Torrance County
Community Wildfire Protection Plan

TORRANCE COUNTY
COMMUNITY WILDFIRE PROTECTION PLAN

Prepared for

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/Nancy Rose 4/17/08

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Mayor of Corona

William Highnight 5/29/08

Date

Table of Contents

List of Figures

List of Tables

List of Acronyms

°F	degrees Fahrenheit
BAER	Burned Area Emergency Rehabilitation
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
BTU/ft/sec	British Thermal Units per feet, per second
CAR	Community at Risk
CFRP	Collaborative Forest Restoration Program
ch/h	chains per hour
CIG	Conservation Innovation Grants
CVAR	Community Values at Risk
CPCWPP	Claunch-Pinto Community Wildfire Protection Plan
CWA	Clean Water Act
DHS	Department of Homeland Security
EAS	Emergency Alert System
ENSO	El Niño-Southern Oscillation
EPA	Environmental Protection Agency
ESRI	Environmental Systems Research Institute
FEMA	Federal Emergency Management Agency
FIREMON	Fire Effects Monitoring and Inventory Protocol
FMP	Fire Management Plan
FP&S	Fire Prevention and Safety Grants
FSA	Farm Service Agency
FRCC	Fire Regime Condition Class
FRI	fire-return interval
GAID	Geographic Area Interagency Dispatch
GAO	Government Accounting Office
GIS	geographic information system
HFRA	Healthy Forest Restoration Act
HIZ	Home Ignition Zone
IC	Incident Command
ICC	International Code Council
JPA	Joint Powers Agreement
NFP	National Fire Plan
m^2/ha	square meters per hectare
MAA	mutual aid agreement
MRCOG	Mid-Region Council of Governments
NASF	National Association of State Foresters
NEPA	National Environmental Policy Act
NFPA	National Fire Protection Association
NIFC	National Interagency Fire Center
NMAC	New Mexico Association of Counties
NMDA	New Mexico Department of Agriculture
NMDOT	New Mexico Department of Transportation
NM-FPTF	New Mexico Fire Planning Task Force
NMFRP	New Mexico Forest Restoration Principles

NMSF	New Mexico State Forestry
NRCS	National Resources Conservation Service
NWCG	National Wildfire Coordinating Group
PNM	Public Service Company of New Mexico
RAWS	remote automated weather station
RMP	Resource Management Plan
SAF	Society of American Foresters
SAFER	Staffing for Adequate Fire and Emergency Response
SAT	situation analysis team
SWCA	SWCA Environmental Consultants
SWCC	Southwest Coordination Center
SWCD	Soil and Water Conservation District
t/ac	tons per acre
TCCWPP	Torrance County Community Wildfire Protection Plan
USDA	U.S. Department of Agriculture
USDI	U.S. Department of the Interior
USFS	U.S. Forest Service
USGS	U.S. Geological Survey
VFD	Volunteer Fire Department
WUI	Wildland Urban Interface

Executive Summary

Winter 2007 and spring 2008 will sadly be memorable periods for the residents of Torrance County (County). During Thanksgiving 2007, an un-seasonal wildfire (Ojo Peak fire) surprised many residents of the Manzano Mountains, destroying three homes and burning 7,000 acres of land. Just five months later, the same communities were ravaged by a second wildfire (Trigo fire), this time much larger and intense, destroying 59 homes and burning 13,709 acres of forest. These wildfires, though a shock to residents, were not unnatural events in the Manzano Mountains. For millennia, fire has been an integral process in the maintenance of grassland and forested ecosystems, but with the growth of communities into the Wildland Urban Interface (WUI), fire is increasingly seen as a threat to life and property. In recent years a number of large fires similar to the Ojo Peak and Trigo 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 the County; it provides recommendations to abate catastrophic wildfire and minimize their impacts to communities. A group of multi-jurisdictional agencies (federal, state, and local), organizations, and residents joined together as a Core Team to develop this plan, which is termed the Torrance County Community Wildfire Protection Plan (TCCWPP). This County-wide plan was developed in conjunction with a plan for the Claunch-Pinto Soil and Water Conservation District (District), which oversees lands within Torrance County. The County encompasses a range of community types, including scattered ranching headquarters, small land grant communities, National Forest in-holdings, new conservation-oriented developments, and a number of larger incorporated towns. The natural environment is equally diverse from plains grasslands, through savanna piñon-juniper woodlands to montane mixed conifer forests. Each of these cover types has its own associated fire hazards and these are discussed throughout the document. Community perceptions of these hazards vary drastically with noticeable complacency of fire risk by grassland residents that make up much of the eastern portion of the County. Public education forms an important component of this plan as an attempt to highlight common misconceptions of fire risk. The importance of public education and outreach in conjunction with recommended physical actions to reduce hazardous fuels are outlined in this plan.

The purpose of the TCCWPP is to assist in protecting human life and reducing property loss due to wildfire throughout the 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 2008 in response to the federal Healthy Forests Restoration Act (HFRA) of 2003.

The TCCWPP meets the requirements of the HFRA by:

1) Having been developed collaboratively by multiple agencies at the state and local level in consultation with federal agencies and other interested parties.
2) Prioritizing and identifying fuel reduction treatments and recommending the types and methods of treatments to protect at-risk communities and pertinent infrastructure.
3) Suggesting multi-party mitigation, monitoring, and outreach.

4) Recommending measures and action items that residents and communities can take to reduce the ignitability of structures.
5) Facilitating public information meetings to educate and involve the community to participate in and contribute to the development of the TCCWPP.

The planning process served to identify many physical hazards throughout the County that could increase the threat of wildfire to communities. The public also helped to identify community values that they would most like to see protected. By incorporating public and Core Team input into the recommendations, treatments were tailored specifically for the County to be sensitive to local values and concerns. The plan raised the importance of collaboration between multi-jurisdictional agencies in order to develop fuels mitigation treatment programs to address wildfire hazards. A major finding of the plan was that it identified the lack of resources available to residents of the County in terms of emergency response. Dependence upon volunteer firefighters and limited County-based staff and resources put the communities at high levels of risk from wildfire. This was evident during the Ojo Peak fire, which caught authorities off guard during what is usually the fire off-season. The Ojo Peak and Trigo fires did serve to heighten public awareness for the need to plan for wildfire risk and generate greater enthusiasm for mitigation practices such as volunteering for local fire departments, creating defensible space, and implementing thinning on public and private lands. For the County, the fires helped highlight weaknesses that could be overcome, such as limited water storage, poor evacuation procedures, and insufficient communication between agencies and the public. Many of these issues were overcome in the five months between the Ojo Peak and Trigo fires, highlighting the achievements that can be made in a short time when agencies and public work together to learn from their lessons.

The TCCWPP planning process highlighted the fire risks and hazards throughout the County but also outlined the actions that can be taken to reduce these risks. It was clear that it takes a combination of homeowner and community awareness, public education, and agency collaboration and treatments in order to fully reduce wildfire risk. The public were extremely active in this planning process, and a range of opinions and values were expressed throughout. A limited number of individuals expressed concern regarding thinning on public lands, but many also noted that they would like to see greater thinning efforts to protect communities that are adjacent to public lands. Overall, the public were in widespread agreement regarding the need for defensible space and treatment on private lands and greater public education and outreach on fire safe practices. The message throughout this document is that the greatest fire mitigation could be achieved through the actions of individual homeowners. 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 TCCWPP should be treated as a *live document* to be updated approximately every year. However, lessons learned from the Ojo Peak and Trigo fires should be addressed immediately so that impacts are decreased in future fires.

1.0 INTRODUCTION

Over the last decade or so, large and severe wildfires have been making regular headline news across the Southwest United States, largely because of the tragic human and structural losses that are associated with them. Communities are increasingly moving into wildland areas, expanding what is termed the Wildland Urban Interface (WUI), and so the human impacts of wildfire have become ever more apparent. In order to mitigate these impacts, communities located 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 Torrance County Community Wildfire Protection Plan (TCCWPP), evaluates wildfire threat to communities and infrastructure and identifies measures that homeowners and land managers can make to reduce the impact of wildfire to life, property, and other Community Values at Risk (CVARs).

Torrance County (hereafter referred to as the County) lies in central New Mexico and covers approximately 2,147,200 acres (3,355 square miles) (Figure 1.1). The County is largely rural with just five incorporated municipalities and significant state and federal land holdings, including U.S. Forest Service (USFS) (151,283 acres), Bureau of Land Management (BLM) (56,017 acres), and Isleta Indian Reservation (16,300 acres) land. Lands held in private ownership total 1,617,308 acres. In addition, 94,250 acres of the County are under land grant ownership, wherein Spanish settlements of the early 1800s in the Manzano Mountains and in the Manzano land grant became the towns of Manzano, Torreon, and Tajique (Torrance County comprehensive Land Use Plan 2007). A portion of the Chilili land grant also lies in the northwest corner of the County. Torrance County also exhibits a diversity of vegetation and land types from steep forested terrain to vast expanses of short grass prairie. This sparsely populated County has a high risk from wildland fire because communities are scattered throughout both grassland and forested areas. For this reason, the County opted to develop a CWPP that would provide recommendations for reducing the susceptibility of County communities to wildfire.

In addition to a rich mosaic of landownership and land managing agencies, the County encompasses three Soil and Water Conservation Districts (SWCDs) (Claunch-Pinto, East Torrance, and Edgewood). A large area in the southern portion of the County is managed by the Claunch-Pinto Soil and Water Conservation District (CPSWCD) (referred to hereafter as the District), which had already pursued a District-wide CWPP. In order to optimize available resources and ensure that both plans could be readily implemented in unison, the County and the District decided to join forces and develop a joint Core Team of stakeholders to develop both plans; the planning process began in October 2007. SWCA Environmental Consultants (SWCA) was contracted to facilitate the planning process and develop plans for both the County and the District. Although the two plans are related and similar, the plan for the District (Claunch-Pinto Community Wildfire Protection Plan [CPCWPP]) is reported separately (SWCA 2008).

This region supports a variety of ecosystems and land uses and includes both rural and urban communities. The topography ranges from the high mountain areas of the Manzano and Gallinas mountains to rolling piñon-juniper foothills to the open short grass prairie and ranchland of the

lowlands. Because of the many varied land types and land uses throughout the County, this collaborative plan seeks to incorporate the many values and opinions of the citizens that have made this area their home.

On November 21, 2007, the importance of developing a CWPP became evident for these rural communities. Sadly, three homes were lost and more than 100 families were forced to evacuate their homes when the Ojo Peak fire spread dramatically through the Manzano Mountains, burning over 7,000 acres in the western portion of the planning area (Figure 1.2). Just five months later on April 15, 2008 (as this CWPP was in its final stages of production), the Trigo fire ignited the western slopes of the Manzano Mountains, subsequently spreading across the crest to the eastern flanks and burning 13,680 acres (as of May 7, 2008) of National Forest and private land. The fire burned 59 homes, the majority of which were in the Sherwood Forest subdivision west of Torreon (Figure 1.3). More details from these two fires can be found throughout this document and in Appendix A. These and other fires throughout this region demonstrate the severity and potential danger of wildfires to communities and residences even outside of the traditional fire season. Such fires are unfortunately typical in these mountainous and forested terrains, and the rural communities that have sprung up amidst this landscape have little choice but to adapt to what is a natural cycle in the forest. This CWPP has been developed to address wildfire threat to communities throughout the County, and it provides recommendations to abate catastrophic wildfires and minimize their impacts on these communities.

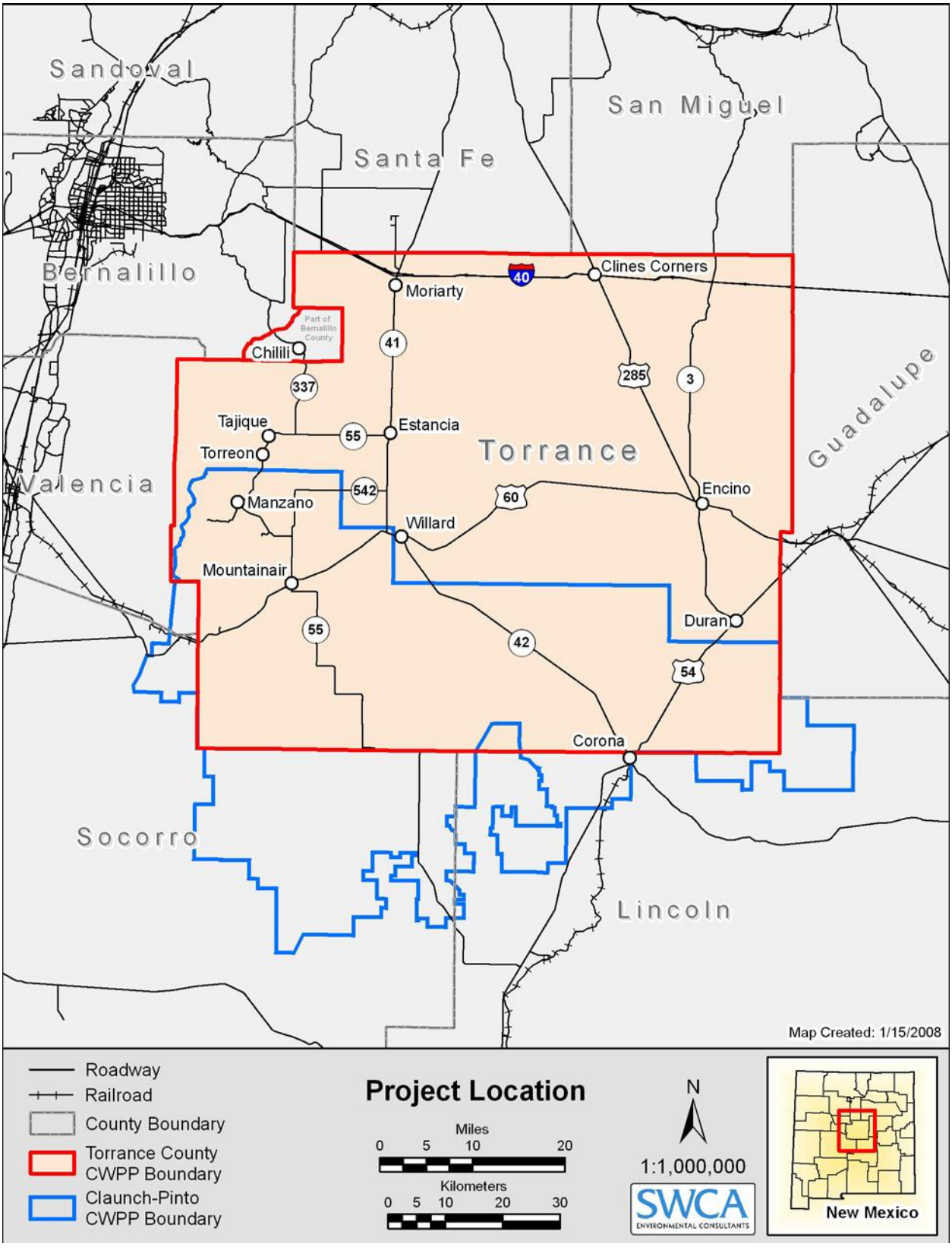

Figure 1.1. Torrance County CWPP project location map.

Figure 1.2. Ojo Peak fire structural losses.
Source: Dierdre Tarr, District

Figure 1.3. Trigo fire structural losses.
Source: Sam Amato, USFS

1.1 OVERVIEW OF COMMUNITY WILDFIRE PROTECTION PLANS (CWPP)

The summer of 2000 demonstrated how devastating severe wildfires could be in New Mexico, particularly with the Cerro Grande fire in Sandoval and Los Alamos Counties. In response to that landmark season, 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 in 2001 by *A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment: A 10 year Comprehensive Strategy*, and then was updated to include the *Implementation Plan* in 2002. This plan has once again been updated in 2006 and like the previous plan, focuses on using a collaborative framework for restoring fire-adapted ecosystems, reducing hazardous fuels and risks to communities, and providing economic benefits, as well as improving fire prevention and suppression strategies. However, the updated *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).

In recognition of widespread declining forest health, in 2003 the U.S. Congress passed and President Bush signed into law the Healthy Forest Restoration Act (HFRA) (Public Law 108-148). 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, specifically suited for each plan. In addition, communities with an established CWPP will be 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.

New Mexico State Forestry (NMSF) 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 (NMSA 1978, Section 68-2-8). As a result, NMSF 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 WUI areas (Communities at Risk [CARs]) in the state that were most vulnerable to wildland fire danger. The NM-FPTF updates its CARs list annually and reviews completed CWPPs and approves those that are compliant with the HFRA. The *2007 Communities at Risk Plan* identified 300 CARs, which was greater

than the previous year's estimate of 234 CARs. CARs identified in the annual plan are also updated federally from the January 2001 Federal Register listing for CARs (NMSF 2007).

New Mexico CWPPs are a mix of county- and city-level plans with some CARs being represented in more than one plan (Council of Western State Foresters 2006). The NM-FPTF has adopted the International Code Council (ICC) WUI Code (NMSF 2007).

A CWPP provides background information about a project area, a discussion of CVARs, community base maps, a fire risk assessment, recommendations for identifying treatment areas to reduce fuels, recommendations for promoting education and awareness about wildland fires, and monitoring and assessment strategies. Collaboration between federal agencies and communities is necessary to develop hazardous fuels reduction projects and to place priority on treatment areas identified by communities in a CWPP.

Assessments of CVARs provide a measure of people, property, and natural and other resources that could suffer losses in a wildfire. Examples of CVARs may include housing, businesses, infrastructure (including utilities, trails, roads), natural resources (including wildlife), cultural resources, recreation areas and open space, scenic resources (including significant landscapes), and water resources. Those CVARs identified by community members strongly influence the recommendations and the risk assessment in a CWPP, and those identified for the TCCWPP are described in greater detail in Chapter 4.

Community base maps provide baseline information, such as the project boundary, areas at potential risk of wildland fire, areas containing critical human infrastructure (e.g., escape routes, water supply structures, power or communication lines), and the preliminary designation of the community's WUI zone. These maps are used to assess and make recommendations regarding protection and risk-reduction priorities. Key base maps are presented in the body of this chapter; other base maps can be found in Appendix B.

The risk assessment, an important part of a CWPP, has two components. One component uses geographic information systems (GIS) and fire behavior modeling to identify areas that are at the greatest risk in the event of a wildland fire; this model is described here as a Composite Hazard/Risk Assessment and is discussed in detail in Chapter 4. Maps of the individual components of the risk assessment are helpful in visualizing the steps used in the model, as is presenting the modeling components separately so that the reader is able to see how the comprehensive model was created. The second component involves individual community hazard and risk assessments that identify hazards that could put each community at risk in the event of a wildland fire.

Implementation of recommendations for fuels treatment areas and public education and awareness is not required. However, if funding becomes available, the recommendations may be used as guidelines for the implementation process. The monitoring and assessment strategies for the TCCWPP are addressed in Chapters 5 and 6.

1.2 GOAL OF A COMMUNITY WILDFIRE PROTECTION PLAN

The goal of a CWPP is to enable local communities to improve their wildfire mitigation capacity while working 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, and, further, it must recommend the types and methods of treatment that will protect one or more 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 TCCWPP 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.

1.3 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" 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 been followed in preparing this TCCWPP. The eight recommended steps are as follows:

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 USFS and the 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 baseline map (or maps) defining the community's WUI and showing inhabited areas at risk, forested areas that contain critical human infrastructure, and forest areas at risk for large-scale fire disturbance.

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(s) and community risk assessment to facilitate a collaborative community discussion that leads to the identification of local priorities for fuel treatment, structural ignitability reduction, 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.

1.4 CORE TEAM

The first step in the TCCWPP process was to bring together a broad group of stakeholders representing both agency and private interests to form a Core Team. Since a large number of jurisdictions are represented in this particular planning area, an extensive distribution list was developed to invite as many stakeholders to join the Core Team as possible. This included state and federal agency representatives; three SWCDs (East Torrance, Edgewood, and Claunch-Pinto); representatives from the Manzano, Torreon, Tajique, and Chilili land grants; the Pueblo of Isleta; and County and municipal fire department and emergency management personnel. Private landowners were also invited through the public outreach process; a number are members of the Core Team (please see Appendix C for a complete list). The TCCWPP was overseen by Torrance County Emergency Manager, John Cordova, and the CPCWPP was overseen by the District Manager, Dierdre Tarr. The first Core Team meeting was held on October 11, 2007. Additional meetings were held monthly from November to April as the planning process developed. Average attendance at Core Team meetings was approximately 20 to 25 people.

1.5 PROJECT BOUNDARY

One of the first tasks of the Core Team was to establish the boundaries of the geographical area to be included in the CWPP. Because this is a County-wide CWPP, the planning area boundary coincides with the political boundary of Torrance County (Figure 1.1).

1.6 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).

Public outreach for the TCCWPP was carried out in conjunction with the CPCWPP. This involved five public meetings broken into two rounds. The first round of meetings was designed to introduce the public to the CWPP planning process with the aim of generating a context and direction for the plans and identifying areas of concern and a list of community values. These initial meetings took place on November 8, 2007, in Estancia (40 people) and December 10, 2007, in Mountainair (70 people). A second round of meetings was carried out later in the planning process with the aim of providing the public an opportunity to comment on the draft plans. These meetings took place on March 17, 2008, in Corona (20 people); April 2, 2008, in Moriarty (0 people); and April 3, 2008, in Torreon (33 people). Meeting locations were chosen so that all geographic areas of the County and District were represented. Each meeting had varying formats and agenda.

The District assisted in advertising meetings and distributing surveys through direct mailings to their members. Core Team members also helped distribute flyers and surveys throughout their jurisdictions. Local homeowner associations were contacted, and personal invitations were made to a number of local groups as well as each land grant community in the County and the District.

All meetings included an open house period at the beginning or end, when members of the public were invited to complete written surveys providing information for the plan. CWPP base maps and agency treatment maps were displayed at all meetings for review by community members. Participants were given the opportunity to ask questions and provide input in the plan. In addition, each meeting included a PowerPoint presentation of the planning process and a question-and-answer session. Participants were asked to provide comments on flip charts and on blank note cards during the meeting. All comments received during the public meetings were recorded (Appendix D). Flyers were used to announce all meetings in combination with a press release and notices posted in the local media.

The first meeting was held as part of the East Torrance SWCD Annual Meeting at the Estancia Fair Grounds in the town of Estancia. The meeting was advertised using flyers distributed throughout the County and District.

The second meeting was held at the Dr. Robert J. Saul Community Building in Mountainair. This meeting was attended by approximately 70 people, an unusually high attendance thought to be attributed to the Ojo Peak fire, which occurred just 19 days before. The meeting included a PowerPoint presentation (Figure 1.4), followed by organized, themed stations throughout the room at which participants were asked to note issues, comments, and information they would like incorporated into the plan regarding four main topics: 1) preparation before a fire, 2) actions to take during a fire (communication between agencies and public), 3) procedures to follow after a fire, and 4) treatment recommendations and specific concerns (**Error! Reference source not found.**). Following this open house session, attendees were reconvened and encouraged to ask questions. This meeting was advertised in a number of local newspapers as well as on primetime local television news broadcasts.

Figure 1.4. PowerPoint presentation at public meeting in Mountainair.

Figure 1.5. Public meeting themed stations.

The third meeting was held in Corona on March 17, 2008, in conjunction with the Lincoln County CWPP (the District includes the northern portion of Lincoln County). Approximately 22 residents attended the meeting, several of whom lived in the District but not Lincoln County. A PowerPoint presentation explained the Lincoln County CWPP process, defensible space concepts, and historic fire regimes. A brief presentation was then given that provided a description of the CPCWPP, progress, and a request for feedback on the draft plan. Following the informational portion of the meeting, attendees reviewed relevant maps and provided feedback on the extent of the WUI near Corona and fire suppression challenges in the area.

The forth meeting was held at the Moriarty Community Center in Moriarty. This meeting was not attended by any members of the public even though it was advertised in local newspapers and through distribution of flyers. It is felt that this lack of attendance resulted from a perception that grassland communities are at low risk from wildfire. This hypothesis was supported through discussion with Core Team members. Overcoming this misconception is a focus of these plans.

The fifth meeting was held at the Torreon Community Center in Torreon. This meeting was well attended by the mountain communities and involved detailed discussion and feedback on the draft plan.

In addition to the five scheduled CWPP meetings, the CWPP was also discussed at two wildfire public information meetings hosted by the Incident Management Teams from the Ojo Peak and Trigo fires. Both meetings provided a platform from which to talk about the CWPPs and gather public comment in the wake of actual wildfires. Public comments were recorded at both meetings.

1.6.1 SURVEYS

Project-specific surveys were developed with input from the Core Team using existing literature on fire management as a guide. The surveys provided a tool to assess public opinion and to guide decision-making for the TCCWPP. Due to the limited water supplies available for fire suppression across the area, the Core Team chose to also include a series of questions to assess the volume and type of water resources available at the residences of respondents. Unfortunately, the survey did not initially contain a question that asked homeowners what type of vegetation surrounded their homes. This important question was added later to help stratify the responses according to the type of fuel complex surrounding a residence. Surveys regarding the TCCWPP were distributed at the public meetings, sent out through direct mailings, and posted at County and District offices and other local establishments. In addition, surveys were sent home with school children attending schools in the Estancia Municipal School District. Approximately 85 community members responded to the survey. Survey responses were compiled using the online survey tool, SurveyMonkey. This tool allowed for rapid reporting of survey response statistics. This tool could have been used to collect electronic surveys, but the consensus of the Core Team was that internet access and computer literacy was not widespread enough to make electronic surveying feasible. The diverse responses about fire risk and mitigation options formed the basis for the recommendations and action items presented within the TCCWPP. Information that was obtained regarding water supplies helped to identify previously unused tanks and highlighted the need for a concerted effort to map and coordinate water supply planning across the project area. Please see Appendix D for community comments received at the public meetings and in the surveys. Appendix D also contains a blank survey form.

2.0 BACKGROUND

2.1 LOCATION AND GEOGRAPHY

Referred to as the "Heart of New Mexico," Torrance County is located in central New Mexico. The County boundary defines the TCCWPP planning area, which includes multiple cities, towns, communities, roadways, and railroads. The largest municipal area is Moriarty, which is the only city in the County. The County seat is the town of Estancia, which is the next-largest municipality. Overall, the County is highly rural and contains a large amount of agricultural land. Approximately 90% of the land in the County is state, tribal, or privately owned with the remainder being federally managed (Figure 2.1).

The main transportation corridors through the planning area are U.S. Route 60, which crosses the County from its southwest boundary to its east central boundary, and U.S. Route 285, which crosses from the County's north-central boundary and runs southeast to intersect with U.S. Route 54, which, in turn, bisects the southeastern corner of the County and runs southwest-northeast. Several state highways intersect with the U.S. highways.

2.2 POPULATION

In 2000, the population within the TCCWPP planning area was approximately 16,911 and represented only 0.93% of the entire population of New Mexico. Populations in the County have grown over the past several years and continue to grow. The County experienced a population increase of about 61% from 1990 to 2000 and has grown approximately 3.8% from 2000 to 2006 to a total estimated population of 17,551 (U.S. Census Bureau 1990, 2001a, and 2001b). Much of this growth is attributed to new residents who have been attracted to the rural lifestyle in the County but who commute to Albuquerque for work.

The largest and only city in Torrance County is Moriarty; it had a total population of 1,765 in 2000. Estancia, the County seat, had a total population of 1,584 in 2000. Mountainair, as the third-largest municipality, had a population of 1,116 in 2000. All other towns throughout the County had populations of 250 or less (U.S. Census Bureau 2001a). The census data indicate that as of 2000, approximately 6,024 households were located within Torrance County. More than 95% of the population resides in the western half of the County (U.S. Census Bureau 2001a).

The city of Moriarty had a housing density of 164 housing units per square mile, and the town of Estancia was estimated to have about 90 housing units per square mile. Other populated areas within the County had housing densities that ranged from approximately five housing units per square mile in the smaller, more rural communities to 530 housing units per square mile in the town of Mountainair, depending on the size and nature of the community (U.S. Census Bureau 2001a). Overall, housing characteristics are found to be primarily rural with much agricultural land and an average density of two housing units per square mile.

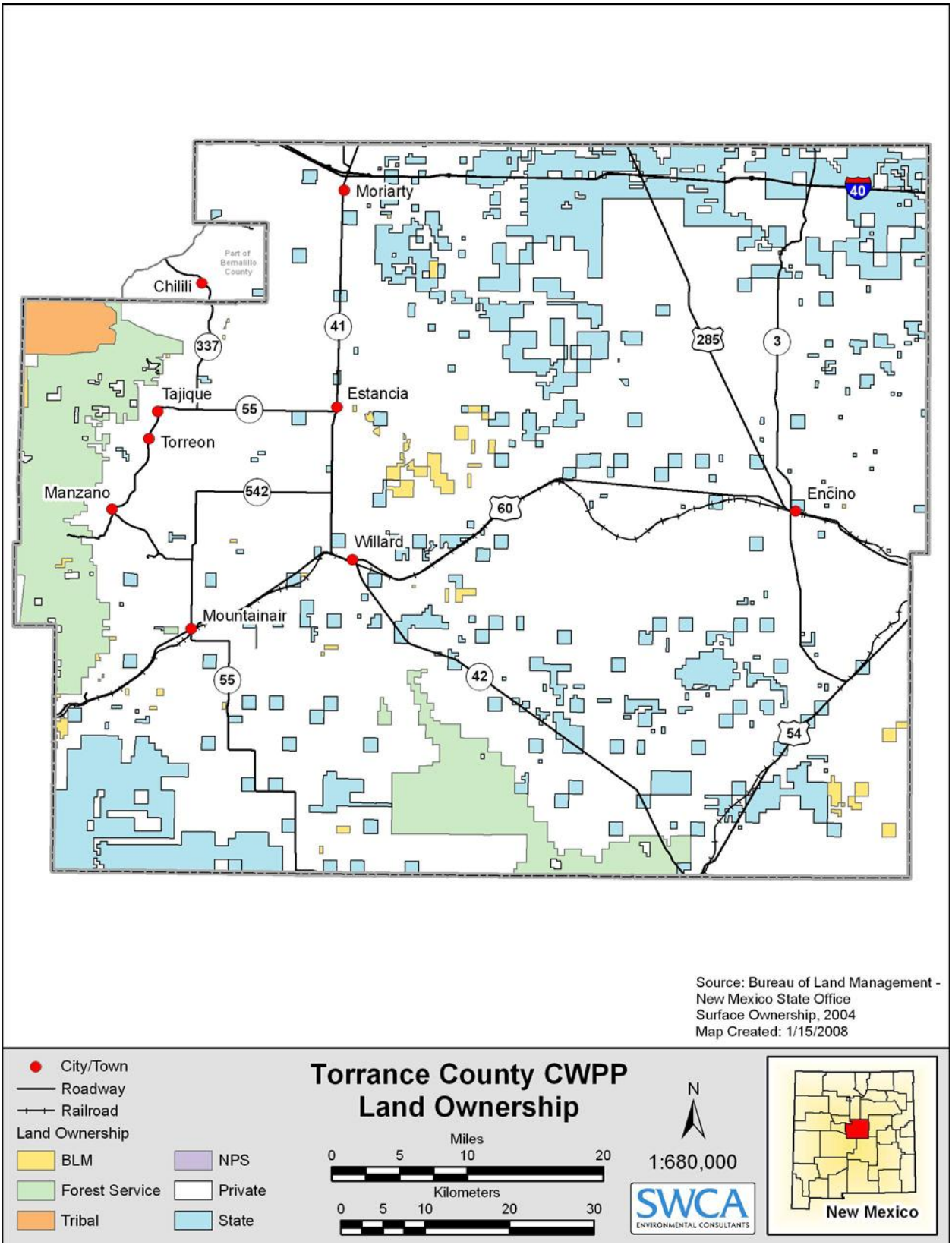

Figure 2.1. Torrance County land ownership.

Within Torrance County, economic and employment statistics are somewhat variable depending on the community and available employment opportunities. The state of New Mexico had an overall median household income of $37,838 in 2004. In Torrance County, the town of Torreon had the largest median household income in 1999 at $36,250. Across the County, the range of median incomes was from about $13,750 to almost $36,250 in 1999. However, the majority of the communities within Torrance County had annual median incomes ranging within $20,000 for 1999 (U.S. Census Bureau 2001a and 2001b). According to assessments carried out by the New Mexico Department of Health, the poverty rate in the County is approximately 19% (Torrance County Comprehensive Land Use Plan 2003).

2.3 HISTORY AND LAND USE

Human occupation within Torrance County is believed to date from the transition period between the Late Pleistocene and Holocene periods about 7,000 years ago (Mid-Region Council of Governments [MRCOG] 2007). Most archaeologists believe that during this time, bands of mobile hunter-gatherers (Paleoindians) subsisted primarily on large game supported by the cooler, wetter environment of that era, but they also collected wild plant foods, as well (Wase et al. 2003). Near the beginning of the A.D. 1300s, pueblo cultures began to appear within the Salinas Valley in Torrance County. These communities may have developed from the earlier transient populations, settling permanently in the area (Ivey 1988). Pueblo communities used agriculture, constructed elaborate dwellings, and relied on persistent surface water resources. Between A.D. 1100 and 1500, Gran Quivira, a massive pueblo, was an outpost of Anasazi civilization and a busy trading center where traders bartered salt found within the area for buffalo meat and hides provided by the Plains Indians and woven cotton goods from the Rio Grande pueblos (MRCOG 2007).

After initial explorations, the Spanish established a permanent settlement in New Mexico in 1598 and began to spread into many areas throughout the state (Scurlock 1998). As Spanish settlers continued to move into the area in the 1600s, they built missions at many of the pueblos. Shortly after that time, after years of drought, Apache attacks, and epidemics, the pueblo people of the Salinas Valley moved closer to the Rio Grande. By the late 1600s the pueblos in the Salinas Valley were deserted. Land uses such as logging, mining, irrigation, and livestock grazing increased significantly in the 1800s as the Spanish settlement continued to expand across New Mexico. These land uses were further augmented by Anglo-American settlement in the late 1800s (Scurlock 1998).

During the Spanish and later the Mexican governance of New Mexico territory, land was distributed to citizens through a system of land grants to foster the development of what was then the northern hinterlands of Mexico. These land grants were provided to both individuals and to groups of citizens with the intent that communal land could be developed into self-sustaining communities. The owner(s) were expected to develop the land, commit to improvements, and defend against foreign attack. After the Mexican-American War of 1848, the land grants became administered by the U.S., and the Treaty of Guadalupe Hidalgo was signed to guarantee ex-Mexican citizens their property rights. This led to numerous land disputes as many land grants had informal demarcations and communal land sharing. In 1981, in an attempt to resolve these many land disputes, Congress created the Court of Private Land Claims that resolved some but not all of the impending claims. Many of the descendants of these early settlers still live and

work the land given to their ancestors over three hundred years ago. Land grant communities in Torrance County are Chilili, Tajique, Torreon, Manzano, and Punta de Agua.

Torrance County was established in March 1903 and was named after Francis J. Torrance, who was involved with the development of the New Mexico Central Railroad. Historically, Torrance County was one of the most productive agricultural counties in the U.S. The Manzano area saw the first apple orchard in the Southwest, and pinto beans, corn, alfalfa, wheat, and pumpkins continue to be dominant crops. Although agriculture is no longer a primary employment sector, the County continues to reflect an agricultural and ranching lifestyle (Torrance County Comprehensive Land Use Plan 2003) (Figure 2.2).

Figure 2.2. Torrance County rural landscape.

2.4 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 Southwest region, including New Mexico, is located in the confluence of mid-latitude and subtropical circulation patterns that are coupled with orographic influences, which ultimately account for variable climatic conditions across the region (Sheppard et al. 2002). Overall climate regimes in the state typically consist of cyclical drought- or wet-year patterns that are driven by El Niño-Southern Oscillation (ENSO). Understanding the effects of ENSO and Pacific Decadal Oscillation on the climate of the region is important for planning fire management and mitigation activities because of their impact on precipitation, snow pack, and the subsequent influences on vegetation growth and fuel moistures (Swetnam and Betancourt 1990; Swetnam and Betancourt 1998).

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

A wide variation in annual precipitation is characteristic of arid and semiarid climates. Generally, July and August are the wettest months of the year, accounting for 30% to 40% of the state's annual precipitation. Summer rains take place almost entirely as frequent, brief, and intense thunderstorms. The moisture associated with these storms originates in the Gulf of Mexico. Winter is the driest season in New Mexico, when precipitation is primarily a result of frontal activity associated with Pacific Ocean storms that move across the country from west to east. Much of this precipitation falls as snow in mountain areas. Wind speeds across New Mexico are usually moderate. However, relatively strong and unpredictable winds can accompany frontal activity during the late winter and spring. Wind direction is typically from the southwest.

Landscape-scale drought and above-average precipitation have historically occurred at irregular intervals and with varying degrees of intensity in the past, as documented by tree-ring and other data. A period of warm and notably wet climatic conditions that were preceded by a significant drought in the 1950s took place from 1976 to 1991 (Swetnam and Betancourt 1998). Severe and prolonged droughts on record have occurred once every century on average (Gray et al. 2003). Currently, New Mexico is experiencing its eighth year of drought, which is expected to continue indefinitely (New Mexico Drought Task Force 2003).

Climate change is well documented as affecting both global and local environments, and will likely have even more pronounced impacts for the foreseeable future. The August 2007 U.S. Government Accounting Office (GAO 2007) report summary provides a clear statement of the problem relative to natural resource management in the United States. Snowmelt in the Rocky Mountains of Colorado and New Mexico is occurring earlier in the year (Hall et al. 2006; Gutzler 2007; Rahmstorf et al. 2007), and western North America forest wildfire frequency and intensity have recently increased (Veblen et al. 2000; Westerling et al. 2006), all of which have been linked to global warming. Since Southwest forest environments and ecological processes are influenced by climate, homeowners and land managers need to be prepared to learn and understand changes in climate and ecosystem processes and functions, while employing adaptive management strategies to accommodate such changes over time.

2.5 TORRANCE COUNTY CLIMATE

The climate within Torrance County is mild and characterized by relatively light annual precipitation, a wide range of diurnal and annual temperatures, abundant sunshine, and low relative humidity, factors which combine to create arid to semiarid climatic conditions. Elevations above 9,000 feet in the Manzano Mountains are typically cooler and moister with a

sub-humid climate regime. Differences in elevation and location within the County contribute to the divergent climatic regimes within the TCCWPP planning area. Aspect and elevation variations add to the effects of climate on vegetation distribution and are a component in management considerations.

With the exception of the Manzano Mountains, elevations do not vary much across the rest of Torrance County; thus, mean annual temperature ranges do not vary significantly, ranging from approximately 49.5ºF in Estancia to 53.4ºF in Salinas Pueblo Missions National Monument (Table 2.1). In the summer months, daily temperatures may exceed 100ºF with the warmest temperatures generally occurring in June, before the onset of the monsoon thunderstorm season. Maximum mean annual temperatures range from 63.6ºF at Clines Corners to 68.9ºF at Salinas Pueblo Missions National Monument. Minimum mean annual temperatures range from 33.0ºF in Estancia to 37.9ºF in Salinas Pueblo Missions National Monument (Table 2.1). Throughout the winter months, minimum temperatures below freezing are common, and the coldest temperatures generally occur in January. The average frost season is from October 1 to May 20.

Like most semiarid regions, Torrance County experiences some variation in seasonal and annual precipitation. However, the mean annual precipitation is typically light and ranges from 12.9 inches at Estancia to 17.7 inches at Clines Corners. The maximum annual rainfall in the project area has been recorded as high as 29.3 inches at Clines Corners, which also shows a significant amount (41.0 inches) of mean annual snowfall. Estancia has the lowest minimum average annual precipitation at 4.8 inches (Table 2.1). The largest quantity of precipitation occurs in July and August during monsoonal moisture patterns that produce high-intensity storms. These storms also generate intense lightning activity, which may result in multiple fire ignitions from one storm across a fire management district. The driest season is winter, with much of the precipitation falling as snow in the mountains and rain in the valleys.

Table 2.1. Summary of Climatic Data for Selected Weather Stations in Torrance County

Station	Elevation	Annual Temperature (F)			Annual Precipitation (inches)				Period of Record
		Mean Annual	Max.	Min.	Mean Annual	Max.	Min.	Mean Snowfall	
Estancia	6,120	50.6	68.0	33.0	12.9	23.6	4.8	17.3	1914–2007
Mountainair	6,500	51.5	67.5	35.5	14.2	27.0	6.8	24.2	1914–2007
Gran Quivira	6,600	53.4	68.9	37.9	15.5	25.5	6.3	21.4	1938–2007
Clines Corners	6,930	49.5	63.6	35.4	17.7	29.3	12.1	41.0	1968–2007

Source: *Western Regional Climate Center 2007.*

2.6 TOPOGRAPHY

Torrance County encompasses an area of approximately 3,355 square miles with elevations ranging from approximately 6,000 feet to just over 10,000 feet. The largest percentage of the County is characterized by gently rolling, high plains topography with a narrow elevational range from approximately 6,000 to 6,900 feet. The Manzano and Sandia mountains account for most all of the topographic relief in the County.

Other significant topographic features within the County include a series of playas and seasonal lakes within the Laguna del Perro region southeast of the town of Estancia. Torrance County is part of the valley known to geologists as the Great Estancia Basin, an ancient lakebed lying alongside the Manzano and Sandia Mountains. When the lakes evaporated, it left salt beds that were mined by Indian people and Spanish colonists (MRCOG 2007).

2.7 VEGETATION AND LAND COVER

2.7.1 CURRENT CONDITIONS

The majority of the vegetation within Torrance County is composed of grassland communities with dispersed patches of shrublands and piñon-juniper woodlands that are encroaching on the native grasslands. Forested areas exist primarily in the Manzano mountains and higher elevations. Vegetation types within the County are primarily a function of elevation, slope, aspect, substrate, and associated climatic regimes. Modified Southwestern Regional Gap Analysis Project land cover descriptions were used as the primary tool for evaluating the vegetated ecosystems within the CWPP project area (U.S. Geological Survey [USGS] 2006). Vegetative characteristics change over time; thus, historic vegetation conditions are discussed in a later section because they play a large role in historic fire regimes. Although a wide variety of different vegetative communities exists in the County, the dominant ecosystems are described below.

2.7.2 WESTERN GREAT PLAINS SHORTGRASS PRAIRIE

Western Great Plains Shortgrass Prairie occupy approximately 85% to 90% of the County. The vegetative structure of this community is characteristic of most shortgrass prairie ecosystems. This vegetative system represents a large area of flat to rolling uplands along the western Great Plains in the rain shadow of the Rocky Mountains, and it ranges from the Nebraska panhandle south into New Mexico. Although commonly overgrazed, these areas still display relatively rich vegetative species diversity (USGS 2006), dominated or co-dominated by very drought-resistant perennial bunch grasses such as blue grama (*Bouteloua gracilis*). Other graminoids associated with this system include sideoats grama (*B. curtipendula*), hairy grama (*B. hirsuta*), buffalograss (*Buchloe dactyloides*), needle and thread grass (*Hesperostipa comata*), purple three-awn (*Aristida purpurea*), prairie junegrass (*Koeleria macrantha*), western wheatgrass (*Pascopyrum smithii*), James' galleta grass (*Pleuraphis jamesii*), alkali sacaton (*Sporobolis airoides*), and sand dropseed (*S. cryptandrus*).

Mid-height grass species such as needle and thread grass and sand dropseed may be present in this ecosystem, especially in sandy soils, but are co-dominant to shortgrass species. Scattered shrubs and dwarf shrubs of sagebrush species (*Artemisia* spp.), spreading buckwheat (*Eriogonum effusum*), four-wing saltbush (*Atriplex canescens*), and broom snakeweed (*Gutierrezia sarothrae*) may also be present within this ecosystem.

2.7.3 INTERMOUNTAIN BASINS MIXED SALT DESERT SCRUB

Shrub/Scrub–type habitats exist in patches throughout the County, but they are most prevalent around the Laguna del Perro region. The vegetative structure of these ecosystems is more complex than grassland ecosystems and has relatively sparse to continuous ground cover.

Vegetation within the mixed salt desert scrub community is characterized by open to moderately dense shrub cover composed of one or more saltbush species. Other shrub species that may be present include sagebrush species, yellow rabbitbrush (*Chrysothamnus viscidiflorus*), rubber rabbitbrush (*Chrysothamnus nauseosus*), winterfat (*Krascheninnikovia lanata*), and broom snakeweed (*Gutierrezia sarothrae*). The herbaceous layer varies from sparse to moderately dense and includes species similar to those found in the intermountain basins grassland and shrub-steppe systems.

2.7.4 PIÑON-JUNIPER HABITAT

Piñon-juniper woodlands are commonly associated with the low mountains and plateau regions of north-central New Mexico. However, severe climatic events occurring during the growing season, such as drought and frost, are thought to limit the upper and lower ranges of this cover type. The canopy is dominated by piñon-juniper (*Pinus edulis*) and one-seed juniper (*Juniperus monosperma*). The understory associated with this land cover type is variable and may be dominated by shrubs or grasses, or may be absent. Common midstory shrubs in this ecosystem include sagebrush, mountain mahogany (*Cercocarpus montanus*), and scrub/Gambel oak (*Quercus gambelii*). Common understory herbaceous species are blue grama, Arizona fescue (*Festuca arizonica*), and James' galleta grass.

2.7.5 SOUTHERN ROCKY MOUNTAIN PONDEROSA PINE WOODLAND

This very widespread ecological system is most common throughout the Rocky Mountains. This woodland ecosystem occurs at the ecotone between grasslands or shrublands and more mesic coniferous forests. This ecosystem can be found on all slopes and aspects; however, it is most common on moderately steep to very steep slopes and ridge tops. Ponderosa pine (*Pinus ponderosa*) is the predominant conifer. Douglas fir (*Pseudotsuga menziesii*), piñon pine, and juniper species may also be present in the canopy. Many dense even-aged stands reflect a history of heavy logging in this cover type, which increases the potential for stand replacing fire in this area.

The understory shrubs, although somewhat limited due to the ever-increasing canopy cover, consist of big sagebrush (*Artemisia tridentata*), mountain mahogany, antelope bitterbrush (*Purshia tridentata*), scrub oak, western snowberry (*Symphoricarpos occidentalis*), Wood's rose (*Rosa woodsii*), and kinnikinnick (*Arctostaphylos uva-ursi*). Common herbaceous understory components include species of needle and thread, fescue (*Festuca* spp.), muhly (*Muhlenbergia capillaries)* and grama (*Bouteloua* spp.).

2.7.6 HIGH MONTANE AND SUBALPINE MIXED CONIFER

This high elevation environment is located mostly above 9,000 feet but also occurs on steeper north-facing slopes as low as 7,500 feet and consists primarily of Rocky Mountain mixed conifer forest and woodland and Southern Rocky Mountain montane/subalpine grassland vegetative communities.

The habitat type high montane and subalpine mixed conifer forest and woodland is found at locations within the Manzano and Sandia mountains at elevations ranging from 7,500 to 10,500 feet. Because this habitat type occurs over such a wide elevation range, this ecological

association is highly variable, depending especially upon temperature and moisture relationships. At the lower end of the elevation range, the mixed conifer forest and woodland is found on the steep, cool, north-facing slopes, while in the upper elevations it occurs on both north- and south-facing slopes. Douglas fir and white fir (*Abies concolor*) are the most common canopy dominants, but blue spruce (*Picea pungens*), Engelmann spruce *(Picea engelmannii),* and ponderosa pine may also be present. This ecosystem includes patches of mixed conifer and aspen (*Populus tremuloides*) stands. Many cold-deciduous shrub species are common in the understory, including kinnikinnick, Oregon grape (*Mahonia repens*), snowberry (*Symphiocarpus* spp.), Gambel oak, Oregon boxleaf (*Paxistima myrsinites*), and common juniper (*Juniperus communis*). Herbaceous species may include Arizona fescue (*Festuca arizonica*), sedges (*Carex* spp.), bluebunch wheatgrass (*Pseudogoegneria spicata*), and meadow rue (*Thalictrum* spp.). Naturally occurring fires are of variable return intervals, but are typically infrequent due to cool moist conditions of this habitat type.

2.7.7 Southern Rocky Mountain montane/subalpine grasslands

Southern Rocky Mountain montane/subalpine grassland habitats are scattered throughout the high-elevation, south-facing slopes and plateaus within the Manzano and Sandia mountains. Soils in these areas resemble prairie soils, in that they are well drained and relatively high in organic matter with a dark brown A-horizon. These areas typically support two to three dominant bunch grasses, including Arizona fescue, timber oatgrass (*Danthonia intermedia*), mountain muhly (*Muhlenbergia montana*), blue grama, and bluebunch wheatgrass (*Pseudogoegneria spicata*).

2.7.8 Riparian Areas

Limited perennial water courses exist in the planning area with most areas dominated by runoff from flashy monsoons. Riparian woodlands do exist along the flood zones of arroyos and lakes and ponds. This vegetation type consists primarily of cottonwood species (*Populus* spp.), willow (*Salix* spp.), saltcedar (*Tamarix* spp.), Russian olive (*Elaeagnus angustifolia*), and a variety of other riparian species.

2.7.9 Other Land Cover Types

2.7.9.1 Developed and Agricultural Land Cover

Scattered areas throughout Torrance County consist of agricultural land and developed areas (e.g., cities, towns, communities, parks, etc.). Agricultural areas are typically areas that have vegetation planted for livestock grazing and/or are used for hay or seed crops, areas being used for cropland production, or land that is actively tilled. Developed areas include all locales that contain human developments that account for greater than 20% of the total land cover.

2.7.9.2 Sparsely Vegetated or Barren Cover Types

Sparsely vegetated or barren areas are also scattered throughout the County, but they do not account for much acreage. These areas include rocky outcrops, cliffs, stabilized dunes, volcanic rock lands, and warm desert washes or playas. Vegetative cover in these environments is generally less than 10% of the ground cover.

2.8 HISTORICAL CONDITIONS

Much of the current vegetation, dominant species, and percentage of cover throughout the County is not representative of historical vegetative conditions. Shifts have occurred in the distribution of vegetative communities and alterations of vegetation from native to non-native species. Vegetation changes may be due to natural influences, such as disturbances or shifts in climate regimes, or they may be the result of human influences. Areas typically undergo natural succession following disturbances, including wildfires, rockslides, insect infestation and disease, or avalanches. Human-induced change in ecosystems is typically caused by overgrazing of herbaceous vegetation, logging, wildfire suppression, hydrologic alteration, chaining, and more.

The quaking aspen stands in the high elevations of the County probably appeared following disturbances such as a wildfire. These areas are of particular management concern because of their inferior health, but they have relatively important wildlife value. Aspen trees require full sunlight to develop and will thrive until they reach 50 to 60 years old. Many of the aspen stands within the area are now growing in the shade of coniferous species, which are becoming a dominant component of the tree canopy. Aspen stands begin to decline when they are no longer in full sunlight. Aspen stands are typically one genetic individual with the same root system (clone). In order to stimulate resprouting from the clone's root system, a disturbance such as fire that kills the above-ground portion of the tree and opens the canopy is required.

2.8.1 HISTORICAL CONDITIONS AND PRESENT CHANGES IN FIRE-ADAPTED ECOSYSTEMS

Fire has played an important role in many ecosystems in the Southwest, but the frequency of this important disturbance mechanism has been highly variable. Tree-ring dating (dendrochronology) has shown that, in historical times, ponderosa pine forests burned every 7 to 10 years, grasslands every 5 to 10 years, spruce-fir greater than 100 years and piñon-juniper from 300 to 400 years (Baker and Shinneman 2004; Romme et al. 2007). These fires were ignited by both humans and lightning. A major shift occurred around the turn of the twentieth century, when land management policies began to require the immediate response and full suppression of wildfires. Ranchers and farmers feared the loss of pasture and agricultural lands, and forest fires threatened homes and timber resources. By the 1940s, improved firefighting equipment and increased manpower had effectively eliminated most wildfires. The unforeseen consequences of excessive fuel buildups and vegetation type conversions across much of the western United States are, in part, the result of decades of successful fire-suppression activities. This effect has been most pronounced in forest types that would have historically undergone frequent low-intensity fire (Allen et al. 2002).

Many different vegetation communities have been converted from their historical conditions. Grasslands cover most areas in the County from approximately 6,000 to 7,000 feet in elevation. These ecosystems contained native bunch grasses, such as various grama species. In some areas, current conditions have been altered by past and continuous intensive grazing and farming practices, which have denuded native grasslands. They now exist in sparse, patchy stands and are encroached upon by juniper trees, shrubs, and cholla (*Opuntia imbricata*). Prior to European settlement, lightning-caused fires and fires ignited by various Native American groups were common and removed encroaching shrubs, forbs, and trees, and promoted vigorous grassland vegetation (Scurlock 1998). Juniper savannas and piñon-juniper woodlands have also changed

over time and have expanded above their historical range and densities as a result of livestock grazing, fire suppression, and climatic variation (Allen and Breshears 1998; Swetnam et al. 1999).

Ponderosa pine communities have exhibited significant differences from historical conditions that were described as much more open and park-like with frequent, low-severity fires maintaining this structure (Covington and Moore 1994). Currently, southwestern ponderosa pine forests have developed sharp increases in tree density, understory growth, and fuel buildup, which have contributed to recent high-intensity crown fires (Covington and Moore 1994).

2.8.2 Non-Native and Invasive Species

Non-native plant species and noxious weeds should be addressed in fuels reduction programs, and attention should be given to using practices that limit their spread and establishment. Some non-native plant species have adapted to fire regimes within the Southwest and are capable of out-competing most native species in the post-fire environment. These species also typically cause dramatic changes in the fire regime, thus changing entire plant communities.

One such species that deserves special mention with regard to wildfire is cheatgrass (*Bromus tectorum*). Cheatgrass, also called downy brome, is an alien grass species that pioneers disturbed ground in shrub-steppe ecosystems of the western United States and Canada (Link et al. 1995), where it establishes primarily from soil-stored and transported seed after fire (Hassan and West 1986). As an annual weed, it grows and matures rapidly in the spring and tends to set seed before most of the native species (Carpenter and Murray 1999). Cheatgrass has altered fire regimes in desert and semi-desert ecosystems because its range is extensive and it exists throughout the majority of the fire season as a dead, dry fuel that will easily carry fire and regenerate rapidly after fire (Hassan and West 1986). Cheatgrass is not currently a species of significant concern in the County but should be monitored for in the future.

Fire has historically been a natural part of the sagebrush grassland ecosystem and has typically occurred at intervals between 40 and 100 years (Baker 2006). However, cheatgrass has increased the fire frequencies within sagebrush steppe communities where fire is likely to burn every 3 to 5 years in areas where cheatgrass has invaded the ground cover (Whisenant 1989). Invasion of cheatgrass, woolly mullein (*Verbascum thapsus*), and Scotch thistle (*Onopordum acanthium*) have the tendency to increase the frequency of fire to the point that native shrub species cannot recover, giving cheatgrass a further competitive advantage. Cheatgrass has also increased fire occurrences in many desert ecosystems where, historically, large fires were infrequent due to sparse vegetative cover (Brooks et al. 2004).

Another non-native and invasive species that is causing great concern in the region is saltcedar (*Tamarix* spp.). Saltcedar, also referred to as tamarisk, is common in riparian areas in the Southwest. Campbell and Dick-Peddie (1964) reported that saltcedar did not occur in areas with a dense cottonwood overstory, but was found only on adjacent disturbed sites. Since the time of that publication, several cottonwood-dominated riparian communities have been described as having saltcedar occurring at varying densities in the subcanopy (Ellis 2001).

Once established, saltcedar can obtain water at deeper groundwater elevations and has higher water-use efficiency than native riparian trees in both mature and post-fire communities (Busch 1995; Busch and Smith 1993). 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 Field 1987; Brotherson and Winkel 1986; 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). It can also contribute to increased canopy density, which creates volatile fuel ladders and increases the likelihood of wildfire (Smith et al. 1998). Other non-native species, such as Russian olive (*Elaeagnus angustifolia*), may be common in riparian areas, and they have created similar problems to those created by saltcedar.

Saltcedar, Russian olive, and Scotch thistle all are on the state list of noxious weeds for New Mexico.

2.9 INSECTS AND DISEASE

2.9.1 INSECTS

Native insect epidemics within plant communities are usually part of a natural disturbance cycle similar to wildfire. They are often cyclic in nature and are usually followed by the natural succession of vegetation over time. Of primary interest are those that attack tree species because of the implications for fire management.

Present-day insect epidemics in forests are more extensive than they have been in the past (Kurz et al. 2008). This may be a result of drought-related stress and/or to faster completion of insect life cycles due to warmer climate regimes. Stands of trees that have been killed by insects have varying degrees of fire danger associated with them depending on the time lapse following an insect attack and structure of the dead fuels that remain. However, forests with a large degree of mortality following an insect attack may have the potential to experience extremely high fire danger, especially if a large degree of needle cover remains in the canopy.

Insects that have infested or have the potential to infect the forests within and around the TCCWPP planning area are discussed below.

Bark Beetles (Ips Beetles) (*Ips* spp. and *Dendroctonus* spp.). Ips beetles, also called engraver beetles, are native insects to North American forests. They attack ponderosa and piñon pines as well as other conifers and are responsible for the huge piñon die-off within the TCCWPP area over the last several years. *Dendroctonus* beetles attack medium to large ponderosa pines, blue spruce, Engelmann spruce, and Douglas firs. Each of these species creates egg galleries, which are distinct to that species in form and shape, which eventually girdle the infected tree. The natural defense of a healthy, rigorous tree is to *pitch out*, or excrete sap into the beetle entrance holes, covering it with sap and killing the invader. Trees are most likely to be successful at this strategy when they are not stressed by competition as a result of high tree density or drought. Once a tree has been colonized, it cannot be stopped.

Twig Beetle (*Pityophthorus* spp.). Twig beetles frequently attack piñon pines, as well as other conifers and occasionally spruce. High populations of this poorly understood native beetle develop in drought-stressed and otherwise injured trees. Breeding is restricted to twigs and small branches. Fading branches throughout the crown and tan sawdust around the attack site can identify trees attacked by the twig beetle. Hand pruning and vigorous watering can sometimes control attacks.

Piñon Needle Scale (Scale) (*Matsucoccus acalyptus*). Scale is a native insect that has the appearance of small black, bean-shaped spots on the piñon pine needles during outbreaks. Scale feeds on the sap of piñon pine needles, damaging cells and leading to decreased vigor, needle drop and dieback, and increased susceptibility to other insects or disease. Sometimes small trees are killed by repeated attacks, and larger trees are weakened to such an extent that they fall victim to attack by bark beetles. Repeated, heavy scale infestations leave trees with only a few needles alive at the tips of the branches. Destroying the eggs before they hatch can greatly reduce potential damage.

Piñon Spindle Gall Midge (Midge) (*Pinyonia edulicola*). Midges produce a spindle-shaped swelling from the needle base that is about 0.5 inch long. This insect is a common parasitic insect that rarely causes serious damage. Control is usually not necessary.

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

Roundheaded and Flatheaded Wood Borers (Family Cerambycidae and Family Buprestidae). Roundheaded and flatheaded wood borers attack recently cut, dead, or dying trees and often create complex tunnel systems. Roundheaded borers are the most destructive and tunnel deep into the wood. Freshly cut logs in the woods or firewood stored at a home are common infestation sources. These borers are most prominent after a wildfire. They may also spread into vigas in homes.

Juniper Borers (*Callidium* spp.). Several juniper borers aggressively attack drought-stressed junipers throughout their range. Damage can be extensive before symptoms are apparent. Usually a large portion of the tree or the entire tree dies before the insects' exit holes are noticed. Larvae bore beneath the bark, making galleries and tunneling deep into the wood to complete their life cycle over the course of the winter. Juniper borer damage has been frequently noticed in some larger junipers around homes.

Tiger Moth (*Halisidota argentata*). Tiger moth caterpillars are one of the most common defoliators throughout the West. The species typically selects only a few host trees within an area, and the impacts are thus generally limited. Tiger moth caterpillars defoliate host trees, and while the appearance may seem severe, the damage is generally nonlethal. Host species for tiger moth caterpillars include Douglas fir, true fir, spruce, and pine, all of which exist in the higher plateau and mountain range elevations surrounding the planning area.

2.9.2 DISEASES

Diseases of trees, such as parasitic plants, fungi, and bacteria, can also affect forests in the TCCWPP planning area. These diseases impact forest systems by degrading the productivity and health of the forest. Some of the more common forest diseases that are found in the County are described below. Trees that are killed by disease have the similar potential to increase fire hazards.

Mistletoe (*Arceuthobium* spp., *Phoradendron* spp.). Both dwarf and true mistletoe are common in the project area. Mistletoes are parasitic plants that gradually degrade tree vigor and may eventually kill their hosts over a long period of time following further infestation. Essential water and nutrients within the host are used by the mistletoe, thus depriving the host of needed food. Dwarf mistletoe is found on juniper, piñon pine, ponderosa pines, and firs. It is host-specific (i.e., the species that infects piñon does not infect other trees). True mistletoe is common on junipers in the Southwest. Both types of mistletoe spread from tree to tree and are difficult to control. Dwarf mistletoe spreads its seed by shooting berries; true mistletoe seeds are spread by birds. In residential areas, pruning can sometimes be effective on smaller trees. Heavy infestations in large trees can be controlled only by cutting down the trees and removing them to stop the spread of the mistletoe to other trees nearby.

Fir Broom Rust (*Melampsorella caryophyllacearum*). Fir broom rust is a species of fungus that has a broom appearance in the tree canopy. Fir broom rust is primarily a forest problem on white firs at higher elevations. A species also infects Engelmann spruce, but it is less common. These infections cause growth loss, top kill, and eventually tree mortality. Both species require alternate hosts to complete their life cycle. No chemical or biological control exists for fir broom rusts.

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

White Pine Blister Rust *(Cronartium ribicola).* White pine blister rust is a non-native disease caused by a fungus that first arrived in America in the early twentieth century from Asia and Europe. The complex life history of the fungus ultimately results in a lethal infestation of the host tree. The branch and stem canker that result from infestation can result in top kill, branch die-back, and eventually tree mortality.

3.0 FIRE ENVIRONMENT

3.1 WILDLAND-URBAN INTERFACE

The Wildland Urban Interface (WUI) is defined as areas where human habitation and development meet or are intermixed with wildland fuels (U.S. Department of Interior [USDI] and U.S. Department of Agriculture [USDA] 2001: 752–753). This intermix is prevalent throughout the County. In the TCCWPP planning area, several land grant communities have existed within the forests and woodlands long before the term WUI existed. What had been a small historical WUI is now growing as residential development in the area increases. Expansion, land management decisions, and the preference of homeowners to live outside of city limits has resulted in rapid development across the landscape into natural, wildland areas that inherently have associated wildfire risks. Human encroachment into wildland ecosystems in recent decades is increasing the extent of the WUI and is therefore having a significant influence on wildland fire management practices within these areas. One example of the expansion of the WUI in Torrance County is the new development of Deer Canyon Preserve south of Mountainair, which offers 20-acre homesites in the piñon-juniper woodlands (Figure 3.1). New developments vary widely in size. In many of these areas, lot sizes may only be one acre.

Figure 3.1. Development at Deer Canyon Preserve.

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 (Figure 3.2). The expansion of the WUI into areas with high fire risks, combined with the collective effects of past management policies and resource

management practices, changing land use patterns, prolonged periods of drought, and introduction of non-native species have 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). Fuels and fire management mitigation techniques have been proven to be effective where methods are strategically planned and implemented in WUI areas; however, all WUI mitigation focus areas will be different and should be planned for accordingly.

Figure 3.2. Typical WUI zone in the County.

A CWPP offers the opportunity for collaboration between 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, as well as 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 initially defined the WUI boundary within the TCCWPP planning area as a 0.5-mile buffer extending from the edge of communities, critical infrastructure, cultural values, and railroads (Figure 3.3). A 1-mile buffer was created around major roads, because roads are seen as a major ignition source and are critical for evacuation routes. The WUI boundary was later expanded by the Core Team to encompass additional areas of hazardous fuels and populated areas that neighbor National Forest land (Figure 3.3). The Core Team wanted to ensure that the WUI area was sufficient enough to enable funds to be appropriated for the protection of communities of any size, particularly adjacent to public lands. For all WUI areas, priority should be placed upon treatments most likely to protect life and property. Map 1 in Appendix B shows critical infrastructure throughout the planning area. Critical infrastructure is described as infrastructure (including hospitals, schools, utilities, communications, bridges, etc.) that should

be protected within the WUI zone in the event of a wildland fire. Because of the in-holdings throughout the National Forest and the results of the risk assessment (Section 4.3.2), the Core Team agreed to draw the WUI broadly west of Highway 41 and 55 to the County boundary. The Core Team understands that this CWPP definition will supersede the default definition under the HFRA. The majority of the Core Team was in favor of the WUI definition, and no objections were raised at public meetings. However, a small minority of the Core Team wanted to see the WUI boundary limited to the HFRA default definition. This more limited definition was opposed by the majority of Core Team members, as it would exclude non-municipal communities from the WUI, including those impacted by recent wildfires in Torrance County.

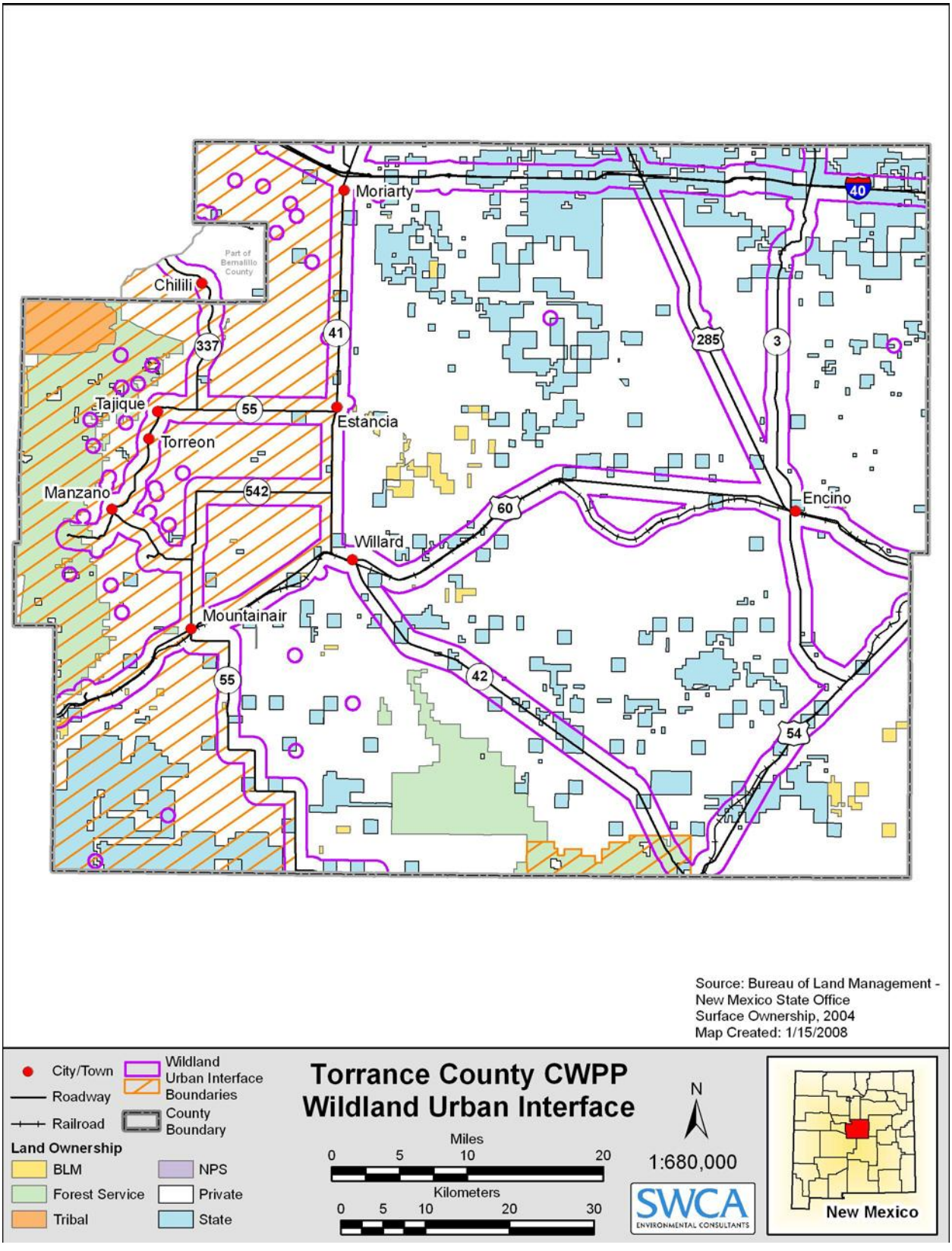

Figure 3.3. Torrance County Wildland Urban Interface map.

3.2 FIRE HISTORY

3.2.1 FIRE AND NATIVE PEOPLES

Prior to European settlement, Native Americans used fire as a tool to open land for agricultural, hunting, or travel; to drive game for hunting; to promote desirable post-fire herbaceous vegetation; or to manage the land for habitat protection and resource use (Scurlock 1998). As a result, human-caused fires are considered one component of the historical fire regime in the Southwest.

Research has indicated that these burning activities were focused around areas that were inhabited and took place primarily in localized regions during certain time periods across the Southwest; however, the specific influence that Native Americans had on historical fire regimes remains uncertain (Kaye and Swetnam 1999).

3.2.2 PAST FIRE MANAGEMENT POLICIES AND LAND MANAGEMENT ACTIONS

A number of factors have combined over the last 120 years to change forest structure, understory and overstory composition, fuel biomass conditions, and historical fire regimes (Cram et al. 2006). Increased settlement, logging practices (Cooper 1960; Schubert 1974), and heavy grazing (Baker and Shinneman 2004) have all been identified as contributing factors (Cram et al. 2006; Kaye and Swetnam 1999). Some species of non-native vegetation were also introduced during that time period and eventually invaded many native landscapes across the West, subsequently altering natural fire-disturbance processes.

Beginning in the early 1900s, the policy for handling wildland fire leaned heavily toward suppression. Over the years other agencies, such as the BLM, the Bureau of Indian Affairs (BIA), and the National Park Service, have followed the lead of the USFS and adopted fire suppression as the proper 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 into open grasslands.

3.2.3 HISTORICAL DISTURBANCE REGIMES AND CURRENT FIRE CONDITIONS IN THE COUNTY

3.2.3.1 Ponderosa Pine Forest

In a study of the Manzano Mountains, Baisan and Swetnam (1997) found that in the late eighteenth to early nineteenth centuries, the mean fire-return interval (FRI) for this area (around Capilla Peak and Canyon de Turrieta), as recorded in tree-ring surveys, was 7.4 years. From the synchrony and spatial pattern of scarred trees on these ponderosa pine and dry mixed conifer sites, the authors hypothesized that the fires were largely surface fires covering large areas. Generally, estimates of FRI in ponderosa pine forests range from a minimum of about 2 years to a maximum of nearly 40 years, and many agree that fires were frequent and generally of low-severity (Cooper 1960; Covington and Moore 1994; Richardson 1998); according to Cooper (1960), crown fires were not a component of the historical fire regime. The majority of fires occurred in late spring and early summer, before the onset of the summer monsoons (Hunter et al. 2007). Local deviations from this general rule are also recorded (Hunter et al. 2007) and on a landscape scale a mixture of open woodlands, meadows, and more dense forests are typical of

this forest type (Savage 1991). The effects of fire exclusion on forest structure are thought to be most profound in forests that previously sustained frequent, low-intensity surface fires (Westerling et al. 2006), and it is likely that fire exclusion was a primary cause of departure from historical conditions in ponderosa pine forests. For the most part, frequent fire consumed fuels on the ground surface and culled young trees to maintain an uneven age distribution and mosaic pattern throughout the forest (Allen et al. 2002). Frequent fire disturbance maintained an open, park-like forest structure with canopy openings and an abundant herbaceous and shrubby understory (Biswell 1973; Cooper 1960; Weaver 1947).

3.2.3.2 Mixed Conifer/Spruce-fir Forests

Often forest patches affected by low- and high-severity fire are closely juxtaposed in a transition zone made up of a forest type known as mixed conifer (Fulé et al. 2003). Fire histories in mixed conifer forests vary with forest composition, landscape characteristics, and human intervention, but tend to exhibit mixed-severity fire regimes, with both low-intensity surface fires and patchy crown fires (Touchan et al. 1996). Mixed-severity fire regimes are the most complex fire regimes in the western United States (Agee 1998) because of their extreme variability (Agee 2004). A mixed-severity fire regime exists where the typical fire, or combination of fires over time, results in a complex mix of patches of different severity, including unburned, low severity, moderate severity and high severity (Agee 2003).

Ponderosa pine was once co-dominant in many mixed conifer forests with relatively open stand structures, but fire suppression has allowed the development of dense sapling understories, with regeneration dominated by the more fire-sensitive Douglas fir, white fir, and Engelmann spruce. Forest stand inventory data from Arizona and New Mexico show an 81% increase in the area of mixed conifer forests between 1962 and 1986 (Fitzhugh et al. 1987; Johnson 1994). Herbaceous understories have been reduced by denser canopies and needle litter, and nutrient cycles have been disrupted. Heavy surface fuels and a vertically continuous ladder of dead branches have developed, resulting in increased risks of crown fires (Touchan et al. 1996).

Spruce-fir forests that occur at higher elevations in the County exhibit high densities (782–1382 trees/acre), high basal areas (28–39 square meters per hectare [m²/ha]), continuous canopy cover (52%–61%), and increased woody debris (28–39 m²/ha). These forest characteristics naturally support high-intensity and severe stand replacing fires (Fulé et al. 2003) and an infrequent fire regime. Approximately 80% or more of the aboveground vegetation is either consumed or dies as a result of such fire.

3.2.3.3 Grasslands

Many authors have suggested that the historical fire-return intervals for grasslands throughout the seventeenth to early nineteenth centuries are thought to have been every 5 to 10 years (Leopold 1924, McPherson 1995, Swetnam et al. 1992). Fire-suppression policies may have contributed to declining fire frequency in this cover type as well, but other interacting factors may have contributed as well. Intensive livestock grazing around the time of the Civil War is thought to have been 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.

Once woody plants become dominant, their long life spans and their ability to extract both shallow and deep soil moisture can maintain a woodland condition indefinitely (Burgess 1995). 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).

3.2.3.4 Piñon-juniper Woodlands

One of most common vegetative communities in the TCCWPP WUI area is piñon-juniper woodland. These woodlands are some of the most poorly understood ecosystems in terms of fire regimes, but recent research suggests that fire may have been a less-common and less-important disturbance agent in piñon-juniper woodlands as compared with adjacent ponderosa pine and grassland ecosystems. In a recent review of piñon-juniper disturbance regimes, Romme et al. (2007) subdivided the piñon-juniper cover type into three subtypes: areas of potential woodland expansion and contraction, piñon-juniper savannas, and persistent woodlands. These categories are helpful in separating the broad piñon-juniper cover type into distinct communities, which are subject to different climatic, topographic, and disturbance conditions.

As mentioned previously, many grasslands in the Southwest have been colonized by trees as a result of a complex interplay of environmental factors. The issue of woodland encroachment into grasslands goes hand in hand with the assessment of historical conditions of the woodlands. Areas of potential expansion and contraction are those zones wherein the boundaries of the piñon-juniper ecotones have shifted. These shifting boundaries have been widely documented (e.g., Gottfried 2004) but the historical condition of the ecosystem may be relative to the time scale of evaluation. Betancourt (1987) has suggested that the changing distribution patterns seen in the last century may be part of larger trends that have occurred over millennia and not the result of land use changes. Overall, it is believed that greater landscape heterogeneity existed previously in many of these areas that are now uniformly covered with relatively young trees (Romme et al. 2007).

Piñon-juniper savannas are found on lower elevation sites with deep soils where most of precipitation comes 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. Significant scientific debate currently exists over the natural FRI for savannas, but most experts agree that fire was more frequent in savannas than in persistent woodlands.

Persistent woodlands, characteristic of rugged upland sites with shallow, coarse soils tend to have older and denser trees. Herbaceous vegetation within this community is typically sparse, even in the absence of heavy livestock grazing. Research from persistent woodlands provides strong evidence to support the theory that the natural fire regime of piñon-juniper woodlands was dominated by infrequent but high-severity fires and that FRIs may have been on the order of 400 years (Baker and Shinneman, 2004; Romme et al., 2007). These findings are in stark contrast to previous estimates of piñon-juniper FRIs of 30 to 40 years (Schmidt et al. 2002; Smith 2000). The short FRI estimates were mostly inferred from FRIs of adjacent ponderosa pine ecosystems due to the scarcity of fire-scarred trees in these ecosystems.

In contrast to ponderosa pine, piñon pines and junipers produce relatively small volumes of litter. Understory fuels, either living or dead, must be sufficiently contiguous to carry a low-intensity surface fire. In the absence of fine surface fuels, fires that spread beyond individual trees were most likely wind driven and spread from crown to crown (Romme et al. 2007). Fire extent was greatest in higher-density woodlands and was limited by both fuels and topography in sparse, low-productivity stands on rocky terrain. These hypotheses are supported by the fact that wind-driven crown fire was observed locally in some areas of dense piñon-juniper woodland during the Ojo Peak fire in November 2007. Most scientists agree that fire was more common in savannas and areas of expansion and contraction than it was in persistent woodlands, but debate remains on the exact range of fire frequency. Overall, frequent, low-intensity surface fires were not the predominant fire regime in piñon-juniper woodlands. Therefore, fire exclusion may not have altered forest structure as dramatically in this forest type.

3.2.3.5 Riparian

In some local ecosystems a more frequent fire regime has occurred as a result of changes in vegetation composition and structure. Fire-adapted invasive species, such as saltcedar and Russian olive, have invaded many southwestern riparian corridors, increasing both fuel volume and continuity. These species also sprout readily after fire. Although native cottonwoods and willows will also regenerate after fire, they typically have 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). Native riparian vegetation is not adapted to fire of the extent and severity it is currently experiencing. Fires within this ecological zone were typically of a smaller scale (e.g., single-tree fires with minimum surface spread). 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 further. These altered fire regimes, rather than the natural hydrologic system, are now influencing the composition and structure of riparian ecosystems in the Southwest (Ellis 2001), as well as causing a threat to communities situated in or adjacent to the riparian zone.

3.2.4 RECENT FIRE OCCURRENCE IN THE COUNTY

Lightning ignition are historically the most common cause of fires within the County. Lightning is widespread throughout monsoon season, which usually takes place from June through August. Most fires are detected early and suppressed before they gain acreage; however, given the right conditions, some fires may grow large and become difficult to suppress, as was seen with the Ojo Peak and Trigo fires of 2007 and 2008, respectively. Annual fire occurrences in the County have increased significantly over the past 15 years. This is most likely the result of increased numbers of human ignitions, but it may also be a result of fuel buildups, changes in climate, and forest disease outbreaks (Figure 3.4).

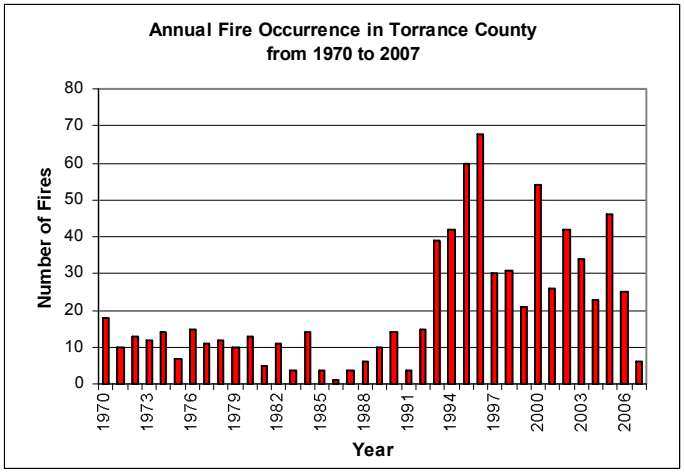

Figure 3.4. Annual fire occurrences on record from 1970 to 2007 (State of New Mexico and Cibola National Forest fire records).

A primary concern of residents in the WUI is the growing number of human ignitions, particularly with the development and improvement of roads, residences, and recreational opportunities in wildland areas. Human-caused fires account for approximately 58% of the wildfires recorded for the County from 1970 to 2007, and approximately 82% of the human-caused fires within that time period have taken place within the last 15 years. Although the majority of fires take place during the summer months, the recent increase in the number of human-caused ignitions has resulted in an increase in fire numbers throughout the year.

From 1970 to 2007, 774 were fires reported to NMSF, recorded in all fuel types throughout and within a 1-mile buffer of the County. The majority of the fires take place in the Manzano Mountains in the piñon-juniper and ponderosa pine communities. Approximately 85% of the fires that are ignited within the region are usually less than 10 acres in size. However, 125 wildfires greater than 10 acres in size are on record in the County from 1970 to 2007; 32 of those fires were greater than 100 acres in size. A total of 10 fires grew to greater than 1,000 acres. Table 3.1 lists the large fires (over 1,000 acres in size) that have occurred within the planning area during the period of record. All but one of those fires resulted from a cause other than a natural lightning strike (Figure 3.5).

Approximately half of the fires on record took place in the Cibola National Forest, and the highest incidence of fire occurrence for both the USFS and State of New Mexico fire records for the County is along the corridor of the Manzano Mountains where a large number of communities and structures exist within the WUI. The Ojo Peak fire that burned 7,500 acres in November 2007 (Figure 3.6) forced the evacuation of approximately 100 families and eventually burned 7 structures, including 3 homes. The fires also impacted local watershed values as drainages were choked with ash (Figure 3.7). The Trigo fire (ongoing at time of publication) burned 13,709 acres (as of May 16, 2008) and destroyed 59 homes, the majority of which were located in the Sherwood Forest subdivision (see Appendix A for more details). Both fires occurred in the Cibola National Forest and surrounding private land and exhibited extreme fire behavior including crown fire spread, spotting, and torching (Figure 3.8). Map 2 in Appendix B illustrates the fire occurrence information for the County.

Table 3.1. Fires Larger than 1,000 Acres in Size on Record within the County

Fire Name	Start Date	Acres	Cover Type	Cause
Vega	April 18, 1994	1,200	Piñon-juniper	Debris burning
Rest Area	April 23, 1996	2,000	Grass	Miscellaneous
Jean	December 20, 1996	3,000	Grass	Human caused
Olna	March 29, 1997	2,500	Grass	Miscellaneous
Pinatosa	April 21, 2001	4,200	Piñon-juniper	Human caused campfire
Lakes	August 25, 2002	4,096	Ponderosa pine	Human caused campfire
Lookout	May 21, 2004	5,280	Ponderosa pine	Human caused campfire
Lucy	June 6, 2006	2,454	Grass	Lightning
Ojo Peak	November 19, 2007	7,500	Piñon-juniper and mixed conifer	Human caused*
Trigo **	April 15, 2008	13,709 (as of 5/16/08)	Piñon-juniper and mixed conifer	Human caused*

* Based on investigations (inconclusive).
** Ongoing at time of publication.

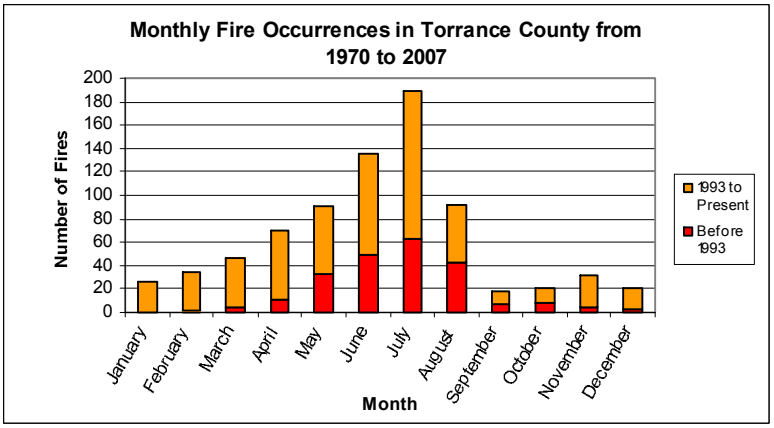

Figure 3.5. Number of fires per month from 1970 to 2007 (State of New Mexico and Cibola National Forest fire records).

Figure 3.6. Ojo Peak fire, November 2007.
Source: Dierdre Tarr, District

Figure 3.7. Drainage with ash from Ojo Peak fire runoff.
Source: Dierdre Tarr, District

Figure 3.8. Trigo fire smoke column, April 2008.
Source: Dierdre Tarr, District

3.3 FUTURE CHALLENGES FOR RESTORATION EFFORTS

3.3.1 SOCIAL

Public meetings have garnered widespread support for fuels treatment on both public and private land, but a small group of individuals from the Forest Valley subdivision have voiced their concerns regarding fuels reduction. Correspondence from this group is provided in Appendix D. Land managers need to be sensitive to these concerns in order to build trust as well as ownership in projects both on public and private lands. Increased public education and outreach is one way to disseminate information regarding fuels reduction so that the public can weigh the benefits against the impacts. A plethora of information is available to the public regarding thinning in ponderosa pine; however, other cover types throughout the County (e.g., piñon-juniper) are not as well addressed in the scientific literature. Increased research and monitoring is therefore needed to determine best management practices that are specific for all cover types. It is also recommended that land managers adopt the New Mexico Forest Restoration Principles (NMFRP 2006) in order that restoration efforts are as sensitive as possible to all ecological and social concerns. This interagency document was collaboratively developed and includes parameters such as retention of old growth trees, reducing the threat of unnatural crown fire, using low-impact techniques, and protecting sensitive communities.

Thinning has been advocated by many forest research scientists as a means of improving forest health and promoting long-term viability of ponderosa pine forest (Allen et al. 2002; Hunter et al. 2007; Swetnam et al. 1999). This broader forest health message should also be the focus of

public outreach and education. In the Southwest, ponderosa pine landscapes were historically composed of a mosaic of meadows, savanna-like forests with low tree density interspersed with more dense forests with higher canopy cover (Savage 1991). Such a structure helps to maintain diverse wildlife and plant habitat, stronger more drought and insect resistant trees, and larger old growth stands that thrive with lower competitive stress (Cram et al. 2006). These more open stands, as has been discussed previously, are also more resilient to high-severity wildfire as the potential for crown fire spread is reduced (Agee and Skinner 2005).

The recent fires in the County provide an opportunity for assessment of actual fire behavior and monitoring of fire effects on previously thinned sites. As illustrated in Appendix A, a number of sites that had been previously thinned exhibited lower burn severity during the Ojo Peak fire (e.g., lower tree mortality, crown consumption, and adverse soil impacts) than neighboring un-thinned stands [Alan Kelso (forest silviculturalist), personal communication 2008].

3.3.2 CLIMATE

In addition to all of the anthropogenic impacts that have impacted natural fire regimes, climate change has also played an extensive role in altering fire occurrence and severity, influencing the vegetative cover and available burnable fuel across the Western landscape. In the past few years, fires have grown to record sizes, are burning earlier and longer, and are burning 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 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 from 1970 to 2003 saw a pronounced increase in frequency of fire since the mid 1980s. Fires from 1987 to 2003 were four times more frequent than the 1970 to 1986 average. After 1987, the length of the fire season was also observed to increase by 78 days. Within just the last seven years, a record number of acreages have burned, and numbers are continually getting larger (NIFC 2006).

Changes in relative humidity have been blamed for much of these changes as increased drying over much of the Southwest has led to an increase in days with high fire danger (Brown et al. 2001). Advanced computer models are now making national-scale simulations of ecosystems providing predictions of how fire regimes will change in the twentieth century (Neilson 2004). Western grasslands are predicted to undergo increased expansion of woodier vegetation, such as piñon-juniper, associated with increased precipitation occurring during typical wet seasons. Summer months are predicted to be hotter and longer, which will also contribute to increased fire risk (Neilson 2004). Under greater climatic extremes widely predicted throughout the U.S., fire behavior is expected to become more erratic, with longer flame lengths, increased torching and crowning, and more rapid runs and blow-ups associated with extremely dry conditions (Brown et al. 2001).

In a GAO (2007) report on climate change and federal lands, natural resource experts from numerous federal and state agencies as well as leading academic experts predict that climate change will cause forest fires to grow in size and severity. This in turn will impact the safety of communities located not just in WUIs but in even larger areas as a result of impaired air quality resulting from vast smoke production. Experts working under the auspices of the Department of Energy's Accelerated Climate Prediction Initiative similarly warn of the increased risks. The

costs of fire suppression and fire preparedness are likely to increase in parallel with increasingly larger fires. Experts warn that Southwest fire and fuels management strategies and policies need to address these risks now in order to prepare for these changing regimes, while also accommodating complex changing ecosystems subject to growing human stresses (Brown et al. 2001).

Although fire suppression is still aggressively practiced, fire management techniques are continually adapting and improving. Due to scattered human developments and values throughout the WUI, suppression will always have to be a priority in those areas. However, combining prescribed fire and wildland fire use with effective fuels management and restoration techniques will help re-establish natural fire regimes and reduce the potential for catastrophic wildfires associated with our changing climate.

3.4 FIRE REGIMES AND FIRE REGIME CONDITION CLASSES

In order to classify, prioritize, and plan for fuels treatments across a fire management region, methods have been developed to stratify the landscape based on physiographic and ecological characteristics.

3.4.1 FIRE REGIME (FR) CLASSIFICATIONS

A natural, or historical, fire regime is a general classification describing the role fire would play throughout a landscape in the absence of modern human intervention but including the influence of burning by Native American groups (Agee 1993; Brown 1995; Hann et al. 2003).

Fire regime classes are based on the average number of years between fires (also known as fire frequency or mean FRI) combined with the severity (i.e., the amount of vegetation replacement) of the fire and its effect on the dominant overstory vegetation (Hann et al. 2003).

The five FR classes are:

FR I: Frequency of 0 to 35 years, and low (mostly surface fires) to mixed severity (less than 75% of the dominant overstory vegetation is replaced).

FR II: Frequency of 0 to 35 years, and high severity (more than 75% of the dominant overstory vegetation is replaced).

FR III: Frequency of 35 to 200+ years, and mixed severity (less than 75% of the dominant overstory vegetation is replaced).

FR IV: Frequency of 35 to 200+ years, and high severity (more than 75% of the dominant overstory vegetation is replaced).

FR V: Frequency of 200+ years, and high severity (more than 75% of the dominant overstory vegetation is replaced).

3.4.2 FIRE REGIME CONDITION CLASS (FRCC)

Natural fire regime reference conditions have been developed for vegetation-fuel class composition, fire frequency, and fire severity in biophysical settings at a landscape level for the

Southwest and most other parts of the U.S. (Hann et al. 2003). 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 (e.g., 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). Several factors, such as fire suppression, timber harvesting, livestock overgrazing, introduction and establishment of non-native species, introduced disease and insects, and other management activities are all possible causes of this departure from historical conditions (Schmidt et al. 2002; Hann et al. 2003).

The three FRCC rankings are:

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	Extreme departure from the central tendency of the reference conditions.

The central tendency is a composite estimate of the reference condition vegetation characteristics; fuel composition; fire frequency, severity, and pattern; and other associated natural disturbances. Low departure includes a range of ±33% deviation from the central tendency (Hann and Bunnell 2001; Hann et al. 2003; Hardy et al. 2001).

Although the FRCC classification provides a useful concept, many authors have questioned the accuracy and appropriate application of the data (e.g., Della Sala et al. 2004; Schoennagel et al. 2004). The initial mapping project (Schmidt et al. 2002) was intended to provide national-level data and was not recommended for use at finer local scales. Unfortunately, despite the coarse nature of the data, it has been widely used to inform local management decisions. Another fundamental assumption is that the natural fire regime data that were used in the creation of the system were, in fact, accurate. This assumption may be critically flawed for piñon-juniper woodlands where recent research has indicated a natural fire-return interval on the order of centuries (Baker and Shinneman 2004; Romme 2007) instead of the estimate of decadal disturbance used in the classification system (Schmidt et al. 2002). Based on this difference in the natural fire-return interval, a piñon-juniper stand that was previously mapped as FR I may be more accurately described as FR V, at the opposite end of the spectrum; this would give it an averaged classification of FRCC III. Improved data and local input may help to improve the applicability of the FR and FRCC systems for future decision-making processes, but the FRCC concept should be applied currently with great caution in designing and prioritizing fuels treatments.

Map 3 in Appendix B illustrates the FRCC classifications for TCCWPP.

3.5 FIREFIGHTING CAPABILITIES

Torrance County is served by multiple firefighting jurisdictions. A number of both volunteer and established fire stations are within or near the County boundary:

City of Moriarty Fire Department
Estancia Fire Department
Torreon and Tajique Fire Department
Mountainair Fire Department
Encino Hills Fire Department
Indian Hills Fire Department
North East Torrance Fire Department
Hills and Valleys Substation
Duran Fire Department
Willard Fire Department
McIntosh Fire Department
Corona Fire Department

These stations fall within five firefighting districts in the County. Appendix E includes an inventory of equipment for each district. It is important to note that with the exception of the City of Moriarty Fire Department (which has three paid firefighters), there is only one paid, full-time firefighter for the entire County. Because the remaining stations are manned by volunteer firefighters, the capabilities of these stations are limited. Also included in Appendix E is a summary of a document entitled *Interagency Emergency Operations in Wildland Fire with NM State Forestry Division: Planning Projects and Incident Management*. This unpublished document was developed by NMSF to provide guidelines for emergency responders.

3.6 FIRE MANAGEMENT POLICY

Within the TCCWPP planning area, the responsibility for managing and responding to wildfire varies according to land ownership. Resources available for initial attack on fire starts include federal, state, and local fire departments. Interagency coordination for the County is provided by the Albuquerque Zone of the Southwest Coordination Center (SWCC). Interagency fire management and dispatch operations within the District fall within the Gila/Las Cruces Zone of the SWCC.

3.6.1 PRIVATE LAND

Wildfire is considered to be the highest-priority hazard in the County according to the County's Hazard Mitigation Plan (2007). The responsibility for responding to wildfire on private land falls to the jurisdiction in which the incident has occurred. Municipal fire departments may respond to incidents, but within the County, County personnel coordinate all fire and rescue efforts.

3.6.2 STATE LAND

The Socorro District of NMSF has primary responsibility for non-federal, non-municipal, non-tribal, and non-pueblo lands within the TCCWPP area. In the event of a wildfire on state land or within the Manzano Mountain State Park, local fire departments or other resources may be used for initial attack under the New Mexico Joint Powers Agreements (JPA) (State of New Mexico 2003).

3.6.3 U.S. Forest Service

On USFS land, initial attack will be conducted by USFS whenever possible. The USFS Mountainair Ranger District maintains Mutual Aid Agreements (MAA) with the NMSF, the County, and the National Park Service. Under the MAA, agency personnel may respond to incidents outside their agency boundaries.

Wildland fire use (using naturally-burning fires in designated, remote sections of forests as a tool for helping to restore forest health and mitigating the escalating costs of fire suppression) is not considered appropriate at this time on the Mountainair Ranger District due to increasing numbers of WUI homes and the lack of vegetation data to support predictive models. Depending on the location and nature of a wildfire, USFS policies outline appropriate management responses to guide district personnel in the application of specific suppression techniques.

In wilderness areas, the Cibola National Forest supervisor must approve the use of helicopters, portable pumps, and chainsaws, as well as the construction of helispots. The Southwestern Regional Forester must approve the use of motorized vehicles and bulldozer line construction. Fire strategies call for:

- restoring fire to the ecosystem,
- using prescribed fire to reduce hazards,
- managing wildland fires so that air quality issues are compatible with local, state, and federal laws; and
- minimizing suppression impacts to wilderness as well as impacts to the surrounding area.

3.6.4 National Park Service

National Park Service policy states that all wildland fires will be effectively managed considering resource values to be protected, considering firefighter and public safety, and using the full range of strategic and tactical operations as described in an approved Fire Management Plan (FMP). The primary goals of the wildland fire management program at Salinas Pueblo Missions National Monument, as stated in the FMP, are to protect human health and safety, property, and natural and cultural resources; diminish risk and consequences of severe wildland fires; and, to the extent possible, increase the health of the ecosystem.

To accomplish these goals, human-caused wildland fires will be suppressed, prescribed fire will be introduced where appropriate, and hazardous fuel-reduction projects will focus on WUI areas. Fire managers will balance the potential impacts of wildland fire with the potential resource impacts of fire suppression activities in choosing the Appropriate Management Response.

3.6.5 Bureau of Land Management Land

The BLM operates a State Fire and Aviation Management office in Santa Fe; three District Fire Programs located in Albuquerque, Farmington, and Las Cruces, respectively; and two Field Office Programs in Roswell and Carlsbad, respectively. Administrative boundaries for these offices follow County boundaries. The County falls within the management area of the Rio

Puerco Field Office of the BLM's Albuquerque District. Within the District, Socorro County falls within the BLM's Socorro Field Office, and land within Lincoln County is managed by the BLM's Roswell Field Office. The local field office has initial attack responsibility and provides mutual aid assistance for wildland fire activities on BLM-administered public lands. Through the JPA, the BLM also maintains initial attack fire response responsibilities for designated state and private lands.

Each field office in New Mexico has a Resource Management Plan (RMP), which provides management direction for all BLM resources. In 2004, a statewide Resource Management Plan Amendment for fire and fuels was completed. This amendment covered all RMPs in New Mexico and Texas. The purpose of this amendment was to improve the BLM's implementation of the NFP and the 2001 Federal Fire Policy, and to update direction for fire and fuels management. Fire Management Plans are supplements to the RMPs and are more detailed, site-specific plans. Fire Management Plans establish fire and fuels objectives and implementation strategies, and they serve as a reference for on-the-ground decisions in fire and fuels management. Each field office has an approved FMP. These plans are periodically reviewed and updated as needed.

The single overriding priority in BLM fire management is to protect human life, of both the public and firefighters. In addition, agency policies aim to protect human communities, their infrastructure, and the natural resources on which they depend. Other property and improvements will be protected. Where possible on BLM land, wildland fire is allowed to function as an essential ecological process and agent of natural change in fire-dependent ecosystems. Management actions also focus on the improvement or maintenance of ecosystem health and wildlife habitat and the protection of high-value cultural, historical, and paleontological resources.

3.7 EVACUATION PROCEDURES

Evacuation procedures outlined here provide a general overview; the reader is cautioned that evacuation procedures are subject to change since every incident is different and evacuations are contingent upon a large number of human and natural factors that could change without warning.

Evacuation procedures will be ordered by the county in which the incident is located or where evacuation is needed.

- In Torrance County, emergency response in the event of a wildfire is coordinated by a situation analysis team (SAT) made up of the County Emergency Service Director, the County Emergency Manager, the County Manager, the County Sheriff, and the Chairman. The SAT is responsible for making the decisions to evacuate or to shelter-in-place and when to return after evacuating.
- County and state law enforcement, as well as fire and rescue, facilitate evacuations. State police officers typically play a large role in carrying out evacuation orders.
- Evacuation is not mandatory, but firefighters will not go in the remove victims after orders have been given.

- Evacuees should utilize the identified routes. Firefighters and equipment must still be able to access areas while residents are evacuating.
- Evacuees should go to the nearest identified shelters and check-in. Accountability is paramount and the authorities need to be able to identify which homes have been evacuated. After checking-in at a shelter, evacuees are free to leave the shelter to stay with friends or relatives. The County maintains an internal list of possible evacuation centers, but the choice of shelter locations and evacuation routes is considered dynamic and is instituted based on the location of the disaster, wind direction, and other factors identified at the time of the disaster.
- Once the evacuation orders have been given, NO ONE will be allowed back into the area until permission is granted by the authorities.
- Evacuees should have a plan with neighbors to aid in the evacuation of elderly residents, people with special needs, and pets and livestock.
- Residents should make arrangements for the shelter of pets and livestock since many emergency shelters and hotels will not allow them.
- Evacuees should notify friends and family.
- Evacuees should notify insurance companies and banks.
- Evacuees should prepare to not return to their homes for many days.

Comments from the Ojo Peak fire highlighted public concerns regarding evacuation procedures in the County. However, following the Trigo fire, vast improvements were recognized by the public and the County Emergency Management Team was praised by the Type 1 Team Incident Commander for its evacuation response.

3.8 INTERNATIONAL WILDLAND URBAN INTERFACE CODE OF THE INTERNATIONAL CODE COUNCIL

Given the current and future expansion of the WUI throughout the TCCWPP planning area, it is recommended that the County adopt the ICC code, at least in part, to increase enforcement of building ordinances in the WUI. Neighboring Bernalillo County has already adopted this code and could act as a model for the County. The County should pursue the code to learn more about its potential application for planning in the WUI. A copy of the code may be obtained from http://www.iccsafe.org.

3.9 FEDERAL TREATMENTS

3.9.1 U.S. FOREST SERVICE FUEL REDUCTION PROJECTS

The USFS conducts ongoing projects to address fire mitigation and forest health within the Mountainair Ranger District. Approximately four projects are currently underway that involve both mechanical fuels reduction and prescribed burn activities, and two projects are proposed that involve thinning and prescribed fire. Please refer to Figure 3.9 for a map of treatment history in the Manzano Mountains. Proposed treatments are described in Section 5.5.

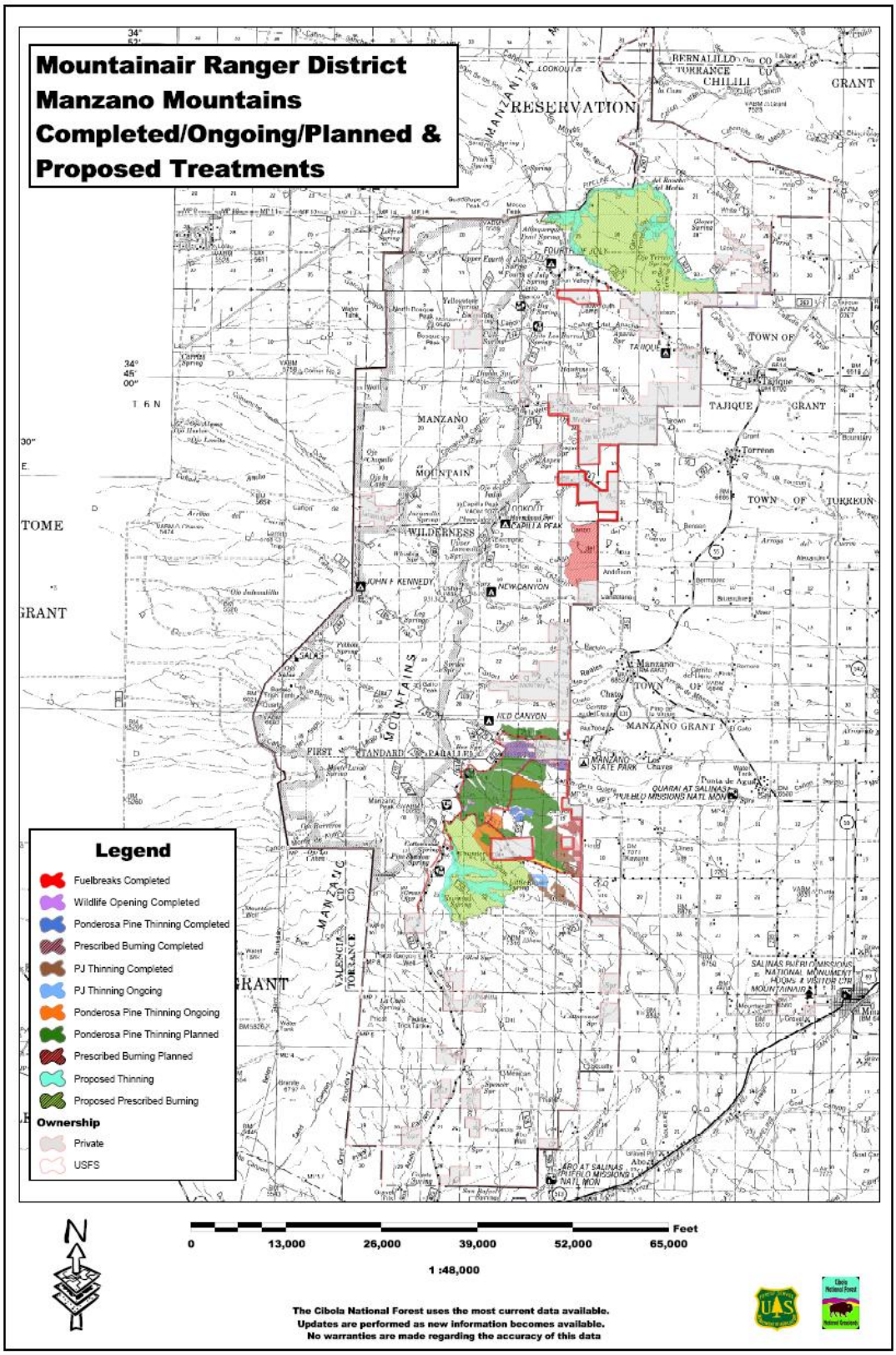

Figure 3.9. Mountainair Ranger District Treatment Map.
Source: Cibola National Forest

4.0 RISK ASSESSMENT

4.1 PURPOSE

The purpose of developing the risk assessment model described here was to create a unique tool for evaluating the risk of wildland fires to communities within the WUI areas of the County.

In the wildland fire vernacular, "hazard" generally refers to wildland fuel in terms of its contribution to problem fire behavior and its resistance to control when combined with terrain and weather features. Fire "risk" refers to the chance of a wildfire starting, as determined by the presence and activity of causative agents (National Wildfire Coordinating Group 1998) and other variables that may impact people living in these areas such as dead-end roads and proximity to fire response facilities. No uniform methodology currently exists for synthesizing elements of hazard and risk into a comprehensive analysis, though very general guidelines have been published in the National Association of State Foresters' (NASF) *Field Guidance for Identifying and Prioritizing Communities at Risk* and the National Wildfire Coordinating Group's (NWCG) *WUI Fire Hazard Assessment Methodology*. Each jurisdiction must evaluate hazard and risk according to the environment and values unique to the area. For the County, elements of hazard and risk were analyzed through a series of steps consistent with NASF and NWCG guidelines.

The risk assessment is two-fold and combines a GIS model of hazard based on fire behavior and fuels modeling technology (Composite Hazard/Risk Assessment) and a field assessment of community hazards and values at risk (Community Hazard/Risk 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, while working 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.

Many methods are available to perform wildfire risk assessments. Different methods will highlight different factors, and it should be emphasized that these assessments illustrate relative risk for the purpose of prioritizing mitigation and planning efforts. Subjectivity plays a role in any WUI risk assessment, and the significance of risk ratings must be kept in perspective. Once relative risk has been determined, components of the assessment can be used to guide mitigation efforts.

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 profuse 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.

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 and crown scorch (Omi and Kalabokidis 1991; Pollet and Omi 2002). 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 was carried out using well-established fire behavior models: FARSITE, FlamMap, BehavePlus, and FireFamilyPlus, as well as ArcGIS Desktop Spatial Analyst tools. Data used in the risk assessment was largely obtained from LANDFIRE.

4.2.2.1 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 U.S. for land management planning. More information can be obtained from http://www.landfire.gov. LANDFIRE was the source of the fuel model data used in the Composite Hazard/Risk assessments.

4.2.2.2 FARSITE

FARSITE is a computer model based on Rothermel's (1983) Spread Equations that 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 and 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.

4.2.2.3 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, it gives fire behavior predictions across a landscape for a snapshot of time but does not predict fire spread across the landscape. FlamMap was used in this project to predict fire behavior across the landscape under extreme (worst case) weather scenarios.

4.2.2.4 BehavePlus

BehavePlus also uses Rothermel (1983) equations. It is a multifaceted fire behavior model and was used to determine fuel moisture in the risk assessment process.

4.2.3 FIRE BEHAVIOR MODEL INPUTS

4.2.3.1 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 (1983) surface fire spread equations, and each vegetation and litter type is broken down into 40 fuel models. This classification was 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 to 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:

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

  Source: Scott and Burgan 2005

A more detailed breakdown of the fuel types present in the planning area is presented in Table 4.1. Map 4 in Appendix B illustrates the fuels classification throughout the planning area. The dominant fuel types in the area are classified as GR2 and GS2. GR2 is a moderately coarse, continuous grass fuel with a depth of approximately 1 foot. The spread rate in these fuels is high (20–50 chains per hour [ch/h]), and flame lengths are moderate (4–8 feet). This fuel type makes up the majority of the central and eastern portions of the County, with patches of GS2 fuels in the southern portion and western foothills. GS2 fuels are made up of shrubs 1 to 3 feet high with a moderate grass understory. Spread rates and flame lengths are comparable to the GS2 fuels. Taller shrubs (1–3 feet high) and flashy light fuels that generate intense fire behavior could be classified as high risk because the flame lengths often exceed lengths that allow direct suppression by hand crews.

The mountainous areas to the west are made up of TL8, TL9, and TU5 fuels. TL8 fuels are timber-litter fuels with a long-needle pine litter and small amounts of herbaceous load beneath a forest canopy; spread rates are moderate (5–20 ch/h) and flame lengths are low (1–4 feet). TL9 fuels are timber-litter fuels with a very high load dead and downed woody litter beneath a forest canopy; these fuels also burn with a moderate rate of spread (5–20 ch/h) and moderate flame length (4–8 feet). The patches of TU5 are timber-understory fuels where the fuel load is high-

load conifer litter with shrub understory; these fuels burn with a moderate rate of spread (5–20 ch/h) and moderate flame length (4–8 feet).

Nonburnable fuels are also present throughout the planning area, with urban fuels (NB1) dominant throughout communities and some patches of agricultural fuels (cultivated crops and pasture) (NB3) in the central area east and west of U.S. Highway 41. A large area of NB8 and NB9 (open water and bare ground, respectively) lies in the center of the Estancia Basin and is characterized by large salt flats and lagoons. No permanent streams are present in the County. Nonburnable fuel types are all considered noncombustible when input into the fire behavior model. This is important to note when determining risk in more rural areas where pasture land and cured crops could pose fire danger during certain times of the year, particularly prior to harvest. Land managers should pay close attention to these agricultural fuels in areas where crop burning is a common vegetation management practice.

Table 4.1. Fuel Model Classification for the TCCWPP Planning Area

1. Nearly pure grass and/or forb type (Grass)

GR1: Grass is short, patchy, and possibly heavily grazed. Spread rate is moderate (5–20 ch/h); flame length low (1–4 feet); fine fuel load 0.40 (tons per acre [t/ac]).

GR2: Moderately coarse continuous grass, average depth about 1 foot. Spread rate high (20–50 ch/h), flame length moderate (4–8 feet); fine fuel load 1.10 (t/ac).

GR4: Moderately coarse continuous grass, average depth about 2 feet. Spread rate very high (50–150 ch/h); flame length high (8–12 feet); fine fuel load 2.15 (t/ac).

2. Mixture of grass and shrub, up to about 50% shrub cover (Grass-Shrub)

GS1: Shrubs are about 1-foot high, low grass load. Spread rate moderate (5–20 ch/h); flame length low (1–4 feet); fine fuel load 1.35 (t/ac).

GS2: Shrubs are 1–3 feet high, moderate grass load. Spread rate high (20–50 ch/h); flame length moderate (4–8 feet); fine fuel load 2.1 (t/ac).

3. Shrubs cover at least 50% of the site; grass sparse to nonexistent (Shrub)

SH1: Low shrub fuel load, fuelbed depth about 1 foot; some grass may be present. Spread rate very low (0–2 ch/h); flame length very low (0–1 foot); fine fuel load 1.7 (t/ac).

SH2: Moderate fuel load (higher than SH1), depth about 1 foot, no grass fuels present. Spread rate low (2–5 ch/h); flame length low (1–4 feet); fine fuel load 5.2 (t/ac).

SH5: Heavy shrub load, depth 4–6 feet. Spread rate very high (50–150 ch/h); flame length very high (12–25 feet); fine fuel load 6.5 (t/ac).

SH6: Dense shrubs, little or no herb fuel, depth about 2 feet. Spread rate high (20–50 ch/h), flame lengths high (8–12 feet) (*only occurring in uplands beyond CWPP boundary*); fine fuel load 4.3 (t/ac).

SH7: Very heavy shrub load, depth 4–6 feet. Spread rate lower than SH5, but flame length similar. Spread rate high (20–50 ch/h); flame length very high (12–25 feet); fine fuel load 6.9 (t/ac).

4. Grass or shrubs mixed with litter from forest canopy (Timber-Understory)

TU1: Fuelbed is low load of grass and/or shrub with litter. Spread rate low (2–5 ch/h); flame length low (1–4 feet); fine fuel load 1.3 (t/ac).

TU5: Fuelbed is high load conifer litter with shrub understory. Spread rate is moderate (5–20 ch/h); flame length moderate (4–8 feet); fine fuel load 7.0 (t/ac).

5. Dead and down woody fuel (litter) beneath a forest canopy (Timber-Litter)

TL1: Light to moderate load, fuels 1–2 inches deep. Spread rate very slow (0–2 ch/h); flame length very low (0–1 foot); fine fuel load 1.0 (t/ac).

TL8: Moderate load and compactness, may include small amount of herbaceous load. Spread rate moderate; flame length low; fine fuel load 5.8 (t/ac).

TL9: very high load conifer litter, spread rate moderate; flame length moderate; fine fuel load 6.65 (t/ac).

6. Insufficient wildland fuel to carry wildland fire under any condition (Nonburnable)

NB1: Urban or suburban development; insufficient wildland fuel to carry wildland fire.

NB3: Agricultural field, maintained in nonburnable condition.

NB8: Open water.

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 the categories present on the TCCWPP fuel maps are presented above. For more information refer to Scott and Burgan 2005.

4.2.3.2 Topography

Topography is important in determining fire behavior. Steepness of slope, aspect, elevation, and landscape features can all affect fuels, local weather, and rate of spread of wildfire. The topography in the planning area varies significantly from the flat open plains to steep mountainous areas of the Manzano and Gallinas mountains. Aspect and slope can assert significant influence on fire behavior, so where topography does fluctuate, flame lengths, rate of spread, and crowning potential could vary considerably. Other topographic features that could be significant are arroyos and tributaries that may funnel fire and intensify fire behavior. Narrow channel width and presence of vegetated islands are also topographic features that could influence fire spread in bosque areas.

4.2.3.3 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 timber 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 with often 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 the fire and protect life and property.

One of the critical inputs for FlaMmap is fuel moisture files. For this purpose weather data was obtained from "FAMWEB" (http://fam.nwcg.gov/fam-web/famweb/index$.startup), a fire weather database maintained by the NWCG. With guidance from Chuck Maxwell, USFWS meteorologist at the Southwest Area Coordination Center, a remote automated weather station (RAWS) was selected and data downloaded from the web site. The weather station was selected based on period of record, location within the planning area, reliability of the data, and how representative the data would be for weather in the planning area. As requested by the Core Team, wind conditions were based upon recorded winds from the Ojo Peak fire, which amounted to 35 miles per hour.

Using an additional fire program (FireFamilyPlus) with the RAWS 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.

4.2.4.1 Flame Length

Map 5 in Appendix B illustrates the predicted 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 and suppression tactics. Direct attack by hand lines is usually limited to flame lengths under 4 feet. For flame lengths in excess of 4 feet, indirect suppression is the preferred tactic. Using engines and heavy equipment, suppression will move from direct to indirect with flame lengths in excess of 8 feet.

The highest predicted flame lengths (>11 feet) are found in the western portion of the County in the Manzano Mountains, largely in the heavy shrub fuel types (SH5). However, a number of areas have potentially high flame lengths (>8-foot and >11-foot), particularly in areas of grass/shrub (GS2) and shrubland fuels (SH6 and SH5) scattered throughout the southern and central portions of the County. A large portion of the landscape is predicted to exhibit low flame lengths (up to 4 feet); this is especially evident in the short and moderate length grasslands (GR1 and GR2).

4.2.4.2 Rate of Spread

Map 6 in Appendix B illustrates the predicted rate of spread classifications for the planning area. As requested by the Core Team, FlamMap was run using the weather parameters recorded during the Ojo Peak fire (35-mile-per-hour winds). As a result the rates of spread appear to counter conventional results that rates of spread are higher in grasslands than in shrub and timber. The greatest rates of spread are predicted to occur in the shrubland fuels (SH5, SH6) that line the foothills of the Manzano Mountains, the southern portion of the County, and scattered throughout central portions. Rates of spread in the remaining grass and timber fuels are expected to be moderate under these extreme wind conditions. Agricultural and urban areas are clearly delineated in this model by their low rate of spread.

4.2.4.3 Crown Fire

Map 7 in Appendix B illustrates the predicted crown fire potential throughout the planning area. Crown fire activity in the County is confined to areas of timber-litter fuel (TL9 and TL8). These areas are primarily in the higher-elevation mountain areas in the west and south of the planning area. The remainder of the planning area is likely to witness surface fire.

4.2.4.4 Spot Fire Potential

The FlamMap results indicate active crowning in some areas, which could generate spot fires. This fire behavior has been observed during recent fires throughout the TCCWPP planning area. Spot fires are fires that are caused by flying embers that can move ahead of the flaming front. These new ignitions pose particular hazard in the mountainous terrain of the Manzanos because the fire can be transmitted from the wildland fuels into the neighboring shrub and grasslands or into urban areas and forest in-holdings. Immediate suppression of spot fires is critical to prevent them from increasing the rate of spread and fire behavior; it also can prevent firefighters from becoming trapped while fighting the main fire.

4.2.4.5 Fireline Intensity

Map 8 in Appendix B 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). It is a good measure, 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 (SH5 and SH6) in the Manzano and Gallinas mountains and in additional shrub communities scattered throughout the planning area. Fireline intensities would be low in the grass-dominated fuels.

4.2.4.6 Fire Occurrence Density

Map 9 in Appendix B illustrates the fire occurrence density throughout the planning area. Fire occurrence density was determined by performing a density analysis on fire start locations with ArcGIS Desktop Spatial Analyst. These locations were provided by NMSF and the USFS as GIS points that showed the location of fire starts within the project area over the last 37years (1970 to 2007). The density analysis was 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 B illustrates the fire occurrence of the area and reveals a definite pattern of fires in the Manzano Mountains and on Cibola National Forest lands, as well as a pattern of fires along the main highways, particularly U.S. Highway 45 and Interstate 25.

It may be argued that areas that have burned previously are less likely to burn in the future due to lowered fuel loads, but post-burn regrowth and dead-and-downed fuels 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 Landsat 2006 imagery. Furthermore, the fire occurrence maps are used to provide information on areas where human-ignited and lightning-ignited fires are prevalent, conditions that make an area more prone to fire in the future.

4.3 RISK ASSESSMENT MODEL

4.3.1 GIS OVERLAY PROCESS

All data used in the risk assessment was processed using Environmental Systems Research Institute (ESRI) ArcGIS Desktop and the ESRI Spatial Analyst Extension. Information on these programs can be found at http://www.esri.com. Data were gathered from all relevant agencies, and the most current data were used.

All fire parameter data sets were 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 (900 m²). Each of the original cell values were 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 data sets, each of the input parameters were weighted; that is, they were assigned a percentage value reflecting that parameter's importance in the model. The parameters were then placed into a Weighted Overlay Model, which "stacks" each geographically aligned data set and evaluates an output value derived from each cell value of the overlaid data set in

combination with the weighted assessment. The resulting data set 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. Figure 4.1 lists the individual datasets and the relative weights assigned within the modeling framework.

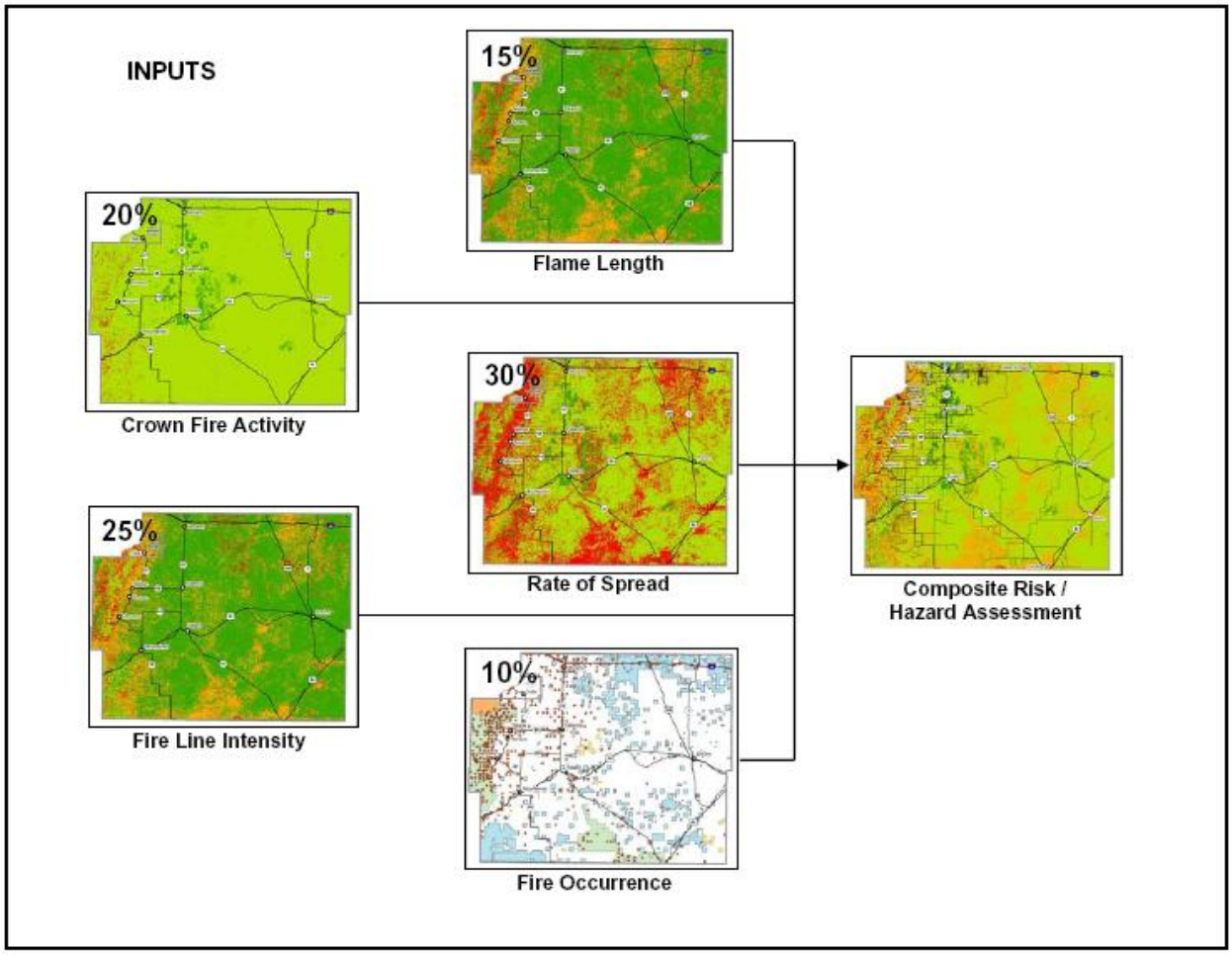

Figure 4.1. Composite Risk/Hazard Assessment GIS layers.

4.3.2 RESULTS

Figure 4.2 is the Composite Hazard/Risk Assessment for the planning area that 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 illustrates the high risk associated with the Manzano Mountain areas and the south-central portion of the County. Extreme risk is scattered throughout these areas and is associated mostly with the dense shrub portion of the fuel complex. Some areas dominated by timber fuels are classified as moderate as a result of the lower flame lengths and rates of spread in these fuel types. Crown fire behavior and spotting potential, however, raise the risk associated with these fuels, as was observed during the Ojo Peak fire. The greatest concentration of high-risk area is found along the western edge of the County and along the Highway 337 corridor extending from the southern boundary of the County up through Chilili to west of Moriarty. This corridor includes forest roads that lead to in-holdings within the Cibola National Forest and act as important evacuation routes in the event of wildfire. The area south of Highway 60 and southwest of Mountainair exhibits a high risk rating. This, coupled with potential spread by prevailing southwest winds, should be acknowledged when prioritizing fuels treatments.

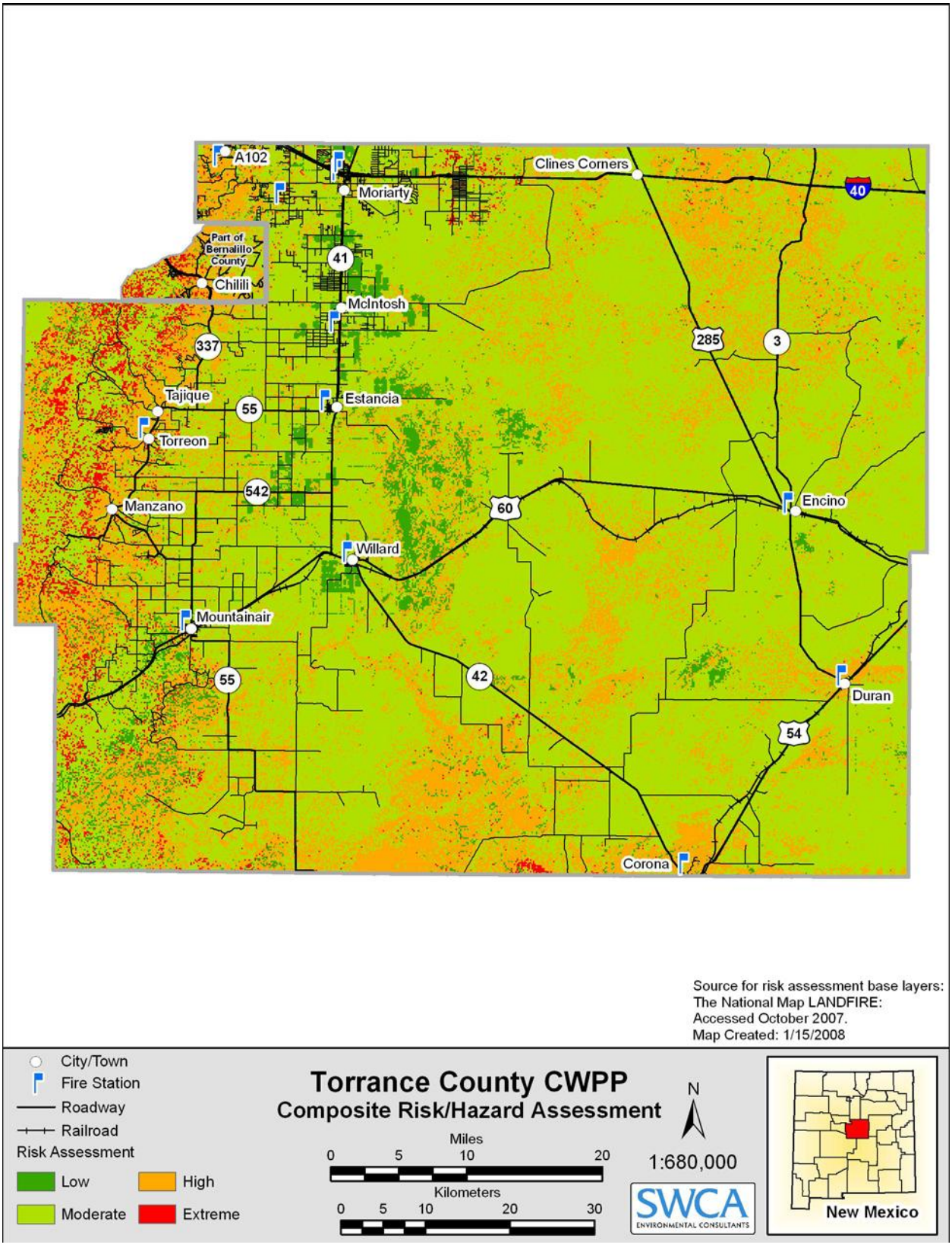

Figure 4.2. Composite Risk/Hazard Assessment.

4.4 COMMUNITY HAZARD/RISK ASSESSMENTS

As part of the planning process, the Core Team compiled a list of communities present throughout the planning area. In order to properly assess the hazards in and around these communities, a series of field days were implemented to carry out Community Hazard/Risk Assessments. These assessments took place before the Trigo fire and as such many of the communities may now exhibit different hazard ratings as a result of the fire. The original ratings are provided below, but updates to the CWPP will be needed in order to adjust ratings to account for the changed conditions in the burned area.

The purpose of the assessments 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 plans or triage plans. The community assessments help to drive the recommendations for mitigation of structural ignitability and community preparedness as well as public education. They also help to prioritize areas for fuels treatment based on the hazard rating (Table 4.2).

The community assessment was carried out using the National Fire Protection Association (NFPA) Wildland Fire Risk and Hazard Severity Form 1144 (NFPA 2008). This form is based upon 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 was issued by the Standards Council on June 4, 2007. The 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. It is used by planners and developers in areas that are threatened by wildfire and is commonly applied in the development of Firewise Communities/USA (Firewise 2006: www.firewise.org).

The assessments were conducted in December 2007 and February 2008, and they rated WUI areas based on conditions within the communities and immediately surrounding structures, including access, adjacent vegetation (fuels), defensible space, adjacent topography, roof and building characteristics, available fire protection, and placement of utilities. Some areas were not incorporated communities but were instead transport corridors or areas with similar environmental characteristics and hazards. Where a range of conditions was less easily parsed out, a range of values was assigned on a single assessment form. One limitation of the assessment strategy is that some homes are difficult to access or view from the road, sometimes reducing the accuracy of the rating. In these circumstances every effort was made to base ratings on as large a sample of homes as possible. Each score was given a corresponding descriptive rating of low, moderate, high, or extreme. An example of the assessment form used in this plan can be found in Appendix F.

Table 4.2. Torrance County Community Hazard Ratings

Community	Score	Hazard Rating
Sherwood Forest	117.5	Extreme
A102	112.0	Extreme
Chilili Land Grant	105.0	High
Red Bluff	104.5	High
Fourth of July Campground	104.0	High
Forest Road 422	103.5	High
Manzano Land Grant	91.5	High
Punta de Agua	84.0	High
Loma Parda	83.5	High
Echo Hills	82.0	High
Deer Canyon Preserve	82.0	High
Game Road	81.0	High
Forest Valley	81.0	High
Corona	79.5	High
Duran	78.0	High
Manzano Morning	77.5	High
Tajique Land Grant	76.0	High
McIntosh	74.0	High
Willard	73.0	High
Torreon Land Grant	71.0	High
Mission Hills	64.5	Moderate
Mountainair	63.0	Moderate
Clines Corners	60.5	Moderate
Estancia	60.0	Moderate
Encino	58.0	Moderate
Moriarty	57.5	Moderate
Sunset Acres	56.0	Moderate
Sweetwater Hills Subdivision	51.0	Moderate
Homestead Estates	36.0	Low

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

Sherwood Forest

Sherwood Forest was heavily impacted by the Trigo fire, which was somewhat predicted by the Core Team as they had listed it as an area of considerable concern. The original assessment is provided below and it highlights many of the hazards that existed in the community and likely contributed to the devastation there. These ratings still apply to some extent for homeowners that remain in the Sherwood Forest community, and this rating should serve as a warning for other communities that exhibit similar hazards.

Rating as of December 2007, before the Trigo fire: Sherwood Forest is a densely forested community in the Manzano Mountains. Many members of the Core Team had highlighted Sherwood Forest as a community of concern because of the surrounding dense ponderosa and mixed conifer forest and limited defensible space (<30 feet around a structure). Roads are steep and narrow (<20 feet wide), and only one road leads in and out. Insufficient turn-around space is available for fire trucks, which would put firefighters at risk. Although roof materials rated generally good, combustible decks and siding increased the risk rating. The community also

rated poorly for firefighter response, being more than 5 miles away from the nearest fire station and with poor water supply for suppression.

Risk Rating: 117.5, Extreme

A102

A102 is an area in the northwest corner of the County. The area is heavily populated and has extremely bad road signage. Many homes in this area are manufactured homes with very little clearance between properties and open exposures underneath. Defensible space is minimal, and many yards are in poor condition with heavy debris and trash buildup. Access into the area is of particular concern as roads are steep and ungraded, and many houses are served by dead-end roads with limited turn-around (Figure 4.3). Bed Rock Road is one example of poor road condition. Dominant fuels are piñon-juniper woodland and scrub. The community is more than 12 miles from the nearest fire station, and limited water supply is available for suppression.

Risk Rating: 112.0, Extreme

Figure 4.3. A102, showing poor access and steep, ungraded roads.

Chilili Land Grant

Chilili is a land grant community in the northwest corner of the County. Although the community scored well on ingress and egress signage, side roads are narrow and driveways have limited turn-around space. It also rated high on combustible building materials, poor defensible space, and insufficient water supply. Fuels are largely light to medium. The community is also more than 5 miles from the nearest fire station, putting it at risk in terms of fire response times.

Risk Rating: 105.0, High

Red Bluff

Red Bluff is a community located along a narrow canyon road rated very high for poor accessibility. Road width and road surface are also poor, and many driveways have insufficient turn-around space. Signage is also identified as a problem in the area, with only a few houses exhibiting driveway markers. Fuels are medium with piñon-juniper and scrub being dominant. The canyon could exhibit extreme fire behavior associated with topographic influences and so was rated high in that respect. Combustible building materials, distance from fire station, and insufficient water for suppression added to the high risk rating.

Risk Rating: 104.5, High

Fourth of July Campground

The greatest risk associated with the Fourth of July Campground is its remoteness and poor access. The area is heavily used in the summer months, but the access road is narrow and un-surfaced, with poor signposting and limited turnaround. The fuels are heavy with thick undergrowth, and defensible space is limited. The campground is more than 5 miles from the nearest fire station, and no water is available for suppression.

Risk Rating: 104.0, High

Forest Road 422

Forest Road 422 is sparsely populated but rated high risk for a number of reasons. The community is spread along the forest road, but poor ingress/egress, a narrow road width, and long driveways with limited turn-around space increase the risk rating. Signage is also poor. Many homes have limited defensible space and combustible construction. Some homes are built on slopes with limited set back. No water is available and no fire stations are within 5 miles. Utilities are above-ground.

Risk Rating 103.5, High

Manzano Land Grant

Manzano land grant was threatened by the Trigo fire, but the actual town of Manzano was not impacted. Homes northwest of Manzano in the New Canyon area were impacted and structural losses occurred.

The greatest risks associated with the Manzano land grant community are a lack of defensible space, limited turn-around space, and poor signage. Structures are generally made of combustible materials, and utilities are above-ground and close to structures. The community is more than 5 miles from the nearest fire station, and no is water available for suppression.

Risk Rating: 91.5, High,

Punta de Agua

Punta de Agua is ranked closely to Manzano land grant in terms of access, combustible construction, and water availability; however, it rated lower on access, signage, and water availability (Figure 4.4)

Risk Availability: 84.0, High

Figure 4.4. Punta de Agua.

Loma Parda

Loma Parda was rated as high risk largely as a result of poor turn-around access and very limited defensible space (Figure 4.5). The community scored low on ingress/egress, having more than one access road. It also scored low on slope and topography, and roofs tend to be of low combustibility. Siding and decks are highly combustible; however, and the distance from a fire station and no water availability increased the risk rating. Many homes in Loma Parda were inaccessible during the assessment, so ratings of home construction and defensible space may not be fully representative of all homes in this area.

Risk Rating: 83.5, High

Figure 4.5. Loma Parda home

Echo Hills

Echo Hills was rated as high, largely as a result of poor ingress/egress, insufficient signage, lack of defensible space, and lack of water availability. The community scored low on road conditions, topography, and fuels. Echo Hills is in a flood zone and is often subject to increased rate of grass growth that can cause great fluctuation in grass fuel loading.

Risk Rating: 82.0, High

Deer Canyon Preserve

Deer Canyon Preserve was rated as high, largely as a result of poor ingress/egress, long driveways with lack of turn-around space, medium fuel loading, and insufficient defensible space around some lots. The placing of structures mid-slope and with limited setback also contributed to the high risk. The community is more than 5 miles from the nearest fire station, but non-pressurized water is available from dry hydrants within the community. Each home will have a water storage tank installed. The community scored low-to-moderate on structure combustibility and roof construction as a result of strict covenants for construction (Figure 4.6). Signage was noted as being excellent.

Risk Rating: 82.0, High

Figure 4.6. Strict building standards.

Game Road

Game Road was rated as high, largely because of the poor ingress/egress, narrow road width, limited turn-around with long driveways, and combustible siding. The community also rated as high risk for its distance from the nearest fire station and lack of water for suppression. The community scored moderate on defensible space and topography.

Risk Rating: 81.0, High

Forest Valley

Forest Valley is a small forest in-holding located close to the forest service boundary. The greatest hazards in the area are the dense fuels, limited defensible space, poor ingress/egress, limited or unavailable water for suppression, and distance to the nearest fire station.

Risk Rating: 81.0, High

Corona

Corona rated as high, largely as a result of poor defensible space, combustible construction, above-ground utilities, and structures built on slopes. Corona also rated high because of the presence of heavier fuels, specifically piñon-juniper that is growing close to structures and the railroad. The community scored well on distance to fire station, water availability, good access, and good road construction. Access is also a problem when a train is stopped in the town because it blocks access roads.

Risk Rating: 79.5, High

Duran

Duran rated low in terms of access but was rated overall as high risk largely as a result of poor defensible space, combustible sidings and decks, and above-ground utilities close to properties. The community is served by a fire station in the town (Figure 4.7); however, no water is availability at the present time, and water has to be supplied from Vaughn. Another concern in Duran is the community's proximity to the railroad, which could act as an ignition source. Duran is also experiencing drastic depopulation, and, as a result, a number of empty lots are becoming overgrown, and run-down properties could act as urban fuels.

Risk Rating: 78.0, High

Figure 4.7. Duran fire department.

Manzano Morning

Manzano Morning is a gated subdivision located north of Tajique on Highway 337. The community is currently being developed so some lots are empty. The greatest hazards associated with the community are the medium fuels, poor ingress/egress, gated access with access codes, some mid-slope structures, and non-surfaced roads with limited turn-arounds. The community has some water storage and non-pressurized hydrants, but it is more than 5 miles from the nearest fire station. Some homes scored well on building construction, but some combustible decks and outbuildings are present.

Risk Rating: 77.5, High

Tajique Land Grant

The Tajique land grant was rated as high risk largely due to poor defensible space, combustible construction, above-ground utilities, and poor water availability. Ingress/egress, road conditions, and topography all scored as low risk, and fuel loads are light to medium.

Risk Rating: 76.0, High

McIntosh

McIntosh was rated as high risk largely as a result of narrow road width along side roads, limited turn-around space, and poor signage. Structures tend to have limited defensible space and much debris and trash on lots. Structures have above-ground utilities and moderate-to-high-risk combustible construction. Access is good along the highway, water is available, and a fire station is within the community.

Risk Rating: 74.0, High

Willard

Willard was rated as high risk largely as a result of limited defensible space, combustible construction, and no water availability. The community scores low in terms of access, fuels, and topography.

Risk Rating: 73.0, High

Torreon Land Grant

The Torreon land grant was rated as high risk, and risk parameters are very similar to those of neighboring Tajique. Torreon scored slightly lower than Tajique because of better water availability from a storage tank at the fire department.

Risk Rating: 71.0, High

Remaining Communities

The remaining communities were rated as moderate or low risk. These moderately-rated communities were all located in the grassland areas of the County and District. Many of these communities scored low risk on access, fuels, topography, and slope, which reduced their overall rating, but all scored higher in terms of defensible space, construction materials, lack of water for suppression, and, for some, distance from a fire department. It is important to note that these Community Risk/Hazard Assessments are taken at one point in time, and, in the current climate of growth, each community could change considerably in terms of its risk from wildland fire. Future developments should be rated using similar methodology in order to prioritize future treatments.

Camps

A number of summer camps in the County have unique fire hazards. These camps are the Manzano Retreat, Inlow Youth Camp, SUFI camp, I00F Camp, and Whirling Winds Ranch.

These camps were not readily accessible and were therefore not included in the formal assessment process. General characteristics, however, are as follows:

- Many of the camps have poor ingress and egress (i.e. Fourth of July campground) and are usually occupied by large numbers of individuals (most often children) with limited available transport for emergency evacuation.
- The camps tend to be located in remote, forested vegetation with higher fire hazard.
- The camps are usually occupied during the height of fire season, during the early summer months.
- Many occupants are from outside areas and are therefore difficult to reach through District and County fire education efforts.
- Large concentrations of people may increase the probability for human-ignited fires

Because of the fire hazards associated with these camps, proactive measures to implement defensible and comprehensive programs of fire education, emergency evacuation, and fire safety for camp staff and participants is critical. An excellent example of the benefits of defensible space was demonstrated by the Manzano Retreat during the Trigo fire (Figure 4.8 and Figure 4.9). These actions should serve as examples to others on how to reduce the impact of wildfire in these forested camp communities.

Figure 4.8. Defensible space that prevented the Trigo fire impacting structures at the Manzano Retreat.
Source: Manzano Retreat

Figure 4.9. Thinning treatments that reduced burn severity resulting from the Trigo fire in stands neighboring structures at the Manzano Retreat.
Source: Manzano Retreat

The community risk assessments and input from the public and the Core Team were used to compile a table of communities at risk as required by the NM-FPTF. A copy of this list can be found in Appendix G. Note that the risk assessment and communities at risk list does not discriminate between communities based on the value of homes or land.

4.4.1 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 helped in the development of a list of CVARs from wildland fire. The WUI boundary was developed and expanded to encompass these CVARs. It is important to note that although an identification of CVARs can inform treatment recommendations, a number of considerations are important in order to fully prioritize areas for treatment, including appropriateness of treatment, landownership constraints, locations of ongoing projects, available resources, and other physical, social or ecological barriers to treatment.

The scope of this report 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 would call upon resources locally, regionally, and nationally. To understand the breadth of such an impact, land-managing 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. To achieve a finer-grained analysis of the smaller jurisdictional and community wildfire concerns, it is suggested that communities included in the TCCWPP pursue further funding to complete a community-level CWPP.

4.4.1.1 Natural Community Values at Risk

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

- Tajique Creek
- Manzano Spring and Lake
- riparian areas
- the Chilili Watershed
- maple trees
- ponderosa pine ecosystem
- native species
- wildlife habitat/wildlife preserves
- habitat for endangered species
- water resources
- wetlands
- air quality
- scenery

4.4.1.2 Socioeconomic Community Values at Risk

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

- wood cutting
- grazing
- livestock economy
- Manzano State Park
- Red Canyon
- Fourth of July Campground
- Manzano Retreat, Inlow Youth Camp, SUFI Camp, I00F Camp, and Whirling Winds Ranch
- utilities (e.g., power and communication)
- Capilla Peak
- water supply
- bridges
- Burlington Northern Santa Fe Railroad
- trails and access roads
- residences

- community facilities (e.g., fire departments, community centers, senior centers, businesses, hospitals, schools, churches)
- agricultural land
- signage
- livestock and fodder
- security and privacy
- heavy equipment
- parks and recreational areas

4.4.1.3 Cultural Community Values at Risk

A large number of historic resources are present in the planning area, including churches, agricultural structures, village sites, and many historic civic and private buildings (National Register of Historic Places 2008). Many of these historic cultural resources maintain their use and purpose within the neighborhoods that surround them; they also may be recognized as critical social infrastructure. The Core Team helped to generate a list of cultural CVARs that should be protected in the event of a wildfire. Examples included:

- Shaffer Hotel in Mountainair (Figure 4.10)
- Salinas Pueblo Missions (National Park Service): Gran Quivira (Figure 4.11), Quarai, and Abo Pueblo Missions
- Catholic churches in mountain communities
- cemeteries
- historical cabins
- continued way of life
- recreation
- hunting

Figure 4.10. Historic Shaffer Hotel, Mountainair

Figure 4.11. Gran Quivira.

5.0 RECOMMENDATIONS AND ACTION ITEMS

This section addresses four 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 GIS risk assessment, and the community risk assessments. 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 H.

5.1 PLANS AND PROJECTS THAT GUIDE AND RELATE TO THE TORRANCE COUNTY CWPP

Many guidance documents and projects are already in place in the TCCWPP planning area. Future fuels treatments within the County should be carried out in conjunction with ongoing treatments and projects to improve efficiency and effectiveness. The following is a summary of projects that have been or are being carried out throughout the planning area. This list is by no mean exhaustive, but it highlights some of the major projects related to this CWPP.

Torrance County Wildland Urban Interface Area Inventory Assessment (Completed)

The Torrance County WUI Assessment (2003) identified areas of WUI within the County. Information was gathered for the report by Torrance County government officials, the National Park Service, the USFS, and the State of New Mexico's Southwest Areas Wildland Fire Operations Group.

The Interagency Fire Protection Association was also used as a resource for the plan, and it assigned hazard ratings for properties across the County. Although many properties were rated as low-hazard, several residential developments were considered high-hazard and in immediate need of mitigation. The plan also identified the limited water supplies for firefighting as a widespread and crucial issue.

Torrance County Emergency Operations Plan

This 2006 document detailed the processes and procedures in case of an emergency in Torrance County. The plan was developed through the Torrance County Emergency Services Director's Office with the cooperation and assistance of the Torrance County Local Emergency Planning Committee. The plan applies only to response within the unincorporated portions of Torrance County. However, MAAs exist between the municipalities of the City of Moriarty, Town of Estancia, Town of Mountainair, Village of Encino, and Village of Willard and were considered in the preparation of the plan. This plan identifies the existing natural and human-made emergency hazards having the potential of causing a disaster affecting a portion, or all of the population and area of Torrance County. The plan addresses hazard mitigation, disaster planning, preparation, response, and recovery. It provides for an overall coordinated and integrated County-wide disaster management organization with each incorporated community providing initial response and disaster management within its own jurisdiction.

Torrance County Hazard Mitigation Plan

Completed in 2007, this plan identified and profiled the natural and human-caused hazards that can affect Torrance County, assessed the County's vulnerability to these hazards, and identified alternative mitigation actions. The plan also includes an implementation strategy for preferred mitigation actions as selected and prioritized by a multi-jurisdictional community-based planning team. The plan was created using support from the New Mexico Office of Emergency Management and FEMA. The document identified relevant hazards and provided guidelines to avoid or minimize vulnerability to these hazards.

New Mexico Non-native Phreatophyte/Watershed Management Plan

This plan was developed in 2005 based on consultation with the State of New Mexico's SWCDs and through the efforts of an interagency workgroup composed of members of numerous state agencies: the New Mexico Department of Agriculture (NMDA); the New Mexico Energy, Minerals, and Natural Resources Department; the New Mexico Environment Department; the New Mexico Indian Affairs Department; and the New Mexico Office of the State Engineer. The purpose of the collaborative plan wass to provide guidance for control of non-native phreatophytes and to set forth methods for monitoring, revegetation, rehabilitation, and long-term watershed management activities (NMDA 2005). Saltcedar eradication activities related to this plan are underway in impacted riparian areas of Torrance County.

Estancia Biomass Plant

Western Water and Power Production, LLC, has proposed a 35 megawatt forest biomass energy power plant (enough power for 28,000 homes) near Estancia and the Public Service Company of New Mexico (PNM) has contracted to buy this energy as part of its required 5% under the State's Renewable Energy Act. The plant has received tax credits from the State of New Mexico and it moving forward. If the plant is built and becomes operational it will require a consistent supply of biomass, much of which may be harvested from local forests and woodlands.

5.2 PUBLIC EDUCATION AND OUTREACH

Needs for public education and outreach have been emphasized throughout the TCCWPP process by all participating parties. Almost 70% of survey respondents felt that community education and communication were some of the most important actions to make the community better prepared for wildfire. The Core Team consistently shared this view, and discussions with community members at public meetings indicated that most people could be better informed of fire risk and effective mitigation options. Table 5.1 lists recommendations for improving public education and outreach.

Table 5.1. Recommendations for Improving Education and Public Outreach

Project	Project Description	Presented by	Target Date	Resources Needed	Serves to
Fire in the media	Coordinate and fund monthly ads in local media that maintain consistent and seasonally relevant fire information.	Community fire representative or agency outreach personnel	2009	Funding for ad space, research, and writing of monthly column addressing wildfire issues.	Maintain fire awareness and relay a consistent message regardless of fuel conditions and short-term changes in fire risk.
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.	SWCDs, local fire departments, State Cooperative Extension agents	2009	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.
FireWorks curriculum	Provide support to local teachers to implement and customize curriculum developed by Missoula Fire Science Lab.	Local schools	Fall 2008, ongoing	FireWorks teacher training including purchase of FireWorks box.	Educate children in grades 1–10 about fire ecology and fire management.
Emergency preparedness meetings	Utilize 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	Summer 2008, 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 2008, ongoing	Written materials, trained personnel.	Empower homeowners to make affordable and effective changes to reduce the vulnerability of individual homes.

Table 5.1. Recommendations for Improving Education and Public Outreach, continued

Project	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	2009	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.	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.
Homeowner's insurance task force	Convene a group of insurance company representatives and local and state officials to discuss current limitations and possible solutions to expand insurance coverage to losses from wildfire across the CWPP area.	Insurance agencies, State Public Regulation Commission, County fire departments, and community representatives	2008	Agency personnel.	Explore possibilities of improving the currently limited insurance coverage for fire.
Neighbors for defensible space	Organize a community group made up of residents and agency personnel to develop materials and communicate relevant defensible space messages.	SWCD, USFS, BLM, NMSF, local residents	2009	Funding to help cover costs of materials and participation.	Engage diverse stakeholders in reaching out to community members and encourage defensible space practices.

The biggest challenge in increasing public understanding of wildfire issues in this area is reaching community members. One theme that appeared repeatedly during public meetings was that many local residents do not consider themselves to 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. The local SWCDs are currently the most effective conduits for reaching the diverse population. Land grant associations, 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 the available information.

Overall, public perception of risk in the TCCWPP area was not consistent with the results of hazard and risk assessments conducted within the TCCWPP process. Only 15% of the survey respondents rated the chances of losing their home to wildfire as high. Although the risk may be low in some parts of the planning area, the results of the comprehensive hazard assessment conducted for the TCCWPP indicated pockets of high or extreme risk throughout the planning area. The community assessments also indicated extreme or high levels of risk for many neighborhoods. Without an understanding of fire behavior and/or suppression tactics, homeowners often lack the knowledge to accurately assess risk (Donovan et al. 2007). Based on the feedback received from local fire personnel and the community assessments, many homes are vulnerable to wildfire and could be better protected with the adoption of basic defensible space practices.

Much of the public education about wildfire risk and mitigation is provided by the media through newspapers, radio, or television. The type of coverage and the level of detail provided by these sources influences how and what people choose to do. By sponsoring a regular column in a local newspaper on fire management, the fire message could be consistently delivered throughout the year. This effort would help to keep wildfire on people's radar even when it is raining outside. The column could provide information on fire behavior principles and local fire management activities, as well as guidance on creating household emergency plans and defensible space.

Perhaps the single most critical need for wildfire education and outreach in the TCCWPP area is regarding the importance of defensible space. The widespread lack of defensible space across the TCCWPP area indicates that more attention is needed to communicate the defensible space message and facilitate implementation of the practices. Efforts to improve defensible space will therefore require a two-pronged approach that facilitates both education and implementation. More discussion of defensible space implementation is provided in Section 5.5 in this document. Although information on defensible space and Firewise principles is widely available, it often fails to reach the intended audience or is ineffective once it gets there (McCaffrey 2004). The development of a local defensible space checklist and a homeowner's guide (See Appendix I) would ensure that the information addresses the on-the-ground situations.

Researchers have also found that the public perceives wildfire as a large catastrophic event beyond their control and immune to their mitigation efforts (Winter and Fried 2000). Local residents may have recently developed this attitude as they watched the extreme fire behavior exhibited during the Ojo Peak and Trigo fires. In the wake of these events, it is crucial that defensible space education begin as quickly as possible and reach as many homeowners as

possible. An excellent model for reaching homeowners who perceive wildfire as an uncontrollable risk is provided by the Los Alamos County Defensible Space Project, which helped to educate residents and implement hazardous fuels reduction for residences that had not been impacted by the Cerro Grande Fire. The project targeted neighborhoods and made defensible space a community goal (DiMauro 2004). The multifaceted approach included logo development, neighborhood informational events, school educational programs, and the use of thinning contractors to implement mitigation work on private property. In three years of program implementation, the project helped to protect more than 2,000 residences from the threat of future wildfires and educated thousands of residents about defensible space concepts.

Local teachers are already engaged in some ecological monitoring and education related to fire and fuels management. Targeting students across all grade levels with fire education increases student understanding of real-world natural resource management issues and broadens the general audience for fire education. Although only a portion of the residents have school-aged children, school programs have been highly effective in other regions for helping to educate residents about fire management (McCaffrey 2004). The FireWorks curriculum, developed by fire scientists at the Missoula Fire Science Lab, is a well-designed program that has an excellent track record. Providing local training for teachers to implement and customize curriculum would increase application of this existing system. Funding for the purchase of the FireWorks box would provide local teachers with existing activities and tools to use in the lessons.

It has been clear in developing the TCCWPP that many homeowners do not understand emergency response procedures and have not communicated with family members or neighbors about what to do in the event of a wildfire. Education regarding the preparation of a household emergency plan is frequently provided by the Red Cross. This information could be improved through participation of local fire departments to help residents understand what happens before, during, and after a fire. Using worksheets and facilitating the development of these plans at community meetings would help to ensure that the plans get created and do not remain abstract ideas. This activity can be conducted at a minimal cost and would serve to increase preparedness and reduce panic during a wildland fire event.

In many fire-prone areas, the majority of homeowners are insured against wildfire losses. In many of the high-risk areas identified in this TCCWPP, however, homeowners are unable to obtain insurance for losses related to wildfire. The dearth of suppression resources and water supplies coupled with the remote location of many residences across the region mean that homeowners have no safety net in the event of a wildfire. As a case in point, local residents who suffered losses from the Ojo Peak and Trigo fires carried no insurance for wildfire and are ineligible for federal assistance, so their ability to rebuild their homes will depend entirely on private fundraising. With an even larger wildfire and greater number of home losses, the local economy could be devastated by this situation. Oversight for private insurance companies is provided by the New Mexico Public Regulation Commission. By bringing representatives of that agency together with fire and emergency personnel and local community members in a concerted effort, it is possible that barriers to coverage and possible solutions could be identified. More widespread insurance coverage would greatly improve the capacity of local communities to prepare for and recover from wildfire losses in the WUI.

5.3 IMPROVING FIREFIGHTING CAPABILITIES

Improving community preparedness for wildfire calls for greater collaboration among emergency responders, emergency managers, and fire departments. Fire departments often have limited resources, particularly in high fire years; therefore, gaining funding to strengthen these services is critical. Educating the public so they can reduce their dependence on fire departments is also essential. 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.

The availability of water is an important firefighting capability component in the area. Most fire departments in the area have metal roofs and large water storage tanks. The installation of gutter and pump systems to harvest rainwater would augment the supply for the stations and reduce competition with other water users. Many fire departments in the area could utilize tenders that could maintain significant volumes of water closer to a fire. The CWPP surveys included questions about water supplies. A few new sources were identified by fire personnel through the survey process. Additionally, more detailed mapping of water sources throughout the area would improve response and turn around times for fire trucks. Table 5.2 provides recommendations for improving firefighting capabilities.

Table 5.2. Recommendations for Improving Firefighting Capabilities

Project	Fire Department	Possible Solution	Timeline	Contact
Overhaul of County maps used by fire responders	Torrance County	Seek funding to aid the overhaul of county maps, and make available in GIS and global positioning system data for fire responders. Update home occupancy information on an annual basis and input information on maps.	Spring 2010	Torrance County Manager; Rural addressing (Ruben Gastelum)
Emergency Alert System	Torrance County	Task intern or special County staff with implementation.	Spring 2009	Torrance County Emergency Manager (John Cordova)
Reverse 911	Torrance County	Use intern or special county staff to research Bernalillo County system and develop budget and implementation schedule.	Spring 2010	John Cordova
Increase volunteer fire department recruitment (diversify age classes)	Torrance County	Target fire education in schools to encourage younger generations to become interested in firefighting. Carry out recruitment drives through open house and mailings.	Annually	Torrance County Fire Marshal (Jason Trumbull)
Increase funds for volunteer fire department	Torrance County	Maintain contact with state fire marshals and regularly seek grant money. Introduce a fire district tax levy. Implement regular evaluations of resource needs for each volunteer fire department and make available to public to raise awareness of shortages. Use local media to inform public of fire resources situation. Work with editor to have a year-round column that documents fire department activities.	Monthly	Torrance County Government
Train volunteer firefighters	Torrance, Mountainair, Lincoln, and Socorro counties	Provide stipend to volunteer firefighters to improve participation in 3-week training course.	Spring 2009	Jason Trumbull
Improve County fire staff	Torrance County	Research opportunities to fund a permanent deputy fire chief.	Spring 2009	John Cordova
Improve emergency medical assistance	Torrance County	Need more trained Emergency Medical Technicians and American Red Cross–certified people in the County who could be called on in the event of an emergency.	Fall 2009	John Cordova
Increase volunteer fire department water supplies	Torrance County	Seek funding to implement rain water harvesting on all volunteer fire department buildings and other county properties. Need to ensure that water supply for volunteer fire department does not impinge on municipal supply.	Fall 2008	Fire department chiefs

Table 5.2. Recommendations for Improving Firefighting Capabilities, continued

Project	Fire Department	Possible Solution	Timeline	Contact
Mapping of suppression water sources	Torrance County	Seek funding to identify stock tanks, water storage tanks, and hydrants as well as funds to provide upkeep for these suppression sources and to provide retrofitting to allow utilization by fire departments. Important to differentiate between ephemeral and perennial water supply. Add water resources to the GIS maps so that dispatchers can direct fire crews to available supplies.	Spring 2009	SWCD, Farm Service Agency, National Resource Conservation Service (NRCS)
Install more road signs	Torrance County	Continue efforts to improve road signage and coordinate with mapping efforts to ensure consistent naming conventions.	Spring 2010	Torrance County, New Mexico Association of Counties Funding
Install high visibility road markers	Torrance County	Seek funding to install road markers that would illuminate major roads in the event of heavy smoke.	Spring 2010	County Manager, Jason Trumbull, John Cordova,
Predetermine shelter for public in event of evacuation	Torrance, Bernalillo, Valencia, Socorro, Lincoln, and Santa Fe counties	Work with local schools, community groups, and neighboring counties to establish a preplan in the event of large scale evacuation.	Spring 2009	County emergency planners
Preplan staging areas	Torrance, Bernalillo, Valencia, Socorro, Lincoln, and Santa Fe counties	Work with local schools, community groups, and neighboring counties to establish a preplan staging area for suppression sources and crews.	Spring 2009	County emergency planners
Enhance agency and public coordination	Torrance County	Identify local figureheads and form an emergency planning and fire management task force to establish better coordination between the County, agencies, and the public in the event of large wildfire. Use local experience and established community networks to improve relationship between stakeholders.	Fall 2009	All SCWDs, fire departments, USFS, Mountainair District, National Park Service, NMSF
S130-190 basic wildland fire training	Torrance County	Provide free training program for public and local heavy equipment contractors to generate greater recruitment in volunteer fire departments and to make available local personnel and equipment to use in fire suppression activities.	Annually	NMSF

Table 5.2. Recommendations for Improving Firefighting Capabilities, continued

Project	Fire Department	Possible Solution	Timeline	Contact
Increase fire management awareness to the public	Torrance County	Provide open days at volunteer fire department and Firewise events that increase public awareness of the processes involved in fire management in the County to provide an avenue through which to disseminate information regarding evacuation procedures.	Annually	Torrance County, NMSF, USFS
Increase inventory of 4x4s and brush trucks	Torrance County	Continue to seek grant money to purchase and increase communications with the state regarding lack of inventory.	Annually	Torrance County
Provide personal protective equipment for all firefighters	Torrance County	Focus future funds and grant requests on purchasing personal protective equipment for all volunteer firefighters.	Fall 2008	Torrance County, Jason Trumbull

5.4 REDUCING STRUCTURAL IGNITABILITY

Homes and structures throughout the CWPP planning area are vulnerable to wildfire. The Community Hazard/Risk Assessments revealed a number of common problems on private land:

- Poor defensible space (few homes had greater than 30 feet of clearance)
- Poor building construction with combustible siding and decks
- Limited access and few adequate turnarounds
- Structures built mid-slope and with limited setback, particularly in Deer Canyon Preserve
- Limited water availability and limited water storage
- Distance from fire station (for some communities)
- Empty lots and limited yard maintenance
- Density of homes and adjacency, specifically in Corona
- Blocked driveways and locked gates
- Poor signage and no driveway markers
- Un-surfaced and narrow roads

Table 5.3 provides a list of community-based recommendations that should be implemented throughout the TCCWPP planning area to address the issues revealed by the Community Hazard/Risk Assessment. For the purposes of this document, actions to reduce structural ignitibility are focused primarily on the 30- to 100-foot radius zones closest to the house (Figure 5.1). Treatments further than 100 feet from the house are discussed in Section 5.4 Hazardous Fuels Reduction.

Reduction of structural ignitability depends largely on public education that provides homeowners the information they need to take responsibility for protecting their own property. Section 5.4.1 provides a list of action items that individual homeowners can follow. 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 firefighters' lives are put at risk when they carry out structural defense. Firefighting resources in these rural areas are minimal and are likely to be stretched thin across the County during a widespread wildfire; this situation highlights the importance of educating homeowners on mitigation efforts they can take to protect themselves and their property. 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 this 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 landscaping methods on properties 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 and are available through local fire departments or NMSF; Firewise Communities/USA is one example of such a scheme (Firewise 2006: www.firewise.org).

Another great conduit for information sharing is the Backyard Tree Farm Program. The Backyard Tree Farm program has been active in New Mexico since the early 1990s. The program serves to educate homeowners on issues such as fire hazard mitigation, thinning techniques, chainsaw safety, beetle infestations, erosion control, water resource management, and funding opportunities. More detailed information on structural ignitability can also be found in Appendix I (Homeowner's Guide).

Table 5.3 provides ideas for community projects to reduce structural ignitability. This is followed by a list of action items for individual homeowners to follow.

Table 5.3. Actions to Reduce Structural Ignitability

Project	Private Lands / Homeowner	Public Lands	Programs Available	Description	Contact	Priority
Strengthen building codes	County-wide	None	International WUI Code	ICC code enforces building codes and ordinances for new development in the WUI.	State Fire Marshal	Moderate
Construct defensible space	All residents would be encouraged to participate	None	Firewise Communities/USA; NMSF; local fire department liaison	Educate Homeowners in defensible space practices: remove all but scattered trees within 30 feet of structure; keep grass mown and green within 100 feet of structure; keep flammable materials at least 30 feet from structure; surround foundations with rocks or gravel to a width of 1 feet.	www.firewise.org or local State Forestry Firewise trained personnel	High
Defensible space cost-sharing programs	All private land within CWPP area would be eligible	None	SWCDs already offering these programs	This project would provide additional funding to SWCDs to expand existing program and target new participants.	Dee Tarr (CPSWCD) Kelly Archuleta (ESWCD) Cheri Lujan (ETSWCD)	High
Community chipper days	All residents would be encouraged to participate	None	SWCDs already offering similar programs	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.	Dee Tarr	High
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 how-to techniques to reduce ignitability of common structural elements. Examples include installing metal flashing between house and fence or deck and installing wire mesh over eaves, vents, and under decks.	State Firewise personnel	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

Table 5.3. Actions to Reduce Structural Ignitability, continued

Project	Private Lands / Homeowner	Public Lands	Programs Available	Description	Contact	Priority
Rural addressing	All residents would be encouraged to participate	None	County rural addressing department	Inform homeowners about the availability of rural addressing signs	Ruben Gastelum Torrance County	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/USA; NMSF, USFS, and academic and peer-reviewed literature.	See section 5.4.1	SWCDs, NMSF, fire departments	High

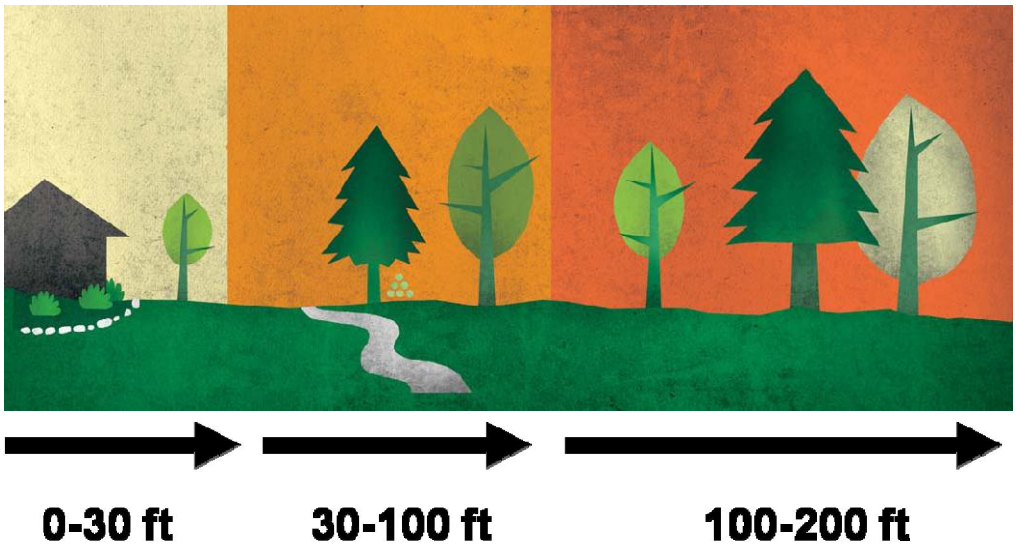

Figure 5.1. Defensible space zones.
Source: www.firewise.org

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 noncombustible meshing with mesh opening not to exceed nominal 1/4-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, noncombustible 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 away from the house; maybe 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 noncombustible 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.
- Box in eaves, attic ventilation, and crawl spaces with noncombustible 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 noncombustible 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.

Moderate to High Investment (> $250)

- Construct a noncombustible 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 or noncombustible material.

- Replace exterior windows and skylights with tempered glass or multilayered glazed panels.

- Invest in updating your roof to noncombustible 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 turn-around 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.

- Install an independent water supply that can be run for 24 hours or more.

- Relocate propane tanks underground.

5.5 HAZARDOUS FUELS REDUCTION

Wildfire hazard can be thought of as the potential fire behavior and effects based on the existing fuel condition (Hunter et al. 2007). As described by Cram et al (2006) the fire behavior triangle states fuel, weather, and topography combine to determine fire behavior. Results from a study of thinned versus un-thinned stands throughout New Mexico and Arizona found that in mid-elevation southwestern montane coniferous forests (6,400–9,100 feet), fire severity was lowered when the fuel leg of the triangle was reduced by silvicultural activities (e.g., thinning, pruning, etc.) (Cram et al. 2006). Treatments to mitigate fuel accumulation and fire hazard have long been advocated (Martinson and Omi 2002). Crown fire initiation and spread depends on the vertical and horizontal continuity of fuels (Van Wagner 1977). The purpose of any fuels reduction project is to reduce this continuity with the intent of protecting life and property and restoring landscapes to a sustainable and healthy condition. In a New Mexico and Arizona study of treated versus untreated stands that subsequently burned, Cram et al (2006) found every treated stand experienced less severe crown fire damage as compared to the adjacent untreated stand. Untreated stands were found to be more susceptible to complete crown consumption than untreated stands (Cram et al. 2006). Crown damage and fireline intensity were found to be positively related to basal area and density and negatively related to tree diameter (Cram et al. 2006). Similar findings were reported by McHugh and Kolb (2003). Four years after the Oso Fire in the Santa Fe National Forest, grass cover remained greater in treated versus untreated stands, while bare soil remained higher in untreated stands (Cram et al. 2006). The same was true following the Rodeo-Chediski fire in Arizona (Cram et al. 2006).

Finney and Cohen (2003) point out that silvicultural thinning treatments can only be expected to change fire behavior within the limits of their prescription. Fuels treatments are not expected to eliminate fire but are designed to mitigate fire behavior to the extent that firefighters can safely suppress the fire (Finney and Cohen 2003). Under extreme conditions, such as drought, extreme weather, and topography, fuels treatment may mitigate some crown fire potential, but treated areas may still burn with a stand replacing regime (Cram et al. 2006). Despite the limitations, endeavoring to moderate extreme fire behavior is a land manager's best chance of saving life and property during catastrophic wildfire. Reducing structural ignitability, creating defensible space, providing safe evacuation routes, maintaining all roads for firefighting access, and minimizing resistance to control are methods of fuels reduction that are likely to be used around communities located in the WUI zone. Using multiple methods often magnifies the benefits. Within and immediately around communities, these goals may or may not be compatible with ecosystem restoration. Natural ecosystem form and function should always guide treatments, but, in WUI areas, protecting life and property should be a primary objective.

When implementing fuels reduction projects, it is important to be clear of the treatment objectives as well as the spatial and temporal goals of the treatment. On a stand level, prescriptions are often designed to prevent potential crown fire initiation, i.e. reducing surface, ladder, and canopy fuels. On a landscape scale, fuels treatments need to be strategically placed to protect values at risk from catastrophic fire (Hunter et al. 2007), such as placing overlapping treatments on the southwest edge of a community. Furthermore, in order that treatments maintain effectiveness over time, it is important that long-term planning managers and homeowners recognize the importance of regular monitoring and maintenance. Research has shown that in forest types of the Southwest that were historically subject to frequent fire regime (e.g.,

ponderosa pine) fuels treatment maintenance is required every 3 to 10 years in order to retain effectiveness (Harrington and Sackett 1990; Hunter et al. 2007; Sackett et al. 1996).

In order to maintain and build trust from the public, land managers need to actively differentiate between fuels treatments that are designed to reduce fire impact on communities and forest restoration treatments that are designed to restore large-scale forest health. These latter projects consider stand structure, seral stage, density, insect infestations, disease, mortality, and wildlife habitat, among other issues. For a CWPP, the primary goal of fuels reduction is to protect life, property, and critical infrastructure from severe wildfire, and treatments are often recommended independent of forest health because the scale of the treatment is small (e.g., the creation of defensible space). Restoration treatments, however, are closely dictated by forest health parameters that consider historical stand structure and impacts to the wider ecosystem and watershed. Because this planning area has a number of communities that abut USFS land, both hazardous fuels reduction treatments and forest restoration treatments are important practices to consider for wildfire protection planning. Planning treatments on a landscape level is important because many wildfires dwarf individual fuel treatment projects (Sisk et al. 2004). Given the huge scope of forest restoration, however, the greatest emphasis in this plan will be on hazardous fuels reduction treatments that can occur on private lands and within the boundaries of public lands, as well as by individual landowners and agencies.

Each land management agency has a different set of policies governing the planning and implementation of fuels reduction projects. For example, treatments on federal land require intensive National Environmental Policy Act (NEPA) analysis, and many treatments may be carried out with wildlife habitat objectives as a primary goal. Because of the complex nature of large treatments on public land, it is the responsibility of local governments, with input from affected stakeholders, to determine which method(s) will safely accomplish the fuels management objectives for a given area. A thorough assessment of current fuel loading is an important prerequisite for any fuels prescription, and all treatment prescriptions should be based on the best possible science. It is recommended that any treatment with the goal of forest restoration follow the newly established NMFRP (2006), which is a collaborative document developed with participation from numerous land management agencies throughout the state including the Nature Conservancy, Forest Guild, Forest Guardians, the USFS, Sierra Club, NRCS, BLM, BIA, NMSF, New Mexico State Land Office, PNM, and the Center for Biological Diversity and Restoration Solutions, LLC. The principles can be found at http://www.fs.fed.us/r3/spf/nm-restor-principles-122006.rtf. The principles were developed for designing projects that have a primary goal of ecological restoration in conjunction with economic and social benefit. The principles highlight that, when possible, simultaneously planning for the management of multiple resources, while reducing fuels will ensure that the land remains viable for multiple uses in the long term. Furthermore, they highlight that the effectiveness of any fuels reduction treatment depends on the degree of maintenance and monitoring that is employed. Monitoring will also ensure that objectives are being met in a cost-effective manner.

Sections 5.5.1 and 5.5.2 summarize the types of fuels treatments recommended throughout the planning area. These treatments are divided into those for private, developed acreages less than 2 acres; undeveloped acreages greater than 2 acres; public land within 0.5 mile of private land; and public land greater than 0.5 mile from private land. The majority of the treatments are focused on

high-risk or extreme-risk areas, as defined by the Composite Hazard/Risk Assessment, Core Team collaboration, and public input. These treatment recommendations are not specified for a community because similar conditions and concerns were raised for all communities that border these National Forest areas. Where specific actions are recommended for public land, they are highlighted in Section 5.5.1, 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 upon available funding and resources, and on NEPA protocols. Treatment areas covering public and private land are illustrated in Figure 5.2.

The treatment lists are 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. It is the intent of this plan to be an evolving document that will incorporate additional areas of the County as they change risk category over time. Since specifics of the treatments are not provided in detail in the tables, different fuels reduction methods are outlined in Section 5.6 Treatment Types.

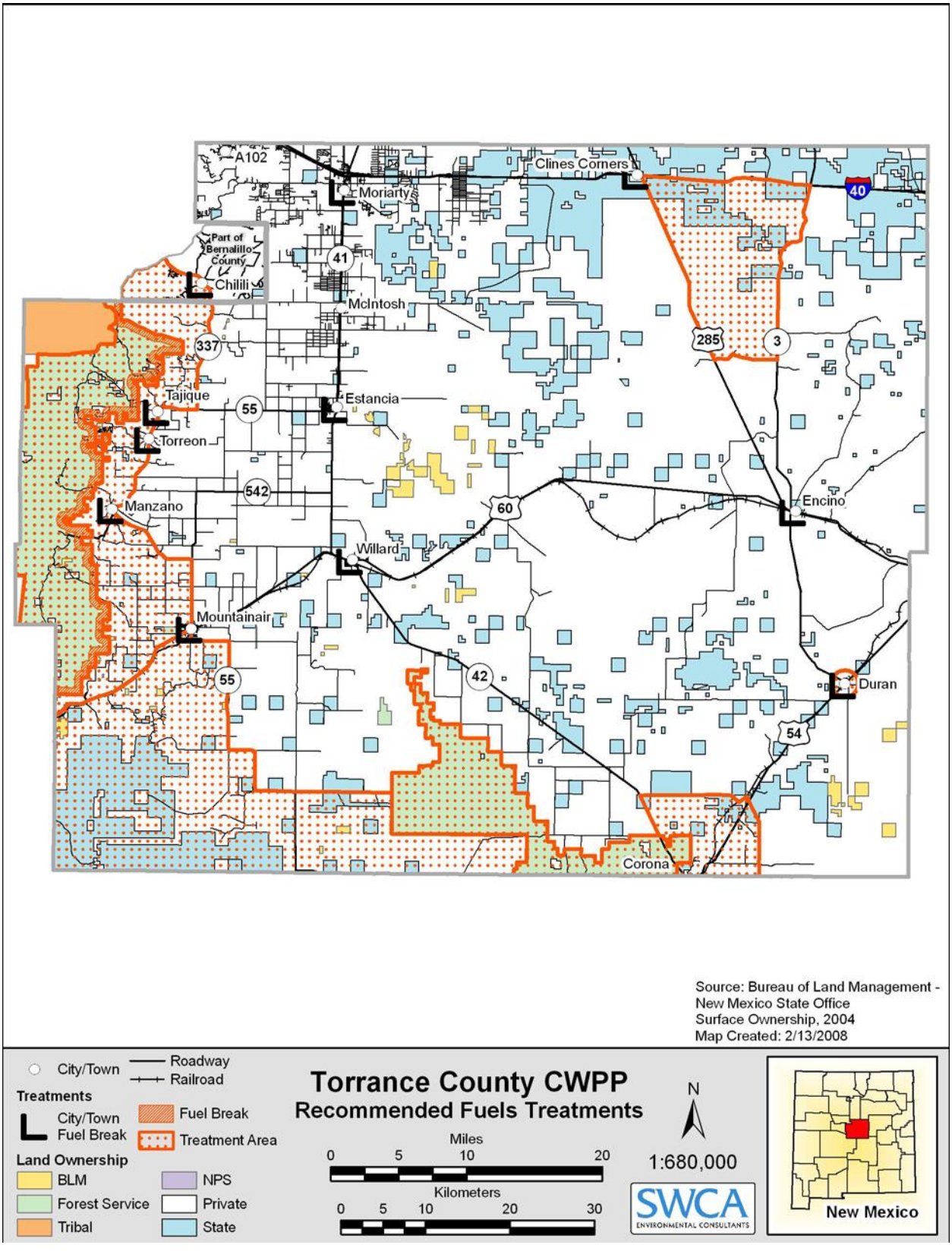

Figure 5.2. Torrance County CWPP fuels treatment recommendations.

5.5.1 TREATMENTS ON PRIVATE LAND

A general lack of fire preparedness on private land was observed throughout the CWPP planning area as discussed in Section 5.4 Reducing Structural Ignitibility. In addition to treatments focused on defensible space within 100 feet of the home, additional treatments may be called for at larger scales to address tree density, crown fire potential, ingress/egress issues, and infrastructure protection. Table 5.4 summarizes fuels treatments on private lands that extend beyond the immediate vicinity of the home.

Almost 70% of survey respondents felt that private property thinning was the most important fire mitigation activity in the area. In addition to feeling that thinning and cleanup by individual property owners was the most important action that could be taken to make the community better prepared for wildfire, respondents also indicated that their greatest interest for funding opportunities would be for thinning on private land. The SWCDs all currently offer cost-share programs to conduct thinning on private land. Popularity for these programs has increased, and there are consistently more applications than available funding. Increased funding for these existing programs to improve defensible space on private land would be efficient and effective in reducing hazardous fuels. One of the challenges in administering these programs has been the annual funding cycle. The administrators recognize the benefit of more coordinated and strategic placement of treatments but have difficulty implementing these goals without long-range budgets to allow for planning across multiple fiscal years.

In recommending prioritized treatment on private lands, the community hazard table (Table 4.2) should be used to identify the community hazard rating. Those communities rated at extreme or high risk, those located adjacent to extreme or high risk areas (as classified in the Composite Hazard/Risk Assessment [Figure 4.2]), and those at the greatest distance from fire stations (as depicted should be prioritized for treatment.

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Table 5.4. Private Land Fuels Reduction Project Recommendations

Project	Location	Land Ownership/ Management	Method	Serves to:	Timelines for Implementation	Priority (H,M,L)	Monitoring	Contact
Developed Private Parcels Less than 2 Acres								
Apply for defensible space cost-sharing programs	All private land within TCCWPP planning area would be eligible. For priority communities please see Table 4.2.	Private	Selective thinning of trees to lower density around homes; crown spacing adjusted for slope; pruning (to about 25% of tree/shrub ht); chip and/or remove debris; providing adequate defensible space.	Protect life and property by reducing crownfire potential; improve vehicle access; increase tree health/vigor. Give firefighters margin of safety.	Spring 2009	H	Conduct on-site inspections with owners; consider photo documentation pre- and post-treatment; apply adaptive management from best available information; determine if Firewise techniques are being applied.	SWCDs already offer related programs. Additional funding for existing programs or a new program with a focus on defensible space would expand implementation.
Defensible space assessments	All private land within TCCWPP planning area would be eligible.	Private	Firewise-based assessments of individual homes. The professional assessment would help to identify the most critical actions that an individual could take. Assessments could also include marking of trees suggested for removal.	Protect life and property by reducing risk of home ignitions. Empower homeowners to make the most effective actions. Allow funding to address a larger number of homes.	Fall 2009	H	Conduct on-site inspections with owners; identify and mark trees for removal within the 100 foot safety zone.	NMSF, New Mexico Association of Counties (NMAC)

Table 5.4. Private Land Fuels Reduction Project Recommendations, continued

Project	Location	Land Ownership/ Management	Method	Serves to:	Timelines for Implementation	Priority (H,M,L)	Monitoring	Contact
Undeveloped Private Parcels Greater than 2 Acres								
Maintain access areas and roads	All private land within TCCWPP planning area.	Private	Keep roadways clear of vegetation using mechanical means.	Protect life and property by improving available ingress/egress for firefighters and residents.	Spring 2009	M	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).	NMSF, USFS, SWCDs, County fire departments
Protect power lines and communication lines	All private land within TCCWPP planning area.	Utilities company/ private	Maintain clearance under power lines and around posts.	Protect life and property by preventing destruction of energy or communications infrastructures in event of fire.	Fall 2008	H	Regular maintenance needed to ensure lines are clear of vegetation. Monitoring should occur prior to fire season (February) and in the fall (October).	Utility Companies
Create fuel breaks on the southwest edge of communities Priorities: Those listed as extreme or high risk in Table 4.2	All private land within TCCWPP planning area.	Private	Strategic placement of treatments on private land will improve effectiveness. Fuel break prescriptions should be site specific depending upon fuel type, topography, soils, and adjacent land management practices.	Protect life and property by helping to mitigate extreme fire behavior, and provide an area from which firefighters can suppress a fire.	Spring 2009	H	Regular maintenance needed to ensure the fuel break remains clear of vegetation. Monitor for erosion and invasive species. Refer to Chapter 6, Levels 1 & 2. Monitoring should occur prior to fire season (February) and in the fall (October).	NMSF, SWCDs

Table 5.4. Private Land Fuels Reduction Project Recommendations, continued

Project	Location	Land Ownership/ Management	Method	Serves to:	Timelines for Implementation	Priority (H,M,L)	Monitoring	Contact
Undeveloped Private Parcels Greater than 2 Acres, continued								
Begin thin-from-below treatments in ponderosa pine	Private land adjoining forested public land. Private in-holdings surrounded by USFS land. Focus on southwest edge of community or structure.	Private	Selective thin-from-below treatment to reduce crown fire transmission from high flame length predictions.	Lower the potential for surface-to-crown transmission of fire in ponderosa pine.	Fall 2008	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. Monitoring should occur in spring and summer months when vegetation can be identified prior to curing and wildlife are most active.	SWCDs already offer related cost-share programs. Additional and consistent funding is needed to meet the growing demand for these programs. Strategic and coordinated treatments could improve effectiveness.
Thin shrubland with mechanical treatment	Private land adjoining forested public land. Private in-holdings surrounded by USFS land. Focus on southwest edge of community or structure.	Private	Reduce shrub density and continuity; create patch structure with openings to promote herbaceous vegetation.	Protect life and property by slowing the rate of spread of fire in shrubland fuels, and lower flame length and fireline intensity.	Spring 2009	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. Monitoring should occur in spring and summer months when vegetation can be identified prior to curing and wildlife are most active.	SWCDs already offer related cost-share programs. Additional and consistent funding is needed to meet the growing demand for these programs. Strategic and coordinated treatments could improve effectiveness.

Table 5.4. Private Land Fuels Reduction Projects Recommendations, continued

Project	Location	Land Ownership/ Management	Method	Serves to:	Timelines for Implementation	Priority (H,M,L)	Monitoring	Contact
Undeveloped Private Parcels Greater than 2 Acres, continued								
Reduce crown bulk density in ponderosa pine	Private land adjoining forested public land. Private in-holdings surrounded by USFS land. Focus on southwest edge of community or structure.	Private	Selective thinning to increase crown spacing between trees.	Lower the potential for crown fire spread.	Fall 2008	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.	SWCDs already offer related cost-share programs. Additional and consistent funding is needed to meet the growing demand for these programs. Strategic and coordinated treatments could improve effectiveness.

5.5.2 TREATMENTS ON PUBLIC LANDS

Although survey responses indicated widespread support for treatments on private land, respondents disagreed about the importance of fuel treatments on public land. 45% of people thought that fuels treatments on public land were important, but 36% thought they were not important. Within the group that supported hazardous fuels treatments, all respondents stressed the importance of a focus on community protection but expressed less support for treatments that focus upon forest restoration (Table 5.5). Recommendations for fuels reduction projects are outlined in Figure 5.2. These treatment recommendations are based upon areas deemed at high risk by the risk assessments and by public and Core Team input. In recognition of the complexity of fuels treatment project planning among various agencies, many more public land treatments have been recommended than can feasibly be implemented within a short time frame. The goal of the list is to provide a wide range of options that directly relate to community protection. Prioritizing among these treatments should consider protection of the maximum number of Community Values at Risk, as described in Section 4.4.1.

Table 5.5. Public Land Fuels Reduction Projects Recommendations

Project	Location	Land Ownership/ Management	Method	Serves to:	Timelines for Implementation	Priority (H,M,L)	Monitoring	Contact
Public Land within 0.5 mile of Private Land								
Begin NEPA process to construct shaded fuel break along forest service boundary within ponderosa pine and mixed conifer	Cibola National Forest north-south-oriented boundary	USFS/Private	Thin-from-below, limb trees to a Crown Base Height; increase crown spacing where needed. Slash will be chipped, removed, or piled and burned.	Protect life and property by preventing crown fire by limiting ladder fuels that transmit surface fire into canopy. Assist fire crews in suppression by slowing passage of fire from national forest lands to adjoining communities in the WUI.	Spring 2010	H	Monitor effects of treatments on stand dynamics and species composition. 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).	USFS Mountainair District
Begin NEPA processto construct fuel break along forest service boundary within piñon-juniper and shrubland cover type	Cibola National Forest north-south-oriented boundary	USFS/private	Thin shrubland fuels, increase spacing, and reduce shrub height. Remove invasive species. Chip, remove, or pile and burn all slash produced by project.	Protect life and property by mitigating extreme fire behavior predicted in shrubland fuels. Assist fire crews in suppression by slowing passage of fire from national forest lands to adjoining communities in the WUI.	Spring 2010	H	Monitor effects of treatments on stand dynamics and species composition. 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).	USFS Mountainair District

Table 5.5. Public Land Fuels Reduction Projects Recommendations, continued

Project	Location	Land Ownership/ Management	Method	Serves to:	Timelines for Implementation	Priority (H,M,L)	Monitoring	Contact
Public Land within 0.5 mile of Private Land, continued								
Mow around fence lines on ranchland	Grassland areas on state land	Public and privately leased	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 2009	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 and maintenance should occur prior to fire season (February) and in the fall (October).	State Land Office
Mow and remove invasive species along railroad	Railroad throughout extent of County	Private, state, BLM	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 2009	H	Monitor for regrowth, and maintain clearance. Monitoring and maintenance should occur prior to fire season (February) and in the fall (October).	Burlington Northern Santa Fe Railway
Remove piñon-juniper and other shrubs encroaching on highway right-of-way	Highway 42 and 54 close to Corona	New Mexico Department of Transportation (NMDOT)	Currently piñon-juniper is close to road and is an ignition risk. Remove all vegetation to at least 30 feet from the road.	Prevent human-caused fires along roads.	Spring 2009	H	Bi-annual monitoring to remove any regrowth and maintain clearance. Monitoring and maintenance should occur prior to fire season (February) and in the fall (October).	NMDOT

Table 5.5. Public Land Fuels Reduction Projects Recommendations, continued

Project	Location	Land Ownership/ Management	Method	Serves to:	Timelines for Implementation	Priority (H,M,L)	Monitoring	Contact
Public Land within 0.5 mile of Private Land, continued								
Roadside clearance along forest roads	Forest service and private in-holdings	USFS/private	Maintain suitable clearance along forest service roads that act as evacuation routes for private in-holdings. Thin tree density within 100 feet of the road and mow grass verges. Remove dense understory that could transmit surface fire into crowns.	Protect life and property by maintaining safe evacuation routes.	Spring 2009	H	Regular upkeep of cleared and thinned areas. Monitoring and maintenance should occur prior to fire season (February) and in the fall (October).	USFS, County, NMSF
Create fuel break around southern and western edges of grassland communities	Moriarty, Estancia, Willard, Mountainair, Encino, Clines Corners, Mission Hills, Duran, Corona	BLM, State Land Office	Chisel the ground to mineral soil to limit erosion potential in sandy soils. Preplan areas that would be suitable for a fuel break/fire break so that in the event of a fire, this could be a preplanned reactive measure to prevent fire spread.	Protect life and property by providing a fire break in grassland fuels from which firefighters could suppress fire close to communities.	Fall 2009	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 and maintenance should occur prior to fire season (February) and in the fall (October).	BLM, State Land Office

Table 5.5. Public Land Fuels Reduction Projects Recommendations, continued

Project	Location	Land Ownership/ Management	Method	Serves to:	Timelines for Implementation	Priority (H,M,L)	Monitoring	Contact
Public Land within 0.5 mile of Private Land, continued								
Remove saltcedar from riparian areas	All infested areas	SWCD, BLM, and State Land Office	Remove saltcedar using chemical and mechanical means. Experiment with the use of biological control for saltcedar leaf beetle.	Protect watershed health and invasive species.	Ongoing annual funding cycles	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).	SWCDs; Claunch-Pinto SWCD already involved in Abo Arroyo Program
Plan prescribed burn in grass and piñon-juniper shrub savanna	Cibola National Forest west of Highway 42 and north of Corona	USFS/private	Develop burn plan for areas of thinned piñon-juniper. Should lop and scatter preburn to provide fuels to carry. Burn under strict prescriptions with head fire and containment using fireline. Ensure smoke management provisions are met.	Protect life and property by improving rangeland health; reduce fuel loading to reduce rate of spread and flame lengths in grass and shrublands.	Spring 2009 (10-year plan)	M	Long-term monitoring program to assess fire effects on vegetation, fuels, soils, wildlife, and invasive species. Work in collaboration with local school monitoring programs. Refer to Chapter 6, Levels 1–4. Monitoring and maintenance should occur prior to fire season (February) and in the fall (October).	SWCDs

Table 5.5. Public Land Fuels Reduction Projects Recommendations, continued

Project	Location	Land Ownership/ Management	Method	Serves to:	Timelines for Implementation	Priority (H,M,L)	Monitoring	Contact
Public Land within 0.5 mile of Private Land, continued								
Reduce shrubs and remove invasives	West of Mountainair, south of Highway 60, and west of Highway 55.	BLM/private	Reduce fuel loading of dense shrubs and invasive species by mechanical means and/or prescribed fire.	Protect life and property by reducing rate of fire spread from area of dense shrub close to Mountainair.	Fall 2008	H	Long-term monitoring program to assess treatment effects on vegetation, fuels, soils, wildlife, and invasive species. Work in collaboration with local school monitoring programs. Refer to Chapter 6, Levels 1–4. Monitoring should occur prior to fire season (February) and in the fall (October). Also monitor during summer months to make use of schools programs.	BLM, Todd Richards; possible NMAC fuels-reduction funding; SWCDs
Reduce shrub load	North-central Torrance County	State Land Office	Prescribed burn in grass and shrublands adjacent to Interstate 40 east of Moriarty.	Reduce fuel loading along major interstate prone to high fire occurrence.	Fall 2008	H	Long term monitoring program to assess treatment effects on vegetation, fuels, soils, wildlife and invasive species. Work in collaboration with local school monitoring programs. Refer to Chapter 6, Levels 1–4.	SWCDs and State Land Office

Table 5.5. Public Land Fuels Reduction Projects Recommendations, continued

Project	Location	Land Ownership/ Management	Method	Serves to:	Timelines for Implementation	Priority (H,M,L)	Monitoring	Contact
Plan prescribed burns on national forest lands	Cibola National Forest on western boundary of the District	USFS	Develop a burn plan to carry out a series of prescribed burns in ponderosa pine and mixed conifer in pretreated stands. Burn under low intensity burn prescription, create patchy mosaic of mortality, and remove surface understory and ladder fuels.	Protect life and property by reducing fuel loading to mitigate predicted fire behavior and limit potential fire spread to the east that could impact communities along the Highway 337 corridor.	Spring 2009 10yr plan	M	Long-term monitoring program to assess fire effects on vegetation, fuels, soils, wildlife, and invasive species. Work in collaboration with local school monitoring programs. Refer to Chapter 6, Levels 1–4. Monitor during summer months to make use of schools programs.	SWCDs and State Land Office
Plan prescribed burns on state/private lands	South of Highway 60 and west of Highway 55	State Land Office	Develop a burn plan to carry out a series of prescribed burns in piñon-juniper savanna and short grass prairie. Burn under low intensity burn prescription to protect soils and encourage grass regeneration. Create patchy mosaic of mortality in shrublands.	Protect life and property by reducing fuel loading to mitigate predicted fire behavior and limit potential fire spread to the northeast that could impact Mountainair, Deer Canyon Preserve, Loma Parda, and new subdivisions southwest of Mountainair.	Spring 2009 10yr plan	M	Long-term monitoring program to assess fire effects on vegetation, fuels, soils, wildlife, and invasive species. Work in collaboration with local school monitoring programs. Refer to Chapter 6, Levels 1–4. Monitor during summer months to make use of schools programs.	State Land Office, Farm Service Agency, NRCS
Fire effects monitoring	TCCWPP planning area	Private and public	Carry out fuels monitoring and fire effects monitoring following wildfire and/or prescribed fire.	Improve understanding of the effectiveness of fuels treatments on fire behavior as well as providing an inventory of fuels loading to direct treatment.	Ongoing	H	Monitoring should be carried out for multiple years (>3yrs) post burn (both prescribed fire and wildfire) to assess vegetation response, wildlife response, soils and hydrology. Refer to Chapter 6, Levels 1–4.	USFS, BLM, SWCD, NMAC, Youth Conservation Corps, Local High Schools, NMSF

5.5.3 TREATMENT TYPES

5.5.3.1 Mechanical Treatments

Intense crown fire has been observed in the Manzano Mountains during recent fires, and this kind of threat has been identified in the risk assessment. This same concern has been raised by many members of the public throughout public meetings and surveys. One of the restoration methods outlined in the NMFRP (2006) is to reduce the threat of unnatural crown fire. What constitutes unnatural fire in a given ecosystem is the subject of much current and ongoing research. Rather than focusing on restoring natural disturbance patterns, fuels treatments in close proximity to homes and communities should be focused on the reduction of crown fire propagation and spread. Mechanical treatment may be the most appropriate method to change the arrangement and reduce the density of fuels of these areas. Depending on the nature of the stand, mechanical fuel treatments can range from none to total when they are used instead of or in conjunction with fire (Windell and Bradshaw 2000). Although the cost of mechanical techniques may exceed that of prescribed burning, there are several reasons why mechanical techniques may be optimal. First, the density of fuels in many areas precludes the use of fire without pretreatment. Second, mechanical techniques are often preferred by community members and treatments can proceed without major public opposition. Third, mechanical treatments can be accomplished over a wide range of weather conditions and with whatever personnel is available.

Mechanical treatments allow a forest manager to be more precise in creating a specific stand structure. Because individual trees and shrubbery can be targeted by chainsaws or machinery, a specific stand density is relatively easy to achieve. Restoration goals can also be met in, for example, the retention of old growth trees, the selective removal of non-native species, and the preservation of wildlife habitat. Due to the cost of and opposition to mechanical treatments on public lands, in areas at some distance from communities, treatment should follow a "thin-from-below" approach. This method focuses on the removal of small trees from the lower crown classes. Where appropriate, removal would concentrate on non-native species or removal of small and suppressed individuals. Prudent thinning can have numerous benefits: the growth rate of the remaining trees usually improves significantly; a more open canopy allows better growth of grasses, forbs, and shrubs, which help maintain soils; the open forest provides improved aesthetics; and, in terms of fire threat, the overall result of reducing ladder fuels is a reduction of passive and active crown fire potential. In some areas, small trees that are removed could also be made available to the public.

Closer to communities, heavier thinning may be needed for protection of life and property. Removal of small trees and shrubs can help to reduce the vertical continuity that aids in the propagation of a crown fire, but overstory density is also a concern in areas where crown continuity creates the potential for wildland fires to become active crown fires. Removal of larger trees to increase crown spacing could help to mitigate this potential crown fire activity. Although specific thinning prescriptions are beyond the scope of this plan, for ponderosa pine the NMFRP recommend favoring the abundance of large diameter trees (>16 inches diameter at breast height) and retaining appropriate distributions of age classes across the landscape. Landowners should endeavor to create clumps of 6 to 12 mature trees that are surrounded by areas of lower tree density to protect against crown fire spread. Wildlife habitat requirements should be followed, particularly in areas of known goshawk habitat. Density and basal area

targets should reflect the local site history, but the NMFRP suggest 40 to 100 trees per acre in ponderosa pine forest as a range for target density. This density should be contingent on distance from roads and communities. Wherever possible, old snags should be retained as they are important wildlife habitat components.

5.5.3.2 Slash Management

In proximity to communities, reducing the total fuel loading must occur in addition to breaking up fuel continuity. Mechanical fuel treatment of the stand only rearranges the fuel complex. The local community has repeatedly stressed their need for fuel wood from the forest. Much of the wood that is considered slash by a commercial logger may be treasured by the community as manageable firewood that fits into small woodstoves. Creative ways to allow for utilization of small diameter timber will help to remove the fuel from the forest and serve the needs of the community.

Even with strong utilization, some residuals will remain from the thinning. The options for treating slash produced by thinning activities are burning, scattering, and mechanical reduction. Burning of slash piles requires specific weather conditions, or burn windows. If the right set of conditions is not met, piles can sit for multiple seasons waiting to be burned and contributing to the overall fuel loading of the site. Many private land owners in the planning area have expressed frustration over never getting the green light from local officials and their resulting inability to get piles burned.

Traditionally, the most widely used slash treatment method in many areas has been lop-and-scatter (Windell and Bradshaw, 2000). In lop-and-scatter treatments, the slash is manually distributed across the treated area. Although positive ecological benefits have been measured (Hastings et al. 2003; Jacobs and Gatewood 1999), lop-and-scatter is only appropriate for treated areas with light fuel accumulations (Wakimoto et al. 1988) and is not recommended within WUI treatments. As a result, lop-and-scatter techniques are not permitted for private land owners who participate in local SWCD cost-share programs. Public land projects bordering private land should also avoid lop-and-scatter techniques. Currently, the best option for treating slash in and around communities is to physically reduce the material using equipment such as a grinder, masticator, or chipper. Outputs from the various types of equipment differ in terms of particle size and dimensions, but, generally, wood chips are produced that can then be spread on site or transported. When the boles and large branches have been removed for firewood, the remaining biomass volume is relatively small and a layer of material less than 2 inches thick can be spread on site. It is important to avoid depths of material exceeding 4 inches, which can happen readily in areas such as non-native-dominated riparian systems where little material is removed from the site. If left on site, wood chips should not be piled against the trunk of remaining trees or placed near homes or outbuildings. In areas where bark beetles are a concern, chipping and masticating should not be conducted in peak summer months.

5.5.3.3 Fuel Breaks

Fire behavior in the County has been modeled using FlamMap. This assessment provides estimates of flame length, crown fire potential, and rate of spread; this information should be used by land managers when prescribing treatments. Based on this assessment, in areas exhibiting extreme fire behavior, more intensive fuels treatments such as fire breaks (cut fuels to

mineral soil) or fuels breaks (reduce fuel loading by cutting or mowing) may be necessary to keep the fire on the ground surface and reduce flame lengths. Land managers are cautioned, however, that fuel breaks will not stop a fire under extreme fire behavior or strong winds; fuel breaks should only be seen as a mitigating measure and not a failsafe fire break. 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 provide a ladder to transmit flames into the canopy. 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 flame lengths that could be generated in excess of 12 feet in these conifer fuels. 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 too wide an area in could open the area 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 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 the 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 kochia (*Kochia scoparia*), Russian thistle (*Salsola tragus)*, and cheatgrass, which respond readily following disturbance.

5.5.3.4 Management of Piñon-juniper Woodlands

Piñon-juniper forests have very diverse structures and fire histories and for these reasons it is difficult to develop a prescription unless specific site conditions are known. It is important that land managers pay attention to the category under which the piñon-juniper woodland falls when developing treatment plans for restoration. Piñon-juniper savanna types have low tree density and are most likely to have experienced low-intensity, high-frequency fires. In these ecosystems, reintroduction of prescribed burning is recommended to maintain the open structure. Piñon-juniper shrublands have higher tree densities than piñon-juniper savannas, and, although there is debate regarding the fire regime, it is thought these savannas have undergone moderate-frequency, mixed-severity fires that are highly patchy. Savage et al. (2008) recommend that these communities should be thinned and the slash scattered on the ground to protect soil from erosion. The final piñon-juniper type, persistent piñon-juniper woodland, is made up of older denser stands of piñon-juniper that are likely to have experienced long fire-return intervals of centuries.

5.5.3.5 Management of Non-native Plants

Like many ecosystems throughout New Mexico, the landscape throughout the County 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 that have heightened 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 (http://plants.usda.gov).

5.5.3.6 Treatments for Saltcedar (*Tamarix* Spp.) Infestation

Many riparian areas throughout the County have become overrun by saltcedar. The eradication and control of saltcedar have many challenges. Long-term commitment and multiple techniques are required to reduce its extent and minimize its spread. Techniques that are used for the management of saltcedar include mechanical, chemical, and biological methods.

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. 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, they readily resprout. 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. Treatments using application of deep mulch have been successful in the Middle Rio Grande at reducing the growth ability of invasive plants (Finch et al. 2008).

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)* that asserts physiological stress on the tree through defoliation. This treatment coupled with burning in the summer months under intense prescribed fire prescription has been found to be 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. Mechanical root crown extraction, combined with chipping and removal of biomass has been accomplished in the Abo arroyo in an ongoing project led by the District. The project could act as a template for future treatments.

5.5.3.7 Mowing

Mowing along roads and surrounding structures should be carried out regularly to reduce grass fuel loads. Where possible, highway mowing should extend to fence lines rather than the current

one-blade width. Areas with cheatgrass and/or other exotic species 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 cheatgrass, limiting the production of seedheads will help to control the density and spread of cheatgrass over time. The timing of mowing is important; it should occur just before grasses cure and become flammable.

5.5.3.8 Prescribed Fire

The idea of using fire as a tool is not a new one. People have used fire to modify the landscape for thousands of years. In modern land management and fuel treatment, fires can be deliberately set (prescribed burns), or naturally occurring fires can be used to achieve management goals (fire use). Prescribed burning is a useful tool to reduce the threat of extreme fire behavior by removing excessive standing plant material, litter, and woody debris; it also can limit the encroachment of shrubby vegetation into grasslands.

5.5.3.9 Prescribed Burning in Timber

Given the current structure of ponderosa pine forests in the County, widespread prescribed burning without prior thinning could pose a threat to WUI communities. Prescribed burning would be most applicable in areas, therefore, that have already undergone a thin-from-below treatment. In some areas where tree density allows, prescribed fires could be conducted along roads bordering the WUI in order to lower potential fire behavior along these evacuation routes.

The goal of conducting a prescribed burn in forested areas is to select weather conditions that, in combination with fuel loading, generate a fire that burns cool, remains mainly on the surface, and consumes understory vegetation. The desired outcome of a low-intensity prescribed fire is to create a mosaic of vegetation structure across the landscape. Currently, prescribed fire in the national forest is often limited to burning of slash piles during appropriate burn windows, usually during the early spring or late fall months. Burn windows are based upon fuel moistures, weather, phenological state of vegetation, and adequate on-site and contingency resources.

5.5.3.10 Prescribed Burning in Grass and Shrublands

Grass and shrubland areas have evolved with frequent disturbance by fire. 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 into the grasslands, such as broom snakeweed, piñon pine, juniper, and other woody species. Similar to mowing, prescribed fires should be conducted along roads surrounding the WUI and around the particular areas at risk, but it should take place on a larger scale beyond the road and WUI corridors since fire is ecologically beneficial to the grassland community and wildlife habitat. 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. Cheatgrass is adapted to fire and will easily regenerate at the site following a fire. Other methods of control of cheatgrass will be necessary if a large amount of cheatgrass is present at the site. Prescribed fires within the grassland ecosystem should be implemented when the conditions are dry enough for the fine fuels to carry a fire but not so dry that fire containment is difficult.

Following a fire, grasses will often be the first plants to sprout from the charred soil, followed by flowering annuals and perennials. Again, the timing of prescribed burning is critical. Also, burning at the hotter end of the prescription is important because hotter fires are typically more effective at reducing heavy fuels and shrub growth. 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.

One factor to take into consideration when using prescribed fire is that generally less predictability exists in post-treatment stand structure than with mechanical thinning. However, prescribed fire can effectively influence fuel bed characteristics by reducing fine fuel loading, large woody fuels, rotten material, and certain overstory components, thus eliminating a large component of the materials that act as fuel to a wildfire (Graham et al. 2004). Prescribed fire is also often far more economical, acre for acre, than mechanical thinning, but, in this ecosystem, its use may have to be confined to areas at the greatest distance from communities.

Overall, whatever fuels reduction technique is employed, a great deal of preparation and planning must go into the project, and site-specific plans should be developed. Having a plan in place will ensure that the project will operate as smoothly, efficiently, and cost effectively as possible. Following any type of fuels-reduction treatments, post-treatment monitoring should be employed to ensure that management actions continue to be effective throughout the fire season and following years.

Developing an action plan and 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 TCCWPP. Table 5.5 in the previous section identifies tentative timelines and monitoring protocols for fuels reduction treatments on public lands, the details of which are outlined below. Appendix H provides a list of possible funding opportunities for implementing treatments.

An often overlooked but critical component of fuels treatment is monitoring. Agencies have been criticized in the past for carrying out fuels reduction projects without knowing their effectiveness or impacts on other CVARs (Hunter et al. 2007). 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. Monitoring and research publications 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.

A number of protocols have been established to monitor the effects of fuels treatments (Hunter et al. 2007). The approach selected should be site specific, and decisions regarding the timeline for

monitoring should be determined by project. Two of the most common monitoring protocols applied on federal lands are the fire effects monitoring guide developed by the National Park Service (2003) and the Fire Effects Monitoring and Inventory Protocol (FIREMON) developed by Lutes et al. (2006). These two protocols utilize similar monitoring parameters including vegetation composition (species and cover), stand structure (density and size class), fuels (duff, 1-hour, 10-hour, 100-hour), and fire effects (scorch and char). Both are easily adapted to suit the objectives of each monitoring project. Fire effects monitoring is an important component of fuels treatment monitoring as it allows land managers to determine the effectiveness of thinning treatments on reducing fire intensity and severity. In conjunction with fire effects monitoring, many research projects also assess the impacts of fire on invasive species establishment as well as soil erosion and other watershed impacts.

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. Levels include:

- ***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 FIREMON plots (Fire monitoring plots).

5.6 POST BURN MONITORING AND REHABILITATION

Much of the initial impacts of fire are monitored by trained interagency Burned Area Emergency Rehabilitation (BAER) teams. Following containment of the Ojo Peak and Trigo fires, BAER teams carried out immediate assessments of burn severity in order to implement emergency

procedures to stabilize the affected areas. The procedures included constructing water bars, reseeding of understory species, sand bagging, road stabilization, hazard warning signs, culvert repair, soil stabilization, and hydro-mulching. The greatest impacts of wildfire are often felt following the fire as a result of major flooding, land slides, and destruction of municipal watersheds. Hazardous fuels reduction is implemented to protect life and property in the event of a fire but also to mitigate some of these potential long-term impacts. Long-term rehabilitation will now be required in impacted areas of the Ojo Peak and Trigo burns. Monitoring is likely to be carried out across the burn area to inform rehabilitation but to also add to the growing body of knowledge on hazardous fuels reduction. Property owners affected by the fire may be eligible for assistance through the EWP program administered by the USDA Natural Resources Conservation Service (NRCS). For the County this program is currently administered through the District.

5.7 IDENTIFY TIMELINE FOR UPDATING THE TCCWPP

The HFRA allows for maximum flexibility in the CWPP-planning process, permitting the Core Team to determine the timeframe for updating the CWPP. Since this plan was completed before the full containment and agency review of the Trigo fire, it is likely that an update to the plan will be needed earlier than is usually recommended (annually). The Core Team should remain in active contact and reconvene at their earliest convenience to review findings from the Trigo fire. Furthermore, as the needs of the community shift, as development proceeds in WUI areas, and as environmental conditions change, the CWPP will need to be continually updated.

5.8 IMPLEMENTATION

The TCCWPP makes recommendations for prioritized fuels reduction projects. However, each fuels reduction project will be unique and will require distinct steps to complete the identified tasks. The tasks will be further identified as the projects begin to take place. On-the-ground implementation of the recommendations in the TCCWPP 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 H.

5.9 CONCLUSION

The Torrance County Community Wildfire Protection Plan was developed to meet the requirements of a CWPP as specified in the HFRA. The TCCWPP plan addresses how to prepare for wildland fire throughout the Torrance County and assesses the risk of this type of fire event creating damage to communities in WUI areas. The planning area is made up of diverse fuels, topography, and community structure; for this reason a comprehensive assessment was made to meet requirements of the many stakeholders. The planning process emphasized public participation and collaborative planning among federal, state, county, and local governments and other contributing agencies. Organizations and stakeholders were contacted through local mailings and encouraged to participate in plan development by submitting comments at one of the public meetings or by mail. A number of local residents were also active Core Team members. 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 Hazard/Risk Assessment, individual community hazard/risk assessments, identification of CVARs, and comments from Core Team and community members. The recommendations are general in nature to provide high levels of flexibility in the implementation phase. The goal of the TCCWPP 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. The protection strategy focuses on the importance of treatments on private lands and the creation of defensible space utilizing public outreach and education practices. The plan then extends out to address treating adjacent USFS, BLM, and State Land Office lands. The TCCWPP is a living document and should be revised as environmental conditions change or social issues arise.

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Appendix A
Ojo Peak and Trigo Fires

COMPILATION OF MATERIAL ON THE OJO PEAK AND TRIGO FIRES

Ojo Peak - November 2007

Two large wildfires occurred within the planning area while the Community Wildfire Protection Plan (CWPP) was being developed. The Ojo Peak fire began in remote, rugged terrain, northwest of Mountainair on November 20, 2007. The fire burned for less than 5 days but covered approximately 7,500 acres. Suppression efforts were hampered by the steep terrain, limited human resources and insufficient aerial support. Weather patterns were unpredictable and fire behavior was erratic and uncharacteristic of the area. The dominant method of suppression following the blow up was point source protection and direct attack; containment of the fire was limited by the fire behavior. Three homes were destroyed in the blaze. Although the official investigation remained open at the time of this publication, the fire was determined to be human-caused.

The following are comments recorded at a public meeting held in Torreon on December 13, 2007, shortly after the fire:

- *People questioned the validity of the winds data saying that wind speeds were greater than predicted and should have generated calls for greater resources from dispatch and communication to residents in the line of the fire. The locals criticize the lack of local input and that more local involvement in fire crews would help in understanding the weather patterns.*
- *The USFS used National Weather service data that estimated wind speeds to be approximately 12 mph overnight. These wind estimates didn't coincide with observed winds on the mountain of 30–40 mph. It was highlighted that the estimated winds may not be accurate enough, but the USFS went with the best available information.*
- *The USFS was criticized for leaving the fire at night. In this terrain, firefighter safety was top priority and it was deemed unsafe to have crews on the mountain at night. A local volunteer fire department (VFD) firefighter with more than 20 years of experience supported the USFS employees by saying that the fire behavior was like nothing he had ever seen and that normal suppression tactics (like fighting fire at night) was not possible for this particular fire and would have been unsafe for firefighters.*
- *Meeting attendees questioned why so few resources were available. The USFS was operating under non-seasonal personnel and the Thanksgiving holiday loomed. Crews were limited and the fireline qualified personnel were few in the District. More fireline trained personnel are needed both on the District and for County crews. Greater recruitment is needed for VFDs. Heavy equipment needs to be made more available; funding for VFDs could help to provide more support for suppression. A recruitment drive is needed and should be carried out soon while the Ojo Peak fire is still on people's minds.*
- *Homeowners felt that fuel breaks on USFS lands had not been well maintained and that treatment areas had heavy slash left on the ground. Better post-treatment planning is needed, and/or areas need to be made available for fuel wood for locals in order to reduce dead-and-downed materials.*

- *Homeowners contended that there was limited warning for evacuation. Those who lost their homes did not have time to pack up valuables. Better communication in advance of the fire is needed to inform the public. Installation of a reverse 911 system could help to reach more people especially during a nighttime evacuation effort.*
- *The post-fire effects were poorly understood, particularly measures for obtaining compensation for valuables lost. The District and County need to have better information available to residents about how to commence cleanup after a fire and insurance claims as well as compensation payments from the Federal Emergency Management Agency (FEMA), etc.*
- *Locals contended that the fire should have been controlled through aerial attack when it was first being fought. The USFS points out that this was not possible due to lack of resources and decisions made out of Boise on aerial support. When the fire was first being attacked, the fire area was insufficient to warrant aerial suppression, and by the time it blew up during the night, the winds were too strong to allow aerial suppression. In this area, aerial suppression is likely to be ineffective during any fire because water drops on steep terrain often cause greater fire spread. This needs to be acknowledged for future fire planning and alternative plans put in place.*
- *Locals called for more thinning throughout the watershed. They want to see thinning carried out by local contractors. They want to reduce the impact of appeals from environmental groups as they see this as limiting treatments that can be carried out by the USFS, which puts homes adjacent to public lands at risk. Better coordination is needed between the USFS and the public in identifying treatment areas using public outreach to ensure that proposed plans are allowed to go ahead to reduce hazardous fuels.*
- *Locals want to see more preventative measures taken around communities, particularly in light of the Ojo Peak fire and the limited suppression in the area due to terrain and weather.*
- *The CWPP is seen as a way to overcome a lot of the issues identified as a result of the Ojo Peak fire. Better communication and cooperation between the USFS and the County is requested so that the VFDs and local contractors could be utilized more during a similar fire.*
- *Better public understanding of the efforts of the USFS, the limitations of fire suppression, and fire prevention is called for by the USFS. This would involve more community outreach and education. Involving local leaders as well as the agency staff would be the best way to share this information. Local VFD firefighters from communities may be the best educators as they are known and trusted by the community. One example is a VFD chief from Torreon/Tajique VFD who was asked to answer questions on the fire and seemed to be trusted more by the audience than the USFS personnel because he is a known figure in the community. Agencies have gained little trust from the communities in this area, particularly the land grant communities. Trust needs to be built between the public and agencies so that the two are working together rather than against each other.*
- *Recruitment of local people is needed into the agencies or the VFDs to make the most of local knowledge.*

- *The dominant feeling in the audience is that more fire prevention work is needed both in terms of thinning and fire department response. The goals of the USFS to restore natural fire regimes and remove hazardous fuels and the locals to protect homes and provide work for locals in forest management can work well together and require more attention and planning to bring to fruition.*

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Forest Service ripped for Ojo fire failures

By Dixie Boyle

Residents criticized the way the Forest Service managed the Ojo Peak Fire during a tense meeting at the Torreon Community Center on Thursday night. Eighty-five people attended the public meeting, including those who lost their homes.

At the start of the meet-

See FOREST SERVICE, page 12

FOREST SERVICE

Continued from Page 1

ing, Michael Barela from Torreón and Mark Lesperance from Tajique had an argument over firewood. According to Heath White from the Torrance County Sheriff's Office, "Michael Barela pulled a box cutter-type knife on Mark Lesperance and cut him. Barela accused Lesperance of stealing wood off his property. Barela was arrested and taken into custody."

The altercation between Barela and Lesperance, although not related to the fire meeting, affected the already tense mood of the crowd. Rosemary Romero, who facilitated the meeting, gained control by asking everyone to take a seat and listen respectfully to one another.

Romero reminded the crowd, "The reason for this meeting is to discuss and share information on the Ojo Peak Fire."

The hostility felt toward the Forest Service was expressed by George Ramirez from Manzano: "This is the second fire you've lost this fall. The Agua Fire in October was allowed to burn for days before winds caused it to explode out of control. You should have already had the Ojo Peak Fire out before the winds hit. I am tired of the government shutting off access to our homes because of their mistakes. You cannot force people to evacuate their homes. If you don't want to put out these fires, then we will."

Another criticism was voiced by Orlando Lopez from Manzano: "Why did crews leave the fire on Tuesday night and wait so long to order air tankers and warn people? If we were in California, air tankers would have been on that fire immediately."

Terrance Gallegos, the initial incident commander on the fire replied:

"The fire was becoming too dangerous from a safety standpoint. I pulled crews off the fire at the last minute, but we still had to walk through fire to get below to where we were safe. If we had waited a few more minutes, I probably would not be here tonight."

"This was an unusual November fire, and we just weren't prepared for it," admitted Rich Nieto, fire management officer for the Cibola National Forest. "We had already let our seasonal fire crews go for the year. The tanker base in Albuquerque was shut down, and all the air tankers were in California."

Arthur Marquez, who lives near Manzano and the national forest boundary, commended firefighters for their work despite limited personnel, then added:

"I know we aren't in California, but doesn't the New Mexico National Guard have resources we could tap into during an emergency like this? We would have greater influence at the political level if we all worked together."

Gallegos admitted: "We were begging for resources on this fire. I was really frustrated because we couldn't get what we needed."

Joe Perea, the Torreón resident who reported the Ojo Peak Fire in the early hours of Nov. 19, said: "I have fought fires for 33 years, and no one could have stopped this fire. The weather conditions and terrain made fighting it impossible. We did the best we could, and we saved a lot of homes, but I feel bad for the ones we lost."

Dee Tarr, manager of the Claunch-Pinto Soil and Water Conservation District, ended the meeting by saying: "The past five years we've had $2 million available for thinning projects. We have money, and we want to help. Please come and visit with us."

Tarr added, "I love these mountains and I know most of you sitting in this room feel the same. We're all going to have to work together to save them."

The recent fires in the District provide an opportunity for assessment of actual fire behavior and monitoring of fire effects on previously thinned sites. Anecdotal reports from members of the public expressed that more intense fire behavior occurred in thinned stands versus un-thinned stands. According to firefighters on the ground and forestry specialists, although fire spread may have been greater in some thinned areas (as a consequence of increased fine fuels and higher wind speeds), the burn severity parameters (tree mortality, crown consumption, and adverse soil impacts) were much lower because of less crown fire activity and lower fireline intensity [Alan Kelso (forest silviculturalist), personal communication 2008]. Homeowners also claim that slash left over from previous thinning projects within the burn area increased fire behavior in some thinned stands. Although these claims have not been supported by scientific research thus far, thinning slash does pose a high fire risk because it increases fuel loading. In this plan, any recommendations for thinning are made in conjunction with recommendations for slash removal.

The following are pictures taken of the Ojo Peak burned areas (Figures A.1–A.11). The discussion above should be considered anecdotal; more thorough scientific monitoring of fire effects is likely to occur over the upcoming years.

Figure A.1. Ojo Peak burn area.
Source: Krista Bonfantine

Figure A.2. High-severity portion of the Ojo Peak burn area.
Source: Krista Bonfantine

Figure A.3. Mixed-severity portion of the Ojo Peak burn area.
Source: Krista Bonfantine

Figure A.4. Fuel break within the Ojo Peak burn area.
Source: Krista Bonfantine

Figure A.5. Fuel break within the Ojo Peak burn area.
Source: Krista Bonfantine

Figure A.6. Slash left over from previous thinning operations (potential fire hazard).
Source: Krista Bonfantine

Figure A.7. High-severity burn area.
Source: Krista Bonfantine

Figure A.8. Thinned stand with a moderate severity burn adjacent to stand replacing burn scar in un-thinned stand.
Source: Krista Bonfantine

Figure A.9. High-severity area showing loss of ground cover.
Source: Dierdre Tarr

Figure A.10. Structural loss from the Ojo Peak fire.
Source: Dierdre Tarr

Figure A.11. Structural loss from the Ojo Peak fire.
Source: Dierdre Tarr

Trigo Fire - April 2008

Upon completion of this CWPP, the Trigo fire was ongoing. The fire began on April 15, 2008. As of May 11, 2008, the fire had consumed 13,709 acres and destroyed 59 homes. Figure A.12 shows the map of the fires progression from April 15 to May 7. Figure A.13 shows the Trigo fire and Ojo Peak burn perimeters overlain on the CWPP risk assessments.

One of the most severely impacted areas was the Sherwood Forest subdivision, which topped the list of Communities at Risk based the hazard/risk rating assigned during the Community Assessment. Unfortunately for residents of the subdivision, much of the information compiled within the CWPP comes too late. However, important lessons can be learned from the destruction of so many homes in such a limited area. One topic that was raised throughout the CWPP process was the issue of vacation homes and abandoned properties. Particularly in areas such as Sherwood Forest where lot sizes are relatively small and homes are closely spaced, the efforts of each individual homeowner to implement defensible space are limited. In order for treatments to be effective, they frequently require the cooperation of multiple homeowners. In the case of unoccupied residences, neighbors do not often know the homeowners or have any way of contacting them. In order to effectively mitigate fire hazard in dense Wildland Urban Interface (WUI) communities, contacting absentee homeowners and encouraging their participation is essential.

Following the passage of the fire through the community, many green trees persist adjacent to destroyed homes (see Figures A/14 and A.15). The overall pattern of fire behavior appears to be similar to that observed in Los Alamos, New Mexico, following the Cerro Grande fire in 2000. Based on his analysis of home destruction in Los Alamos, Jack Cohen (2001) determined that the fire intensity surrounding many of the destroyed homes was actually low. Rather than a continuously spreading crown fire, homes were actually destroyed following ignition of pine needles or flammable items either by a spreading surface fire or by firebrands. Although some structure-to-structure spread was observed, many homes were saved through relatively simple measures of litter removal and basic defensible space implementation. An example of the success of these types of practices during the Trigo fire was the Manzano Mountain Retreat. The fire moved through the property but structures were spared due to the presence of defensible space (see Section 4.4 of the main document). The lessons learned from those homes that survived the Trigo fire, particularly in heavily-impacted areas, may help to encourage other homeowners in the community to be more proactive about preparing for wildfire. Tours of properties destroyed and spared led by fire behavior and defensible space experts could provide crucial education and outreach opportunities.

One action that may be timely and would help to strengthen community ties in the wake of the fire would be the pursuit of individual communities for designation under the national Firewise Communities/USA program. The Firewise program is intended to serve as a resource for any community that wants to reduce the loss of lives, property, and natural resources to wildfire. Not only does Firewise encourage the implementation of defensible space by individual homeowners, it helps to strengthen effects of treatments by incorporating the entire community and it unifies and organizes the overall community response to wildfire. The program is flexible and can be implemented by any number of community members who wish to participate, but it does not mandate action for any homeowner in a designated community. New Mexico State Forestry

(NMSF) provides guidance to communities on implementing the program. More information is available at http://firewise.org/usa/index.htm.

Although there are many safety considerations, efforts to bring the community into the burned area are strongly encouraged. Throughout the CWPP process, the need for improved relations between communities and governmental agencies has been highlighted. Post-fire activities provide an opportunity for community members and agency personnel to unite towards a common goal. One example of such an opportunity would be a post-burn tour for the public led by U.S. USFS personnel. Within a month after the Booth and Bear Butte fires in Oregon in 2003, the Sisters Ranger District organized two bus tours of fire-affected forest. The six-hour bus tours led by the District Ranger significantly improved public knowledge and support of forest restoration and fuels reduction strategies (Toman et. al 2008). The tours also built confidence that the USFS was open to community concerns and would incorporate citizen input into future planning activities. The concern and desire for action on the part of community members can also broaden rehabilitation treatments. Community members can learn about the effects of fire while helping to install erosion control and other mitigation measures. Following Cerro Grande, Los Alamos school children collected native seeds and combined them with dirt and a little water. The seeded dirt balls were placed in burned areas and the seeds were protected until rain was available for germination. Creativity and a willingness to utilize local skills and knowledge could improve both social and ecological conditions following the recent fires.

Many of the homes destroyed in the Ojo Peak and Trigo fires did not carry insurance. As mentioned in the CWPP, the lack of insurance is a widespread vulnerability that requires closer investigation by a local task force. Impediments to insurers need to be examined in an effort to improve overall coverage throughout the area. An article in the *New Mexico Business Weekly* (Thomas Munro, May 16, 2008) highlighted a lack of information regarding the number of homeowners who are uninsured in New Mexico. The article was written in light of the large number of Trigo victims who carried no home insurance coverage. The article discusses the International Organization for Standardization (ISO) rating system that ranges from 0–10 stating that, for example, Torreon is a class 9 community because of a lack of firefighting resources. Many insurance companies will not write policies for communities rated 9–10 because of the increased liability. Allstate for example will not write a policy for a home greater than 10 miles from the nearest fire station. Alternatively where policies are available, premiums are often beyond the means of many residents. John Standefer, the State Fire Marshal states in the article that the distribution of the State Fire Fund depends largely on ISO ratings with attempts to focus funds on areas where it could improve the ISO rating. If ISO ratings are dropped, insurance premiums usually follow suit. It is important to note that insurance rates for rural residents are not driven solely by ISO ratings, but also by measures that individuals have taken to reduce the susceptibility of their home to wildfire. The bottom line is usually defensible space coupled with firefighter safety; a crew will not defend a structure that could put their lives at risk and defensible space makes a structure more accessible and safe for firefighters.

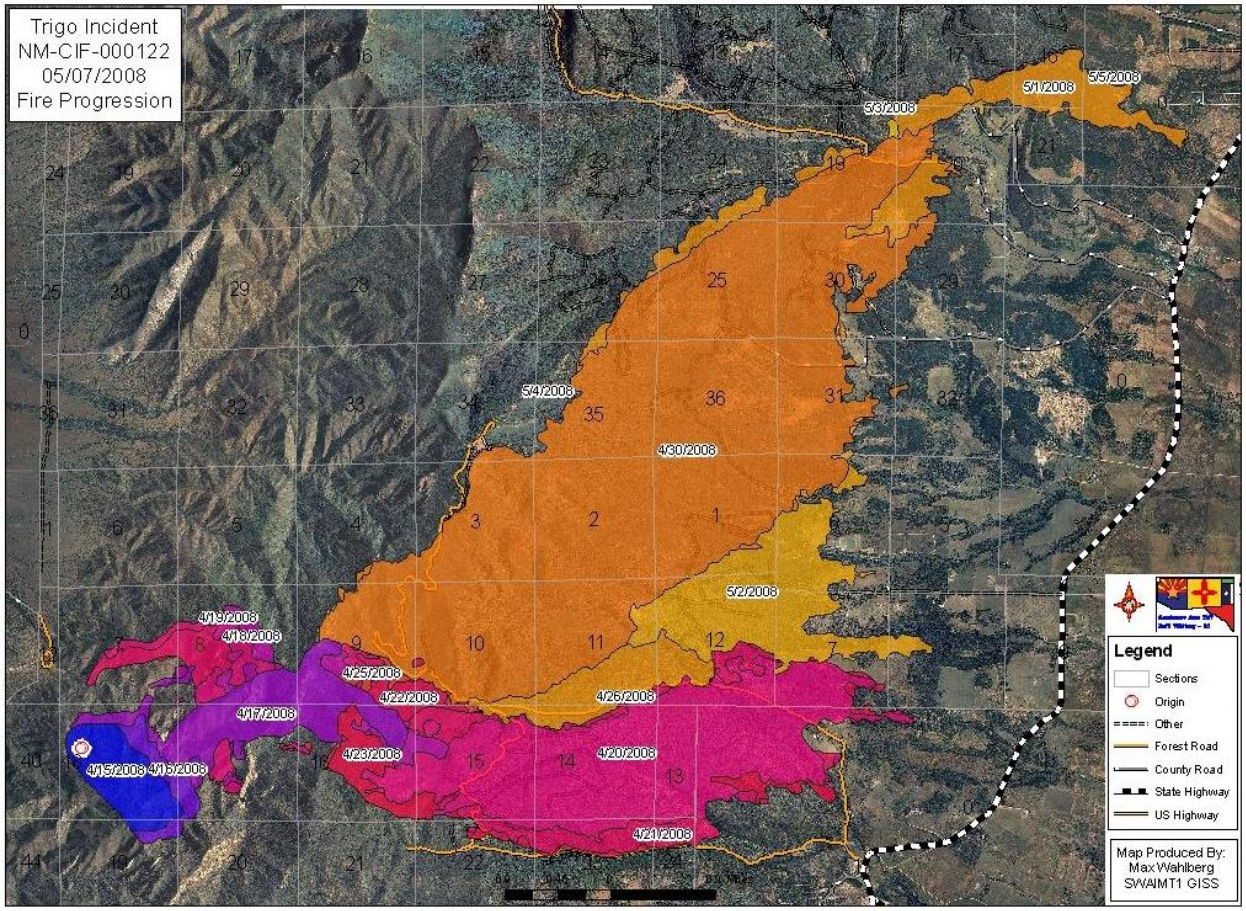

Figure A.12. Trigo fire progression, April 15–May 7.
Source: Inciweb (http://www.inciweb.org/incident/1211/)

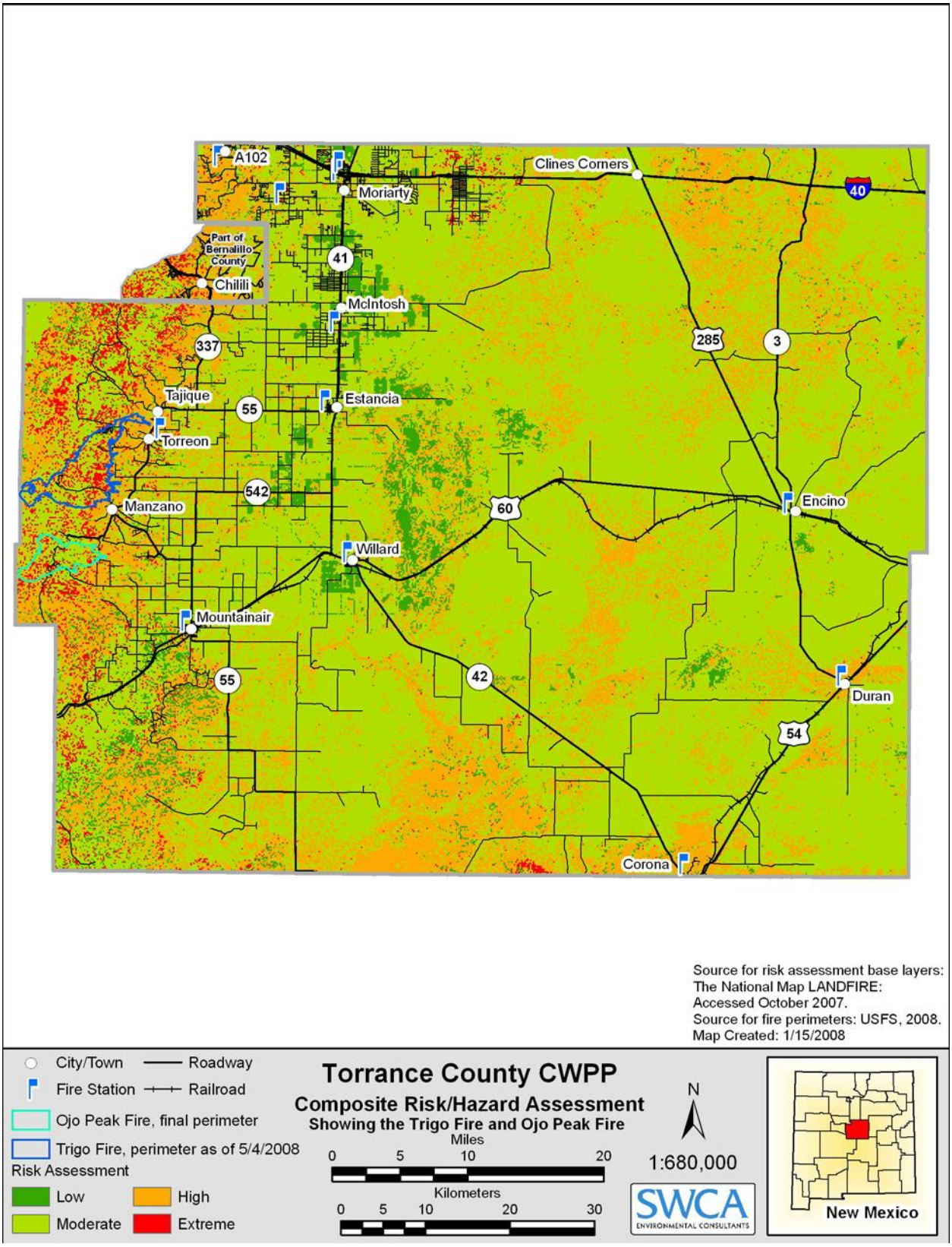

Figure A.13. Trigo fire and Ojo Peak fire perimeters overlain on CWPP Risk Assessment.

Figure A.14. Green trees with minor scorch surrounding lost structure in Sherwood Forest.
Source: Sam Amato, USFS

Figure A.15. Green trees with minor scorch surrounding lost structure in Sherwood Forest.
Source: Sam Amato, USFS

Photos by Frank Martin

Clockwise from top left: Los Lunas inmates clearing brush and trees at home of Dan Brunnuel in Manzano.

Arlene Perea showing position of the fire to the Chavez family.

Sikorsky Chinook chopper loading up with water.

Life at a store on the edge of ground zero

By Frank Martin

"Our business is better," said Lita Estrada at Ray's One Stop store in Tajique, about as close to ground zero of the Trigo fire as civilians can get.

"But I am not happy these things are happening," she continued. "Yesterday they evacuated Manzano. They told my brother, who lives in Torreon, to get ready to leave. I have all my things packed and ready to go. People were really panicked yesterday.

"We saw lots of trucks with stock trailers full of animals leaving. They told my brother to get his horses and goats out today and that he couldn't go back to Torreon. We stayed open till nine last night and I left a sign on the door to come get me at my house in case the firefighters or anyone else needed gas to get out."

Tajique resident Marlene Barber said: "Last night really scared me. I could hardly breathe. You could see the fire was close. I loaded up my motor home and took it to Tijeras. I live 4 miles north of Tajique."

Dan Bastion, of the New Mexico Incident Management Team, said while putting up maps of the fire at Ray's: "We're the only Type II Management Team in the state." That team was brought in to manage the fire after the first few days.

"They're dipping water out of Manzano [Lake] and dropping water on the front," Bastion said. "We have dozers on the ground, engines and hand crews fighting the fire." Bastion pointed on the map to where the fire had jumped containment at Ten Pines Road, just north of Torreon, and was advancing in the direction of the village. "It's a multifaceted event," Bastion said.

Many residents of Manzano and Torreon bought essentials at Ray's while waiting to be allowed to return to their homes to see if they had survived the fire. Some residents had been refused entry at the police roadblock set up at Torreon before evacuation requests were canceled Tuesday morning.

Juan Nunez clearing Ramirez home of combustible materials as George Ramirez Jr. takes out his belongings.

Friday, May 02, 2008

Gov. Declares Torrance County As Disaster Area

By
For the Journal

Press release from Governor's office:

Governor Bill Richardson Declares a Disaster in Torrance County Because of Trigo Fire

Governor directs DHS to seek additional assistance from FEMA

SANTA FE- New Mexico Governor Bill Richardson this afternoon issued and Executive Order declaring a disaster in Torrance County because of the significant damage and ongoing threat to citizens and property caused by the Trigo Fire. Governor Richardson's declaration makes emergency state funding available to support firefighting efforts and assist in providing emergency public services.

"The state is standing with the people of Torrance County during this difficult and dangerous time," said Governor Richardson. "The funding I have made available will help support ongoing efforts to deal with the effects of the fire. Because of the serious extent of the destruction, I have also directed the Department of Homeland Security and Emergency Management (DHSEM) to set the wheels in motion for possible assistance from the Federal Emergency Management Administration (FEMA)."

Early assessments indicate that a large number of homes and buildings may have been damaged or destroyed by the fire which could make the state eligible for additional assistance from FEMA.

"We're working closely with federal, state, and local officials and will do whatever it takes to provide as much assistance as possible," said Tim Manning, New Mexico DHSEM Director.

The Governor's executive order also authorizes the New Mexico National Guard to provide additional support if needed.

Last week Governor Richardson surveyed the Trigo Fire by helicopter and met with fire officials on the ground. Yesterday the Governor visited the Southwest Coordination Center in Albuquerque where he was briefed about the fire's resurgence by federal and state officials.

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Photo by Andy Hayes

Photo by Frank Morris

Missoula, Mont., Smokejumper crew chief Andy Hayes in fire-ravaged forest where his crew fought the fire advancing on Manzano Mountain Retreat.

Trigo fire still dangerous after burning 59 houses

Having destroyed 59 homes and charred nearly 14,000 acres in three weeks, the Trigo fire in the Manzano Mountains is only 55 percent contained and remains extremely dangerous despite firefighters' progress.

The Sherwood Park area, where most of the homes were lost, was reopened to residents noon Tuesday after being closed for five days.

Telecommunications equipment on Capilla Peak was damaged by the fire, disrupting cell phone service. Backup generators ran out of fuel. Repairs are under way.

Disrupted services include cell phones, pagers, government communications and public service communications.

The wildfire is the worst in New Mexico since the 2000 Cerro Grande fire destroyed 400 homes in Los Alamos and threatened the nuclear facilities at Los Alamos National Laboratory.

The U.S. Forest Service said the fire is "cold" on the southwestern and western sides, where it began. Firefighters completed a burnout on Monday afternoon on the north-northeast corner of the blaze. Some scattered showers Monday along with cooler temperatures and higher humidity helped the more than 800 firefighters.

How the retreat was saved, p. 14,
Perspectives on tragedy, p. 15,
'An act of God' spared villages, p. 15.

Winds were coming from the south at 15-25 mph Tuesday afternoon.

"Fire managers are guardedly optimistic that the hard work done by hundreds of firefighters is showing results," according to a Forest Service press release.

The villages of Torreón, Tajique and Manzano were spared, and their residents were allowed to return home by noon Sunday.

Other areas, however, ran out of luck. The Sufi Foundation Camp, the Sherwood Forest subdivision and the Ten Pines Road area were heavily burned, and most of the destroyed buildings were located there.

No deaths or injuries have been reported, although at least one family refused to evacuate and remained in their home in the midst of the fire.

A separate blaze started in a home south of the Trigo fire but was quickly extinguished, with local firefighters working on the house and federal firefighters diverted from the Trigo fire to prevent the house fire from spreading into the surrounding woods.

The Independent offers to aid fire victims

Our hearts go out to our friends and neighbors in the Manzano foothills whose homes were destroyed or damaged in the Trigo fire. Many of them had to evacuate on minutes notice; many lost almost everything.

Now they face the long, difficult, painful task of putting their lives back together.

To help in this work, The Independent makes the following offers:

- We will run without charge classified ads from residents of the burned area seeking help, services, labor or anything else.
- Likewise, we will run free classified ads for any businesses, organizations or individuals offering to help these stricken families.

If there is anything else The Independent can do, we would appreciate our readers telling us about it. Meanwhile, we offer our condolences to those who are suffering.

References

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TRIGO FIRE: INCIWEB reports and announcements

The following are excerpts from information provided by Cibola National Forest and the Trigo Fire Incident Management Teams and displayed at **(**www.inciweb.org**)**

Date: 4/15/08

The Mountainair Ranger District along with other resources are currently hiking into the Trigo Fire, which was reported just before 10 am this morning. This fire is in the Trigo Canyon area on the west side of the Manzano Mountains. Air resources are currently dropping fire retardant over the fire which at this point is reported at approximately 10 acres.

Update 4/15/08

This fire is in the Trigo Canyon area on the west side of the Manzano Mountains. At this time the fire is estimated at around 100 acres.

All air resources have been grounded due to high winds. They were able to drop a few loads of retardant before being grounded, however the winds continue pushing the fire in a eastern direction toward Capilla Peak Lookout and Electronic sites. Hand crews from throughout the southwest have been ordered and are in route or on scene.

Date: 4/16/08

The Trigo Fire on the Mountainair Ranger District continues to be a slow backing fire burning solely on the west side of the Manzano Mountains.

Air resources were grounded at noon today due to high winds. The use of air tankers and helicopters continues to be wind dependent. Six Hot Shot crews are working to flank the fire. The Inmate Work Camp crew is clearing line on Cañon del Trigo trail. Fire size is estimated at 250-300 acres, pending official GPS perimeter mapping. Fire fighters continue to be challenged by high winds as well as very steep, rugged terrain.

There are currently NO community evacuations; however, east Manzano residents are asked to be prepared in case the need for evacuations becomes necessary. Have important papers, pets, prescriptions and photos readily available in case the need for evacuation arises.

Craig Cowie's New Mexico Type 2 Incident Management Team will assume command of the Trigo Fire at 6:00 p.m. today.

Date: 4/21/08

Additional Resources Brought in to Battle Trigo Fire

The Trigo Fire, burning in the Manzano Mountains south of Albuquerque, more than doubled in size yesterday as a result of red flag weather conditions. Fire within control lines gained

momentum in the early afternoon due to low relative humidity, warm temperatures, and dry, gusty winds.

The interior flame formed a column from convection heat. The column rose high into the air sending burning embers in one-half mile or more to the east. The burning embers quickly ignited dry fuels, resulting in a wind driven fire that traveled three miles within five hours, producing flame lengths of 100 - 200 feet.

Shortly after 3:00 p.m., residents of Manzano were prompted to evacuate. As the fire traveled Northwest of Manzano, residents of Torreon were advised to evacuate. Crews forced off of the line due to extreme fire behavior staged in Manzano until the flame front passed. Soon after, they were back out doing structure protection and flanking the fire with hand line and dozer line.Crews worked into the night establishing dozer lines on the flank and around the head of the fire spread area. Additional resources arrived during the night with more expected today. A swing shift is being implemented today to provide additional coverage into the evening.

Fire Facts:

Containment: 10% Acres: 3745 Fire Personnel: 387 Hot Shot Crews: 6

Type II Crews: 6 Engines: 8 Aircraft Available: 4 helicopters, 5 air tankers

Cost to date: $1,870,000

Evacuations remain in effect for the communities of Manzano and Torreon. Residents who have left their homes may not be allowed back in until the evacuation is lifted by the Torrance County Office of Emergency Services. Red flag conditions will be in effect again today and residents are urged to be on alert.

Date: 4/22/08

Smoke held down by a morning inversion was beginning to lift as New Mexico Governor Bill Richardson's helicopter landed in a field in Torreon this morning. The governor met with Craig Cowie, Commander of the New Mexico Incident Management Team for a briefing and recon flight over the fire area.

Governor Richardson expressed concern for losses sustained as a result of the fire. He also commended firefighters for suppression efforts performed in steep, rough, remote terrain and adverse conditions.

Crews that have been "spiked out" in camps near their assigned divisions will soon return to the Incident Command Post in Mountainair. The crews have been braving windy, cold nights. In addition, they have been returning to camp to find that bears have apparently been rummaging through trash. However, no confrontations between bears and firefighters have been reported.

Crews are taking advantage of milder wind conditions today as they continue to make progress on control lines. Cooler portions of the fire are in the mop-up stage.

Fire Facts:

Containment: 27% Acres: 4130 Fire Personnel: 389 Hot Shot Crews: 6

Type II Crews: 6 Engines: 16 Aircraft Available: 5 helicopters, 4 air tankers

1 lead plane Cost to date: $2,300,000

Evacuations were lifted at 6:00 this morning but New Canyon Road remains closed.

Date: 4/26/08

Firefighters seem to be getting the upper hand on the Trigo Fire. Crews have been battling steep, rough terrain, and strong, shifting winds for the past ten days. Northwest winds today are expected to assist firefighters.

As fire behavior winds down, the focus will shift to rehabilitation efforts. A public meeting will be held at the Torreon Community Center at 6:00 p.m. this evening. "After the Wildfire - What Next " will be the topic.

Nine weekend or summer homes were destroyed Sunday when extreme fire behavior caused the Trigo Fire to jump contingency lines near the Forest boundary along Forest Road 245. A portion of the meeting will be dedicated to wildland/urban interface and how homeowners can plan for potential wildfire. Area residents will also be informed about local services available to property owners who were affected by the fire.

After the fire danger is passed, soil erosion, watershed contamination, falling snags, wildlife habitat, hazardous material leakage, and other issues must be addressed. Local agencies will be on hand to answer questions about available services.

Fire Facts:

Containment: 59% Acres: 4,910 Fire Personnel: 478 Hot Shot Crews: 6

Type II Crews: 9 Engines: 15 Aircraft Available: 4 helicopters 2 airtankers

Dozers: 1 Cost to date: $4,800,000

Date: 4/28/08

The New Mexico Type 2 Incident Management Team will officially hand over management of the Trigo Fire to a Type 3 management team at 6:00 a.m. on Tuesday. A 95 percent containment of the fire, few hot spots and reinforced fire lines prompted the change in management.

More accurate mapping of the fire resulted in a reduction of burned area. The final tally is 4,832 acres. Firefighters have been battling the stubborn fire since April 15. The exact cause of the fire remains under investigation. However, no lightning strikes were reported in the area of fire origin, prior to ignition.

Since the onset, firefighters have logged more than 5,000 miles on foot, in difficult terrain, performing suppression tactics. Kindergarten students from the Susie Rayos Marmon Elementary School in Albuquerque sent more than fifty handcrafted cards to the firefighters calling them "super heroes" and praising them for "saving our mountain." The cards remain posted in the briefing area as a constant reminder of support.

The Type 3 team will continue mop-up, rehabilitation and monitoring of the burned area until the fire is declared fully controlled. Hot, dry, windy conditions are expected to return by the weekend.

Fire Facts:

Containment: 95% Acres: 4,832 Fire Personnel: 358 Hot Shot Crews: 3

Type II Crews: 8 Engines: 5 Aircraft Available: 3 helicopters

1 dozer Cost to date: $5,700,000

Note* This is the last news release from the New Mexico Incident Management Team for the Trigo Fire. For information, contact the Mountainair Ranger District at (505) 847-2990

Date: 5/1/08

High winds of 30-40 mph with gusts up to 50 mph pushed the fire North then East.

Estimated Acreage: 13,000

Containment: 30%

Personnel: Approx. 234

Resources: 2 Hotshot Crews, 4 Type 2 Hand Crews, 1 Type 2 Helicopter, 1Type 3 Helicopter, 4 Type 6 Engines, 1 Lead Plane and 2 Air Tankers, 1 Dozer

The Torrance County Emergency Management Team held a meeting at the Estancia Community Center. The Estancia Community Center is where the Red Cross has set up for evacuees.

The Emergency Management Team was unable to do any damage assessment due to the intensity of the fire. When the fire on Ten Pines Road subsided the Fire Marshal resumed his damage assessment. No completed findings are available at this time.

Air tankers with a lead plane continued to drop retardant today until the high winds forced them to suspend activity. The drops were effective on the North end of the fire.

Around 6 p.m. the fire came within 150 yards of Hwy 55 between Torreon.

The Trigo Fire transitioned to Whitney's Arizona Type 1 team from Gesser's Type 3 team at 6 p.m.

Date: 5/3/08

Winds will be favorable for firefighting efforts, however the terrain will continue to dominate the direction of the wind. The north and west side of the fire located in extremely rough terrain with heavy bug killed fuels is still a concern and will continue to be a priority location for firefighters. Additionally firefighters and heavy equipment will continue to focus on areas with urban interface implications. Air operations will continue today as winds allow: air tankers are available, 2 air attack platforms, 2 Type 1 Helicopters, 2 Type 3 Helicopters, and 1 Type 2 Helicopter.

Torrance County Sheriff's Department will continue to assess damage today. Currently it appears less than one hundred homes were damaged. As there is active fire still in the area the threat for damage still remains. There is a strong law enforcement presence and no looting is occurring.

Torrance County Emergency Management will be holding daily updates at 1 p.m. in the Estancia Community Center until evacuees have returned home.

Date 5/6/08

As of 12:00 noon today, May 6, the evacuation of the Sherwood Forest subdivision has been lifted by Torrance County Civil Authorities. Residents can now enter the subdivision. Most of the 59 homes lost in the fire were in Sherwood Forest.

Property owners affected by the fire may be eligible for assistance through the Emergency Watershed Protection (EWP) program administered by the US Department of Agriculture - Natural Resources Conservation Service (NRCS). This program is administered through the Claunch-Pinto Soil and Water Conservation District.

The EWP program assists with erosion control and flood prevention projects after disasters. The District Office of the NRCS in Mountainair can be reached at 505 847 2941. The Claunch-Pinto SWCD number is 505 847-2243.

For information about other sources of assistance or opportunities to provide assistance contact the Torrance County Office of Emergency Management. They can be reached at 505 384 9634.

Date 5/12/08

The Trigo Fire is now 100% contained.

Containment signifies that a control line has been completed around the fire and any associated spot fires. These lines are reasonably expected to stop the fire's spread.

While the fire has been contained, it probably won't be controlled for some time to come. Controlled is basically out and cold.

Today's predicted Red Flag Warning with low humidity and the expected wind event of gusts up to 55 mph means that any new fire started today in Central New Mexico is going to be extremely difficult to fight. The firefighter resources on the Trigo Fire are prepared to fight any new starts within the adjacent area that has been designated as initial attack responsibility.

Infrared flights continue over the fire on a daily basis. Only a few isolated heat sources remain in the southwestern portion of the fire. Crews worked on one of these sources in the southwest area and used the helicopters to drop several buckets of water. No heat sources were picked up in northern 2/3 of the fire.

Patrol and mop-up continue.

Date: 5/13/08

Significant Rain Event for Manzano Mountain Area possible late Tuesday evening and Wednesday, May 14, 2008.

Communities and homes downstream from the Trigo wildfire will be especially susceptible to flooding from this rain event. This includes the area found between the communities of Manzano and Torreon. Drainages of concern include New, Cuervo, Jaral and Torreon canyons.

The following pictures are a compilation of photos from the Trigo fire:

Smoke Column from the blow out 4/30/2008
Source: Dierdre Tarr

Smoke Column 4/30/2008. *Source: Dierdre Tarr*

Smoke Column 4/30/2008
Source: Dierdre Tarr

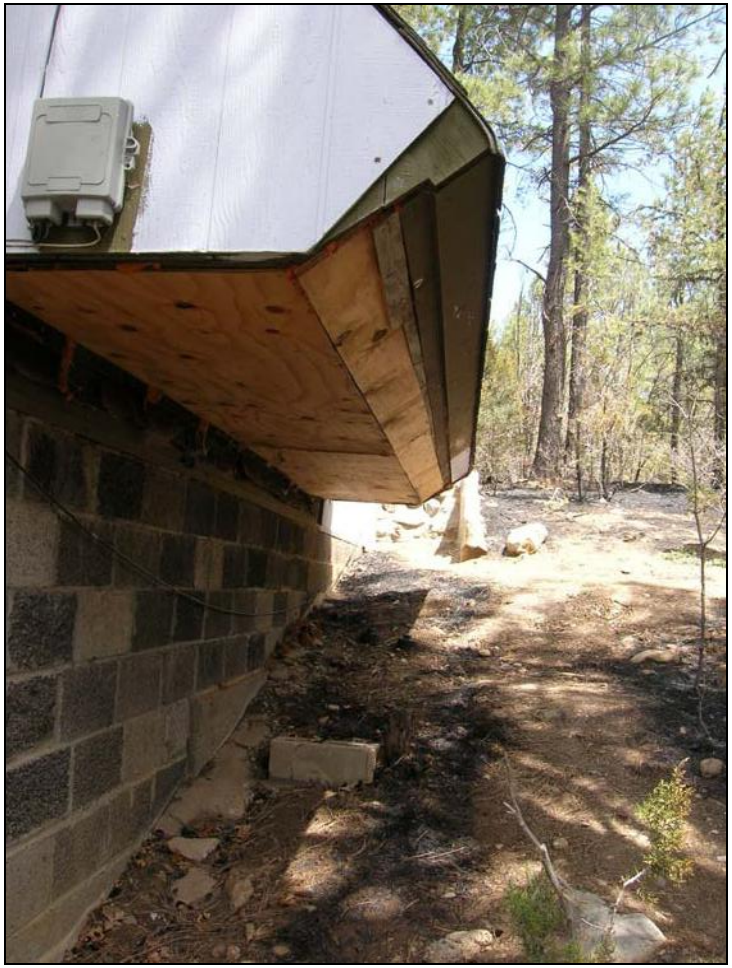
Total consumption of a home in Sherwood Forest.
Source Sam Amato, USFS.

Leaking propane tank.
Source: Sam Amato, USFS

ATV.
Source: Sam Amato, USFS

Loose livestock after the Trigo fire.
Source: Sam Amato, USFS

Pathway around a house in Sherwood Forest that acted as a fire break.
Source: Sam Amato, USFS



Screened in soffits, reducing potential structural ignitability, Sherwood Forest structure.
Source: Sam Amato, USFS

Screened in vents as a precaution against embers, Sherwood Forest residence. *Source: Sam Amato, USFS*

Structural devastation in Sherwood Forest. *Source: Sam Amato, USFS*

Unscathed homes in Sherwood Forest. *Source: Sam Amato, USFS*

Structural devastation in Sherwood Forest. *Source, Sam Amato, USFS*

Hot shots heading to the Trigo fire.
Source: Karen Takai, USFS/ Inciweb

Governer Bill Richardson visits the Trigo fire.
Source: Inciweb

Retardant Drop
Source: Arlene Perea, USFS

Blow up in New Canyon and Bartelo Canyon 4/20/2008
Source: Dierdre Tarr

Bartelo Canyon 4/20/2008
Source: Dierdre Tarr

Bartelo Canyon 4/20/2008
Source: Dierdre Tarr

4/27/2008-Public Meeting, Torreon Community Center
Source: Dierdre Tarr

4/27/2008- Public Meeting, Torreon Community Center
Source: Dierdre Tarr

How close the fire came to a cabin at Manzano Mountain Retreat
Source: Dierdre Tarr

4/27/2008- Dierdre Tarr, CPSWCD District Manager
Source: Dierdre Tarr

High severity burn area
Source: Dierdre Tarr

Ground fire Manzano Mountain Retreat
Source: Dierdre Tarr

Low severity fire, Manzano Mountain Retreat
Source: Dierdre Tarr

Heliport, off Ten Pines Road
Source: Dierdre Tarr

The Mountain below Capilla Peak
Source: Dierdre Tarr

Defensible space, Manzano Mountain Retreat
Source: Dierdre Tarr

Congressman discussing the Trigo fire with firefighters
Source: Dierdre Tarr

Dirt Tank area on the Brown-Wootten Property
Source: Dierdre Tarr

Corbin Newman, U.S. Senator Pete Domenici and Karen Lessard. *Source: Dierdre Tarr*

Briefing at Torreon Fire Department- Incident Team Commander-Jeff Whitney, Torrance County Emergency Manager-John Cordova, NM State Forestry District Forester-Todd Haines, U.S. Senator-Pete Domenici, District Ranger, Mountainair Ranger District, Karen Lessard and Regional Forester, Corbin Newman.
Source: Dierdre Tarr

U.S. Senator Pete Domenici listens to Leon Chavez a private landowner in Torreon discuss the success of his defensible space treatments. *Source: Dierdre Tarr*

The "TEAM" who worked together during the Trigo Fire with U.S. Senator Domenici. *Source: Dierdre Tarr*

Site visit to Sherwood Forest
Source: Dierdre Tarr

Landscape scale view of the Trigo burn scar
Source: Dierdre Tarr

Brown-Wooten Property showing defensible space area that mitigated fire behavior. *Source: Dierdre Tarr*

Monitoring plots staked out for the Estancia Basin Watershed Health, Restoration and Monitoring Project-crown fire area
Source: Dierdre Tarr

Weather Station on Jim Bouton Property.
Source: Dierdre Tarr

Water monitoring flume on Jim Bouton Property- ground fire
Source: Dierdre Tarr

Cabin at Manzano Mountain Retreat- raking pine needles 100 foot away from the cabin stopped the fire. *Source: Dierdre Tarr*

Fire crew
Source: Arlene Perea

Direct impingement on structures
Source: Arlene Perea

Dense smoke
Source: Arlene Perea

Mountain view
Source: Arlene Perea

Retardant drop
Source: Arlene Perea

Mountain view
Source: Arlene Perea

Morning briefing
Source: Arlene Perea

Public Meeting May 2008
Source: Arlene Perea

Retardant drop
Source: Arlene Perea

Fire Fighter 4/18/2008
Source: Arlene Perea

Smoke column 4/30/2008
Source: Arlene Perea

Smoke column 4/30/2008
Source: Arlene Perea

Smoke haze
Source: Arlene Perea

Community show their gratitude
Source: Arlene Perea

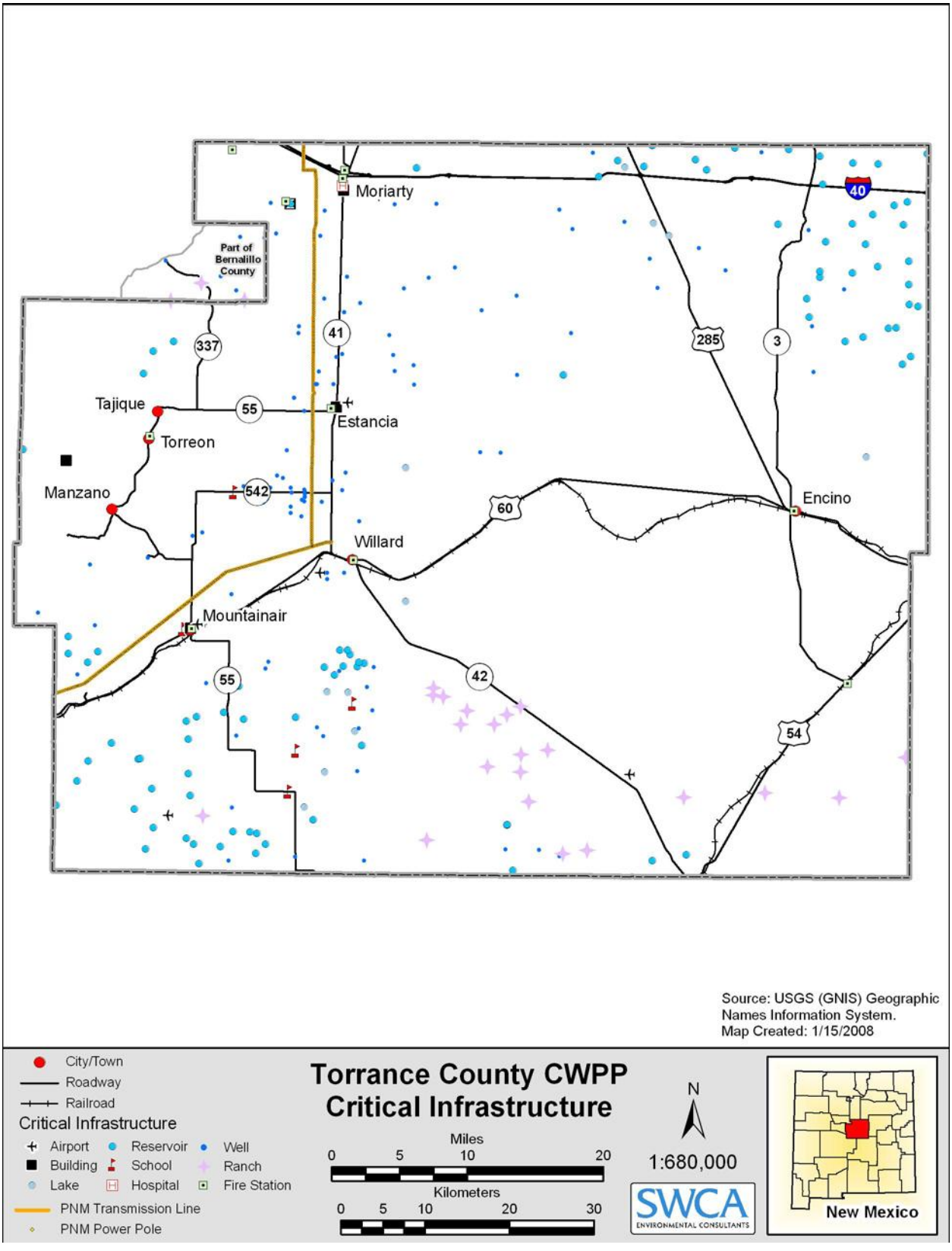
Helicopter loading for bucket drops
Source: Arlene Perea

Smoke column 4/30/2008
Source: Arlene Perea

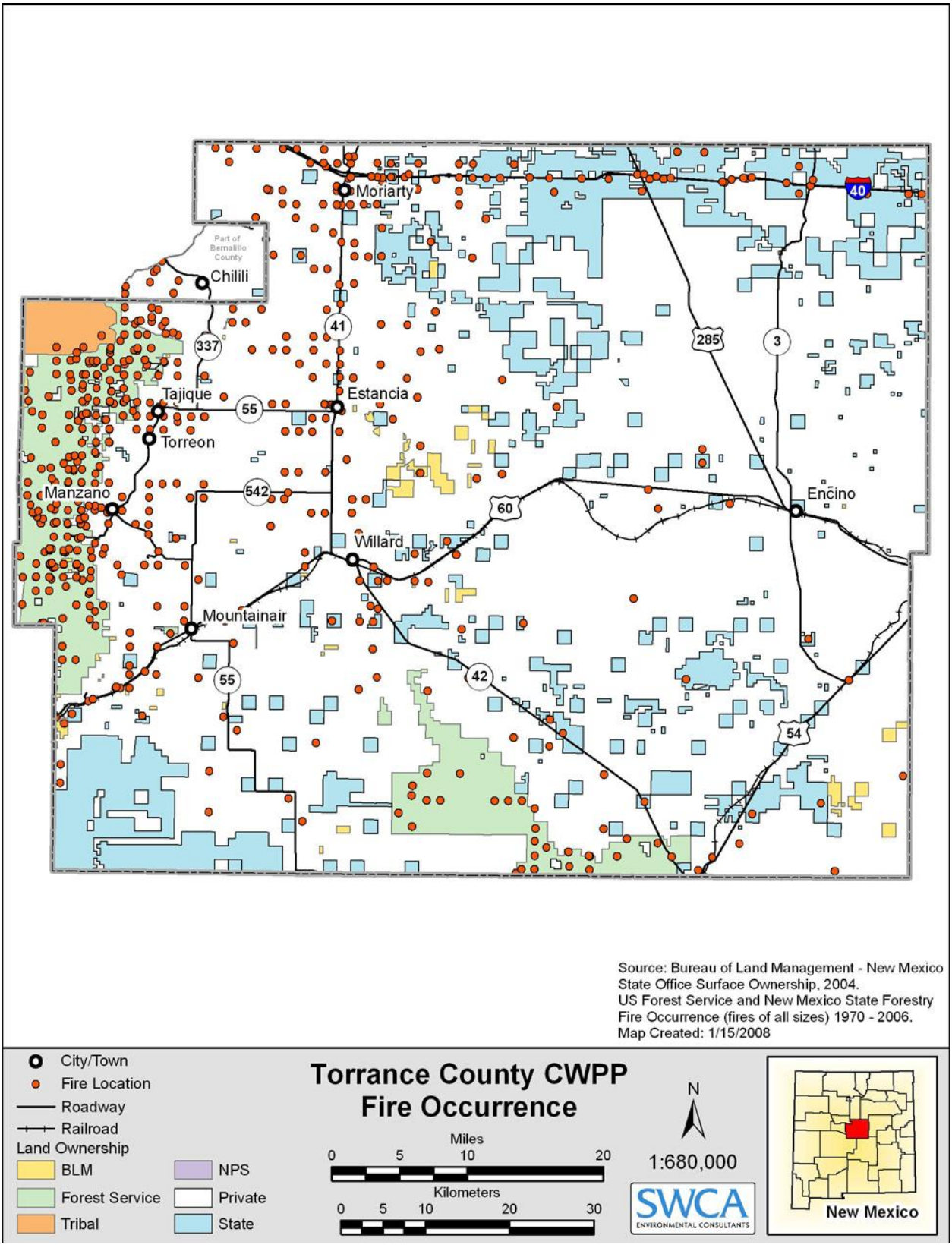
Impacting on a house
Source Arlene Perea

Livestock
Source: Arlene Perea

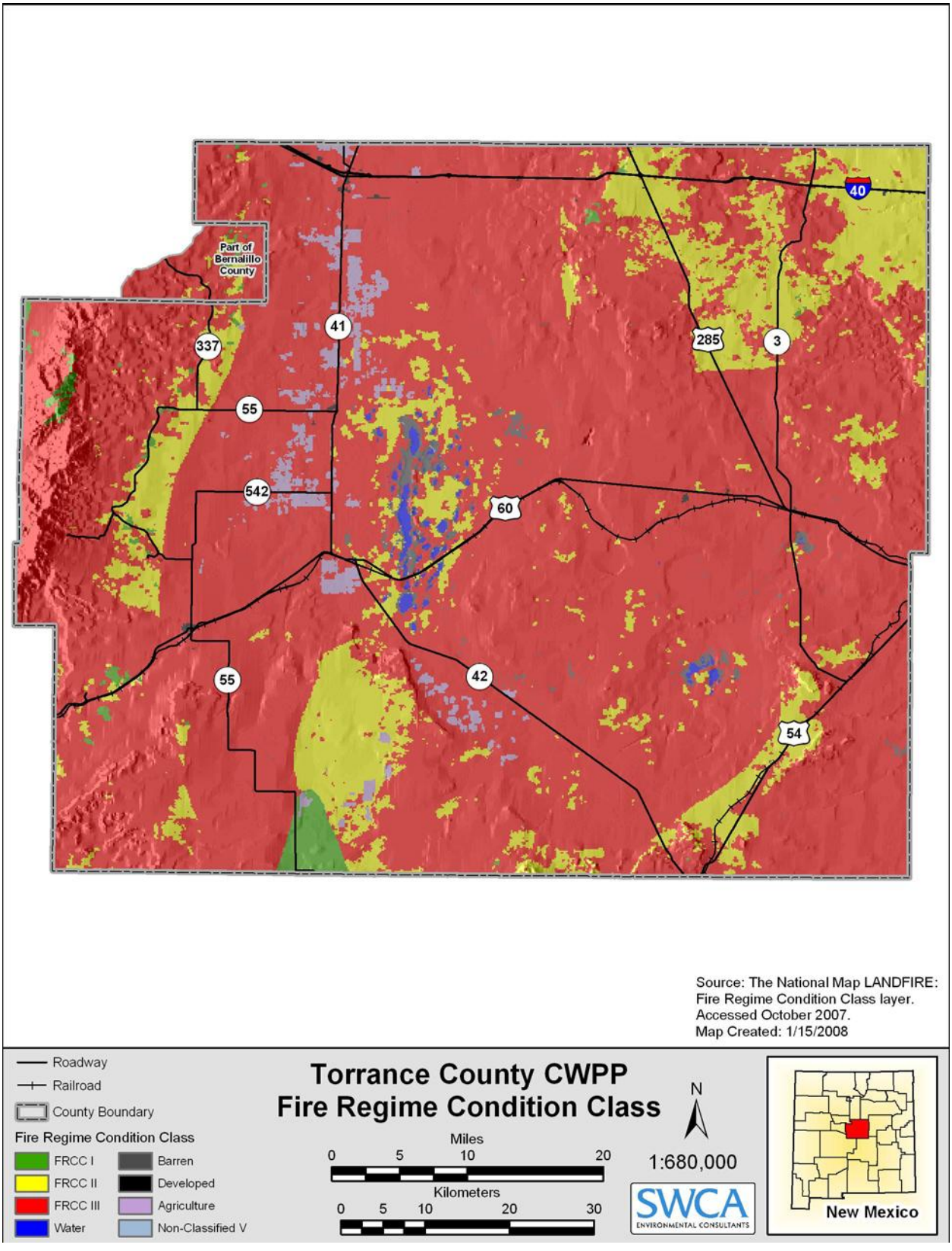
Appendix B
Base Maps



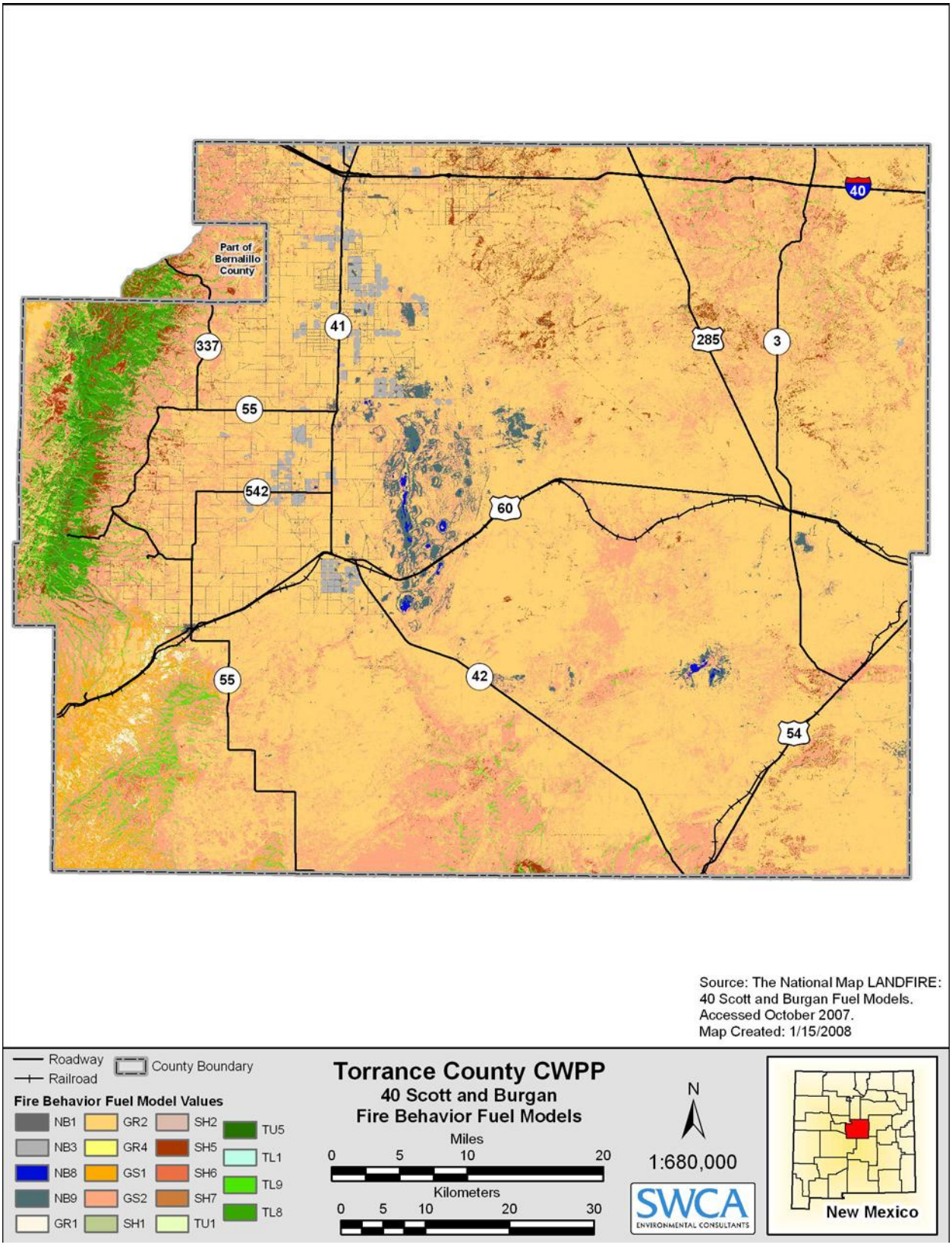
Map 1. Torrance County critical infrastructure.



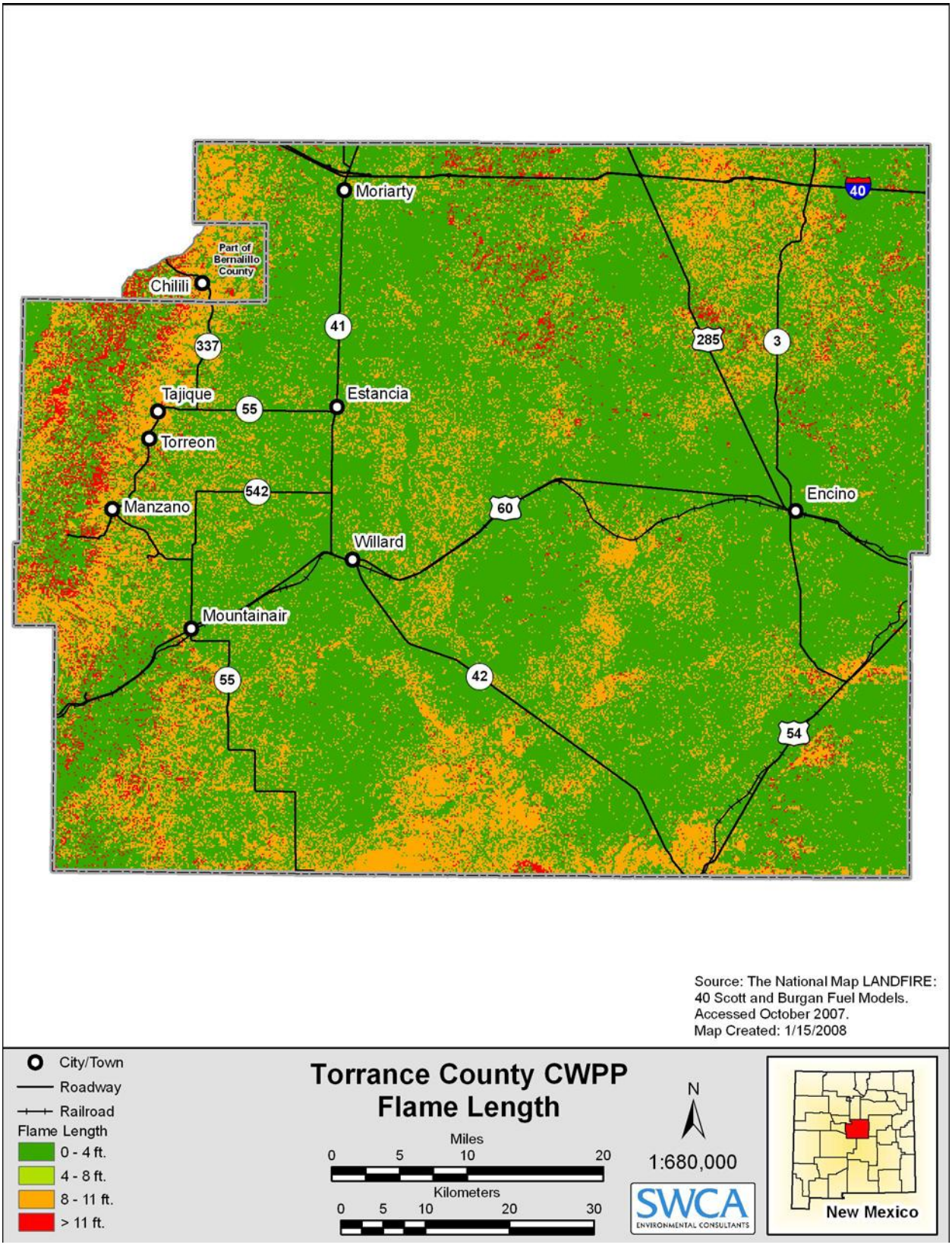
Map 2. Torrance County fire occurrence.



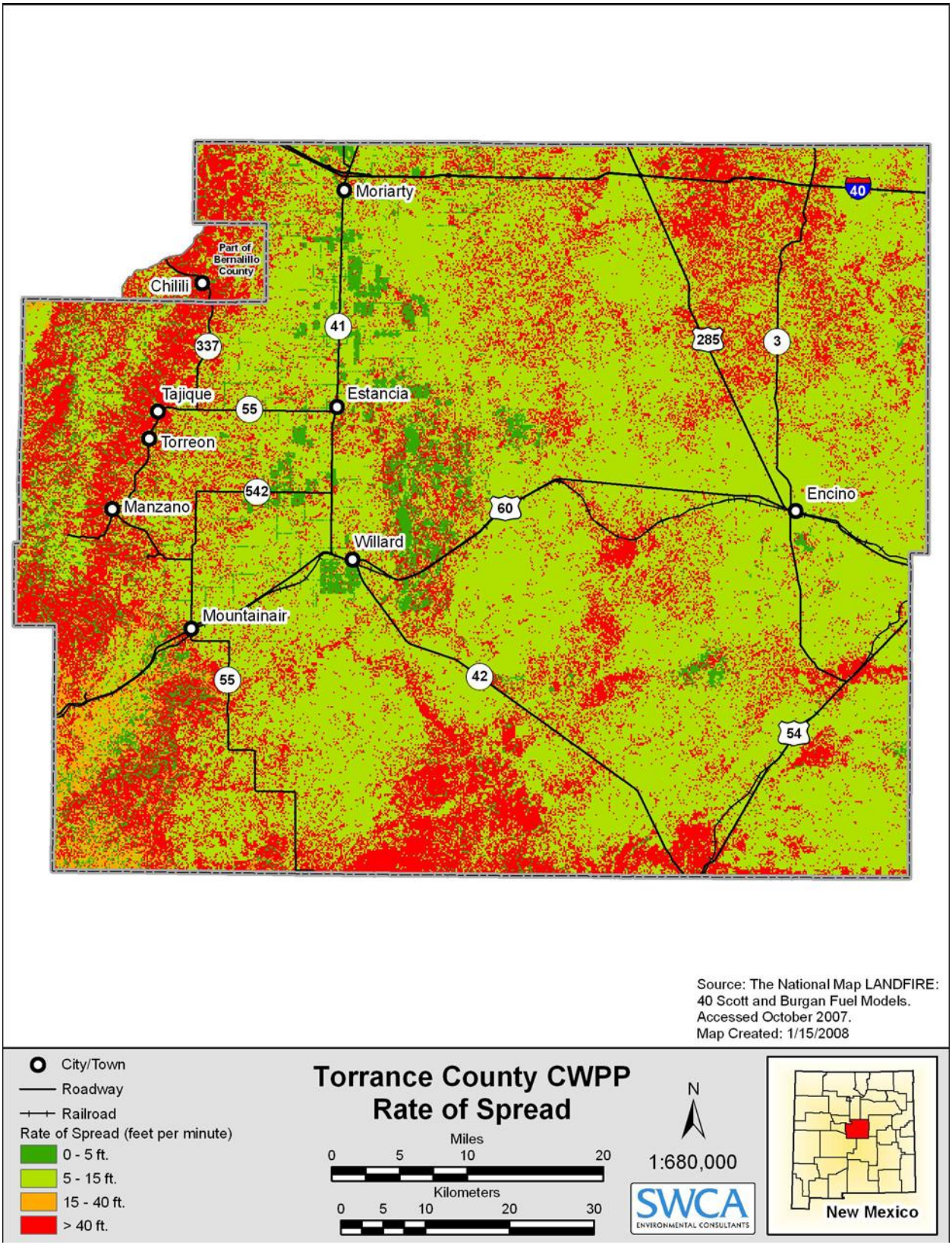
Map 3. Torrance County Fire Regime Condition Class.



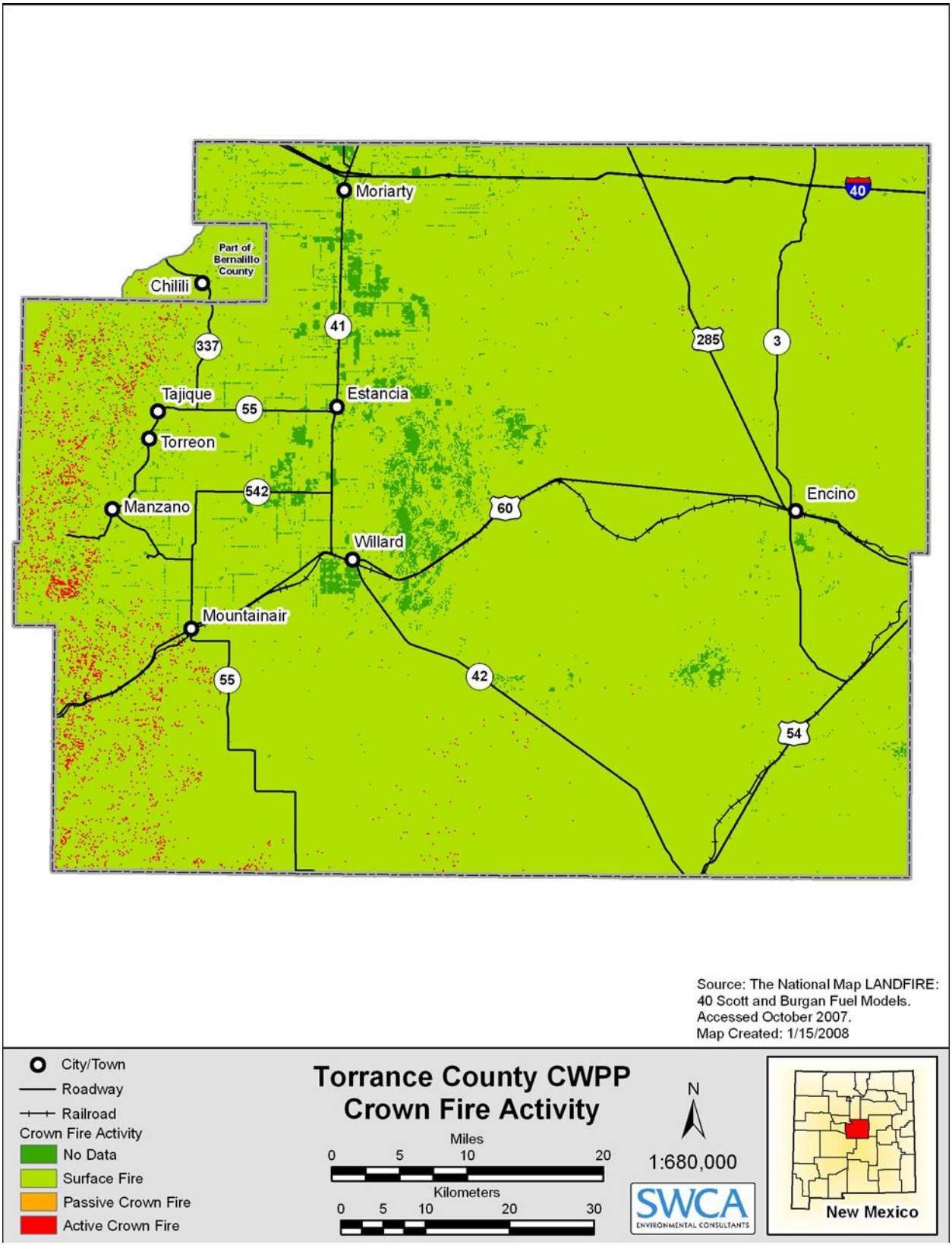
Map 4. Torrance County fuels classification.



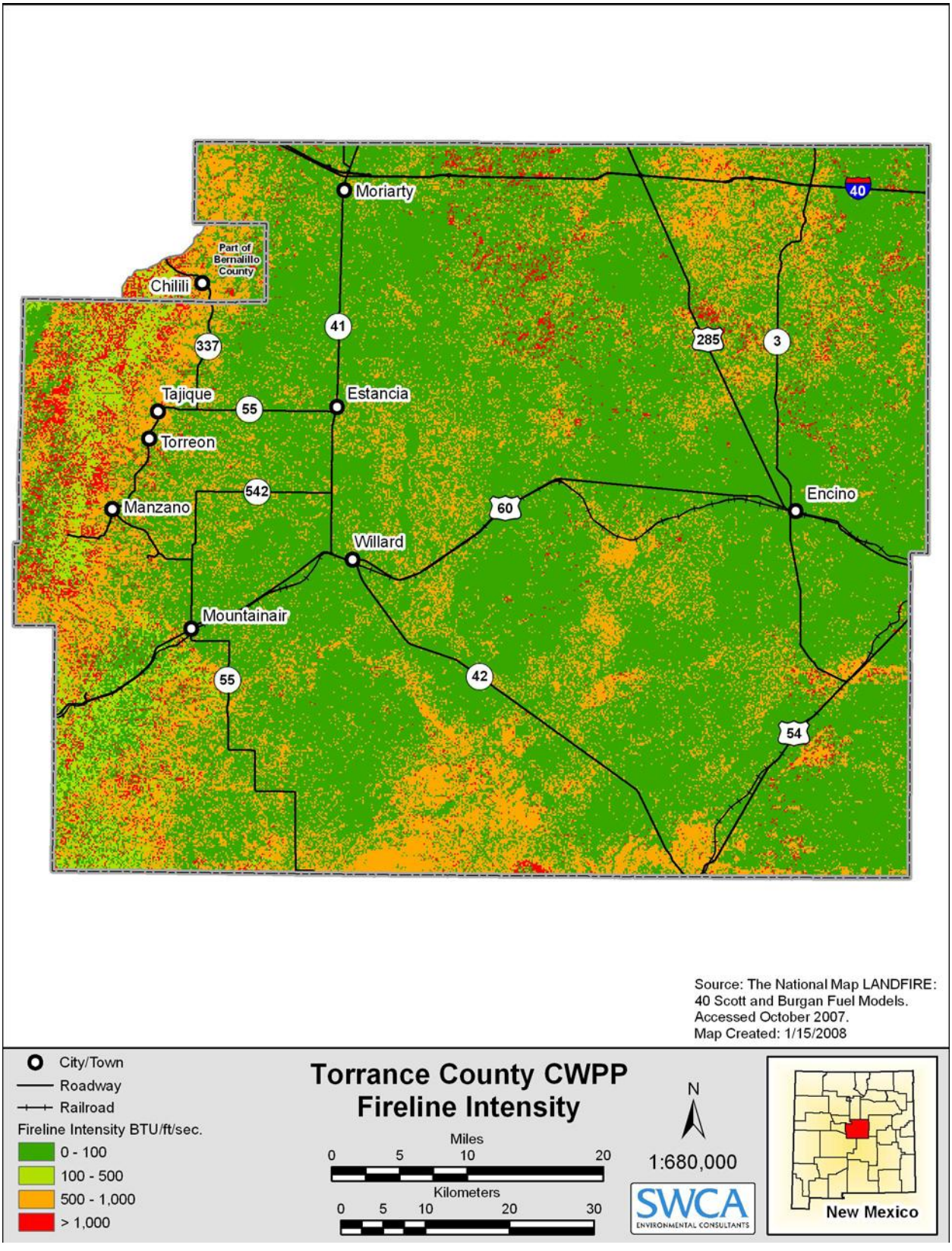
Map 5. Torrance County flame length.



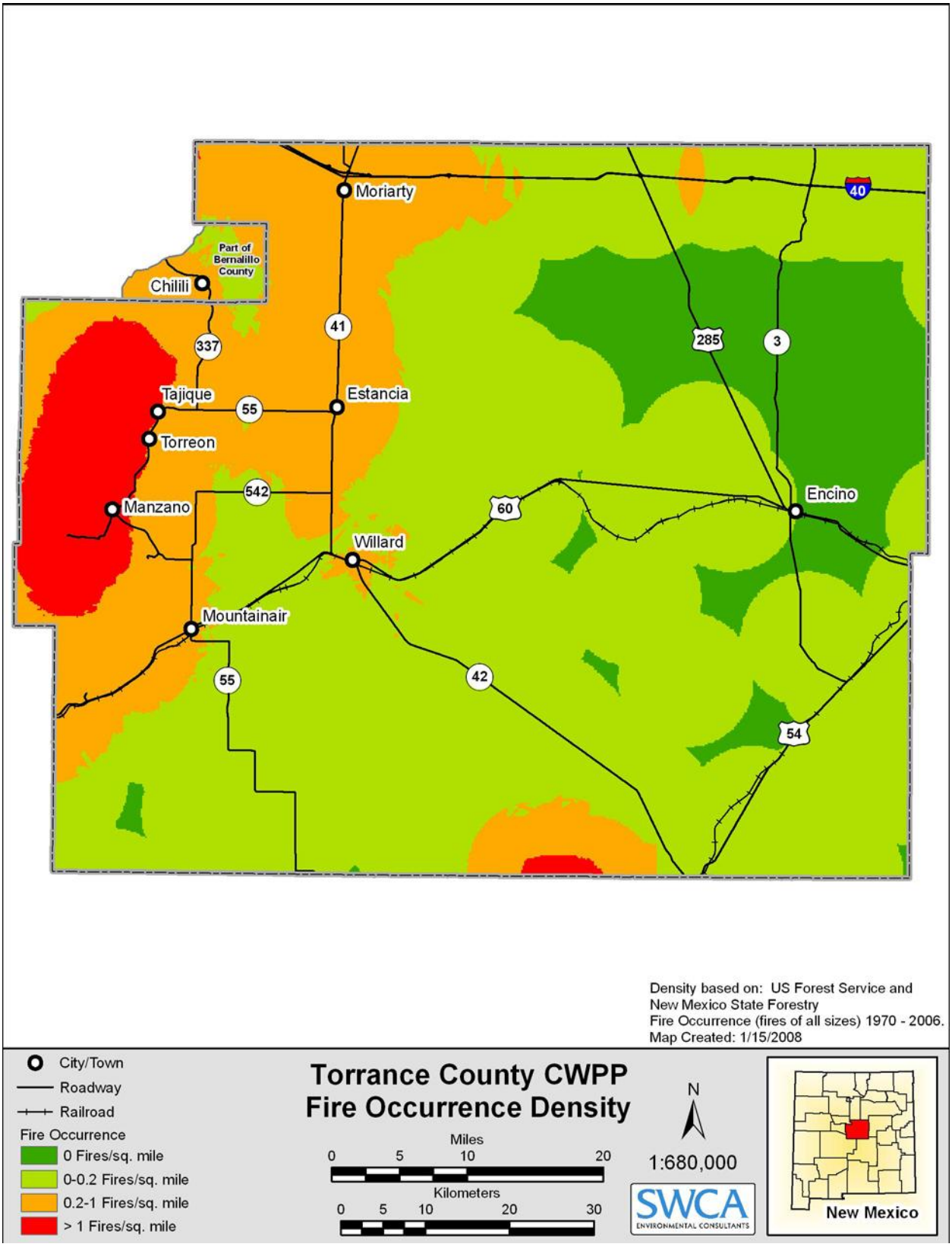
Map 6. Torrance County rate of spread.



Map 7. Torrance County potential crown fire activity.



Map 8. Torrance County fireline intensity.



Map 9. Torrance County fire occurrence density.

Appendix C
Core Team List

Claunch-Pinto SWCD and Torrance County CWPP Core Team List

Name	Organization	Position
Victoria Williams	SWCA	Planning Lead
Krista Bonfantine	Arid Land Innovations	Subcontractor to SWCA
Dave Lightfoot	SWCA	Project Manager
Dierdre Tarr	Claunch Pinto Soil and Water Conservation District	District Manager
John Cordova	Torrance County	Emergency Manager
Susan Brazil	Town of Mountainair	Mountainair Clerk
Sam Blackshaw	Mountainair Fire Department	Fire Chief
Celilio Quintana	Manzano Land Grant Association	
Jason Trumbull	Torrance County	Fire Marshal
Karen Lessard	Mountainair Ranger District	District Ranger
Juan Sanchez	Chilili Land Grant	Resident
Bobby Garcia	Moriarty Fire Dept	Fire Chief
Leo Padilla	Tajique- representative	Resident
Gilbert Chavez	Torreon Land Grant	Resident
Brenda Smythe	Edgewood Soil and Water Conservation District	District Manager
Cheri Luyan	East Torrance Soil and Water Conservation District	District Manager
Todd Richards	BLM	Fire Management Officer
Dave Bervin	State Forestry Bernalillo District	Fire Management Officer
Wayne Granger	Estancia Fire Department	Fire Chief
Beth Dillingham	Manzano Mountain State Park	Park Superintendent
Glen Fulfer	Salinas Pueblo Mission National Park	Superintendent
Derek Toms	Salinas Pueblo Mission National Park	Fire
Bud Latven	Tajique CYN	Resident
Ann Adams	Forest Valley	Resident
Carolyn Allen-Renteria	Estancia Municipal Schools	Estancia Schools Superintendent
Ernie Sandoval	Moriarty Municipal Schools	Moriarty Municipal Schools Superintendent
Jay Mortensen	Mountainair Public Schools	Mountainair Public Schools Superintendent
William Hignight	Corona	Mayor
Sam Blackshaw	Mountainair	Fire Chief
Jan Eshleman	Loma Parda	Resident
James Sullenger	Mountainair Fire Department	Volunteer
Wanda Sullenger	Mountainair Fire Department	Volunteer
Vernon Kohler	CPSWCD	Field Tech
Ruben Gastelum	Torrance County	Rural Addressing TCFD #5
Joy Ansley	Torrance County	County Manager
George Duffy	Torrance County landowner	Resident
Louis King	NRCS	District Conservationist
Wayne Sleep	NRCS	District Conservationist

Claunch-Pinto SWCD and Torrance County CWPP Core Team List, continued

Name	Organization	Position
Paul Davis	Tajique	Resident
Lance Elmore	US Forest Service	District FMO
Kelly Archuleta	Edgewood Soil and Water Conservation District	Technician
Jack Dickey	NMSF Socorro	District Fire Management Officer
Terrell Treat	NMSF	WUI Specialist
Rick Golden	Deer Canyon Preserve	Sales Manager
Art Swenka	Torreon Fire Department	Chairman
Debra Elkins	Heritage Preserve	Office Manager
Tye Chesser	State Land Office	District resource Manager
Harold Zuni	NM State Parks	Park Ranger
Terrance Gallegos	US Forest Service	E-YOL Captain
George Ramirez	Los Humanes	CEO

Appendix D
Community Comments

COMPILATION OF COMMUNITY COMMENTS FROM PUBLIC MEETING

The following is a compilation of comments made by community members at the Public Meeting held in Mountainair on December 10, 2007. Community members circulated around the room to three different stations and wrote comments on flip charts based on the theme of each station.

Station 1 - BEFORE FIRE

- Need to have better preplanning by homeowner
- Need to encourage homeowners to put together important documents
- Homeowners should get copies of documents and store in a safe location
- Be prepared to have sufficient medication
- Have a plan for pets
- Need more firebreaks
- Need better education for landowners
- Implement more Firewise programs
- Carry out more thinning projects
- Need more money for thinning
- USFS needs to do more thinning
- USFS not spending the money that they have
- Need funding to extend fire lookout season
- Create wind barriers
- Firebreaks – every mile or so
- More volunteer fire department members
- More water storage facilities
- More fire hydrants
- Organize community (area) call lists (notification lists)
- Need County Road numbers and need to replace downed signs (county problem)
- Need better road signs and address labels
- Need to improve consistency in road names over time
- Use 4X4 posts with numbers stenciled or metal numbers
- Need compensation to local fire departments for volunteer firefighting
- County needs more fire personnel
- Need local Red Cross training
- Funding for firefighter training

Station 2 - DURING FIRE

List of Priority Items

- Utilize specialized fire teams EARLY in fire when possible
- Keep firefighters safe
- Try to recruit more members to volunteer fire department
- Use more local firefighters or community members to help in orientation for emergency response
- Transwestern has 100,000 gallon tank just south of Mountainair that can be utilized for firefighting
- There is a 3,500 tank off highway in Gran Quivira that is available for firefighting

Improve Communications

- Improve consistency of communication to public and agency
- Implement Reverse 911 call
- Need Reverse 911 system
- Need Emergency Alert System
- Updated website of information on evacuation etc. is needed to inform homeowners
- Joint communication/message from agencies
- Use local Forest Service employees (recognized community members) to help with communications to local community
- Volunteers could help to carry out community communication
    - Liaisons (local knowledge)
        - Sheriff's Department
        - Fire Department
        - County emergency
        - (Fed fires: USFS/BLM/National Park Service)
        - (State fires: State Forestry/NRCS/SWCDs)
- Utilize all local Soil and Water Conservation Districts, i.e., funding/technical assistance

Station 3 - AFTER THE FIRE

- We carried out treatments around our house but the Forest Service left slash piled up behind our house.
- Forest Service need to be accountable for clearing up slash post treatments in a timely manner.
- We want to know how the clean-up of private property should be handled. Where can we get help from?
- Need a better plan for getting more people to help with the volunteer fire departments

Attendees were also asked where they think emphasis (either education, treatments, firefighting capabilities) should be focused for the County and the District:

Emphasis should be on:

- Thinning in WUI Areas
- Forest valley
- Allowing prescribed burns
    - West/NW of Kayserville
    - West/NW of mountain towns
    - Around housing developments
- Deer Canyon Preserve
- Education around County
- More thinning
- Manzano – fire breaks

- Thinning around canyons
- Focus surrounding dense wildlife habitat/wilderness to protect those areas
- Access roads to allow firefighters to fight the fires
- Overall watershed health
- Better communication between the agencies and public about thinning. Inform and involve the public
- Need more local help to manage the forest
- Need local input and locals need to benefit from treatments- bring jobs to the locals
- Come up with a plan to allow locals to collect fuel wood

Community Feedback Form

Victoria Williams
SWCA Environmental Consultants
5647 Jefferson Street, NE
Albuquerque, NM 87109

Torrance County and
Claunch-Pinto Soil and Water Conservation District
Community Wildfire Protection Plans

Please complete this survey to provide input for YOUR County Wildfire Protection Plan.
Please send in this form by Nov. 15th to: Email*: vwilliams@swca.com

*** To submit by email, please answer the questions and save the form as an MSWord document. Then attach the document to your email. Forms can also be mailed to the address above.**

1. Name (optional):

2. Contact Information (optional), Phone: Email:

3. I live in: (check all that apply) **Torrance County** ☐ **Claunch-Pinto SWCD** ☐

4. I would rate the chances of losing my home to wildfire as:
LOW ☐ **MODERATE** ☐ **HIGH** ☐

5. My home is vulnerable to wildfire because of: (please check all that apply)
☐ Building Materials
☐ Distance to fire station
☐ Lack of water supplies for fighting the fire
☐ Inaccessible area
☐ Flammable trees and shrubs

6. How prepared is your community for a large wildfire? (check)
Poorly prepared **1** ☐ **2** ☐ **3** ☐ **4** ☐ **5** ☐ Well prepared

7. Rate the following actions in their importance to making the community better prepared for wildfire? (please number 1 to 5)
1 Thinning or clean-up by individual property owners
1 Better fire-fighting equipment
1 Improved water supplies
1 Thinning and fuel treatments on public land
1 Community education and communication

8. My biggest challenge to making my home more fire-safe is (please check):
☐ **Time** ☐ **Money** ☐ **Don't know what to do** ☐ **I think my home is already safe**

9. I would be most interested in funding to help me and my community with (please check):
☐ **Green-waste disposal** ☐ **Home hazard assessments** ☐ **Education**
☐ **Thinning on private land** ☐ **Water supply development**

FOR MORE INFORMATION PLEASE CONTACT:
Victoria Williams, (505) 254-1115, vwilliams@swca.com

10. Other questions and comments: *(Please attach additional page if needed)*

Water Supply Details

My household water is supplied by: private well ☐ community system ☐

What system provides water to your community?

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

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

Does the water system have storage tanks in your community?

Is the supply gravity fed ☐ or pressurized ☐?

General location of tanks:

What is the total storage capacity of the tanks?

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

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

Who would need to provide permission for access and use?

General location:

FOR MORE INFORMATION PLEASE CONTACT:
Victoria Williams, (505) 254-1115, vwilliams@swca.com

CPCWPP

1. Name (optional)			
		Response Percent	Response Count
Name:		100.0%	49
	answered question		49
	skipped question		35

2. Phone number (optional)		
		Response Count
		45
	answered question	45
	skipped question	39

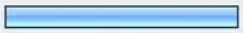
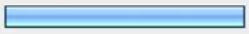
3. Email (optional):		
		Response Count
		7
	answered question	7
	skipped question	77

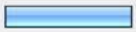
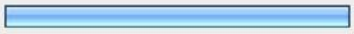
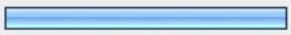
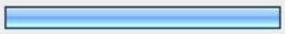
4. I live in:

	Response Percent	Response Count
Torrance County	**72.8%**	59
Claunch-Pinto SWCD	2.5%	2
Both	17.3%	14
Other	7.4%	6
Other (please specify)		6
answered question		**81**
skipped question		**3**

5. I would describe my property as:

	Response Percent	Response Count
Grassland	25.0%	2
Pinon-juniper woodland	**50.0%**	4
Ponderosa forest	12.5%	1
Other	12.5%	1
Other (please specify)		3
answered question		**8**
skipped question		**76**

6. I would rate the chances of losing my home to wildfire as:			
		Response Percent	Response Count
Low		41.8%	33
Moderate		**43.0%**	34
High		15.2%	12
		answered question	**79**
		skipped question	**5**

7. My home is vunerable to wildfire because of:			
		Response Percent	Response Count
Building Materials		22.5%	16
Distance to fire station		**62.0%**	44
Lack of water supplies for fighting the fire		50.7%	36
Inaccessible area		16.9%	12
Flammable trees and shrubs		49.3%	35
		Other (please specify)	4
		answered question	**71**
		skipped question	**13**

8. How prepared is your community for a large wildfire? (1= poorly prepared, 5= well prepared)

	Response Percent	Response Count
1	30.6%	22
2	**44.4%**	32
3	13.9%	10
4	8.3%	6
5	2.8%	2
answered question		**72**
skipped question		**12**

9. Rate the following actions in their importance to making the community better prepared for wildfire?

	Least Important				Most Important	Rating Average	Response Count
Thinning or clean-up by individual property owners	2.9% (2)	15.7% (11)	11.4% (8)	22.9% (16)	**47.1% (33)**	3.96	70
Better fire-fighting equipment	21.7% (13)	**33.3% (20)**	13.3% (8)	21.7% (13)	10.0% (6)	2.65	60
Improved water supplies	25.8% (16)	17.7% (11)	**30.6% (19)**	6.5% (4)	19.4% (12)	2.76	62
Thinning and fuel treatments on public land	25.8% (16)	11.3% (7)	14.5% (9)	**29.0% (18)**	19.4% (12)	3.05	62
Community education and communication	17.2% (11)	15.6% (10)	**25.0% (16)**	21.9% (14)	20.3% (13)	3.13	64
answered question							**76**
skipped question							**8**

Page 4

10. My biggest challenge to making my home more fire-safe is:

	Response Percent	Response Count
Time	**42.3%**	33
Money	25.6%	20
Don't know what to do	14.1%	11
I think my home is already safe	37.2%	29
answered question		**78**
skipped question		**6**

11. I would be most interested in funding to help me and my community with:

	Response Percent	Response Count
Green-waste disposal	18.1%	13
Home hazard assessments	12.5%	9
Education	23.6%	17
Thinning on private land	**51.4%**	37
Water supply development	44.4%	32
answered question		**72**
skipped question		**12**

12. Other questions and comments

	Response Count
	14
answered question	**14**
skipped question	**70**

Page 5

13. My household water is supplied by:		
	Response Percent	Response Count
private well	**84.4%**	65
community system	18.2%	14
Other (please specify)		0
answered question		**77**
skipped question		**7**

14. What water system provides water to your community?	
	Response Count
	13
answered question	**13**
skipped question	**71**

15. How would you rate the reliability of the water supply?		
	Response Percent	Response Count
Low	20.6%	14
Moderate	**44.1%**	30
High	35.3%	24
answered question		**68**
skipped question		**16**

Page 6

16. Do you have fire hydrants in your neighborhood?			
		Response Percent	Response Count
Yes		28.1%	16
No		71.9%	41
	answered question		57
	skipped question		27

17. If yes, approximately how many?		
		Response Count
		14
	answered question	14
	skipped question	70

18. Is the supply:			
		Response Percent	Response Count
gravity fed		69.2%	9
pressurized		38.5%	5
	answered question		13
	skipped question		71

19. Does the water system have storage tanks in your community?			
		Response Percent	Response Count
Yes		60.0%	18
No		40.0%	12
	answered question		30
	skipped question		54

20. General location of tanks		
		Response Count
		33
	answered question	**33**
	skipped question	**51**

21. What is the total storage capacity of the tanks?		
		Response Count
		27
	answered question	**27**
	skipped question	**57**

22. Do the water tanks have access points or fittings for firefighting equipment?			
		Response Percent	Response Count
Yes		26.9%	7
No		23.1%	6
Not sure		**50.0%**	13
	answered question		**26**
	skipped question		**58**

23. Are there any other water supplies in you neighborhood such as stock tanks, swimming pools, or ponds that could be used for firefighting?		
		Response Count
		53
	answered question	**53**
	skipped question	**31**

24. Who would need to provide permission for access and use?		
		Response Count
		25
	answered question	**25**
	skipped question	**59**

25. General location:		
		Response Count
		19
	answered question	**19**
	skipped question	**65**

Comments received from citizens of Forest Valley Subdivision

To: SWCA
Re: Feedback on Torrance County and Claunch-Pinto CWPPs

As the only members of the public that were part of the core team we would like to thank you for this additional opportunity to respond to the proposed Torrance County and Claunch-Pinto CWPPs. You have done a very thorough job of summarizing the various issues at play and bringing in key members of the Torrance County community who are interested and involved in the issue of how to effectively address wildfires in Torrance County.

In particular, we think your focus on citizen awareness and cooperation among agencies are key. Other CWPPs have focused on these areas with great success because these are areas in which there is no disagreement that improvements can be made and which have an immediate affect on the critical issues of human safety and private property.

We believe that the highest priority should be focused on:

- Inadequate equipment for firefighters,
- Limited access and few adequate turnarounds,
- Limited water availability and limited water storage,
- Empty lots and limited yard maintenance,
- Poor signage and no driveway markers,
- Unsurfaced roads and narrow roads,
- Poor defensible space; few had greater than 30 feet.

A campaign for community awareness around how to deal with the other issues could include:

- Poor building construction with combustible siding and decks,
- Structures built midslope and with limited setback, particularly at Red Bluff, Manzano Morning, and Deer Canyon Preserve,
- Blocked driveways and locked gates

Again, the key is to take steps that the whole community can get behind. There are more recommendations listed than funding available. That is all the more reason to focus in on a few recommendations that all the community supports. We would like to see that focus strengthened to improve funding opportunities for keeping our community safe.

That said, we cannot sign on to either the Torrance County or the Claunch Pinto CWPP because the recommendations for forest fuel reduction are not consistent with the intent of the HFRA, not based on sound science, are contradicted by all available data, and are counter productive.

The following sections briefly address each of these issues followed by a set of detailed comments.

The draft Torrance County CWPP recommends designating a very broad geographic area as Wildlife Urban Interface (WUI) areas for the CWPP. SWCA Environmental Consultants informed core team members that the new WUI area designations in the CWPP were designed to help streamline project development and that new CWPP WUI designed areas will supercede the default definition in the HFRA for Federal projects.

The new WUI designated areas include all the Federal Forest Service lands in the Manzano Mountains. These USFS lands completely surround the Forest Valley Ranch subdivision in-holding. The majority of residents of Forest Valley Ranch subdivision object to this broad definition of WUI lands and request that WUI boundaries within Federal Forest Service lands be defined by a ½ mile buffer along all private lands *within* USFS lands and a ½ mile buffer along all private lands *adjacent to* Federal Forest Service lands where, in both situations, the adjacent lands meet the population densities of the default definitions of a WUI in the HFRA. Subdivision residents are concerned that this new broad CWPP WUI designation will effectively restrict public involvement in USFS HFRA project development by allowing the USFS to cite the CWPP WUI area definition and thereby minimize public input.

In response to this problem SWCA noted that, “rather than create little islands of WUI around each in-holding the Core Team decided to add verbage to the document that states that the CWPP WUI definition does not supercede designations on federal land. We confirmed with the National Park Service representative that federal agencies use their own WUI designations that are not affected by the CWPP so the designation does not affect those areas.” We agree that there should not be little WUI islands. If you would follow the HFRA default definition of a WUI this problem would be avoided. The problem here is that the CWPP WUI area designation will now become the new default Federal WUI area designation according to the rules of the HFRA. Therefore, the comment that “federal agencies use of their own WUI designations that are not effected by the CWPP” is in contravention with the directive of the HFRA that CWPP WUI designated areas will supercede the default definition.

The current default definition of a WUI as found in the Federal Registry defines three categories of WUI areas: interface, intermix and occluded (Federal Register, Vol. 66, No.3, p. 753, as referenced in the HFRA, Sec.101(1)(A(i)). A WUI *interface* area is defined as a community with "*3 or more structures per acre (structure is defined as a residence or business) with shared municipal services*". An alternative definition of an *interface* area is "*250 or more people per square mile*". An *intermix* area is defined as an area with "*structures very close together to one structure per 40 acres*". An alternative definition has a "*population density of between 28-250 people per square mile.*" An *occluded* area is not relevant to the project area. Only municipal areas in Torrance County currently qualify as WUI areas under this default definition since most areas are very rural.

Instead of utilizing this definition you have decided that you can call any area a WUI. While you have found some language to allow you to meet the letter of the law you are circumventing the intent of the HFRA. Recognizing that we never have unlimited funds, the HFRA provided default definitions for a WUI that would focus monies on the greatest good. That is, on the highest populations. Following the large Arizona fires, Congress explicitly wanted to protect

communities like Red River, Ruidoso, Cedar Crest, etc. over isolated cabins and small groups of homes in the Manzano Mountains.

The focus of the HFRA that created CWPPs was appropriately on risk. When making decisions that may affect a future uncertain event like fire, risk is the only appropriate metric. However, both the Torrance County and the Claunch-Pinto CWPPs use risk when they are only speaking of hazard or consequence. This is absolutely not a matter of semantics. Risk is the combination of what can happen, how likely it is to happen, and the consequences of it happening. In this case, the concern is that there is fuel on the ground, some ignition source will light the fuel, there will be an inadequate response to the fire, the fire will spread, and the fire will burn down someone's home. The associated likelihood or probability comes into each component. These CWPPs automatically assume all of these bad things will happen immediately and with complete certainty which provides the basis for recommended thinning. This is equivalent to someone spending a dollar on the lottery and then taking out a loan for millions of dollars because they are certain they will win. They are ignoring the probability they will win just as the CWPP is ignoring the probability that all of these bad things will happen at all, let alone simultaneously. Both are making very bad decisions in terms of spending money. Only in the case of the lottery, it is only one dollar and only personal, not taxpayer money.

When very briefly allowed to bring up this issue at the CWPP meetings we were told that data were not available to calculate risk. Therefore hazard has become risk like rural became urban in the WUI definition. So we were living comfortably in the forest for the past 30 years loving our rural environment and knowing that the fire risk was not zero, but low and acceptable. Now we find out we live in an urban area that should have already exploded. Funny how someone's loose and inaccurate use of language can change people's perspective of the world they live in.

However, both data and models exist to use in calculating the risk that your home will burn down in a forest fire. Start with the most basic data. When you get car insurance what do they want to know first – your driving record. Your driving record will be the primary factor in deciding how much to charge you for insurance. Why? It is used to calculate the probability you will get in a wreck. Now look at the so-called communities at risk in the CWPP. They are still standing. They have been there hundreds of years. Their driving record (fire history) is clean. Their fire risk is very low. Why? Because they are virtually all surrounded by pinion-juniper forests which almost never have forest fires – check the real fire data for your selves at http://www.fs.fed.us/r3/cibola/plan-revision/gis_data/data.shtml (download the database file that can be read by EXCEL). It is important to note here that the CWPP lists the Ojo Peak fire as a pinion-juniper fire. It was not. It was virtually contained within spruce, fir, and ponderosa pine forests. Next, you can use the same data to calculate the probability of a fire starting as well as the probability that any one fire will exceed even 10 acres. These are both very small probabilities. Once you have those probabilities you could use the CWPP fire model if it had of quantitatively included uncertainties. It didn't. Now the CWPP would have you believe that forest fire frequency is increasing, therefore, the existing data is not valid. So instead of just looking at the histogram of fire frequency shown in the CWPP (the one that shows a dramatic rise in the number of fires over time) you could plot, as we have, the number of fires that have occurred in the forests over the same period of time. Other than a minor correlation with drought, there is no change in the fire frequency in our forests. You could also go a step deeper and

realize that the CWPP plot is telling us that the number of home fires in the county (not forest fire related) is increasing with time. Maybe just due to an increase in population, but maybe due to something we should be concerned about and could change.

For calculating the risk of a forest fire destroying our homes, CWPP could have just used the risk assessment method developed by the US Forest Service Pacific Northwest Research Station (http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6T6X-4NW1H8T-1&_user=10&_rdoc=1&_fmt=&_orig=search&_sort=d&view=c&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=00057556ebfffa355b40c065c5a93e5b).

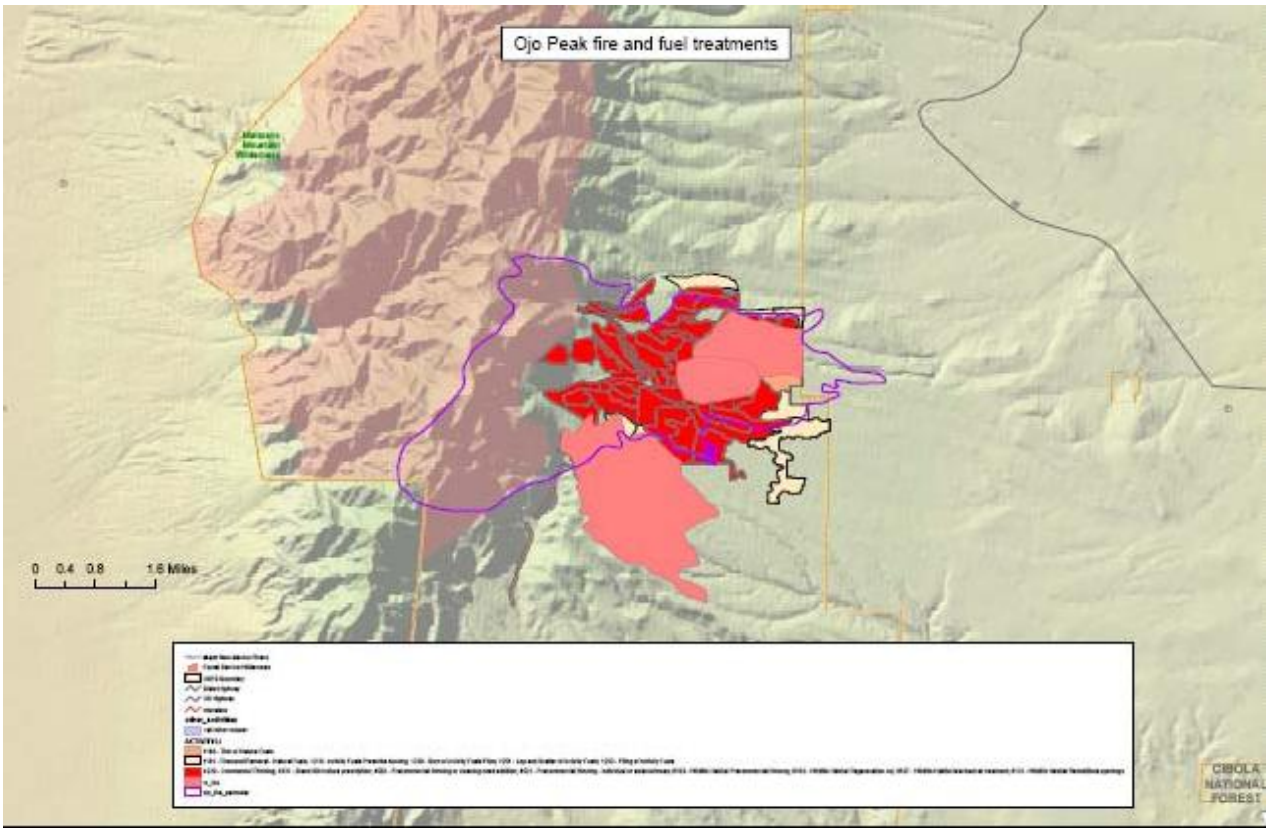
Finally, note that the fact we had a fire in the Manzanos that burned down structures does not change the risk any more than the fact that of someone having a car accident changes your risk of driving to work. It doesn't. Wrecks have always and will always happen and you still drive to work not because the consequences of having a wreck aren't severe but because the probability you will get in a wreck is still low. In fact, if anything, the Ojo Peak fire reduced the local fire risk for some time to come.

Given a true fire risk, we could then sit down and discuss what reasonable actions we may want to take. First what could we do for free? Looking at the fire data for the Manzano Mountains and New Mexico, the first thing we would do is stop lighting so-called controlled burns. Yes, the largest fire in recent New Mexico history (Los Alamos) and the second largest recorded fire in the Manzanos were controlled burns. Simple solution – stop lighting them. Since controlled burns are part and parcel of thinning, this also means no thinning. Again looking at the data, what is the next thing we should do? Stop allowing people on our public lands during droughts. Humans cause the majority of the remaining large fires in the Manzanos. It is a minor and temporary inconvenience to limit entry to the forests during severe droughts.

Now look at something perhaps more important. The current fire risk in ponderosa pine forests is decreasing without USFS intervention. The CWPP presented a one-sided view of the forest, claiming that man's intervention (fighting forest fires) had caused the high density of trees we see in the forest. However, the cause of the overcrowding of trees is previous logging practices followed by natural succession. Clear cutting around the turn of the century virtually eliminated our forests. As new trees sprung up, an equal-aged stand of trees was created. As these trees matured, natural fire was suppressed by the USFS due to pressure by logging interests and a logging bias by the USFS. So now we have a very crowded forest. However, nature is taking care of itself. Crowns of the larger trees now overlap, resulting in less sun to the smaller trees. These smaller trees are dying at an ever increasing pace. Natural succession is eliminating small diameter trees.

And without regard to fire, we would still be against thinning for the simple facts that it doesn't work and it causes harm.

Following is a map of the Ojo Peak fire overlain by the recent fuel management projects including the very large Thunderbird thinning project. The fire went right across all thinned areas and the map does not even show the earlier, very large thinning projects to the west of the current fuel management areas.



And what happens if we thin? The act of thinning introduces chainsaws, cigarettes, campfires, etc. to areas that are currently inaccessible to most people. In addition, clearing (with or without all of the new roads) will drastically increase access to these parts of the forest. Note, previous road closures failed to keep illegal wood cutters from accessing these roads. With fewer trees they simply find a way around any barriers or gates. To date, this lack of access has also protected old growth oak and juniper and archeological sites. Now, the only remaining old growth juniper in this area are isolated from any roads. By opening up these areas (thinning by itself opens up these areas with or without roads) all remaining old growth juniper are likely to be eliminated. In addition, any old growth oak will be eliminated either with the thinning or as soon as any wood cutter can get into the thinned area – probably the first night after thinning starts.

Finally, if the agencies whose bias is toward large thinning projects are serious about fire risk on pinion-juniper forest, they would prohibit cattle grazing. The CWPP specifically states that increasing forest density and fires are caused in part by grazing. So why is it that the CWPP only focuses on thinning?

SPECIFIC COMMENTS

p. 34 Table 3.1...cause of fire "miscellaneous????" The Forest Service has concluded the fire was human caused.

p.42 Evacuation Procedures, Stage 4 "incident commander or his designee" How are people supposed to know who that person is, especially in potentially panicky situations? Badges? Do all residents in the county have that/those people's names and cell phone numbers, including knowledge that cell phone reception in the mountain area is extremely problematic?

same page....Implementation procedures#2 Seems that should include some statement to the effect that no resident will be forcibly removed from their home/land.

same page... re the paragraph just beneath #4 "In the event of an evacuation, the responsible jurisdiction's policy on people that do not comply with evacuation instructions. The statement addresses the consequences for not evacuating, and the services (food medical, utilities,sanitation,etc.) that will be discontinued or interrupted in the evacuation area." We have some concern that this sounds like if a resident chooses to stay (refuses to evacuate) to defend their home, is possibly able to save their home but phone lines and electric lines are burned and they might suffer from smoke inhalation as a result of this choice...they would be refused "services" NOT OK

p.58 Loma Parda...just a note that there are more homes in Loma Parda that are stucco, adobe and rammed earth with metal or non-flammable roofing than there are those that are not, they just are not visible from the main road.

p.67 5.1 Will there be any addressing of the fact that the Ojo Peak fire seemed to accelerate by virtue of burning through areas that had been thinned for the very purpose of preventing fire???

p.78 5.1.4.1 We am personally against ALL forms of herbicides. Salt cedar leaf beetle, goats, and some burning is quite enough to my way of thinking.

p.80 5.1.7 I'm saddened to see that "They also indicated that their greatest interest for funding opportunities should be for thinning on private land." All the thinning- for- pay opportunities in the world won't matter in a fire if there is no water available to fight it. For example, only one Loma Parda resident has chosen this option. Our position is that a priority for funding should be for water availability, i.e. catchment systems, dry hydrant installation and any other options for making lots of water available quickly. Thinned dry land will not prevent or stop a fire ever!!

p.80 5.2 paragraph 2....In the eyes of the Soil and Water Conservation District they may be "arguably the most effective conduit for reaching the diverse population." The Claunch-Pinto Soil and Water Conservation District may well arguably be the best conduit for ranchers who have a huge desire to eliminate pinion and juniper from their lands to create more open grazing lands and better yet want to be paid to do just that There are MAY people who have been alienated by CPSWCD in their zealous efforts to eliminate the pinion-juniper from the land in a myth of recreating springs and streams. In the Mountainair area we would argue that the Soil and Water Conservation office is NOT the most effective conduit just because they have a

mailing list. In fact they have a built in bias toward thinning if for no other reason that they have a strong vested financial interest in thinning projects.

p.126 Emphasis should be on: thinning, burning, more thinning, fire breaks, thinning. overall watershed health?? (i.e. herbicides, burning) Still there is absolutely no addressing of water...what exactly is the method to be employed o fight a wildfire? We don't see how a "Wildfire Prevention Plan" can exist without addressing water availability and accessibility especially in a desert climate. ALL THE THINNING IN THE WORLD WILL NOT PREVENT A WILDFIRE! In a fact a large percent of the large fires listed in the CWPP were grassland fires. What do you pretend to do about those fires – eliminate all grass?

Sincerely,

Core Team Members Representing the Public
Ann Adams (resident of Tajique)
Paul Davis and Bud Latven (members of the Forest Valley Homeowners Association – a USFS inholding)
Jan Eshleman (resident of Loma Parda)

Appendix E
Firefighting Resources

Firefighting Resources

There are five fire districts in Torrance County and 17 fire stations in neighboring counties, which would respond to fires in both the Claunch-Pinto SWCD and Torrance County planning areas.

Fire Station List

City of Moriarty Fire Department, Torrance County
Estancia Fire Department, Torrance County
Mountainair Fire Department, Torrance County
McIntosh Fire Department, Torrance County
Corona Fire Department, Lincoln County
San Antonia Fire Department, Socorro County
Willard Fire Department, Torrance County
Abeytas Fire Department, Valencia County
Rio Grande Estates Fire Department, Valencia County
Veguita Fire Department, Socorro County
Midway Fire Department, Socorro County
Duran Fire Department, Torrance County
Encino Hills Fire Department, Torrance County
Indian Hills Fire Department, Torrance County
North East Torrance Fire Department, Torrance County
Hills and Valleys substation, Torrance County
Torreon and Tajique Fire Torrance Co.

The following is a resources list for all five fire districts in Torrance County:

Torrance County District 1
1 – Engine 500 gallon tank
1 – Brush 200 gallon tank

Torrance County District 2
1 – Tender 2,000 gallon tank
1 – Brush 250 gallon tank
1 – Tender 1,500 gallon tank
1 – Engine 500 gallon tank
1 – Utility truck rehab, 3,000 watt generator

Torrance County District 3
1 – Engine 500 gallon tank
2 – Tender 3,000 gallon tank
1 – Quick attack 300 gallon tank
1 – Tender 2,000 gallon tank
1 – Brush 200 gallon tank
1 – Rescue 4X4

Torrance County District 4

1 – Tender 1,200 gallon tank
1 – Quick attack 300 gallon tank

Torrance County District 5

1 – Engine 1,000 gallon tank
1 – Tender 2,500 gallon tank
1 – Brush 300 gallon tank

Incident Management Protocol

This is a summary of a document entitled *Interagency Emergency Operations in Wildland Fire with NM State Forestry Division: Planning Projects and Incident Management*. This unpublished document was developed by Dave Bervin of New Mexico State Forestry (NMSF) to provide guidelines for emergency responders.

Three factors are always present in any emergency incident, and all jurisdictions responding to a fire in the TCCWPP planning area follow these three basic parameters.

- Life safety
- Incident stabilization
- Resource protection

There are a number of tiers to emergency management and emergency management planning. A Geographic Area Operations Plan is the overarching document that defines roles and responsibilities for the responders to an incident by jurisdiction and activity. There are three levels to this plan:

- State–Federal Geographic Area Operations Plan
- A local area operations plan
- Mutual aid plans

General Incident Operations

The following outlines the general set of procedures for wildland fire response:

1. Local resources (i.e., municipal, county, or volunteer fire department) are often the first to be called and dispatched when there is a report of a fire. The dispatch office that has jurisdictional authority will activate the initial attack.
2. The initial attack provides dispatch with a size up for the fire in order to determine the need for additional resources.
3. An Incident Command (IC) post is established and staging areas set up.
4. Dispatched resources from all jurisdictions check in at staging area.
5. If the IC level changes (higher or lower), the IC holds a briefing to inform all concerned about any change of status or tactic.

For initial attack responders:

- No notification to NMSF is necessary for fires controlled at initial attack using municipal resources.
- For an initial attack on fires in a County response area, notification to NMSF is necessary.
- For an initial attack response by federal agencies responders or BIA, notification must be made to the Geographic Area Interagency Dispatch (GAID) (e.g., Albuquerque Area Zone for Bernalillo County responders).

- For federal jurisdiction fires, notification must be made to NMSF about who will contact the GAID to confirm resource needs and act as liaison.

For fires that activate Mutual Aid Agreements (e.g., spread potential, red flag warnings, values at risk):

- Municipal fire departments must notify NMSF if they respond.
- All requests for additional resources must be made through NMSF.
- For federal jurisdictions, NMSF will respond to all resource requests.
- For additional requests from federal jurisdictions, all additional requests must pass through GAID.

If the fire goes to extended attack, additional operation procedures are implemented:

- Dispatch responsibilities are transferred to GAID
- Request activation of Type 3 Team.
- Establish IC post and unified command
- Identify and establish a large staging area
- Request activation of New Mexico resource mobilization plan
- Request implementation of Emergency Preparedness Network
- Notify Red Cross to set up rehab units
- Begin collecting information for complexity analysis and wildland situation analysis
- Notify Office of Emergency Management
- Notify NMSF
    - Type 3 Management Team
    - New Mexico resources mobilization plan
    - Air Attack Operations

Appendix F
Community Hazard/Risk Assessment Form

Wildfire Fire Risk and Hazard Severity Form NFPA 1144

Ingress and Egress	Points
2 or more roads in and out	0
One road in and out	7
Road Width	
> 24 ft	0
> 20 ft < 24 ft	2
< 20 ft	4
Road Conditions	
Surfaced road, grade < 5%	0
Surfaced road, grade > 5%	2
Non-surfaced road, grade < 5%	2
Non-surfaced road, grade > 5%	5
Other than all season	7
Fire Access	
< 300 ft with turnaround	0
> 300 ft with turnaround	2
< 300 ft with no turnaround	4
> 300 ft with no turnaround	5
Street Signs	
Present – reflective	0
Present – non-reflective	2
Not present	5
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 ft around structure	1
> 70 ft < 100 ft around structure	3
> 30 ft < 70 ft around structure	10
< 30 ft around structure	25
Slope	
< 9%	1
10% to 20%	4
21% to 30%	7
31% to 40%	8
>41%	10
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	
Class A	0
Class B	3
Class C	15
Unrated	25

Materials (predominant)	
Noncombustible siding, eaves, deck	0
Noncombustible siding/combustible desk	5
Combustible siding and deck	10
Building Set-back	
> 30 ft to slope	1
< 30 ft to slope	5
Water Sources	
Hydrants 500 gpm < 1000 ft apart	0
Hydrants 250 gpm < 1000 ft apart	1
Non-pressurized > 250 gpm/2 hrs	3
Non-pressurized < 250 gpm/2hrs	5
Water unavailable	10
Organized Response	
Station < 5 mi from structure	1
Station > 5 mi from structure	3
Fixed Fire Protection	
NFPA sprinkler system	0
None	5
Utilities	
Both underground	0
One above, one below	3
Both above ground	5

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

Appendix G
Communities at Risk List

Community at Risk List

This Community at Risk list is developed for the New Mexico Fire Planning Task Force. 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 a County-wide plan, it is recommended that more detailed analysis be carried to identify to a subdivision level communities to be added to this Community at Risk list in the future.

Community	Hazard Rating
Sherwood Forest	High
AI02	High
Chilili Land Grant	High
Red Bluff	High
Fourth of July Campground	High
Forest Road	High
Manzano Land Grant	High
Punta de Agua	High
Loma Parda	High
Echo Hills	High
Deer Canyon Preserve	High
Game Rd	High
Forest Valley	High
Corona	High
Duran	High
Manzano Morning	High
Tajique Land Grant	High
McIntosh	High
Willard	High
Torreon Land Grant	High
Mission Hills	Moderate
Mountainair	Moderate
Clines Corners	Moderate
Estancia	Moderate
Encino	Moderate
Moriarty	Moderate
Sunset Acres	Moderate
Sweetwater Hills Subdivision	Moderate
Homestead Estates	Low

Appendix H
Funding Opportunities

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

I. Federal Funding Information

Source: Pre-Disaster 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 pre-disaster 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 pre-disaster 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 multi-hazard 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
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 Dept. (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 Environmental Protection Agency (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 non-competitive 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 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 non-governmental 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: U.S. Department of Agriculture (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 web site.

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; re-establishment of historical 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/
- Pre-Disaster 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, U.S. Department of the Interior (USDI) Bureau of Indian Affairs, USDI Bureau of Land Management, 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. There are many different Firewise activities that can help homes and whole neighborhoods become safer from wildfire without significant expense. Community clean-up 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/USA 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 noncombustible 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 web sites and e-mail contacts.

Source: The National Fire Plan
Website: http://www.forestsandrangelands.gov/
Description: Many states are using funds from the National Fire Plan 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 grants 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.

The 2007 Western WUI Grant Program is a specific grant available under the State Fire Assistance Program. It includes opportunities for hazardous fuels reduction, education, and community and homeowner actions. An application and instructions can be found at: http://www.firesafecouncil.org/news/ attachments/2007_CDF_application-proccess_final168.pdf

Source: New Mexico Association of Counties 2007–2008 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 pre-requisite 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 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 web site 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 web site: 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 I
Homeowner's Guide

This guide has been developed to address site-specific information on wildfire for Torrance 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 noncombustible, 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—Noncombustible 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 non-flammable 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 non-flammable or fire resistant materials and have the exterior wood treated with UL-approved fire-retardant chemicals. More information on fire-resistant construction can be found at 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.

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, non-flammable materials such as gravel are much better than wood chips or pine needles.

Pine needles provide important erosion protection for soil but also may carry a surface fire. It is simply not feasible to remove all the pine needles around your property. However, it is a good idea to remove any accumulations of pine needles or cones within the safety zone and extending out as far as possible. This is particularly important if pine needles tend to build up alongside your house or outbuildings. Removing needles and leaves and exposing bare mineral soil 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 Torrance 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 turn around 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 fire-safe storage box within your home.

IN THE EVENT OF A FIRE

NOTIFICATION

In the event of a wildfire, announcements from the local Emergency Management office will be broadcast over local radio and television stations. Media notification may be in the form of news reports or the Emergency Alert System (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 (NOAA) 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 Torrance 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 wildland-urban interface toolbox is aerial attack. Airplanes and helicopters can be used to drop water or retardant to help limit the spread of the fire, but these resources cannot be used until the area has been cleared of civilians.

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 rerouting roads.

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