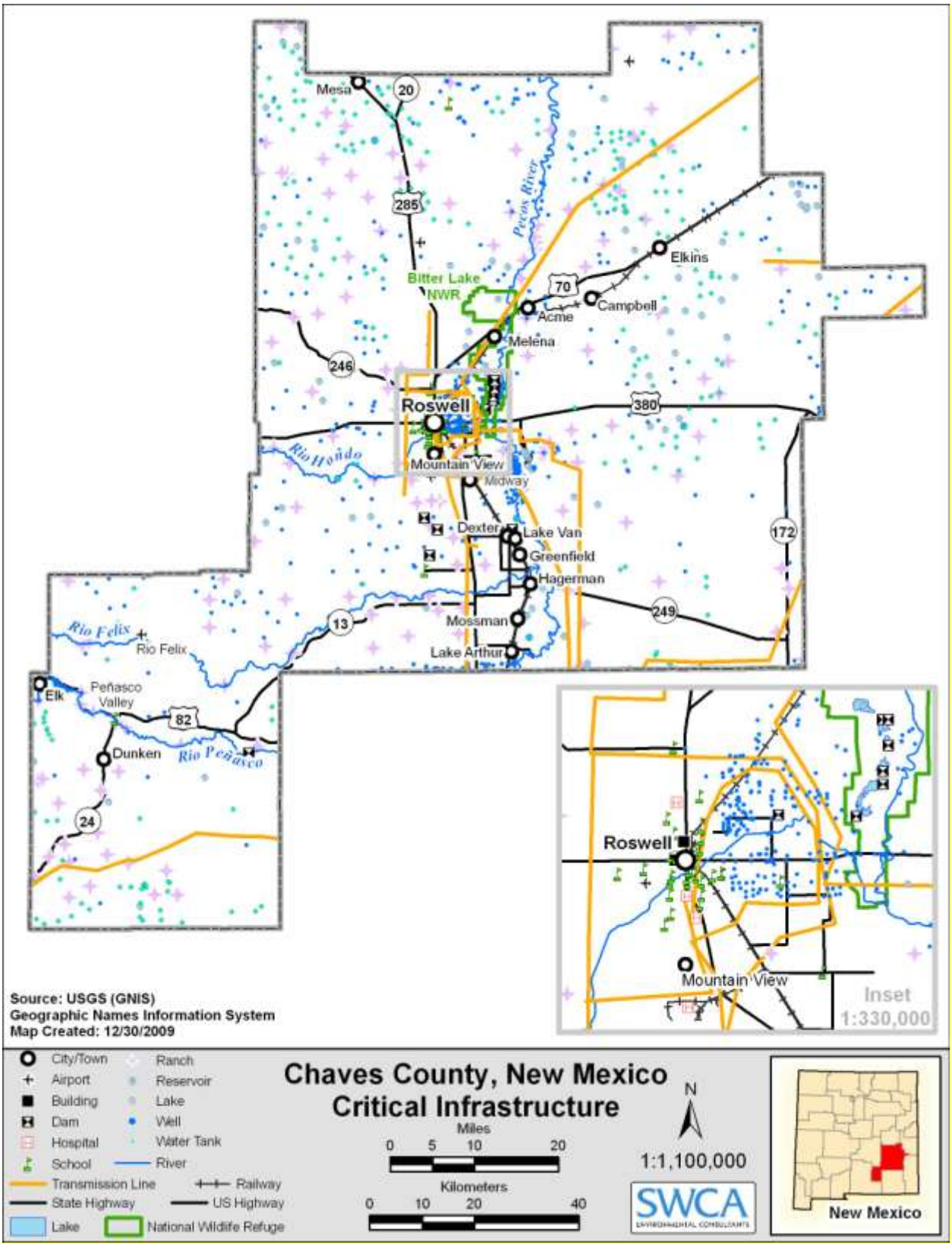
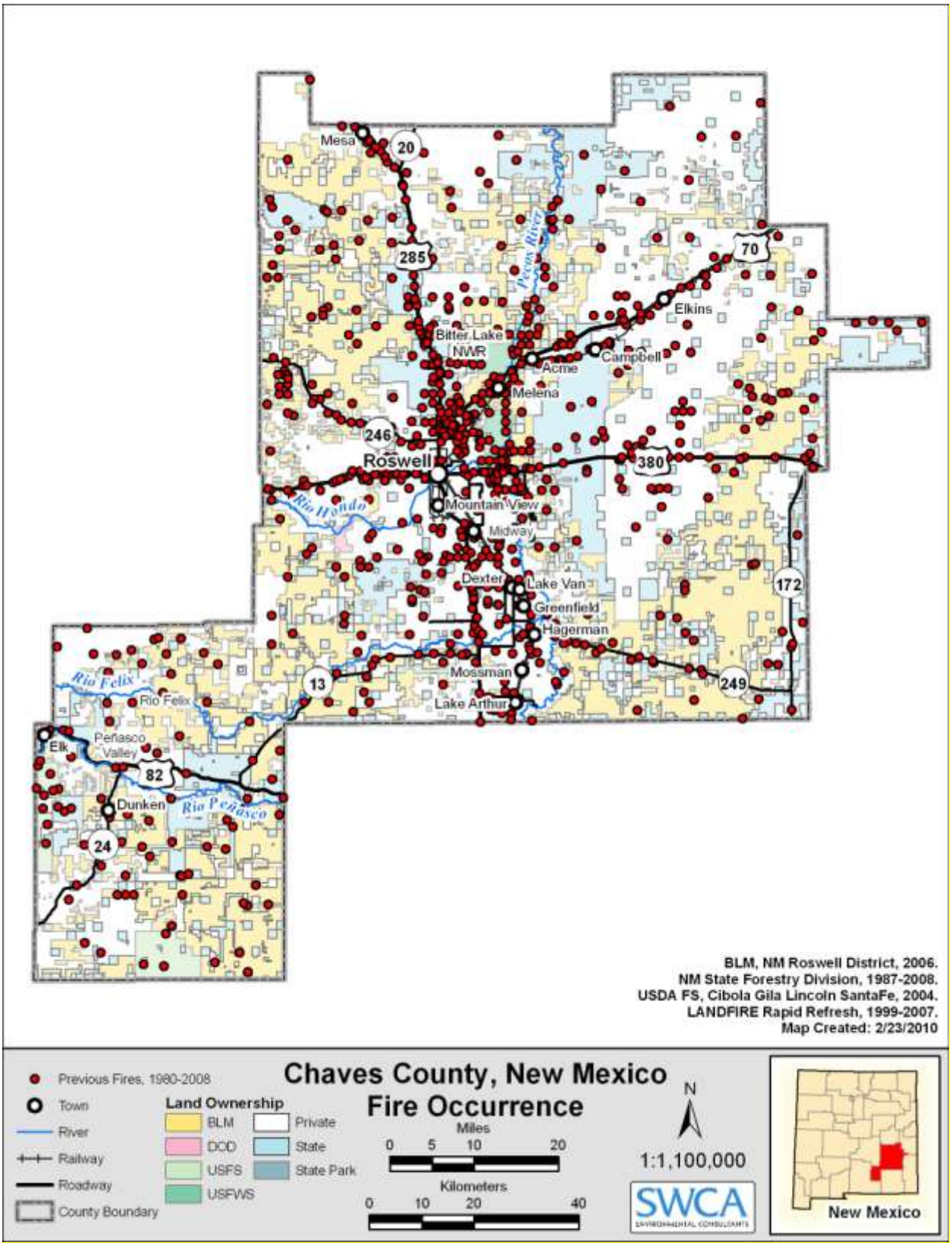
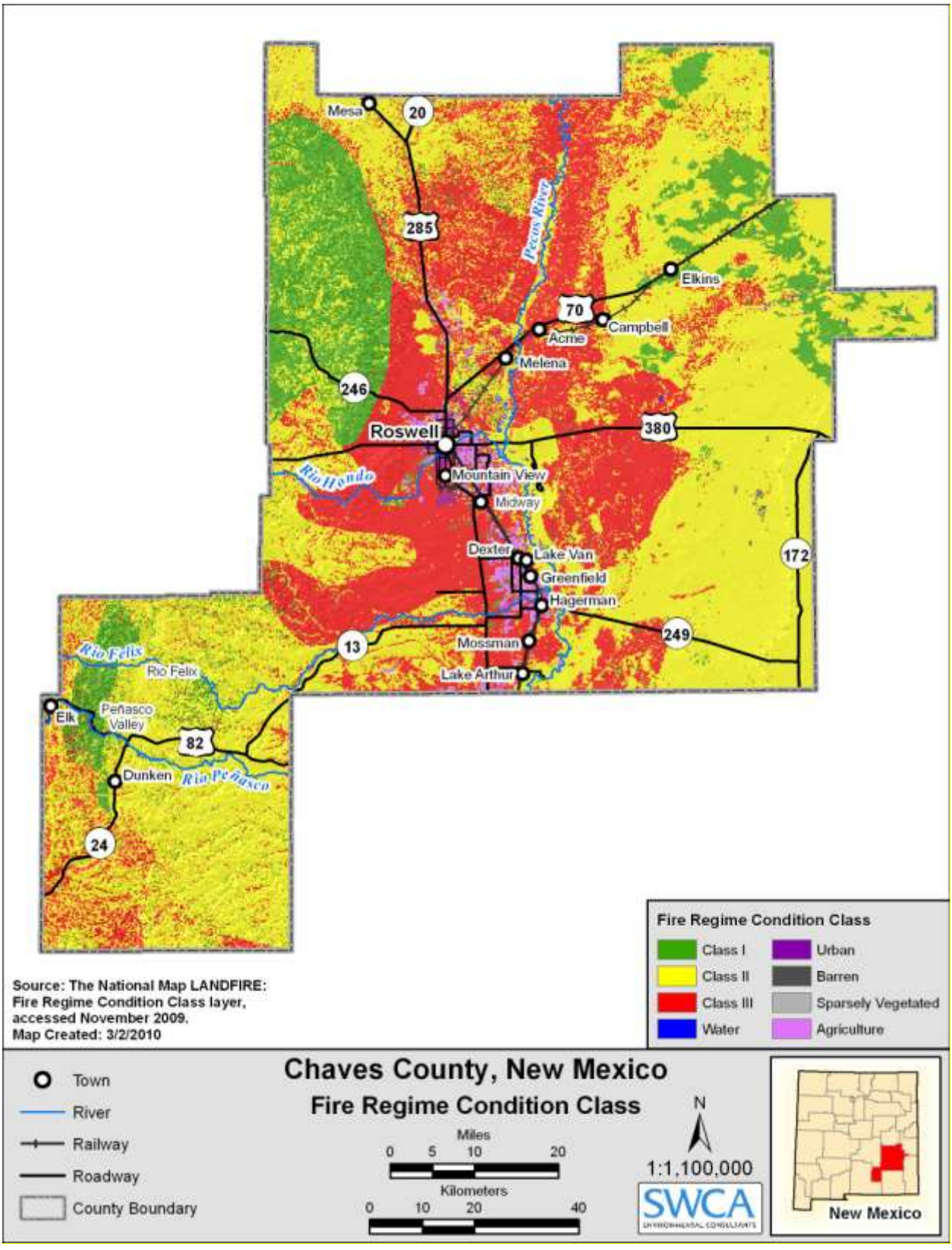
APPENDIX A
MAPS



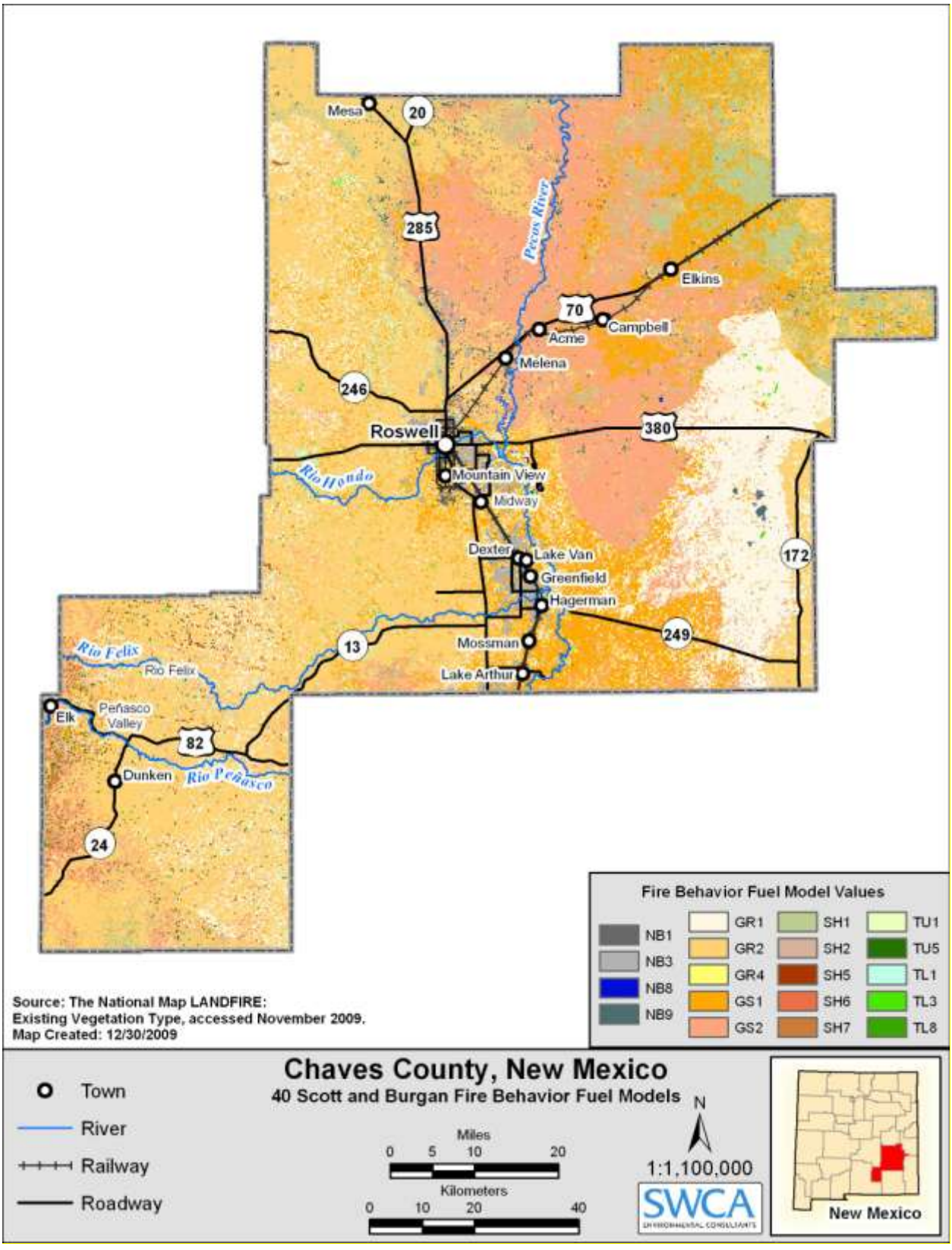
Map 1. Critical infrastructure.



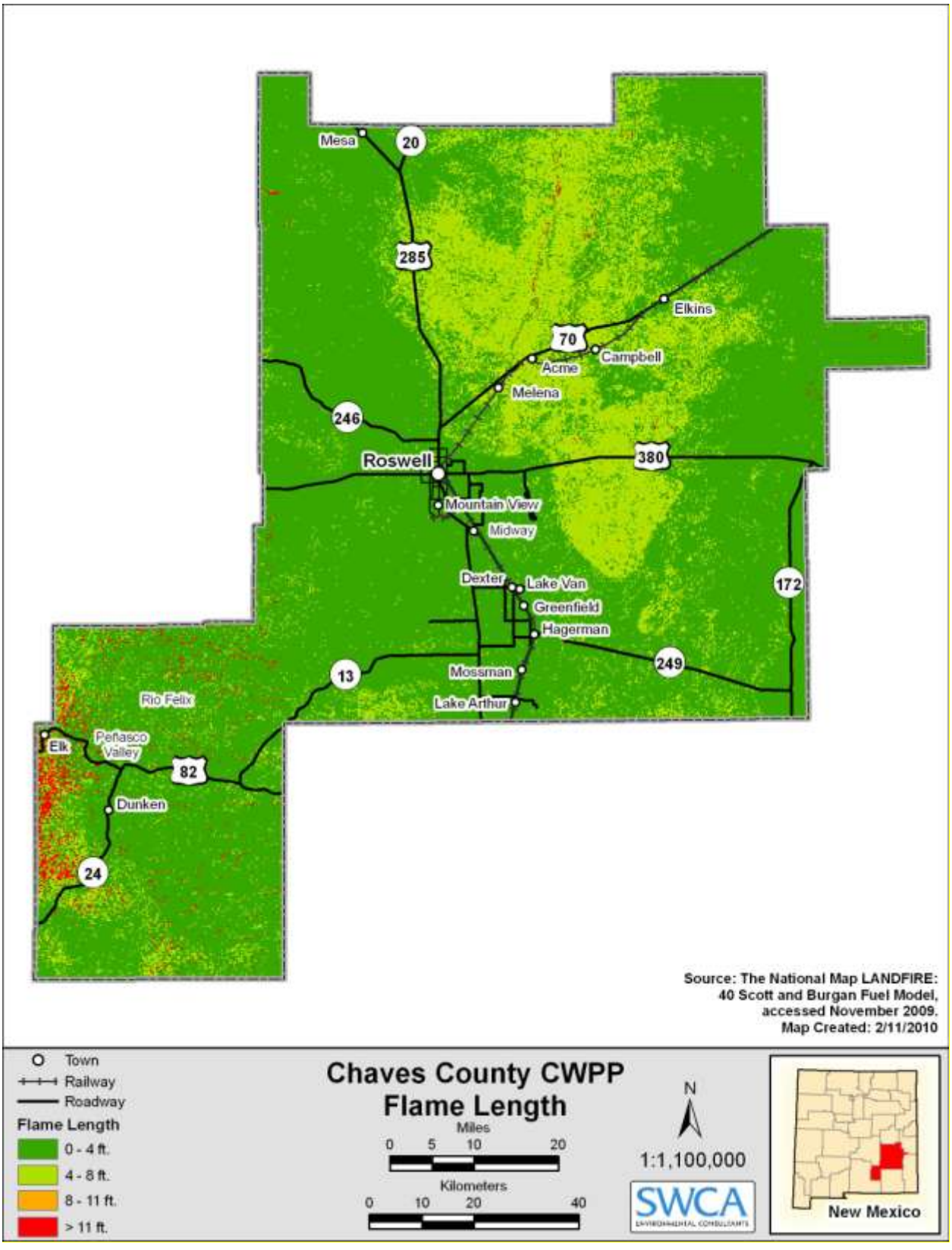
Map 2. Fire occurrence.



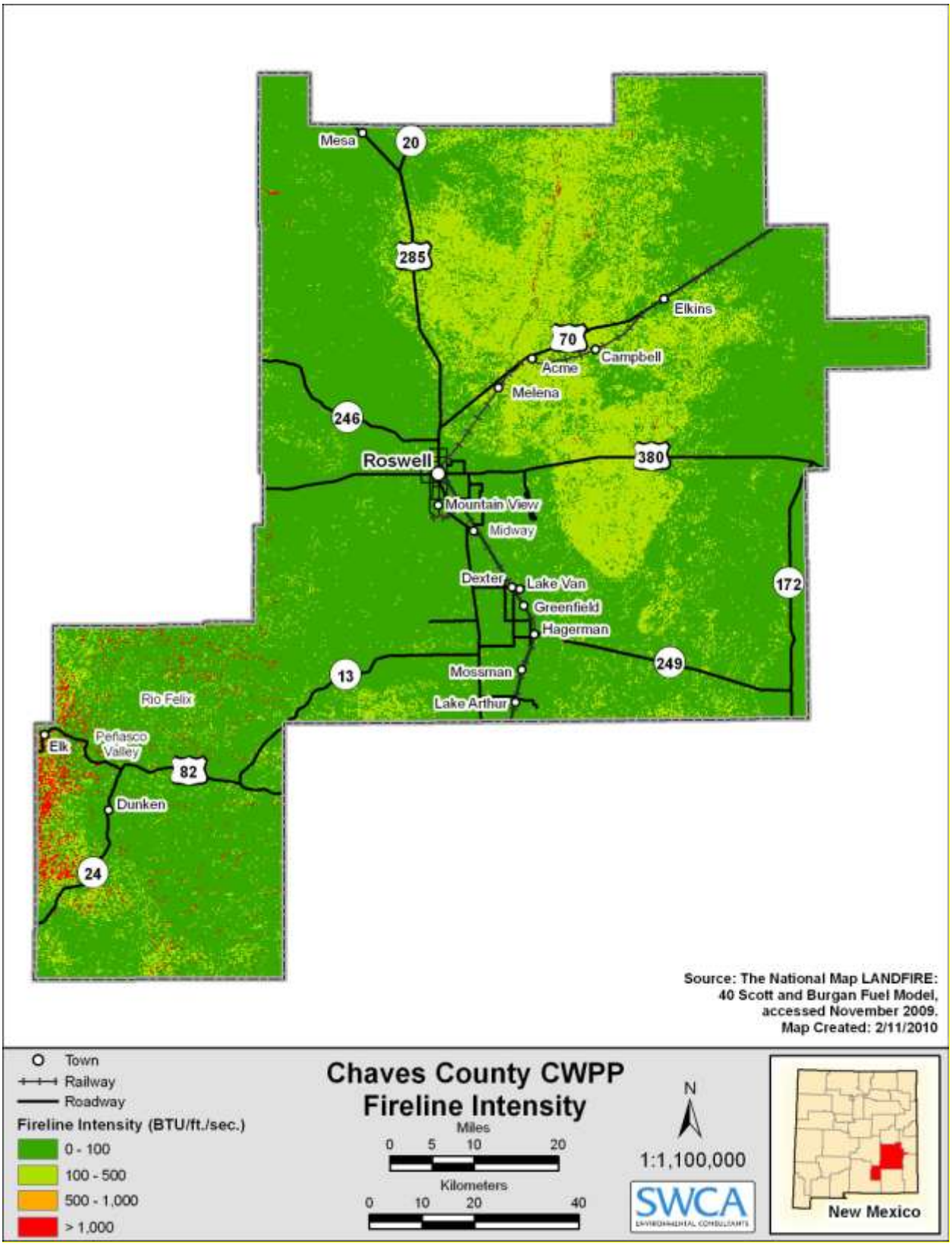
Map 3. Fire Regime Condition Class.



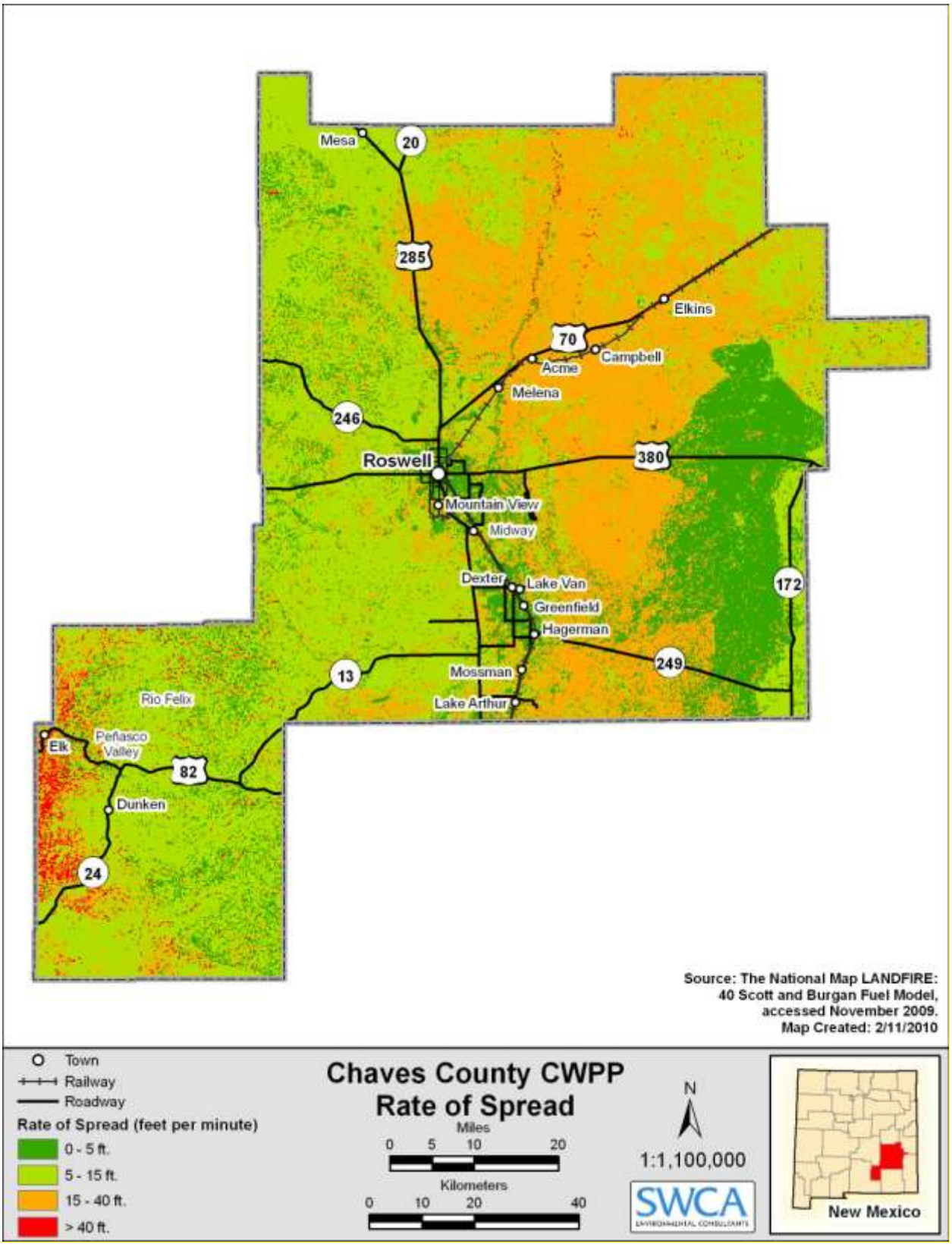
Map 4. Fuels classification.



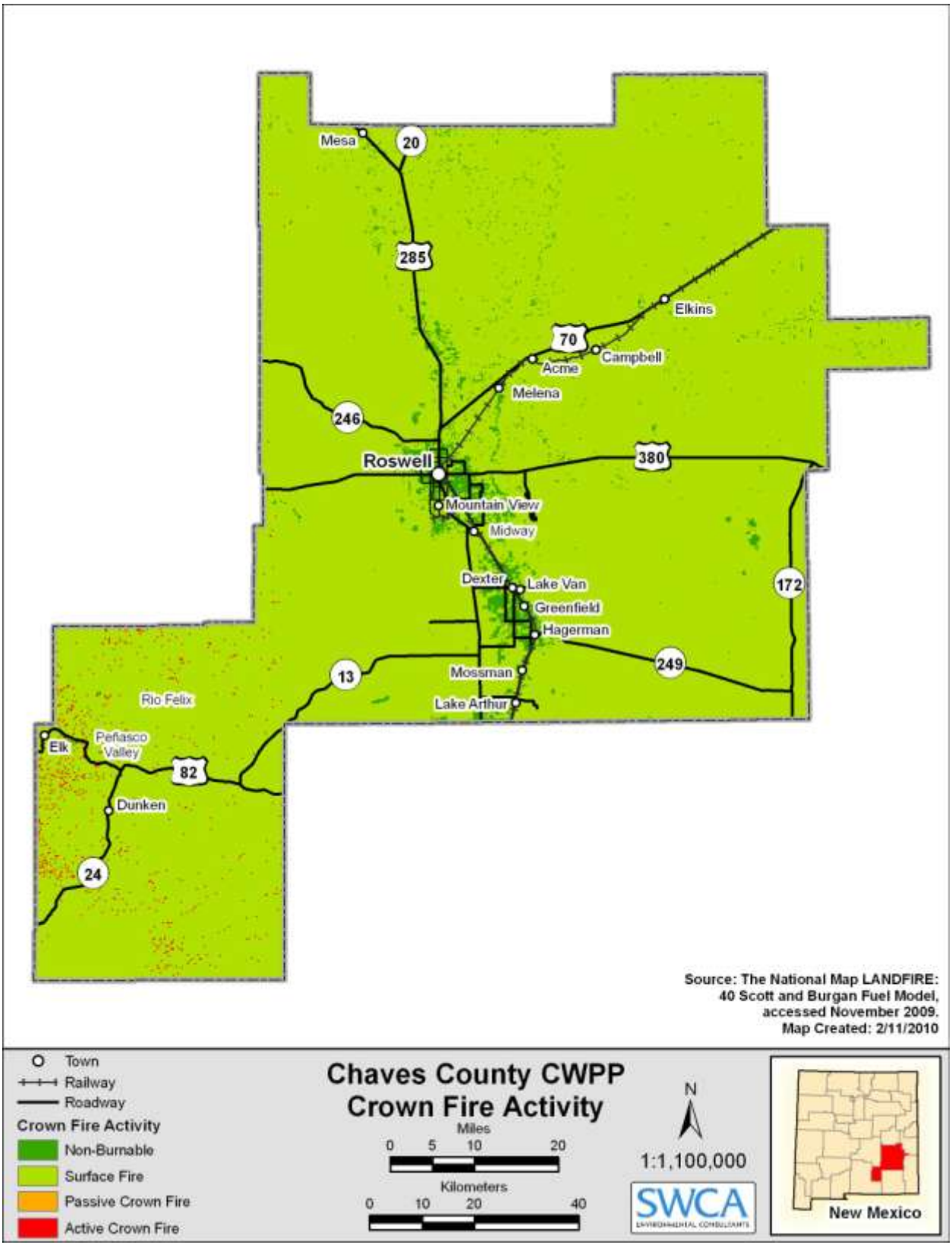
Map 5. Flame length.



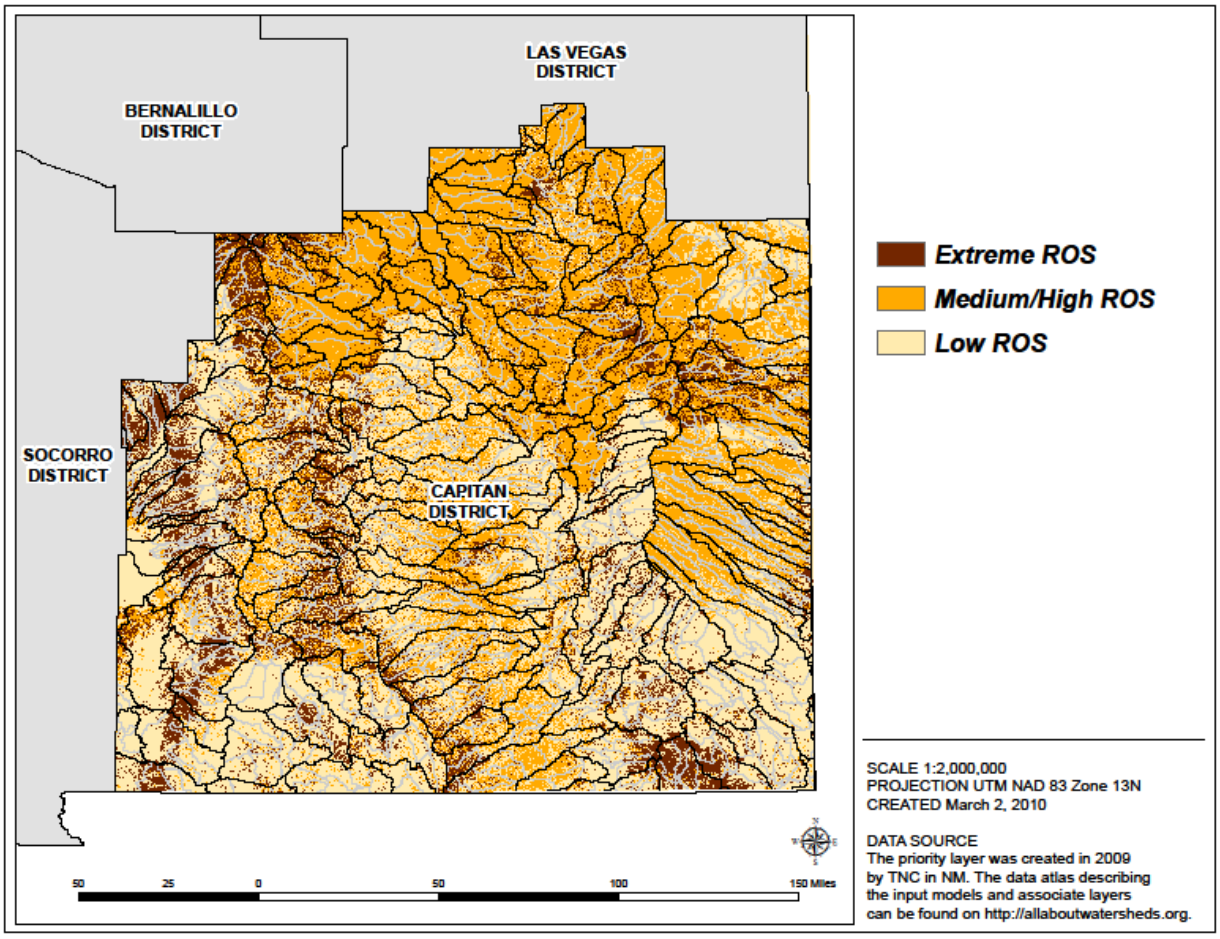
Map 6. Fireline intensity.



Map 7. Rate of spread



Map 8. Crown fire activity.



Map 9. New Mexico Natural Resources Assessment and Strategy and Response Plan, Capitan District Wildfire Rate of Spread (NMSFD 2010).

APPENDIX B
CORE TEAM CONTACT LIST

Chaves County CWPP
Core Team List

Name	Agency or Organization	Position
Stanton Riggs	County	County Manager
Charlotte Andrade	County	Grants Specialist
Georgianna Hunt	County	Fire Services Administrator
Sonny Chancey	County	Public Services Director
Rob Coon	County	Sheriff
Teresa Barncastle	County	Emergency Manager
Chief James Salas	Municipal	Fire Chief
Chief Jeff Turpin	Municipal	Fire Chief
Chief Justin Powell	Municipal	Fire Chief
Allan Wyngaert	BLM	Fire Management Specialist
Ty Bryson	BLM	Fire Management Officer
James Villard	USFS- Lincoln National Forest	Fire Management Officer
Julian Affuso	U.S. Fish and Wildlife Service	Fire Management Officer
Jake Nuttall	U.S. Fish and Wildlife Service	Assistant Fire Management Officer
Milton Harper	U.S. Fish and Wildlife Service	Fire Management Specialist
Joe Saenz	U.S. Fish and Wildlife Service	Refuge Manager
Eddie Tudor	NM State Forestry Division	District Forester
Lynn Lovelace	NM State Forestry Division	Fire Management Officer
Alan Fiala	NM State Parks Division	SE Regional Director
Steve Patterson	NM State Parks Division	Park Manager
Leon Redman	NM Game and Fish	SE Area Chief
Mark Naranjo	State Land Office	Fire Management Specialist
Tim Henry	NRCS	District Conservationist
Tim Jennings	County	Fire Chief
Monte Baker	County	Fire Chief
Kim Chesser	County	Commissioner
Dick Smith	County	Flood Superintendant

APPENDIX C
COMMUNITY COMMENTS

No public comments were received on the Draft CWPP.

APPENDIX D
FIREFIGHTING RESOURCES

Chaves County Fire Resources

The following is taken from the Chaves County Fire Services website and outlines the fire department resources that make up the County Fire Services. The County has eight fire departments with 15 individual stations.

Berrendo Volunteer Fire Department

The Berrendo volunteer fire department started in 1972 with one truck that was housed at the Roswell Fire Department Station #3. Since that time the department has expanded into its main station and constructed two sub-stations, the last of which was completed this past year. It has grown to include 23 personnel, and a total of 8 emergency units. These emergency units include:

1995 Southern Coach Pumper with a 1,260-gpm pump and a 1,000-gallon tank,
1998 Southern Coach Pumper with a 1,260-gpm pump and a 1,000-gallon tank.
1994 International/Southern Coach Initial attack vehicle with a 500gpm pump and a 750- gallon tank.
2002 American La-France 3,000-gallon water tanker with a 1,000-gpm pump.
1983 Chevy with a 70-gpm pump and a 300-gallon tank (Brush Truck).
1995 Chevy with a 70-gpm pump and a 350-gallon tank (Brush Truck).

The department now has 2 Main Stations and one sub-station and their district services 45 square miles. This district includes a wide variety of areas that cover residential, agricultural, and industrial zones along with a Federal Game Reserve that all need their fire protection services. This department has a strong EMS program with 10 EMT's and 2 in training, and responds to EMS calls along with the City of Roswell and Superior Ambulance.

This department has a split ISO rating of 6/9 and received a State Fire Fund Allotment totaling $171,303.00 to operate all three stations with this year, out of this allotment they have an NMFA loan payment of $10,000 to leave a balance of 68,087 to operate with. The current Fire Chief for this Department is Chief Tom Mealand, a retired City of Roswell Firefighter, and the department currently has 23 personnel. The department had an average of 200 runs last year, EMS, Fire and Mutual Aid related.

District 8 Volunteer Fire Department

The District 8 volunteer fire department is the County's newest Fire District and it was established as a County volunteer fire department in 1996. It is the only Chaves County volunteer fire department located on a State Correctional Facility. This department currently has 20 personnel, is housed on the Correctional Facility grounds and has apparatus consisting of:

1983 GMC 7,000 Pumper with a 1,000-gpm pump and a 750 gallon tank.
1977 GMC 6500 with a 500-gpm and a 500-gallon tank,
1961 International with a 500-gpm and a 500-gallon tank.
2001 Ford F550 with a 300-gpm pump with a 500-gallon tank.

The inmates are screened and approved for the fire department program and respond outside of their facility to provide protection for their district and assist the surrounding districts with additional manpower as needed. They are accompanied by Corrections Officers that also work as the Officers for the fire department. They are currently working on plans to construct a Fire Station House and hope to have the building completed before the end of next year.

This department has an ISO rating of 6/9 and received a State Fire Fund allotment totaling $68,807.00 to operate with this year. The current Fire Chief for this department is Chief Barry Wilkerson, who was a Volunteer Firefighter for the Midway volunteer fire department before he took over as Chief at District 8. The department had an average of 50 runs last year all were fire and mutual aid related.

Dunken Volunteer Fire Department

The Dunken volunteer fire department is located in the Southwestern part of Chaves County in the rugged Sacramento Mountains. This department was established under the leadership of Chief Sonny Watts in May of 1960 after the department had co-signed a loan for a 1946 International Pumper with a 500 gallon tank to get the department started, after operating one year, it was finally established. The original station was built in 1963 and added onto in 1984. In 1969 the International Pumper was replaced with a 1969 Ford Pumper. Dunken maintained a sub-station at Flying H from 1973 until 1980 when the department was split and formed the Rio Felix volunteer fire department. The Dunken volunteer fire department has 23 personnel, and fire apparatus consisting of:

2 Water tankers, and 2 Initial Attack vehicles.
1993 Mack 1,000-gpm pump with a 1,000-gallon tank.
1994 Multi-fuel 6x6
1997 Ford 200-gpm pump and a 300-gallon tank
19—GMC 200-gpm pump and a 200-gallon tank
Other Vehicles: Ford F550 cab and chassis that is scheduled to be outfitted with a CAFS.

This department has an ISO rating of 7 and they received a State Fire fund Allotment of $73,375.00 to operate on this year. The current Chief of this Department is Chief Tim Jennings. They have just entered into a shared well agreement with Sam Elkins, a local rancher in their district, and have installed a water storage tank that holds 30,000 gallons of water for firefighting purposes. They have also just awarded a bid for the construction of their new Fire Station Building and with these changes they are planning on requesting a new ISO inspection in an attempt to lower their ISO rating and increase their funding allotment.

East Grande Plains

The East Grand Plains volunteer fire department started out as Boy Scout Troop 36 in 1938. The Scouts rigged a small pump onto a two-wheeled trailer, which was pulled behind a pickup. In 1947 a surplus Dodge power wagon was obtained and a station was built on donated land. The building was paid for with a voluntary 10 cents per acre assessment from area farmers and with bar-b-que fundraisers. In 1951 two of the department members, Ellis Whitney and Morgan Nelson wrote and successfully lobbied for legislation that created the State Fire Fund. That year the department was recognized by the Chaves County Commission. By 1961 the acreage assessment had increased to 25 cents and the department was able to buy its first assembled and

equipped fire truck. With the addition of more equipment and apparatus, the department built a new station in 1983. The department currently has 22 personnel, and fire apparatus consisting of:

One 105' Aerial Ladder Truck: 2007 Smeal Ladder Truck with a 1,250-gpm pump and a 500-gallon tank.
2001 Freightliner with a 1-250-gpm pump, and a 1,500-gallon tank.
1983 Ford (Allegheny) 750-gpm pump and a 750-gallon tank
1992 International 500-gpm pump, and a 3,000-gallon tank.
1980 International (4x4) 300-gpm pump and a 1,000-gallon tank.
2001 Freightliner (Smeal) 1,250-gpm pump, and a 1,500-gallon tank
1996 Ford 1 ton 4x4 90-gpm pump and a 340-gallon tank.
2000 Ford F550 4x4 120-gpm pump and a 500-gallon tank.
2005 Ford Excursion
2008 Haulmark Trailer
2009 Kawasaki Mule for off road rescue services.

It has an ISO rating of 6/8B with plans to try and lower their ISO rating in the next year by requesting a new ISO inspection. They received a State Fire Fund allotment of $116,627 to operate with this year. The department recently achieved a long term goal of obtaining a 150' Aerial Ladder truck and has also purchased an off road Kawasaki Mule, trailer and Command Vehicle to enhance their rescue capabilities.
This department had an average of 130 Fire, EMS and Mutual Aid Calls. The current Fire Chief of the department is Chief Monte Baker, who has been a member of the department for over 30 years.

Midway Volunteer Fire Department

The Midway volunteer fire department started out as a sub-station for the East Grand Plains volunteer fire department, it was spun off as its own department in November of 1983 using an old truck donated to them by the East Grand Plains volunteer fire department. It was located on No-Name Road and operated out of a one-car garage owned by the Chesser family. The garage allowed a one-inch clearance on either side of the unit so it was a little difficult to maneuver in. Shortly after that the department received a 6x6 from the Berrendo volunteer fire department that had the wiring burned up. Once they completely replaced all of the wiring they were set to go.

When they received the 6x6 they moved out of the one car garage into a building that is located at Hwy. 285 and Darby Rd.

In 1984 the County built them a 40 x 60 metal building that did not have any interior features so they had to install their own plumbing. They have since received a Legislative Grant that allowed them to completely finish their building and add on a training facility and kitchen
This department was also the first department in Chaves County to receive new fire trucks purchased with the County Gross Receipts tax revenues. Chief Fuller of Midway, Chief Powell of Peñasco, Chief Collins of Sierra and Chief Bowen of Berrendo volunteer fire departments meeting and setting up the Fire Apparatus Replacement Schedule which sets out the guidelines and time-frame for the replacement of County Fire Apparatus and use of the Gross Receipts Tax.
The department received a State Fire Fund allotment of $77,451 to operate with this year. They just awarded a bid for their Second Main Station which will be located on Honolulu Road, West of Highway 285 South. They are the only department in Chaves County to still be operating under their original and only Fire Chief Ornell Fuller. The Midway volunteer fire department has 20 members and fire apparatus consisting of:

1992 Chevrolet, 1,250-gpm pump and a 1,500-gallon tank.
1984 GMC, 750-gpm pump and a 1,000-gallon tank.
1994 Freightliner, 500-gpm pump and a 3,000-gallon tank.
1992 Chevrolet, 500-gpm pump and a 450-gallon tank.
1996 Chevrolet, 200-gpm pump and a 350-gallon tank.
2002 Ford F550, 200-gpm pump and a 500-gallon tank.
1993 Chevrolet Van donated to the department by the Sheriff's Office.

Peñasco Volunteer Fire Department

The Peñasco volunteer fire department is located in the Sacramento Mountains surrounding the Rio Peñasco in Southern Chaves County. The department was started in 1953, at that time Edmund Runyan was the Chief and Hezzie Powell was the Assistant Chief and Hazel Cleve was the Secretary. The members donated cattle sprayers to equip the department at first, mounting the equipment on racks to enable them to slip into the back of a pickup. Shortly afterwards a 1936 fire truck was donated to the department by the Artesia fire department. Since that time, the department has added an addition to its existing station, acquired a sub-station on land donated by a member of the community and is the only department in Chaves County to own a Humvee.

The department covers approximately 90 square miles of rough mountainous terrain that requires innovative ways to provide fire protection and the Humvee is one way to address these needs, this department has just finished drilling a well and installing a water storage tank to help improve their water capabilities, they are currently in the process of purchasing a 3 to 4,000 gallon tanker to supplement their water storage.

They have an ISO rating of 9 and received a State fire fund allotment of $72,028 to operate with this year. They have just awarded a bid for the construction of their second Main Station.

This department has 22 members and their Current Fire Chief is Jim Ellett who oversees the department as it faces the challenge of providing Urban-Interface Wildland Fire Protection to the many homes, ranches and businesses in the district. They have apparatus consisting of:

1996 Chevrolet, 1,000-gpm pump with a 1,250-gallon tank.
1995 Hummer VLC2, 75-gpm pump with a 300-gallon tank.
1998 Chevrolet 4X4 Crew Cab 75-gpm pump with a 300-gallon tank.
1995 Southern Coach, 1,250-gpm pump with a 1,250-gallon tank.
A gooseneck trailer with a 250-gpm pump and a 1,200-gallon tank.

Rio Felix Volunteer Fire Department

This fire department is also located in the Sacramento Mountains around the Rio Felix River. It was originally a substation of the Dunken volunteer fire department, in order to benefit both communities they decided to split the department. On October 16, 1989, Rio Felix was recognized by ISO Commercial Risk Services Inc. as an independent fire district. This rural department is so rural that once you turn off of the main highway, you have to drive an additional ten miles before you can get to it! The Department has an ISO rating of 9 and received a State fire fund allotment of $30,592 to operate with this year.

This department currently has eight members and two units and their current Fire Chief is Phillip Brainerd. This department also faces the daunting task of providing Urban Inter-face Wildland Fire Protection to the homes and businesses in the district. They also act as Automatic Aid support for the districts surrounding their boundaries.

They have recently awarded a bid to construct an addition to their existing Main Station that will allow them to purchase and house a new Tanker and once that goal is completed they will try to lower their ISO rating. Their apparatus consists of:

1996 International/Ferrara, 1,250-gpm pump with a 1,000-gallon tank. 1999 Ford/Mertz Ford F550, 250-gpm pump with a 500-gallon CAFS. Ford F550, 250-gpm pump and a 500-gallon water tank.

Sierra Fire Department

The Sierra volunteer fire department was formed in April of 1975. The department's first Fire Chief was Jimmy Collins. Serving under Chief Collins were six seasoned Firefighters and five junior firefighters. Their first station was a rented one-vehicle garage and it housed a 1942 International 4X4 fire truck, which had a top speed of 25 miles per hour. Later that year they were given a 1959-ton and a half GMC with a front mount pump.

In 1976 the department bought a piece of land on South Brown Road, and then donated the land to the County. Chaves County bought and placed a three bay fire station on the land, once it was placed, the fire department supplied all plumbing and the building interior. In August of 1996 the department built a new building located next to their original station on South Brown Rd. in order to provide much needed space for a training room and offices.

In 1981 Sierra acquired land on South Lea St. and built a two bay sub-station. They added onto this sub-station and received approval for it to be a second Main station in 2003. In November 2003 the department requested and received authorization to construct their third Station located on Dogwood Road. This building was completed and approved for their third Main Station in 2009.

The department has a split ISO rating of 7/9 and received a State fire fund allotment of $220,125 to operate with this year. Their current Fire Chief is Don Ford. They had an average of 200 runs last year including Fire, EMS and Mutual Aid.
The department currently has 21 members and eight pieces of firefighting apparatus consisting of:

1972 American LaFrance, 1,250-gpm pump with a 750-gallon tank.
1997 Freightliner, 1,250-gpm pump with a 1,000-gallon tank.
1983 Chevrolet, 750-gpm pump with a 750-gallon tank.
2001 Freightliner, 1,250-gpm pump with a 3,000-gallon tank.
1995 Chevrolet 60-gpm pump with a 350-gallon tank.
1995 Chevrolet 60-gpm pump with a 350-gallon tank.
1995 Ford, 60-gpm pump with a 300-gallon tank.
1990 Dodge, Command Vehicle.

The following outline the federal fire resources available for use in the County on wildfire.

Fire Department	Location	# Firefighters	# Stations	(ISO)Rating	Airtanker Base	Apparatus
BLM Roswell	County Wide	Perminent 9, Fire Season 15	1	N/A	1	3 engines, 1 water tender
USFWS	Bitter Lake NWR	Permanent and seasonal crews vary	1	-	-	Type 4 and Type 6 Engine and water tender
USFS	Mayhill	Permanent and seasonal crews vary	-	-		3 Engines and hotshot crew

APPENDIX E
WILDFIRE FIRE RISK AND HAZARD SEVERITY FORM
NFPA 1144

Wildfire Fire Risk and Hazard Severity Form NFPA 1144

Means of Access						
Ingress and Egress	**Points**					
Two or more roads in and out	0					
One road in and out	7					
Road Width						
>24 feet	0					
>20 feet, <24 feet	2					
<20 feet	4					
Road Conditions						
Surfaced road, grade <5%	0					
Surfaced road, grade >5%	2					
Nonsurfaced road, grade <5%	2					
Nonsurfaced road, grade >5%	5					
Other than all season	7					
Fire Access						
<300 feet with turnaround	0					
>300 feet with turnaround	2					
<300 feet with no turnaround	4					
>300 feet with no turnaround	5					
Street Signs						
Present–reflective	0					
Present–nonreflective	2					
Not present	5					
Vegetation (fuel models)						
Predominant veg						
Light–1,2,3	5					
Medium–5,6,7,8,9	10					
Heavy–4,10	20					
Slash–11,12,13	25					
Defensible Space						
>100 feet around structure	1					
>70 feet, <100 feet around structure	3					
>30 feet, <70 feet around structure	10					
<30 feet around structure	25					
Topography within 300 Feet of Structures						
Slope						
<9%	1					
10% to 20%	4					
21% to 30%	7					
31% to 40%	8					
>41%	10					
Additional Rating Factors (rate all that apply)						
Additional Factors						
Topographic features	0–5					
History of high fire occurrence	0–5					
Severe fire weather potential	0–5					
Separation of adjacent structures	0–5					

Roofing Assembly						
Roofing						
Class A	0					
Class B	3					
Class C	15					
Unrated	25					
Building Construction						
Materials (predominant)						
Non-combustible siding, eaves, deck	0					
Non-combustible siding/combustible desk	5					
Combustible siding and deck	10					
Building Set-back						
>30 feet to slope	1					
<30 feet to slope	5					
Available Fire Protection						
Water Sources						
Hydrants 500 gpm, <1000 feet apart	0					
Hydrants 250 gpm, <1000 feet apart	1					
Nonpressurized, >250 gpm/2 hrs	3					
Nonpressurized, <250 gpm/2hrs	5					
Water unavailable	10					
Organized Response						
Station <5 miles from structure	1					
Station >5 miles from structure	3					
Fixed Fire Protection						
NFPA sprinkler system	0					
None	5					
Placement of Gas and Electric Utilities						
Utilities						
Both underground	0					
One above, one below	3					
Both above ground	5					

Totals for Home or Subdivision						

Hazard Rating Scale
<40 Low
>40 Moderate
>70 High
>112 Extreme

APPENDIX F
COMMUNITY AT RISK LIST

CHAVES COUNTY CWPP
COMMUNITY AT RISK LIST

This Community at Risk (CAR) list is developed for the NM-FPTF. The communities listed are based upon Core Team input and the risk assessment carried out as part of this CWPP.

The communities are rated as high, moderate, low, or no risk. Because this is plan covers multiple communities and jurisdictions, it is recommended that more detailed analysis be carried out to a subdivision level in the future.

Community/ Fire Department	Score	Hazard Rating
Peñasco Valley	85	High
Northeast Roswell	80	High
Lake Arthur	74	High
Midway	72	High
Rio Felix FD	65	Moderate
Hagerman	61	Moderate
Peñasco 2 FD	58	Moderate
Peñasco 1 FD	57	Moderate
Southwest Roswell	57	Moderate
Dexter	57	Moderate
North Roswell	55	Moderate
District 8	55	Moderate
Dunken	54	Moderate
East Roswell	54	Moderate
West Roswell	51	Moderate
East Grande Plains	50	Moderate
Dunken/Peñasco School	49	Moderate
Northwest Roswell	49	Moderate
South Springs Acres	49	Moderate
Country Club	42	Moderate
Lake Van	42	Moderate
South Roswell	41	Moderate

Risk Rating Classification:
<40 = Low
40–69 = Moderate
70–111 = High
>112 = Extreme

APPENDIX G
FUNDING OPPORTUNITIES

CHAVES COUNTY CWPP
FUNDING OPPORTUNITIES

The following section provides information on federal, state, and private funding opportunities for conducting wildfire mitigation projects.

I. Federal Funding Information

Source: Predisaster Mitigation Grant Program
Agency: Department of Homeland Security Federal Emergency Management Agency (DHS FEMA)
Website: http://www.fema.gov/government/grant/pdm/index.shtm
Description: The DHS includes FEMA and the U.S. Fire Administration. FEMA's Federal Mitigation and Insurance Administration is responsible for promoting predisaster activities that can reduce the likelihood or magnitude of loss of life and property from multiple hazards, including wildfire. The Disaster Mitigation Act of 2000 created a requirement for states and communities to develop predisaster mitigation plans and established funding to support the development of the plans and to implement actions identified in the plans. This competitive grant program, known as PDM, has funds available to state entities, tribes, and local governments to help develop multihazard mitigation plans and to implement projects identified in those plans.

Source: Section 319 Base Grant to State Entities and Indian Tribes
Agency: Environmental Protection Agency (EPA)
New Mexico State 319 Coordinator
David Hogge
New Mexico Environment Department
P.O. Box 26110
Santa Fe, NM 87502
Phone: (505) 827-2981
Fax: (505) 827-0160
david_hogge@nmenv.state.nm.us
Website: http://www.epa.gov
Description: Funding under this program is often used for reduction of nonpoint-source pollution; however, one community successfully used the grant to obtain funding to reduce hazardous fuels to protect the municipal watershed. For additional information on this success story, visit http://www.santafewatershed.com. To learn about obtaining this type of funding for your community, contact New Mexico's 319 Grant Coordinator, Dave Hogge, New Mexico Environmental Department at (505) 827-2981.

This funding opportunity is a Request for Proposals from state entities and Indian tribes for competitive grants under section 319 of the Clean Water Act (CWA). The purpose of this grant program is to provide funding to implement nonpoint-source management programs developed pursuant to CWA section 319(b). The primary goal of this management program is to control nonpoint-source pollution. This is done through implementation of management measures and practices to reduce pollutant loadings resulting from each category or subcategory of nonpoint-source identified in the grant recipient's nonpoint-source assessment report, which should be

developed pursuant to CWA section 319(a). The EPA has set aside a portion of section 319 funds appropriated by Congress for competitive grant awards to tribes for the purpose of funding the development and implementation of watershed-based plans and other on-the-ground watershed projects that result in a significant step toward solving nonpoint-source impairments on a watershed-wide basis. Please note that the funding opportunity described here is found in Section B of the full announcement. (Section A includes the EPA's national guidelines, which govern the process for awarding noncompetitive base grants to all eligible tribes.)

Source: Funding for Fire Departments and First Responders
Agency: DHS, U.S. Fire Administration
Website: http://www.usfa.dhs.gov/fireservice/grants/
Description: Includes grants and general information on financial assistance for fire departments and first responders. Programs include the Assistance to Firefighters Grant Program (AFGP), Reimbursement for Firefighting on Federal Property, State Fire Training Systems Grants, and National Fire Academy Training Assistance.

Source: Conservation Innovation Grants (CIG)
Agency: National Resource Conservation Service
Website: http://www.nm.nrcs.usda.gov/programs/cig/cig.html
Description: CIG State Component. CIG is a voluntary program intended to stimulate the development and adoption of innovative conservation approaches and technologies while leveraging federal investment in environmental enhancement and protection, in conjunction with agricultural production. Under CIG, Environmental Quality Incentives Program (EQIP) funds are used to award competitive grants to non-federal governmental or nongovernmental organizations, tribes, or individuals. CIG enables the Natural Resources Conservation Service (NRCS) to work with other public and private entities to accelerate technology transfer and adoption of promising technologies and approaches to address some of the nation's most pressing natural resource concerns. CIG will benefit agricultural producers by providing more options for environmental enhancement and compliance with federal, state, and local regulations. The NRCS administers the CIG program. The CIG requires a 50/50 match between the agency and the applicant. The CIG has two funding components: national and state. Funding sources are available for water resources, soil resources, atmospheric resources, and grazing land and forest health.

Source: Volunteer Fire Assistance
Agency: USDA Forest Service
Website: http://www.fs.fed.us/fire/partners/vfa/
Description: USDA Forest Service funding will provide assistance, through the states, to volunteer fire departments to improve communication capabilities, increase wildland fire management training, and purchase protective fire clothing and firefighting equipment. For more information, contact your state representative; contact information can be found on the National Association of State Foresters website.

Source: Economic Action Programs
Agency: USDA Forest Service
Website: http://www.fs.fed.us/spf/coop/programs/eap/index.shtml
Description: USDA Forest Service funding will provide for Economic Action Programs that work with local communities to identify, develop, and expand economic opportunities related to traditionally under-utilized wood products and to expand the utilization of wood removed through hazardous fuel reduction treatments. Information, demonstrations, application development, and training will be made available to participating communities. For more information, contact a Forest Service Regional Representative.

Source: Collaborative Forest Restoration Program (CFRP)
Agency: USDA Forest Service
Website: http://www.fs.fed.us/r3/spf/cfrp/index.shtml
Description: The Community Forest Restoration Act of 2000 (Title VI, Public Law 106–393) established a cooperative forest restoration program in New Mexico to provide cost-share grants to stakeholders for forest restoration projects on public land to be designed through a collaborative process (the CFRP). Projects must include a diversity of stakeholders in their design and implementation, and should address specified objectives including: wildfire threat reduction; ecosystem restoration, including non-native tree species reduction; reestablishment of historic fire regimes; reforestation; preservation of old and large trees; increased utilization of small-diameter trees; and the creation of forest-related local employment. The act limits projects to four years and sets forth cost limits and provisions respecting collaborative project review and selection, joint monitoring and evaluation, and reporting. The act authorizes appropriations of up to $5 million annually and directs the Secretary to convene a technical advisory panel to evaluate proposals that may receive funding through the CFRP.

Source: Catalog of Federal Funding Sources for Watershed Protection
Agency: N/A
Website: http://cfpub.epa.gov/fedfund/
Examples of the types of grants found at this site are:

- Native Plant Conservation Initiative: http://www.nfwf.org/AM/Template.cfm?Section=Browse_All_Programs&TEMPLATE=/CM/ContentDisplay.cfm&CONTENTID=3966
- Targeted Watershed Grants Program, http://www.epa.gov/owow/watershed/initiative/
- Predisaster Mitigation Program, http://www.fema.gov/government/grant/pdm/index.shtm
- Environmental Education Grants, http://www.epa.gov/enviroed/grants_contacts.html

Source: Firewise
Agency: Multiple
Website: http://www.firewise.org
Description: The Wildland/Urban Interface Working Team (WUIWT) of the National Wildfire Coordinating Group is a consortium of wildland fire organizations and federal agencies responsible for wildland fire management in the United States. The WUIWT includes the USDA Forest Service, USDI Bureau of Indian Affairs, USDI BLM, USDI Fish and Wildlife Service, USDI National Park Service, FEMA, U.S. Fire Administration, International Association of Fire Chiefs, National Association of State Fire Marshals, National Association of State Foresters,

National Emergency Management Association, and National Fire Protection Association. Many different Firewise Communities activities are available help homes and whole neighborhoods become safer from wildfire without significant expense. Community cleanup days, awareness events, and other cooperative activities can often be successfully accomplished through partnerships among neighbors, local businesses, and local fire departments at little or no cost. The Firewise Communities recognition program page (http://www.firewise.org/usa) provides a number of excellent examples of these kinds of projects and programs.

The kind of help you need will depend on who you are, where you are, and what you want to do. Among the different activities individuals and neighborhoods can undertake, the following actions often benefit from some kind of seed funding or additional assistance from an outside source:

- Thinning/pruning/tree removal/clearing on private property—particularly on very large, densely wooded properties
- Retrofit of home roofing or siding to non-combustible materials
- Managing private forest
- Community slash pickup or chipping
- Creation or improvement of access/egress roads
- Improvement of water supply for firefighting
- Public education activities throughout the community or region

Some additional examples of what communities, counties, and states have done can be found in the National Database of State and Local Wildfire Hazard Mitigation Programs at http://www.wildfireprograms.usda.gov. You can search this database by keyword, state, jurisdiction, or program type to find information about wildfire mitigation education programs, grant programs, ordinances, and more. The database includes links to local websites and e-mail contacts.

Source: The National Fire Plan
Website: http://www.forestsandrangelands.gov/
Description: Many states are using funds from the NFP to provide funds through a cost-share with residents to help them reduce the wildfire risk to their private property. These actions are usually in the form of thinning or pruning trees, shrubs, and other vegetation and/or clearing the slash and debris from this kind of work. Opportunities are available for rural, state, and volunteer fire assistance.

Source: Staffing for Adequate Fire and Emergency Response (SAFER)
Agency: DHS
Website: http://www.firegrantsupport.com/safer/
Description: The purpose of SAFER grants is to help fire departments increase the number of frontline firefighters. The goal is for fire departments to increase their staffing and deployment capabilities and ultimately attain 24-hour staffing, thus ensuring that their communities have adequate protection from fire and fire-related hazards. The SAFER grants support two specific activities: (1) hiring of firefighters and (2) recruitment and retention of volunteer firefighters. The hiring of firefighters activity provides grants to pay for part of the salaries of newly hired

firefighters over the five-year program. SAFER is part of the Assistance to Firefighters Grants and is under the purview of the Office of Grants and Training of the DHS.

Source: The Fire Prevention and Safety Grants (FP&S)
Agency: DHS
Website: http://www.firegrantsupport.com/fps/
Description: The FP&S are part of the Assistance to Firefighters Grants and are under the purview of the Office of Grants and Training in the DHS. FP&S offers support to projects that enhance the safety of the public and firefighters who may be exposed to fire and related hazards. The primary goal is to target high risk populations and mitigate high incidences of death and injury. Examples of the types of projects supported by FP&S include fire-prevention and public-safety education campaigns, juvenile fire-setter interventions, media campaigns, and arson prevention and awareness programs. In fiscal year 2005, Congress reauthorized funding for FP&S and expanded the eligible uses of funds to include firefighter safety research and development.

II. State Funding Information

Source: State and Private Forestry Programs
Agency: National Association of State Foresters
Website: http://www.stateforesters.org/S&PF/coop_fire.html
Description: The National Association of State Foresters recommends that funds become available through a competitive grant process on Wildland Urban Interface hazard mitigation projects. State fire managers see opportunities to use both the State Fire Assistance Program and the Volunteer Fire Assistance Program to improve the safety and effectiveness of firefighters in the interface, as well as in other wildland fire situations. To ensure firefighter safety, minimize property and resource loss, and reduce suppression costs, land management agencies, property owners, local leaders, and fire protection agencies must work cooperatively to mitigate interface fire risks, as well as to ensure that wildland firefighters receive the training, information, and equipment necessary to safely carry out their responsibilities.

Source: New Mexico Association of Counties :Wildfire Risk Reduction Program
Agency: New Mexico Association of Counties
Website: http://www.nmcounties.org/wildfire.html
Description: This program targets at-risk communities by offering seed money to help defray the costs of community wildfire protection projects. During the past two years, the Wildfire Risk Reduction Grant Program has primarily funded projects for the development of Community Wildfire Protection Plans (CWPP), a prerequisite to all other activities. In 2007, priority was given to projects that requested funding for hazardous fuel reduction, wildfire prevention, and community outreach activities that were identified in completed CWPPs.

III. Private Funding Information

Source: The Urban Land Institute (ULI)
Website: http://www.uli.org
Description: ULI is a 501(c)(3) nonprofit research and education organization supported by its members. The institute has more than 22,000 members worldwide, representing the entire spectrum of land use and real estate development disciplines, working in private enterprise and public service. The mission of the ULI is to provide responsible leadership in the use of land to enhance the total environment. ULI and the ULI Foundation have instituted Community Action Grants (http://www.uli.org/Content/NavigationMenu/MyCommunity/CommunityActionGrants/Community_Action_Gr.htm) that could be used for Firewise Communities activities. Applicants must be ULI members or part of a ULI District Council. Contact actiongrants@uli.org or review the web page to find your District Council and the application information.

Source: Environmental Systems Research Institute (ESRI)
Website: http://www.esri.com/grants
Description: ESRI is a privately held firm and the world's largest research and development organization dedicated to geographic information systems. ESRI provides free software, hardware, and training bundles under ESRI-sponsored Grants that include such activities as conservation, education, and sustainable development, and posts related non-ESRI grant opportunities under such categories as agriculture, education, environment, fire, public safety, and more. You can register on the website to receive updates on grant opportunities.

Source: StEPP Foundation
Website: http://www.steppfoundation.org/default.htm
Description: StEPP is a 501(c)(3) organization dedicated to helping organizations realize their vision of a clean and safe environment by matching projects with funders nationwide. The StEPP Foundation provides project oversight to enhance the success of projects, increasing the number of energy efficiency, clean energy, and pollution prevention projects implemented at the local, state, and national levels for the benefit of the public. The website includes an online project submittal system and a Request for Proposals page.

Source: The Public Entity Risk Institute (PERI)
Website: http://www.riskinstitute.org
Description: PERI is a not for profit, tax-exempt organization. Its mission is to serve public, private, and nonprofit organizations as a dynamic, forward-thinking resource for the practical enhancement of risk management. With its growing array of programs and projects, along with its grant funding, PERI's focus includes supporting the development and delivery of education and training on all aspects of risk management for public, nonprofit, and small business entities, and serving as a resource center and clearinghouse for all areas of risk management.

IV. Other Funding information

The following resources may also provide helpful information for funding opportunities:

- National Agricultural Library Rural Information Center: http://www.nal.usda.gov/ric/ricpubs/fire_department_resources.htm
- Forest Service Fire Management website: http://www.fs.fed.us/fire/
- Insurance Services Office Mitigation Online (town fire ratings): http://www.isomitigation.com/
- National Fire Protection Association: http://www.nfpa.org
- National Interagency Fire Center, Wildland Fire Prevention/Education: http://www.nifc.gov/preved/rams.htm
- Department of Homeland Security U.S. Fire Administration: http://www.usfa.dhs.gov/fireservice/grants/rfff/

APPENDIX H
HOMEOWNERS GUIDE

CHAVES COUNTY CWPP HOMEOWNERS GUIDE

This guide has been developed to address site-specific information on wildfire for Chaves County. 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 was developed to meet these expressed community needs, as well as to fulfill requirements for the 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.

BEFORE THE FIRE—PROTECTION AND PREVENTION

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 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, cement, 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 wood fence or trellis can carry fire to your home siding or roof. Consider using nonflammable materials or use a protective barrier such as metal or masonry between the fence and the house.

If you are designing a new home or remodeling your existing one, do it with fire safety as a primary concern. Use nonflammable 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 http://www.firewise.org.

SCREEN OFF THE AREA BENEATH DECKS AND PORCHES

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 one-half inch. Keep the area behind the screen free of all leaves and debris.

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 tanks 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.

The Public Service Company of New Mexico (PNM) does not have sufficient crews for frequent inspection of all its high-voltage power lines. If you have high-voltage lines running near your property, take a moment to walk underneath them and ensure that no tree branches are close to the towers or lines. If there is any situation that could be a fire hazard, contact a customer service representative from PNM.

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. Your local fire department will have the latest edition of National Fire Prevention Code 211 covering spark arrestors. Make sure to clear away dead 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 a couple of days. Then either dispose of the cold ash with other garbage or bury the ash residue in the earth and cover it 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 an 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. A 100-foot safety zone, free of all trees and shrubs, is recommended by the fire department; the minimum distance is 30 feet. Steep slopes require increased defensible space because fire can travel quickly uphill.

Within the minimum 30-foot 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, nonflammable materials such as gravel are much better than wood chips or pine needles.

Vegetative debris such as dead grasses or leaves provide important erosion protection for soil but also may carry a surface fire. It is simply not feasible to remove all the vegetative debris from around your property. However, it is a good idea to remove any accumulations within the safety zone and extending out as far as possible. This is particularly important if leaves tend to build up alongside your house or outbuildings. Removing dead vegetation and leaves and exposing bare mineral soil are recommended in a 2-foot-wide perimeter along the foundation of the house. Also, be sure to regularly remove all dead vegetative matter including grasses, flowers, and leaf litter surrounding your home and any debris from gutters, especially during summer months. Mow the lawn regularly and promptly dispose of the cuttings properly. If possible, maintain a green lawn for 30 feet around your home.

All 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 http://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 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 is one of the most difficult tasks facing emergency responders. Every home should have the address clearly posted with numbers at least three inches high. 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 Chaves County. 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.

Beyond your gate, make sure your driveway is uncluttered and at least 12 feet wide. The slope should be less than 10%. 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 to the occurrence of a wildfire more quickly than media channels. Talk to your neighborhood association about the possibility of designing an effective phone tree.

NEIGHBORS IN NEED OF ASSISTANCE

Ask mobility-impaired neighbors if they have notified emergency responders of their specific needs. 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 not in communication 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 woodpile 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 an out of state contact, such as a family member. When disaster strikes locally, it is often easier to make outgoing calls to a different area code than local calls. Make sure 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% 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 three-day supply of food and water, bowls, a litter box for cats, 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. Often in large-scale emergencies, special accommodations can be made at fair and rodeo grounds, 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 being loaded 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 them somewhere away from your home, such as in a safe deposit box. Important documents can also be protected in a designated firesafe 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 (EAS). 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 your local frequency. The programming also determines the types of events for which you want to be alerted. The weather alert radio can be used for any type of large incident (weather, wildfire, hazardous materials, etc.), depending on how it is programmed. Local fire personnel can assist with programming if needed.

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. Some roads in Chaves County 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. Also, arguably the most important tool in the WUI 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.

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.

A light-colored sheet closed in the front door serves as a signal to emergency responders that your family has safely left. This signal saves firefighters precious time, as it takes 12–15 minutes per house to knock on each door and inform residents of the evacuation.

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 (BAER) teams are inter-disciplinary 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 re-routing 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.