Torrance County Community Wildfire Protection Plan
(Draft)

The entities listed below participated in the development of and/or reviewed and are in support of the Torrance County Community Wildfire Protection Plan:

Signature	**Signature**
Name (printed)	**Name (printed)**
Date	**Date**
Agency /Position (printed)	**Agency /Position (printed)**

Signature	**Signature**
Name (printed)	**Name (printed)**
Date	**Date**
Agency /Position (printed)	**Agency /Position (printed)**

Signature	**Signature**
Name (printed)	**Name (printed)**
Date	**Date**
Agency /Position (printed)	**Agency /Position (printed)**

Signature	**Signature**
Name (printed)	**Name (printed)**
Date	**Date**
Agency /Position (printed)	**Agency /Position (printed)**

We would like to formally thank the Core Team and all stakeholders for contributing their time and expertise throughout the planning process. Your participation has contributed to creating resilient landscapes, implementing public education, reducing structural ignitability, and ensuring safe and effective wildfire response.

For additional information, questions, or concerns regarding this project, please contact Project Manager Cody Stropki cstropki@swca.com.

SWCA®
ENVIRONMENTAL CONSULTANTS

For all your planning and implementation needs, please visit www.swca.com.

CONTENTS

APPENDICES

FIGURES

TABLES

EXECUTIVE SUMMARY

WHAT IS THE PURPOSE OF THIS COMMUNITY WILDFIRE PROTECTION PLAN?

The purpose of the 2024 Torrance County Community Wildfire Protection Plan (CWPP) update is to:

1. provide a countywide scale of wildfire risk and protection needs,
2. bring together all responsible wildfire management and suppression entities in the planning area to address identified needs, and
3. provide a framework for future planning and implementation of necessary mitigation measures.

This CWPP aims to assist in protecting human life and reducing property loss due to wildfire throughout the County. This 2024 plan was compiled from reports, documents, data, and Core Team and public input. The plan was developed in response to the federal Healthy Forests Restoration Act (HFRA) of 2003.

The CWPP meets the requirements of the federal HFRA of 2003 by addressing the following:

1. Having been developed collaboratively by multiple agencies at the state and local levels in consultation with federal agencies and other interested parties.
2. Prioritizing and identifying fuel reduction treatments and recommending the types and methods of treatments to protect at-risk communities and pertinent infrastructure.
3. Suggesting multi-party mitigation, monitoring, and outreach.
4. Recommending measures and action items that residents and communities can take to reduce the ignitability of structures.
5. Soliciting input from the public on the draft.

WHAT ARE THE KEY ISSUES ADDRESSED?

Issues addressed in this CWPP include:

- Fuel treatment recommendations for land management agencies and homeowners to mitigate hazard and risk
- Prioritizing hazardous fuels reduction in the wildland urban interface (WUI)
- Raising awareness about the natural role that fire plays in the ecosystem and maintaining resilient landscapes
- Public education and outreach to homeowners to enable individuals to reduce the risk of fire to their properties, particularly regarding the time required for fire response to remote communities
- Constant and consistent messaging for residents and visitors concerning wildfire risks and mitigation strategies
- Increasing public access to information through the use online materials created for this CWPP

- Investing and supporting fire response at all levels, including resources for local fire departments to increase capacity to serve the community
- Increasing public understanding of the fire response process
- Continuing to address wildfire issues at the landscape level, across multiple jurisdictions
- Managing fire to protect values and accomplish resource management goals, including protection and enhancement of wildfire habitat, water supply and quality, and forest health
- Recent climate patterns and associated changes to the wildland fire environment
- Disease and insect outbreaks associated with tree mortality

HOW IS THE PLAN ORGANIZED?

The CWPP provides a Composite Risk-Hazard Assessment, action items, project recommendations, and background information about Torrance County's wildland fire environment, as well as land management plans and agencies. Most of the background information is housed in several appendices.

Chapter 1 provides a general overview of CWPPs, the Core Team, planning area, land ownership, and public involvement.

Chapter 2 presents an overview of the WUI, fire environment, and specific information about vegetation and fire history, as well as fire management and response.

Chapter 3 describes the Composite Risk-Hazard Assessment, results of the assessment, and community values at risk (VARs).

Chapter 4 provides mitigation strategies in accordance with the National Cohesive Wildfire Strategy as well as post-fire protocols and rehabilitation strategies.

Chapter 5 presents monitoring strategies to assist in tracking project progress and in evaluating work accomplished.

Appendix A contains background information on the County, including fire policy, past planning efforts, challenges to forest health, public education programs, and federal, state, and tribal land management agencies.

Appendix B presents additional mapping.

Appendix C lists the Core Team members.

Appendix D provides summary information on hazard and risk for each WUI community.

Appendix E presents a sample form of the National Fire Protection Association (NFPA) Wildfire Fire Risk and Hazard Severity Form 1144.

Appendix F details funding opportunities.

Appendix G contains additional resources for community members, including a homeowner wildfire mitigation guide and a list of outside resources covering a variety of topics.

Appendix H presents information on public outreach and engagement with regard to this CWPP.

Appendix I houses project recommendations.

Appendix J outlines modeling and geographic information system (GIS) backgrounds and explanations.

Appendix K describes various fuel treatment types and methods

Appendix L provides methods for post fire-response and restoration

WHAT IS THE GOAL OF A CWPP?

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. Another goal of the CWPP is to enhance public awareness by helping residents better understand the natural- and human-caused risks of wildland fires that threaten lives, safety, and the local economy. The minimum requirements for a CWPP, as stated in the HFRA, are (Society of American Foresters [SAF] 2004):

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

HOW WAS THE TORRANCE COUNTY CWPP UPDATE DEVELOPED?

A group of multijurisdictional agencies (federal, state, and local) and organizations joined together as a Core Team to update previous plans and develop this countywide CWPP. Previous CWPPs include the Claunch Pinto Soil and Water Conservation District CWPP (2008 and 2016) and the Torrance County CWPP (2008 and 2016). Several Core Team members have many years of experience working on previous CWPPs, as well as a depth knowledge of fire management in the community and surrounding areas, and have contributed their expertise to this CWPP.

The CWPP planning process served multiple purposes. One was to model and map areas of the county for high wildfire risk. Another was to identify and map the many physical hazards throughout the planning area that could increase the threat of wildfire to communities. This mapping process allowed the planning team to prioritize treatments tailored specifically for the community to reduce fire risk.

The CWPP planning process also brings together wildfire responders and land managers into a Core Team, providing opportunities to build lasting working relationships and encourage collaboration with local, state, and federal agencies. By incorporating public and Core Team input into the recommendations, treatments are tailored specifically for the planning area. Overall, the Torrance County CWPP emphasizes the importance of collaboration among multijurisdictional agencies and the public in developing fuels mitigation treatment programs to address wildfire hazards.

WHO PARTICIPATED IN DEVELOPING THE PLAN?

Land managers across Torrance County, New Mexico, participated in this CWPP. Cooperating agencies included four Soil and Water Conservation Districts (SWCDs); Claunch-Pinto, Cuidad, East Torrance,

and Edgewood, Isleta Pueblo, Moriarty Fire Department, Estancia Fire Department, Mountainair Fire Department, Encino Fire Department, City of Moriarty, City of Edgewood, Torrance County, Chili Land Grant, Manzano Land Grant, New Mexico Department of Agriculture, Bureau of Land Management, National Park Service, New Mexico State Forestry, New Mexico State land office, and U.S. Forest Service along with other additional community or organization representatives, served as the Core Team for this CWPP and drove the decision-making process. Several Core Team members were involved in previous CWPPs in and around the county and have contributed their expertise to this CWPP.

WHERE IS THE PLANNING AREA?

The planning area includes all the Torrance County as delineated by its geographic and political boundaries.

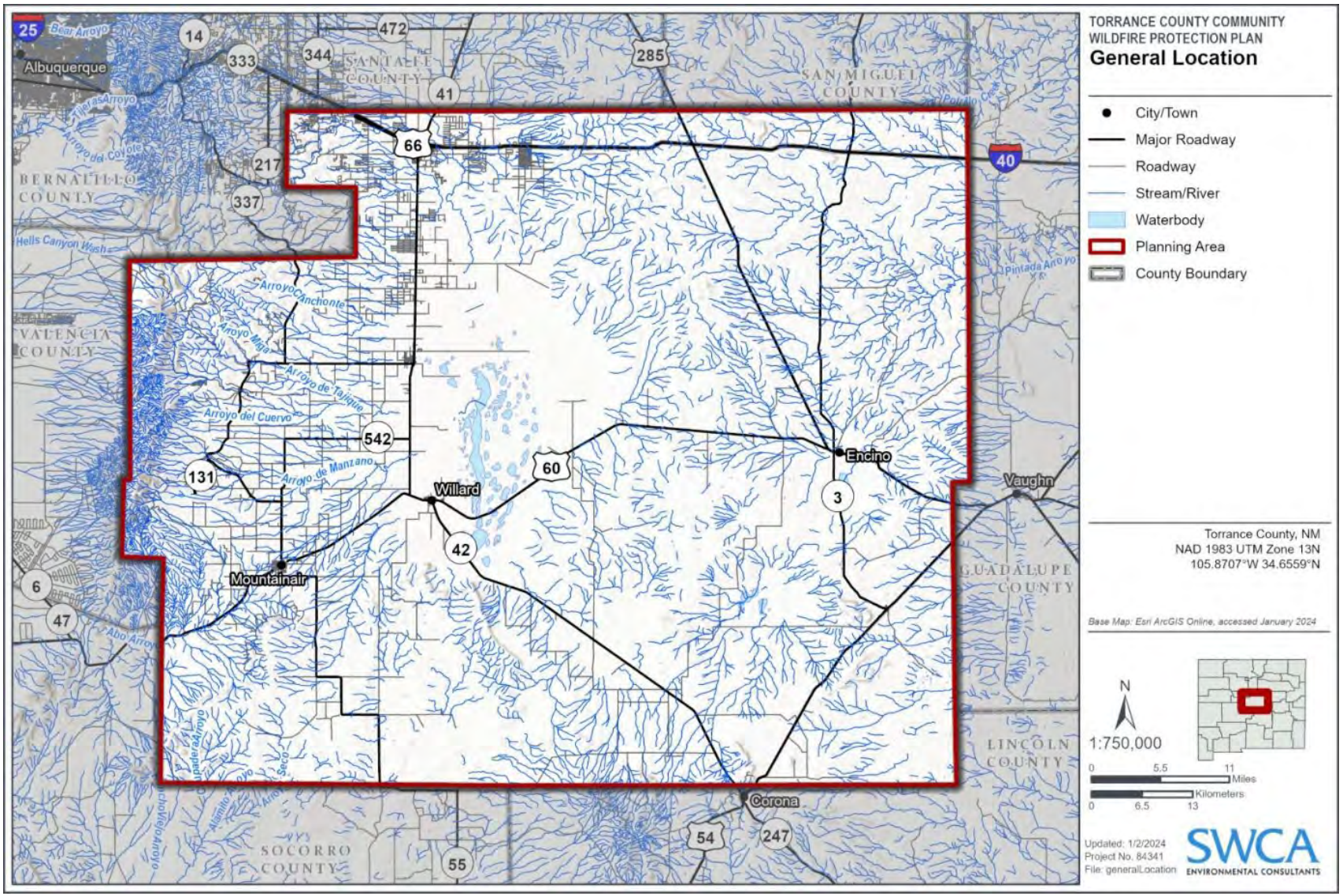


Figure ES 1. Torrance County CWPP planning area.

WHAT WAS THE PUBLIC INVOLVEMENT?

The Core Team engaged in public outreach through community surveys, CWPP public review period, and information distributed through mass emails. Given that this is a living document, public comments are always welcome, allowing for continuous community involvement and refinement of recommendations. By incorporating public and Core Team input into the recommendations, treatments are tailored specifically for Torrance County.

WHAT IS THE CURRENT WILDFIRE SITUATION?

Torrance County contains a considerable portion of wildfire-prone land. Vegetation types across the county consist of grasslands with dispersed patched of shrublands, which transition to piñon-juniper woodlands and ponderosa pine forests at higher elevations. Fires are a natural part of the disturbance cycle for most of the vegetation types, but recent fires have been more likely to occur in piñon-juniper woodlands and ponderosa pine forests, particularly within the Manzano Mountains. Encroachment within the county into the WUI, especially in Mountainair, the Manzano Mountains, and the steeper topography along the western portion of the county create additional complications on wildland fire management practices. Many of the county's forested areas comprise abundant fuels; for that reason, most historic and current fire incidents have occurred in these areas, including the largest fire in recent memory, the Doghead Fire, which burned nearly 18,000 acres across private land and the Cibola National Forest. Multiple factors have combined to increase forest susceptibility to wildfire, including frequent drought, fire suppression–based forest management tactics which have led to a buildup of fuels and changes to vegetation composition, insects, diseases, and climate change (Goodwin et al. 2021). These forest changes have been shown to increase the risk of uncharacteristically large high-severity fires (Goodwin et al. 2021; Schoennagel 2017). In recent years across the western United States, including New Mexico, fires have grown to record sizes and are burning earlier, longer, hotter, and more intensely than they have in the past (Westerling et al. 2006; Westerling 2016).

WHAT RECENT FIRES OCCURRED HERE?

Torrance County and the surrounding natural environment consist of diverse landscapes that produce a complex wildfire setting due to variable topography, tree mortality, and an assortment of vegetation types. Recent large, severe wildfires include the Doghead Fire and Big Spring Fire. There have been 81 wildfires in New Mexico from 2020 to 2023, with two breaking records for the largest wildfire to occur on State land. The wildfires which occurred in 2007-20068, and 2016 within the County have significantly changes the vegetative communities over large parts of the burn scars within the Manzano Mountains.

- **Doghead Fire:** which was caused by equipment, occurred on June 14, 2016, and ultimately consumed nearly 18,000 acres.
- **Big Spring Fire:** a lightning-caused fire, started on June 25, 2008, and scorched 5,478 acres.

WHAT IS THE PURPOSE OF THE COMPOSITE RISK-HAZARD ASSESSMENT?

The purpose of the risk assessment is to evaluate and provide information pertaining to the risk of wildland fires within the WUI of the Torrance County. The Composite Risk-Hazard Assessment is twofold and combines a GIS model of hazard based on fire behavior and fuels modeling technology (Composite Risk-Hazard Assessment) and a Core Team–generated assessment of on-the-ground community hazards and VARs.

The risk assessment considers:

- Fire behavior modeling, which includes
    - fire history
    - probability of fire occurring
    - intensity of a fire if one occurs
- Exposure and susceptibility of the WUI and VARs to wildfire based on their locations

The purpose of the Composite Risk-Hazard Assessment is to provide information about wildfire hazard and risk to highly valued resources and assets (HVRAs).

Some of the highest risk areas identified in the planning area are communities located in the Manzano Mountains in the forested regions of the County within the Cibola National Forest, as well as the surrounding WUI. Other high risk areas within the county include the portion of U.S. route 66 by Moriarty, and well as the region north of Corona.

HOW IS MY COMMUNITY RATED?

Community field evaluations, summarizing information on hazard and risk for each WUI community within Torrance County are provided in this plan. SWCA Environmental Consultants conducted on-the-ground community risk assessment surveys (field evaluations) throughout the county on several days in April and May, 2024, using the NFPA 1144 standard for assessing structure ignitability in the WUI. Using this standard provided a consistent process for evaluating wildland fire hazards around existing structures to determine the potential for structure ignition from wildland fire ignitions.

Community evaluations provide a total score of risk and hazard based on various parameters observed during the surveys, and a corresponding descriptive rating of low, moderate, or high are available in Appendix D.

WHAT ARE THE STRATEGIES TO ADDRESS WILDFIRE HAZARDS?

Goal 1 of the Cohesive Strategy and the Western Regional Action Plan is to **Restore and Maintain Landscapes**: Landscapes across all jurisdictions are resilient to fire and other disturbances in accordance with management objectives.

Recommendations for hazardous fuels treatments include**:**

- Road and vegetation maintenance
- WUI mitigation actions and maintenance
- Capacity to address projects

Goal 2 of the Cohesive Strategy and the Western Regional Action Plan is **Fire-Adapted Communities:** Human populations and infrastructure can withstand a wildfire without loss of life and property.

Recommendations for public outreach/education and structural ignitability include:

- Developing and promoting wildfire education
- Interagency collaboration
- Defensible space and structural hardening improvements
- Hosting community awareness events

Goal 3 of the Cohesive Strategy and the Western Regional Action Plan is **Wildfire Response:** All jurisdictions participate in making and implementing safe, effective, efficient risk-based wildfire management decisions:

Recommendations for improving fire response capabilities include:

- Water supply improvements
- Emergency notification improvements
- Evacuation route identification
- Interagency collaboration

WHAT DOES POST-FIRE RESPONSE AND RECOVERY INVOLVE?

There are many aspects to post-fire response recovery, including but not limited to:

- Returning home and checking for hazards.
- Coordinating and mobilizing a group of teams in the community to respond to emergencies.
- Rebuilding communities and assessing economic needs—securing the financial resources necessary for communities to rebuild homes, business, and infrastructure.
- Restoring the damaged landscape—restoration of watersheds, soil stabilization, and tree planting.
- Prioritizing the needs of vulnerable and disadvantaged communities during response and disaster recovery efforts.
- Evaluating and updating disaster recovery plans every 5 years to respond to changing needs and characteristics of the community.
- Coordinating with planning, housing, health, and human services, and other local, regional, or state agencies to develop contingency plans for meeting short-term, temporary housing needs of those displaced during a catastrophic wildfire event.

HOW WILL THE PLAN BE IMPLEMENTED?

The CWPP does not require implementation of any of the recommendations, but the message throughout this document is that the greatest fire mitigation could be achieved through the joint actions of individual homeowners, tribes, and local, state, and federal governments.

The recommendations for fuels reduction projects are general in nature; site-specific planning that addresses location, access, land ownership, topography, soils, and fuels would need to be employed upon implementation. Also, it is important to note the recommendations are specific to wildland urban interface (WUI) areas and are expected to reduce the loss of life and property.

In addition, implementation of fuels reduction projects need to be tailored to the areas of interest and will be unique depending on available resources and regulations. In an effort to streamline project implementation, this CWPP has identified the pertinent land management/ownership agencies associated with each recommendation. On-the-ground implementation of the recommendations in the CWPP planning area will require development of an action plan and assessment strategy for completing each project.

WHEN DOES THE CWPP NEED TO BE UPDATED?

The CWPP should be treated as a living document to be updated annually or immediately following a significant fire event. The plan should continue to be revised to reflect changes, modification, or new information. These elements are essential to the success of mitigating wildfire risk throughout the county and will be critical in maintaining the ideas and priorities of the plan and the communities in the future.

WHAT HAS BEEN DONE SINCE 2016?

- Fuel reduction treatments (Figure 4.1-4.5): fuel reduction treatments have been completed within the Cibola National Forest and state land in the western portion of the county, state land in the southern portion of the county state land outside of Mountainair, as well as along Highway 66 in the northern portion of the county.
- Water storage: water storage capacities within the district have been increased to provide more water supply for firefighting capacity this includes large water storage tanks at local fire departments. Other water sources available in the County include 10,0000 gallons at the Mountainair VFD, 10,000 gallons at the Claunch Pinto Soil and Water Conservation District, and 10,000 gallons at the Torreon VFD.

CHAPTER 1 – INTRODUCTION

The United States is facing urgent forest and watershed health concerns. The number of annual wildfires throughout the United States has been increasing (58,100 fires in 2018 vs. 69,000 fires in 2022), the number of acres burned has been on the decline (8,800,000 acres in 2018 vs. 7,600,000 acres in 2022) (Congressional Research Service [CRS] 2023). An average of 7 million acres is burned every year due to wildfire, more than doubling the annual average of acres burned in the 1990s (CRS 2023). Communities are seeing the most destructive wildfire seasons in history. The 2015 fire season had the most acreage impacted in a single year since 1960 at 10.13 million acres. 2020 was the second most extensive year for wildfire with 10.12 million acres burned (CRS 2023). These statistics demonstrate that wildfires are becoming larger and harder to control.

New Mexico's 2020 Forest Action Plan states that New Mexico, like other western states, faces urgent issues concerning extreme wildfire events, insect epidemics, and shifting climate conditions that are unprecedented and threaten the sustainability of ecosystems and increase risk to communities, firefighters, and water resources. These issues were exemplified in 2022 when New Mexico experienced two of the largest wildfires in State history which each burning over 300,000 acres on the Gila and Santa Fe National Forests. The Hermits Peak Calf Canyon wildfire burned 341,471 acres over three months on the Santa Fe National Forest while the Black Fire burned over 325,133 acres. These wildfires like many resulted in deteriorated wildlife habitat, and damaged and disrupted key watersheds, and an overall loss of habitat.

As wildfire severity increases, communities need a plan to help 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.

The development of the CWPP is rooted in meaningful collaboration among many stakeholders, including local, state, and federal officials. The planning process involves looking at past fires and treatment accomplishments using the knowledge and expertise of the professional fire managers who work for the various agencies and governing entities in Torrance County. From there, the CWPP ultimately identifies the current local wildfire risks and needs that occur in the county, which is further supported with relevant science and literature from the southwestern region of the United States.

In addition, this document, the 2024 Torrance County CWPP, reviews, verifies, and/or identifies potential new priority areas where mitigation measures are needed to protect from wildfire the irreplaceable life, property, and critical infrastructure in the county. However, this CWPP does not attempt to mandate the type and priority for treatment projects that will be carried out by the land management agencies and private landowners. The responsibility for implementing wildfire mitigation treatments lies at the discretion of the landowner; the 2024 Torrance County CWPP will only identify potential treatments and a suggested priority for these projects.

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. Another goal of the CWPP is to enhance public awareness by helping residents better understand the natural-and human-caused risk of wildland fires that threaten lives, safety, and the local economy. The minimum requirements for a CWPP, as stated in the HFRA, are:

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).

Prioritized Fuel Reduction: A CWPP must identify and prioritize areas for hazardous fuels reduction and treatments and recommend the types and methods of treatment that will protect one or more communities at risk (CARs) and their essential infrastructures (SAF 2004).

Treatments of Structural Ignitability: A CWPP must recommend measures that homeowners and communities can take to reduce the ignitability of structures throughout the area addressed by the plan (SAF 2004).

It is the intent of this 2024 CWPP update to provide a countywide scale of wildfire risk and protection needs, bring together wildfire management and suppression entities to address the identified needs, and to support these entities in planning and implementing mitigation measures. Additional information on the planning process is available in Appendix A.

NAVIGATION

The plan provides background information, a Composite Risk-Hazard Assessment, and recommendations to reduce or mitigate wildfire risk to communities. The CWPP is designed to be used by the residents of Torrance County, as well as stakeholders tasked with forest, fire, and emergency management. Some information is therefore highly technical in order to provide sufficient detail to aid in project implementation.

This CWPP is organized into several chapters with more detailed information compiled into appendixes. Chapter 1 provides an overview of CWPPs and describes the need for a plan; Chapter 2 gives an overview of the fire environment and introduces the reader to fire history information and well as fire response; Chapter 3 describes field evaluations, road and evacuation analysis, and the Composite Risk-Hazard Assessment; Chapter 4 includes detailed mitigation strategies that could be implemented to reduce wildfire risk under the umbrella of the National Cohesive Wildland Fire Management Strategy

(Cohesive Strategy), including action plans that outline priorities and recommendations for reducing fuels, initiating public education and outreach, reducing structural ignitability, and improving fire response capabilities; and Chapter 5 provides suggested approaches to monitoring actions.

The recommendations for fuels reduction projects are general in nature; site-specific planning that addresses location, access, land ownership, topography, soils, and fuels would need to be employed upon implementation. Also, it is important to note that the recommendations are specific to WUI areas and are expected to reduce the loss of life and property.

In developing the CWPP, a large amount of background information on the County was compiled and analyzed, including location and land use data, climate and weather data, baseline vegetation data, historic conditions, population, demographics, CWPP planning process, fire regime and baseline conditions, fire policy, and other supporting background information. This information is presented in Appendix A, Community and CWPP Background Information.

Additional appendices to this CWPP include maps in Appendix B; the Core Team contact list in Appendix C; community descriptions and hazard ratings in Appendix D; NFPA 1144 form in Appendix E; funding sources in Appendix F, homeowner resources in Appendix G, community outreach in Appendix H, project recommendations in Appendix I, and modeling/GIS background and methodology in Appendix J.

ALIGNMENT WITH THE NATIONAL COHESIVE STRATEGY

The 2024 CWPP is aligned with the Cohesive Strategy and its Phase III Western Regional Action Plan by adhering to the nationwide goal “To safely and effectively extinguish fire, when needed; use fire where allowable; manage our natural resources; and as a Nation, live with wildland fire.” (Forests and Rangelands 2014:3).

The primary, national goals identified as necessary to achieving the vision are:

- **Restore and maintain landscapes:** Landscapes across all jurisdictions are resilient to fire-related disturbances in accordance with management objectives.
- **Fire-adapted communities:** Human populations and infrastructure can withstand a wildfire without loss of life and property.
- **Wildfire response:** All jurisdictions participate in making and implementing safe, effective, efficient risk-based wildfire management decisions.

For more information on the Cohesive Strategy, please visit: https://www.forestsandrangelands.gov/strategy/documents/strategy/CSPhaseIIINationalStrategyApr2014.pdf

Alignment with these Cohesive Strategy goals is described in more detail in Chapter 4, Mitigation Strategies.

In addition to aligning with the Cohesive Strategy, the CWPP also incorporates information on post-fire recovery, the significant hazards of a post-fire environment, and the risk that post-fire effects pose to communities (Figure 1.1).

Figure 1.1. CWPP incorporating the three primary goals of the Cohesive Strategy and post-fire recovery and serving as holistic plan for fire prevention and resilience.

ALIGNMENT WITH PLANS AND AGREEMENTS

This CWPP is aligned with multiple local, state, and federal planning documents. These documents or agreements are summarized in Appendix A. In addition, fire policy and legislative direction is also summarized in Appendix A.

CORE TEAM

Torrance County invited engagement from adjacent government agencies in the development of this 2022 Torrance County CWPP. Stakeholder involvement is critical in producing a meaningful document that includes all collaborators' diverse perspectives. Representatives from adjacent counties were included in the Core Team to ensure the CWPP is aligned with the goals and planning objectives of those counties as well. The Core Team drives the planning process in its decision making, data sharing,

experience, and communication with community members. The project was kicked off and the Core Team met for the first time on November 29, 2023, and met again on March 14, 2024.

The Core Team List is provided in Appendix C.

PLANNING AREA

The planning area includes all of Torrance County as delineated by its political boundary (Figure 1.2).

Details on location and geography can be found in Appendix A.

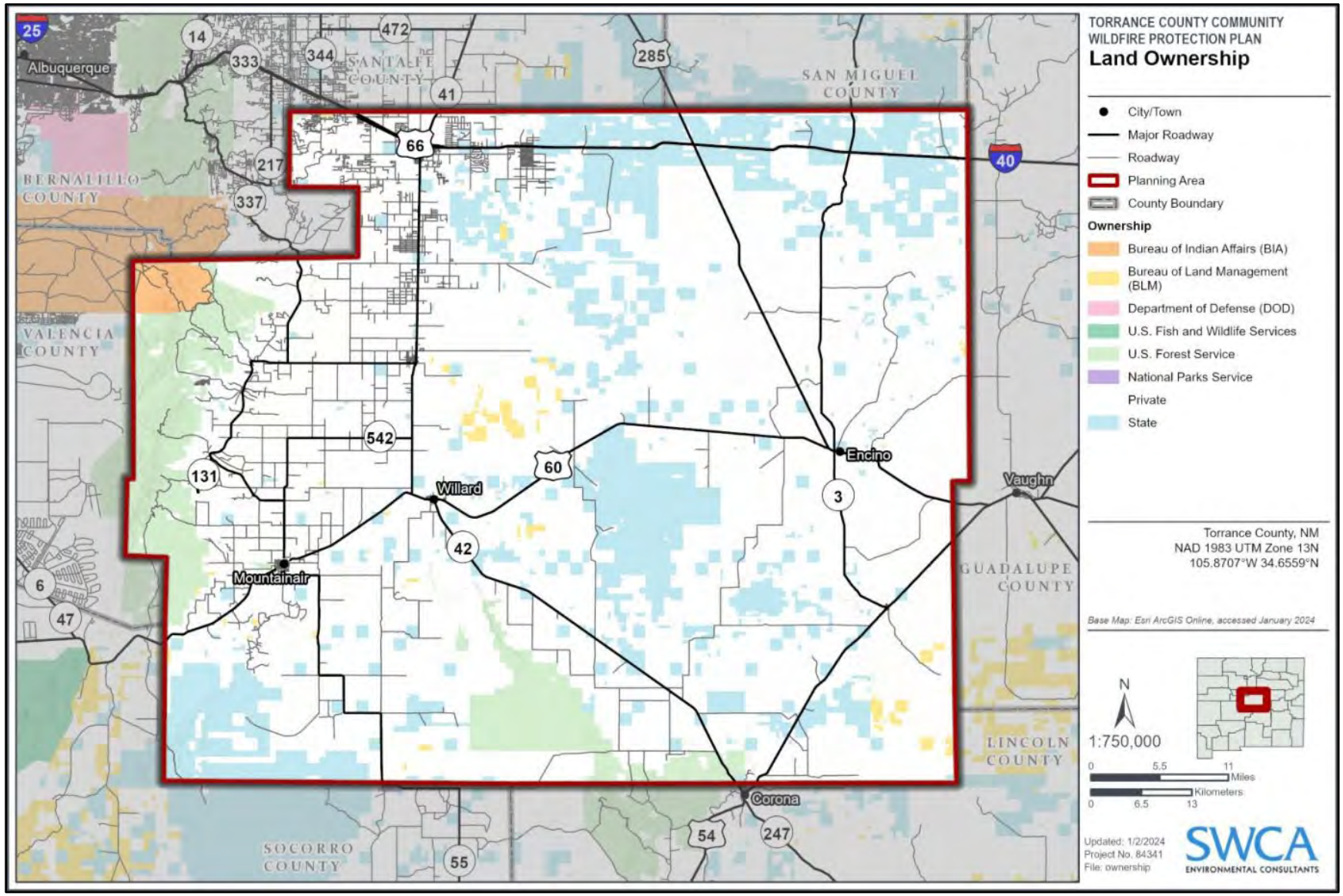


Figure 1.2. Land ownership within Torrance County.

LAND OWNERSHIP

Torrance County has various land ownership jurisdictions, including municipal, county, tribal, state, and federal agencies (see Figure 1.2 and Table 1.1). The U.S. Forest Service (USFS) owns the Cibola National Forest (Cibola NF); the National Park Service (NPS) owns the Salinas Pueblo Missions National Monument, the State of New Mexico owns portions of state trust land, and the Bureau of Land management (BLM) owns several small portions of land scattered throughout the county. The largest landownership throughout the county are privately owned tracts of land are distributed throughout the county.

Additional detail regarding the planning area, such as topography, weather, and vegetation is summarized in Appendix A.

Table 1.1. Breakdown of Land Ownership in Torrance County.

Land Ownership	Acres	% of Focus Area
Private	1,594,930.9	74.5%
State	370,223.2	17.3%
US Forest Service	144,666.3	6.8%
Bureau of Land Management	16,190.9	0.8%
Bureau of Indian Affairs	15,615.8	0.7%

PUBLIC INVOLVEMENT

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 (Society for American Foresters [SAF] 2004). The draft CWPP was made available for public review from June xx through July XX, 2024. Additionally, there was a public survey available from approximately June 17th- July 31st 2024.

More information regarding the details of these online resources (including URLs) can be found in Appendix H, Community Outreach.

During subsequent updates to this plan, the County will employ more traditional methods of engagement to ensure community members are able to continue to provide substantive input into the document. Recommendations for future community engagement and outreach are provided in Table 4.4 in Chapter 4.

CHAPTER 2 – FIRE ENVIRONMENT

WILDLAND URBAN INTERFACE

The wildland urban interface (WUI) is composed of both interface and intermix communities and is defined as areas where human habitation and development meet or intermix with wildland fuels (U.S. Department of the Interior [DOI] and U.S. Department of Agriculture [USDA] 2001:752–753). Interface areas include housing developments that meet or are in the vicinity of continuous vegetation. Intermix areas are those areas where structures are scattered throughout a wildland area where the cover of continuous vegetation and fuels is often greater than cover by human habitation.

In addition, the WUI has an area of influence, or influence zone. This area is described with respect to wildland and urban fire; it is an area with a set of conditions that facilitate the opportunity for fire to burn from wildland fuels to the home and or structure ignition zone (NWCG 2021a).

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

The Core Team in 2008 initially defined the WUI boundary within the CWPP planning area as a 0.5-mile buffer extending from the edge of communities, critical infrastructure, cultural values, and railroads. A 1-mile buffer was created around major roads because roads are seen as a major ignition source as well as 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.

At-risk communities were delineated prior to the on-the-ground community hazard assessments and were based on the presence of homes and structures surrounded by wildland fuels. Buffers representing the area for the WUI as defined above are presented in Appendix D for each community.

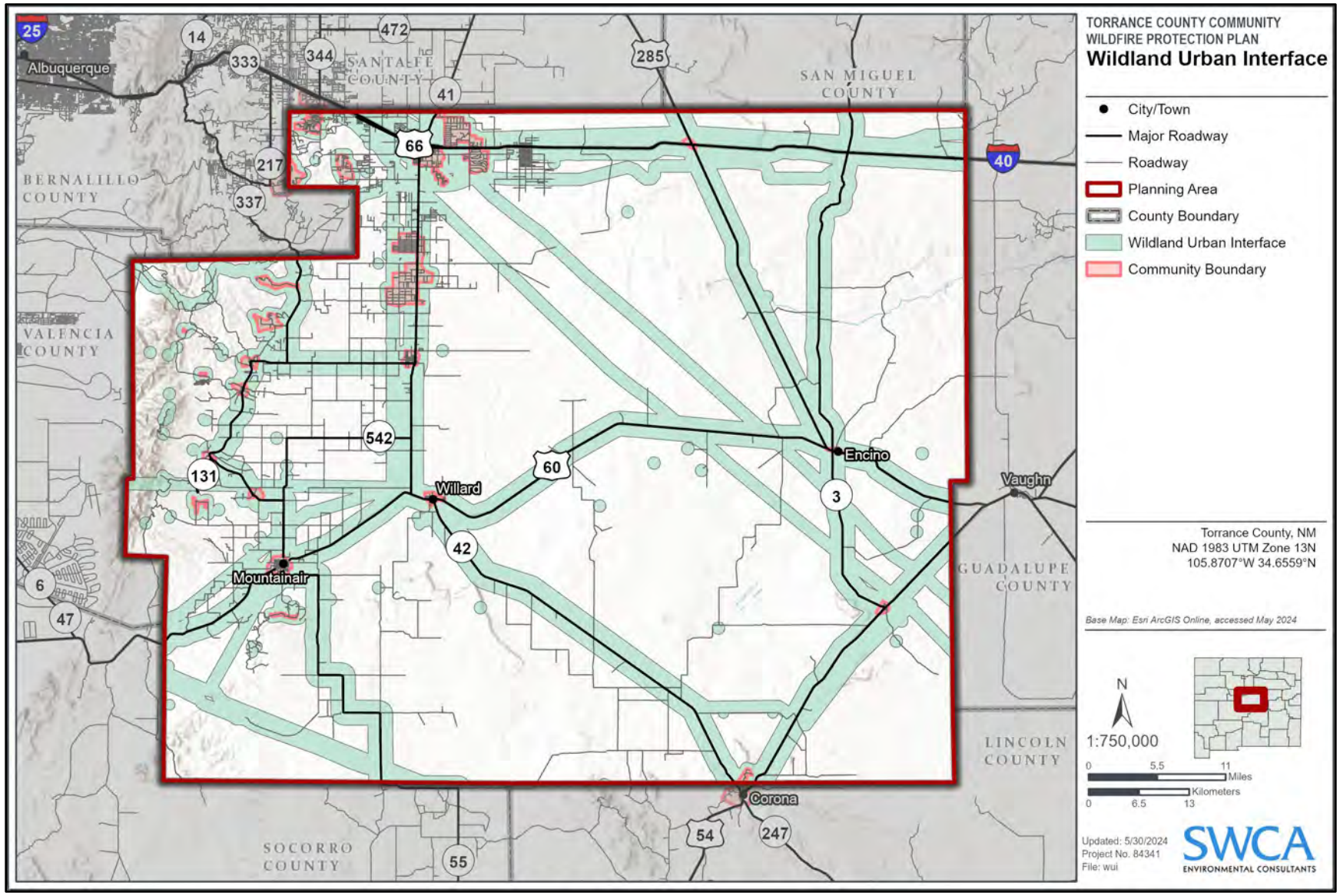


Figure 2.1. Torrance County WUI.

The WUI creates an environment in which fire can move readily between structural and vegetative fuels, increasing the potential for wildland fire ignitions and the corresponding potential loss of life and property. Human encroachment upon wildland ecosystems within recent decades is increasing the extent of the WUI throughout the county (Figures 2.2 and 2.3), which is having a significant influence on wildland fire management practices. Combined with the collective effects of aggressive suppression policies, resource management practices, land use patterns, climate change, and insect and disease infestations, the expansion of the WUI into areas with high fire risk has created an urgent need to modify fire management practices and policies and to understand and manage fire risk effectively in the WUI (Pyne 2001; Stephens et al. 2005). Mitigation techniques for fuels and fire management can be strategically planned and implemented in WUI areas; for example, with the development of defensible space around homes and structures.

During the 20-year period between 1990 and 2010, the WUI expanded rapidly with regard to the number of new houses built (41%) and land area (%33), making it the fastest-growing land use category in the lower 48 states. The highest proliferation of houses and population in the WUI occurred in the southwestern United States, and it's expected that these trends will continue and amplify (Radeloff et al. 2018). Today, more than 46 million residences in 70,000 communities are at risk for WUI fires (U.S. Fire Administration [USFA] 2021a). When it comes to wildfire, this trend is of special concern since WUI conditions are linked with an increased risk of loss of human life, property, natural resources, and economic assets.

Fire and WUI Code information is described in Appendix A.

Figure 2.2. Example of the WUI in Torrance County.

Figure 2.3. Example of the WUI in Torrance County.

FIRE REGIMES

Fires are characterized by their intensity, the frequency at which they occur, the season in which they occur, their spatial pattern or extent, and their type. Combined, these attributes describe the fire regime.

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.

Fire regimes in the western United States have changed dramatically within the past several decades. Historically, fire regimes within the wildlands in Torrance County were largely a function of the dominant vegetation, where ponderosa pine forests, grasslands, and pinyon-juniper woodlands had relatively frequent, low-intensity surface fires. Piñon-juniper woodlands, however, typically experienced infrequent high-severity fires. The mixed-confider/Spruce-fire forests have a mixed-severity regime of both low-intensity surface fires and patchy crown fires. These historical regimes would typically create a mosaic of different stages of vegetative structure across the landscape. For the most part, these fires have helped to preserve an open vegetative community structure by consuming fuels on the ground surface, which has maintained open meadows and cleared the forest understory of encroaching vegetation. However, the forested portions of the county, e.g., the Cibola NF, have departed from historical fire regimes (USFS 2021a). As a result, some areas, especially in the Manzano Mountains, have not burned in over 100 years (Arid Land Innovation, LLC 2015). This departure from historical fire regimes has caused recent wildland fires to burn much more intensely and unpredictably in many areas of New Mexico (EMNRD Forestry Division 2020a).

It is important to address here the common misconception that all southwestern forests have historically exhibited low-intensity frequent surface fire regimes. This is not always the case, as many of the higher-elevation (8,500 feet and above) spruce-fir and mid-elevation mixed-conifer forests would have naturally

experienced infrequent stand replacing fires as part of their natural regeneration cycle (Touchan et al. 1996; Fulé et al. 2003), so for these forest types, restoration to more open stands is not always appropriate. At lower elevations, plants and animals are adapted to historical frequent, low-severity fire regimes and are therefore not resilient to the high-severity, extensive wildfires burning today (Keane et al. 2002). Human influences regarding fire regimes have therefore been greatest at these low-elevation sites. An additional factor contributing to the natural disturbance regime in southwestern forests are outbreaks of bark beetle (Ips, *Dendroctonus*, and *Scolytus* spp.), which have locally killed significant numbers of spruce (*Picea* sp.), fir (*Abies* sp.), Douglas-fir (*Pseudotsuga menziesii*), ponderosa pine (*Pinus ponderosa*), and piñon pine (*Pinus edulis*) trees throughout the planning area (EMNRD Forestry Division 2022a). The effect of bark beetle infestation is particularly evident within the Cibola NF (EMNRD Forestry Division 2022a). Currently, many needles have dropped to the ground and have left only skeletons of trees where fire is less likely to be carried through the canopy due to the absence of light and flashy aerial fuels. In areas where the canopy is still maintaining dead needles, the risk of fire being carried through the canopy is much greater and should be mitigated as appropriate.

FUELS AND TOPOGRAPHY WITHIN THE WUI IN TORRANCE COUNTY

The County is primarily made up of grassland fuels, transitioning into shrub-steppe or shrubland dominated fuels with increasing elevation. Grassland communities are primarily characterized by semidesert grasslands, which are relatively sparse and usually occur on flat to rolling topography at lower elevations. Grassland fuels can allow fire to spread rapidly when continuous fuels are present, with flame lengths increasing as fuel height increases.

Forested communities contain timber/timber litter fuels which occur in higher elevation regions such as the Manzano mountains in the western portion of the county.

Map 1 in Appendix B shows fuels within Torrance County.

Grasslands

This vegetation type covers an elevational range from approximately 4,700 up to 7,600 feet in the surrounding foothills. Grassland fires can move quickly under dry, windy, and steep conditions, often reaching speeds of over 300 feet per minute. Previous work has suggested that the historical fire return intervals (FRIs) for grasslands throughout the seventeenth to early nineteenth centuries were every 5 to 10 years (Leopold 1924; Swetnam et al. 1992). Recent fire-suppression policies may have contributed to declining fire frequency in this cover type, but other interacting factors may have contributed as well. Beginning in the latter half of the nineteenth century, intensive livestock grazing is thought to have been responsible for a decline in grassland fires (Touchan et al. 1996; West 1984). Heavy grazing reduced the fuels 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 lifespans 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).

Piñon-Juniper Woodlands

The fire ecology of pinyon-Juniper woodlands is not well understood, but generally it is believed that fire disturbance was relatively infrequent, while fire played more of a role as piñon-juniper woodland transitioned to savannah and ponderosa pine ecotones. In a review of piñon-juniper disturbance regimes, Romme et al. (2007) has 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.

Areas of potential expansion and contraction are those zones wherein the boundaries of the piñon-juniper ecotones have shifted. 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. 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 precipitation occurs during the summer monsoon season. Juniper savanna, the most common savanna in New Mexico, consists of widely scattered trees in a grass matrix (Dick-Peddie 1993). Similar to grasslands, the range of savannas has decreased as tree density has increased, but the mechanisms for tree expansion are complex as is the subject of current research. Significant scientific debate currently exists over the natural FRI for savannas. Generally, it is agreed that fire was more frequent in savannas than in persistent woodlands due to the higher density of ground fuels in the savannah zones.

Persistent woodlands, characteristic of rugged upland sites with shallow, coarse soils, tend to have older and denser trees. Herbaceous understory vegetation 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). The short FRI estimates are 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 are most likely wind-driven and spread from crown to crown (Romme et al. 2007). Fire extent is greatest in higher-density woodlands and is limited by both fuels and topography in sparse, low-productivity stands on rocky terrain. It is likely that fire has been more common in savannas and areas of expansion and contraction than in persistent woodlands, but debate remains regarding the exact range of fire frequency. Overall, frequent, low-intensity surface fires are not the predominant fire regime in piñon-juniper woodlands. Therefore, fire exclusion has likely not significantly impacted this forest type. However, the degree of departure from historical conditions and the causes of any observed changes remain uncertain; therefore, restoration treatments in woodlands should be approached with caution (Romme et al. 2007).

Ponderosa Pine Forests

In general, studies have found that pre-1900 mean fire intervals—the arithmetic average of all fire frequencies for a specific study site—ranged from 4 to 36 years across southwestern ponderosa pine forests and that fire frequencies and areas burned were the greatest in mid-elevation ponderosa pine forests (Fulé et al. 2003; Grissino-Mayer et al. 2004; Swetnam and Dieterich 1985; Veblen et al. 2000). Ponderosa pine stands, which exist in higher elevation and steeper portions within the county, are fire-adapted ecosystems that were historically maintained by frequent, low-intensity fires. Throughout the Southwest, extensive fire history studies have documented historic fire frequencies in ponderosa pine forests using tree-ring data (Allen et al. 2002). Large variation in the spatial and temporal scales of fires in ponderosa pine forest was common and was usually based on forcing factors, such as seasonality, regional climate, elevation, aspect, and other site conditions. The effects of fire exclusion on forest structure are thought to be more 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. Historically, frequent fire would have 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 (Cooper 1960; Covington and Moore 1994; Weaver 1947). In contrast to this historic structure, modern ponderosa stands are often overly dense with an understory of younger trees, increasing the likelihood for a fire to be lifted into the canopy. In areas where canopy spacing is less than 20 feet, there is increased crown fire hazard and potential for long-range spotting, especially in the presence of wind and steep slopes.

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 because of their extreme variability (Agee 1998, 2005).

A mixed-severity fire regime exists where the typical fire, or combination of fires over time, results in a complex mixture of patches of different severity, including unburned, low-severity, moderate-severity, and high-severity patches (Agee 2005). 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 (*Abies concolor*), and Engelmann spruce (*Picea engelmannii*). Forest stand inventory data from Arizona and New Mexico show an 81% increase in the area of mixed-conifer forests between 1962 and 1986. 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). Thus, across New Mexico there has been an increase in both mixed-conifer forests and the likelihood of these forests experiencing high-severity fire.

Spruce-fir forests that occur at higher elevations across the southwestern United States typically exhibit high densities (782–1,382 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.

Riparian Woodland Communities

Native riparian vegetation in the bosque is not adapted to fire, and fires did not typically occur within this ecological zone. As a result, fire can actually influence the composition and structure of riparian ecosystems. The ecology of this habitat type has changed significantly over time, as fire-adapted invasive species such as saltcedar (*Tamarix* spp.) and Russian olive (*Elaeagnus angustifolia*) have invaded many areas. Once saltcedar has been established at a location, it increases the likelihood that the riparian area will burn and, as a result, alter the natural disturbance regime. This is of particular concern along the WUI that borders the Rio Grande riparian areas. Saltcedar and Russian olive both sprout readily after fire, and although cottonwood (*Populus* sp.) will also regenerate after fire, it typically has limited survival of resprouting individuals. Studies have found that the density of saltcedar foliage is higher at burned sites than unburned sites within riparian areas (Smith et al. 2006).

FIRE HISTORY

Fire is a natural part of New Mexico's varied landscapes and is essential to many ecosystems across the state. Fire controls the density and composition of young trees, recycles nutrients, clears debris and litter from the ground, and creates wildlife habitat at different scales. Many of New Mexico's ecosystems, such as forest, grassland, and savanna ecosystems, are fire-dependent or fire-adapted (Forest Stewards Guild [FSG] 2017]). Native plant species and wildlife are adapted to a specific set of fire regimes (fire frequency, severity, and spatial extent), which are typically of moderate-frequency, low-severity fires (FSG 2017; Schoennagel et al. 2017). Historically, many New Mexico Native American tribes recognized this interdependence between fire and the ecosystem and were actively engaged in fire management to maintain and restore ecosystem health, among other objectives (Raish 2005). However, more than a century of suppression efforts have resulted in dense stand conditions, pest outbreaks, and increased susceptibility to fire (FSG 2017; Schoennagel et al. 2017; Young et al. 2019). Wildland fire suppression practices, in conjunction with other management actions such as human expansion into the wildlands and a changing climate, have resulted in an imbalance between wildfire and ecosystem interactions (Schoennagel et al. 2017).

PAST FIRE MANAGEMENT POLICIES AND LAND MANAGEMENT ACTIONS

Beginning in the early 1900s, the policy for handling wildland fire leaned heavily toward suppression. Over the years, other agencies, such as the Bureau of Land Management (BLM), the Bureau of Indian Affairs (BIA), and the NPS, 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.

RECENT FIRE OCCURRENCE

An analysis of the fire history of the County and its surrounding area (2000–2023) shows that fires have predominantly occurred within the Manzano Mountains in the western portion of the county. There has also been a high concentration of fires near Moriarty and along U.S. Highway 40, and in the southern portion of the county near Corona (Figures 2.4 and 2.5). Fire frequency in the area did not increase until 2010- 2019, where the number of fires became significantly greater. From 2020-2023 the fire frequency again substantially increased (Figure 2.6). Over the last 23 years, there have been 227 fires, with 77% of these fires (176 fires) being under 10 acres in size (Figure 2.7). Since 2000, a total of 73,884 acres in and around Torrance County have experienced wildfire. In this timespan, eleven fires have been greater than 1,000 acres. The largest fire since 2000 was the Dog Head Fire, which burned 17,912 acres in 2016 in western Torrance County

Lightning ignitions are historically the most common cause of fires within the County. Lightning is widespread throughout monsoon season, which usually takes place from July through September. 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 historically. In general, annual fire occurrences have increased over the past 15 years. This is most likely the result of increased numbers of human ignitions but may also be a result of fuel build-up, changes in climate, and forest disease outbreaks.

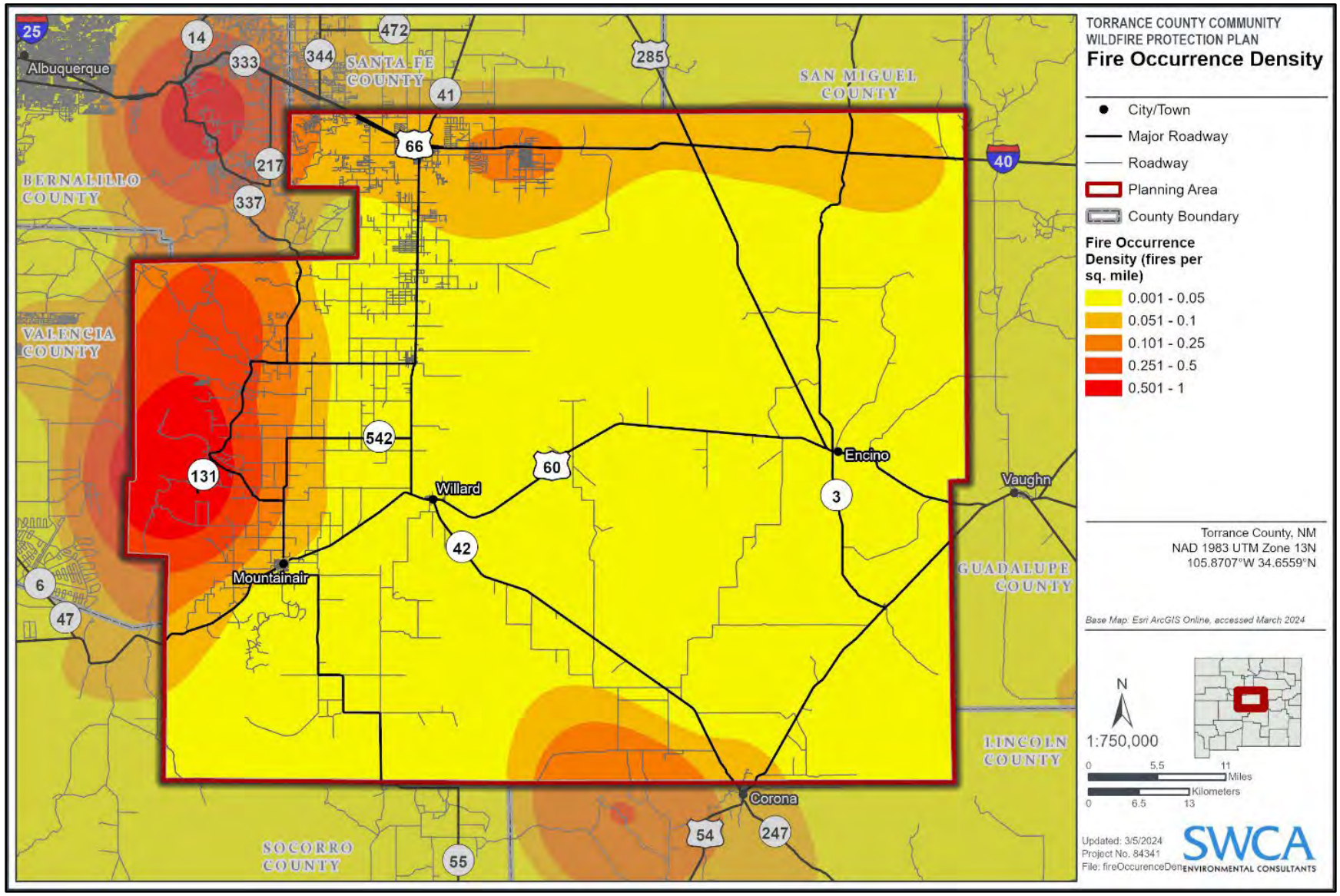


Figure 2.4. Fire occurrence density for Torrance County from 2000 through 2022.

Note: Fire occurrence density has been determined by performing a density analysis on fire start locations with ArcGIS Desktop Spatial Analyst.

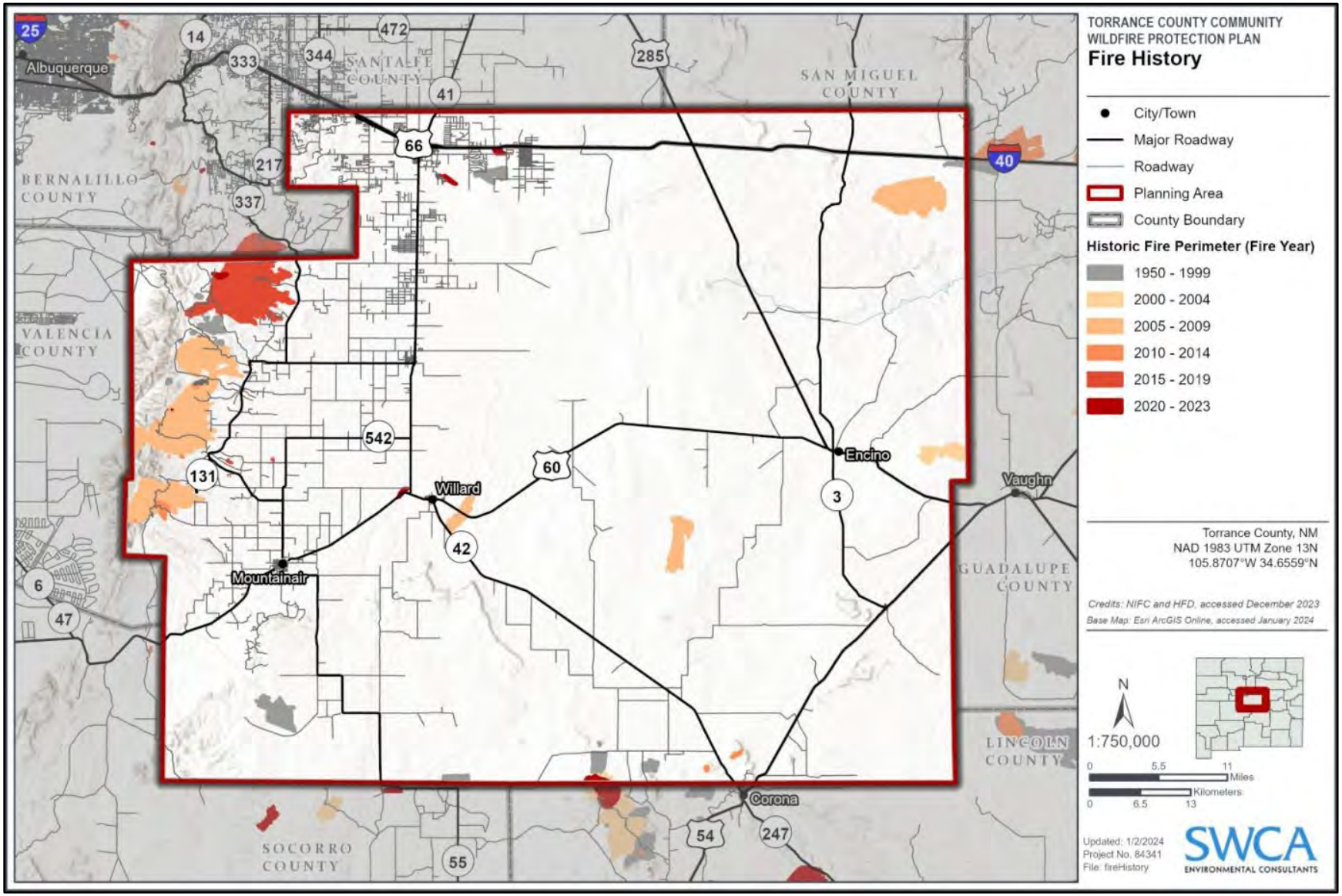


Figure 2.5. Historic fire events for Torrance County from 1950 through 2023.

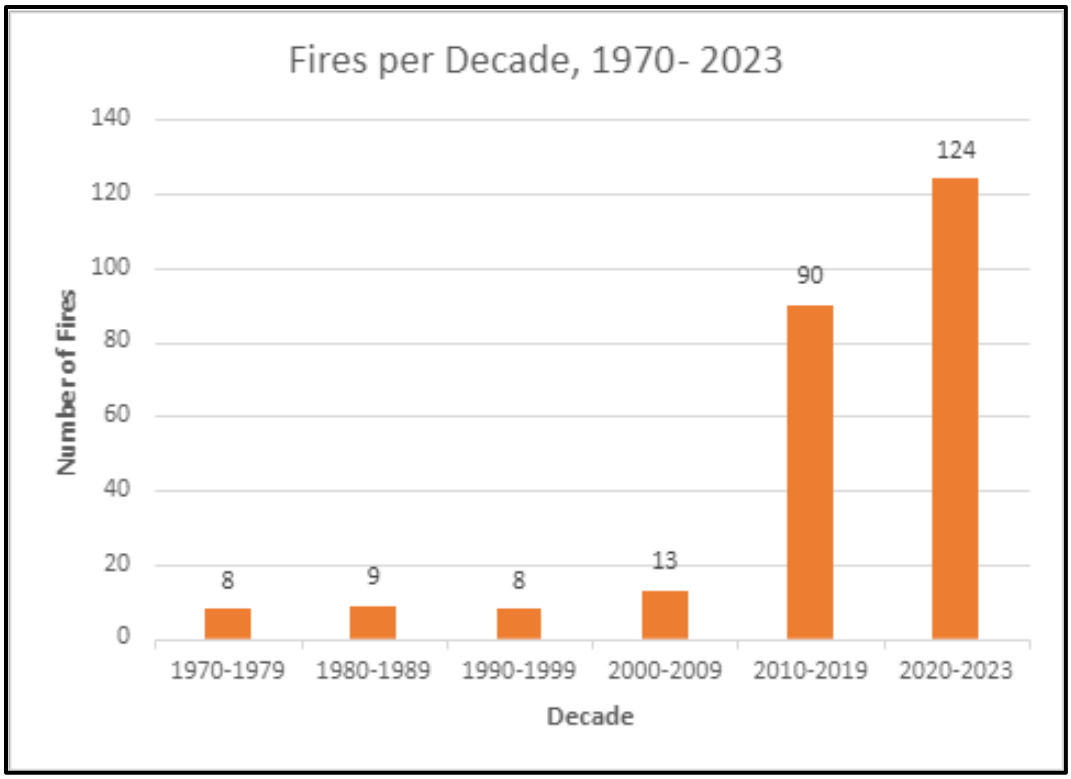


Figure 2.6. Annual wildfire frequency for Torrance County from 1970 through 2023, based on available data.

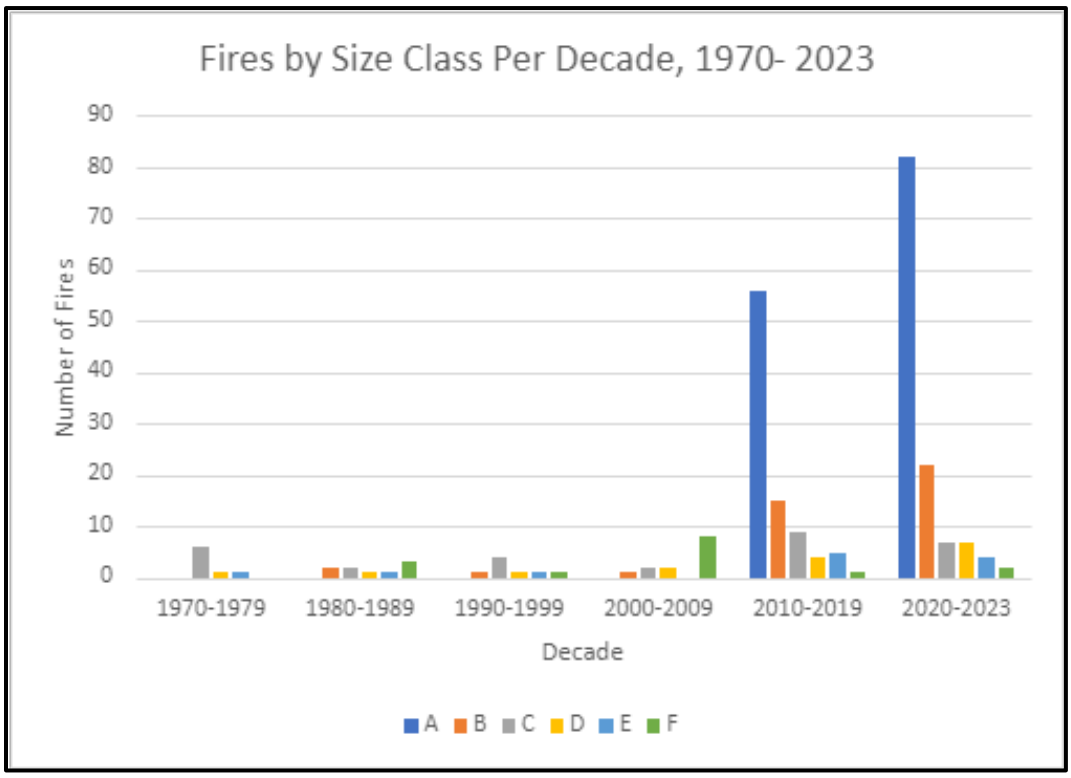


Figure 2.7. Fire size statistics for Torrance County from 1970 through 2023. Size Class: A = 0.25 acre or less; B = greater than 0.25 to 10 acres; C = 10 to 100 acres; D = 100 to 300 acres; E = 300 to 1,000 acres; F = 1,000+ acres

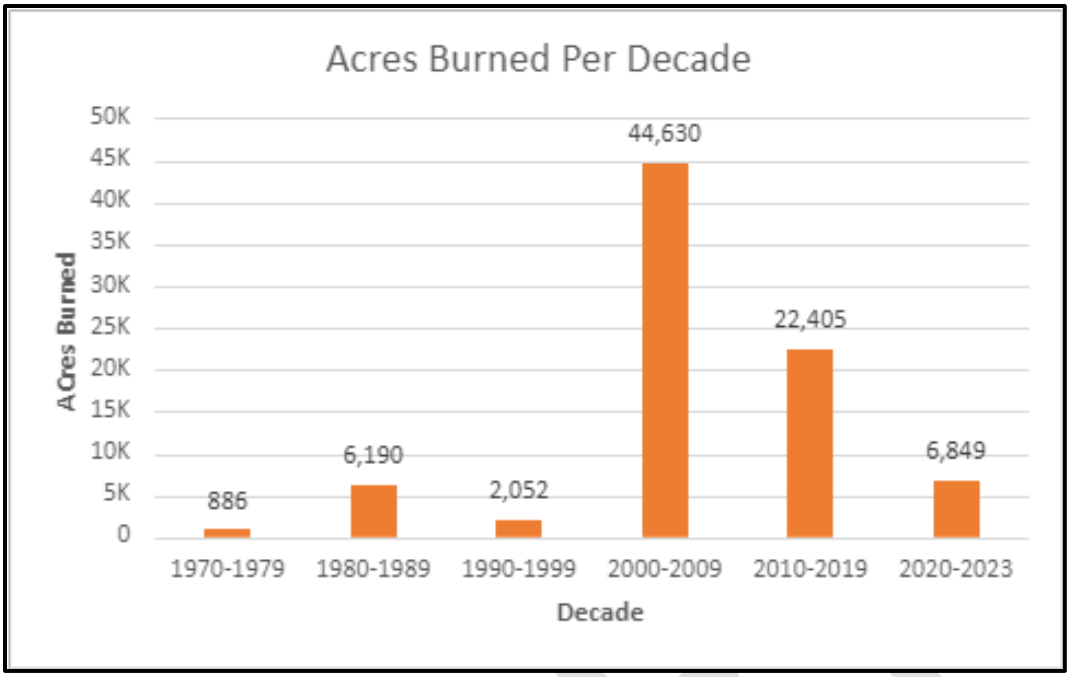


Figure 2.8. Acres Burned per decade in Torrance County from 1970-2023.

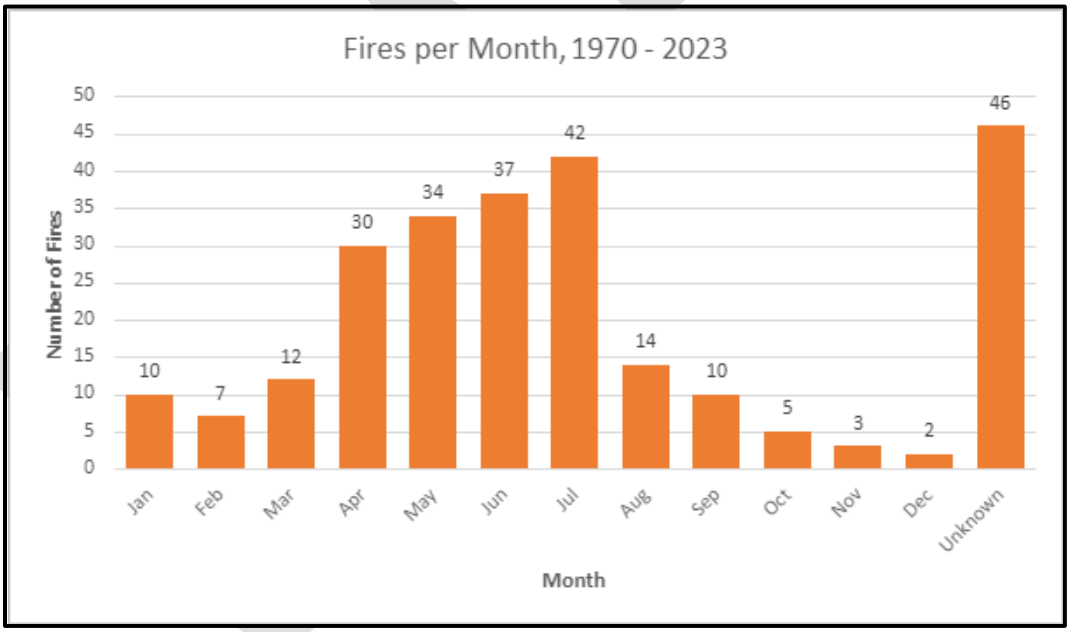


Figure 2.9. Fires per month in Torrance County from 1970-2023.

FUTURE CHALLENGES

IMPACT OF CLIMATE CHANGE

Frequent drought, fire suppression-based forest management tactics, and climate change have all worked together to increase forest vulnerability. In the past few years, fires have grown to record sizes

and are burning earlier, longer, hotter, and more intensely than they have in the past (Westerling et al. 2006; Westerling 2016).

According to the National Interagency Fire Center (NIFC), occurrence of catastrophic wildfires has greatly increased over the last 20 years.

Within just the last 10 years, a record number of acres have burned, and numbers are continually increasing (NIFC 2023a). In 2023, 56,580 fires were reported nationwide, burning 2.7 million acres (NIFC 2023a). In New Mexico, 230,000 acres were burned by wildfire in 2022 (NIFC 2022). With increased fires comes increased suppression costs; 2021 beat all previous records, with federal firefighting costs hitting $4,389,000,000 (NIFC 2023b).

The shifting climate, particularly rising temperatures, frequent drought, and the extension of the fire season, are considerably escalating wildfire risk across the state. The length of the fire season in the southwestern United States has increased significantly since 1979; and since the 1970s, the frequency of large fires has increased by **462%** in southwestern U.S. forests (Schoennagel 2017).

In addition to direct damage (e.g., structure and property damage) caused by wildfires, abnormally large and severe wildfires also cause indirect impacts to the environment and ecosystem. Uncharacteristically large and severe wildfires may deteriorate local soil, pollute waterways, displace native species (animal and plant), cause localized air quality degradation and increase carbon dioxide emissions.

TREE MORTALITY

Rising temperatures, drought, and insect outbreaks have contributed to increased tree mortality in and around the County. Tree mortality due to the aforementioned factors is a natural process in forest ecosystems. However, if due to compound disturbances or other factors a significant number of trees die in a brief time period over large regions, forest health may be negatively affected. Dead trees function as a fuel that will readily burn as they contain lower moisture and, in conjunction with the fuel aridity of the surrounding environment, may result in larger and more intense fires (Goodwin et al. 2021).

In New Mexico, in the early 2000s, severe heat, drought, and subsequent bark beetle outbreaks caused significant tree mortality. Specifically, mortality among mature piñon pines in the middle Rio Grande Basin was more than 90% (Union of Concerned Scientists 2016). Rising temperatures and reduced water availability have stressed trees, thereby increasing their susceptibility to insect and pathogen infestations, particularly bark beetles (EMNRD Forestry Division 2020b). Over 500,000 acres of New Mexico forests had tree mortality between 2015 and 2020 (EMNRD Forestry Division 2022a). In 2020, over 10,000 acres with ponderosa pine mortality were detected, with the Cibola NF ranking as the second highest national forest by tree mortality. Most of the 2020 surveyed tree mortality in Torrance County occurred in the Manzano mountains (EMNRD Forestry Division 2022a).

Additional information on forest health considerations and wildlife are summarized in Appendix A.

FIRE RESPONSE CAPABILITIES

PLANNING DECISION AND SUPPORT

Wildfires have continued to grow in size and severity over the last decade, requiring fire managers to institute more robust pre-fire planning as well as adapt and improve decision-making tools in order to reduce risk to fire responders and the public and assess impacts on ecological processes.

A primary decision tool utilized by fire managers across all agencies is the Wildland Fire Decision Support System (WFDSS), a system that assists fire managers and analysts in making strategic and tactical decisions for fire incidents (WFDSS 2021). WFDSS combines desktop applications for fire modeling into one web-based system. It provides a risk-informed decision process and documentation system for all wildland fires, and it also introduces economic principles into the fire decision process in order to improve efficiencies while also ensuring safe and effective wildfire response.

One intent of the WFDSS is to ensure that when fire response decisions are made, they fall in line with agency land and resource management plans. Agencies have recently been moving away from the traditional written fire management plans and instead are developing spatial fire management plans that can be housed within WFDSS (WFDSS 2015). The Cibola NF for example will have all management requirements and strategic objectives for fire management, contained within WFDSS, so that in the event of a fire, incident managers are considering this information when making decisions and developing strategic direction for the wildfire incident (WFDSS 2015).

FIRE RESOURCES

TheCounty contains several local, tribal, state, and federal fire protection organizations that are well integrated through mutual aid and fire protection agreements such as the Joint Powers Agreement. During the regular fire season (i.e., August-March), the time to obtain resources may be extended, especially for areas that are under federal and state jurisdiction.

Local Response

There are ten firefighting districts within the County:

- Torrance/ Tajique District
- Mountainair District
- Estanicia District
- Mountainair/Corona District
- Duran District
- Encino District
- Mcinitosh District
- Socorro District
- District 2
- District 1

These districts include the following volunteer and established fire stations which could respond to Torrance County:

- City of Moriarty Fire Department
- Estancia Fire Department
- Torreon and Tajique 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

It should be noted 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

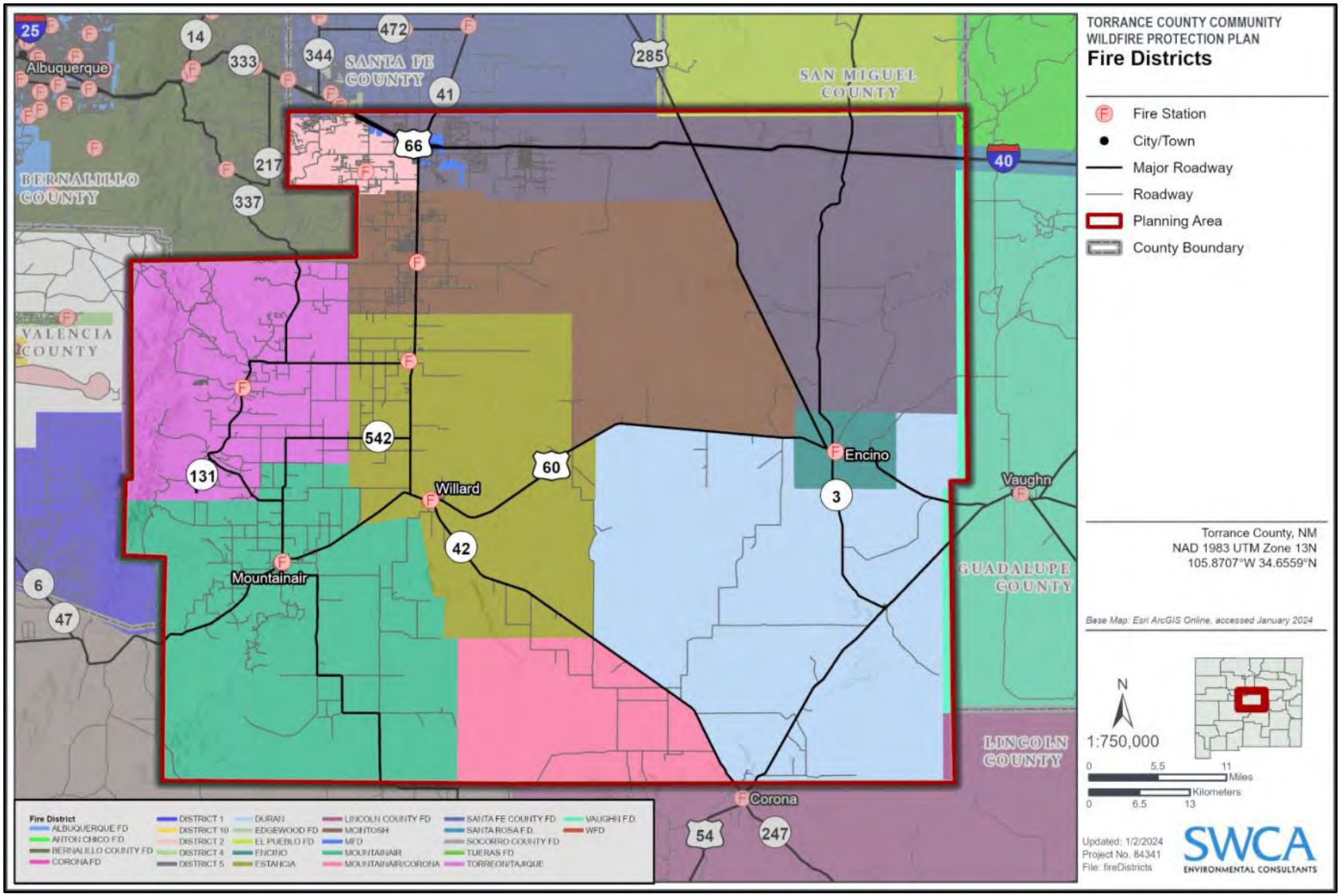


Figure 2.9. Fire station locations and districts within Torrance County.

State Response

New Mexico Energy, Minerals, and Natural Resources Department Forestry Division

The EMNRD Forestry Division, established in 1957, focuses on wildfire response, fuels treatments, monitoring insect outbreaks and invasive insects that lead to tree mortality, conservation of rare plants, and promoting healthy watersheds. The EMNRD Forestry Division is headquartered in Santa Fe, with 78 full-time personnel working at nine locations throughout the state. In addition, the EMNRD Forestry Division trains and staffs about 300 emergency wildland firefighters and is responsible for fire suppression on 43 million acres of non-municipal, non-tribal, and non-federal land in the state (EMNRD Forestry Division 2022b).

Dispatch, coordination, and logistical support is provided via the Southwest Coordination Center (SWCC) (DOI et al. 2015). Resource distribution for all-risk incidents, such as aircraft and equipment requests, is handled by the SWCC. The SWCC is a cooperative effort amongst various agencies, including the USFS, U.S. Fish and Wildlife Service (USFWS), NPS, BLM New Mexico State Office, BIA, and EMNRD Forestry Division (SWCC 2022).

The Bernalillo District of the EMNRD Forestry Division has primary responsibility for non-federal, non-municipal, non-tribal, and non-pueblo lands within the Torrance County CWPP planning area. In the event of a wildfire on state land, local fire departments or other resources may be used for initial attack under the New Mexico Joint Powers Agreements.

Federal Response

Bureau of Land Management

In New Mexico, the BLM is responsible for fire management on 13.5 million acres of public land in four BLM districts, including the Albuquerque District. The BLM operates a fleet of 14 fire crews and engines across the state of New Mexico and holds mutual aid agreements with other agencies (BLM 2021c). The County falls under the BLM Albuquerque District, specifically, within the Rio Puerco Field Office. However, due to the minimal presence of BLM land in the county, the BLM does not have initial attack responsibility. The BLM may respond to fires in the county through mutual aid agreements (DOI et al. 2015).

U.S. Forest Service

Overall, the USFS provides wildfire response and management for over 193 million acres of National Forest System lands within the United States (CRS 2021). National Forest lands are considered federal responsibility areas, which are regions where the federal government is responsible for fire response. On USFS land, the USFS has the responsibility for initial attack (initial response).

Cibola National Forest

Fire response for the Cibola NF is coordinated through the SWCC in partnership with the National Interagency Coordination Center. Dispatch, coordination, and logistical support is provided via the SWCC. Resource distribution for all-risk incidents, such as aircraft and equipment requests, is handled by the SWCC (SWCC 2022).

Tribal Response

Pueblo of Isleta

The Pueblo of Isleta fire department is a volunteer department with 10 firefighters and one paid Fire Chief. All members have received appropriate wildland firefighting training (*Isleta Pueblo News* 2021).

Mutual Aid

The wildland fire community is well known for its development of mutual aid agreements at the federal, state, and local levels. Such automatic aid agreements allow for the closest forces to respond to an incident as quickly as possible regardless of jurisdiction. Such agreements may also describe how reimbursement will be conducted; state resources responding to wildfires on federal land may have their associated costs reimbursed by the responsible federal agency, and the reverse is true for federal resources suppressing a wildfire on state land.

New Mexico Wildland Fire Management Joint Powers Master Agreement

Under the New Mexico Wildland Fire Management Joint Powers Master Agreement personnel, equipment, supplies, services, and funds regarding wildland fire are coordinated and exchanged through participating agencies.

Participating agencies include the New Mexico Energy, Minerals and Natural Resources Department, Forestry Division; United States Department of Agriculture Forest Service, Southwest Region 3; United States Department of the Interior, National Park Service, Intermountain Region; United States Department of the Interior, Fish and Wildlife Service, Southwest Region; United States Department of the Interior, Bureau of Indian Affairs, Southwest Regional Office and Navajo Regional Office; United States Department of the Interior, Bureau of Land Management, New Mexico State Office; and the United States Department of Energy, National Nuclear Security Administration, Los Alamos Site Office.

You can find more information on the agreement here: https://gacc.nifc.gov/swcc/dc/nmadc/management_admin/incident_business/documents/New%20Mexico%20JPA.pdf.

New Mexico Master Cooperative Wildland Fire Management Response Agreement

The New Mexico Master Cooperative Wildland Fire Management Response Agreement facilitates the coordination and exchange of resources needed for wildfire management, such as equipment/supplies, personnel, services, and funds. The EMNRD Forestry Division; USFS Southwest Region 3; NPS Intermountain Region; USFWS Southwest Region; BIA Southwest Regional Office and Navajo Regional Office, BLM New Mexico State Office, and National Nuclear Security Administration Los Alamos Field Office (NA-LA) are all parties to the agreement.

In addition, for federal agencies, the agreement goes beyond wildland fire. Additional information regarding the agreement is provided here: https://www.emnrd.nm.gov/sfd/master-cooperative-agreement-and-interstate-mutual-aid-agreement/.

Interstate Mutual Aid Agreement for Wildland Fire Management Assistance

The EMNRD Forestry Division and Oregon Department of Forestry have come together to provide mutual assistance in wildland fire management. The exchange of equipment/supplies, personnel, and services is facilitated by the agreement.

Additional information about the agreement is provided here: https://www.emnrd.nm.gov/sfd/wp-content/uploads/sites/4/NMStateForestry_OregonDepartmentofForestry_MutualAidAgreementforWildlandFire.pdf.

Southern Pueblos Agency Fire Management Program

Under the Southern Pueblos Agency Fire Management Program, initial attack and suppression responsibilities on federal trust lands are coordinated through the Albuquerque Dispatch Center. In addition, the Joint Powers Agreement mandates that initial attack responsibilities on private, state, and federal lands are shared by the Agency Fire Management program (Pueblo of Isleta 2021). The Albuquerque Dispatch Center is made of participating state and federal agencies within New Mexico, including New Mexico State Forestry, USFS, BIA, NPS, BLM, and USFWS. The Southern Pueblos Agency Fire Management Program is a contributing member of the dispatch center under the BIA. Participating agencies share resources that may be needed for fire suppression (Pueblo of Isleta 2021).

EVACUATION RESOURCES

In Torrance County, emergency response in the event of a wildfire is coordinated by a situational 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.

Sign up for Torrance County emergency notifications here: https://public.coderedweb.com/CNE/en-US/BF1E050D1A5D.

ROAD SYSTEMS

Much of the County is accessible via surfaced, unsurfaced roads and highways. many of the communitieswithin the WUI, are accessed only via unsurfaced roads, which are often narrow and winding. In addition, some communities adjacent to the WUI are limited to one major road in and out, have dead ends or locked access gates or are located on steep slopes. These access roads are particularly hazardous during emergency evacuation, especially where they are lined by thick, dense, and/or overhanging vegetation (Figure 2.11). Fuel treatment may be needed along some roads with encroaching vegetation that could prevent safe evacuation of residents or safe access by emergency responders.

Figure 2.10. Example of a narrow unsurfaced road with limited turnaround ability.

PEOPLE

The safe and efficient evacuation of people from wildfire requires several factors, including:

- **Emergency notification methods:** The County uses the CodeRED Emergency Alert System (CodeRED) to notify county residents of emergencies. Residents must sign-up to receive emergency alerts through CodeRED. County residents can also sign up for emergency alerts through Wireless Emergency Alerts (WEAs) through Ready.gov.
    - Sign up for Torrance County emergency notifications here: https://public.coderedweb.com/CNE/en-US/BF1E050D1A5D
- **Preplanning by the public about how to evacuate and where to go:** Locked gates, poor or missing signage, and conflicts with emergency vehicles driving into the community versus the public trying to leave complicate evacuation. Uncertainty about where to find temporary refuge can cause families to become separated and delay reunions. Some individuals without transportation or with limited mobility may be accidentally left behind.
- **Public awareness:** These two items will fail to occur throughout communities at risk (CARs) if the residents are unaware of notification methods: 1) the need for preplanning and 2) the elements that should be included in preplanning. Therefore, public education and outreach on these topics should be part of all efforts conducted by agencies such as fire departments in a wide variety of venues.

TORRANCE COUNTY EMERGENCY MANAGEMENT CIVILIAN VOLUNTEER ASSOCITION

Residents of Torrance County can apply to be volunteers through the Torrance County Emergency Management Civilian Volunteer Association. Volunteers would primarily be requested to assist in setting up shelters during inclement weather that closes main roads, or in the event of a fire requiring evacuation. Volunteers may also be requested to support staff during search and rescue or any other event requiring assistance from the Office of Emergency Management.

Application information can be found here: https://torrancecountynm.org/departments/emergency-mgmt.

ANIMALS AND LIVESTOCK

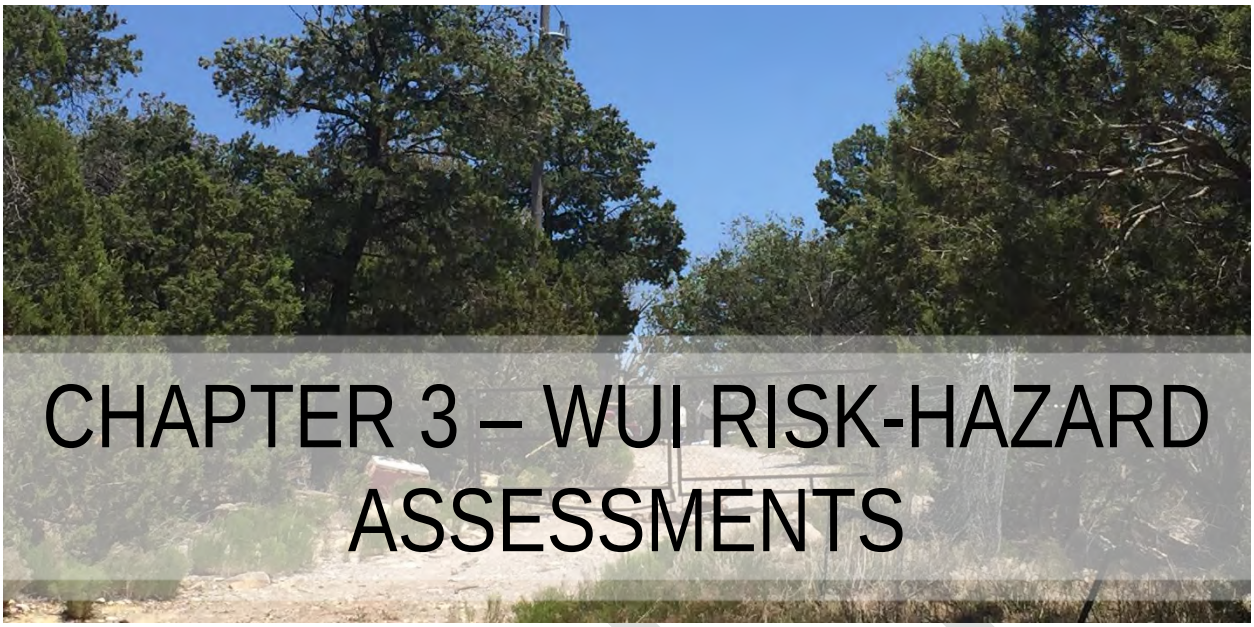
In the event of a wildfire, it is important that residents, fire responders, and the Torrance County Department of Emergency Management have a plan for evacuation of pets and livestock. Evacuation planning often neglects to describe how animals will be evacuated and where they will be taken. The loading of horses, for example, during a fire and smoke situation, and transport of stock vehicles down narrow roads under stressful situations, can be very difficult. Public education could emphasize the need for individuals to have a plan for the evacuation of pets in addition to their family, ensuring a lack of planning doesn't slow or prevent evacuation.

There is also a need to identify where animals can be taken, such as county fairgrounds, for large animal shelters. Similarly, locations where small animals such as dogs and cats are picked up in the fire area should also be identified, as well as the lead agencies, such as humane societies, coordinating this work.

The Torrance County Animal Services may be of assistance in an emergency. For more information, view their webpage here: https://torrancecountynm.org/departments/animal-services

WATER AVAILABILITY AND SUPPLY

Water supply is provided by hydrants and tanks. However, most communities located around the County have inconsistent, limited, or no permanent water supplies. Waterbodies include Laguna del Perro, and isolated stock ponds. Other water sources available in the County include 10,0000 gallons at the Mountainair VFD, 10,000 gallons at the Claunch Pinto Soil and Water Conservation District, and 10,000 gallons at the Torreon VFD. There are also several neighborhoods that have water catchment systems where universal fittings would be beneficial for Torrance County to ensure water access when needed.



CHAPTER 3 – WUI RISK-HAZARD ASSESSMENTS

PURPOSE

The purpose of completing the assessments listed below is to create unique tools for evaluating the risk of wildland fires to communities within the WUI areas of Torrance County. Although many definitions exist for hazard and risk, for the purpose of this document these definitions follow those used by the firefighting community:

Hazard fuel is a fuel complex defined by kind, arrangement, volume, condition, and location that forms a special threat of ignition and resistance to control.

Risk is defined as the chance of a fire starting as determined by the presence and activity of causative agents (NWCG 1998).

From these assessments, land use managers, fire officials, planners, and others can begin to prepare strategies and methods for reducing the threat of wildfire, as well as work with community members to educate them about methods for reducing the damaging consequences of fire. Moreover, by using the final Composite Risk-Hazard Assessment, fuels reduction treatments can be implemented on both private and public land. Through these treatments, community members have the opportunity to actively participate, as well as recommend treatments on the public land they use or care about.

COMMUNITY FIELD EVALUATIONS

Community field evaluations were conducted using the NFPA Wildland Fire Risk and Hazard Severity 1144 Form (see Appendix E). This form is based on the NFPA Standard for Reducing Structure Ignition Hazards from Wildland Fire 2018 Edition. The NFPA standard focuses on individual structure hazards and requires a spatial approach to evaluating and mitigating wildfire hazards around existing structures. It also includes ignition-resistant requirements for new construction and is used by planners and developers in areas that are threatened by wildfire and is commonly applied in the development of Firewise Communities (for more information, see www.firewise.org).

The purpose of the field evaluation and subsequent ratings is to identify fire hazards and risks and prioritize areas requiring mitigation and more detailed planning. These evaluations should not be seen as tactical pre-suppression or triage plans. The evaluations help to drive the recommendations for mitigation of structural ignitability, community preparedness, and public education. The evaluation also helps to prioritize areas for fuels treatment based on the hazard rating. Each area was rated based on conditions within the community and immediately surrounding structures, including access, adjacent vegetation (fuels), defensible space, adjacent topography, roof and building characteristics, available fire protection, and placement of utilities. Where a range of conditions was less easily parsed out, a range of values was assigned on a single evaluation form. Each score was given a corresponding adjective rating of low, moderate, or high.

Community field evaluations for Torrance County were conducted in spring 2024. The community at risk (CAR) hazard ratings from the evaluations are provided in Table 3.1. This table also includes a summary of the positive and negative attributes of a community as they relate to wildfire risk. **Full CAR descriptions are provided in Appendix D.**

Table 3.1. Communities at Risk Ratings with Community Field Evaluation Summary

Community	Risk Rating (2024)	Risk Rating (2016)	Fire District	Positives	Negatives
A102	112 (High)	115 (High)		• Large fuel break SW of community • Fire stations located in area • Some homeowners are starting to do defensible space treatments Homes with new metal roofs	• Heavily populated • Poor signage • Highly flammable building materials common on structures • Minimal defensible space • Limited water
Clines Corner	62 (Moderate)	65 (Moderate)		• Good ingress and egress • Light fuel loads • Limited slopes	• Combustible housing construction • Limited water availability • Light, flashy fuels
Chilili	101 (High)	103 (High)		• Good ingress and egress • Homeowners are starting to do defensible space treatments • Large burn scar (Doghead) on the edge of town.	• Heavily populated • Poor signage • Highly flammable building materials common on structures • Minimal defensible space • Limited water
Deer Canyon	71 (High)	80 (High)	Mountainair	• Good signage • Chipseal road leading out to the community • Adjacent fuel breaks to Preserve • Fuels breaks along exit roads • Safe zone development within community • Homeowner implementation of defensible space	• Narrow roads with limited turnaround space • Fire station is more than 5 miles from the community • Community is surrounded by dense fuels on public lands • Limited water availability
Duran	74 (high)	78 (High)		• Good ingress/egress • Fire station in town • Fuel breaks to the west of town	• Flashy fuels mixed with pinyon juniper woodlands • Limited defensible space • Limited water availability • Close to railroad

Community	Risk Rating (2024)	Risk Rating (2016)	Fire District	Positives	Negatives
Echo ridge	78 (high)	80 (High)		• Non pressurized water is available • Each home has a water storage tank • Fire resistant building materials Great signage	• Long driveways with no turnaround space • Structures have limited separation from adjacent structures • Wooden fences connected to homes
Estancia	60 (moderate)	62 (Moderate)		• Good ingress/egress • Many houses metal roofs • Fire station in town	• Flashy fast-moving fuels • Limited defensible space: >30 feet of defensible space • Above ground utilities
Encino	45 (moderate)	52 (moderate)		• Good ingress/egress • Light fuel loads • Limited slopes • Lots of metal roofs	• Limited defensible space: >30 feet of defensible space • Above ground utilities • Adjacent to the railroad
Game Road	76 (high)	71 (high)	Mountainair, Torreon/Tajique	• Sparsely populated • Limited overstory due to past wildfires	• Poor ingress/egress • Narrow dirt roads with limited to no turnaround space • Poor signage • Limited defensible space • Limited water availability • Fire station is more than 5 miles from the community • Heavy understory vegetation post Ojo Peak Wildfire
Manzano Morning	72 (high)	77 (High)		• Fire resistant building materials • Non pressurized hydrants • Some water storage	• Limited water availability • Ingress/egress • Gated community (access codes)

Community	Risk Rating (2024)	Risk Rating (2016)	Fire District	Positives	Negatives
La Merced del Manzano Land Grant	85 (high)	83 (high)	Torreon/Tajique	• Manzano lake provides a water source • Recent thinning projects on USFS lands above the community • Homeowner implementation of defensible space • Some homes with metal roofs	• Poor ingress/egress • Narrow dirt roads with limited to no turnaround space • Poor signage • Limited defensible space • Fire station is more than 5 miles from the community
McIntosh	65 (moderate)	74 (High)		• Good ingress/egress • Metal roofing • Fire station in town	• Narrow road width • Poor signage • Limited turnaround space • Empty lots overgrown and lots of debris • Limited defensible space: >30 feet of defensible space
Mission Hills	87 (high)	65 (Moderate)		• Multiple ingress/egress • Large defensible space treatment to the west of the community	• Limited defensible space: >30 feet of defensible space • Above ground utilities • Mix of woodlands and grasslands • Steeper slopes with limited setbacks
Moriarty	50 (moderate)	55 (Moderate)		• Good ingress/egress • Light fuel loads • Local fire stations	• Flashy fast moving fuels • Limited defensible space: >30 feet of defensible space • Above ground utilities

Community	Risk Rating (2024)	Risk Rating (2016)	Fire District	Positives	Negatives
Mountainair	62 (moderate)	65 (moderate)	Mountainair	• Local fire station • Extra water storage at CPSWCD • Surfaced and maintained roads • Good signage • Light adjacent fuels • Roads with good turnaround space • Generally low slope in most areas	• Limited defensible space • Mixed construction: wood siding, decks, and fences • Utilities are aboveground
Loma Parda	88 (high)	91 (high)	Mountainair	• More than one access road • Generally low slope in most areas • Low combustibility roofs • Homeowner implementation of defensible space	• Narrow roads with limited turnaround space • Poor signage • Limited defensible space • Fire station is more than 5 miles from the community • Limited water availability
Punta de Auga	67 (Moderate)	72 (High)	Mountainair, Torreon/Tajique	• Surfaced and maintained roads • Good signage • Some homes with metal roofs	• Limited defensible space • Fire station is more than 5 miles from the community • Heavy loading of flashy fuels
Sunset Acres	50 (moderate)	55 (moderate)		• Good ingress/egress • Light fuel loads • Some home with below ground utilities	• Flashy fast moving fuels • Limited defensible space: >30 feet of defensible space
Sweetwater Acres	42 (moderate)	48 (moderate)		• Good ingress/egress • Light fuel loads • Irrigated agriculture adjacent to community	• Flashy fast-moving fuels • Limited defensible space: >30 feet of defensible space • Above ground utilities

Community	Risk Rating (2024)	Risk Rating (2016)	Fire District	Positives	Negatives
Taijique	72 (high)	78 (High)		• Good ingress/egress • Good road conditions Lots of fuel breaks around the community (especially to the south)	• Limited defensible space: >30 feet of defensible space • Above ground utilities • Poor water availability • Highly flammable construction materials
Torreon	68 (moderate)	71 (High)		• Water availability at Fire Station • Good ingress/egress • Good road conditions • Many homes with metal roofs	• Limited defensible space: >30 feet of defensible space • Above ground utilities • Heavy and flashy fuels surrounding the community
Willard	65 (moderate)	73 (High)		• Good ingress/egress • Good road conditions due to infrastructure development in area	• Flashy fuels • Limited defensible space • Limited water availability
USFS 422	100 (high)	101 (high)	District 1, Socorro County FD	• Sparsely populated • Mowing of fine fuels around structures	• Poor ingress/egress • Narrow dirt roads with limited turnaround space • Poor signage • No water sources for fire suppression • Limited defensible space
4th of July Loop	94 (High)	104 (High)		• Sparsely populated • Recent fires have limited heavy fuels on federal lands	• Poor ingress/egress • Narrow dirt rods with limited turnaround space • Poor signage • Limited defensible space

COMPOSITE RISK-HAZARD ASSESSMENT INPUTS

The Composite Risk-Hazard Assessment is created by layering several risk-hazard inputs, including fire behavior model outputs generated in the desktop analysis (flame length, fireline intensity, rate of spread, and crown fire potential), VARs (discussed in Appendix A), and the WUI, fire history, and fire response, which are described in Chapter 2.

DESKTOP ANALYSIS

A desktop analysis of risks and hazards uses fuels properties, topography, and weather to generate fire behavior modeling outputs (flame length [Map 2 in Appendix B], fireline intensity [Map 3 in Appendix B], rate of spread [Map 4 in Appendix B], and crown fire potential [Map 5 in Appendix B]), which were used as inputs (along with fire history, fire response, and the WUI) in the Composite Risk-Hazard Assessment.

Information regarding fuels, fire history, and response is provided in Chapter 2.

Fire Behavior Modeling

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, in which the flaming front remains on the ground surface (in grasses, shrubs, small trees, etc.) and resistance to control is comparatively low; 2) crown fire, in which 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, in which embers are lifted and carried with the wind ahead of the main fire and ignite in receptive fuels; if embers are plentiful and/or long range (>0.5 mile), resistance to control can be very high. Crown fire and spotting activity have been a concern for fire managers, particularly under extreme weather conditions. In areas where homes are situated close to timber fuels and/or denser shrubs and trees, potential spotting from woody fuels to adjacent fuels should always be acknowledged.

Treating fuels in the WUI can lessen the risk of intense or extreme fire behavior (Martinson and Omi 2013; Safford et al. 2009). Studies and observations of fires burning in areas where fuel treatments have occurred have shown that the fire either remains on or drops to the surface, thus avoiding destructive crown fire, as long as activity fuels are treated or removed (Graham et al 2004; Pollet and Omi 2002; Prichard et al. 2010; Safford et al. 2012; Waltz et al. 2014). Fuel mitigation efforts therefore should be focused specifically where these critical conditions could develop in or near CARs.

For this plan, an analysis of fire behavior was carried out using well-established fire behavior models: FARSITE, FlamMap, BehavePlus, and FireFamily Plus housed within the Interagency Fuel Treatment Decision Support System (IFTDSS), as well as ArcGIS Desktop Spatial Analyst tools. Data used in the Composite Risk-Hazard Assessment were largely obtained from LANDFIRE.

Detailed information regarding fire behavior models can be found in Appendix J.

COMPOSITE RISK-HAZARD ASSESSMENT RESULTS

The Composite Risk-Hazard Assessment modeling approach uses a weighted sum model, which "stacks" geographically aligned data sets and evaluates an output value derived from each cell value of the overlaid data set in combination with the weighted assessment. In a weighted sum model, the weighted values of each pixel from each parameter data set are added together so that the resulting data set contains pixels with summed values of all the parameters. This method ensures that the model resolution is maintained in the results and thus provides finer detail and range of values for denoting fire risk. Figure 3.7 illustrates the individual data sets and the relative weights assigned within the modeling framework. These include fire behavior parameters, fire occurrence density, HVRAs, WUI, and distance from fire stations. Figure 3.8 is the Composite Risk-Hazard Assessment for the planning area and classifies the planning area into low-, moderate-, and high-risk categories.

Additional information can be found in Appendix J.

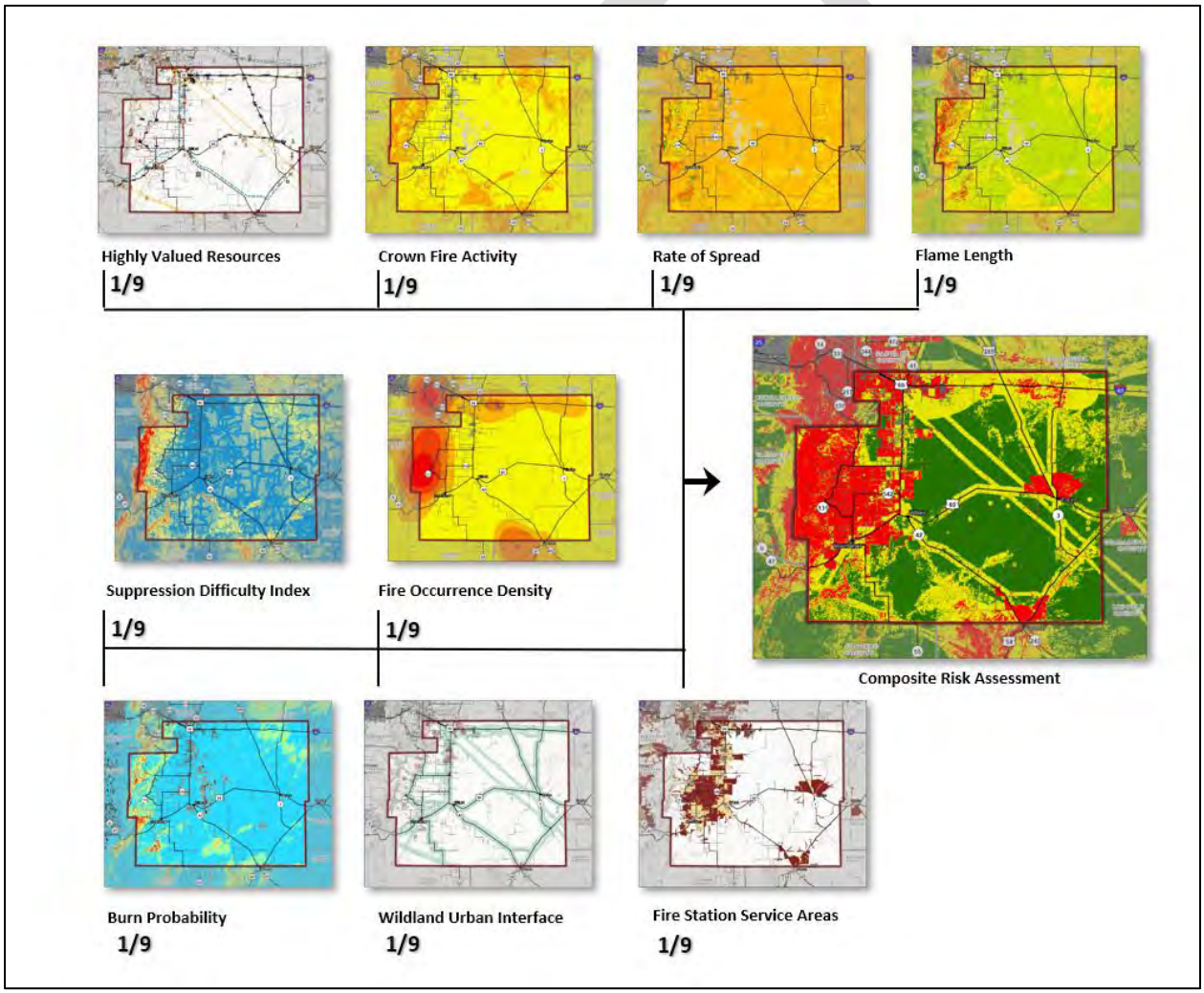


Figure 3.7. Composite Risk-Hazard Assessment overlay process.

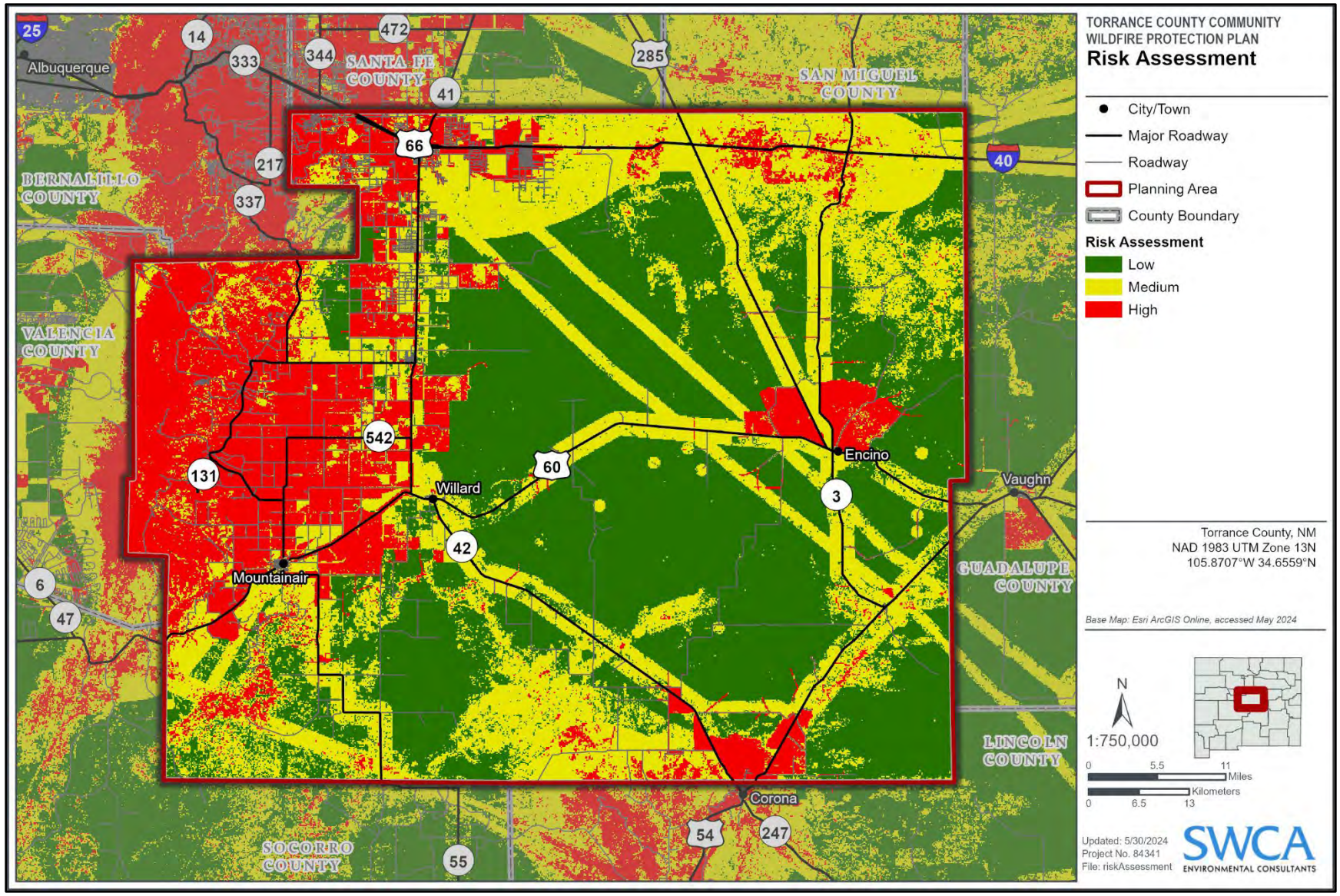


Figure 3.8. Composite Risk-Hazard Assessment.

CHAPTER 4 – MITIGATION STRATEGIES

This chapter provides project recommendations and implementation guidance. However, mitigation does not stop there. In addition to the recommendations, recognizing wildfire mitigation, preparedness, and resilience, means being prepared both pre- and post-fire. Postfire response and rehabilitation information can be found at the end of this chapter.

This plan has been aligned with the Cohesive Strategy and its Phase III Western Regional Action Plan by adhering to the nation-wide goal:

> *"To safely and effectively extinguish fire, when needed; use fire where allowable; manage our natural resources; and as a Nation, live with wildland fire." (Forests and Rangelands 2014:3).*

Thus, CWPP recommendations have been structured around the three main goals of the Cohesive Strategy: restoring and maintaining landscapes, fire-adapted communities, and wildfire response. In addition, counties adjacent to theCounty were included in the Core Team, and project recommendation development to ensure the recommendations have been aligned with cross-boundary goals. Many of the recommendations listed can be implemented at the homeowner or community level. Projects requiring large-scale support can be prioritized based on the Composite Risk-Hazard Assessment.

Recommendation matrixes are used throughout this chapter to serve as an action plan for implementation. Recommendations have been aligned with the strategies in the 2020 New Mexico Forest Action Plan (EMNRD Forestry Division 2020a) wherever possible.

COHESIVE STRATEGY GOAL 1: RESTORE AND MAINTAIN LANDSCAPES

Goal 1 of the Cohesive Strategy and the Western Regional Action Plan is Restore and Maintain Landscapes: Landscapes across all jurisdictions are resilient to fire and other disturbances in accordance with management objectives.

> *"Sustaining landscape resiliency and the role of wildland fire as a critical ecological process requires a mix of actions that are consistent with management objectives. The West will use all available methods and tools for active management of the landscape to consider and conserve a diversity of ecological, social, and economic values. The West will coordinate with all partners and seek continued stakeholder engagement in developing market-based, flexible, and proactive solutions that can take advantage of economies of scale. All aspects of wildland fire will be used to restore and maintain resilient landscapes. Emphasis will be placed on protecting the middle lands near communities."* (Western Regional Strategy Committee [WRSC] 2013:14).

In this CWPP, recommendations to restore and maintain landscapes focus on vegetation management and hazardous fuel reduction.

This region has been home to an active and committed fuel treatment program led by land managers for many years. Figures 4.1 - 4.5 show existing fuel treatments that have been completed or planned in and around the planning area. This information is derived from the New Mexico Forest and Watershed Restoration Institute and ArcGIS New Mexico Vegetation Treatments database. The reader is referred to agency websites and the Federal Register for the latest information on planned or ongoing actions on adjacent public land. The treatment momentum already observed surrounding the planning area should be built upon in order to increase fuel treatment effectiveness across the landscape.

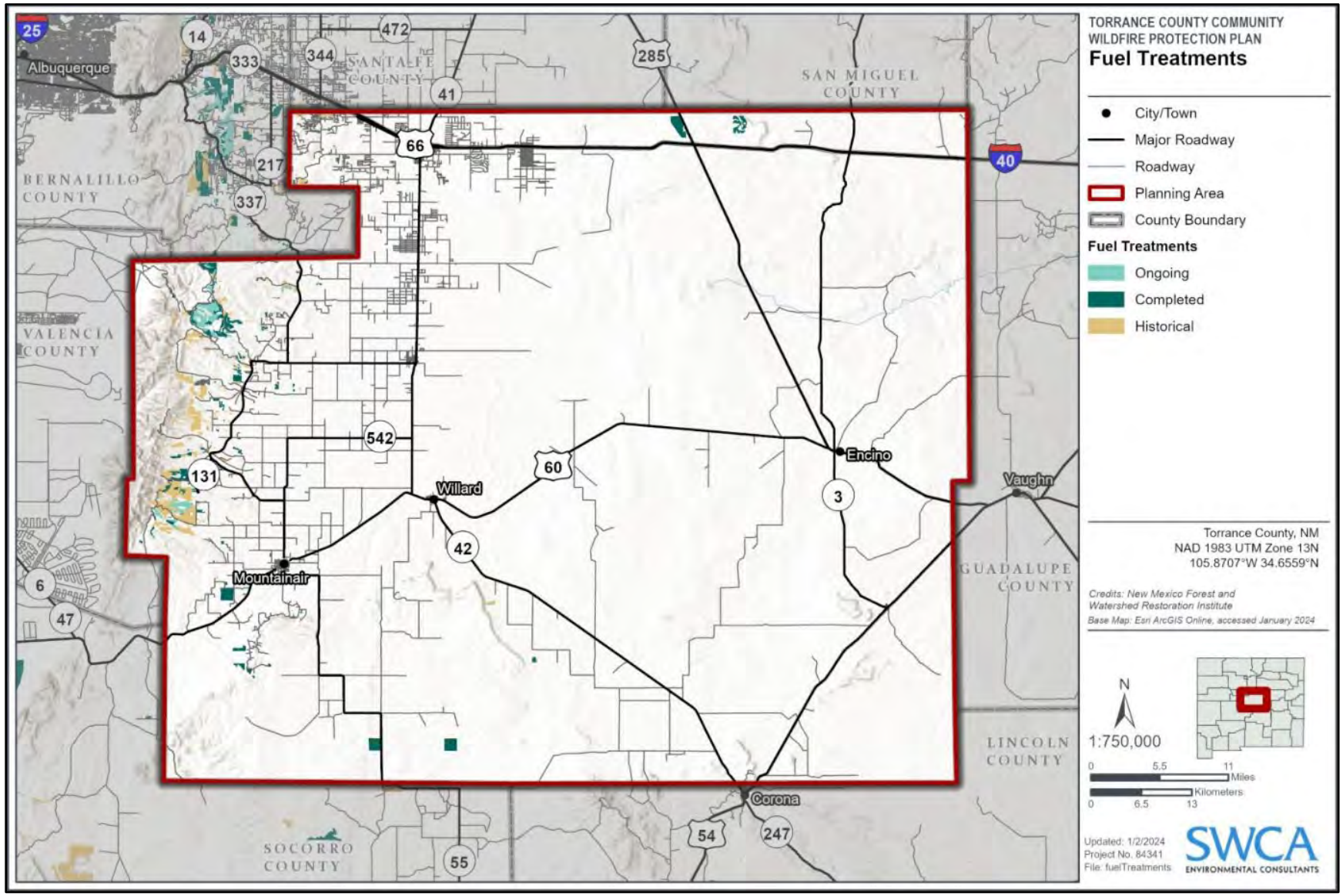


Figure 4.1. Existing fuel treatments across all jurisdictions.

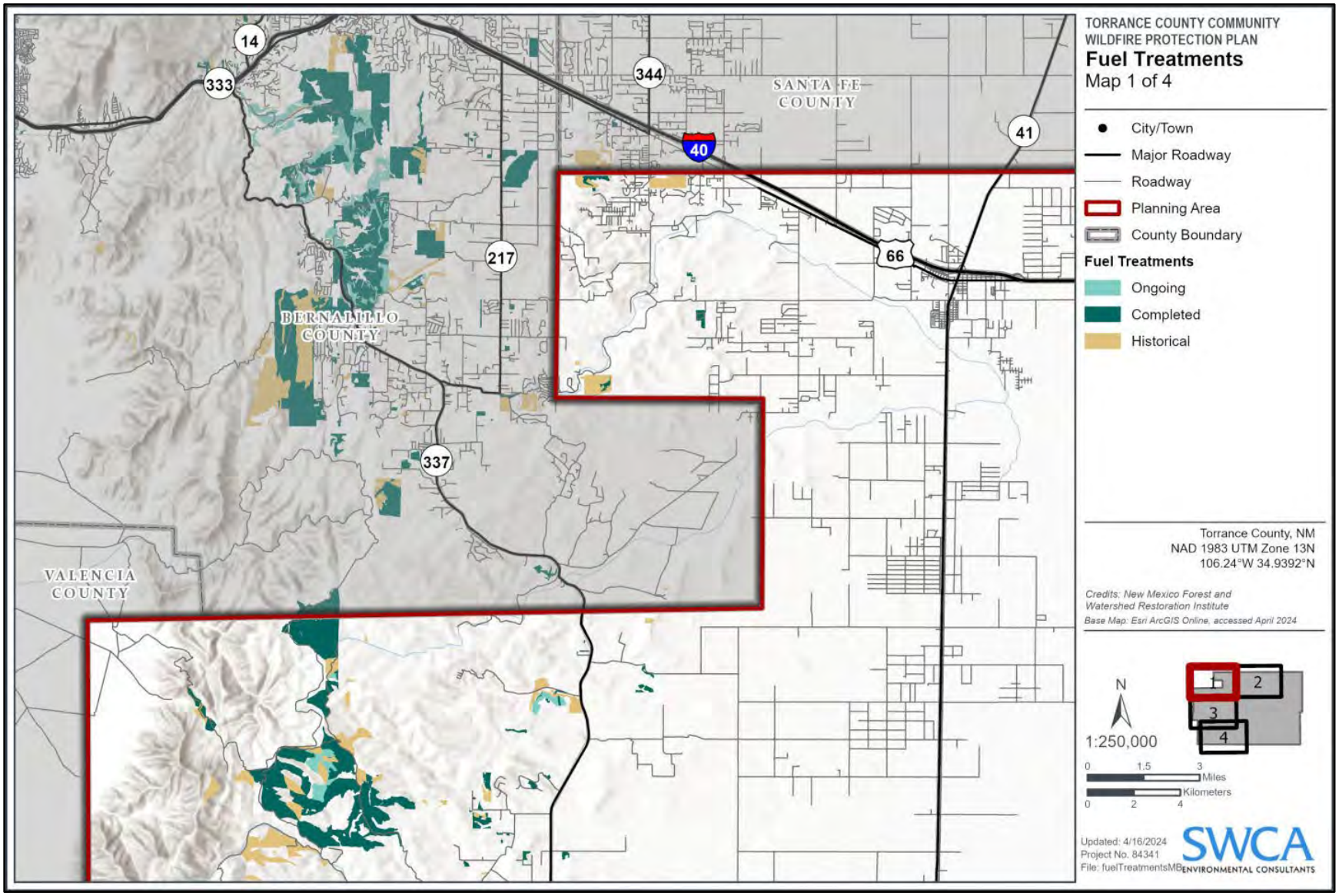


Figure 4.2. Existing fuel treatments detail (zoomed in).

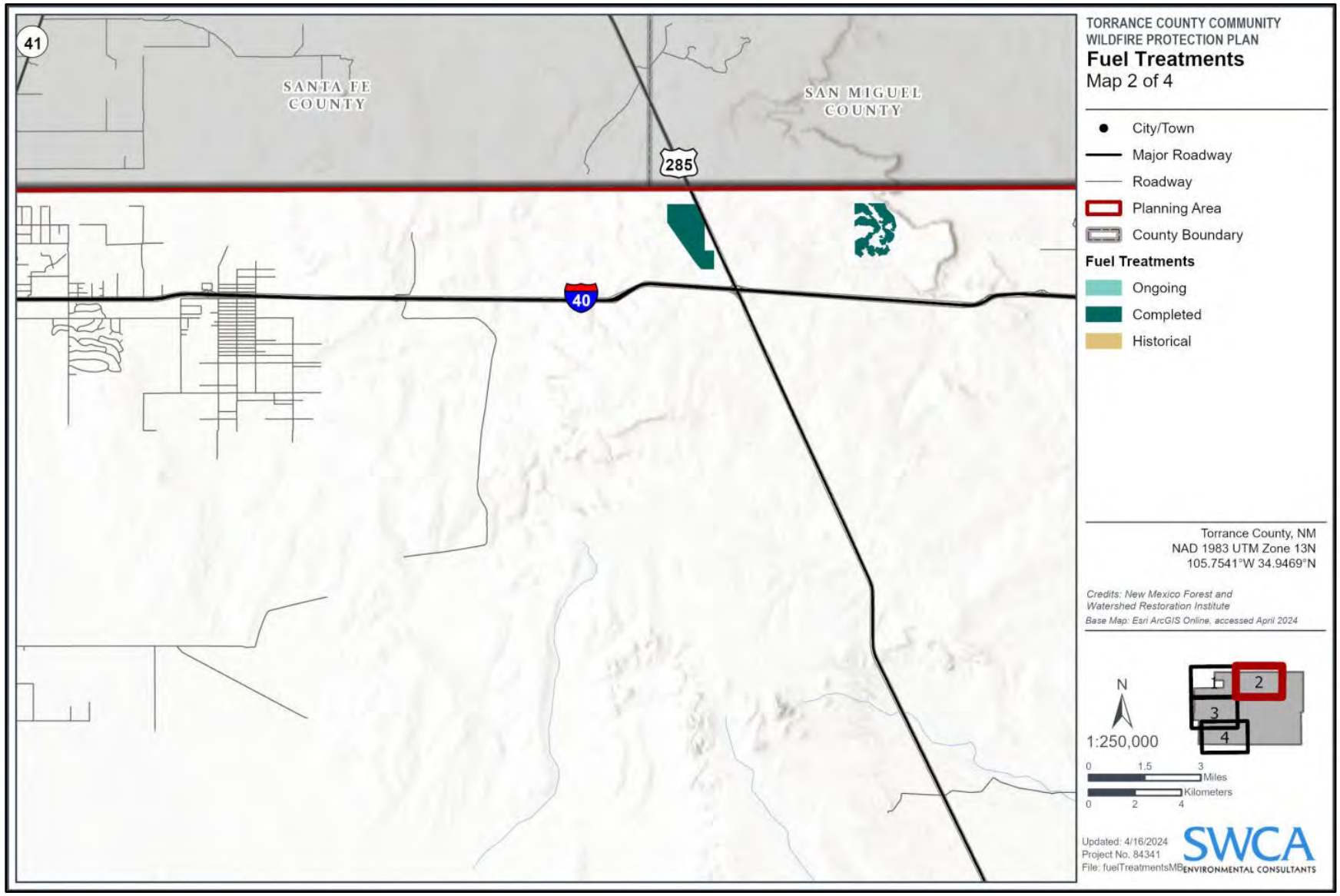


Figure 4.3. Existing fuel treatments detail (zoomed in).

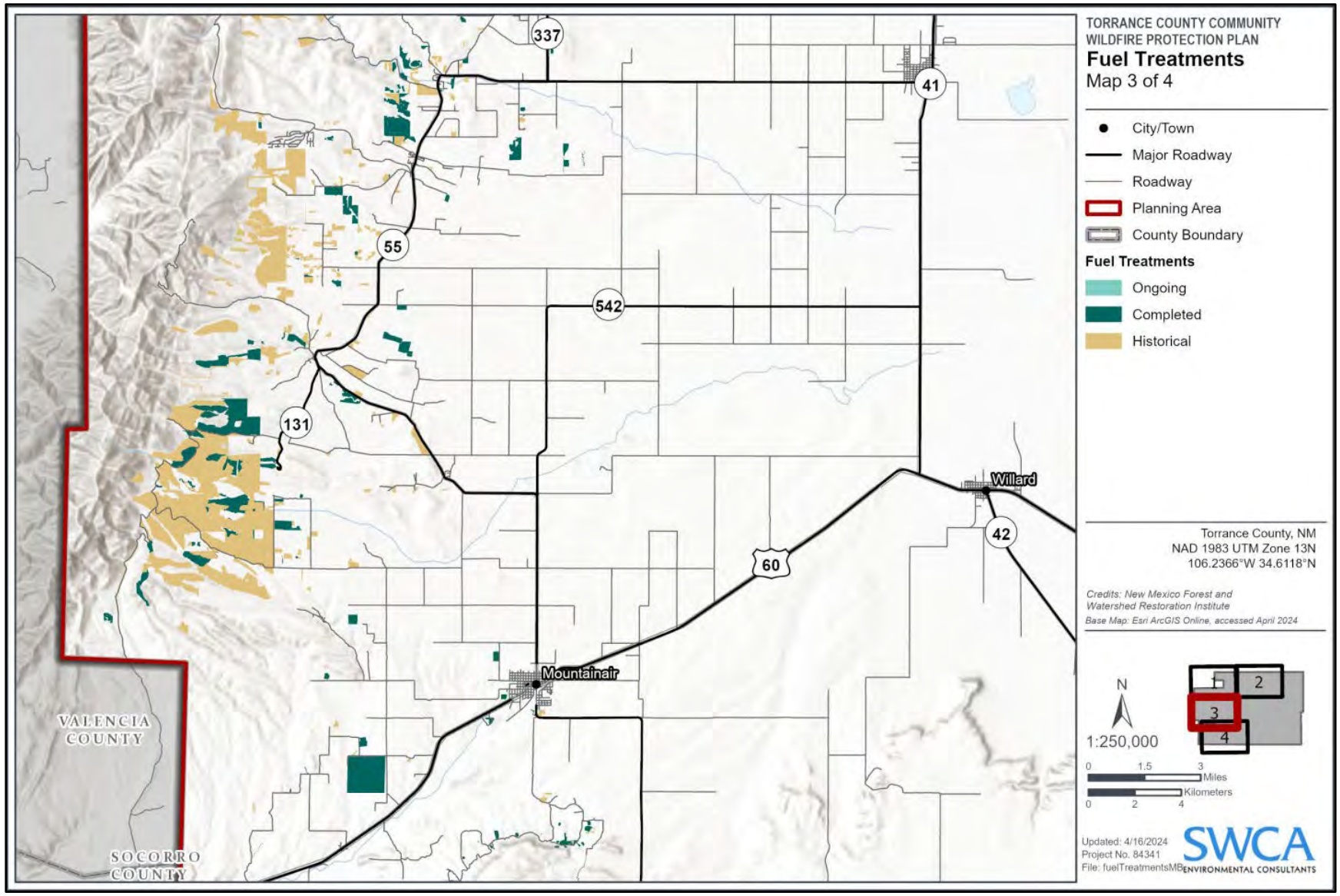


Figure 4.4. Existing fuel treatments detail (zoomed in).

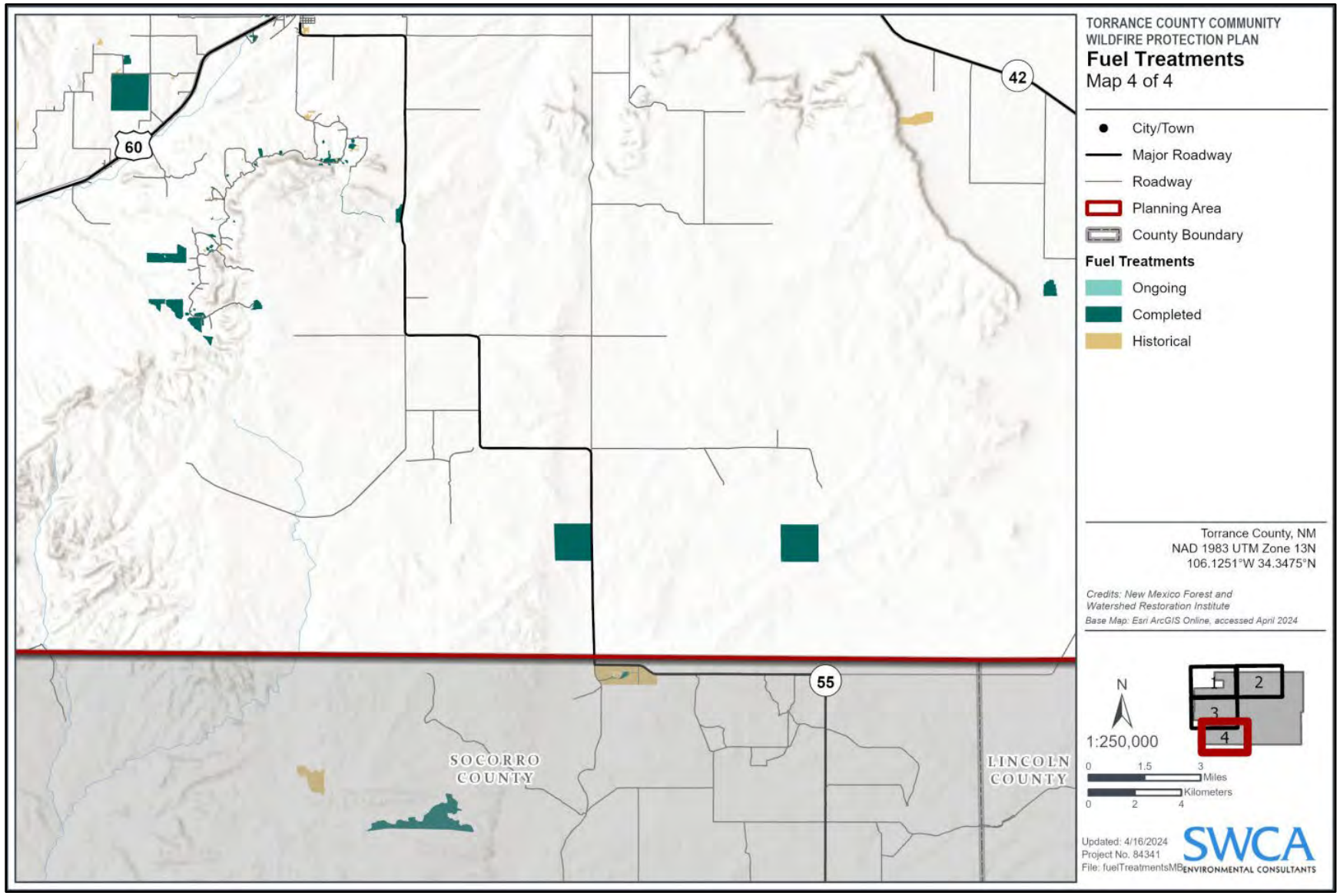


Figure 4.5. Existing fuel treatments detail (zoomed in).

RECOMMENDATIONS FOR HAZARDOUS FUEL REDUCTION

Fuels management of public and private land in the WUI is key to the survival of homes during a wildfire event, as well as the means to meet the criteria of Goal 1. Research has shown how fuel treatments in the WUI can change fire behavior to support suppression activities and protect homes (Evans et al. 2015). The importance of fuels management is reflected in policy at the federal level, with the HFRA requiring that federal land management agencies spend at least 50% of their fuels reduction funds on projects in the WUI.

Fuels should be modified with a strategic approach to reduce the threat that high-intensity wildfires pose to lives, property, and other values. This section provides information on fuel treatment methodologies that can be applied to first protect structures (defensible space), then near community boundaries (fuel breaks, cleanup of adjacent open spaces), and finally in the wildlands beyond community boundaries (larger-scale forest health and restoration treatments).

While not necessarily at odds with one another, the emphasis of each of these treatment types is different. Proximate to structures, the recommendations focus on reducing fire intensity consistent with Firewise and International Fire Code standards. Further into open space areas, treatments tend to emphasize forest health and increasing resiliency to catastrophic wildfire and other disturbances. Cooperators in fuels management should include federal, state, and local agencies as well as interested members of the public. Federal land management plans focus on these more landscape-level treatments, so the CWPP incorporates most federal land management by reference to those land management planning documents. The CWPP focuses primarily on projects within or adjacent to WUI areas.

Table 4.1 summarizes the types of treatments recommended throughout the planning area. The majority of the treatments are focused on higher risk areas, as defined by the Composite Risk-Hazard Assessment and Core Team input. Many of these treatment recommendations are general across the communities because similar conditions and concerns were raised by fire responders for all communities that border wildland areas. Tables 4.1, 4.4, and 4.5 also address the requirement for an action plan and assessment strategy by providing monitoring guidelines and a timeline for implementation. This timeline is obviously dependent on available funding and resources, as well as National Environmental Policy Act (NEPA) protocols for any treatments pursued on public land.

When applying fuel treatments, every effort should be made to align treatments with 2020 New Mexico Forest Action Plan (EMNRD Forestry Division 2020a) with consideration of all appropriate best management practices and sound science. In addition, treatments should be strategically located in areas to maximize effectiveness of other existing and ongoing projects (see Figures 4.1 and 4.2).

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. The effectiveness of any fuel 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.

The treatment list is by no means exhaustive and should be considered purely a sample of required projects for the future management of the planning area. Many projects may be eligible for grant funds available from federal and/or state sources. For a list of funding sources, please refer to Appendix F.

This page intentionally left blank.

Table 4.1. Recommendations to Create Resilient Landscapes (Fuel Treatments)

Project ID	Status	Priority (H,M,L)	Target Date	Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves To:	Monitoring/Maintenance Requirements	Funding Sources
RL #1		H	Fall 2026	Implement fuels reductions treatments in the County particularly targeted at the Manzano Mountain communities with the highest risk.	Private and Public lands throughout Torrance County	Torrance County, SWCDs, USFS, State, Land Grants, NMSLO	• Begin thin-from-below treatments in ponderosa pine • Thin Pinyon Juniper (PJ) woodlands through hand and mechanical treatment • Reduce crown bulk density in ponderosa pine and PJ woodlands • Mow around fence lines on ranchlands • Reduce shrubs and remove invasives • Plan prescribed burns on national forest lands • Plan prescribed burns on state/private lands	Create resilient landscapes	Regular maintenance needed to keep effective fuels treatments	• FMAG • Firewise grants • New Mexico Fire Protection Grant • BRIC • Hazard Mitigation Grant Program (HMGP) • NMSF WUI/NFL • NRCS RCPP • New Mexico Water Trust Board Grants
RL #2		H	Fall 2026	Protect power lines and communication lines	Utility ROWS, Private and public lands in Torrance County	Torrance County	Ensure adequate clearance between power lines and trees for enhanced safety and wildfire prevention.	Protect life and property by preventing destruction of energy or communications infrastructures in event of fire.	Regular maintenance needed to ensure lines are clear of vegetation. Monitoring should occur prior to fire seas in (February) and in the fall (October).	• Building Resilient Infrastructure and Communities (BRIC) Grant Program • Firewise Grants • New Mexico Fire Protection Grant • EFRP
RL #3		H	Fall 2026	Implement roadside and fuels treatments	Torrance County	Torrance County, NMDOT, SWCDs	• Mow and remove invasive species along roadside o Mow a 70-foot buffer along edge of roadway. Regularly remove invasive species and shrub encroachment. • Remove piñon juniper and other shrubs encroaching on highway right-of-way	Reduce risk of roadside ignitions	Regular maintenance needed to ensure roadsides and railroads are clear of vegetation.	• BRIC • EFRP • New Mexico Fire Protection Grant • Firewise grants • NMSF WUI/NFL • NRCS RCPP
RL#4		M	Fall of 2025	Prescribed herbivory. Identify continued prescribed herbivory in open spaces, targeting grasses and light fuels throughout the county.	Torrance County	Torrance County in collaboration with FPDs, NMSF, and USFS	Utilize prescribed herbivory as fuel reduction and maintenance technique, especially adjacent to WUI areas. Work with local ranchers to develop a regional grazing plan. Implement grazing plans to eliminate dry grass and remove weeds and/or establish irrigation to regreen the parcel. Employ grazing as a solution for treating areas of high concern topography that would be unsafe for hand treatment. Work with local personnel to investigate locations where grazing would be most effective	Reduce fuel loading of fine fuels that could increase wildfire spread to WUI areas.	Regular monitoring needed to ensure against environmental damage and invasive species Update the CWPP project tracking tool with progress and relevant statistics.	• Firewise Grants • New Mexico Fire Protection Grant • New Mexico Association of Counties: Wildfire Risk Reduction Program • EFRP
RL #6		H	Fall of 2025	Sustain maintenance of existing fuel breaks and progress with execution of planned fuel breaks	Torrance County	Torrance County, NMSF, USFS, NMSLO, Private land owners	• Implement a routine maintenance schedule and inspection schedule for existing fuel breaks to ensure their effectiveness o Maintain existing fuel breaks according to vegetation conditions • Execute planned fuel break projects according to established timelines and priorities • Collaborate with relevant agencies, organizations, and communities to ensure project success • Integrate the mitigation of hazards, such as dead or diseased trees, into fuel break maintenance plans • Assess if existing fuel breaks are sufficiently wide to be effective; expand fuel breaks where needed	Provide continued effectiveness of previously installed fuel breaks	Regular evaluations and maintenance needed to keep fuel break effectiveness	• New Mexico Association of Counties: Wildfire Risk Reduction Program • National Forest Foundation (NFF); Innovative Finance for National Forests Grant Program • BRIC • Firewise Grants • NFP • NRCS RCPP

Project ID	Status	Priority (H,M,L)	Target Date	Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves To:	Monitoring/Maintenance Requirements	Funding Sources
RL #7		H	Fall of 2025	Strategically install fuel breaks throughout the county in accordance with risk assessment findings and existing knowledge of fuel loading and high-risk areas	Public and Private lands throughout Torrance County	Torrance County,SWCDs, NMSF, USFS, NMSLO	• Install fuel breaks in high-risk areas and prioritize underserved, remote, and isolated areas. Potential fuel break locations include: o Along community perimeters o Perpendicular to average wind direction in vulnerable areas o Along rights-of-way, including evacuation corridors o Along riparian corridors that lead into communities, strategically reducing ladder fuels and breaking up fuel continuity o Areas that support protection of the WUI o Areas that increase fire responder safety o Communities surrounded by steep topography and heavy fuels o Around critical infrastructure and facilities o Along strategic ridge tops Look for opportunities to expand or tie into existing fuel breaks for improved effectiveness	Provide access to fire personnel Establish fuel breaks and fire containment lines Create resilient landscapes and address potential for extreme wildfire behavior in and around the WUI Protect communities and critical infrastructure and facilities	Regular evaluations and maintenance needed to keep fuel break effectiveness	• New Mexico Association of Counties: Wildfire Risk Reduction Program • National Forest Foundation (NFF); Innovative Finance for National Forests Grant Program • BRIC • Firewise Grants • NFP • NRCS RCPP • NMSF WUI/NFL • New Mexico Water Trust Board
RL #8		M	Spring 2027	Continue to identify and execute watershed-scale ecosystem projects cross jurisdictions (i.e., private, federal, tribal, state) to enhance wildfire resilience, wildlife habitat, and water quality	Public and Private lands within Torrance County	Torrance County, SWCDs, NMSF, USFS, NMSLO	• Collaborate with agencies, environmental organizations, and community stakeholders to design and implement integrated riparian fuel reduction projects • Develop comprehensive project plans that outline specific mitigation strategies and ecological restoration goals • Utilize a combination of fuel reduction methods tailored to riparian areas, including prescribed burns, mechanical thinning, debris removal, chipping, and targeted vegetation management o Ensure that mitigation efforts comply with environmental regulations and best practices to minimize ecological impacts • Build on the riparian maintenance documentation to streamline environmental review and permitting. • Integrate restoration practices that promote water quality, soil health, and native vegetation recovery • Assess and prioritize watersheds based on: o Wildfire risk o Presence of sensitive species o Watershed health • Develop and implement a monitoring program to track the effectiveness of fuel reduction and restoration projects	Reduce hazardous fuels throughout the district county. Create resilient landscapes and address potential for extreme wildfire behavior in and around the WUI. Ensure the protection of vulnerable ecosystems and values at risk	Maintenance and updates as needed	• New Mexico Fire Protection Grant • USFS CWDG Grants • FEMA BRIC • FEMA HMGP • GSA Federal Excess Personal Property (FEPP) • Firewise Grants • RCP • ECP • NRCS RCPP • NMSF WUI/NFL • New Mexico Water Trust Board

Project ID	Status	Priority (H,M,L)	Target Date	Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves To:	Monitoring/Maintenance Requirements	Funding Sources
RL #9		L	Winter 2025	Promote green waste disposal resources and establish designated collection days to encourage community participation and proper disposal of green waste	Torrance County	Torrance County, NMSF, SWCDs	• Conduct public outreach to ensure that residents are aware of all the resources for green waste disposal (e.g., slash disposal locations, etc.) • Establish regular green waste disposal days and ensure communities are informed about these events • Explore options for expanding waste disposal sites, ensuring accessibility where it's most needed • Engage the community in discussions about green waste disposal, gathering input on preferences and addressing concerns • Establish partnerships with adjacent counties for enhanced resource sharing and allocation	Reduce fuel loading and continuity within and around communities Enhance regional landscape resiliency	Revise and review strategy on an annual basis Track yearly progress	• USFS CWDG Grants • FEMA BRIC Grants • New Mexico Association of Counties: Wildfire Risk Reduction Program

This page intentionally left blank.

COHESIVE STRATEGY GOAL 2: FIRE-ADAPTED COMMUNITIES

Goal 2 of the Cohesive Strategy/Western Regional Action Plan is: Fire-Adapted Communities: Human populations and infrastructure can withstand a wildfire without loss of life and property. The basic premise of this goal is:

> *"Preventing or minimizing the loss of life and property due to wildfire requires a combination of thorough pre-fire planning and action, followed by prudent and immediate response during a wildfire event. Post-fire activities can also speed community recovery efforts and help limit the long-term effects and costs of wildfire. CWPPs should identify high-risk areas and actions residents can take to reduce their risk. Fuels treatments in and near communities can provide buffer zones to protect structures, important community values and evacuation routes. Collaboration, self-sufficiency, acceptance of the risks and consequences of actions (or non-action), assisting those who need assistance (such as the elderly), and encouraging cultural and behavioral changes regarding fire and fire protection are important concepts. Attention will be paid to values to be protected in the middle ground (lands between the community and the forest) including watersheds, viewsheds, utility and transportation corridors, cultural and historic values, etc."* (WRSC 2013:15).

In this CWPP, recommendations for fire-adapted communities include public education and outreach actions and actions to reduce structural ignitability.

RECOMMENDATIONS FOR PUBLIC EDUCATION AND OUTREACH

Just as environmental hazards need to be mitigated to reduce the risk of fire loss, so do the human hazards. Lack of knowledge, lack of positive actions (e.g., failing to create adequate defensible space), and negative actions (e.g., keeping leaf litter and exposed propane tanks close to structures) all contribute to increased risk of loss in the WUI.

Most residents in the WUI understand the risk that wildfire poses to their communities. However, it is important to continually engage the community as a partner in order to expand wildfire mitigation options across land ownership (McCaffrey 2004, 2020; McCaffrey and Olsen 2012; Winter and Fried 2000).

Methods to improve public education could include increasing awareness about fire department response and resource needs; providing workshops at demonstration sites showing Firewise landscaping techniques or fuels treatment projects; organizing community cleanups to remove green waste; publicizing availability of government funds for treatments on private land; and, most importantly, improving communication between homeowners and local land management agencies to improve and build trust, particularly since the implementation of fuel treatments and better maintenance of existing treatments needs to occur in the interface between public and private land.

Please see Appendix G for a list of educational resources.

Table 4.4 lists public education recommendations to be implemented in the County.

RECOMMENDATIONS FOR REDUCING STRUCTURAL IGNITABILITY

Table 4.4 provides a list of community-based recommendations to reduce structural ignitability that should be implemented throughout the Torrance County CWPP planning area. Reduction of structural ignitability depends largely on public education which provides homeowners the information they need to take responsibility for protecting their own properties. A list of action items that individual homeowners can follow can be found below. Carrying out fuels reduction treatments on public land may only be effective in reducing fire risk to some communities; if homeowners have failed to provide mitigation efforts on their own land, the risk of home ignition remains high, and firefighter lives are put at risk when they carry out structural defense.

Preparing for wildland fire by creating defensible space around the home is an effective strategy for reducing structural ignitability as discussed under Cohesive Strategy Goal 1: Resilient Landscapes. Studies have shown that burning vegetation beyond 120 feet of a structure is unlikely to ignite that property through radiant heat (Butler and Cohen 1996), but fire bands that travel independently of the flaming front have been known to destroy houses that had not been impacted by direct flame impingement. Hardening the home to ignition from embers, including maintaining vent coverings and other openings, is also strongly advised to protect a home from structural ignitability. Managing the landscape around a structure by removing weeds and debris within a 30-foot radius and keeping the roof and gutters of a home clean are two maintenance measures proven to limit combustible materials that could provide an ember bed and ignite the structure. In essence, reducing structural ignitability and creating defensible space are key for protecting from the potential loss and damage.

Below you will find pertinent information regarding recent legislation related to Goal 2 of the Cohesive Strategy.

House Bill 266: The Forest and Watershed Restoration Act emphasized the need for restoration throughout the state and allocates funds through EMNRD for the purpose of restoring forests and watersheds (see Appendix F for more information).

Table 4.4. Recommendations for Creating Fire-Adapted Communities (Public Education and Reducing Structural Ignitability)

Project ID	Status	Priority (H,M,L)	Target date	Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves To:	Monitoring/Maintenance Requirements	Funding Sources
FAC #1		H	Spring 2026	Continue to support land grant communities with wildfire preparedness and capacity building	Torrance County	Torrance County	• Focus efforts on: community education, fuels reduction, debris and rubbish removal and disposal, grant applications, and capacity building • Develop tailored community education programs to address the unique requirements and cultural considerations of land grant communities • Provide support and resources for fuels reduction efforts, including defensible space assistance • Offer guidance and support for home hardening measures • Organize debris and rubbish removal initiatives in land grant communities, addressing fire hazards and environmental concerns • Engage with land grant community leaders and community representatives to ensure that assistance programs align with community priorities and cultural values • Seek partnerships with state, federal, and tribal agencies to support these initiatives • Maintain ongoing outreach and communication with land grant communities to ensure their needs are being met and their concerns addressed	Improve local ability and self-reliance of land grant communities to address its wildfire concerns Reduce risk of loss of life and property from wildfire	Annual assessment of personnel and equipment capacity.	• FEMA BRIC Grants • FEMA Fire Management Assistance Grant (FMAG) • Firewise Grants • 2022 Infrastructure Investments and Jobs Act • Assistance to Firefighters Grants (AFG)
FAC #2		H	Spring 2026	Implement Firewise Communities programs	Torrance County	Fire Departments, County staff, HOAs, Land Grants	Work with communities to participate in Firewise Communities and prepare for fire events. Hold Firewise booths at local events for example during the October Fire Awareness Week each year.	Protect communities and infrastructure through increased awareness and defensible space.	N/A	• Firewise grants • USFS CDWG Grants
FAC #3		M	Spring 2026	Increase signage regarding fire danger. Consider installing electronic sign in high risk areas that can have updated messages.	Torrance County	Torrance County, USFS	Add additional fire signage throughout the community to spread message of fire danger and reduce human ignitions.	Protect communities and infrastructure by raising awareness of local citizens and those travelling in the area about actions to prevent wildfire ignitions.	Regular maintenance of signage	• Firewise grants • USFS CDWG Grants
FAC #4		M	Spring 2026	Plan livestock evacuation routes and inform communities	Torrance County	Emergency Management officials, livestock agencies.	Work with emergency management officials to plan evacuation of livestock and pets and then develop into an informational brochure that could be appended to the CWPP and posted on County Emergency Management websites.	Protect communities, livestock and infrastructure through increased awareness. Expedites evacuation of residents in event of mandatory evacuation.	Regular updates	• Firewise grants • USFS CDWG Grants • RIA landowner assistance programs.
FAC #5		L	Winter 2027	Strengthen building codes	Torrance County	Torrance County	ICC code enforces building codes and ordinances for new development in the WUI.	Enhance community resiliency	N/A	• BRIC • Firewise grants • USFS CDWG Grants
FAC #6		M	Fall 2026	Construct defensible space	Torrance County	Fire Departments and Torrance County	Educate homeowners about defensible space practices. Remove all but scattered trees within 30 feet of structures. Keep grass mown and green within 100 feet of structure. Keep flammable materials at least 30 feet from structure. Surround foundations with rocks or gravel to a width of 1 feet.	Protect communities and infrastructure through increased awareness and defensible space.	Maintenance of defensible space	• Firewise grants • BRIC • USFS CDWG Grants

Project ID	Status	Priority (H,M,L)	Target date	Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves To:	Monitoring/Maintenance Requirements	Funding Sources
FAC #7		H	Winter 2026	Continue to develop a comprehensive public education and community engagement program	Torrance County	Torrance County, SWCDs	• Consider a mobile wildland fire workshop: o Have a mobile display that can be used to present fire awareness at community and partner events • Develop a comprehensive outreach strategy that considers the district's unique challenges o Utilize both online and offline communication methods (e.g., bulk mailing, radio, local newspapers) to ensure that all residents and visitors are reached • Continue to organize community engagement events, such as defensible space workshops or wildfire simulation and evacuation exercises to engage residents directly and promote involvement • Develop educational materials for addressing riparian fuels • Increase awareness and knowledge through community workshops and training classes on buffer strips, defensible space, fire safe landscaping, structural hardening, and the benefits of prescribed burning and mechanical fuels treatments • Increase awareness about common human ignition sources and associated dangers (e.g., dragging chains, equipment use, rail roads, welding and debris burning) • Identify areas with high frequencies of human ignitions to focus educational efforts • Increase awareness of the wildfire-related issues of invasive plants • Ensure inclusivity and support for vulnerable populations (e.g., disabled residents, low-income individuals, land grant members, non-English-speakers, etc.) in wildfire planning, preparedness, and response efforts • Partner with federal agencies, special districts, community associations, schools, and nonprofits to facilitate outreach efforts. • Identify and empower "community navigators" or "champions" who can advocate for wildfire preparedness and education within their communities • Develop a system for periodic updates and feedback collection from the community to ensure that outreach efforts remain effective and responsive to community needs • Tailor outreach materials and messages to address the specific concerns of each community, including issues related to fire protection, water resources, road access, and evacuation planning • Continue to provide resources and guidance to remote communities for fuels reduction efforts • Maintain a user-friendly website dedicated that centralizes wildfire safety information and resources • Establish programs in schools to distribute wildfire safety information to students • Utilize Valencia County outreach efforts as a model to follow, e.g., firefighters distributing educational pamphlets and educating homeowners on steps they can take to mitigate fire risk.	Reduce risk of human-caused wildfire ignitions. Educate citizens about wildfire hazards.	Conduct regular review of outreach materials as needed. Track local engagement.	• New Mexico Association of Counties: Wildfire Risk Reduction Program • BRIC • Firewise grants • FP&S • USFS CDWG Grants

Project ID	Status	Priority (H,M,L)	Target date	Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves To:	Monitoring/Maintenance Requirements	Funding Sources
FAC #8		H	Winter 2027	Implement a countywide program to support property owners in defensible space and home hardening measures, green waste disposal, home assessments, and addressing and signage improvements	Torrance County	Torrance County, SWCDs	• 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 consideration • Conduct an initial assessment to identify service gaps and deficiencies • Integrate this program with educational programs and proposed ordinances • Establish a defensible space and home hardening assistance program that covers funding and education • Establish a wildfire mitigation assistance program for disabled, elderly, and low-income residents • Promote and expand (if necessary) existing green waste disposal program to support residents in defensible space efforts • Implement community chipper days • Prioritize efforts in areas that are high-risk, remote, and that lack adequate water supply • Consider: o Financial incentives such as tax credits for structure improvements o Subsidies to offset mitigation costs (e.g., retrofits and new builds) for economically disadvantaged residents, for example, grants and cost-sharing opportunities o Expanding technical assistance programs for communities at greatest risk with limited capacity o Increasing financial support and technical resources to jurisdictions to hire staff and enhance capacity to adopt, enforce, and maintain building codes and standards that govern construction, design, and development in wildfire-prone areas o Defensible space cost-sharing programs	Support community defensible space and home hardening efforts	Annual program evaluation and updates as necessary Regular assessments in heavily vegetated areas	• New Mexico Association of Counties: Wildfire Risk Reduction Program • Firewise grants • EPA Environmental Education Grants • FP&S

Project ID	Status	Priority (H,M,L)	Target date	Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves To:	Monitoring/Maintenance Requirements	Funding Sources
FAC #9		M	Summer 2025	Explore options to resolve limited access issues (potential bottlenecks, locked gates, heavy roadside fuels, etc.)	Torrance County	Torrance County in collaboration with FPDs, SWCDs, USFS, NMSLO, Private landowners	• Conduct and initial assessment of ingress and egress issues to identify high-risk roads such as roads with potential bottlenecks, locked gates, or heavy roadside fuels • Prioritize road maintenance and clearance efforts to ensure safe passage for emergency vehicles and residents o Maintain fire access roads o Promote resident involvement in ROW vegetation clearance efforts o Establish regular maintenance schedules to address encroaching vegetation, debris, and road surface conditions • Maintain turn around locations, where appropriate, for first responders, and determine the need for improving or construction of new ones • Consider using backroads on public and private lands as alternatives ingress and egress points o Work with relevant entities to assess feasibility • Develop and communicate plans for communities with limited access. Ensure that residents are aware of all potential evacuation routes • Inform homeowners about the importance of keeping driveways accessible to fire trucks and emergency responders • Establish vegetation management programs and/or centralize existing plans from agencies that are responsible for ROW management • Conduct assessments of bridges with unknown capacities to determine their load-bearing capacities o Upgrade or replace bridges that do not meet safety standards o Document load bearing-capabilities of bridges, and insure proper signage is posted at key bridges, to promote safety of first responders • Implement fire breaks and fuel reduction measures along key access roads to mitigate fire risks and increase fire responder safety • Collaborate with transportation authorities and agencies to address road safety concerns and explore funding opportunities for road improvements • Install clear and informative directional signage in communities with dead ends, cul-de-sacs, and complex layouts to aid navigation for emergency responders • Collaborate with County planners and community stakeholders to ensure that future development accounts for improved access and safety considerations • Create and maintain a map with emergency access roads	Provides safe and effective means of evacuation in case of emergencies	Regular monitoring and maintenance to ensure roads are drivable for emergency response vehicles	• Building Resilient Infrastructure and Communities (BRIC) • Firewise grants • National Urban and Community Forestry Challenge Cost Share Grant Program

Project ID	Status	Priority (H,M,L)	Target date	Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves To:	Monitoring/Maintenance Requirements	Funding Sources
FAC #11		M	Spring 2026	Develop an accessible and informative toolkit for private property owners to navigate the process of collaborating with land managers	Torrance County	Torrance County, NMSF, CPSWCD, ESWCD, NMSLO	• Develop a comprehensive toolkit for private property owners, outlining the process and requirements for collaborating with land managers (e.g. USFS, NMSF, etc.) on fire mitigation projects • Ensure that the toolkit is easily accessible and transparent, with clear instructions and contact information for relevant land management agencies • Include a detailed map that clearly shows jurisdictional boundaries • Provide information on the legal and regulatory consideration for conducting fire mitigation work on land managed by governmental agencies (e.g., creeks and streams, areas with sensitive species, etc.) • Include guidance on the permitting process, documentation requirements, and any associated fees or costs • Offer resources and contact details for agency representatives who can assist private property owners in project planning and implementation • Conduct outreach to inform homeowners about the toolkit's availability and importance • Establish a feedback mechanism to gather input and suggestions from property owners for toolkit improvement	Increase collaboration Enhance community resilience	As needed	• New Mexico Association of Counties: Wildfire Risk Reduction Program • BRIC • Firewise grants • The Fire Prevention and Safety Grants (FP&S) • Environmental Protection Agency (EPA) - Environmental Education Grants

COHESIVE STRATEGY GOAL 3: WILDFIRE RESPONSE

Goal 3 of the Cohesive Strategy/Western Regional Action Plan is Wildfire Response: All jurisdictions participate in making and implementing safe, effective, efficient risk-based wildfire management decisions:

> *"A balanced wildfire response requires integrated pre-fire planning with effective, efficient, and coordinated emergency response. Pre-fire planning helps tailor responses to wildfires across jurisdictions and landscape units that have different uses and management objectives. Improved prediction and understanding of weather, burning conditions, and various contingencies during wildfire events can improve firefighting effectiveness, thereby reducing losses and minimizing risks to firefighter and public health and safety. Wildfire response capability will consider the responsibilities identified in the Federal Response Framework. Local fire districts and municipalities with statutory responsibility for wildland fire response are not fully represented throughout the existing wildland fire governance structure, particularly at the NWCG, NMAC, and GACC levels."* (WRSC 2013:15).

This section provides recommended actions that jurisdictions could undertake to improve wildfire response.

RECOMMENDATIONS FOR IMPROVING FIRE RESPONSE CAPABILITIES

Educating the public so they can reduce dependence on fire departments is essential because these resources are often stretched thin due to limited personnel. Education to enhance community preparedness is a key factor in supporting local fire departments in fire response, particularly educating residents about emergency notifications and evacuation protocols so that residents are able to safely evacuate an area while emergency responders prepare to protect life and property.

Table 4.5 below provides recommendations for improving firefighting capabilities. Many of these recommendations are general in nature.

This page intentionally left blank.

Table 4.5. Recommendations for Safe and Effective Wildfire Response

Project ID	Status	Priority (H,M,L)	Target Date	Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves To:	Monitoring/Maintenance Requirements	Funding Sources
FR #1		M	Summer 2026	Overhaul maps used by fire responders across county jurisdictions	Torrance County	Torrance County	Seek funding to aid the overhaul of county maps and make them available in GIS and global positioning system (GPS) data for fire responders. Update home occupancy information on an annual basis, and input information on maps.	Increase fire responder safety	Regular updates to maps	• Firewise grants • USFS CDWG Grants
FR #2		H	Fall 2027	Develop comprehensive evacuation strategies for remote communities, encompassing the identification of evacuation routes, establishment of potential temporary refuge areas, and the implementation of tailored evacuation plans and drills. Additionally, focus on educating residents in these isolated communities with limited access on effective evacuation procedures.	Torrance County	Torrance County	Work with local schools, community groups, and neighboring counties to establish a preplan in the event of large-scale evacuation. • Collaborate with land management agencies and fire protection agencies to discuss and develop evacuation procedures • Identify potential temporary refuge areas on a map and distribute to all residents • Increase awareness of evacuation issues through community events, workshops, and practice drills • Develop detailed maps that show all roads with potential ingress and egress points into and out of the particular community and distribute to the respective community members • Focus efforts in communities with limited ingress and egress • Connect refuge locations with backup batteries and generators. • Develop tailored evacuation plans for isolated and remote communities with only one road for access, addressing their unique challenges and needs • Engage community members in the planning process to incorporate their local knowledge and preferences • Utilize the risk assessment and the community summaries to identify high-risk communities with limited access • Plan and conduct evacuation drills in these communities, involving residents in practicing evacuation procedures under different scenarios • Develop and test effective communication strategies to notify residents of evacuation orders and provide real-time updated during emergencies • Allocate resources, including signage, emergency equipment, and personnel, to support implementation of evacuation plans • Periodically review and update the community evacuation plans to ensure they remain relevant and effective	Protect public and first responder life and safety	Regular updates to evacuation plans	• BRIC • RCP • Firewise grants • USFS CDWG Grants
FR #3		M	Winter 2026	Preplan staging areas	Torrance County	Torrance County	Work with local schools, community groups, and neighboring counties to establish a preplanned staging area for suppression sources and crews.	Protect life and property though Improved firefighting response	N/A	• BRIC • Firewise • RCP • USFS CDWG

Project ID	Status	Priority (H,M,L)	Target Date	Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves To:	Monitoring/Maintenance Requirements	Funding Sources
FR #4		H	Spring 2025	Identify, assess, and map existing water resources for fire suppression, ensuring comprehensive coverage	Torrance County	Torrance County in collaboration with FPDs	• Assess existing water resources throughout the county and create a map and/or web map showing all water sources (e.g., tanks, hydrants, ponds, ditches, etc.) o Record flow rates, pressure, and overall condition for fire hydrants o Record water availability, proper fittings, and landowner willingness to collaborate for maintaining water tanks o For ditches, identify areas where drafting water is accessible (e.g., where there is little to no vegetation) o Record areas where drafting water is feasible (e.g., ditches and ponds) • Work with fire personnel to explore the best method to host, utilize, and maintain the information • Identify stock tanks, water storage tanks, and hydrants, as well as funding 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 dispatchers can direct fire crews to available supplies.	Improve efficiency and speed of wildfire response and suppression Reduce wildfire threats to life and property	Annual assessment/review of water resources	• Emergency Management Performance Grant (EMPG) (FEMA) • New Mexico Fire Protection Grant • Firewise grants • BRIC • RCP • ECP • USFS CWFDG
FR #5		M	Spring 2025	Investigate and explore approaches to enhancing water sources for firefighting purposes	Torrance County	Torrance County in collaboration with FPDs	• Establish relationships with private property owners and assess their interest in collaborating with fire departments (i.e., making their tanks, ponds, wells, or ditches accessible to firefighters during emergencies) o Work with willing private owners to install universal fittings to water tanks • Seek funding to purchase multiple 12,000-gallon tanker trucks that can be stationed throughout the County during high fire risk. • Conduct community outreach to community residents to increase awareness of firefighting water supply issues and provide a list of action they can take to support firefighting efforts (e.g., coming together as a community to map water resources in the community; installing universal fittings to water tanks; and keeping water tanks full) • Maintain water resources accessible (e.g., reduce heavy vegetation near tanks, hydrants, and ditches) • Collaborate with land grant communities for water infrastructure improvements • Conduct outreach to agricultural or industrial operators with ample water sources (e.g., large water tanks) to assess interest in collaborating with fire departments • Consider painting fire hydrants according to their flow rates (NFPA standards) • Implement a regular testing and maintenance program for fire hydrants to ensure they are in good working condition • Seek funding to implement rainwater 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.	Protect life and property through improved firefighting response	Assess capacity on an annual basis	• FEMA Assistance to Firefighters Grants • FEMA Staffing for Adequate Fire and Emergency Response • New Mexico Fire Protection Grant • BRIC • RCP • ECP

Project ID	Status	Priority (H,M,L)	Target Date	Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves To:	Monitoring/Maintenance Requirements	Funding Sources
FR #6		H	Spring 2027	Upgrade street signage and addressing to enhance wildfire response navigation capabilities	Torrance County	Torrance County	• Continue efforts to improve road signage and coordinate with mapping efforts to ensure consistent naming conventions. • Conduct outreach to residents about the dangers of unmarked or illegible home addressing. • Install directional signage in communities with complex road layouts. • Investigate opportunities to offer programs and incentives for landowners to improve addressing • Require that all homes within the County have a visible address sign that meets an agreed upon standard (e.g., reflective 3 inch lettering, visible from the road, posted on metal sign, etc.). • install road markers that would illuminate major roads in the event of heavy smoke.	Protect life and property though Improved firefighting response	Assess current situation and determine where signage can be improved	• BRIC • FP&S • Firewise grants • USFS CDWG
FR #7		M	Winter 2027	Investigate the feasibility of establishing a Wildfire Coordinator Position for the County	Torrance County	Torrance County	• Assess feasibility of creating a countywide wildfire coordinator. The Wildfire Coordinator will serve to support: o Coordination and cooperations between agencies, organizations, and communities o Implementation of projects identified in this CWPP o Efforts regarding public outreach, awareness, trainings, and knowledge o Volunteer fire departments with building capacity o Acquisition of grant funding o Fostering of local forestry and mitigation businesses through strategic partnerships and workforce development initiatives o Wildfire mitigation, prevention, and preparedness efforts	Build resilient landscapes by scaling up wildfire planning, coordination, and training at a county level	Schedule frequent check-ins to monitor progress and effectiveness	• Staffing for Adequate Fire and Emergency Response (SAFER) • USFS CWDG • County general fund
FR #8		M	Summer 2027	Establish a Fuels management crew: create a dedicated crew trained in fuels management, defensible space inspections, and community engagement. The crew will conduct fuels reduction projects, collaborate with fire departments, and contribute to increased local capacity for wildfire prevention and firefighting	Torrance County and surrounding region	Torrance County, adjacent counties, USFS, NMSF	• Investigate opportunities to create employment and expand the fire and fuels management workforce • A fuels management crew could be utilized as a cross county resource to provide support during wildfire incident response, while simultaneously achieving significant progress in fuels management and defensible space inspections in the region • Provide crew members with extensive training in fuels management, wildland fire, defensible space assessments, and wildfire prevention, ensuring they meet all relevant qualifications o Collaborate with the USFS for potential job training • The crew may also be trained in post-fire projects (e.g., vegetation restoration and monitoring protocols for completed fuels reduction projects) • Allocate the necessary resources, equipment, and funding to support the crew and their activities • Collaborate with local fire departments to assist in firefighting efforts when necessary, adding to local firefighting capacity • Seek a partnership with adjacent counties to tackle the initiative jointly	Enhance public and firefighter safety and mitigate wildfire risk within the county	Convene annually to assess and document status of firefighting capabilities. Maintain list of trained personnel and volunteers that can be utilized across all field and incident command positions.	• Building Resilient infrastructure and Communities (BRIC) • Staffing for Adequate Fire and Emergency Response (SAFER) • USFS CWDG

Project ID	Status	Priority (H,M,L)	Target Date	Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves To:	Monitoring/Maintenance Requirements	Funding Sources
FR #9		M	Spring 2026	Explore opportunities to strengthen countywide fire department capacity building as well as equipment upgrades	Torrance County, Manzano Mountain Communities	Torrance County	• Implement a series of training programs aimed at increasing the number of community members who are Red Card certified o Conduct workshops specifically designed for mountain communities along the Manzano Mountains o Offer specialized training sessions to empower local residents to assist in fire response effort • Centralize and provide fire protection protocols between agencies • Assist fire departments with grant applications and to find new sources of funding • Create online resources to facilitate sharing of information between fire chiefs in Torrance County • Consider establishing a monthly or quarterly roundtable for regular status updates • Establish and/or expand relationships with high schools, colleges, and nonprofits to encourage volunteer recruitment • Inform communities about the challenges faced by FDs to emphasize the significance of supporting these organizations through volunteering, fundraising, and personal actions • Increase inventory of 4×4s and brush trucks • Provide personal protective equipment for all firefighters • Provide free training program (S130-190 Basic Wildland Fire Training) 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. • 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 the public of fire resources situation. Work with editor to have a year-round column that documents fire department activities.	Protect life and property through improved firefighting response	Assess capacity on an annual basis	• FEMA Assistance to Firefighters Grants • FEMA Staffing for Adequate Fire and Emergency Response • Firewise grants • National Urban and Community Forest Program • GSA-Federal Excess Personal Property (GSA)

This page intentionally left blank.

CHAPTER 5 – MONITORING AND EVALUATION

Developing an action plan and an assessment strategy that identifies roles and responsibilities, funding needs, and timetables for completing highest-priority projects is an important step in organizing the implementation of the Torrance County CWPP. The previous chapter identifies tentative timelines and monitoring protocols for project recommendations, the details of which are outlined below.

All stakeholders and signatories to this CWPP desire worthwhile outcomes. It is also known that risk reduction work on the ground, for the most part, is often not attainable in a few months—or even years. The amount of money and effort invested in implementing a plan such as this requires that there be a means to describe, quantitatively and/or qualitatively, if the goals and objectives expressed in this plan are being accomplished according to expectations.

Monitoring and reporting contribute to the long-term evaluation of changes in ecosystems, as well as the knowledge base about how natural resource management decisions affect both the environment and the people who live in it. Furthermore, as the CWPP evolves over time, there may be a need to track changes in policy, requirements, stakeholder changes, and levels of preparedness. These can be significant for any future revisions and/or addendums to the CWPP.

It is recommended that project monitoring be a collaborative effort. There are many resources for designing and implementing community based, multi-party monitoring that could support and further inform a basic monitoring program for the CWPP (Egan 2013). Multi-party monitoring involves a diverse group consisting of community members, community-based groups, regional and national interest groups, and public agencies. Using this multi-party approach increases community understanding of the effects of restoration efforts and trust among restoration partners. Multi-party monitoring may be more time consuming due to the collaborative nature of the work; therefore, a clear and concise monitoring plan must be developed.

Table 5.1 Identifies monitoring strategies for various aspects of all categories of CWPP recommendations and the effects of their implementation, both quantifiable and non-quantifiable, for assessing the progress of the CWPP and increase sustainability of projects. It must be emphasized that these strategies are 1) not exhaustive and 2) dependent on available funds and personnel to implement them.

Table 5.1. Recommended Monitoring Strategies

Strategy	Task/Tool	Lead	Remarks
Project tracking system	On-line web app to track hazardous fuels projects spatially, integrating wildfire risk layer to show progress towards wildfire hazard and risk reduction. Web app would include attribute tables that outline project details	County	Interactive tool will be easily updated and identify areas that require additional efforts
Photographic record (documents pre- and post-fuels reduction work, evacuation routes, workshops, classes, field trips, changes in open space, treatment type, etc.)	Establish field global positioning system (GPS) location; photo points of cardinal directions; keep photos protected in archival location	Core Team member	Relatively low cost; repeatable over time; used for programs and tracking objectives
Number of acres treated (by fuel type, treatment method)	GPS/GIS/fire behavior prediction system	Core Team member	Evaluating costs, potential fire behavior
Number of home ignition zones/defensible space treated to reduce structural ignitability	GPS	Homeowner	Structure protection
Number of residents/citizens participating in any CWPP projects and events	Meetings, media interviews, articles	Core Team member	Evaluate culture change objective
Number of homeowner contacts (brochures, flyers, posters, etc.)	Visits, phone	Agency representative	Evaluate objective
Number of jobs created	Contracts and grants	Core Team member	Evaluate local job growth
Education outreach: number, kinds of involvement	Workshops, classes, field trips, signage	Core Team member	Evaluate objectives
Emergency management: changes in agency response capacity	Collaboration	Agency representative	Evaluate mutual aid
Codes and policy changes affecting CWPP	Qualitative	Core Team	CWPP changes
Number of stakeholders	Added or dropped	Core Team	CWPP changes
Wildfire acres burned, human injuries/fatalities, infrastructure loss, environmental damage, suppression, and rehabilitation costs	Wildfire records	Core Team	Compare with 5- or 10-year average

FUELS TREATMENT MONITORING

It is important to evaluate whether fuel treatments have accomplished their defined objectives and whether any unexpected outcomes have occurred.

The strategies outlined in this section consider several variables:

- Do the priorities identified for treatment reflect the goals stated in the plan? Monitoring protocols can help address this question.

- Can there be ecological consequences associated with fuels work? Items to consider include soil movement and/or invasive species encroachment post-treatment. Relatively cost-effective monitoring may help reduce long term costs and consequences.
- Vegetation will grow back. Thus, fuel break maintenance and fuels modification in both the home ignition zone and at the landscape scale require periodic assessment. Monitoring these changes can help decision-makers identify appropriate treatment intervals.
- Monitoring for all types of fuels treatment is recommended. For example, in addition to monitoring mechanical treatments, it is important to carry out comprehensive monitoring of burned areas to establish the success of pre-fire fuels reduction treatments on fire behavior, as well as monitoring for ecological impacts, repercussions of burning on wildlife, and effects on soil chemistry and physics. Adaptive management is a term that refers to adjusting future management based on the effects of past management. Monitoring is required to gather the information necessary to inform future management decisions. Economic and legal questions may also be addressed through monitoring. In addition, monitoring activities can provide valuable educational opportunities for students.

The monitoring of each fuels reduction project would be site-specific, and decisions regarding the timeline for monitoring and the type of monitoring to be used would be determined by project. The most important part of choosing a fuels project monitoring program is selecting a method appropriate to the people, place, and type of project. Several levels of monitoring activities meet different objectives, have different levels of time intensity, and are appropriate for different groups of people. They include the following:

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

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, global positioning system (GPS)-recorded locations, and photographs 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. This method is appropriate for foresters or other personnel monitoring fuel treatments on forested lands.

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

The protocol for this level would include the vegetation plots described above but would add more details regarding fuel loading. Crown height or canopy closure might be included for live fuels. Dead and downed fuels could be assessed using other methods, such as Brown's transects (Brown 1974), an appropriate photo series (Ottmar et al. 2000), or fire monitoring (Fire Effects Monitoring and Inventory System [FIREMON]) plots. This method is ideal for foresters or university researchers tracking vegetation changes in forested lands.

IMPLEMENTATION

The Torrance County CWPP makes recommendations for prioritized fuels reduction projects, for measures to reduce structural ignitability, and methods with which carry out public education and outreach. Implementation projects need to be tailored to the specific project and will be unique to the location depending on available resources and regulations. Implementation of the recommendations in the Torrance County CWPP planning area will require the development of a 1- to 2-year action plan each project in order to plan, implement, track, and report on progress made. The Core Team should commit to no less than annual review in regard to the action plan.

Furthermore, outside of, or in addition to, the Core Team that developed the CWPP, there should be a community-based action plan team that carries the CWPP actions forward.

Information pertaining to funding is provided in Appendix F.

CWPP EVALUATION

CWPPs are intended to reduce the risk from wildfire for a community and surrounding environment. However, over time, communities change and expand, vegetation grows back, and forests and wildlands evolve. As such, the risk of wildfire to communities is constantly changing. The plans and methods to reduce risk must be dynamic to keep pace with the changing environment. An evaluation of the CWPP will gather information and identify whether the plans and strategies are on course to meet the desired outcomes or if modifications are needed to meet expectations.

Four general steps can be used to evaluate the CWPP:

1. Identify objectives: What are the goals identified in the plan? How are they reached? Is the plan performing as intended?
    a. Structural ignitability
    b. Fuel treatments
    c. Public education and outreach
    d. Multi-agency collaboration
    e. Emergency response
2. Assess the changing environment: How have population characteristics and the wildfire environment changed?
    a. Population change
        i. Increase or decrease
        ii. Demographics
    b. Population settlement patterns
        i. Distribution
        ii. Expansion into the WUI
    c. Vegetation
        i. Fuel quantity and type

ii. Drought and disease impacts

3. Review action items: Are actions consistent with the plan's objectives?
   a. Check for status, i.e., completed/started/not started
   b. Identify completed work and accomplishments
   c. Identify challenges and limitations
   d. Identify next steps
4. Assess results: What are the outcomes of the action items?
   a. Multi-agency collaboration
      i. Who was involved in the development of the CWPP?
      ii. Have partners involved in the development process remained involved in the implementation?
      iii. How has the planning process promoted implementation of the CWPP?
      iv. Have CWPP partnerships and collaboration had a beneficial impact on the community?
   b. Risk assessment
      i. How is the risk assessment utilized to make decisions about fuel treatment priorities?
      ii. Have there been new wildfire-related regulations?
      iii. Are at-risk communities involved in mitigating wildfire risk?
   c. Hazardous fuels
      i. How many acres have been treated?
      ii. How many projects are cross-boundary?
      iii. How many residents have participated in creating defensible space?
   d. Structural ignitability
      i. Have there been updates to fire codes and ordinances?
      ii. How many structures have been lost to wildfire?
      iii. Has the CWPP increased public awareness of structural ignitability and reduction strategies?
   e. Public education and outreach
      i. Has public awareness of wildfire and mitigation strategies increased?
      ii. Have residents been involved in wildfire mitigation activities?
      iii. Has there been public involvement?
      iv. Have vulnerable populations been involved?
   f. Emergency response
      i. Has the CWPP been integrated into relevant plans (e.g., hazard mitigation or emergency operations)?
      ii. Is the CWPP congruent with other hazard mitigation planning efforts?
      iii. Has availability and capacity of local fire departments changed since the CWPP was developed?

TIMELINE FOR UPDATING THE CWPP

The HFRA allows for maximum flexibility in the CWPP planning process, permitting the Core Team to determine the time frame for updating the CWPP. However, it is suggested that a formal revision be made on the fifth anniversary of signing and every 5 years following. The Core Team members are encouraged to meet on an annual basis to review the project list, discuss project successes, and strategize regarding project implementation funding.

ABBREVIATIONS AND ACRONYMS

°F	degrees Fahrenheit
AMMs	avoidance and minimization measures
AFR	Albuquerque Fire Rescue
ATV	all-terrain vehicle
BAER	Burned Area Emergency Rehabilitation
BCFR	Bernalillo County Fire & Rescue
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
BMP	best management practice
BTU/ft/sec	British Thermal Units per foot per second
CAR	community at risk
CE	categorical exemption
ch/hr	chains per hour
Cibola NF	Cibola National Forest
CIG	Conservation Innovation Grants
Cohesive Strategy	National Cohesive Wildland Fire Management Strategy
County	Bernalillo County
CRS	Congressional Research Service
CUSP	Coalition for the Upper South Platte
CWA	Clean Water Act
CWPP	Community Wildfire Protection Plan
DEM	digital elevation model
DHS	Department of Homeland Security
DOI	U.S. Department of the Interior
EAS	Emergency Alert System
EIR	Environmental Impact Report
EMNRD	New Mexico Energy, Minerals, and Natural Resources Department
EMS	Emergency Management System
EPA	U.S. Environmental Protection Agency
EOC	Emergency Operations Center
EQIP	Environmental Quality Incentives Program
ESRI	Environmental Systems Research Institute
EWP	Emergency Watershed Protection

FAC	Fire-adapted Community
FACNM	Fire Adapted Communities New Mexico
FAWRA	Forest and Watershed Restoration Act
FEMA	Federal Emergency Management Agency
FLAME	Federal Land Assistance, Management and Enhancement Act
FP&S	Fire Prevention and Safety
FRA	Federal Responsibility Area
FRI	fire return interval
FSG	Forest Stewards Guild
GAID	Geographic Area Interagency Division
GIS	geographic information system
GPS	global positioning system
HFRA	Healthy Forests Restoration Act
HIZ	home ignition zone
HMP	hazard mitigation plan
HVRA	highly valued resource or asset
ICC	International Code Council
ICS	Incident Command System
IFTDSS	Interagency Fuel Treatment Decision Support System
IMAS	Interstate Mutual Aid System
IPAWS	Integrated Public Alert & Warning System
ISO	Insurance Services Office
KAFB	Kirtland Air Force Base
LRA	Local Responsibility Area
MFI	mean fire interval
MND	mitigated negative declaration
NEPA	National Environmental Policy Act
ND	negative declaration
NFP	National Fire Plan
NFPA	National Fire Protection Association
NIFC	National Interagency Fire Center
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NWCG	National Wildfire Coordinating Group

OES	Office of Emergency Services
PERI	Public Entity Risk Institute
PPE	personal protective equipment
RAWS	remote automated weather station
RFA	Rural Fire Assistance
SAF	Society of American Foresters
SAFER	Staffing for Adequate Fire and Emergency Response
SE	statutory exemption
SHPO	State Historic Preservation Office
SRA	State Responsibility Area
SWCA	SWCA Environmental Consultants
SWCC	Southwest Coordination Center
SWCD	Soil and Water Conservation District
ULI	Urban Land Institute
USDA	U.S. Department of Agriculture
USFA	U.S. Fire Administration
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VAR	value at risk
VCC	Vegetation Condition Class
VDEP	Vegetation Departure
WFDSS	Wildland Fire Decision Support System
WRSC	Western Regional Strategy Committee
WUI	wildland urban interface

GLOSSARY

Aspect: Cardinal direction toward which a slope faces in relation to the sun (NWCG 2021b).

Active Crown Fire: A crown fire in which the entire fuel complex is involved in flame, but the crowning phase remains dependent on heat released from surface fuel for continued spread. An active crown fire presents a solid wall of flame from the surface through the canopy fuel layers. Flames appear to emanate from the canopy as a whole rather than from individual trees within the canopy. Active crown fire is one of several types of crown fire and is contrasted with **passive crown fires**, which are less vigorous types of crown fire that do not emit continuous, solid flames from the canopy (SWCA Environmental Consultants [SWCA]).

Available Canopy Fuel: The mass of canopy fuel per unit area consumed in a crown fire. There is no post-frontal combustion in canopy fuels, so only fine canopy fuels are consumed. We assume that only the foliage and a small fraction of the branchwood is available (Wooten 2021).

Available Fuel: The total mass of ground, surface and canopy fuel per unit area available fuel consumed by a fire, including fuels consumed in postfrontal combustion of duff, organic soils, and large woody fuels (Wooten 2021).

Backfiring: Intentionally setting fire to fuels inside a control line to contain a fire (Wooten 2021).

Biomass: Organic material. Also refers to the weight of organic material (e. g. biomass roots, branches, needles, and leaves) within a given ecosystem (Wooten 2021).

Burn Severity: A qualitative assessment of the heat pulse directed toward the ground during a fire. Burn severity relates to soil heating, large fuel and duff consumption, consumption of the litter and organic layer beneath trees and isolated shrubs, and mortality of buried plant parts (SWCA).

Canopy: The more or less continuous cover of branches and foliage formed collectively by adjacent trees and other woody species in a forest stand. Where significant height differences occur between trees within a stand, formation of a multiple canopy (multi-layered) condition can result (SWCA).

Chain: Unit of measure in land survey, equal to 66 feet (20 M) (80 chains equal 1 mile). Commonly used to report fire perimeters and other fireline distances. Popular in fire management because of its convenience in calculating acreage (example: 10 square chains equal one acre) (New Mexico Future Farmers of America 2010).

Climate Adaptation: Adaptation is an adjustment in natural or human systems to a new or changing environment. Adaptation to climate change refers to adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities (California Governor's Office of Planning and Research [CA GOPR] 2020).

Climate Change: A change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods (CA GOPR 2020).

Community Assessment: An analysis designed to identify factors that increase the potential and/or severity of undesirable fire outcomes in wildland urban interface communities (SWCA).

Communities at Risk: Defined by the HFRA as "Wildland-Urban Interface Communities within the vicinity of federal lands that are at high risk from wildfire."

Community Emergency Response Team (CERT): The CERT program educates volunteers about disaster preparedness for the hazards that may impact their area and trains them in basic disaster response skills, such as fire safety, light search and rescue, team organization, and disaster medical operations. CERT offers a consistent, nationwide approach to volunteer training and organization that professional responders can rely on during disaster situations, allowing them to focus on more complex tasks (Ready 2021).

Community Wildfire Protection Plan (CWPP): A planning document that seeks to reduce the threat to life and property from wildfire by identifying and mitigating wildfire hazards to communities and infrastructure located in the wildland urban interface (WUI). Developed from the HFRA, a CWPP addresses issues such as wildfire response, hazard mitigation, community preparedness, or structure protection (SWCA).

Conditional Surface Fire: A potential type of fire in which conditions for sustained conditional surface fire active crown fire spread are met but conditions for crown fire initiation are not. If the fire begins as a surface fire, then it is expected to remain so. If it begins as an active crown fire in an adjacent stand, then it may continue to spread as an active crown fire (Wooten 2021).

Contain: A tactical point at which a fire's spread is stopped by and within specific contain features, constructed or natural; also, the result of stopping a fire's spread so that no further spread is expected under foreseeable conditions. For reporting purposes, the time and date of containment. This term no longer has a strategic meaning in Federal wildland fire policy (Wooten 2021).

Control: To construct fireline or use natural features to surround a fire and any control spot fires therefrom and reduce its burning potential to a point that it no longer threatens further spread or resource damage under foreseeable conditions. For reporting purposes, the time and date of control. This term no longer has a strategic meaning in Federal wildland fire policy (Wooten 2021).

Cover Type: The type of vegetation (or lack of it) growing on an area, based on cover type minimum and maximum percent cover of the dominant species, species group or non-living land cover (such as water, rock, etc.). The cover type defines both a qualitative aspect (the dominant cover type) as well as a quantitative aspect (the abundance of the predominant features of that cover type; Wooten 2021).

Creeping Fire: A low-intensity fire with a negligible rate of spread (Wooten 2021).

Crown Fire: A fire that advances at great speed from crown to crown in tree canopies, often well in advance of the fire on the ground (National Geographic 2021).

Defensible Space: An area around a structure where fuels and vegetation are modified, cleared, or reduced to slow the spread of wildfire toward or from a structure. The design and distance of the defensible space is based on fuels, topography, and the design/materials used in the construction of the structure (SWCA).

Duff: The layer of decomposing organic materials lying below the litter layer of freshly fallen twigs, needles, and leaves and immediately above the mineral soil (SWCA).

Ecosystem: An interacting natural system including all the component organisms together with the abiotic environment and processes affecting them (SWCA).

Environmental Conditions: That part of the fire environment that undergoes short-term changes: weather, which is most commonly manifest as windspeed, and dead fuel moisture content (Wooten 2021).

Escape Route: A preplanned and understood route firefighters take to move to a safety zone or other low-risk area. When escape routes deviate from a defined physical path, they should be clearly marked (flagged; SWCA).

Evacuation: The temporary movement of people and their possessions from locations threatened by wildfire (SWCA).

Fire-Adapted Community: A fire-adapted community collaborates to identify its wildfire risk and works collectively on actionable steps to reduce its risk of loss. This work protects property and increases the safety of firefighters and residents (USFA 2021b).

Fire Behavior: The manner in which fuel ignites, flame develops, and fire spread and exhibits other related phenomena as determined by the interaction of fuels, weather, and topography (Fire Research and Management Exchange System 2021).

Fire Break: Areas where vegetation and organic matter are removed down to mineral soil (SWCA).

Fire Environment: The characteristics of a site that influence fire behavior. In fire modeling the fire environment is described by surface and canopy fuel characteristics, windspeed and direction, relative humidity, and slope steepness (Wooten 2021).

Fire Frequency: A broad measure of the rate of fire occurrence in a particular area. For historical analyses, fire frequency is often expressed using the fire return interval calculation. For modern-era analyses, where data on timing and size of fires are recorded, fire frequency is often best expressed using fire rotation (SWCA).

Fire Hazard: Fire hazard is the potential fire behavior or fire intensity in an area, given the type(s) of fuel present – including both the natural and built environment – and their combustibility (CA GOPR 2020).

Fire History: The chronological record of the occurrence of fire in an ecosystem or at a specific site. The fire history of an area may inform planners and residents about the level of wildfire hazard in that area (SWCA).

Fire Intensity: A general term relating to the heat energy released in a fire (SWCA).

Fireline Intensity: Amount of heat release per unit time per unit length of fire front. Numerically, the product of the heat of combustion, quantity of fuel consumed per unit area in the fire front, and the rate of spread of a fire, expressed in kilowatts per minute (SWCA). This expression is commonly used to describe the power of wildland fires, but it does not necessarily follow that the severity, defined as the vegetation mortality, will be correspondingly high (Wooten 2021).

Fire Prevention: Activities such as public education, community outreach, planning, building code enforcement, engineering (construction standards), and reduction of fuel hazards that is intended to reduce the incidence of unwanted human-caused wildfires and the risks they pose to life, property or resources (CA GOPR 2020).

Fire Regime: A measure of the general pattern of fire frequency and severity typical to a particular area or type of landscape: The regime can include other metrics of the fire, including seasonality and typical fire size, as well as a measure of the pattern of variability in characteristics (SWCA).

Fire Regime Condition Class: Condition classes are a function of the degree of fire regime condition class departure from historical fire regimes resulting in alterations of key ecosystem components such as composition structural stage, stand age, and canopy closure (Wooten 2021).

Fire Return Interval: Number of years (interval) between two successive fires in a designated area (SWCA).

Fire Severity: A qualitative measure of the immediate effects of fire on the fire severity ecosystem. It relates to the extent of mortality and survival of plant and animal life both aboveground and belowground and to loss of organic matter. It is determined by heat released aboveground and belowground. Fire Severity is dependent on intensity and residence dependent of the burn. For trees, severity is often measured as percentage of basal area removed. An intense fire may not necessarily be severe (Wooten 2021).

Fire Risk: "Risk" takes into account the intensity and likelihood of a fire event to occur as well as the chance, whether high or low, that a hazard such as a wildfire will cause harm. Fire risk can be determined by identifying the susceptibility of a value or asset to the potential direct or indirect impacts of wildfire hazard events (CA GOPR 2020).

Flammability: The relative ease with which fuels ignite and burn regardless of the quantity of the fuels (SWCA).

Flame Length: The length of flames in the propagating fire front measured along the slant of the flame from the midpoint of its base to its tip. It is mathematically related to fireline intensity and tree crown scorch height (Wooten 2021).

Foliar Moisture content: Moisture content (dry weight basis) of live foliage, foliar moisture content expressed as a percent. Effective foliar moisture content incorporates the moisture content of other canopy fuels such as lichen, dead foliage, and live and dead branchwood (Wooten 2021).

Forest Fire: uncontrolled burning of a woodland area (National Geographic 2021).

Fuel Break: A natural or manmade change in fuel characteristics which affects fire behavior so that fires burning into them can be more readily controlled (NWCG 2021c).

Fuel Complex: The combination of ground, surface, and canopy fuel strata (Wooten 2021).

Fuel Condition: Relative flammability of fuel as determined by fuel type and environmental conditions (SWCA).

Fuel Continuity: A qualitative description of the distribution of fuel both horizontally and vertically. Continuous fuels readily support fire spread. The larger the fuel discontinuity, the greater the fire intensity required for fire spread (Wooten 2021).

Fuel Loading: The volume of fuel in a given area generally expressed in tons per acre (SWCA). Dead woody fuel loadings are commonly described for small material in diameter classes of 0 to 0.25, 0.25 to 1, and 1 to 3 inches and for large material greater than 3 inches (Wooten 2021).

Fuel Management/Fuel Reduction: Manipulation or removal of fuels to reduce the likelihood of ignition and to reduce potential damage in case of a wildfire. Fuel reduction methods include prescribed fire, mechanical treatments (mowing, chopping), herbicides, biomass removal (thinning or harvesting or trees, harvesting of pine straw), and grazing. Fuel management techniques may sometimes be combined for greater effect (SWCA).

Fuel Model: A set of surface fuel bed characteristics (load and surface-area-to- fuel model volume-ratio by size class, heat content, and depth) organized for input to a fire model (Wooten 2021).

Fuel Modification: The manipulation or removal of fuels (i.e., combustible biomass such as wood, leaves, grass, or other vegetation) to reduce the likelihood of igniting and to reduce fire intensity. Fuel modification activities may include lopping, chipping, crushing, piling and burning, including prescribed burning. These activities may be performed using mechanical treatments or by hand crews. Herbicides and prescribed herbivory (grazing) may also be used in some cases. Fuel modification may also sometimes be referred to as "vegetation treatment" (CA GOPR 2020).

Fuel Moisture Content: This is expressed as a percent or fraction of oven dry fuel moisture content weight of fuel. It is the most important fuel property controlling flammability. In living plants, it is physiologically bound. Its daily fluctuations vary considerably by species but are usually above 80 to 100 percent. As plants mature, moisture content decreases. When herbaceous plants cure, their moisture content responds as dead fuel moisture content, which fluctuates according to changes in temperature, humidity, and precipitation (Wooten 2021).

Fuel Treatment: The manipulation or removal of fuels to minimize the probability of ignition and/or to reduce potential damage and resistance to fire suppression activities (NWCG 2021d). Synonymous with fuel modification.

Grazing: There are two types of grazing: (1) traditional grazing, and (2) targeted grazing. Traditional grazing refers to cattle that are managed in extensive pastures to produce meat. Targeted grazing involves having livestock graze at a specific density for a given period of time for the purpose of managing vegetation. Even though both kinds of grazing manage fuel loading in range- and forested lands, targeted grazing is different in that its sole purpose is to manage fuels. Targeted grazing is done by a variety of livestock species such as sheep, goats, or cows (University of California, Agriculture and Natural Resources [UCANR] 2019).

Ground Fire: Fire that burns organic matter in the soil, or humus; usually does not appear at the surface (National Geographic 2021).

Ground Fuels: Fuels that lie beneath surface fuels, such as organic soils, duff, decomposing litter, buried logs, roots, and the below-surface portion of stumps (Wooten 2021).

Hazard: A "hazard" can be defined generally as an event that could cause harm or damage to human health, safety, or property (CA GOPR 2020).

Hazardous Areas: Those wildland areas where the combination of vegetation, topography, weather, and the threat of fire to life and property create difficult and dangerous problems (SWCA).

Hazardous Fuels: A fuel complex defined by type, arrangement, volume, condition, and location that poses a threat of ignition and resistance to fire suppression (NWCG 2021e).

Hazardous Fuels Reduction: Any strategy that reduces the amount of flammable material in a fire-prone ecosystem. Two common strategies are mechanical thinning and controlled burning (Wooten 2021).

Hazard Reduction: Any treatment that reduces the threat of ignition and spread of fire (SWCA).

Highly Valued Resources and Assets: Landscape features that are influenced positively and/or negatively by fire. Resources are naturally occurring, while Assets are human-made (IFTDSS 2021).

Ignition: The action of setting something on fire or starting to burn (SWCA).

Incident: An occurrence or event, either natural or person-caused, which requires an emergency response to prevent loss of life or damage to property or natural resources (Wooten 2021).

Influence Zone: An area that, with respect to wildland and urban fire, has a set of conditions that facilitate the opportunity for fire to burn from wildland fuels to the home and or structure ignition zone (NWCG 2021a).

Initial Attack: The actions taken by the first resources to arrive at a wildfire to protect lives and property, and prevent further extension of the fire (SWCA).

Invasive Species: An introduced, nonnative organism (disease, parasite, plant, or animal) that begins to spread or expand its range from the site of its original introduction and that has the potential to cause harm to the environment, the economy, or to human health (USGS 2021).

Ladder Fuels: Fuels that provide vertical continuity allowing fire to carry from surface fuels into the crowns of trees or shrubs with relative ease (SWCA).

Litter: Recently fallen plant material that is only partially decomposed and is still discernible (SWCA).

Manual Treatments: Felling and piling of fuels done by hand. The volume of material generated from a manual fuel treatment is typically too small to warrant a biomass sale therefore collected material is disposed of by burning or chipping. The work can be performed by either a single individual or a large organized crew with powered equipment (UCANR 2021a).

Mechanized Treatments: Mechanical treatments pulverize large continuous patches of fuel to reduce the volume and continuity of material. Mechanical treatments can be applied as either mastication or chipping treatments. Both treatments shred woody material, but mastication leaves residue on-site while chipping collects the particles for transportation off site. Similar to hand treatments, mechanical treatments can target specific areas and vegetation while excluding areas of concern. In addition, mechanical treatment is easily scalable to large areas (>30 acres) with little added cost (UCANR 2021b).

Mitigation: Action that moderates the severity of a fire hazard or risk (SWCA).

Mutual Aid: Assistance in firefighting or investigation by fire agencies, irrespective of jurisdictional boundaries (NWCG 2021f).

Native Revegetation: The process of replanting and rebuilding the soil of disturbed land (e.g., burned) with native plant species (USDA 2005).

Native Species: A species that evolved naturally in the habitat, ecosystem, or region as determined by climate, soil, and biotic factors (USDA 2005).

National Cohesive Strategy: The National Cohesive Wildland Fire Management Strategy is a strategic push to work collaboratively among all stakeholders and across all landscapes, using best science, to make meaningful progress toward three goals:

- Resilient Landscapes
- Fire-Adapted Communities
- Safe and Effective Wildfire Response

Vision: To safely and effectively extinguish fire when needed; use fire where allowable; manage our natural resources; and as a nation, to live with wildland fire (Forests and Rangelands 2021).

Overstory: That portion of the trees in a forest which forms the upper or uppermost layer (SWCA).

Passive Crown Fire: A type of crown fire in which the crowns of individual trees or small groups of trees burn, but solid flaming in the canopy cannot be maintained except for short periods. Passive crown fire encompasses a wide range of crown fire behavior, from occasional torching of isolated trees to nearly active crown fire. Passive crown fire is also called torching or candling. A fire in the crowns of the trees in which trees or groups of trees torch, ignited by the passing front of the fire. The torching trees reinforce the spread rate, but these fires are not basically different from surface (SWCA).

Prescribed Burning: Any fire ignited by management actions under specific, predetermined conditions to meet specific objectives related to hazardous fuels or habitat improvement. Usually, a written, approved prescribed fire plan must exist, and NEPA requirements must be met, prior to ignition (USFS 2021c).

Rate of Spread: The relative activity of a fire in extending its horizontal dimensions. It is expressed as rate of increase of the total perimeter of the fire, as rate of forward spread of the fire front, or as rate of increase in area, depending on the intended use of the information. Usually, it is expressed in chains or acres per hour for a specific period in the fire's history (NWCG 2021g).

Resilience: Resilience is the capacity of any entity – an individual, a community, an organization, or a natural system – to prepare for disruptions, to recover from shocks and stresses, and to adapt and grow from a disruptive experience (CA GOPR 2020).

Response: Movement of an individual firefighting resource from its assigned standby location to another location or to an incident in reaction to dispatch orders or to a reported alarm (SWCA).

Safety Element: One of the seven mandatory elements of a local general plan (a county plan that forms the foundation for future development), the safety element must identify hazards and hazard abatement provisions to guide local decisions related to zoning, subdivisions, and entitlement permits. The element should contain general hazard and risk reduction strategies and policies supporting hazard mitigation measures (CA GOPR 2020).

Slash: Debris left after logging, pruning, thinning, or brush cutting. Slash includes logs, chips, bark, branches, stumps, and broken trees or brush that may be fuel for a wildfire (SWCA).

Slope Percent: The ratio between the amount of vertical rise of a slope and horizontal distance as expressed in a percent. One hundred feet of rise to 100 feet of horizontal distance equals 100 percent (NWCG 2021h).

Suppression: The most aggressive fire protection strategy, it leads to the total extinguishment of a fire (SWCA).

Surface Fire: fire that typically burns only surface litter and undergrowth (National Geographic 2021).

Surface Fuel: Fuels lying on or near the surface of the ground, consisting of leaf and needle litter, dead branch material, downed logs, bark, tree cones, and low stature living plants (SWCA).

Structural Ignitability: The ability of structures (such as homes or fences) to catch fire (SWCA).

Topography: The arrangement of the natural and artificial physical features of an area (SWCA).

Total Fuel Load: The mass of fuel per unit area that could possibly be consumed in a hypothetical fire of the highest intensity in the driest fuels (Wooten 2021).

Tree Crown: The primary and secondary branches growing out from the main stem, together with twigs and foliage (SWCA).

Understory: Low-growing vegetation (herbaceous, brush or reproduction) growing under a stand of trees. Also, that portion of trees in a forest stand below the overstory (SWCA).

Understory Fire: A fire burning in the understory, more intense than a surface fire with flame lengths of 1 to 3 m (Wooten 2021).

Values and Assets at Risk: The elements of a community or natural area considered valuable by an individual or community that could be negatively impacted by a wildfire or wildfire operations. These values can vary by community and can include public and private assets (natural and manmade) -- such as homes, specific structures, water supply, power grids, natural and cultural resources, community infrastructure-- as well as other economic, environmental, and social values (CA GOPR 2020).

Vulnerable Community: Vulnerable communities experience heightened risk and increased sensitivity to natural hazard and climate change impacts and have less capacity and fewer resources to cope with, adapt to, or recover from the impacts of natural hazards and increasingly severe hazard events because of climate change. These disproportionate effects are caused by physical (built and environmental), social, political, and/ or economic factor(s), which are exacerbated by climate impacts. These factors include, but are not limited to, race, class, sexual orientation and identification, national origin, and income inequality (CA GOPR 2020).

Wildfire: A “wildfire” can be generally defined as any unplanned fire in a “wildland” area or in the wildland-urban interface (WUI) (CA GOPR 2020).

Wildfire Exposure: During fire suppression activities, an exposure is any area/property that is threatened by the initial fire, but in National Fire Incident Reporting System (NFIRS) a reportable exposure is any fire that is caused by another fire, i.e., a fire resulting from another fire outside that building, structure, or vehicle, or a fire that extends to an outside property from a building, structure, or vehicle (USFA 2020).

Wildfire Influence Zone: A wildland area with susceptible vegetation up to 1.5 miles from the interface or intermix WUI (CA GOPR 2020).

Wildland: Those unincorporated areas covered wholly or in part by trees, brush, grass, or other flammable vegetation (CA GOPR 2020).

Wildland Fire: Fire that occurs in the wildland as the result of an unplanned ignition (CA GOPR 2020).

Wildland Fuels (aka fuels): Fuel is the material that is burning. It can be any kind of combustible material, especially petroleum-based products, and wildland fuels. For wildland fire, it is usually live, or dead plant material, but can also include artificial materials such as houses, sheds, fences, pipelines, and trash piles. In terms of vegetation, there are 6 wildland fuel types (Fuel Type: An identifiable association of fuel elements of distinctive species, form, size, arrangement, or other characteristics that will cause a predictable rate of spread or resistance to control under specified weather conditions.) The 6 wildland fuel types are (NWCG 2021i):

- Grass
- Shrub
- Grass-Shrub
- Timber Litter
- Timber-Understory
- Slash-Blowdown

Wildland Urban Interface (WUI): The WUI is the zone of transition between unoccupied land and human development. It is the line, area or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels (USFA 2021a). In the absence of a Community Wildfire Protection Plan, Section 101 (16) of the Healthy Foresters Restoration Act defines the wildland urban interface as " (I) an area extending ½ mile from the boundary of an at-risk community; (II) an area within 1 ½ miles of the boundary of an at-risk community, including any land that (1) has a sustained steep slope that creates the potential for wildfire behavior endangering the at-risk community; (2) has a geographic feature that aids in creating an effective fire break, such as a road or ridge top; or (3) is in condition class 3, as documented by the Secretary in the project-specific environmental analysis; (III) an area that is adjacent to an evacuation route for an at-risk community that the Secretary determines, in cooperation with the at-risk community, requires hazardous fuels reduction to provide safer evacuation from the at-risk community." A Community Wildfire Protection Plan offers the opportunity to establish a localized definition and boundary for the wildland urban interface (USFS 2021c, 2021d).

REFERENCES

Abatzoglou, J.T., and A.P. Williams. 2016. Impact of anthropogenic climate change on wildfire across western US forests. *Proceedings of the National Academy of Sciences* 113(42):117770–11775. Available at: https://doi.org/10.1073/pnas.1607171113.

Adams, H.D., M. Guardiola-Claramonte, G.A. Barron-Gafford, J.C. Villegas, D.D. Breshears, C.B. Zou, P.A. Troch, and T.E. Huxman. 2009. Temperature sensitivity of drought-induced tree mortality portends increased regional die-off under global-change-type drought. *Proceedings of the National Academy of Sciences* 106(17):7063–7066. Available at: https://www.pnas.org/content/106/17/7063.short. Accessed March 2022.

Agee, J.K. 1998. The landscape ecology of western forest fire regimes. *Northwest Science* 72 (special issue 1):24–34.

———. 2005. *The Complex Nature of Mixed Severity Fire Regimes*. Available at: https://www.ltrr.arizona.edu/~ellisqm/outgoing/dendroecology2014/readings/Agee2005.pdf. Accessed February 2020.

Allen, C.D. 2014. Forest ecosystem re-organization underway in the southwestern United States: A preview of widespread forest changes in the Anthropocene. In *Proceedings*, p. 103-123, 71, 123. RMRS-P-71. Fort Collins, Colorado: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. Available at: https://www.fs.usda.gov/treesearch/pubs/57327. Accessed March 2022.

Allen, C.D., M. Savage, D.A. Falk, K.F. Suckling, T.W. Swetnam, T. Schulke, P.B. Stacey, P. Morgan, M. Hoffman, and J.T. Klingel. 2002. Ecological Restoration of Southwestern Ponderosa Pine Ecosystems: A Broad Perspective. *Ecological Applications* 12(5):1418–1433. Available at: https://www.biologicaldiversity.org/publications/papers/Allen-Restoration-2002.pdf.

Anderegg, W.R.L., A. Flint, C. Huang, L. Flint, J.A. Berry, F.W. Davis, J.S. Sperry, and C.B. Field. 2015. Tree mortality predicted from drought-induced vascular damage. *Nature Geoscience* 8:367–371. Available at: https://doi.org/10.1038/ngeo2400. Accessed March 2022.

Arid Land Innovation, LLC. 2015. East Mountain Community Wildfire Protection Plan Update (EMCWPP). Available at: https://www.emnrd.nm.gov/sfd/wp-content/uploads/sites/4/2015_EastMountainCWPPcomplete.pdf. Accessed March 2022.

Baker, W. L. and Shinneman, D.J. 2004. Fire and restoration of pinon-juniper woodlands in the western United States: a review. *Forest Ecology and Management* 189(1–3):1–21.

Betancourt, J.L. 1987. Paleobotany of pinyon-juniper woodlands: summary. In *Proceedings – Pinyon Juniper Conference*, pp. 129–140. U.S. Department of Agriculture Forest Service. GTR-INT-215.

Brown, J.K. 1974. *Handbook for Inventorying Downed Woody Material*. General Technical Report No. GTR-INT-16. Ogden, Utah: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station.

Bureau of Land Management (BLM). 2020a. BLM New Mexico issues policy to reduce wildfire risk around power lines on public lands. Available at: https://www.blm.gov/press-release/blm-new-mexico-issues-policy-reduce-wildfire-risk-around-power-lines-public-lands. Accessed April 2022.

———. 2021a. History of the BLM. Available at: https://www.blm.gov/about. Accessed March 2022.

———. 2021b. Fuels Management. Available at: https://www.blm.gov/programs/public-safety-and-fire/fire/fuels-management. Accessed March 2022.

———. 2021c. New Mexico Fire Information. Available at: https://www.blm.gov/programs/public-safety-and-fire/fire-and-aviation/regional-info/new-mexico. Accessed March 2022.

———. 2021d. Rio Puerco Resource Management Plan. Available at: https://www.blm.gov/programs/planning-and-nepa/plans-in-development/new-mexico/rio-puerco-rmp. Accessed March 2022.

Burgess, T.L. 1995. Desert grassland, mixed shrub savanna, shrub steppe, or semidesert scrub? The dilemma of coexisting growth forms. In *The Desert Grassland*, edited by M.P. McClaran and T.R. Van Devender, pp. 31–67. Tucson: University of Arizona Press.

Butler, B.W., and J.D. Cohen. 1996. An Analytical Evaluation of Firefighter Safety Zones. 12th Fire and Forest Meteorology Conference, Lorne, Australia.

California Department of Forestry and Fire Protection (CAL FIRE). 2022. Defensible Space. Available at: https://www.fire.ca.gov/programs/communications/defensible-space-prc-4291/. Accessed May 2022.

California Governor's Office of Planning and Research (CA GOPR). 2020. *Fire Hazard Planning Technical Advisory*. Available at: https://www.opr.ca.gov/docs/ 20201109-Draft_Wildfire_TA.pdf. Accessed August 2021.

Coalition for the Upper South Platte (CUSP). 2016. *The Phoenix Guide*. Available at: https://cusp.ws/wp-content/uploads/2016/12/phoenix_guide.pdf. Accessed December 2021.

Clifford, M.J., M.E. Rocca, R. Delph, P.L. Ford, and N.S. Cobb. 2008. Drought induced tree mortality and ensuing bark beetle outbreaks in southwestern pinyon-juniper woodlands. In *USDA Forest Service Proceedings RMRS*, pp. 39–51. Available at: https://books.google.com/books?hl=en&lr=&id=qvoJAQAAMAAJ&oi=fnd&pg=PA39&dq=CLifford+et+al+forests,+insects+health+2008&ots=rLvVl_pX1r&sig=K5C5CUpK6tZhXe70vUdQ9C9AY1w#v=onepage&q&f=false. Accessed March 2022.

Congressional Research Service (CRS). 2021. Wildfire Statistics. Available at: https://fas.org/sgp/crs/misc/IF10244.pdf. Accessed March 2022.

Cooper, C.F. 1960. Changes in vegetation, structure, and growth of southwestern pine forests since white settlement. *Ecological Monographs* 30:129–64.

Covington, W.W., and M.M. Moore. 1994. Southwestern ponderosa forest structure: changes since Euro-American settlement. *Journal of Forestry* 92(1):39–47.

Dick-Peddie, W.A. 1993. New Mexico vegetation--past. present, and future. Albuquerque: University of New Mexico Press.

Egan, D. 2013. *Monitoring- Organizing a Landscape-Scale Forest Restoration Multi-Party Monitoring Program*. Available at: https://openknowledge.nau.edu/id/eprint/2501/1/Dubay_C_etal_2013_HandbookBreakingBarriers3.pdf. Accessed October 2021.

Evans, A., S. Auerbach, L.W. Miller, R. Wood, K. Nystrom, J. Loevner, A. Argon, M. Piccarello, and E. Krasilovsky. 2015. Evaluating the effectiveness of wildfire mitigation activities in the wildland urban interface. *Forest Guild* October 2015.

Fire Adapted Communities New Mexico (FACNM). 2021. Wildfire Wednesdays #68: Cultural Forest Practices. Available at: https://facnm.org/news/2021/9/8/wildfire-wednesdays-68-prescribed-fire?fbclid=IwAR1cmiTA91wIGkXh6y9iZDPimRzs8IiHT8NFC_cPbmRuKxgH2CwvAjIQyG8. Accessed March 2022.

Fire Research and Management Exchange System. 2021. Applied Wildland Fire Behavior Research and Development. Available at: https://www.frames.gov/applied-fire-behavior/home. Accessed November 2021.

Forests and Rangelands. 2006. *A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment: 10-Year Strategy Implementation Plan*. Available at: https://www.forestsandrangelands.gov/documents/resources/plan/10-yearstrategyfinal_dec2006.pdf. Accessed January 2022.

———. 2014. *The National Strategy: The Final Phase in the Development of the National Cohesive Wildland Fire Management Strategy*. Available at: https://www.forestsandrangelands.gov/strategy/documents/strategy/CSPhaseIIINationalStrategyApr2014.pdf. Accessed January 2022.

———. 2021. *The National Strategy*. Available at: https://www.forestsandrangelands.gov/strategy/thestrategy.shtml. Accessed November 2021.

Forest Stewards Guild (FSG). 2017. Controlled Burning on Private Land in New Mexico. Available at: https://secureservercdn.net/198.71.233.231/cm4.379.myftpupload.com/wp-content/uploads/2019/09/ControlledBurningNM_05162017.pdf?time=1647298903. Accessed March 2022.

Fulé, P.Z., J.E. Crouse, T.A. Heinlein, M.M. Moore, W.W. Covington, and G. Verkamp. 2003. Mixed-severity fire regime in a high-elevation forest of Grand Canyon, Arizona, USA. *Landscape Ecology* 18:465–486.

Gaylord, M.L., T.E. Kolb, W.T. Pockman, J.A. Plaut, E.A. Yepez, A.K. Macalady, R.E. Pangle, and N.G. McDowell. 2013. Drought predisposes piñon–juniper woodlands to insect attacks and mortality. *New Phytologist* 198(2):567–578. Available at: https://nph.onlinelibrary.wiley.com/doi/pdf/10.1111/nph.12174. Accessed March 2022.

Goodrich, S. 1999. Multiple use management based on diversity of capabilities and values within pinyon-juniper woodlands. RMRS-P-9: 164-171.Fort Collins, Colorado: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

Goodwin, M.J., H.S.J. Zald, M.P. North, and M.D. Hurteau. 2021. Climate-driven tree mortality and fuel aridity increase wildfire's potential heat flux. *Geophysical Research Letters* 48, e2021GL094954. Available at: https://doi.org/10.1029/2021GL094954.

Gottfried, G. 2004. Silvics and silviculture in the southwestern pinyon-juniper woodlands. In *Silviculture in Special Places: Proceedings of the 2003 National Silviculture Workshop*, edited by W.D. Shepperd and L.G. Eskew, pp. 64–79. U.S. Department of Agriculture, Forest Service Proceedings RMRS-P-34.

Graham, R., S. McCaffrey, and T. Jain. 2004. *Science Basis for Changing Forest Structure to Modify Wildfire Behavior and Severity*. General Technical Report RMRS-GTR-120. Fort Collins, Colorado: U.S. Department of Agriculture Forest Service, Rocky Mountain Research Station.

Greater Santa Fe Fireshed Coalition. 2022. Smoke. Available at: http://www.santafefireshed.org/smoke. Accessed March 2022.

Grissino-Mayer, H.D., W.H. Romme, L.M. Floyd, and D.D. Hanna. 2004. Climatic and Human Influences on Fire Regimes of the Southern San Juan Mountains, Colorado, USA. *Ecology* 85(6):1708–1724.

Interagency Fuel Treatment Decision Support System (IFTDSS). 2021. About Map Values - Highly Valued Resources or Assets (HVRAs). Available at: https://iftdss.firenet.gov/firenetHelp/help/pageHelp/content/30-tasks/qwra/mapvalues/hvraabout.htm. Accessed November 2021.

International Association of Fire Chiefs. 2021. Ready, Set, Go! Available at: http://wildlandfirersg.org/. Accessed January 2022.

Isleta Pueblo News. 2021. November Newsletter. Available at: https://www.isletapueblo.com/wp-content/uploads/2021/11/2021NovemberNewletter.pdf. Accessed March 2022.

Keane et al. 2002. Cascading effects of fire exclusion in Rocky Mountain ecosystems: a literature review. RMRS-GTR-91:24 p.

Kurz, W.A., C.C. Dymond, G. Stinson, G.J. Rampley, E.T. Neilson, A.L. Carroll, T. Ebata, and L. Safranyik. 2008. Mountain pine beetle and forest carbon feedback to climate change. Nature 452(7190):987–990. Available at: https://www.nature.com/articles/nature06777?bcgovtm=33698585fb-EMAIL_CAMPAIGN_2018_04_13. Accessed March 2022.

Mid-Region Council of Governments of New Mexico (MRCOG). 2007. Torrance County. Available at: http://www.mrcog-nm.gov/. Accessed May 2016

Leopold, A. 1924. Grass, brush, timber, and fire in southern Arizona. *Journal of Forestry* 22:1–10.

Long, J.W., F.K. Lake, and R.W. Goode. 2021. The importance of Indigenous cultural burning in forested regions of the Pacific West, USA. *Forest Ecology and Management* 500 (2021):119597, ISSN 0378-1127. Available at: https://doi.org/10.1016/j.foreco.2021.119597.

Lovreglio, R., O. Meddour-Sahar, and V. Leone. 2014. Goat grazing as a wildfire prevention tool: a basic review. *iForest* 7:260-268. doi: 10.3832/ifor1112-007.

Martinson, E.J., and P.N. Omi. 2013. Fuel treatments and fire severity: A meta-analysis. RMRS-RP-103WWW. Fort Collins, Colorado: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

McCaffrey, S.M. 2004. Fighting fire with education: what is the best way to reach out to homeowners? *Journal of Forestry* 102:12–19.

———. 2020. What Motivates Homeowners to Mitigate Fire Risk? Lessons from Social Science [conference presentation]. Bill Lane Center for the American West, Virtual Wildfire Series: Wildfire management during COVID. Available at: https://www.youtube.com/watch?v=3dmbenV-ZsM. Accessed August 2020.

McCaffrey, S.M., and C.S. Olsen. 2012. *Research Perspectives on the Public and Fire Management: A Synthesis of Current Social Science on Eight Essential Questions*. Northern Research Station GTR-104. Available at: https://www.firescience.gov/projects/06-4-1-26/project/06-4-1-26_gtr_nrs104.pdf. Accessed September 2020.

McDowell, N.G. 2011. Mechanisms linking drought, hydraulics, carbon metabolism, and vegetation mortality. *Plant Physiology* 155(3):1051–1059. Available at: https://www.ncbi.nlm.nih.gov/sites/ppmc/articles/PMC3046567/. Accessed February 2022.

McDowell, N., W.T. Pockman, C.D. Allen, D.D. Breshears, N. Cobb, T. Kolb, J. Plaut, J. Sperry, A. West, D.G. Williams, and E.A. Yepez. 2008. Mechanisms of plant survival and mortality during drought: Why do some plants survive while others succumb to drought? *New Phytologist* 178(4):719–739. Available at: https://nph.onlinelibrary.wiley.com/doi/pdfdirect/10.1111/j.1469-8137.2008.02436.x. Accessed March 2022.

McPherson, G.R. 1995. The role of fire in the desert grasslands. In *The Desert Grassland*, edited by M.P. McClaran and T. Van Devender, pp. 130–151. Tucson: University of Arizona Press.

National Geographic. 2021. Resource Library, Wildfires. Available at: https://www.nationalgeographic.org/encyclopedia/wildfires/. Accessed November 2021.

National Interagency Fire Center (NIFC). 2021a. Wildland Fire Statistics. Available at: https://www.nifc.gov/fireInfo/fireInfo_stats_totalFires.html. Accessed June 2021.

———. 2021b. 2021 Statistics and summary. Available at: https://www.predictiveservices.nifc.gov/intelligence/2021_statssumm/2021Stats&Summ.html. Accessed March 2022.

———. 2021c. Suppression Costs. Available at: https://www.nifc.gov/fire-information/statistics/suppression-costs. Accessed December 2021.

———. 2021d. Wildfire Education. Available at: https://www.nifc.gov/fire-information/fire-prevention-education-mitigation/wildfire-education. Accessed December 2021.

———. 2021e. Fire Prevention, Education and Mitigation. Available at: https://www.nifc.gov/fire-information/fire-prevention-education-mitigation. Accessed December 2021.

National Park Service (NPS).2017. Climate Change in the Southwest – Potential Impacts. Available at: https://www.nps.gov/articles/climate-change-in-the-southwest-potential-impacts.htm. Accessed March 2022.

National Oceanic and Atmospheric Administration (NOAA). 2020. Available at: https://www.weather.gov/wrh/Climate?wfo=abq. Accessed February 2024.

National Wildfire Coordinating Group (NWCG). 1998. Fireline Handbook. NWCG Handbook 3. PMS 410-1. NFES 0065. Boise: National Interagency Fire Center.

———. 2020. Smoke Management Guide for Prescribed Fire. Available at: https://www.nwcg.gov/sites/default/files/publications/pms420-3.pdf. Accessed October 2021.

———. 2021a. NWCG Glossary of Wildland Fire, PMS 205, I-Zone. Available at: https://www.nwcg.gov/term/glossary/i-zone. Accessed October 2021.

———. 2021b. NWCG Glossary of Wildland Fire, PMS 205, Aspect. Available at: https://www.nwcg.gov/term/glossary/aspect. Accessed September 2021.

———. 2021c. NWCG Glossary of Wildland Fire, PMS 205, fuel break. Available at: https://www.nwcg.gov/term/glossary/fuel-break. Accessed September 2021.

———. 2021d. NWCG Glossary of Wildland Fire, PMS 205, fuel treatment. Available at: https://www.nwcg.gov/term/glossary/fuel-treatment. Accessed November 2021.

———. 2021e. NWCG Glossary of Wildland Fire, PMS 205, hazard fuel. Available at: https://www.nwcg.gov/term/glossary/hazard-fuel. Accessed November 2021.

———. 2021f. NWCG Glossary of Wildland Fire, PMS 205, mutual aid. Available at: https://www.nwcg.gov/term/glossary/mutual-aid. Accessed November 2021.

———. 2021g. NWCG Glossary of Wildland Fire, PMS 205, rate of spread. Available at: https://www.nwcg.gov/term/glossary/rate-of-spread. Accessed September 2021.

———. 2021h. NWCG Glossary of Wildland Fire, PMS 205, slope percent. Available at: https://www.nwcg.gov/term/glossary/slope-percent. Accessed September 2021.

———. 2021i. Instructor Guide, S-190 Unit 2: Fuels. Available at: https://www.nwcg.gov/sites/default/files/training/docs/s-190-ig02.pdf. Accessed November 2021.

———. 2022. Incident Information System. Table of Incidents - Alternative Accessibility Friendly Map View. Available at: https://inciweb.nwcg.gov/accessible-view/. Accessed June 2022.

New Mexico Department of Homeland Security and Emergency Management. 2018. *New Mexico State Hazard Mitigation Plan*. Available at: https://drought.unl.edu/archive/plans/GeneralHazard/state/NM_2018.pdf. Accessed March 2022.

New Mexico Energy, Minerals and Natural Resources Department (EMNRD). 2021. Fire Planning Task Force. Available at: https://www.emnrd.nm.gov/sfd/fire-planning-task-force/#:~:text=The%20New%20Mexico%20Fire%20Planning%20Task%20Force%20%28Task,identify%20and%20protect%20areas%20most%20vulnerable%20to%20wildfires. Accessed April 2022.

———. 2022. Forest and Watershed Restoration Act. Available at https://www.emnrd.nm.gov/sfd/forest-and-watershed-restoration-act-fawra/. Accessed March 2022.

New Mexico Energy, Minerals and Natural Resources Department, Forestry Division (EMNRD Forestry Division). 2018. New Mexico Initial Attack Zones. Available at: https://www.emnrd.nm.gov/sfd/wp-content/uploads/sites/4/Statewide-IA-30x40-1.pdf. Accessed March 2022.

———. 2020a. *New Mexico Forest Action Plan*. Available at: https://nmfap.org/wp-content/uploads/2020/10/NMFAP_2020_Version1_2020_09_28_web.pdf. Accessed April 2022.

———. 2020b. New Mexico Forest Health Conditions on State and Private Lands 2019. Available at: https://www.emnrd.nm.gov/sfd/forest-health/. Accessed March 2022.

———. 2022a. Forest Health Program. Available at: https://www.emnrd.nm.gov/sfd/forest-health/. Accessed March 2022.

———. 2022b. Forestry Home. Available at: https://www.emnrd.nm.gov/sfd/. Accessed March 2022.

New Mexico Energy, Minerals and Natural Resources Department (EMNRD Forestry Division) and U.S. Forest Service. 2022. After Wildfire New Mexico. Available at: https://afterwildfirenm.org/. Accessed April 2022.

New Mexico Environment Department, Air Quality Bureau. 2005. *New Mexico Smoke Management Program Guidance Document*. Available at: https://www.env.nm.gov/wp-content/uploads/sites/2/2018/03/SMP_Guidance_052505.pdf. Accessed March 2022.

New Mexico Future Farmers of America. 2010. Introduction to Wildland Fire Behavior for NM Forestry CDE. Available at: http://www.nmffa.org/uploads/4/1/0/7/41075673/wildland_fire_behavior.pdf#:~:text=Wildland%20fuels%20are%20basically%20live%20and%2For%20dead%20plant,fire%20behavior%20is%20dependent%20on%20certain%20fuel%20characteristics%3A. Accessed November 2021.

Ottmar, R., R. Vihnanek, and J. Regelbrugge. 2000. *Wildland Fire in Ecosystems: Effects of Fire on Fauna*. Vol. 1. General Technical Report RMRS-GTR-42. Ogden, Utah: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

Park Williams, A., C.D. Allen, A.K. Macalady, D. Griffin, C.A. Woodhouse, D.M. Meko, T.W. Swetnam, S.A. Rauscher, R. Seager, H.D. Grissino-Mayer, and J.S. Dean. 2013. Temperature as a potent driver of regional forest drought stress and tree mortality. *Nature Climate Change* 3(3):292–297. Available at: https://www.nature.com/articles/ngeo2400. Accessed March 2022.

Paysen, T.E., R.J. Ansley, J.K. Brown, G.J. Gottfried, S.M. Haase, M.G. Harrington, M.G. Narog, S.S. Sackett, and R.C. Wilson. 2000. Fire in western shrubland, woodland, and grassland ecosystems. *Wildland Fire in Ecosystems*: Effects of Fire on Flora 2:121–159.

Peters, E.F., and S.C. Bunting. 1994. Fire conditions pre-and post-occurrence of annual grasses on the Snake River Plain. *Proc. Ecology and Management of Annual Rangelands*. General Technical Report INT-GTR-313, pp. 31–36. Ogden, Utah: U.S. Department of Agriculture, Forest Service, Intermountain Research Station.

Pollet, J., and P.N. Omi. 2002 Effect of thinning and prescribed burning on crown fire severity in ponderosa pine forests. *International Journal of Wildland Fire*11:1–10.

Prichard, S.J., D.L. Peterson, and K. Jacobson. 2010. Fuel treatments reduce the severity of wildfire effects in dry mixed conifer forest, Washington, USA. *NRC Research Press* 40:1615–1626.

Pueblo of Isleta. 2021. *Pueblo of Isleta Wildfire Management Plan*. Available at: https://www.isletapueblo.com/wp-content/uploads/2021/11/GOV-Isleta-2021-WFMP-FMP-EA.pdf. Accessed March 2022.

Pyne, S.J. 2001. The fires this time, and next. *Science* 294(2):12–17.

Radeloff, V.C., D.P. Helmers, H.A. Kramer, and S.I. Stewart. 2018. Rapid growth of the US wildland-urban interface raises wildfire risk. *Proceedings of the National Academy of Sciences* 115 (13):3314–3319. Available at: https://doi.org/10.1073/pnas.1718850115.

Raffa, K.F., B.H. Aukema, B.J. Bentz, A.L. Carroll, J.A. Hicke, M.G. Turner, and W.H. Romme. 2008. Cross-scale drivers of natural disturbances prone to anthropogenic amplification: the dynamics of bark beetle eruptions. *Bioscience* 58(6):501–517. Available at: https://academic.oup.com/bioscience/article/58/6/501/235938, Accessed March 2022.

Raish, C., A. Gonzalez-Caban, and C.J. Condie. 2005. The importance of traditional fire use and management practices for contemporary land managers in the American Southwest. *Environmental Hazards* 6:115-122. doi: 10.1016/j.hazards.2005.10.004.

Ready. 2021. Community Emergency Response Team. Available at: https://www.ready.gov/cert. Accessed November 2021.

Romme, W.H., C.D. Allen, J. Bailey, W.L. Baker, B.T. Bestelmeyer, P. Brown, K. Eisenhart, L. FloydHanna, D. Huffman, B.F. Jacobs, R. Miller, E. Muldavin, T. Swetnam, R. Tausch and P. Weisberg. 2007. *Historical and Modern Disturbance Regimes of Pinon-juniper Vegetation in the Western U.S*. Colorado Forest Restoration Institute and the Nature Conservancy.

Safford, H.D., D.A. Schmidt, and C.H. Carlson. 2009. Effects of fuel treatments on fire severity in an area of wildland-urban interface, Angora Fire, Lake Tahoe Basin, California. *Forest Ecology and Management* 258:773–787.

Safford, H.D., J.T. Stevens, K. Merriam, M.D. Meyer, and A.M. Latimer. 2012. Fuel treatment effectiveness in California yellow pine and mixed conifer forests. *Forest Ecology and Management* 274:17–28. Available at: https://doi.org/10.1016/j.foreco.2012.02.013.

Schmidt, K.M., J.P. Menakis, C.C. Hardy, W.J. Hann, and D.L. Bunnell. 2002. *Development of Coarsescale Spatial Data for Wildland Fire and Fuel Management*. General Technical Report RMRS-GTR-87. Fort Collins, Colorado: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

Schoennagel, T., J.K., Balch, H. Brenkert-Smith, and C. Whitlock. 2017. Adapt to more wildfire in western North American forests as climate changes. *Proceedings of the National Academy of Sciences* 114(18):4582–4590. Available at: http://www.pnas.org/cgi/doi/10.1073/pnas.1617464114.

Scott, J.H., and R.E. Burgan. 2005. Standard Fire Behavior Fuel Models: A Comprehensive Set for Use with Rothermel's Surface Fire Spread Model. Gen. Tech. Rep. RMRS-GTR-153. Fort Collins, Colorado: U.S. Department of Agriculture, U.S. Forest Service, Rocky Mountain Research Station.

Smith, D.M., J.F. Kelly, and D.M. Finch. 2006. Wildfire, exotic vegetation, and breeding bird habitat in the Rio Grande bosque. In *Monitoring Science and Technology Symposium: Unifying Knowledge for Sustainability in the Western Hemisphere Proceedings*, edited by C. Aguirre-Bravo, P.J. Pellicane, D.P. Burns, and S. Draggan, pp. 230–237. RMRSP-42CD. Fort Collins, Colorado: U.S. Department of Agriculture Forest Service, Rocky Mountain Research Station.

Society of American Foresters (SAF). 2004. *Preparing a Community Wildfire Protection Plan: A Handbook for Wildland Urban Interface Communities*. Sponsored by Communities Committee, National Association of Counties, National Association of State Foresters, Society of American Foresters, and Western Governors' Association. Available at: https://www.forestsandrangelands.gov/documents/resources/communities/cwpphandbook.pdf. Accessed April 2022.

Southwest Coordination Center (SWCC). 2022. Southwest Coordination Center. Available at: https://gacc.nifc.gov/swcc/About_Us/SWCC/SWCC.htm. Accessed March 2022.

Stephens, S.L., and L.W. Ruth. 2005. Federal forest-fire policy in the United States. *Ecological Applications* 15(2):532–542.

Swetnam, T.W., C.H. Baisan, A.C. Caprio, and P. Brown. 1992. Fire history in a Mexican oak-pine woodland and adjacent montane conifer gallery forest in southeastern Arizona. *Symposium on the Ecology and Management of Oak and Associated Woodlands: Perspectives in the Southwestern United States and Northern Mexico*. RMRS-GTR-218, pp. 165–173.

Swetnam, T.W., and J.H. Dieterich. 1985. *Fire History of Ponderosa Pine Forests in the Gila Wilderness, New Mexico*. Available at: https://www.researchgate.net/profile/Thomas_Swetnam/publication/228116957_Fire_history_of_ponderosa_pine_forests_in_the_Gila_Wilderness_New_Mexico/links/0fcfd4ff609e953130000000.pdf.

SWReGAP. 2022. Southwest Regional Gap Analysis Project. Available at: https://swregap.org/. Accessed March 2022.

Touchan, R., C.D. Allen, and T.W. Swetnam. 1996. Fire history and climatic patterns in ponderosa pine and mixed conifer forests of the Jemez Mountains, northern New Mexico. U.S. Forest Service General Technical Report RM-GTR-286, pp. 33–46.

Union of Concerned Scientists. 2016. *Confronting Climate Change in New Mexico*. Available at: https://www.ucsusa.org/sites/default/files/attach/2016/04/Climate-Change-New-Mexico-fact-sheet.pdf. Accessed March 2022.

U.S. Census Bureau. 2024. Quick Facts, Torrance County, New Mexico. Available at https://www.census.gov/quickfacts/fact/table/torrancecountynewmexico,NM/PST045223. Accessed April 2024

U.S. Department of Agriculture (USDA). 2005. *Terminology and Definitions Associated with Revegetation*. Available at: https://www.nrcs.usda.gov/Internet/FSE_PLANTMATERIALS/publications/wapmctn6333.pdf. Accessed November 2021.

———. 2022. Introduced, Invasive, and Noxious Plants. Available at: https://plantsorig.sc.egov.usda.gov/java/noxiousDriver. Accessed

U.S. Department of Agriculture, Natural Resources Conservation Service, New Mexico. 2022. After the Fire: Resources for Recovery. Available at: https://www.nrcs.usda.gov/wps/portal/nrcs/detail/nm/home/?cid=stelprdb1261654. Accessed April 2022.

U.S. Department of the Interior (DOI). 2019. Branch of Wildland Fire Management. Available at: https://www.bia.gov/bia/ots/dfwfm/bwfm. Accessed March 2022.

———. 2022a. Responding to Wildfires. Available at: https://www.bia.gov/bia/ots/dfwfm/bwfm/responding-wildfires. Accessed March 2022.

———. 2022b. Tribes Served by the Southwest Region. Available at: https://www.bia.gov/regional-offices/southwest/tribes-served. Accessed March 2022.

U.S. Department of the Interior (DOI), Bureau of Land Management, National Park Service, Bureau of Indian Affairs, U.S. Fish and Wildlife Service, U.S. Forest Service, U.S. Department of Energy, and State of New Mexico. 2015. *New Mexico Wildland Fire Management Joint Powers Master Agreement*. Available at: https://gacc.nifc.gov/swcc/dc/nmadc/management_admin/incident_business/documents/New%20Mexico%20JPA.pdf. Accessed March 2022.

U.S. Department of the Interior (DOI) and U.S. Department of Agriculture (USDA). 2001. Urban Wildland Interface Communities within Vicinity of Federal Lands that are at High Risk from Wildfire. *Federal Register* 66(3):751–777.

U.S. Fire Administration (USFA). 2020. Exposures. Available at: https://www.usfa.fema.gov/nfirs/coding-help/nfirsgrams/nfirsgram-including-exposures.html. Accessed November 2021.

———. 2021a. What is the WUI? Available at: https://www.usfa.fema.gov/wui/what-is-the-wui.html. Accessed February 2022.

———. 2021b. Fire-Adapted Communities. Available at: https://www.usfa.fema.gov/wui/communities/. Accessed September 2021.

U.S. Fish and Wildlife Service (USFWS). 2024. IPaC Information for Planning and Consulting. Available at: https://ipac.ecosphere.fws.gov/location/index. Accessed February 2024.

U.S. Forest Service (USFS). 2010. *Field Guide for Mapping Post-Fire Soil Burn Severity*. Available at: https://www.fs.fed.us/rm/pubs/rmrs_gtr243.pdf. Accessed April 2022.

———. 2019. *Agreement for Shared Stewardship between the State of New Mexico, EMNRD Forestry Division and the U.S. Forest Service*. Available at: https://www.fs.usda.gov/sites/default/files/2019-11/nm_shared_stewardship_mou.pdf. Accessed April 2022.

———. 2021a. *Cibola National Forest Land Management Plan*. Available at: https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fseprd948219.pdf. Accessed April 2022.

———. 2021b. After the Fire. Available at: https://www.fs.usda.gov/science-technology/fire/after-fire. Accessed September 2021.

———. 2021c. Fire Terminology. Available at: https://www.fs.fed.us/nwacfire/home/terminology.html#top. Accessed November 2021.

———. 2021d. Setting Priorities and Collaborating. Available at: https://www.fs.fed.us/projects/hfi/field-guide/web/page14.php#:~:text=For%20at-risk%20communities%20that%20have%20not%20yet%20designated,mile%20from%20the%20boundary%20of%20an%20at-risk%20community. Accessed November 2021.

U.S. Geological Survey (USGS). 2021. What is an invasive species and why are they a problem? Available at: https://www.usgs.gov/faqs/what-invasive-species-and-why-are-they-a-problem?qt-news_science_products=0#qt-news_science_products. Accessed November 2021.

University of California, Agriculture and Natural Resources (UCANR). 2019. Grazing for fire fuels management. Available at: https://ucanr.edu/blogs/blogcore/postdetail.cfm?postnum=31445. Accessed November 2021.

———. 2021a. Manual. Available at: https://ucanr.edu/sites/fire/Prepare/Treatment/Manual/. Accessed November 2021.

———. 2021b. Mechanical. Available at: https://ucanr.edu/sites/fire/Prepare/Treatment/Mechanical/. Accessed November 2021.

Veblen, T.T., T. Kitzberger, and J. Donnegan. 2000. Climatic and human influences on fire regimes in ponderosa pine forests in the Colorado Front Range. *Ecological Applications* 10(4):1178–1195.

Venturas, M.D., H.D. Todd, A.T. Trugman, and W.R.L. Anderegg. 2021. Understanding and predicting forest mortality in the western United States using long-term forest inventory data and modeled hydraulic damage. *New Phytologist* 230.5:1896–1910. Available at: https://nph.onlinelibrary.wiley.com/doi/abs/10.1111/nph.17043. Accessed March 2022.

Waltz, A.E.M., M.T. Stoddard, E.L. Kalies, J.D. Springer, D.W. Huffman, and A.S. Meador. 2014. Effectiveness of fuel reduction treatments: Assessing metrics of forest resiliency and wildfire severity after the Wallow Fire, AZ. *Forest Ecology and Management* 334:43-52. Available at: https://doi.org/10.1016/j.foreco.2014.08.026.

Weaver, H. 1947. Fire- Nature's Thinning Agent in Ponderosa Pine Stands. *Forestry* 45(6):437–444.

West, N.E. 1984. Successional patterns and productivity of pinyon-juniper ecosystems. In *Developing Strategies for Range Management*, pp. 1301–1322. Boulder, Colorado: Westview Press.

Westerling, A.L. 2016. Increasing western US forest wildfire activity: sensitivity to changes in the timing of spring. *Philosophical Transactions* B 371. Available at: http://ulmo.ucmerced.edu/pdffiles/16RSTB_Westerling.pdf. Accessed March 2022.

Westerling, A.L., H.G. Hidalgo, D.R. Cayan, and T.W. Swetnam. 2006. Warming and earlier spring increase in western U.S. Forest wildfire activity. *Science* 313(5789):940–943. Accessed March 2022.

Western Regional Strategy Committee (WRSC). 2013. *Western Regional Action Plan*. Available at: https://www.forestsandrangelands.gov/documents/strategy/rsc/west/WestRAP_Final20130416.pdf. Accessed October 2021.

Wildland Fire Decision Support System (WFDSS). 2015. WFDSS Spatial Fire Planning Guide. October 2015. Available at: https://wfdss.usgs.gov/wfdss/pdfs/WFDSS_SFP_Guide.pdf. Accessed September 2021.

Winter, G., and J.S. Fried. 2000. Homeowner perspectives on fire hazard, responsibility, and management strategies at the wildland-urban interface. *Society and Natural Resources* 13:33–49.

Wooten, G. 2021. *Fire and Fuels Management: Fire and Fuels Management: Definitions, Ambiguous Terminology And References*. Available at: https://www.nps.gov/olym/learn/management/upload/fire-wildfire-definitions-2.pdf. Accessed November 2021.

Young, J.D., A.E. Thode, C. Huang, A.A. Ager, and P.Z. Fulé. 2019. Strategic application of wildland fire suppression in the southwestern United States. *Journal of Environmental Management* 245:504–518. Available at https://doi.org/10.1016/j.jenvman.2019.01.003.

Zouhar, K. 2003. *Bromus tectorum*. In: Fire Effects Information System. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available at: https://www.fs.fed.us /database/feis/plants/graminoid/brotec/all.html. Accessed April 2022.

APPENDIX A:

Community and CWPP Background Information

This page intentionally left blank.

CONTENTS

This page intentionally left blank.

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. Another goal of the CWPP is to enhance public awareness by helping residents better understand the natural- and human-caused risk of wildland fires that threaten lives, safety, and the local economy. The minimum requirements for a CWPP, as stated in the HFRA, are:

Collaboration: Local and state government representatives, in consultation with federal agencies or other interested groups, must collaboratively develop a CWPP (SAF 2004).

Prioritized Fuel Reduction: A CWPP must identify and prioritize areas for hazardous fuels reduction and treatments and recommend the types and methods of treatment that will protect one or more communities at risk (CARs) and their essential infrastructures (SAF 2004).

Treatments of Structural Ignitability: A CWPP must recommend measures that homeowners and communities can take to reduce the ignitability of structures throughout the area addressed by the plan (SAF 2004).

PLANNING PROCESS

The SAF, in collaboration with the National Association of Counties and the National Association of State Foresters, developed a guide entitled *Preparing a Community Wildfire Protection Plan: A Handbook for Wildland-Urban Interface Communities* (SAF 2004) to provide communities with a clear process in developing a CWPP. The guide outlines eight steps for developing a CWPP and has been followed in preparing the Torrance County CWPP:

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 federal representatives and contact and involve other land management agencies as appropriate.

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

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

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

Step Six: Establish Community Priorities and Recommendations. Use the base map and community Risk-Hazard Assessment to facilitate a collaborative community discussion that leads to the identification of local priorities for treating fuels, reducing structural ignitability and other issues of

interest, such as improving fire response capability. Clearly indicate whether priority projects are directly related to the 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.

FIRE MANAGEMENT POLICY

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

LEGISLATIVE DIRECTION

Federal Direction

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

In 2003, the U.S. Congress recognized widespread declining forest health by passing the Healthy Forests Restoration Act (HFRA), and President Bush signed the act into law (Public Law 108–148, 2003). The HFRA was revised in 2009 to address changes to funding and provide a renewed focus on wildfire mitigation (H.R. 4233 - Healthy Forest Restoration Amendments Act of 2009). The HFRA expedites the development and implementation of hazardous fuels reduction projects on federal land and emphasizes the need for federal agencies to work collaboratively with communities. A key component of the HFRA is the development of Community Wildlife Protection Plans (CWPPs), which facilitate 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, which is used to delineate priority areas for treatment. In addition, priority is placed upon municipal watersheds, critical wildlife habitat, and areas impacted by

wind throw, insects, and disease. Communities with an established CWPP are given priority for funding of hazardous fuels reduction projects carried out in accordance with the HFRA.

In 2014, the final stage of the development of a national cohesive strategy for wildfire was developed: *The National Strategy: The Final Phase in the Development of the National Cohesive Wildland Fire Management Strategy* (Forests and Rangelands 2014). The national strategy takes a holistic approach to the future of wildfire management:

To safely and effectively extinguish fire, when needed; use fire where allowable; manage our natural resources; and as a Nation, live with wildland fire.

In order to achieve this vision, the national strategy goals are:

1. **Restore and maintain landscapes:** Landscapes across all jurisdictions are resilient to fire-related disturbances in accordance with management objectives.
2. **Fire-adapted communities:** Human populations and infrastructure can withstand a wildfire without loss of life and property.
3. **Wildfire response:** All jurisdictions participate in making and implementing safe, effective, efficient risk-based wildfire management decisions (Forests and Rangelands 2014:3).

State Direction

The 2020 New Mexico State Forest Action Plan recognizes that New Mexico faces continued and urgent threats from catastrophic wildfire. The State Forest Action Plan includes a resource assessment to identify threats to resources, including wildfire, post-wildfire flooding, erosion and debris flow, disease and insects, climate changes, development and fragmentation, and use and forest management activities. The Plan then provides strategies to protect these resources over the next decade. There are several strategies and sub-strategies outlined in the Draft Plan; those specific to wildfire include:

- **Restore Forests and Watersheds**: addresses the legacy of fire exclusion and excessive fuels.
- **Fire Management**: addresses wildfire response on state and private land; supports regional, state, and national wildfire response for all jurisdictions; and restores the ecological role of fire to foster resilient landscapes and watershed health.

The passing of H.B. 266, the Forest and Watershed Restoration Act (2019) provides support for landscape resilience throughout the State, by allocating state funds to the EMNRD for the purpose of forest and watershed restoration. EMNRD has been tasked with determining which proposed projects will be funded, in coordination with a newly established Advisory Board (EMNRD 2022).

Like the 2014 national strategy, the NFP, the State Forest Action Plan, 10-year comprehensive strategy, and 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 multiagency cooperation. In compliance with Title 1 of the Healthy Forests Restoration Act (HFRA), a CWPP must be mutually agreed upon by the local government, local fire departments, and the state agency responsible for forest management (EMNRD Forestry Division). As outlined in HFRA, this CWPP is developed in consultation with interested parties and the federal agencies managing land surrounding the at-risk communities.

Forest and Watershed Restoration Act: The Forest and Watershed Restoration Act (FAWRA) was created by house bill 266. FAWRA allocates funding annually to the EMNRD Forestry Division. The funding is to restore forests and watersheds in the state of New Mexico and establishes a Forest and

Watershed Advisory Board, which evaluates proposed projects and recommends guidelines, protocols, and best management practices. When projects have been selected and approved, EMNRD Forestry Division will administer, implement, and report on the projects. Work funded by FAWRA includes on-the-ground restoration treatments; project planning; economic development programs to advance the use of small-diameter trees and woody biomass; and workforce development for wood utilization projects (EMNRD 2022). For more information on the FAWRA, please visit: https://www.emnrd.nm.gov/sfd/forest-and-watershed-restoration-act-fawra/.

PAST PLANNING EFFORTS

There are several existing documents relating to fire management in Torrance County. This CWPP is meant to supplement and not replace any other existing plans. See Chapter 2 for information on agency fire management planning and the growing use of spatial fire planning and decision support tools.

Federal

The Cibola National Forest Land Management Plan is the guiding policy for forest and fire management within the Cibola NF. The USFS finished its revised plan in September 2021. The new plan considers how the ecological, climatic, and fire ecology conditions have changed since the last published Forest Land Management Plan (published in 1985) and describes the desired conditions for fire and fuels, objectives for creating the desired conditions, the agreed upon standards for dealing with wildfire and fuels, and the guidelines for managing fire and fuels (USFS 2021a).

Tribal

Pueblo of Isleta Tribe Fire Management Plan – The Pueblo of Isleta Wildland Fire Management Plan is the guiding plan for wildfire management for the Isleta Pueblo Tribe. It describes wildfire policy, partnerships, and wildfire management goals and objectives. Within the plan, the tribal areas are defined by Management Action Areas, which are specific descriptions of areas with similar management constraints, requirements, and guidelines. These include WUI areas, recreation areas, rangelands, and commercial timber areas, among others. It also describes pre- and post-wildfire planning efforts as well as pre- and post-wildfire mitigation efforts. The plan also presents various recommendations for wildfire management, including thinning treatments, prescribed burns, invasive species removal, fuels monitoring, and WUI assessments (Pueblo of Isleta 2021).

State

State of New Mexico Hazard Mitigation Plan: The New Mexico Hazard Mitigation Plan was developed in 2013 and updated in 2018. It was a collaborative effort of state agencies under the coordination of the New Mexico Department of Homeland Security and Emergency Management. Within the plan is a discussion of the process used to "identify, profile, and assess natural hazards in New Mexico and the actions which should be taken to mitigate those hazards." The plan focuses on hazard identification and risk assessment; federal, state, and local capabilities and resources; New Mexico vulnerabilities; mitigation strategies, goals, and actions; and implementation strategies. The plan is renewed and enhanced as new mitigation opportunities become available (New Mexico Department of Homeland Security and Emergency Management 2018).

2020 New Mexico Forest Action Plan: As part of the federal Farm Bill, the USFS requires states to develop a Forest Action Plan on recurring 10-year cycles. Using the best science available, the EMNRD

of State of New Mexico worked as part of a collaborative group to create the 2020 New Mexico Forest Action Plan (EMNRD Forestry Division 2020a). The plan provides a current assessment of the state's natural resources and, with the perspective of a changing climate, proposes strategies to address pressing issues in forest and watershed management. The plan focuses on natural resource assets and their assessments in regard to wildfire, post-wildfire conditions, disease and insects, climate change, human development, and forest management activities. The Plan provides information on risk assessments, relative importance of resources, and strategies for managing natural resources, among other information. The 10 strategies set forth in this 2020 plan are restoring forests and watersheds, fire management, private land stewardship, utility rights of way, rare plants, reforestation, urban forests and communities, restoration economy, land conservation, and outdoor recreation (EMNRD Forestry Division 2020a). The plan also identifies priority landscapes for the application of the strategies:

1. Priority landscapes for restoration across all jurisdictions with forest and woodland cover types and identifies the top 500 watersheds in the state ranked by wildfire risk and importance for water source protection and biodiversity. These priority landscapes account for approximately 20% of all watersheds at risk.
2. Shared stewardship for high priority landscapes on National Forest System lands and adjacent lands and identifies the top 250 watersheds in the state ranked by wildfire risk and importance for water source protection and biodiversity.

Local

Torrance County and Claunch Pinto CWPPs: In 2008, the plans were created for Torrance County and Claunch-Pinto Soil and Water Conservation District. These plans were developed for communities to prepare for, mitigate, and prevent, wildfire. Specifically, these plans were developed to evaluate 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 assets and infrastructure. In 2016, updates to the Torrance County and Claunch Pinto CWPPs was conducted by SWCA in partnership with the communities and their partners. This update was conducted following the large wildfires in the area in 2007-2008.

PUBLIC LAND MANAGEMENT

LAND MANAGEMENT STRATEGIES

In 2019, the Forest and Watershed Restoration Act (FAWRA) was signed into law. The FAWRA distributes funding to the EMNRD Forestry Division with the objective of restoring forests and watersheds in the state of New Mexico and creates a Forest and Watershed Advisory Board to assess and recommend projects. Restoration projects under the FAWRA are planned and implemented with collaboration between the EMNRD Forestry Division and partnering organizations, including local, state, federal, tribal, non-governmental organizations, and other partners and stakeholders. Between 2020 and 2022, a total of 6,050 acres of forest restoration were completed, including fuels treatments, thinning, invasive species removal, and prescribed fire (EMNRD 2022).

The Forestry Division's Forest and Watershed Health Office has been concentrating on three work areas related to forest and watershed health: 1) supporting collaborations that expand the State's capacity to get more work done on the ground; 2) implementing the National Cohesive Strategy in New Mexico; and 3) using science, policy, and legislation to facilitate the Forestry Division's mission. Forest managers in

the region are addressing land management objectives through the use of prescribed fire, and mechanical and manual treatments to promote more resilient forest land. Private, state, and federal lands are interspersed, creating a matrix of land ownership, which is often a hurdle to implementation of landscape-level treatments. By working with private landowners, forest managers are enhancing landscape-scale efforts to create more resilient forest communities.

Federal Land

Cibola National Forest

The Cibola NF covers 1,633,783 acres, with elevations ranging from 5,000 to 11,305 feet at the summit of Mt. Taylor. By descending order, the Cibola NF comprises land in Socorro, Cibola, McKinley, Catron, Torrance, Bernalillo, Sandoval, New Mexico, Lincoln, Sierra, and Valencia Counties.

The Cibola National Forest Land Management Plan is the guiding policy for forest and fire management in the Cibola NF (USFS 2021a). Management considerations outlined in the plan primarily involve creating "suitable and desirable" conditions in the WUI, such as allowing wildland fires to sustain characteristic ecosystem function while preserving property and human health and safety. Furthermore, the plan states that fuel conditions in the WUI will be managed so that firefighters can suppress and manage fire safely and efficiently. The plan also states that prescribed fire and other fuel treatments will be used to create a return to more desired "natural" fuel conditions. Outlined in the plan are objectives and goals for fire and fuels, which include, but are not limited to, setting acreage for plans for prescribed burns in needed areas; allowing natural wildfires to perform their ecological function in areas where there is minimal to no threat to human life or property; managing the forest ecosystem so it is resilient to uncharacteristic wildfire; and efficient coordination and collaboration across agencies and stakeholders for wildfire response, planning, mitigation, and research efforts. Furthermore, Cibola NF works closely with neighboring entities to develop cross-boundary landscape projects focused on landscape resiliency and forest health.

Bureau of Land Management (BLM) Lands

In New Mexico, the BLM is responsible for fire management on 13.5 million acres of public land in four BLM districts in New Mexico, including the Albuquerque District. Only minor portions of Torrance County contain BLM public lands, which are distributed throughout the center of the county. The BLM lands in Torrance County are managed by the Rio Puerco Field Office, which is overseen by Albuquerque District Office (BLM 2021a, 2021d). The BLM was established in 1946 to "sustain the health, diversity, and productivity of the public lands for the use and enjoyment of present and future generations" (BLM 2021a). The BLM operates a national fire program, which focuses on public safety as its main priority. The BLM's fire management program is organized at three levels: national, state, and field (local) levels. The national office provides direction and oversight of the program while developing policy and budget; the state offices coordinate policy and interagency management efforts within their state; and the field offices are responsible for executing field operations such as fire management activities and providing initial attack (BLM 2021b, 2021c, 2021d). The BLM collaborates with federal, state, and local organizations to develop and implement wildland fire programs.

For instance, BLM's fuels management program directs a wide range of active management vegetation treatments using mechanical, biological, and chemical tools, and prescribed fire. The program consists of creating fuel breaks, reducing fuel loads, reducing fire risk near communities, targeted grazing, and herbicide to break fire-grass cycles. Fuels treatments are planned and implemented jointly with other

BLM programs, and with federal, state, local, and non-governmental collaborators (BLM 2021b, 2021c). Furthermore, on BLM lands there is an active vegetation treatment program with priority to reduce wildfire risk around powerlines (BLM 2020a).

State Land

The EMNRD Forestry Division 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 land and within rural communities on all non-federal and non-municipal lands in the state (New Mexico Statutes Annotated 1978, Section 68-2-8). As a result, the EMNRD Forestry Division is involved in the CWPP planning process. The New Mexico Fire Planning Task Force was created in 2003 by the New Mexico legislature to identify the WUI areas (CARs) in the state that were most vulnerable to wildland fire danger. The task force updates its CARs list annually, reviews completed CWPPs, and approves CWPPs that are compliant with the HFRA.

Fire Planning Taskforce: In 2003, the New Mexico State Legislature created the fire planning taskforce. This taskforce is collaborative and is composed of stakeholders and land managers from local, state, and tribal cooperators. These cooperators assist the EMNRD Forestry Division in identifying areas of New Mexico most vulnerable to wildfire. This taskforce also guides policy and land management recommendations that are designed to reduce the threat of wildfires to communities. Responsibilities and roles the taskforce include, but are not limited to, developing model ordinances and standards for building codes; considering the benefits of thinning and prescribed burn projects; and guiding recommendations for defensible space standards for infrastructure and property. This taskforce meets once per year to approve CWPPs (EMNRD 2021). For more information on participating members please see: https://www.emnrd.nm.gov/sfd/fire-planning-task-force/#:~:text=The%20New%20Mexico%20Fire%20Planning%20Task%20Force%20%28Task,identify%20and%20protect%20areas%20most%20vulnerable%20to%20wildfires.

STEWARDSHIP AGREEMENTS

In 2019, the EMNRD and USFS signed a shared stewardship agreement to commit to collaborative forest management and set landscape-scale priorities for targeted treatments that manage risks and increase benefits in areas where they will have the greatest impact across broad landscapes. The shared stewardship agreement includes a commitment to implement the Cohesive Strategy. As part of the agreement, EMNRD and USFS will use their respective authorities to conduct government-to-government consultation directly with the tribes and pueblos throughout the state to encourage shared stewardship strategies (USFS 2019).

LOCATION AND GEOGRAPHY

Torrance County is 3,555 square miles and is bordered by seven New Mexico counties: Santa Fe to the North, Bernalillo to the east, Valencia to the east, Socorro to the south, Lincoln to the south, Guadalupe to the west, and Sand Miguel to the west. 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. 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.

The topography of Torrance County is discussed further below and typical landscapes within the county are shown in Figures A.1 and A.2.

Figure A.1. Typical landscape in Torrance County.

Figure A.2. Typical landscape in Torrance County.

ROADS AND TRANSPORTATION

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.

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).

POPULATION

The following information is drawn primarily from U.S. census data (U.S. Census Bureau 2024). As of the 2020 census, the population of Torrance County was 15,045, a decrease of 8.2% compared with the 2010 census population of 16,383. As of 2020, there were 7,169 housing units in the county. The majority of the county citizens live within the city limits of Moriarty, which has a population of 1,946.

RECREATION

Outdoor recreation is extremely popular in Torrance County, with the Cibola NF (including the Manzana Mountains), BLM lands, city and state parks, and cultural attractions throughout the county, attracting thousands of visitors. Hunting and camping are also popular on the county’s public lands.

During peak seasons and large events, a significant number of people can congregate in a relatively small space, which may constitute a large population to evacuate.

VALUES AT RISK

Earlier compilation of the critical infrastructure in the planning area, coupled with the community evaluations, public outreach, and Core Team input, has helped in the development of a list of values at risk (VARs) from wildland fire. These data are also supplemented with Highly Valued Resources and Assets (HVRA) data, which is a data set that is being gathered nationwide and available through the Interagency Fuel Treatment Decision Support System (IFTDSS). The public was encouraged to provide additional VARs during the public outreach period, via the story map survey link. Based on feedback provided, this section and the associated mapping was revised.

In addition to critical infrastructure (Map 9 in Appendix B), VARs can also include natural, socioeconomic, and cultural resources (see Maps 6–8 in Appendix B). It is important to note that although an identification of VARs can inform treatment recommendations, a number of factors must be considered in order to fully prioritize areas for treatment; these factors include appropriateness of treatment, land ownership constraints, locations of ongoing projects, available resources, and other physical, social, or ecological barriers to treatment.

The scope of this CWPP does not allow determination of the absolute natural, socioeconomic, and cultural values that could be impacted by wildfire in the planning area. In terms of socioeconomic values, the impact due to wildfire would cross many scales and sectors of the economy and call upon resources locally, regionally, and nationally.

Natural Values at Risk

The CWPP planning area and Cibola NF have a variety of natural resources of particular concern to land managers, such as rare habitats and listed plant and wildlife species. Public outreach throughout Torrance County has emphasized the importance of protecting natural/ecological values to the general public. Examples of natural values identified by the public and the Core Team include the following:

- Public land (e.g., Cibola NF)
- Trail systems
- Agricultural land
- Scenic viewsheds (Figure A.3)
- Wildlife habitat and sensitive species
- Watersheds and preservation of water quality (such as drinking water).

Figure A.3. Example of a natural VAR, a scenic viewshed.

Socioeconomic Values at Risk

Social values include population, recreation, infrastructure, and the built environment. Examples include the following:

- Communications Infrastructure (e.g., cell phone and radio towers)
- Tourism values (e.g., restaurants, recreational facilities)
- Schools
- Public safety infrastructure
- Highways
- Care homes, senior housing, day care, and other group homes
- Water storage
- Business facilities (Figure A.4)
- Recreation sites (e.g., golf courses , trails, parks)

Figure A.4. Example of a socioeconomic VAR, ranching infrastructure.

Cultural Values at Risk

Many historical landmarks are scattered throughout county, for example the Abo pueblo ruins t. Cultural VARs that have been identified by the Core Team and the public in the CWPP planning area are the following:

- Historical markers and memorials
- Museums
- Water bodies (Laguna del Perro)
- Churches
- Cemeteries

Figure A.5. Example of a cultural VAR, the historic church in Manzano.

CLIMATE AND WEATHER PATTERNS

Differences in topographical characteristics throughout the state of New Mexico and Torrance County contribute to the variable climatic regimes within the planning area. The state generally 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.

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. The Manzano and Sandia mountains account for most all of the topographic relief in the County. 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.. 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.

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.

Table A.3. Mean Annual Temperature and Precipitation by Region in Torrance County

			Mean Annual Temperature (°F)		
Region	**Period of Record**	**Total Annual Precipitation (Inches)**	**Max**	**Min**	**Mean Annual**
Encino	1991–2020	13.80	67.9	35.6	51.8
Moriarty	1991–2020	12.71	67.1	32.7	49.9
Mountainair	1991–2020	16.96	67.1	35.3	51.2
Gran Quivira	1991-2020	25.35	69.2	39.1	54.1

Source: NOAA (2020)

July and August are typically the hottest and driest months of the year in Torrance County, with temperatures ranging from 86.3ºF in Moriarty to 88.4ºF in Encino. December and January are usually the coldest months, with average December and January minimum temperatures ranging from 15.2ºF in Moriarty area to 22.8 ºF in Gran Quivira (NOAA 2020). Mean annual temperatures are high and precipitation is generally low throughout Torrance A county. 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 49.9ºF in Moriarty to 54.1ºF in Gran Quivira. Elevations above 9,000 feet in the Manzano Mountains are typically cooler and moister with a sub-humid climate regime.

Torrance County experiences some variation in seasonal and annual precipitation. However, the mean annual precipitation is typically light and ranges from 12.7 inches in Moriarty to 25.35 inches in Gran Quivira. The largest quantity of precipitation occurs in July and August during monsoonal moisture patterns that produce high-intensity storms. Precipitation highs range from 2.04 inches (month of August) in Moriarty to 3.01 inches (month of August) in Gran Quivira. The driest season is winter into early spring and varies slightly throughout the county, the driest months are typically February and March,

Monthly climate normals (30-year averages) for Torrance County (NOAA 2020) are graphed by regions below (Figures A.6–A.9).

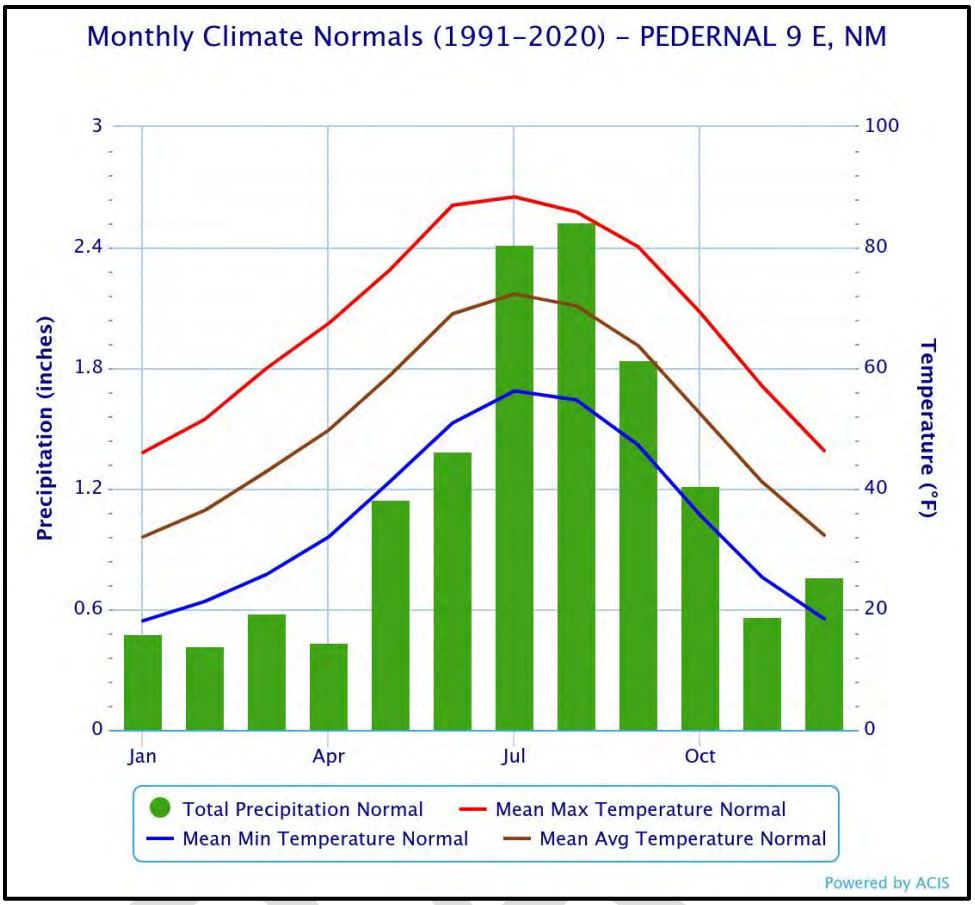


Figure A.6. Monthly climate averages for the Encino Region taken for the period of 1991–2020. Source: NOAA (2020)

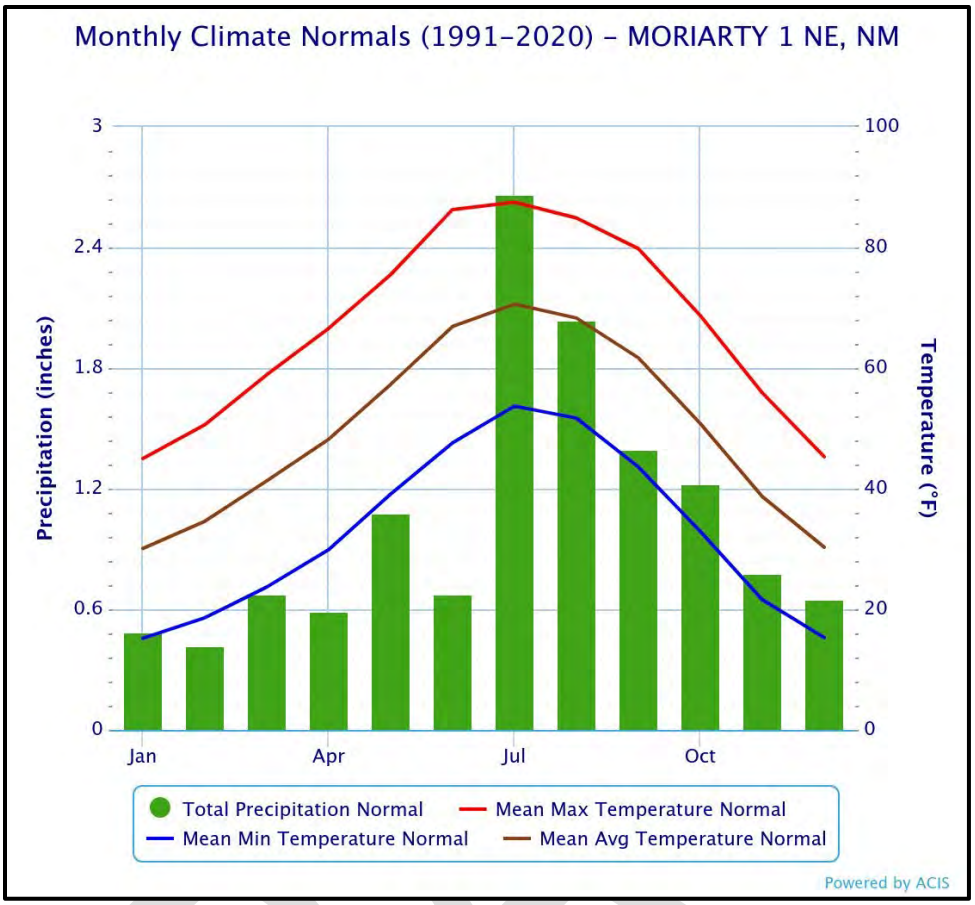


Figure A.7. Monthly climate averages for the Moriarty region for the period of 1991–2020. Source: NOAA (2020)

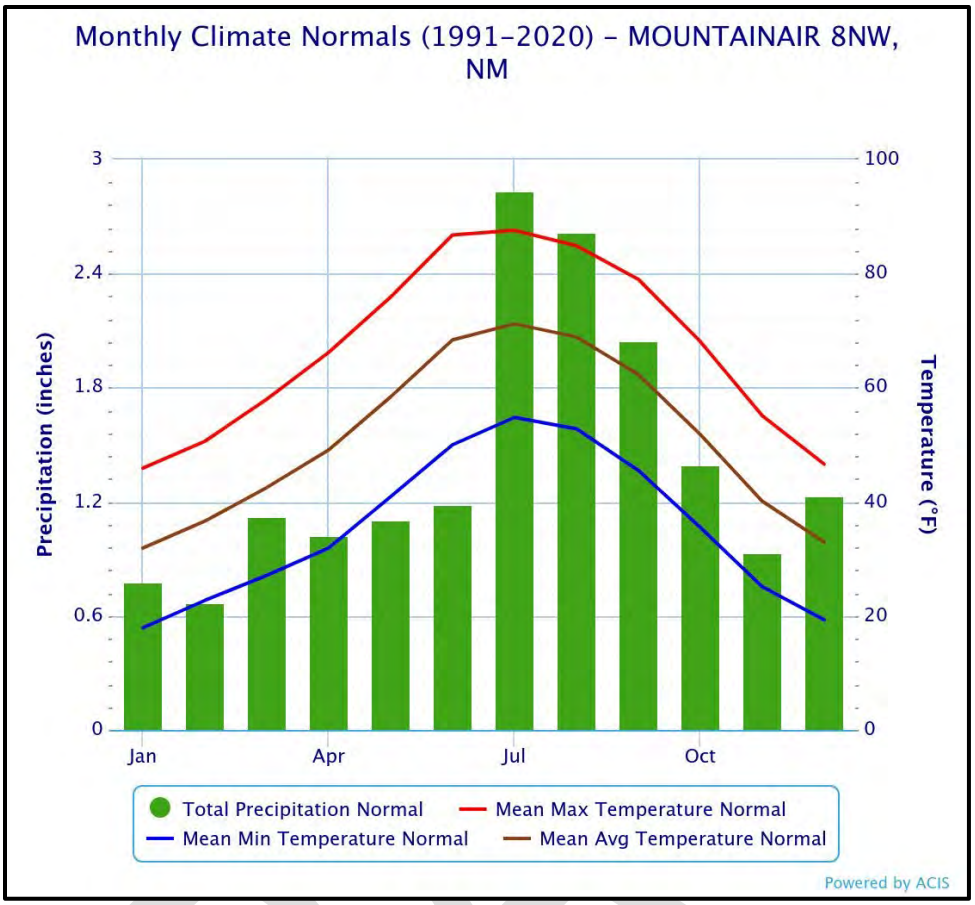


Figure A.8. Monthly climate averages for the Mountainair region for the period of 1991–2020. Source: NOAA (2020)

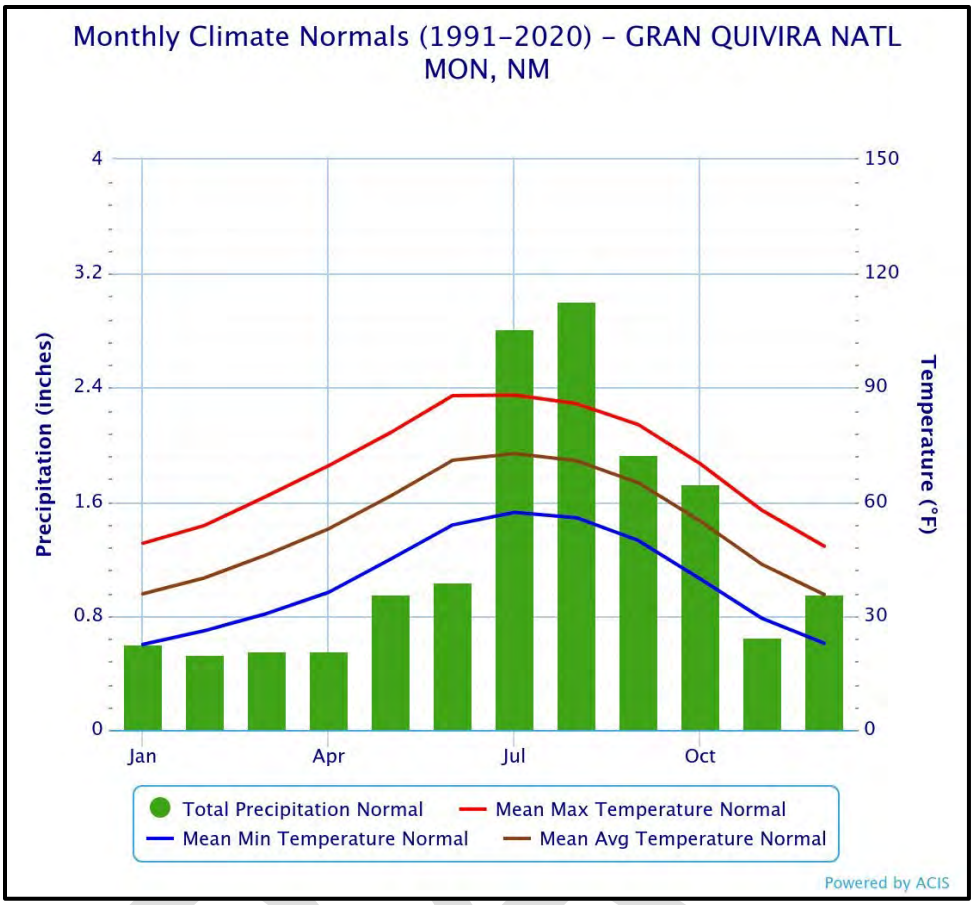


Figure A.9. Monthly climate averages for the for the Gran Quivira region for the period of 1991–2020. Source: NOAA (2020)

VEGETATION AND LAND COVER

As there is little elevation change throughout the County, with the exception of the Manzano and Sandia Mountains, vegetative communities have a variety of factors which impact their distribution. Vegetation zones within Torrance County are primarily a function of elevation, slope, aspect, substrate, and associated climatic regimes (Figure A.9).

Dominant vegetation types within the county are described based on a large spatial scale and represent the overall community structure that will play a general role in fire occurrence and behavior. Although the vegetation types are outlined and described for the county, site-specific evaluations of the vegetative composition and structure in each area of focus should be taken into consideration when planning fuel treatments.

The majority of the vegetation within the County is composed of grassland communities with dispersed patches of shrublands and piñon-juniper woodlands that encroach on the native grasslands. Forested areas exist primarily in the Manzano Mountains and higher elevations. 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 within the County, the dominant ecosystems are described below.

The major vegetation types in the county are listed in Table A.4 and are described below in more detail using the 2004 U.S. Geological Survey (USGS) GAP Analysis Program, specifically the Southwest Regional Gap Analysis Project (SWReGAP 2022). Other types of land cover (e.g., agricultural and developed) also exist in the county but are not described in more detail as they do not play a significant role in fire behavior. For reference, Figure A.9 shows a detailed map of the vegetation in Torrance County.

Table A.4. Major Vegetation Types within the Torrance County

Existing Vegetation Type	Acres	Percent
Western Great Plains Shortgrass Prairie	1,258,824.5	58.8%
Southern Rocky Mountain Juniper Woodland and Savanna	157,972.1	7.4%
Southern Rocky Mountain Pinyon-Juniper Woodland	146,528.1	6.8%
Inter-Mountain Basins Semi-Desert Shrub-Steppe	91,269.5	4.3%
Apacherian-Chihuahuan Semi-Desert Grassland	90,050.9	4.2%
Southern Rocky Mountain Ponderosa Pine Woodland	60,888.1	2.8%
Apacherian-Chihuahuan Semi-Desert Shrub-Steppe	37,866.7	1.8%
Inter-Mountain Basins Mixed Salt Desert Scrub	32,736.6	1.5%
Developed-Roads	27,181.5	1.3%
Madrean Pinyon-Juniper Woodland	21,602.6	1.0%

GRASSLAND AND ARID SHRUB-STEPPE COMMUNITIES

Western Great Plains Shortgrass Prairie: A large portion of the county consists of shortgrass prairie. Graminoid species dominate the sand prairies, although relative dominance can change due to impacts of wind disturbance. Andropogon hallii and Calamovilfa longifolia are the most common species, but other grass and forb species such as Hesperostipa comata, Carex inops ssp. heliophila, and Panicum virgatum may be present. Patches of Quercus havardii can also occur within this system in the southern Great Plains. Fire and grazing constitute the other major dynamic processes that can influence this system.

Inter Mountain Basins Semi-Desert Grassland: A good portion of vegetation in Torrance County consists primarily of semi-desert grasslands. These typically occur on dry plains and mesas. The dominant perennial bunch grasses and shrubs within this system are all very drought-resistant. Common grasses include *Achnatherum hymenoides*, *Aristida* spp., blue grama (*Bouteloua gracilis*), needle and thread grass (*Hesperostipa comata*), *Muhlenbergia torreyana*, and James' galleta (*Hilaria jamesii*). Common scattered shrubs in the semi desert grasslands may include species of sagebrush (*Artemisia* spp.), saltbush (*Atriplex* spp.), blackbrush (*Coleogyne* spp.), Mormon tea (*Ephedra* spp.), snakeweed (*Gutierrezia* spp.), and winterfat (*Krascheninnikovia lanata*).

Intermountain Basins Semi-Desert Shrub-Steppe: The shrub steppe has similar species composition as the semi-desert grassland, but with a higher proportion of shrub cover (SWReGAP 2022).

Apacherian-Chihuahuan Semi-Desert Grassland: It is characterized by typically diverse perennial grasses. Common grass species include Bouteloua eriopoda, Bouteloua hirsuta, Bouteloua rothrockii, Bouteloua curtipendula, Bouteloua gracilis, Eragrostis intermedia, Muhlenbergia porteri, Muhlenbergia

setifolia, Pleuraphis jamesii, Pleuraphis mutica, and Sporobolus airoides, succulent species of Agave, Dasylirion, and Yucca, and tall-shrub/short-tree species of Prosopis and various oaks (e.g., Quercus grisea, Quercus emoryi, Quercus arizonica).

Apacherian-Chihuahuan Semi-Desert Shrub-Steppe: The shrub steppe has similar species composition as the semi-desert grassland, but with a higher proportion of shrub cover (SWReGAP 2022).

Inter-Mountain Basins Mixed Salt Desert Scrub: The vegetation is characterized by a typically open to moderately dense shrubland composed of one or more Atriplex species such as Atriplex confertifolia, Atriplex canescens, Atriplex polycarpa, or Atriplex spinifera. Other shrubs present to codominate may include Artemisia tridentata ssp. wyomingensis, Chrysothamnus viscidiflorus, Ericameria nauseosa, Ephedra nevadensis, Grayia spinosa, Krascheninnikovia lanata, Lycium spp., Picrothamnus desertorum, or Tetradymia spp. Sarcobatus vermiculatus is generally absent, but if present does not codominate. The herbaceous layer varies from sparse to moderately dense and is dominated by perennial graminoids such as Achnatherum hymenoides, Bouteloua gracilis, Elymus lanceolatus ssp. lanceolatus, Pascopyrum smithii, Pleuraphis jamesii, Pleuraphis rigida, Poa secunda, or Sporobolus airoides. Various forbs are also present.

FORESTED COMMUNITIES

Southern Rocky Mountain Piñon-Juniper Woodland: The most common forested areas within Torrance County consists of piñon-juniper woodlands. This ecological system occurs on dry mountains and plateaus of north-central New Mexico and is represented in the elevational region between ponderosa pine and grassland communities. Piñon pine (*Pinus edulis*) and/or oneseed juniper (*Juniperus monosperma*) dominate the tree canopy; however, Rocky Mountain juniper (*J. scopulorum*) may codominate or replace oneseed juniper in higher elevations. Understory layers are variable and may be dominated by shrubs or graminoids, or may be absent. Associated understory species may include blue grama, James's galleta (*Hilaria jamesii*), Arizona fescue (*Festuca arizonica*), Bigelow sage (*Artemisia bigelovii*), mountain mahogany (*Cercocarpus montanus*), and Gambel oak (*Quercus gambelii*).

Southern Rocky Mountain Piñon-Juniper Woodland and Savanna: These vegetative communities are similar to the Southern Rocky Mountain Piñon-Juniper Woodlands (see above) except there is a lower degree of canopy cover and a higher degree of grass abundance in the understory.

Madrean Pinyon-Juniper Woodland: This system occurs on foothills, mountains and plateaus in the Sierra Madre Occidentale and Sierra Madre Orientale in Mexico, Trans-Pecos Texas, southern New Mexico and Arizona, generally south of the Mogollon Rim. Substrates are variable, but soils are generally dry and rocky. The presence of Pinus cembroides, Pinus discolor, or other Madrean trees and shrubs is diagnostic of this woodland system. Juniperus coahuilensis, Juniperus deppeana, Juniperus pinchotii, Juniperus monosperma, and/or Pinus edulis may be present to dominant. Madrean oaks such as Quercus arizonica, Quercus emoryi, Quercus grisea, or Quercus mohriana may be codominant. Pinus ponderosa is absent or sparse. If present, understory layers are variable and may be dominated by shrubs or graminoids.

Southern Rocky Mountain Ponderosa Pine Woodland: These woodlands occur at the lower treeline/ecotone between grassland or shrubland and more mesic coniferous forests typically in warm, dry, exposed sites. Occurrences are found on all slopes and aspects; however, moderately steep to very steep slopes or ridgetops are most common. Pinus ponderosa (primarily var. scopulorum and var. brachyptera) is the predominant conifer; Pseudotsuga menziesii, Pinus edulis, and Juniperus spp. may be present in the tree canopy. The understory is usually shrubby, with Artemisia nova, Artemisia tridentata,

Arctostaphylos patula, Arctostaphylos uva-ursi, Cercocarpus montanus, Purshia stansburiana, Purshia tridentata, Quercus gambelii, Symphoricarpos oreophilus, Prunus virginiana, Amelanchier alnifolia, and Rosa spp. common species. Pseudoroegneria spicata and species of Hesperostipa, Achnatherum, Festuca, Muhlenbergia, and Bouteloua are some of the common grasses. Mixed fire regimes and ground fires of variable return intervals maintain these woodlands, depending on climate, degree of soil development, and understory density.

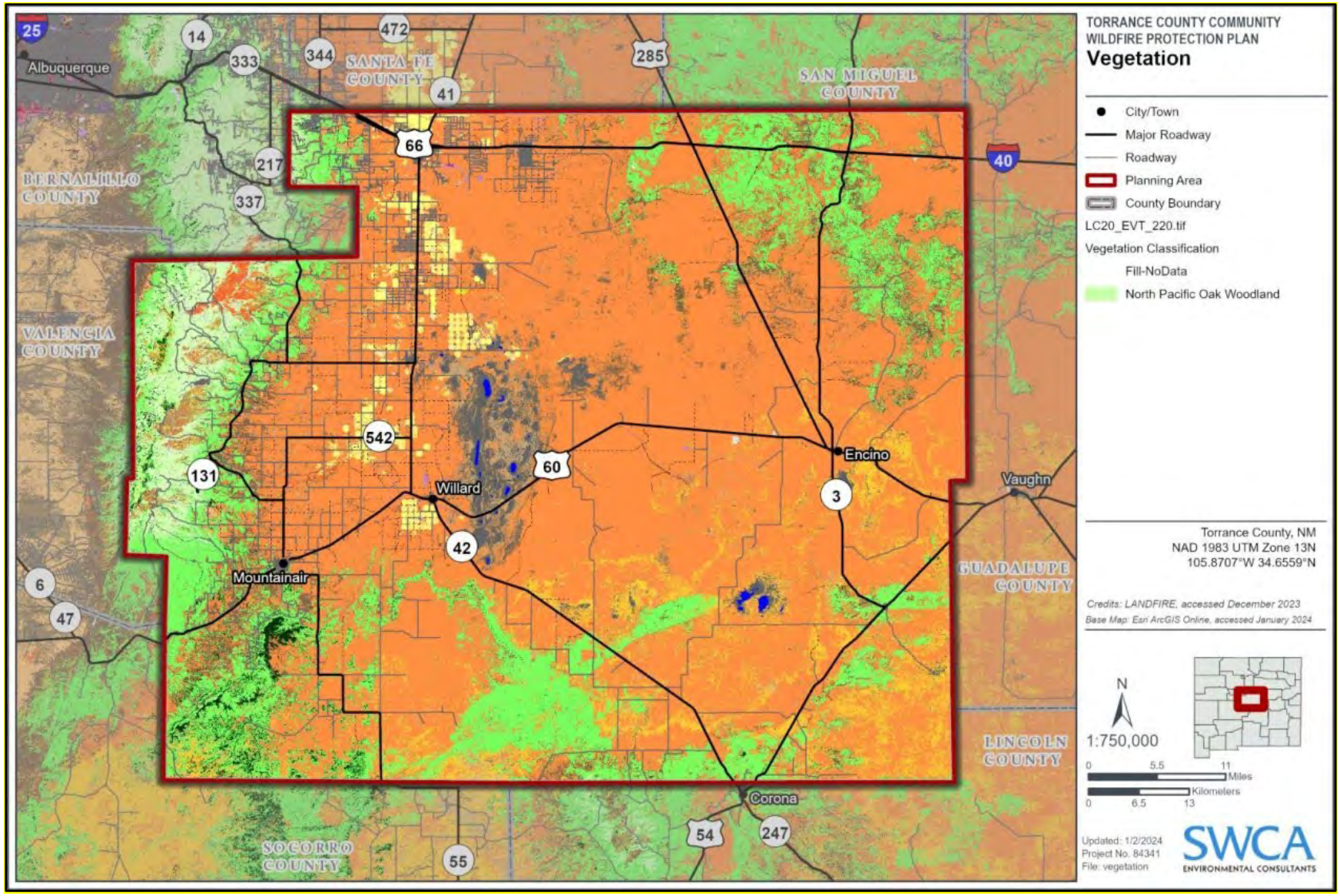

TORRANCE COUNTY COMMUNITY
WILDFIRE PROTECTION PLAN
Vegetation
City/Town
Major Roadway
Roadway
Planning Area
County Boundary
LC20_EVT_220.tif
Vegetation Classification
Fill-NoData
North Pacific Oak Woodland
Torrance County, NM
NAD 1983 UTM Zone 13N
105.8707°W 34.6559°N
Credits: LANDFIRE, accessed December 2023
Base Map: Esri ArcGIS Online, accessed January 2024
N
1:750,000
0 5.5 11
Miles
Kilometers
0 6.5 13
Updated: 1/2/2024
Project No. 84341
File: vegetation
SWCA
ENVIRONMENTAL CONSULTANTS
Albuquerque
Mountainair
Willard
Encino
Vaughn
Corona
SANTA FE COUNTY
SAN MIGUEL COUNTY
BERNALILLO COUNTY
VALENCIA COUNTY
GUADALUPE COUNTY
LINCOLN COUNTY
SOCORRO COUNTY
25
14
333
344
472
285
41
66
40
217
337
542
60
131
3
42
6
47
54
247
55

Figure A.9. Vegetation types in Torrance County derived from SWReGAP.

FOREST HEALTH CONSIDERATIONS

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 faster completion of insect life cycles due to warmer climate regimes. Stands of trees that have been killed by insects have varying degrees of associated fire danger 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.

For the past two decades, forests and woodlands in the southwestern United States have been subjected to increased drought, insect infestation, and disease, which have resulted in a decline in forest health (Clifford et al. 2008). Mortality from drought and bark beetle infestation of ponderosa pine, piñon-juniper, and other forest and woodland species throughout the Southwest region increased dramatically between 2000 and 2008 (McDowell et al 2008). Piñon pine was especially affected, with over 1.9 million acres (774,771 hectares) of piñon across New Mexico and Arizona showing evidence of bark beetle attack by 2003. Some areas experienced greater than 90% piñon mortality (Gaylord et al. 2013), while juniper mortality was significantly lower. Piñon mortality was largely a result of the piñon ips bark beetle (*Ips confuses*), which generally attacks water-stressed or recently dead trees (Raffa et al. 2008). A plethora of recent research has focused on the effects that restoration treatments have on the species resistance/susceptibility to bark beetles in ponderosa pine forests (Gaylord 2013).

Insects that have infested or have the potential to infect the forests within and around the Torrance County CWPP 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 piñon die-off in the region over the last several years. *Dendroctonus* beetles attack medium to large ponderosa pines, blue spruce (*Picea pungens*), Engelmann spruce, and Douglas-fir. 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.

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.

Diseases

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

Mistletoe (*Arceuthobium* spp., *Phoradendron* spp.). Both dwarf and true mistletoe are common in the forested regions of the planning 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 the year-old needles turn brown 6 to 12 mm from the needle base.

White Pine Blister Rust *(Cronartium ribicola).* White pine blister rust can infect and kill local white pines, such as limber pine (*Pinus flexilis*) and southwestern white pine (*Pinus strobiformis*). 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.

Physiological Stress

As climate change progresses, rising temperatures, prolonged growing seasons, and increased spatial and temporal variation in water availability are having considerable effects on tree physiology and health. When trees experience extreme water stress during periods of prolonged and/or intense drought considerable tree mortality can be exacerbated due to physiological stresses (Anderegg et al 2015; McDowell 2011; Park Williams et al. 2013). Usually, large-scale tree mortality is exacerbated by, and sometimes even caused by, one of or a combination of two physiological pressures: 1) hydraulic failure – this is more common and occurs when a tree's water column (its xylem) is no longer able to transport water to its leaves due to the column embolizing under extreme tension; 2) carbon starvation – this occurs when a tree consumes more sugars than it photosynthesizes due to limited photosynthesis during prolonged drought (Adams et al. 2009; McDowell 2011; Venturas et al. 2020). During periods of extreme drought, physiological stress can inhibit plant and tree defenses (due to the limits on photosynthates being mobilized for defense) and make trees more susceptible to disease pests and pathogens. Furthermore, extreme water stress in trees can also make forests more prone to extreme fire events. Large-scale forest die-offs in New Mexico in the 1990s and twenty-first century during periods of intense drought have been linked and attributed to physiological stress (Allen 2014).

WILDLIFE

Vegetation management treatments are commonly applied throughout the county to benefit habitat for general wildlife species or game habitat. Most native wildlife species found in the region evolved with a frequent fire regime. However, impacts to wildlife should still be considered when planning fuel treatments.

THREATENED AND ENDANGERED SPECIES

Torrance County is home to six threatened and endangered species. Endangered species are the New Mexico meadow jumping mouse (*Zapus hudsonius luteus*), the southwestern willow flycatcher

(*Empidonax traillii extimus*), and the Rio Grande silvery minnow (*Hybognathus amarus*). Threatened species are the yellow-billed cuckoo (*Coccyzus americanus*), the monarch butterfly (*Danaus plexippus*), and the pecos sunflower (*Helianthus paradoxus*) (USFWS 2024).

Treatments on federal land would be subject to the National Environmental Policy Act (NEPA) and associated analysis of impacts to these species. Treatments in areas that may impact threatened and endangered species would require application of certain mitigation measures to prevent degradation to habitat.

MANAGEMENT OF NON-NATIVE PLANTS

The USDA maintains a list of introduced, invasive, and noxious plants by state (USDA 2022). Fuel treatment approaches should always consider the potential for introduction or proliferation of invasive non-native species as a result of management actions. Fuel treatments typically include monitoring and treatment of noxious weeds, especially those that can increase fire risk shortly after a treatment (e.g., burningbush [*Kochia scoparia*] and cheatgrass [*Bromus tectorum*]). Other fuel treatments, such as mowing and fuel reduction projects, could create areas of disturbance that may provide suitable conditions for invasive establishment and propagation. Land managers should monitor for invasives before and after all fuel treatments and employ appropriate treatment and management strategies to mitigate potential risks from invasive/noxious species. However, areas of the county, especially within the WUI, with considerable noxious weed infestation can create areas of high fire risk. Land managers should target these areas for invasive treatments/removal and native plant restoration. Finally, certain species, particularly cheatgrass, have significantly altered the fire regime for much of the vegetation ecology in Torrance County. Land managers should carefully consider the ecological impacts of treatments in areas which already have established invasive populations and consider how fuel treatments may impact (i.e., increase or decrease) these populations.

PUBLIC EDUCATION AND OUTREACH PROGRAMS

Public education and outreach programs are a common factor in virtually every agency and organization challenged by wildfires. Detailed information regarding fire education programs that can support existing efforts by the County is provided in Appendix A.

LOCAL AND STATE PROGRAMS

Torrance County Fire & Rescue

Torrance County contains several local, tribal, state, and federal fire protection organizations that are well integrated through mutual aid and fire protection agreements such as the Joint Powers Agreement. In general, most of the agencies serving the County are well staffed and have plentiful resources throughout the wildfire season (April–July). However, during the regular season (i.e., August–March), resources, especially state, federal, and County resources, may be shifted to other regions. During the regular fire season (i.e. August- March) period, the time to obtain resources may be extended, especially for areas that are under federal and state jurisdiction.

There are five firefighting districts within the County, they include the following volunteer and established fire stations: City of Moriarty Fire Department, Estancia Fire Department, Torreon and Tajique 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, and the Corona Fire Department.

It should be noted 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

New Mexico Energy, Minerals, and Natural Resources Department Forestry Division

The EMNRD Forestry Division participates in various nationally recognized programs that guide homeowners and landowners with wildfire prevention and preparation. The EMNRD Forestry Division collaborates with local, state, federal, and tribal partners on public education efforts to promote fire prevention and education throughout New Mexico.

Interagency programs used by the EMNRD Forestry Division include:

- Ready, Set, Go!
- Smokey Bear
- Living with Fire
- Fire Adapted Communities
- Firewise USA

For more information please visit: https://www.emnrd.nm.gov/sfd/fire-prevention-programs/

Bureau of Land Management - New Mexico

The BLM New Mexico Office conducts fire prevention and education programs and coordinates interagency fire messaging throughout the state and within the Southwest geographic area. This includes broad and targeted public messaging via social media, traditional media, and interagency prevention and mitigation publications with cooperators such as the recent revisions of Ready, Set, Go and NM Living with Fire. This also includes the funding and maintenance of the primary interagency fire information site in the state, NMFireInfo.com. Through a partnership with New Mexico Counties, the BLM funds the Wildfire Risk Reduction Grant Program that includes awards for education and outreach, CWPPs, and fuels reduction projects to local government, tribes, and non-profit entities.

NATIONAL PROGRAMS

Ready, Set, Go!

The Ready, Set, Go! Program, which is managed by the International Association of Fire Chiefs, was launched in 2011 at the WUI conference. The program seeks to develop and improve the dialogue between fire departments and residents, providing teaching for residents who live in high-risk wildfire areas—and the WUI—on how to best prepare themselves and their properties against fire threats (International Association of Fire Chiefs 2021).

The tenets of Ready, Set, Go! as included on the website (http://www.wildlandfirersg.org) are:

Ready – Take personal responsibility and prepare long before the threat of a wildland fire so your home is ready in case of a fire. Create defensible space by clearing brush away from your home. Use fire-resistant landscaping and harden your home with fire-safe construction measures. Assemble emergency supplies and belongings in a safe place. Plan escape routes and ensure all those residing within the home know the plan of action.

Set – Pack your emergency items. Stay aware of the latest news and information on the fire from local media, your local fire department, and public safety.

Go – Follow your personal wildland fire action plan. Doing so will not only support your safety but will allow firefighters to best maneuver resources to combat the fire.

National Fire Protection Association

The NFPA is a global non-profit organization devoted to eliminating death, injury, property, and economic loss due to fire, electrical, and related hazards. Its 300 codes and standards are designed to minimize the risk and effects of fire by establishing criteria for building, processing, design, service, and installation around the world.

The NFPA develops easy-to-use educational programs, tools, and resources for all ages and audiences, including Fire Prevention Week, an annual campaign that addresses a specific fire safety theme. The NFPA's Firewise Communities program (www.firewise.org) encourages local solutions for wildfire safety by involving homeowners, community leaders, planners, developers, firefighters, and others in the effort to protect people and property from wildfire risks.

The NFPA is a premier resource for fire data analysis, research, and analysis. The Fire Analysis and Research division conducts investigations of fire incidents and produces a wide range of annual reports and special studies on all aspects of the nation's fire problem.

National Interagency Fire Center

The National Interagency Fire Center (NIFC) provides a wide array of fire resources and services. The National Interagency Coordination Center offers communication assistance to over 32,000 firefighters and 50 major events at one given time (NIFC 2021c). The Predictive Services Group creates wildfire forecasts and predictions from fuel and weather data. The NIFC has a Remote Automated Weather Base with over 2,000 weather stations which help inform the Predictive Services Group. The National Wildfire Coordinating Group, which is nested under the NIFC, provides operational coordination to federal, state, local, tribal, and territorial partners (NIFC 2021c). The NIFC also has a training branch where training curriculums are developed to be used across the nation. For those too young to participate in the standard trainings, the NIFC offers FireWorks, an educational program designed for kids K-12. The program teaches children topics such as wildland fire science, ecosystem fluctuations, human interaction on the environment, and other environmental science topics (NIFC 2021d). The NIFC also provides public education resources (NIFC 2021e):

- Wildfire Readiness – Home
- Wildfire Readiness – Business
- Wildfire Readiness – Farm and Ranch
- Weekend Wildfire Preparedness

- What to Do if a Wildfire is Approaching
- Wildfire Risk – Community
- Prepare and Protect Your Home
- Prepare Your Community
- One Less Spark, One Less Wildfire
- Only You Can Prevent Wildfires

U.S. Fire Administration's WUI Toolkit

The U.S. Fire Administration (USFA) is an entity of the U.S. Department of Homeland Security's Federal Emergency Management Agency (FEMA) that aids in the preparation for and response to fire. Their WUI toolkit consists of a list of websites and other information regarding risk assessments, public outreach, and community training. Find the toolkit here: https://www.usfa.fema.gov/wui/training/

WILDFIRE RESEARCH CENTER (WIRĒ)

Wildfire Research Center (WiRē) is a non-profit organization that works with local wildfire services to achieve community-tailored pathways which reduce risk to wildfire while simultaneously promoting pathways to fire adaptation. WiRē's mission states that fire adaptation is "about living with fire", while "creating safe and resilient communities that reduce wildfire risk on their properties before a fire, and supporting effective response when fires threaten a community." WiRē states that wildfire is an integral component of many ecosystems, and that fire must be allowed, when safe, as to ensure the health of forests. Core to WiRē's approach are four main concepts. One, residents are critical actors in the wildland-urban interface wildfire problem. Two, action is central to adaptation. Three, people and their decisions are complex. Finally, four, decisions are not made in a vacuum. To achieve its goals and serve communities, WiRē will typically conduct a "rapid wildfire risk assessment," which assesses what contributes to wildfire risk, such as, building materials, vegetation near homes, background fuels, local topography, and access to emergency fire services. Additionally, they also conduct "social surveys", which assess residents' perceptions about wildfire, wildfire risk, risk mitigation behavior, and assess their willingness towards taking action to reduce wildfire risk.

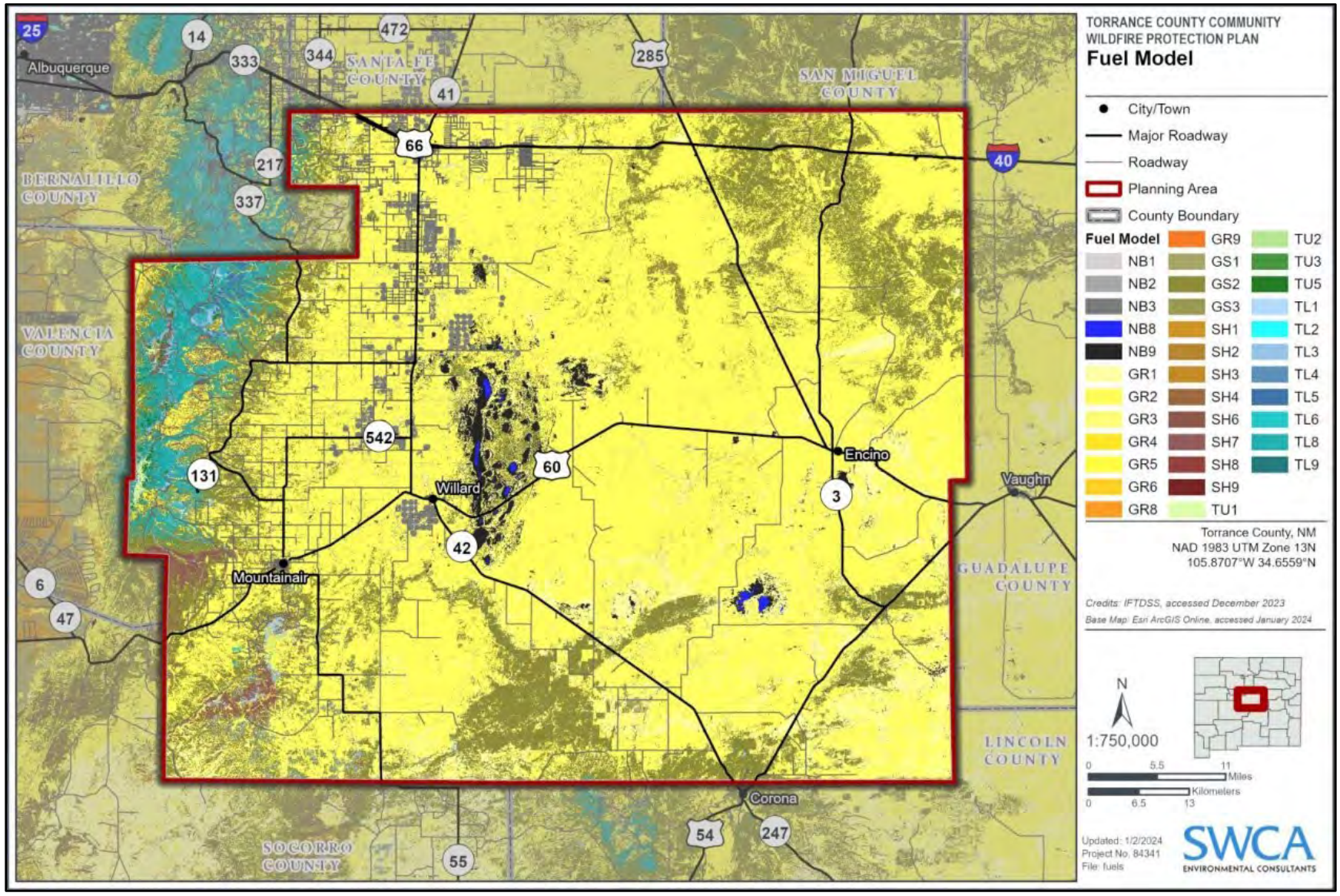
For more information, please visit https://wildfireresearchcenter.org/.

This page intentionally left blank.

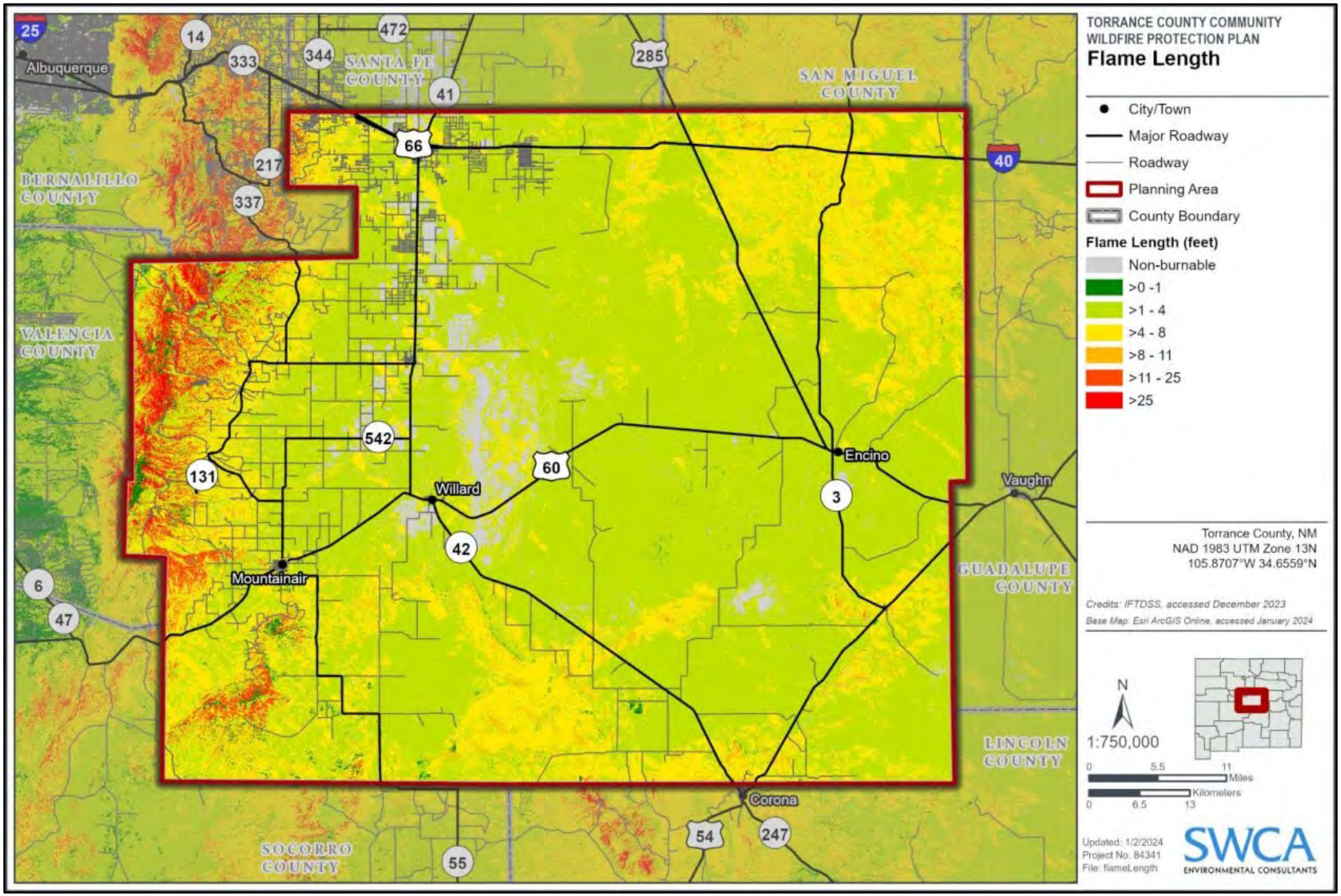
APPENDIX B:

Additional Mapping

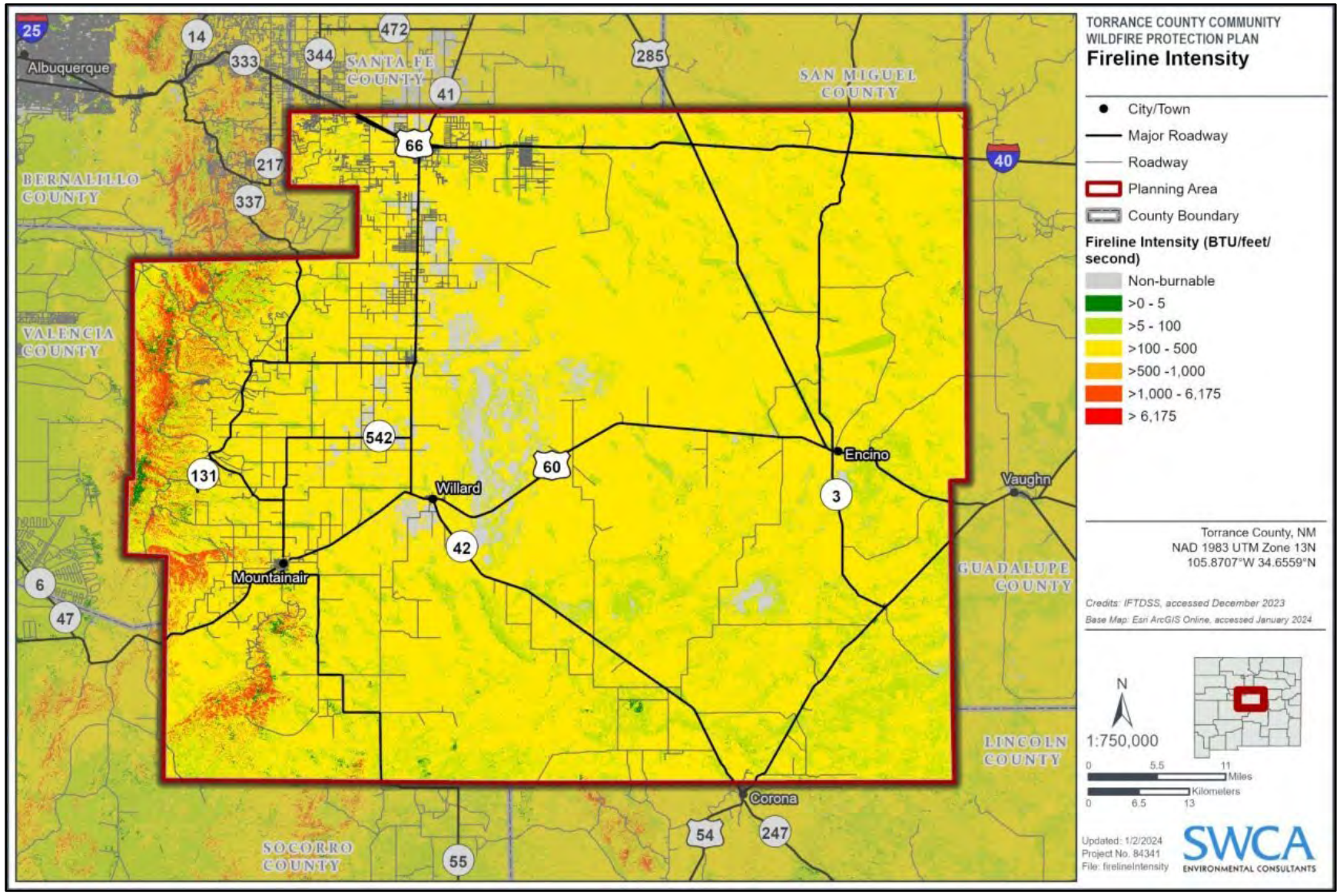
This page intentionally left blank.



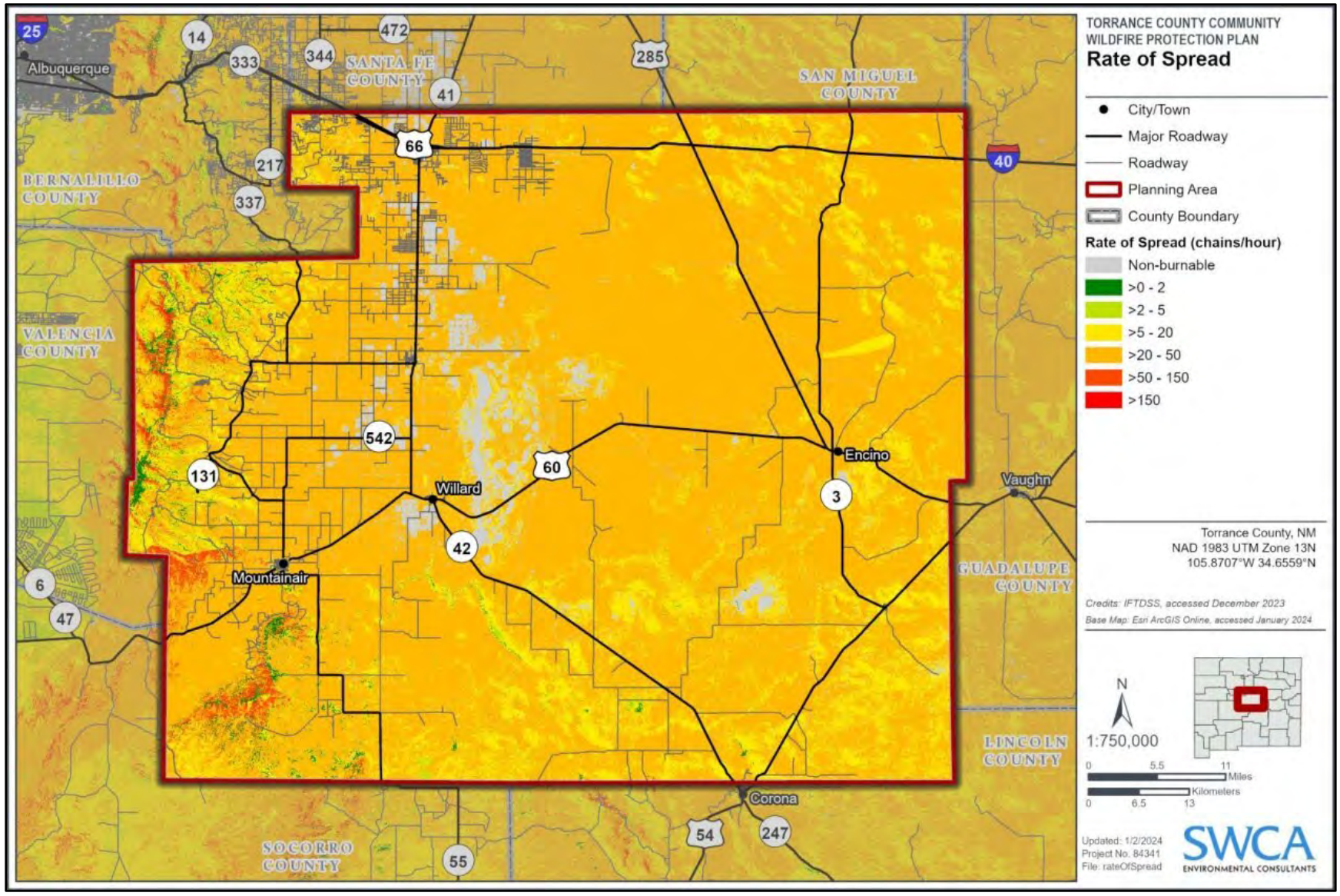
Map B.1. Scott and Burgan 40 Fire Behavior Fuel Models.



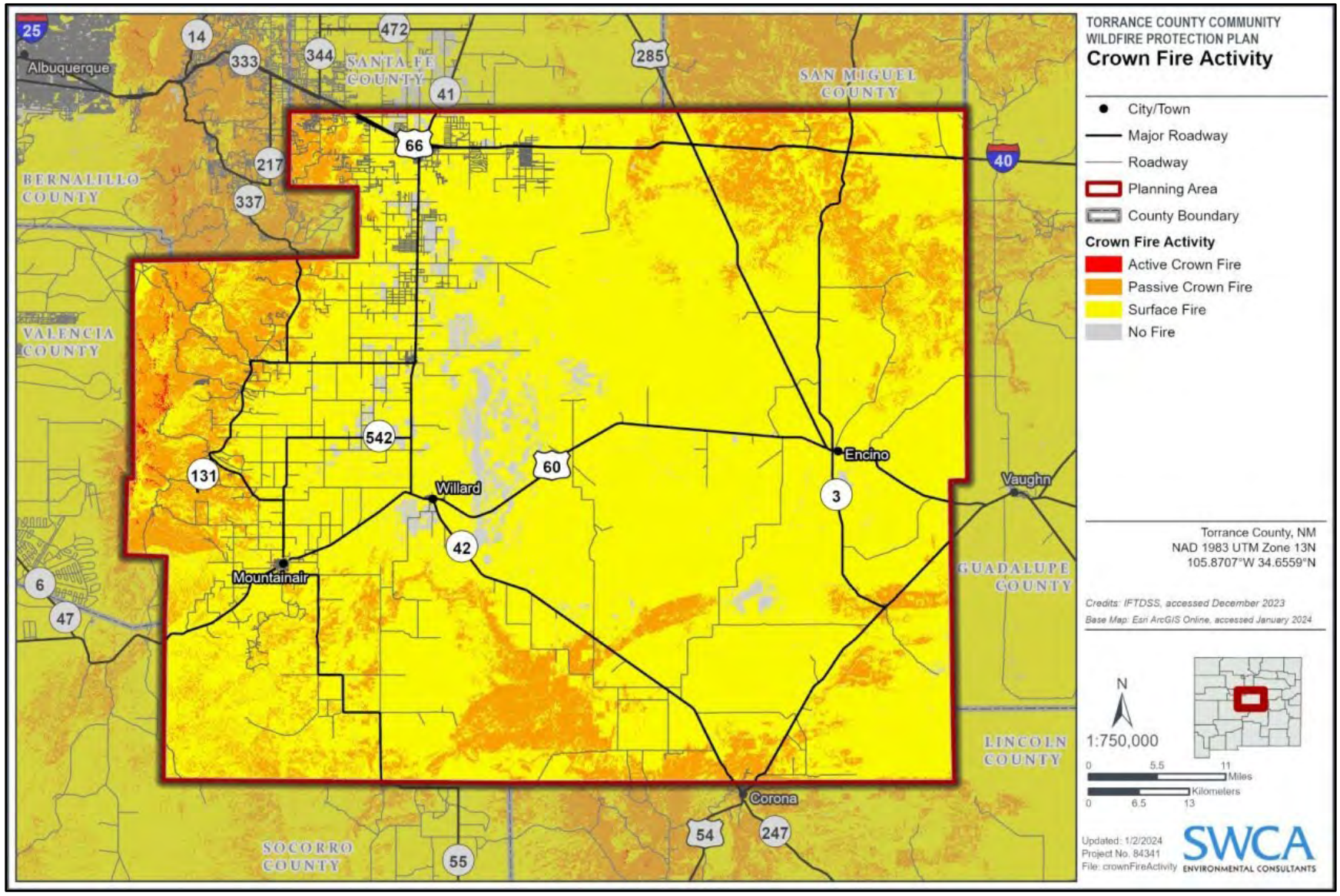
Map B.2. Fire behavior model output: flame length.



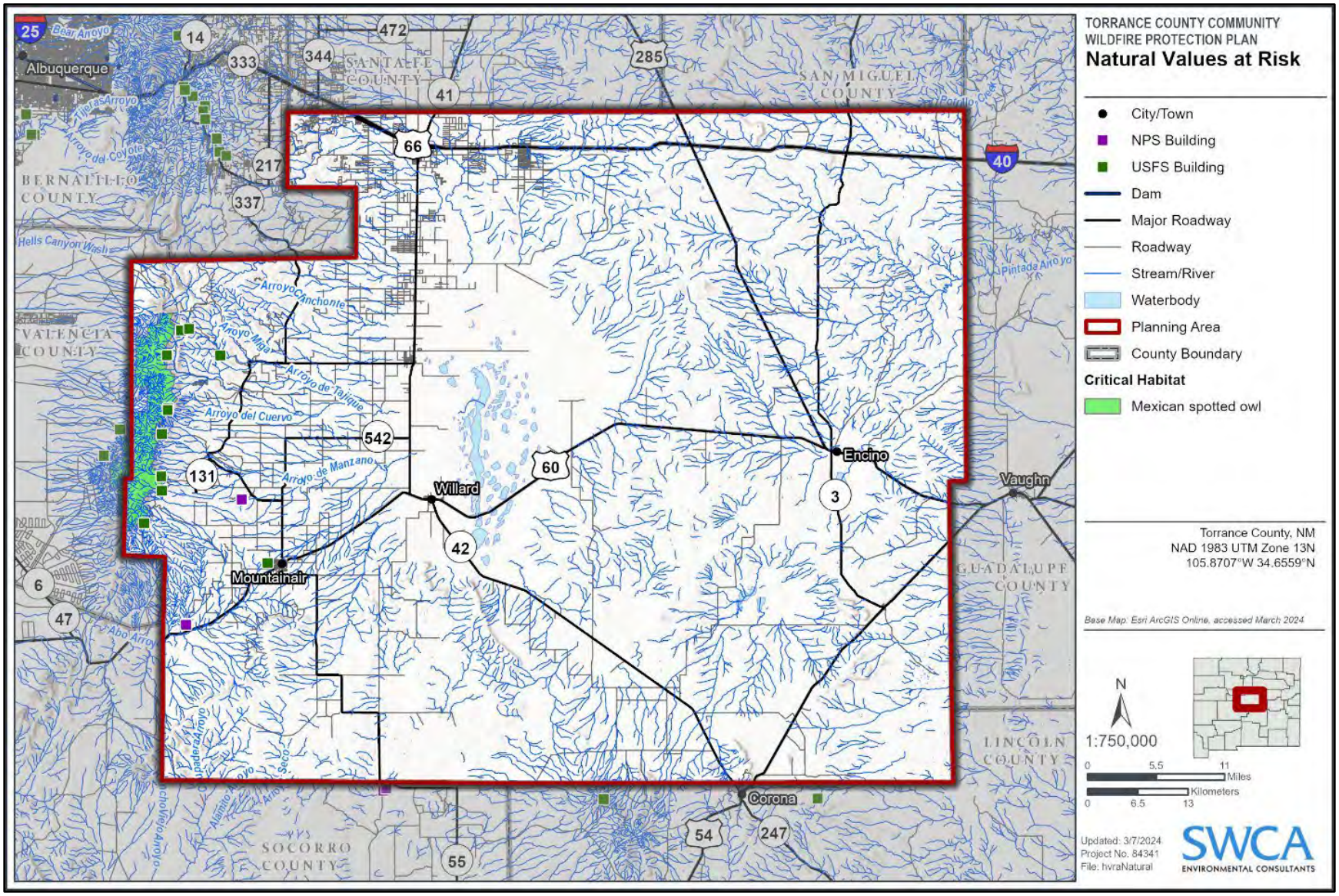
Map B.3. Fire behavior model output: fireline intensity.



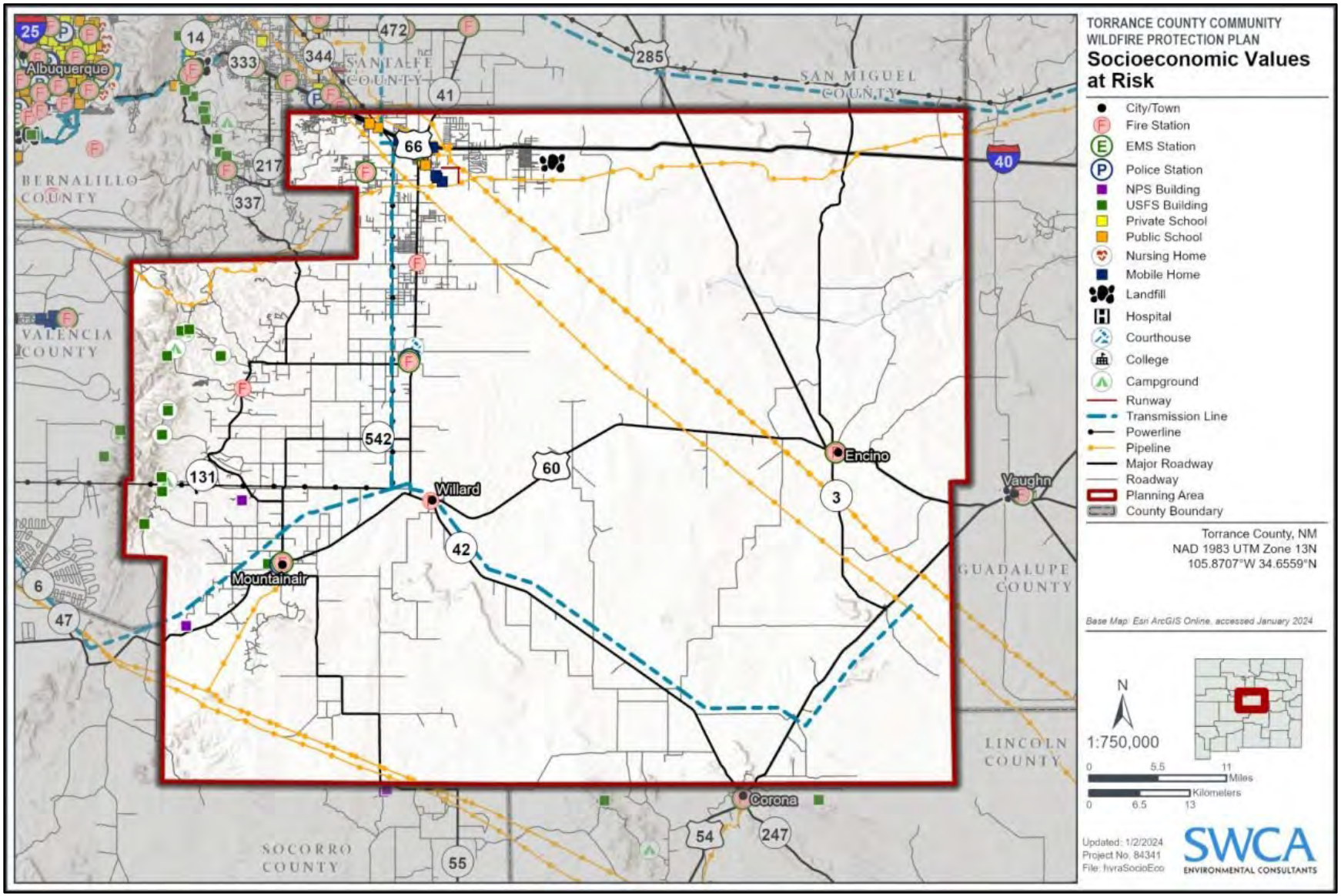
Map B.4. Fire behavior model output: rate of spread.



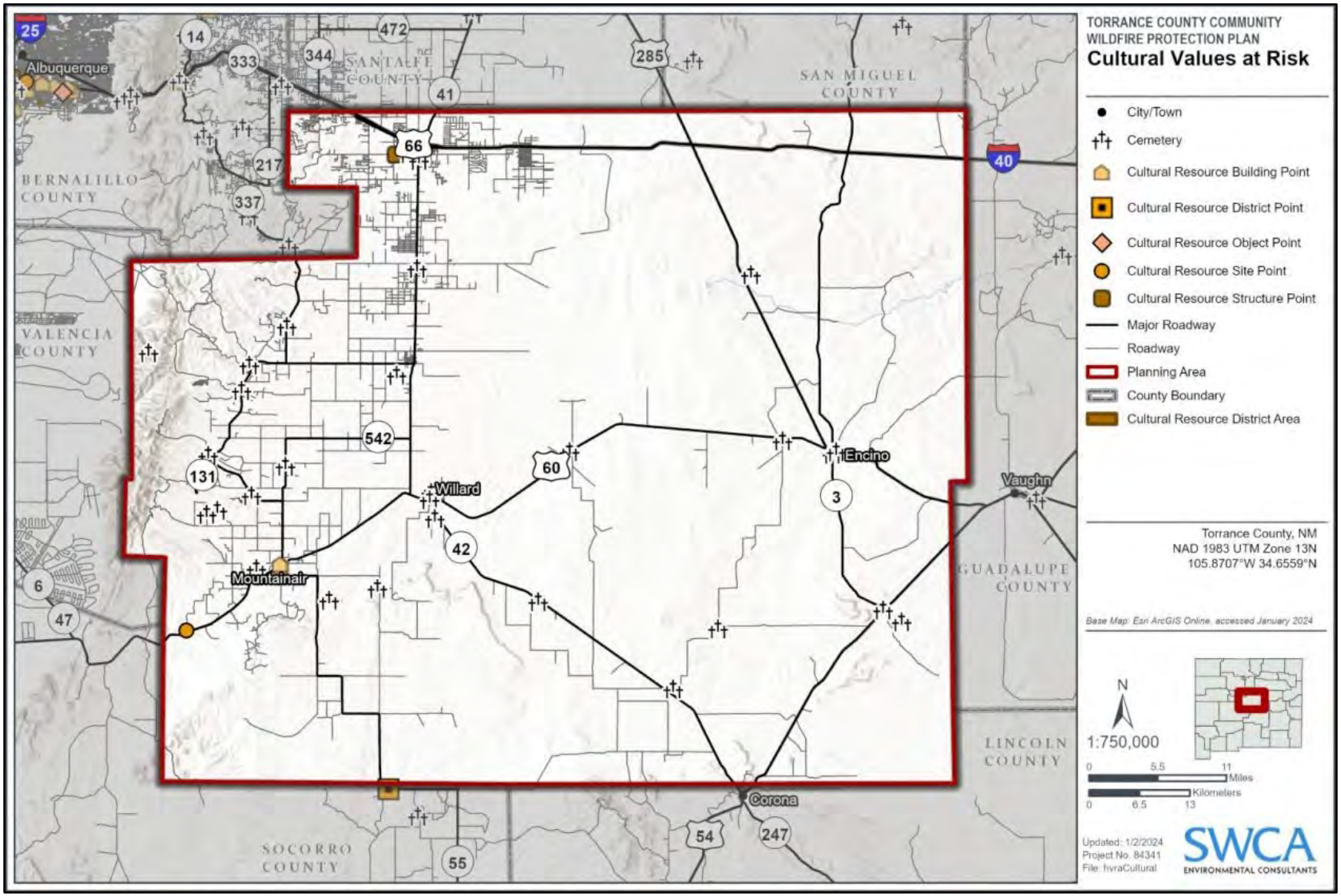
Map B.5. Fire behavior model output: crown fire activity.



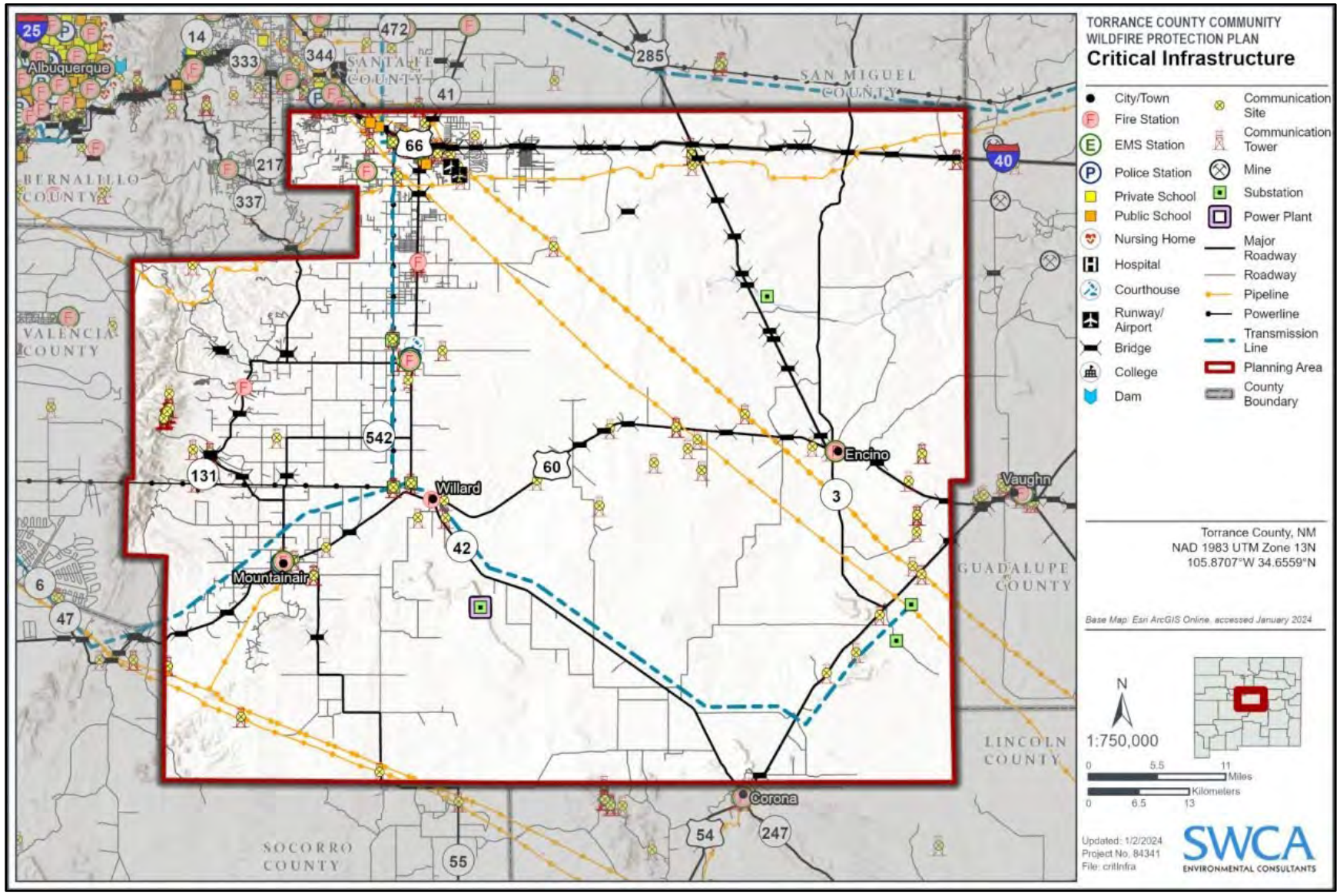
Map B.6. Natural values at risk.



Map B.7. Socioeconomic values at risk.



Map B.8. Cultural values at risk.



Map B.9. Critical infrastructure.

This page intentionally left blank.

APPENDIX C:

Core Team List

This page intentionally left blank.

CORE TEAM LIST

Organization	Name
Samantha O'dell	Torrance County
Chief Winham	Torrance County
Juan Sanchez	Chili Land Grant
Jason Quintana	Manzano Land Grant
Mayor Webb	Moriarty
Deputy Chief Sanchez	Torrance County Fire Department
Chief Hart	Moriarty Fire Department
Chief Nelson	Mountainair Fire Department
Chief Wolonsky	Estancia Fire Department
Chief Gallegos	Encino Fire Department
Diedre Tarr	Claunch Pinto SWCD
Felipe Lovato	Claunch Pinto SWCD
David King	Edgewood SWCD
Brenda Smythe	Edgewood SWCD
Kelly Smith	Edgewood SWCD
Leonard Howell	East Torrance SWCD
Diedre Tarr	Claunch Pinto SWCD
Felipe Lovato	Claunch Pinto SWCD
David King	Edgewood SWCD
Brenda Smythe	Edgewood SWCD
Kelly Smith	Edgewood SWCD
Steve Glass	Cuidad SWCD
Katie Mechenbier	New Mexico District Attorney
Camilla Romero	NMSLO
Kyle Rose	NMSLO
Ian Dolly	NMSLO
Lawrence Crane	New Mexico State Forestry
Kevin Pachero	New Mexico State Forestry
Lester Gary	Isleta Pueblo
Nathan Currnutt	BLM
Todd Richards	BLM
Pete Rivera	BLM
Jean Berkebile	NPS
Ernie Taylor	USFS

Organization	Name
Adrian Padilla	USFS
Brent Baca	USFS
Phillip Rudy	USFS
Danielle Johnston	Edgewood Board
Tom Caroll	Resident
Jerry Melaragno	Resident
Cody Stropki	SWCA Environmental Consultants
Montiel Ayala	SWCA Environmental Consultants
Lena Wilson	SWCA Environmental Consultants
Liz Hitzfelder	SWCA Environmental Consultants
Cara McConnell	SWCA Environmental Consultants

APPENDIX D:

Community Risk-Hazard Assessments for WUI Communities

This page intentionally left blank.

TORRANCE COUNTY CWPP
WILDLAND URBAN INTERFACE COMMUNITIES
COMMUNITY ASSESSMENT SUMMARIES

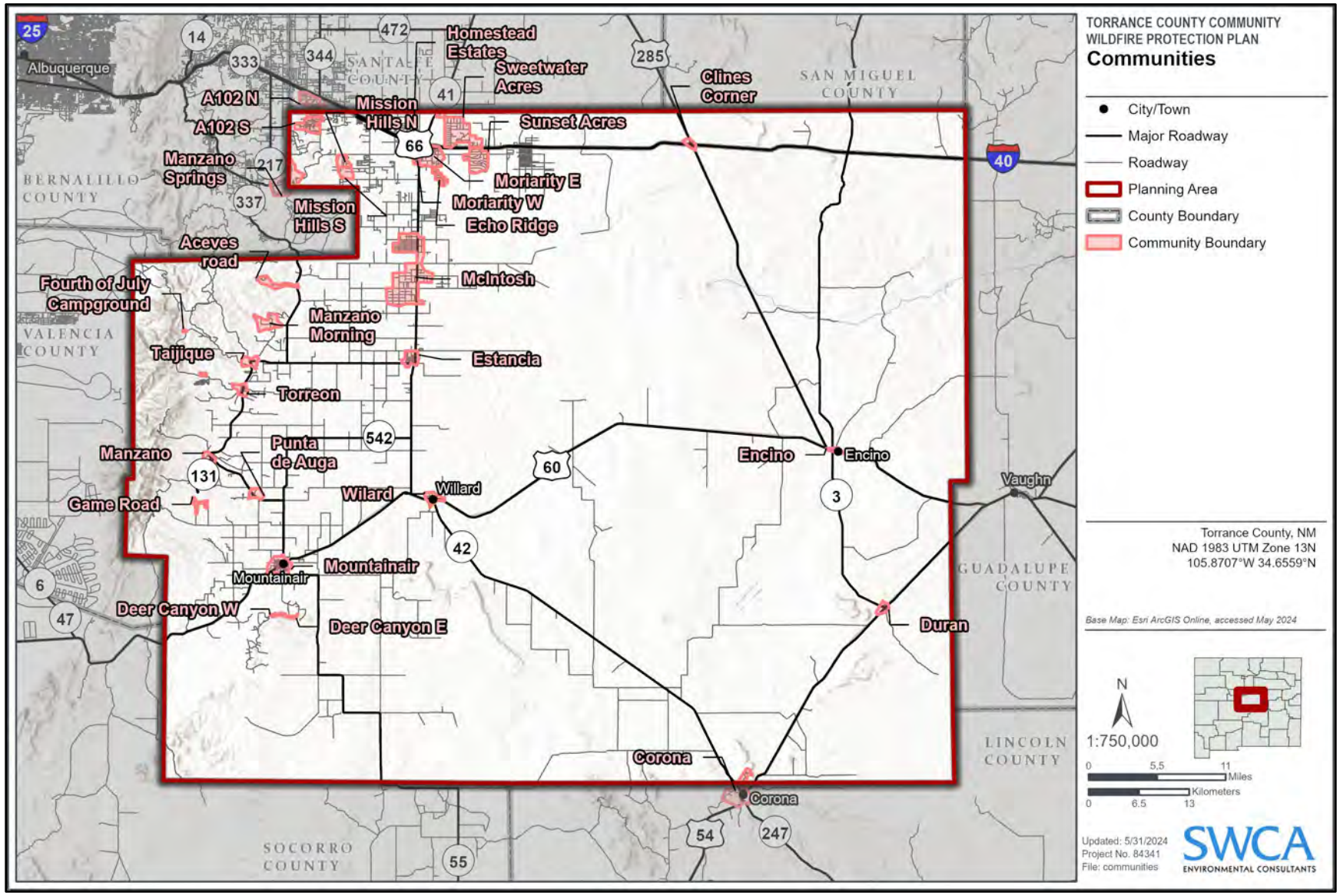


Figure D.1. Torrance County communities

A102

Community Background

Community Name: A102

Total Score (2024): 112 (high)

Total Score (2016): 115 (high)

Fire Protection District:

Land Area:

1144 Survey Summary Highlights

Positive Attributes (Low Scores)

- Large fuel break SW of community
- Fire stations located in area
- Some homeowners are starting to do defensible space treatments
- Homes with new metal roofs

Negative Attributes (High Scores)

- Heavily populated
- Poor signage
- Highly flammable building materials common on structures
- Minimal defensible space
- Heavy debris and trash build up
- Steep ungraded roads with numerous dead ends
- Limited water
- Limited turn around for emergency vehicles

Suggested Mitigation Focus Area

Fire Department Concerns:

- Defensible space treatments and educational outreach to community members

CLINES CORNER

Community Background

Community Name: Clines Corner

Total Score (2024): 62 (moderate)

Total Score (2016): 65 (moderate)

Fire Protection District:

Land Area:

1144 Survey Summary Highlights

Positive Attributes (Low Scores)

- Good ingress/egress
- Light fuel loads
- Limited slopes

Negative Attributes (High Scores)

- Housing construction from a mix of combustible materials
- Water availability
- Flashy fast moving fuels

Suggested Mitigation Focus Area

Fire Department Concerns:

- Grasslands along road and highway ROWs

CHILILI

Community Background

Community Name: Chilili

Total Score (2024): 101 (high)
Total Score (2016): 103 (high)

Fire Protection District:

Land Area:

1144 Survey Summary Highlights

Positive Attributes (Low Scores)

- Good ingress and egress
- Homeowners are starting to do defensible space treatments
- Large burn scar (Doghead) on the edge of town.

Negative Attributes (High Scores)

- Heavily populated
- Poor signage
- Highly flammable building materials common on structures
- Minimal defensible space
- Heavy debris and trash build up
- Steep ungraded roads with numerous dead ends
- Limited water
- Limited turn around for emergency vehicles

Suggested Mitigation Focus Area

- Education material on creating a safe and defensible home
- Defensible space treatments around structures

DEER CANYON

Community Background

Community Name: Deer Canyon

Total Score (2024): 71 (high)
Total Score (2016): 80 (high)

Fire Protection District: Mountainair

Land Area (acres): 224

1144 Survey Summary Highlights

Positive Attributes (Low Scores)

- Excellent signage
- Chipseal road leading out to the community
- Fuel breaks done adjacent to Preserve
- Fuel breaks along exit roads
- Safe zone development within community
- Homes are made of low-combustibility materials
- Some water available
- Below ground utilities
- Property owners have implemented defensible space work and fuel reduction treatments

Negative Attributes (High Scores)

- Narrow road width with limited turnaround space
- >5 miles from fire station
- Surrounded by dense fuels on public lands
- Limited water

Suggested Mitigation Focus Area

- Preserve land and adjacent public lands where dense fuel loads exist building off of completed work
- Continue to encourage homeowners to implement defensible space treatments

DURAN

Community Background

Community Name: Duran

Total Score (2024): 74 (high)

Total Score (2016): 78 (high)

Fire Protection District:

Land Area:

1144 Survey Summary Highlights

Positive Attributes (Low Scores)

- Good ingress/egress
- Fire station in town
- Fuel breaks to the west of town

Negative Attributes (High Scores)

- Flashy fuels mixed with pinyon juniper woodlands
- Limited defensible space
- Limited water availability
- Close to railroad
- Empty lots that are not maintained

Suggested Mitigation Focus Area

Fire Department Concerns:

- Defensible space education

ECHO RIDGE

Community Background

Community Name: Echo Ridge

Total Score (2024): 78 (high)

Total Score (2016): 80 (high)

Fire Protection District:

Land Area:

1144 Survey Summary Highlights

Positive Attributes (Low Scores)

- Non pressurized water is available
- Each home has a water storage tank
- Fire resistant building materials
  Great signage

Negative Attributes (High Scores)

- Poor ingress/egrees
- Long driveways with no turnaround space
- Structures have limited separation from adjacent structures
- Wooden fences connected to homes

Suggested Mitigation Focus Area

Fire Department Concerns:

- .

ESTANCIA

Community Background

Community Name: Estancia

Total Score (2024): 60 (moderate)

Total Score (2016): 62 (moderate)

Fire Protection District:

Land Area:

1144 Survey Summary Highlights

Positive Attributes (Low Scores)

- Good ingress/egress
- Light fuel loads
- Limited slopes
- Many houses metal roofs
- Fire station in town

Negative Attributes (High Scores)

- Flashy fast-moving fuels
- Limited defensible space: >30 feet of defensible space
- Above ground utilities

Suggested Mitigation Focus Area

- Maintain grasslands adjacent to the community
- Educational outreach on home hardening

ENCINO

Community Background

Community Name: Encino

Total Score (2024): 45 (moderate)

Total Score (2016): 52 (moderate)

Fire Protection District:

Land Area:

1144 Survey Summary Highlights

Positive Attributes (Low Scores)

- Good ingress/egress
- Light fuel loads
- Limited slopes
- Lots of metal roofs

Negative Attributes (High Scores)

- Flashy fast moving fuels
- Limited defensible space: >30 feet of defensible space
- Above ground utilities
- Adjacent to the railroad

Suggested Mitigation Focus Area

- Grasslands adjacent to the community.
- Education about defensible space

GAME ROAD

Community Background

Community Name: Game Road

Total Score (2024): 76 (high)
Total Score (2016): 71 (high)

Fire Protection District: Mountainair, Torreon/Tajique

Land Area (acres): 321

1144 Survey Summary Highlights

Positive Attributes (Low Scores)

- Sparsely populated
- Limited overstory from the occurrence of previous wildfires

Negative Attributes (High Scores)

- Poor ingress/egress
- Narrow dirt road width with limited to no turnaround space
- Poor signage
- Utilities are above ground
- Limited defensible space: >30 feet of defensible space around most homes, but <100 feet around many
- Heavy understory vegetation regrowth following Ojo Peak Wildfire
- Limited water availability
- >5 miles from fire station

Suggested Mitigation Focus Area

- Defensible space treatments around residential structures especially with Ojo Peak fire regrowth

MANZANO MORNING

Community Background

Community Name: Manzano Morning

Total Score (2024): 72 (high)
Total Score (2016): 77 (high)

Fire Protection District:

Land Area:

1144 Survey Summary Highlights

Positive Attributes (Low Scores)

- Fire resistant building materials
- Non pressurized hydrants
- Some water storage
- Burn scar (DogHead) adjacent to community

Negative Attributes (High Scores)

- Limited defensible space
- Limited water availability
- Ingress/egress
- Gated community (access codes)
- Combustible decks and outbuildings

Suggested Mitigation Focus Area

- Defensible space around structures
- Educational outreach

LA MERCED DEL MANZANO

Community Background

Community Name: La Merced del Manzano Land Grant

Total Score (2024): 85 (high)
Total Score (2016): 83 (high)

Fire Protection District: Torreon/Tajique

Land Area (acres): 438

1144 Survey Summary Highlights

Positive Attributes (Low Scores)

- Manzano Lake provides a source of water
- Recent thinning projects on FS lands above the community
- Property owners have implemented defensible space work and fuel reduction treatments
- Metal Roofs have been installed on some homes

Negative Attributes (High Scores)

- Poor ingress/egress
- Narrow road width with limited turnaround space
- Poor signage
- Utilities are above ground
- Limited defensible space: >30 feet of defensible space around most homes, but <100 feet around many
- >5 miles from fire station

Suggested Mitigation Focus Area

- Continue with fuel breaks on adjacent public lands
- Defensible space treatments around residential structures
- Educational outreach

MCINTOSH

Community Background

Community Name: Mcintosh

Total Score (2024): 65 (moderate)
Total Score (2016): 74 (high)

Fire Protection District:

Land Area:

1144 Survey Summary Highlights

Positive Attributes (Low Scores)

- Below ground utilities in some areas
- Good ingress/egress
- Metal roofing
- Fire station in town

Negative Attributes (High Scores)

- Narrow road width
- Poor signage
- Limited turnaround space
- Empty lots overgrown and lots of debris
- Limited defensible space: >30 feet of defensible space

Suggested Mitigation Focus Area

- Educational outreach on defensible space
- Maintain grasslands adjacent to the community

MISSION HILLS

Community Background

Community Name: Mission Hills

Total Score (2024): 87 (high)

Total Score (2016): 65 (moderate)

Fire Protection District:

Land Area:

1144 Survey Summary Highlights

Positive Attributes (Low Scores)

- Buildings made from modern materials
- Sparce low grasses
- Multiple ingress/egress
- Large defensible space treatment to the west of the community

Negative Attributes (High Scores)

- Limited defensible space: >30 feet of defensible space
- Above ground utilities
- Mix of woodlands and grasslands
- Steeper slopes with limited setbacks

Suggested Mitigation Focus Area

Fire Department Concerns:

- .

MORARITY

Community Background

Community Name: Morarity

Total Score (2024): 50 (moderate)

Total Score (2016): 55 (moderate)

Fire Protection District:

Land Area:

1144 Survey Summary Highlights

Positive Attributes (Low Scores)

- Good ingress/egress
- Light fuel loads
- Limited slopes
- Many houses metal roofs
- Local fire stations

Negative Attributes (High Scores)

- Flashy fast moving fuels
- Limited defensible space: >30 feet of defensible space
- Above ground utilities

Suggested Mitigation Focus Area

- Education outreach about defensible space

MOUNTAINAIR

Community Background

Community Name: Mountainair

Total Score (2024): 62 (moderate)

Total Score (2016): 65 (moderate)

Fire Protection District: Mountainair

Land Area (acres): 1,434

1144 Survey Summary Highlights

Positive Attributes (Low Scores)

- Local VFD in town
- Extra water storage at CPSWCD
- Surfaced/maintained roads
- Well signposted
- Adjacent fuels are light
- Surfaced roads and adequate width and turnaround
- Low slope in most areas, some steep sections
- Limited recent fire history

Negative Attributes (High Scores)

- Limited defensible space: >30 feet of defensible space around most homes, but <100 feet around many
- Mix of construction types. Building construction includes wood siding, wooden decks, and fences that can act as fuses from vegetation to homes.
- Utilities are above ground

Suggested Mitigation Focus Area

- USFS lands Southwest of town
- Education outreach about defensible space

LOMA PARDA

Community Background

Community Name: Loma Parda

Total Score (2024): 88 (High)

Total Score (2016): 91 (High)

Fire Protection District: Mountainair

Land Area (acres):

1144 Survey Summary Highlights

Positive Attributes (Low Scores)

- More than one access road
- Low slope in most areas, some steep sections
- Roofs tend to be of low combustibility
- Some homeowners have started to implement defensible space treatments

Negative Attributes (High Scores)

- Narrow road width with limited turnaround space
- Poor signage
- Utilities are above ground
- Limited defensible space: >30 feet of defensible space around most homes, but <100 feet around many
- Limited water availability
- >5 miles from fire station

Suggested Mitigation Focus Area

- Continue to work with private landowners on defensible space and fuel reduction treatments.

PUNTA DE AGUA

Community Background

Community Name: Punta de Agua

Total Score (2024): 67 (moderate)

Total Score (2016): 72 (high)

Fire Protection District: Mountainair, Torreon/Tajique

Land Area (acres): 520

1144 Survey Summary Highlights

Positive Attributes (Low Scores)

- Surfaced/maintained roads
- Well signposted
- Metal roofs have been installed on some homes Mowing occurs on some of the private lands.

Negative Attributes (High Scores)

- Utilities are above ground
- Limited defensible space: >30 feet of defensible space around most homes, but <100 feet around many
- >5 miles from fire station
- Lots of flashy fuels

Suggested Mitigation Focus Area

- . Continue to work with private landowners on defensible space and fuel reduction treatments.

Community Background

Community Name: La Merced del Manzano

Total Score: 30 (low)

Fire Protection District:

Land Area:

SUNSET ACRES

Community Background

Community Name: Sunset Acres

Total Score (2024): 50 (moderate)

Total Score (2016): 55 (moderate)

Fire Protection District:

Land Area:

1144 Survey Summary Highlights

Positive Attributes (Low Scores)

- Good ingress/egress
- Light fuel loads
- Limited slopes
- Some home with below ground utilities

Negative Attributes (High Scores)

- Flashy fast moving fuels
- Limited defensible space: >30 feet of defensible space

Suggested Mitigation Focus Area

- Educational outreach on Defensible space.

SWEETWATER ACRES

Community Background

Community Name: Sweetwater Acres

Total Score (2024): 42 (moderate)

Total Score (2016): 48 (moderate)

Fire Protection District:

Land Area:

1144 Survey Summary Highlights

Positive Attributes (Low Scores)

- Good ingress/egress
- Light fuel loads
- Limited slopes
- Irrigated agriculture adjacent to community

Negative Attributes (High Scores)

- Flashy fast moving fuels
- Limited defensible space: >30 feet of defensible space
- Above ground utilities

Suggested Mitigation Focus Area

Fire Department Concerns:

- Educational outreach on Defensible space.

TAIJIQUE

Community Background

Community Name: Taijique

Total Score (2024): 72 (high)

Total Score (2016): 78 (high)

Fire Protection District:

Land Area:

1144 Survey Summary Highlights

Positive Attributes (Low Scores)

- Good ingress/egress
- Good road conditions
- Lots of fuel breaks around the community (especially to the south)

Negative Attributes (High Scores)

- Limited defensible space: >30 feet of defensible space
- Above ground utilities
- Poor water availability
- Highly flammable construction materials

Suggested Mitigation Focus Area

- Educational outreach on Defensible space.

TORREON

Community Background

Community Name: Torreon

Total Score (2024): 68 (moderate)

Total Score (2016): 71(high)

Fire Protection District:

Land Area:

1144 Survey Summary Highlights

Positive Attributes (Low Scores)

- Water availability at Fire Station
- Good ingress/egress
- Good road conditions
- Many homes with metal roofs

Negative Attributes (High Scores)

- Limited defensible space: >30 feet of defensible space
- Above ground utilities
- Heavy and flashy fuels surrounding the community

Suggested Mitigation Focus Area

- Educational outreach on Defensible space.

WILLARD

Community Background

Community Name: Willard

Total Score (2024): 65 (moderate)

Total Score (2016): 73 (high)

Fire Protection District:

Land Area:

1144 Survey Summary Highlights

Positive Attributes (Low Scores)

- Good ingress/egress
- Good road conditions due to infrastructure development in area

Negative Attributes (High Scores)

- Flashy fuels
- Limited defensible space
- Limited water availability

Suggested Mitigation Focus Area

- Educational outreach on Defensible space.

USFS 422

Community Background

Community Name: USFS 422

Total Score (2024): 100 (high)
Total Score (2016): 101 (high)

Fire Protection District: District 1, Socorro County FD

Land Area (acres): 587

1144 Survey Summary Highlights

Positive Attributes (Low Scores)

- Sparsely populated
- Mowing of fine fuels around structures

Negative Attributes (High Scores)

- Poor ingress/egress
- Narrow dirt road width with limited turnaround space
- Poor signage
- Utilities are above ground
- No water available
- Limited defensible space: >30 feet of defensible space around most homes, but <100 feet around many>5 miles from fire station

Suggested Mitigation Focus Area

- Educational outreach about fuel reduction and defensible space treatments as new homes have been built since 2016 and continue to be built in this area.

4TH OF JULY LOOP

Community Background

Community Name: 4th of July Loop 422

Total Score (2024): 94 (high)
Total Score (2016): 104 (high)

Fire Protection District:

Land Area (acres):

1144 Survey Summary Highlights

Positive Attributes (Low Scores)

- Sparsely populated
- Recent fires have limited heavy fuels on federal lands

Negative Attributes (High Scores)

- Poor ingress/egress
- Narrow dirt road width with limited turnaround space
- Poor signage
- Utilities are above ground
- No water available
- Limited defensible space: >30 feet of defensible space around most homes, but <100 feet around many
- >5 miles from fire station

Suggested Mitigation Focus Area

- Educational outreach about fuel reduction and defensible space treatments

APPENDIX E:

NFPA 1144 Form

This page intentionally left blank.

1144 NATIONAL FIRE PROTECTION ASSOCIATION ASSESSMENT FORM

SWCA – 1144 NFPA Assessment		
Community		**Notes:**
Surveyor		
Survey Date/Time		
Means of Access		
Ingress and Egress		
2 or more roads in and out score | 0		
1 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		
Notes:		
Vegetation (Fuel Models)		
Predominant Vegetation		
Primary Predominant Vegetation		
Non-Burnable (NB) Score | 2		
Grass (GR) Score | 5		
Grass-Shrub (GS) Score | 10		
Shrub (SH) Score | 15		
Timber-Understory (TU) Score | 20		

Timber-Litter (TL) Score | 25	
Slash-Blow (TU) Score | 30	
Notes:	
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	
Topography Within 300 ft of Structures	
Slope	
< 9% | 1	
10% to 20% | 4	
21% to 30% | 7	
31% to 40% | 8	
>41% | 10	
Additional Rating Factors (rate all that apply)	
Topographic features | 1-5	
History of high fire occurrence | 1-5	
Severe fire weather potential | 1-5	
Separation of adjacent structures | 1-5	
Notes:	
Roofing Assembly	
Roofing	
Class A - metal roof, clay/concrete tiles, slate, asphalt shingles | 0	
Class B - pressure treated composite shakes and shingles | 3	
Class C - untreated wood shingle, plywood, particle board | 15	
Unrated - Extremely poor roofing conditions | 25	
Notes:	
Building Construction	
Siding Materials (predominant)	
Non-combustible (brick/concrete) | 5	
Fire Resistive (stucco/adobe) | 10	
Combustible (wood or vinyl) | 12	
Deck and fencing (predominant)	
No deck or fence/non-combustible | 0	
Combustible deck and fence | 5	

Building Set-Back	
> 30 ft to slope | 1	
< 30 ft to slope | 5	
Notes:	
Available Fire Protection	
Water Sources	
Water Source? | yes/no	
Water Source Type | hydrant, water tank, other	
Other Water Source	
Water Source Score | Hydrant = 1 Water Tank = 3	
Organized Response	
Station < 5 mi from community | 1	
Station > 5 mi from community | 3	
Notes:	
Placement of Gas and Electric Utilities	
Both underground | 0	
One above, one below | 3	
Both above ground | 5	
Values at Risk Observations	
Forest Health Observations	
Land Use Observations	
Misc Observations	
Total	

Hazard Rating Scale	**<40 Low**	**41-69 Moderate**	**>70 High**

This page intentionally left blank.

APPENDIX F:

Funding Sources

This page intentionally left blank.

FUNDING SOURCES

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

FEDERAL FUNDING INFORMATION

Source: 2022 Infrastructure Investments and Jobs Act

Agency: Multiple

Website: https://www.congress.gov/bill/117th-congress/house-bill/3684

Description: The Infrastructure Investments and Jobs act allocated funding through various departments for infrastructure projects including, but not limited to roads, bridges, and major projects; passenger and freight rail; highway and pedestrian safety; public transit; broadband; ports and waterways; airports; water infrastructure; power and grid reliability and resiliency; resiliency, including funding for coastal resiliency, ecosystem restoration, and weatherization; clean school buses and ferries; electric vehicle charging; addressing legacy pollution by cleaning up Brownfield and Superfund sites and reclaiming abandoned mines; and Western Water Infrastructure.

Specifically, the Community Wildfire Defense Grant Program is a $1 billion program where the Department of Agriculture will provide grants to communities at risk from wildfire to develop or revise their community wildfire protection plans and carry out projects described within those plans. The program includes a mix of formula and competitive funds. Applications are expected to open early in 2023.

Section 40803 addresses wildfire risk reduction, section 40804 deals with ecosystem restoration, section 40806 handles the establishment of fuel breaks in forests and other wildland vegetation, and section 70302 addresses reforestation. To learn more about the Act, please see the guidebook located here: https://www.whitehouse.gov/wp-content/uploads/2022/05/BUILDING-A-BETTER-AMERICA-V2.pdf.

Source: Access to Ancestral Lands Grant Opportunity (AALG)

Agency: First Nations Development Institute

Website: https://www.firstnations.org/

Description: For more than 41 years, First Nations Development Institute (First Nations), a Native-led 501(c)(3) nonprofit organization, has worked to strengthen American Indian economies to support healthy Native communities by investing in and creating innovative institutions and models that strengthen asset control and support economic development for American Indian people and their communities. First Nations began its national grantmaking program in 1993. Through mid-year 2021, First Nations has successfully managed 2,276 grants totaling more than $46 million to tribal and community institutions across Indian Country.

Source: Building Resilient Infrastructure and Communities (BRIC) Grant Program

Agency: Department of Homeland Security (DHS) Federal Emergency Management Agency (FEMA)

Website: https://www.fema.gov/grants/mitigation/building-resilient-infrastructure-communities

Description: BRIC will supports states, local communities, tribes, and territories as they undertake hazard mitigation projects, reducing the risks they face from disasters and natural hazards. The BRIC program guiding principles are supporting communities through capability- and capacity-building; encouraging and enabling innovation; promoting partnerships; enabling large projects; maintaining flexibility; and providing consistency.

Source: Hazard Mitigation Grant Program (HMGP)

Agency: FEMA

Website: https://www.fema.gov/grants/mitigation/hazard-mitigation

Description: The HMGP provides funding to state, local, tribal, or territorial governments (and individuals or businesses if the community applies on their behalf) to rebuild with the intentions to mitigate future losses due to potential disasters. This grant program is available after a presidentially declared disaster.

Source: Hazard Mitigation Grant Program (HMGP) – Post Fire

Agency: FEMA

Website: https://www.fema.gov/grants/mitigation/post-fire

Description: The HMGP Post Fire grant program provides assistance to communities for the purpose of implementing hazard mitigation measures following a wildfire. Mitigation measures may include:

- Soil stabilization
- Flood diversion
- Reforestation

Source: Flood Mitigation Assistance (FMA) Grant

Agency: FEMA

Website: https://www.fema.gov/grants/mitigation/floods

Description: The Flood Mitigation Assistance Program is a competitive grant program that provides funding to states, local communities, federally recognized tribes, and territories. Funds can be used for projects that reduce or eliminate the risk of repetitive flood damage to buildings insured by the National Flood Insurance Program. FEMA chooses recipients based on the applicant's ranking of the project and the eligibility and cost-effectiveness of the project.

Source: Emergency Management Performance Grant (EMPG)

Agency: FEMA

Website: https://www.fema.gov/grants/preparedness/emergency-management-performance

Description: The EMPG program provides funding to state, local, tribal, and territorial emergency management agencies with the overall goal of creating a safe and resilient nation. The two main

objectives of the program are 1) closing capability gaps that are identified in the state or territory's most recent Stakeholder Preparedness Review (SPR); and 2) building or sustaining those capabilities that are identified as high priority through the Threat and Hazard Identification and Risk Assessment (THIRA)/SPR process and other relevant information sources. The grant recipient and Regional Administrator must come to an agreement on program priorities, which are crafted based on National, State, and regional priorities.

Source: Fire Management Assistance Grant (FMAG)

Agency: FEMA

Website: https://www.fema.gov/assistance/public/fire-management-assistance

Description: Fire Management Assistance is available to state, local, and tribal governments for the mitigation, management, and control of fires on publicly or privately owned forests or grasslands, which threaten such destruction as would constitute a major disaster. The Fire Management Assistance declaration process is initiated when a state submits a request for assistance to the FEMA Regional Director at the time a "threat of major disaster" exists. The entire process is accomplished on an expedited basis and a FEMA decision is rendered in a matter of hours. Before a grant can be awarded, a state must demonstrate that total eligible costs for the declared fire meet or exceed either the individual fire cost threshold, which applies to single fires, or the cumulative fire cost threshold, which recognizes numerous smaller fires burning throughout a state.

Source: Regional Catastrophic Preparedness (RCP) Grants

Agency: FEMA

Website: https://www.fema.gov/grants/preparedness/regional-catastrophic

Description: The Regional Catastrophic Preparedness Grant program provides funding to increase collaboration and capacity in regard to catastrophic incident response and preparation.

Source: Emergency Forest Restoration Program (EFRP)

Agency: USDA Farm Service Agency (FSA)

Website: https://www.fsa.usda.gov/programs-and-services/disaster-assistance-program/emergency-forest-restoration/index

Description: The Emergency Forest Restoration Program (EFRP) helps the owners of non-industrial private forests restore forest health damaged by natural disasters. The EFRP does this by authorizing payments to owners of private forests to restore disaster damaged forests. The local FSA County Committee implements EFRP for all disasters with the exceptions of drought and insect infestations. Eligible practices may include debris removal, such as down or damaged trees; site preparation, planting materials, and labor to replant forest stand; restoration of forestland roads, fire lanes, fuel breaks, or erosion-control structures; fencing, tree shelters; wildlife enhancement.

To be eligible for EFRP, the land must have existing tree cover; and be owned by any nonindustrial private individual, group, association, corporation, or other private legal entity.

Source: Emergency Conservation Program (ECP)

Agency: USDA Farm Service Agency (FSA)

Website: https://www.fsa.usda.gov/programs-and-services/conservation-programs/emergency-conservation/index

Description: The Emergency Conservation Program (ECP) helps farmers and ranchers to repair damage to farmlands caused by natural disasters and to help put in place methods for water conservation during severe drought. The ECP does this by giving ranchers and farmers funding and assistance to repair the damaged farmland or to install methods for water conservation. The grant could be used for restoring conservation structures (waterways, diversion ditches, buried irrigation mainlines, and permanently installed ditching system).

Source: Environmental Quality Incentives Program (EQIP)

Agency: National Resource Conservation Service (NRCS)

Website: https://www.nrcs.usda.gov/programs-initiatives/eqip-environmental-quality-incentives

Description: The Environmental Quality Incentives Program (EQIP) is a voluntary program authorized under the Agricultural Act of 2014 (2014 Farm Bill) that helps producers install measures to protect soil, water, plant, wildlife, and other natural resources while ensuring sustainable production on their farms, ranches, and working forest lands.

Source: Emergency Watershed Protection (EWP) Program

Agency: National Resource Conservation Service (NRCS)

Website: https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/landscape/ewpp/

Description: The program offers technical and financial assistance to help local communities relieve imminent threats to life and property caused by floods, fires, windstorms, and other natural disasters that impair a watershed.

Eligible sponsors include cities, counties, towns, conservation districts, or any federally recognized Native American tribe or tribal organization. Interested public and private landowners can apply for EWP Program recovery assistance through one of those sponsors.

EWP Program covers the following activities.

- Debris removal from stream channels, road culverts, and bridges
- Reshape and protect eroded streambanks
- Correct damaged drainage facilities
- Establish vegetative cover on critically eroded lands
- Repair levees and structures
- Repair conservation practices

Source: Funding for Fire Departments and First Responders

Agency: DHS, U.S. Fire Administration

Website: **https://www.usfa.fema.gov/a-z/grants/index.html**

Description: Includes grants and general information on financial assistance for fire departments and first responders. Programs include the Assistance to Firefighters Grant Program, Reimbursement for Firefighting on Federal Property, State Fire Training Systems Grants, and National Fire Academy Training Assistance.

Source: Tribal Environmental General Assistance Program (GAP)

Agency: Environmental Protection Agency (EPA)

Website: https://www.epa.gov/tribal-pacific-sw/epa-region-9-tribal-environmental-gap-funding

Description: Funding under this program is used to aid Native American tribes in establishing and implementing their own reservation-specific environmental protection programs. To find out more about this funding opportunity please contact Tribal Branch Manager, Jeremy Bauer, at bauer.jeremy@epa.gov.

Source: Specific EPA Grant Programs

Agency: Environmental Protection Agency (EPA)

Website: https://www.epa.gov/tribal-pacific-sw/epa-region-9-tribal-environmental-gap-funding

Description: Various grant programs are listed under this site. Listed below are examples of grants offered:

- Multipurpose Grants to States and Tribes: https://www.epa.gov/grants/multipurpose-grants-states-and-tribes
- Environmental Education Grants: https://www.epa.gov/education/grants
- Environmental Justice Grants: https://www.epa.gov/environmentaljustice/environmental-justice-grants-funding-and-technical-assistance

Source: Conservation Innovation Grants (CIG)

Agency: National Resource Conservation Service

Website: https://www.nrcs.usda.gov/wps/portal/nrcs/site/ca/home/

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

Source: Urban and Community Forestry Program, National Urban and Community Forestry Challenge Cost Share Grant Program

Agency: U.S. Forest Service

Website: https://www.fs.usda.gov/managing-land/urban-forests/ucf

Description: U.S. Forest Service funding will provide for Urban and Community Forestry Programs that work with local communities to establish climate-resilient tree species to promote long-term

forest health. The other initiative behind this program is to promote and carry out disaster risk mitigation activities, with priority given to environmental justice communities. For more information, contact a Forest Service Regional Program Manager.

Source: Catalog of Federal Funding Sources; Land Resources

Agency: Multiple

Website: https://ofmpub.epa.gov/apex/wfc/f?p=165:512:6483383318137:::512::

Description: The Land Finance Clearing House is a catalogue of Federal funding sources for all things land related.

Examples of the types of grants found at this site are:

- Forest and Woodlands Resource Management Grant: https://sam.gov/fal/a798ad78cac749639b48270db3e86fdc/view?index=cfda&page=2&organization_id=100011100
- Environmental Education Grant: https://www.epa.gov/education/grants
- Public Assistance Grant Program: https://www.fema.gov/assistance/public
- Hazard Mitigation Grant: https://www.fema.gov/grants/mitigation/hazard-mitigation

Source: Catalog of Federal Funding Sources; Water Resources

Agency: Multiple

Website: https://ofmpub.epa.gov/apex/wfc/f?p=165:12:6483383318137:::12::

Description: The Water Finance Clearing House is a catalogue of Federal funding sources for all things water related.

Examples of the types of grants found at this site are:

- Water Conservation Field Services Program: https://www.usbr.gov/waterconservation/
- New Mexico Water Project Fund: https://www.nmfinance.com/water-project-fund/
- New Mexico Rural Infrastructure Fund: https://www.env.nm.gov/construction-programs/rural-infrastructure-program/

Source: Firewise Communities

Agency: Multiple

Website: http://www.firewise.org

Description: Many different Firewise Communities activities are available to help homes and whole neighborhoods become safer from wildfire without significant expense. Community cleanup days, awareness events, and other cooperative activities can often be successfully accomplished through partnerships among neighbors, local businesses, and local fire departments at little or no cost.

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

- Thinning/pruning/tree removal/clearing on private property—particularly on very large, densely wooded properties

- Retrofit of home roofing or siding to non-combustible materials
- Managing private forest
- Community slash pickup or chipping
- Creation or improvement of access/egress roads
- Improvement of water supply for firefighting
- Public education activities throughout the community or region

Source: The National Fire Plan (NFP)

Agency: DOI & USDA

Website: http://www.forestsandrangelands.gov/

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

Source: Staffing for Adequate Fire and Emergency Response (SAFER)

Agency: FEMA

Website: https://www.fema.gov/grants/preparedness/firefighters/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.

Source: The Fire Prevention and Safety Grants (FP&S)

Agency: FEMA

Website: https://www.fema.gov/grants/preparedness/firefighters/safety-awards#:~:text=Awards%20%20%20%20Organization%20%20%20,%20%20%241%2C499%2C957%20%2016%20more%20rows%20

Description: FP&S offers support to projects that enhance the safety of the public and firefighters who may be exposed to fire and related hazards. The primary goal is to target high risk populations and mitigate high incidences of death and injury. Examples of the types of projects supported by FP&S include fire-prevention and public-safety education campaigns, juvenile fire-setter interventions, media campaigns, and arson prevention and awareness programs. In fiscal year 2005, Congress reauthorized funding for FP&S and expanded the eligible uses of funds to include firefighter safety research and development.

Source: GSA-Federal Excess Personal Property

Agency: USFS

Website: https://www.fs.usda.gov/managing-land/fire/fepp

Description: The Federal Excess Personal Property (FEPP) program refers to Forest Service-owned property that is on loan to State Foresters for the purpose of wildland and rural firefighting. Most of the property originally belonged to the Department of Defense (DoD). Once acquired by the Forest Service, it is loaned to State Cooperators for firefighting purposes. The property is then loaned to the State Forester, who may then place it with local departments to improve local fire programs. State Foresters and the USDA Forest Service have mutually participated in the FEPP program since 1956.

Source: Assistance to Firefighters Grants (AFG)

Agency: FEMA

Website: https://www.fema.gov/grants/preparedness/firefighters.

Description: The AFG program provides resources to assist fire departments in attaining critical resources such as training and equipment.

STATE FUNDING INFORMATION

Source: New Mexico Fire Protection Grant

Agency: New Mexico Department of Homeland Security and Emergency Management

Website: https://www.nmdhsem.org/state-firemarshal/fire-grant-council/#grant

Description: The New Mexico Fire Protection Grant focuses on funding fire departments for various needs such as equipment, facilities/facility improvement, PPE, firefighting gear, apparatuses, and more. Two different grant programs are offered:

1) Fire departments currently certified and funded by the New Mexico State Fire Marshal's Office are eligible to apply for an **Individual Department Grant.**
2) County Administrative Offices having administrative responsibility for more than one district/department may apply for a **County-wide Project Grant** as long as each district within the County is compliant with the requirements of the grant application (i.e., Pump Tests, etc.). The countywide project must benefit all the departments within the County.
    a. Note: A County Administrative Office applying for a grant does not prevent departments within the County from applying for an Individual Department Grant.

To learn more about the 2022–2023 program, see the informational fact sheet: https://www.nmdhsem.org/wp-content/uploads/2021/11/Eligibility-Requirements-and-Selection-Criteria-fy23-rel.pdf

Source: New Mexico Association of Counties: Wildfire Risk Reduction Program

Agency: New Mexico Association of Counties

Website: https://www.nmcounties.org/services/programs/

Description: This program targets communities, tribes, counties, and non-profits who may be impacted by wildland fire initiating from, spreading from, or spreading to BLM lands. The Wildfire Risk Reduction Grant Program funds three categories of projects: development or updates of CWPPs, outreach and education, and hazardous fuels reduction. You can learn more about the

2022–2023 program here: https://www.nmcounties.org/wp-content/uploads/2022/01/Wildfire-Risk-Reduction-Program-Information-Packet-2022-2023.pdf

Source: HB 266: Forest and Watershed Restoration Act (FAWRA)

Agency: EMNRD Forestry Division

Website: http://www.emnrd.state.nm.us/SFD/FAWRA.html

Description: The Forest and Watershed Restoration Act (FAWRA) was created by House Bill 266 and signed into law by Governor Michelle Lujan Grisham on March 15, 2019. FAWRA allocates funding annually to EMNRD Forestry Division for the purpose of restoring forests and watersheds in the state of New Mexico. A Forest and Watershed Advisory Board has been established to evaluate and recommend projects, and EMNRD Forestry Division will administer, implement, and report on the projects. FAWRA funds can be used on public lands for on-the-ground restoration treatments; project planning; economic development programs to advance small diameter trees and woody biomass; and workforce development for wood utilization projects. More information on funding is available: http://www.emnrd.state.nm.us/SFD/documents/HB0266.pdf and https://www.emnrd.nm.gov/sfd/wp-content/uploads/sites/4/FAWRA-Guidelines-FY22-FINAL.pdf.

PRIVATE FUNDING INFORMATION

Source: State Farm Good Neighbor Citizenship (GNC) Grants

Agency: State Farm

Website: https://www.statefarm.com/about-us/corporate-responsibility/community-grants/good-neighbor-citizenship-grants

Description: State Farm funding is directed at:

- Auto and roadway safety
- Teen Driver Education
- Home safety and fire prevention
- Disaster preparedness
- Disaster recovery

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 that could be used for Firewise Communities activities. Applicants must be ULI members or part of a ULI District Council. Contact actiongrants@uli.org or review the web page to find your District Council and the application information.

Source: Environmental Systems Research Institute (ESRI)

Website: http://www.esri.com/grants

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

Source: National Forest Foundation; Innovative Finance for National Forests Grant Program

Website: https://www.nationalforests.org/grant-programs/innovative-finance-for-national-forests-grant-program

Description: The Innovative Finance for National Forests Grant Program aims to bring in non-USFS funds to increase forest resilience. There are three main topics for funding: Wildfire Resilience and Recovery, Sustainable Recreation Access and Infrastructure, and Watershed Health. In addition, three types of projects are funded. Pilot Programs with on-the-ground implementation, Scaling Projects to deliver backlogs of unfunded work, and Research and Development to provide to new forest information.

Source: Matching Awards Program

Agency: National Forest Foundation (NFF)

Website: https://www.nationalforests.org/grant-programs/map

Description: The NFF is soliciting proposals for its Matching Awards Program (MAP) to provide funds for direct on-the-ground projects benefitting America's National Forests and Grasslands. By pairing federal funds provided through a cooperative agreement with the U.S. Forest Service with non-federal dollars raised by award recipients, MAP measurably multiplies the resources available to implement stewardship projects that benefit the National Forest System.

Source: Patagonia Environmental Grants and Support

Agency: Patagonia

Website: https://www.patagonia.com/how-we-fund/

Description: Patagonia supports innovative work that addresses the root causes of the environmental crisis and seeks to protect both the environment and affected communities. Patagonia focuses on places where they have built connections through outdoor recreation and through their network of retail stores, nationally and internationally.

Source: Leonardo DiCaprio Foundation Grants

Agency: Leonardo DiCaprio Foundation

Website: https://www.rewild.org/

Description: The foundation supports projects around the world that build climate resiliency, protect vulnerable wildlife, and restore balance to threatened ecosystems and communities.

Source: U.S. Endowment for Forestry and Communities

Agency: U.S. Environmental Protection Agency, Natural Resources Conservation Service (NRCS), U.S. Forest Service, U.S. Department of Defense, U.S. Economic Development Agency

Website: https://www.usendowment.org/

Description: As the nation's largest public charity dedicated to keeping our working forests working and ensuring their bounty for current and future generations, the Endowment deploys the creativity and power of markets to advance their mission: The Endowment works collaboratively with partners in the public and private sectors to advance systemic, transformative and sustainable change for the health and vitality of the nation's working forests and forest-reliant communities.

Source: State and Private Forestry Programs

Agency: National Association of State Foresters

Website: https://www.stateforesters.org/appropriations/

Description: The National Association of State Foresters supports both federal (USDA) and State and Private Forestry programs. Funding allocations and points of contact are clearly displayed in the program fact sheets crated by the National Association of State Foresters. Programs included cover forest stewardship, fire assistance, restoration and more.

OTHER FUNDING INFORMATION

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

- Western Forestry Leadership Coalition: https://www.thewflc.org/
- USDA Information Center: https://www.nal.usda.gov/main/information-centers
- Forest Service Fire Management website: https://www.fs.usda.gov/science-technology/managing-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: https://www.nifc.gov/fire-information/fire-prevention-education-mitigation
- Department of Homeland Security U.S. Fire Administration: https://www.usfa.fema.gov/index.html

This page intentionally left blank.

APPENDIX G:

Homeowner Resources

This page intentionally left blank.

TORRANCE COUNTY CWPP HOMEOWNERS GUIDE

This guide has been developed to address site-specific information on wildfire for the Torrance County communities. This guide 1) suggests specific measures that can be taken by homeowners to reduce structure ignitability and 2) enhances overall preparedness in the planning area by consolidating preparedness information from several local agencies and departments.

BEFORE THE FIRE—PROTECTION AND PREVENTION

Reducing Structure Ignitability

Structural Materials

Roofing—The more fire-resistant the roofing material, the better. The roof is the portion of the house that is most vulnerable to ignition by falling embers, known as firebrands. Metal roofs afford the best protection against ignition from falling embers. Slate or tile roofs are also non-combustible, and Class-A asphalt shingles are recommended as well. The most dangerous type of roofing material is wood shingles. Removing debris from roof gutters and downspouts at least twice a year will help to prevent fire, along with keeping them functioning properly.

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

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

Fencing and trellises—Any structure attached to the house should be considered part of the house. A wood fence or trellis can carry fire to your home siding or roof. Consider using nonflammable materials or use a protective barrier such as metal or masonry between the fence and the house.

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

Screen Off the Area Beneath Decks and Porches

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

Firewood, Kindling, and Other Flammables

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

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

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. It 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. Pruning and limbing trees along with the selective removal of trees and shrubs is recommended to create a minimum defensible space area of 30 feet. Steep slopes require increased defensible space because fire can travel quickly uphill.

Within the minimum 30-foot safety zone, plants should be limited to fire-resistant trees and shrubs. Focus on fuel breaks such as concrete patios, walkways, rock gardens, and irrigated garden or grass areas within this zone. Use mulch sparingly within the safety zone, and focus use in areas that will be watered regularly. In areas such as turnarounds and driveways, nonflammable materials such as gravel are much better than wood chips or pine needles.

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

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

Fire Retardants

For homeowners who would like home protection beyond defensible space and fire-resistant structural materials, fire-retardant gels and foams are available. These materials are sold with various types of equipment for applying the material to the home. They are like 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. Residents should research and consider environmental impacts of chemicals.

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 the planning area. 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 not recommended by emergency services. The keys are difficult to keep track of and may not be available to the specific personnel that arrive at your home. An alternative offered by some manufacturers is a device that opens the gate in response to sirens. This option is preferred by firefighters but may be difficult or expensive to obtain.

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

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

Neighborhood Communication

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

Phone Trees

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

Neighbors in Need of Assistance

Ask mobility-impaired neighbors if they have notified emergency responders of their specific needs. It is also a good idea for willing neighbors to commit to evacuating a mobility-impaired resident in the event of an emergency. Make sure that a line of communication is in place to verify the evacuation.

Absentee Owners

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

Household Emergency Plan

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

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

Children

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

The time between when the children arrive home from school and when you return home from work is the most important time frame 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 can 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 of your important household paperwork, such as birth certificates, titles, and so forth. Store them away from your home, such as in a safe deposit box. Important documents can also be protected in a designated firesafe storage box within your home.

IN THE EVENT OF A FIRE

Notification

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

One good way to stay informed about wildfire is to use a National Oceanic and Atmospheric Administration weather alert radio. The radios can be purchased at most stores that carry small appliances, such as Target, Walmart, or Amazon. 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, interior doors, and your garage door. Disconnect automatic garage openers. Leave exterior doors unlocked. 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 are too narrow for two-way traffic, especially with fire engines. Fire

trucks often can't get into an area until the residents are out. Also, arguably the most important tool in the WUI toolbox is aerial attack. Airplanes and helicopters can be used to drop water or retardant to help limit the spread of the fire, but these resources cannot be used until the area has been cleared of civilians.

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

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

AFTER THE FIRE

Returning Home

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

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

Insurance Claims

Your insurance agent is your best source of information as to the actions you must take in order to submit a claim. Here are some things to keep in mind. Your insurance claim process will be much easier if you photographed your home (both inside and outside) 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. If it appears to be a large loss, consider whether you should hire a public adjuster that is licensed by the state department of insurance who will represent and advocate for you as the policyholder in appraising and negotiating the claimant's insurance claim to ensure you get the best outcome and recovery from your insurance company. Most public adjusters charge a small percentage of the settlement that is set by the state and primarily they appraise the damage, prepare an estimate and other claim documentation, read the policy of insurance to determine coverages, and negotiate with the insurance company's claims handler.

You can view a guide on creating a home inventory here: https://www.iii.org/article/how-create-home-inventory

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 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 can assist BAER team members by planting seeds or trees, hand mulching, or helping to construct straw-bale check dams in small drainages.

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

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

ADDITIONAL LINKS AND RESOURCES

TORRANCE COUNTY

- Sign up for emergency notifications here: https://public.coderedweb.com/CNE/en-US/BF1E050D1A5D
- Residents of Torrance County can apply to be volunteers through the Torrance County Emergency Management Civilian Volunteer Association: https://torrancecountynm.org/departments/emergency-mgmt

TORRANCE COUNTY EMERGENCY MANAGEMENT

- Torrance County Wildfire information: https://www.torrancecountynm.org/uploads/Downloads/Emergency%20Mgmt/Wildfire%20Preparedness.pdf
  - Includes Fire District information, volunteer information, wildfire preparedness
- Fire Prevention and Safety Helpful Links: https://www.ready.gov/wildfires

NEW MEXICO ENERGY, MINERALS, AND NATURAL RESOURCES DEPARTMENT (EMNRD)

Home and Fuels Management

- Protecting Your Home From Wildfire: https://www.emnrd.nm.gov/sfd/protecting-your-home-from-wildfire/
- Living With Fire – A Homeowner's Guide: https://www.emnrd.nm.gov/sfd/fire-prevention-programs/

  - Scroll to the bottom of the page
  - Both English and Spanish versions available
- Defensible Space Guide: https://www.emnrd.nm.gov/sfd/wp-content/uploads/sites/4/Wui_defzone.pdf

Preparing for Wildfire

- Ready, Set, Go! - New Mexico Action Guide: https://www.emnrd.nm.gov/sfd/fire-prevention-programs/
  - Scroll to the bottom of the page
- Fire Prevention Tips: https://www.emnrd.nm.gov/sfd/fire-prevention-tips/

During the Fire

- Active New Mexico Fire Information: https://www.emnrd.nm.gov/sfd/fire-prevention-programs/

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA):

Protecting Your Home

- Community Wildfire Risk Assessment Tutorial: https://www.nfpa.org/Public-Education/Fire-causes-and-risks/Wildfire/Firewise-USA/Online-learning-opportunities/Community-Wildfire-Risk-Assessment-Tutorial
- Preparing Homes for Wildfire: https://www.nfpa.org/Public-Education/Fire-causes-and-risks/Wildfire/Preparing-homes-for-wildfire
- If your Home Doesn't Ignite, It Can't Burn: https://www.youtube.com/watch?v=RqKFDDBGd5o
- How do Homes Burn in a Wildfire? https://www.youtube.com/watch?v=3QthynXympI
- Wildfire Community Preparedness Day Toolkit: https://go.nfpa.org/l/14662/2022-01-11/8j6nqh
- 5 Key Areas Around the Home You Must Examine When Assessing Wildfire Risk: https://www.youtube.com/watch?v=MIUQVL3BvVg
- Your Home and Wildfire, Choices That Make a Difference: https://www.youtube.com/watch?v=pfbEcMeYFFA
- Protect Your Home: 7 Firewise Tips for Residents: https://www.nfpa.org/downloadable-resources/safety-tip-sheets/protect-your-home-7-firewise-tips-for-residents
- Wildfire Risk Reduction 10 Safety Tips Sheet: https://www.nfpa.org/downloadable-resources/safety-tip-sheets/wildfire-risk-reduction-10-safety-tips-sheet

Preparation and Evacuation

- How to Prepare Your Home for Wildfires: https://www.nfpa.org/downloadable-resources/safety-tip-sheets/how-to-prepare-your-home-for-wildfires

- Pet Fire Safety Tip Sheet: https://www.nfpa.org/downloadable-resources/safety-tip-sheets/pet-fire-safety-tip-sheet
- Outthink a Wildfire; Wildfire Action Policies: https://www.nfpa.org/wildfirepolicy

INTERNATIONAL ASSOCIATION OF FIRE CHIEFS (IAFC):

- Ready, Set, Go!: https://www.wildlandfirersg.org/s/?language=en_US
- Are You Wildfire Ready? https://www.wildlandfirersg.org/s/are-you-wildfire-ready?language=en_US
- What is the WUI? https://www.wildlandfirersg.org/s/iafc2/what-is-the-wildland-urban-interface-20Y3m0000004Ee8EAE?language=en_US
- Firewise Plant Materials: https://www.emnrd.nm.gov/sfd/wp-content/uploads/sites/4/FireWisePlantMaterialsNMSU.pdf
- Seed Mixes to Reduce Wildfire Hazard: https://www.emnrd.nm.gov/sfd/wp-content/uploads/sites/4/Wui_grassmix.pdf
- Creating Defensible Space Zones: https://www.emnrd.nm.gov/sfd/wp-content/uploads/sites/4/Wui_defzone.pdf
- Ember Awareness Checklist: https://www.emnrd.nm.gov/sfd/wp-content/uploads/sites/4/Ember-Awareness-Checklist_NMForestryDivision.doc.pdf

MISCELLANEOUS

- After Wildfire; A Guide for New Mexico Communities: https://afterwildfirenm.org/
  - A condensed PDF of the guide: https://afterwildfirenm.org/additional-resources/site-pdfs/pdf-of-condensed-version-of-the-guide/view
- After the Fire: Before the Fire: Resilience Projects : https://afterthefireusa.org/our-programs/before-the-fire/
- New Mexico State University; New Mexico Prescribed Fire Council; Resources: https://nmrxfire.nmsu.edu/resources.html
- Fire Adapted New Mexico; Learning Network: https://facnm.org/
- New Mexico Fire Information: https://nmfireinfo.com/
- Instructor Guide. The ability to identify, analyze, and use relevant situational information about topographic features can help predict wildland fire behavior is the responsibility of everyone on the fireline: https://www.nwcg.gov/sites/default/files/training/docs/s-190-ig04.pdf
- WiRē; Wildfire Research, an interdisciplinary collaboration on community adaptability to wildland fire: https://wildfireresearchcenter.org/
- Wildfire Ready App:
  - App Store: https://apps.apple.com/us/app/wildfire-ready-virtual/id1540773278?msclkid=4eac0069a71411ecb26fa03c0b08eba2

- Google Play: https://play.google.com/store/apps/details?id=com.BaltiVirtual.Wildfire&gl=US&msclkid=4eabc8f6a71411ecbfe27aa64cd6d835

APPENDIX H:

Community Outreach

This page intentionally left blank.

PUBLIC OUTREACH

Table H.1. Outreach Activities for the Torrance County CWPP Update

Date	Location	Meeting Type	Purpose	URL	Figure Number
6/xx/2024	online		Start to let public know about review period and how to participate. Link to public survey		
6/17/2024	online	Survey	Release of public survey		
7/5/2024		Public review period for draft document			
7/xx/2024	TBD				

Figure H.1. November 2021 Zoom meeting.

Figure H.2. Torrance County CWPP outreach with EMIFPA.

Figure H.3. Flyer for the May 12th Wildfire Preparedness event.

Figure H.4. Flyer for the June 6th emergency preparedness event.

APPENDIX I:

Project Recommendations

This page intentionally left blank.

Table I.1. Recommendations to Create Resilient Landscapes (Fuel Treatments)

Table I.2. Recommendations for Creating Fire-Adapted Communities (Public Education and Reducing Structural Ignitability)

Table I.3. Recommendations for Safe and Effective Wildfire Response

This page intentionally left blank.

APPENDIX J:

Modeling/GIS Background and Methodology

This page intentionally left blank.

FIRE BEHAVIOR MODELING

FIRE BEHAVIOR MODELS

LANDFIRE

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

FARSITE

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

FlamMap

Like FARSITE, FlamMap uses a spatial component for its inputs but only provides fire behavior predictions for a single set of weather inputs. In essence, FlamMap gives fire behavior predictions across a landscape for a snapshot of time; however, FlamMap does not predict fire spread across the landscape. FlamMap has been used for the Torrance County CWPP to predict fire behavior across the landscape under extreme (97% worst case) weather scenarios. For this CWPP assessment, the model was run within the Interagency Fuel Treatment Decision Support System (IFTDSS) modeling platform.

FIRE BEHAVIOR MODEL INPUTS

Fuels

The fuels in the planning area are classified using Scott and Burgan's (2005) Standard Fire Behavior Fuel Model classification system. This classification system is based on the Rothermel surface fire spread equations, and each vegetation and litter type is broken down into 40 fuel models.

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

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

Table J.1 provides a description of each fuel type.

Map 1 in Appendix B illustrates the fuels classification throughout the planning area.

Table J.1. Fuel Model Classification for Torrance County CWPP Planning Area

1.	**Nearly pure grass and/or forb type (Grass)**
i.	**GR1:** Grass is short, patchy, and possibly heavily grazed. Spread rate is moderate (5–20 chains/hour); flame length low (1–4 feet); fine fuel load (0.40 ton/acre).
ii.	**GR2:** Moderately coarse continuous grass, average depth about 1 foot. Spread rate high (20–50 chains/hour); flame length moderate (4–8 feet); fine fuel load (1.10 tons/acre).
iii.	**GR3:** Very coarse grass, average depth 2 feet. Spread rate high (20–50 chains/hour); flame length moderate (4–8 feet).
iv.	**GR4:** Moderately coarse continuous grass, average depth 2 feet. Spread rate very high (50–150 chains/hour); flame length high (8–12 feet).
v.	GR5: Dense coarse continuous grass, average depth 1-2 feet. Spread rate very high (50–150 chains/hour); flame length high (8–12 feet).
vi.	GR6: Dryland grass about 1 to 2 feet tall. Spread rate very high (50–150 chains/hour); flame length very high (12-25 feet).
vii.	GR8: Heavy, coarse, continuous grass 3 to 5 feet tall. Spread rate very high (50–150 chains/hour); flame length very high (12-25 feet).
2.	**Mixture of grass and shrub, up to about 50% shrub cover (Grass-Shrub)**
i.	**GS1:** Shrubs are about 1-foot high, low grass load. Spread rate moderate (5–20 chains/hour); flame length low (1–4 feet); fine fuel load (1.35 tons/acre).
ii.	**GS2:** Shrubs are 1–3 feet high, moderate grass load. Spread rate high (20–50 chains/hour); flame length moderate (4–8 feet); fine fuel load (2.1 tons/acre).
iii.	**GS3:** Moderate grass and shrub load, average depth less than 2 feet. Spread rate high (20–50 chains/ hour); flame length moderate (4–8 feet).
3.	**Shrubs cover at least 50% of the site; grass sparse to non-existent (Shrub)**
i.	**SH1:** Low fuel load, depth about 1 foot, some grass fuels present. Spread rate very low (0–2 chains/hour); flame length very low (0–1 feet).
ii.	**SH2:** Moderate fuel load (higher than SH1), depth about 1 foot, no grass fuels present. Spread rate low (2–5 chains/hour); flame length low (1–4 feet); fine fuel load (5.2 tons/acre).
iii.	**SH3:** Moderate shrub load. Fuel bed depth 2–3 feet. Spread rate low (2–5 chains/hour), flame length low (1–4 feet).
iv.	**SH4:** Low to moderate shrub and litter load, possibly with pine overstory. Fuel bed depth about 3 feet. Spread rate high (20–50 chains/hour); flame length moderate (4–8 feet).

v. **SH6:** Dense shrubs, little to no herb fuels. Fuel bed depth about 2 feet. Spread rate high (20–50 chains/hour); flame length high (8-12 feet).

vi. **SH7:** Very heavy shrub load, possibly with pine overstory. Fuel bed depth 4–6 feet. Spread rate high(20–50 chains/hour); flame length very high (12–25 feet).

vii. **SH8:** Dense shrubs, little to no herb. Fuel bed depth about 3 feet. Spread rate high (20–50 chains/hour); flame length high (8–12 feet).

viii. **SH9:** Dense shrubs, significant fine fuel. Fuel bed depth 4-6 feet. Spread rate high (20–50 chains/hour); flame length very high (12–25 feet).

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

i. **TU1:** Fuel bed is low load of grass and/or shrub with litter. Spread rate low (2–5 chains/hour); flame length low (1–4 feet); fine fuel load (1.3 tons/acre).

ii. **TU2:** Moderate litter load with shrub component. Spread rate moderate (5-20 chains/hour); flame length low (1-4 feet).

iii. **TU3:** Moderate litter load with grass and shrub components. Spread rate high (20-50 chains/hour); flame length moderate (4-8 feet).

iv. **TU5:** Fuel bed high load conifer with shrub understory. Spread rate moderate (5–20 chains/hour); flame length moderate (4–8 feet).

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

i. **TL1:** Low to moderate load, fuels 1–2 inches deep. Spread rate very low (0–2 chains/hour); flame length very low (0–1 foot).

ii. **TL2:** Low load, compact. Spread rate very low (0–2 chains/hour); flame length very low (0–1 foot).

iii. **TL3:** Moderate load. Spread rate very slow (0–2 chains/hour); flame length low (1–4 foot); fine fuel load (0.5 ton/acre).

iv. **TL4:** Moderate load. Spread rate very low (0–2 chains/hour); flame length low (1–4 feet).

v. **TL5:** High load conifer litter. Spread rate slow (2–5 chains/hour); flame length low (1–4 foot).

vi. **TL6:** Moderate load. Spread rate moderate (5–20 chains/hour); flame length low (1–4 foot).

vii. **TL8:** Long needle litter; long needle fuel. Spread rate moderate (5–20 chains/hour); flame length low (1–4 feet).

viii. **TL9:** Very high load fluffy dead and downed fuel littler. Spread rate moderate (5–20 chains/hour); flame length moderate (4–8 feet).

6. Insufficient wildland fuel to carry wildland fire under any condition (Non-burnable)

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

ii. **NB2:** Snow/ice.

iii. **NB3:** Agricultural field, maintained in non-burnable condition.

iv. **NB8:** Open water.

v. **NB9:** Bare ground.

Notes: Based on Scott and Burgan's (2005) 40 Fuel Model System.

More detailed information on fuels within the planning area can be found in Chapter 2.

Topography

Topography is important in determining fire behavior. Steepness of slope, aspect (direction the slope faces), elevation, and landscape features can all affect fuels, local weather (by channeling winds and affecting local temperatures), and rate of spread of wildfire. There are some steep slopes in Torrance County that would influence fire behavior and spread.

More detailed information regarding topography can be found in Appendix A.

Weather

Of the three fire behavior components, weather is the most likely to fluctuate. Accurately predicting fire weather remains a challenge for forecasters. As dry eastern and western winds and rising temperatures dry fuels in the spring and summer, conditions can deteriorate rapidly, creating an environment that is susceptible to wildland fire (Figures A.1 and A.2). Fine fuels (grass and leaf litter) can cure rapidly, making them highly flammable in as little as 1 hour following light precipitation. Low live fuel moistures of shrubs and trees can significantly contribute to fire behavior in the form of crowning and torching. With a high wind, grass fires can spread rapidly, engulfing communities, often with limited warning for evacuation. The creation of defensible space is of vital importance in protecting communities from this type of fire. For instance, a carefully constructed fuel break placed in an appropriate location could protect homes or possibly an entire community from fire. This type of defensible space can also provide safer conditions for firefighters, improving their ability to suppress fire and protect life and property.

One of the critical inputs for FlamMap are the fuel moisture files. The initial run of the Composite Risk-Hazard Assessment utilized the IFTDSS Auto 97th modeling parameters, which integrate historic fire weather data from nearby RAWS. The Core Team noted that some of the fire behavior outputs did not reflect the intensity and severity of fire behavior that has been observed during recent fires. Therefore, the Composite Risk-Hazard Assessment was revised using custom extreme parameters to better align with extreme fire behavior conditions.

More detailed information regarding climate and weather can be found in Appendix A.

FIRE BEHAVIOR MODEL OUTPUTS

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

Flame Length

Map 2 in Appendix B illustrates the flame length classifications for the planning area. Flame lengths are determined by fuels, weather, and topography. Flame length is a particularly important component of the Composite Risk-Hazard Assessment because it relates to potential crown fire (particularly important in timber areas) and suppression tactics. Direct attack by hand lines is usually limited to flame lengths less

than 4 feet. In excess of 4 feet, indirect suppression is the dominant tactic. Suppression using engines and heavy equipment will move from direct to indirect with flame lengths in excess of 8 feet.

Flame lengths across the planning area range from 0 to more than 25 feet. The highest flame lengths are associated with the timber fuels found in the higher elevations of the county.

Fireline Intensity

Map 3 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). This is a good measure of intensity and is used for planning suppression activities. The expected fireline intensity throughout the planning area is similar in pattern to predicted flame length, as fireline intensity is a function of flame length.

The pattern for fireline intensity is similar to flame length in that intensities range from low (less than 100 Btu/ft/sec) through moderate (100–500 Btu/ft/sec) high and extreme intensity (greater than 1000 Btu/ft/sec), which tend to be associated with areas dominated by tall shrub and timber fuel loads.

Rate of Spread

Map 4 in Appendix B illustrates the rate of spread classifications for the planning area. The rates of spread in the area range from 0 chains/hour to over 150 chains/hour (one chain is approximately 66 feet and is a common measure in wildland firefighting). Low rates of spread are associated with timber-dominated areas in riparian areas or in Cibola NF, while moderate and high rates of spread are associated with grass and shrub fuels. Agricultural areas are modeled with low rate of spread; however, these fuel types may also pose a severe hazard during certain times of the year (prior to harvest or following harvest when residual materials remain). Some areas of the WUI exhibit very steep slopes that can contribute to increased rates of spread and intense fire behavior. The rate of spread, or the speed with which fire is moving away from the point of origin, is influenced by the slope. Fire moves at a faster rate uphill than downhill, thus the steeper the slope the faster the rate of spread. Additionally, steep slopes bring the fuels above the fire closer to a growing fire, making them more susceptible to ignition. Another issue with steep slopes is the possibility of burning debris rolling down the hill and igniting fuel below the main fire. This is illustrated in Figure J.1.

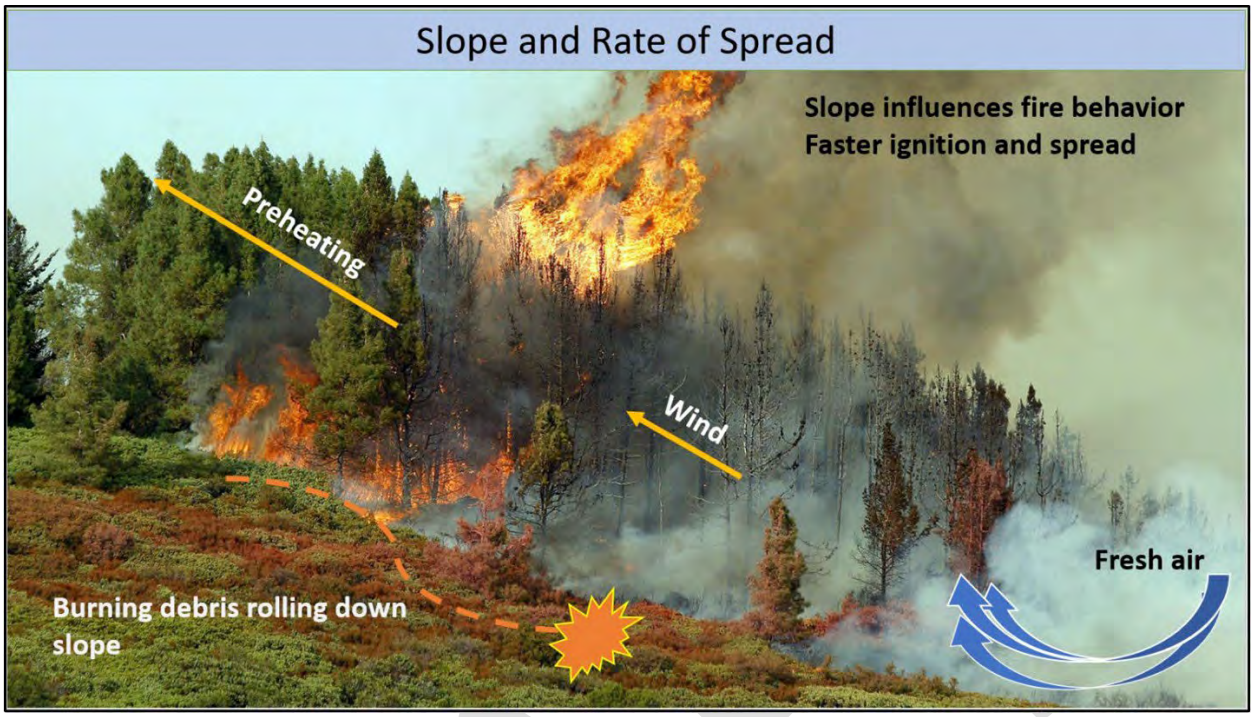


Figure J.1. Effect of topography on fire behavior.

Crown Fire Potential

Map 5 in Appendix B illustrates the range of crown fire activity from surface fire (in grass-dominated areas) to passive and active crown fire (in timber dominated fuels).

Fire Occurrence/Density of Starts

Figure 2.5 in Chapter 2 illustrates the fire history for the planning area. These data have been provided by the USFS, and New Mexico State Forestry, and show fires within the planning area from 2000 to 2023. Figure 2.5 (Chapter 2) reveals a cluster pattern of fires in the mountainous regions of the county, associated with forested areas. The fire history map is used to provide information on areas where human-ignited fires are prevalent and hence could be more prone to fire in the future and where there is a higher density of lightning ignitions due to topographic conditions and receptive forest fuels.

COMPOSITE RISK-HAZARD ASSESSMENT GIS MODEL

All data used in the Composite Risk-Hazard Assessment have been processed using ESRI ArcGIS Desktop and the ESRI Spatial Analyst Extension. Information on these programs can be found at http://www.esri.com. Data have been gathered from all relevant agencies, and the most current data have been used.

All fire parameter datasets have been converted to a 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 meters (98 × 98 feet). Each of the original cell values have been reclassified with a new value between 1 and 4, based on the significance of the data (1 = lowest, 4 = highest). Prior to running the models on the reclassified datasets, each of the input parameters have been weighted; that is, they are

assigned a percentage value reflecting that parameter's importance in the model. We used the weighted sum raster overlay geoprocessing tool to stack each geographically aligned dataset and evaluate an output value derived from each cell value of the overlaid dataset in combination with the weighted assessment. In a Weighted Sum Model, the weighted values of each cell from each parameter dataset are added together so that the resulting dataset contains cells with summed values of all the parameters. This method ensures that the model resolution is maintained in the results and thus provides finer detail and range of values for denoting fire risk.

Composite Risk-Hazard Assessment GIS Modeling Process

Our Composite Risk-Hazard Assessments comprise multiple inputs, which can be grouped into three categories: hazard, threat, and values. The result is a raster data layer that weighs and sums those inputs to determine risk. Datasets in the hazard category include historical weather data, topography, and vegetation and fuel regimes. Datasets in the threat category include fire history points and perimeters. The values category includes the WUI, distance from fire station, and natural, cultural, and socioeconomic assets datasets.

As shown in Figure J.2 with the elements in the black shaded box, we began by using the Interagency Fuel Treatment Decision Support System (IFTDSS) application to prepare a landscape file for the planning area. This landscape file compiles multiple LANDFIRE datasets, including fuels (calibrated to recent fires), slope, elevation, and aspect, into one layer that can then be used to develop fire behavior outputs. We then edited the fuels model to match the more precise local datasets and used the edited fuels and landscape file to create custom fire behavior outputs.

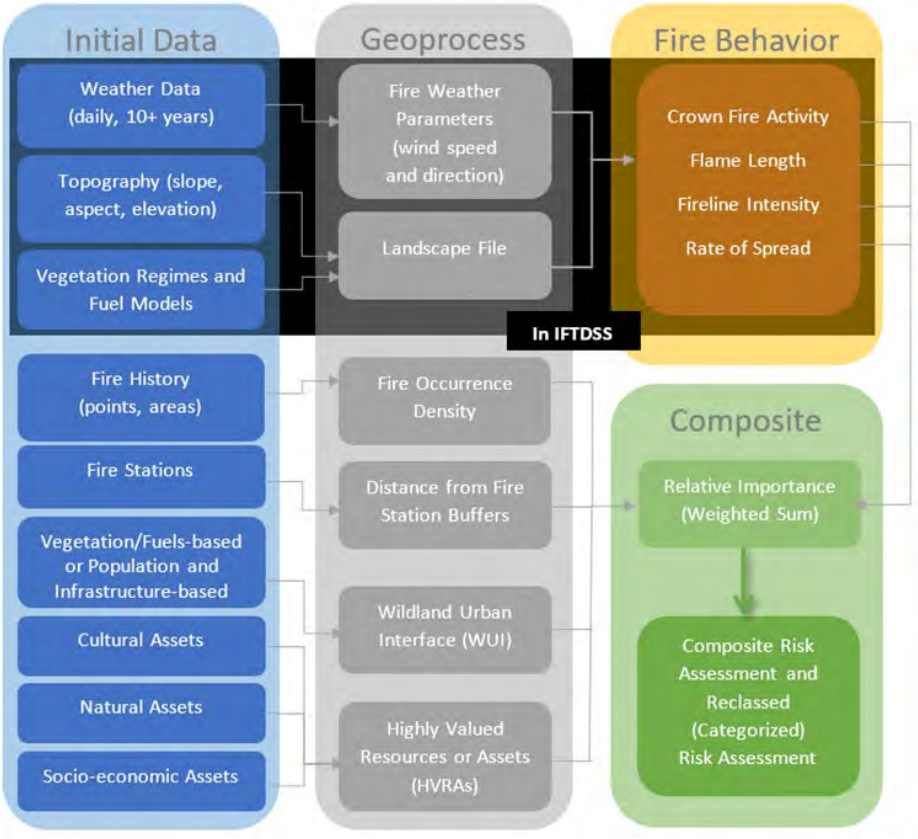


Figure J.2. Composite Risk-Hazard Assessment breakdown.

Next, in Esri ArcGIS Pro, we processed the fire history, fire station, WUI, and HVRA datasets to merge and create buffers where appropriate and converted the layers to rasters with the same spatial extent and resolution as the IFTDSS fire behavior outputs (30-meter cell size).

Last, we used ArcGIS Pro to run a weighted sum raster process to add all the inputs together. We assigned weights for input layers, based on feedback from the Core Team on the importance that each layer should contribute to the Composite Risk-Hazard Assessment (see Figure 3.7). While weighted sum composite rasters can be better for describing more detailed variations in risk, they can be overwhelming and difficult to understand, so we also created a reclassified raster from the weighted sum composite, using the natural breaks (Jenks) method, with four categories of low, medium, and high risk.

APPENDIX K:

Fuels Treatment Types and Methods

This page intentionally left blank.

Fuels Treatment Types

Defensible Space

Defensible space is perhaps the fastest, most cost-effective, and most efficacious means of reducing the risk of loss of life and property. Although fire agencies can be valuable in providing guidance and assistance, creating defensible space is the responsibility of the individual homeowner (Figure K.1).

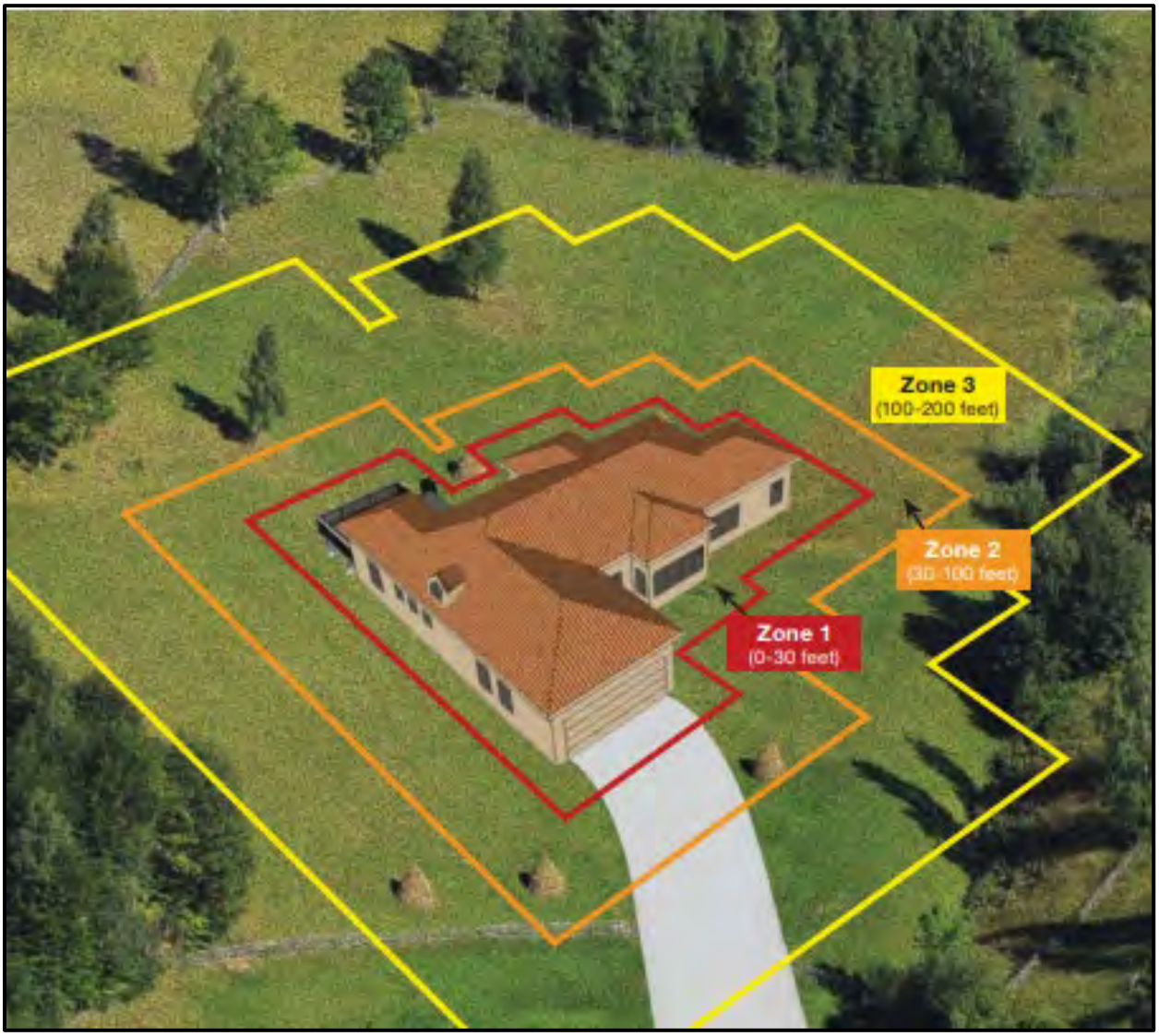


Figure K.1. Defensible space zones providing clearance between a structure and adjacent woodland or forest fuels.
Source: https://www.emnrd.nm.gov/sfd/wp-content/uploads/sites/4/FINAL-new-mexico-RSG-guide-2017_000.pdf.

Effective defensible space consists of creating an essentially fire-free zone adjacent to the home (Zone 1), a treated secondary zone that is thinned and cleaned of surface fuels (Zone 2), and (if the parcel is large enough) a transitional third zone that is basically a managed forest area (Zone 3). These components work together in a proven and predictable manner. Zone 1 keeps fire from burning directly to the home; Zone 2 reduces the adjacent fire intensity and the likelihood of torching, crown fire, and ember

production; and Zone 3 does the same at a broader scale, keeping the fire intensity lower by maintaining a more natural, historic condition (see Figure K.1).

Three zones for defensible space actions are described. These include:

Zone 1 – Keeps fire from burning directly to the home: This zone, which consists of an area of 0 to 30 feet around the structure, features the most intense modification and treatment. This distance is measured from the outside edge of the home's eaves and any attached structures, such as decks. While Zone 1 extends to 30 feet from your structures, the first 5 feet surrounding your structure is the most important. Do not plant directly beneath windows or next to foundation vents. Frequently prune and maintain plants in this zone to ensure vigorous growth and a low growth habit. Remove dead branches, stems, and leaves. Do not store firewood or other combustible materials in this area. Enclose or screen decks with metal screening. Extend gravel coverage under the decks. Do not use areas under decks for storage. Prune low-lying branches (ladder fuels that would allow a surface fire to climb into the tree) and any branches that interfere with the roof or are within 10 feet of the chimney. In all other areas, prune all branches of shrubs or trees up to a height of 10 feet above ground (or 1/3 the height, whichever is the least).

Recommendations for treating Zone 1 include (CAL FIRE 2022):

- Use non-combustible landscaping materials, such as gravel, in place of mulch. Clear all dead and dying debris from around a structure, including branches, dead leaves, pinecones, pine needles, grasses, and shrubs. Remember to check areas where the debris can accumulate, such as gutters, stairways, porches, and roofs.
- Clear all branches or vegetation within 10 feet of any chimney or stovepipe outlet.
- To keep vegetation within the 5-foot buffer around all structures, make sure plants are thoroughly watered, and keep non-woody, low-growing plant species if possible. However, it is best to keep no vegetation within 5 feet of any structures.
- If keeping shrubs or trees within this zone, please see information below on recommended spacing.
- Maintain trees by trimming them regularly and keeping a minimum 10-foot buffer between tree canopies.
- Trim or remove any flammable vegetation near windows.
- Remove any items or vegetation that could catch fire and ignite other property structures, such as vegetation under decks or stairs.
- Separate any items that could ignite, such as trees, shrubs, swing sets, patio furniture, etc.
- Limit the use of combustible materials, such as outdoor furniture, on decks or patios.
- Relocate firewood or lumber to Zone 2.
- Replace structures attached to a home, such as fencing or gates, with non-combustible materials.
- If possible, keep garbage receptacles outside of Zone 1.
- If possible, keep all vehicles, boats, all-terrain vehicles (ATVs), and any other machines outside of Zone 1.

Zone 2 – Reduces the adjacent fire intensity and the likelihood of torching, crown fire, and ember production: This zone features fuel reduction efforts and serves as a transitional area between Zones 1 and 3. The size of Zone 2 depends on the slope of the ground where the structure is built. Typically, the defensible space should extend at least 100 feet from the structure. Remove stressed, diseased, dead, or dying trees and shrubs. Thin and prune the remaining larger trees and shrubs. Be sure to extend thinning along either side of your driveway all the way to your main access road. These actions help eliminate the continuous fuel surrounding a structure while enhancing home

site safety and the aesthetics of the property. Keep grass and wildflowers under 8 inches in height. Regularly remove leaf and needle debris from the yard.

Recommendations for treating Zone 2 include but are not limited to (CAL FIRE 2022):

- Maintain all grasses to reach a maximum height of 4 inches.
- For shrubs or trees, maintain a distance between plants of at least two times a plant's size. Additional space between vegetation is needed for properties on slopes (Figure K.2.).
    - Flat to mild slope (less than 20 percent): Minimum distance of 10 feet between trees and two times the size of other plants. Example: For shrubs 2 feet in diameter, at least 4 feet is needed between shrubs.
    - Mild to moderate slope (20–40 percent): Minimum distance of 20 feet between trees and four times the size of other plants. Example: For shrubs 2 feet in diameter, at least 8 feet is needed between shrubs.
    - Moderate to steep slope (greater than 40 percent): Minimum distance of 30 feet between trees and six times the size of other plants. Example: For shrubs 2 feet in diameter, at least 12 feet is needed between shrubs.
- Create vertical space between vegetation by clearing all branches at least 6 feet from the ground for isolated trees, or for trees with nearby shrubs, clear at least three times the shrub height (Figure 4.6).
    - Example: A 4-foot shrub is growing near a tree; a clearance of 12 feet (3 × 4) is needed between the top of the shrub and the lowest tree branch.
- Vegetation debris such as dead leaves, branches, twigs, pinecones, etc., may be allowed up to 3 inches in depth. However, it is best to remove vegetation debris.
- All wood or lumber piles must have a 10-foot buffer of bare mineral soil in all directions; no vegetation is allowed.

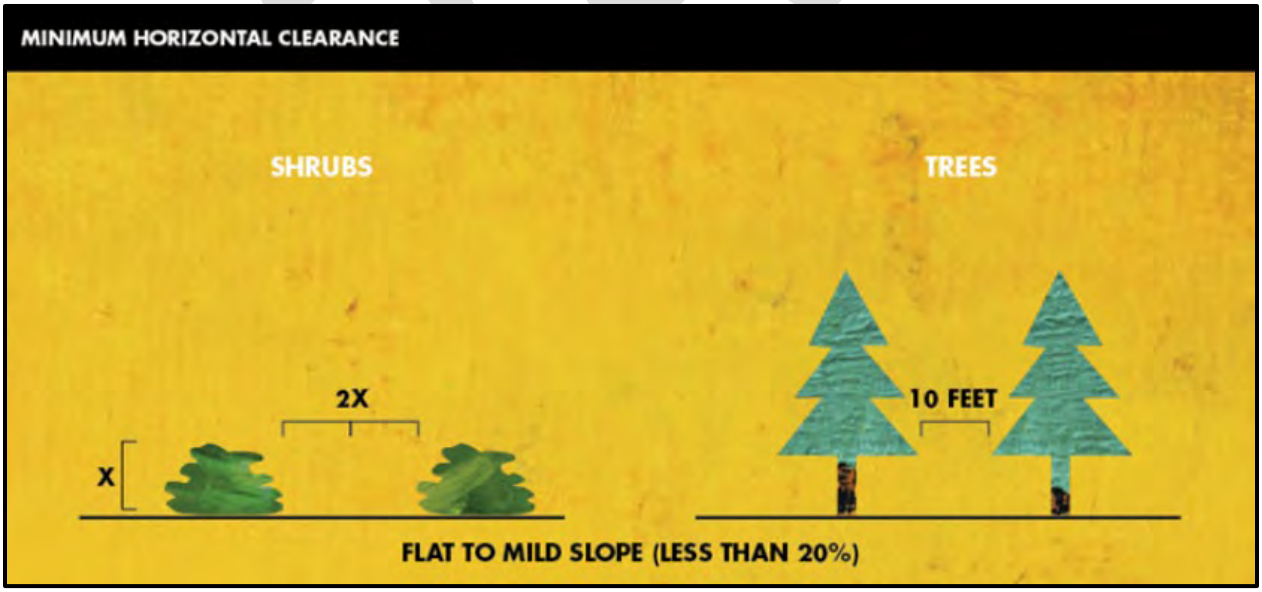


Figure K.2. Minimum horizontal clearance.
Source: CAL FIRE (2022)

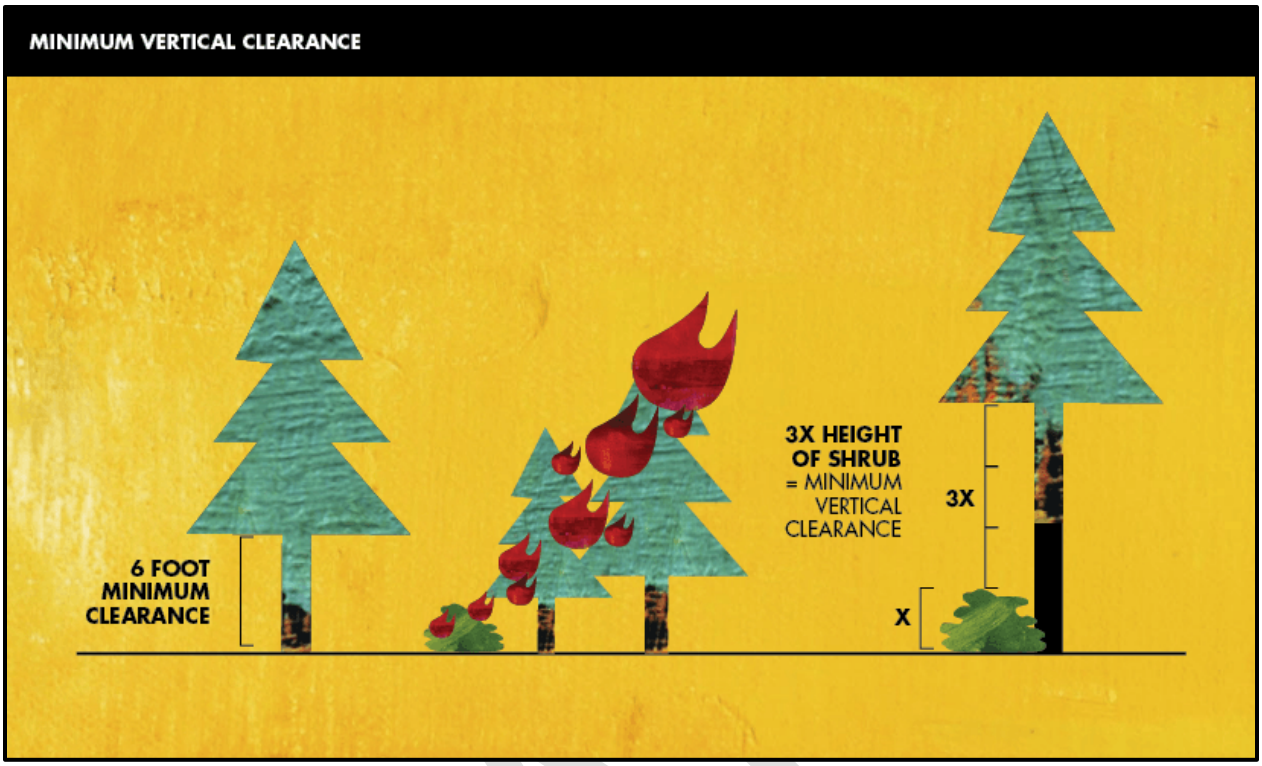


Figure K.3. Minimum vertical clearance.
Source: CAL FIRE (2022)

Zone 3 – Provides the same at a broader scale, keeping the fire intensity lower by maintaining a more natural, historic condition: This area extends from the edge of your defensible space to your property boundaries (Figure K.4.). The healthiest forest is one that has multiple ages, sizes, and species of trees where adequate growing room is maintained over time, so maintain a distance of at least 10 feet between the tops of trees. Remove ladder fuels, creating a separation between low-level vegetation and tree branches to keep fire from climbing up trees. A greater number of wildlife trees can remain in Zone 3, but regularly remove dead trees and shrubs. Ensure trees in this area do not pose a threat to power lines or access roads.

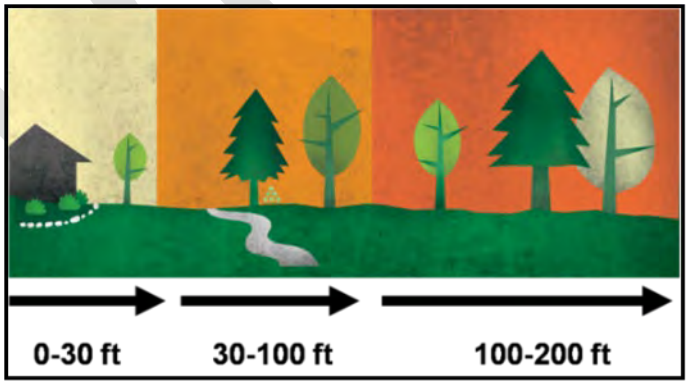


Figure K.4. Defensible space zones.
Source: Firewise.org

Specific recommendations should be based on the hazards adjacent to a structure such as slope steepness and fuel type. Firewise guidelines and the Homeowner's Guide (see Appendix G) are excellent

resources but creating defensible space does not have to be an overwhelming process. The NFPA offers a free Community Wildfire Risk Assessment Tutorial and an online learning module: Understanding the Wildfire Threat to Homes. Both tools are great resources for learning about, and implementing, defensible space.

Assisting neighbors may be essential in many cases. Homeowners should consider assisting the elderly, sharing ladders for gutter cleaning, and assisting neighbors with large thinning needs. Homeowner actions have been found to also motivate neighbors to act, increasing the scope of the wildfire mitigation across a community (Evans et al. 2015). Adopting a phased approach can make the process more manageable and encourage maintenance (Table K.1).

Table K.1. Example of a Phased Approach to Mitigating Home Ignitability

Year	Project	Actions
1	Basic yard cleanup (annual)	Dispose of clutter in the yard and under porches. Remove dead branches from yard. Mow and rake. Clean off roofs and gutters. Remove combustible vegetation near structures. Coordinate disposal as a neighborhood or community. Post 6-inch reflective address numbers visible from road.
2	Understory thinning near structures	Repeat basic yard cleanup. Limb trees up to 6–10 feet. Trim branches back 15 feet from chimneys. Trim or cut down brush. Remove young trees that can carry fire into forest canopy. Coordinate disposal as a neighborhood or community.
3	Understory thinning on private property along roads and drainages	Limb trees up to 6–10 feet. Trim or cut down brush. Remove young trees that can carry fire into forest canopy. Coordinate disposal as a neighborhood or community.
4	Overstory treatments on private property	Evaluate the need to thin mature or diseased trees. Prioritize and coordinate tree removal within neighborhoods to increase cost effectiveness.
5	Restart defensible space treatment cycle	Continue the annual basic yard cleanup. Evaluate need to revisit past efforts or catch those that were bypassed.

Fuel Breaks and Open Space Cleanup

The next location priority for fuels treatments should be where the community meets wildland. This may be the outer margins of a town or an area adjacent to occluded open spaces such as a park. Fuel breaks (also known as shaded fuel breaks) are strips of land where fuel (for example, living trees and brush, dead branches, leaves or downed logs) has been modified or reduced to limit the fire's ability to spread rapidly. Fuel breaks should not be confused with firebreaks, which are areas where vegetation and organic matter are removed down to mineral soil. Shaded fuel breaks may be created to provide options for suppression resources or to provide opportunities to introduce prescribed fire. In many cases, shaded

fuel breaks may be created by thinning along roads. This provides access for mitigation resources and firefighters, as well as enhancing the safety of evacuation routes.

Larger Scale Treatments

Farther away from WUI communities, the emphasis of treatments often becomes broader. While reducing the buildup of hazardous fuels remains important, other objectives are often included, such as forest health and resiliency to catastrophic wildfire and climate change considerations. Wildfires frequently burn across jurisdictional boundaries, sometimes on landscape scales. As such, these larger treatments need to be coordinated on a strategic level. This requires coordination between projects and jurisdictions, as is currently occurring in the County.

Land managers have carried out numerous forest restoration projects across the Cibola NF, and have ongoing projects planned on public land that are designed to reduce hazardous fuels to protect communities and resources, while restoring fire-adapted communities (Figures K.5. and K.6.).

Figure K.5. Photograph of a prescribed burn in progress within Torrance County.

Figure K.6. Photograph of a completed prescribed burn within Torrance County.

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. Work with neighbors to provide adequate fuels mitigation in the event of overlapping property boundaries.
	Install an environmentally appropriate xeriscape yard instead of grass
	Screen vents with non-combustible meshing with mesh opening not to exceed nominal 1/16-1/8-inch size.
	Ensure that house numbers are easily viewed from the street.
	Keep wooden fence perimeters free of dry leaves and combustible materials. If possible, non-combustible material should link the house and the fence.
	Keep gutters free of vegetative litter. Gutters can act as collecting points for fire brands and ashes.
	Store combustible materials (firewood, propane tanks, grills) away from the house; in shed, if available.
	Clear out materials from under decks and/or stacked against the structure. Stack firewood at least 30 feet from the home, if possible.
	Reduce your workload by considering local weather patterns. Because prevailing winds in the area are often from the west-southwest, consider mitigating hazards on the west corner of your property first, then work around to cover the entire area.
	Seal up any gaps in roofing material and enclose gaps that could allow fire brands to enter under the roof tiles or shingles.
	Remove flammable materials from around propane tanks.
Minimal Investment (<$250)	When landscaping in the home ignition zone (HIZ) (approximately 30 feet around the property), select non-combustible plants, lawn furniture, and landscaping material. Combustible plant material like junipers and ornamental conifers should be pruned and kept away from siding. If possible, trees should be planted in islands and no closer than 10 feet to the house. Tree crowns should have a spacing of at least 18 feet when within the HIZ. Vegetation at the greatest distance from the structure and closest to wildland fuels should be carefully trimmed and pruned to reduce ladder fuels, and density should be reduced with approximately 6-foot spacing between trees crowns.
	Box in eaves, attic ventilation, and crawl spaces with non-combustible material.
	Work on mitigating hazards on adjoining structures. Sheds, garages, barns, etc., can act as ignition points to your home.
	Enclose open space underneath permanently located manufactured homes using non-combustible skirting.
	Clear and thin vegetation along driveways and access roads so they can act as a safe evacuation route and allow emergency responders to access the home.
	Purchase or use a National Oceanic and Atmospheric Administration weather alert radio to hear fire weather announcements.

Moderate to High Investment (>$250)	Construct a non-combustible wall or barrier between your property and wildland fuels. This could be particularly effective at mitigating the effect of radiant heat and fire spread where 30 feet of defensible space is not available around the structure.
	Construct or retrofit overhanging projections with heavy timber that is less combustible.
	Replace exterior windows and skylights with tempered glass or multilayered glazed panels.
	Invest in updating your roof to non-combustible construction. Look for materials that have been treated and given a fire-resistant roof classification of Class A. Wood materials are highly combustible unless they have gone through a pressure-impregnation fire-retardant process.
	Construct a gravel turnaround in your driveway to improve access and mobilization of fire responders.
	Treat construction materials with fire-retardant chemicals.
	Install a roof irrigation system.
	Replace wood or vinyl siding with nonflammable materials.
	Relocate propane tanks underground.

Additional resources regarding home hardening can be found in Appendix G.

Fuel Treatment Methods

Since specifics of the treatments are not provided in detail in Table K.1., different fuels reduction methods are outlined in the following narrative.

Several treatment methods are commonly used for hazardous fuels reduction, including manual treatments, mechanized treatments, prescribed fire, and grazing (Table K.2.). This brief synopsis of treatment options is provided for general knowledge; specific projects will require further planning. The appropriate treatment method and cost will vary depending on factors such as the following:

- Diameter of materials
- Proximity to structures
- Acreage of project
- Fuel costs
- Steepness of slope
- Area accessibility
- Density of fuels
- Project objectives

It is imperative that long-term monitoring and maintenance of all treatments is implemented. Post-treatment rehabilitation such as seeding with native plants and erosion control may be necessary. In addition, post-treatment fuel clean-up is a must, as neglected piles of vegetation may result in increased fire risk.

Table K.2. Summary of Fuels Treatment Methods

Treatment	Comments
Machine mowing	Appropriate for large, flat, grassy areas on relatively flat terrain.
Manual treatment with chipping or pile burning	Requires chipping, hauling, and pile burning of slash in cases where lop and scatter is inappropriate. Pile burning must comply with smoke management policy.
Brush mastication	Brush species tend to re-sprout vigorously after mechanical treatment. Frequent maintenance of treatments is typically necessary. Mastication tends to be less expensive than manual (chainsaw) treatment and eliminates disposal issues.
Timber mastication	Materials up to 10 inches in diameter and slopes up to 30 percent can be treated. Eliminates disposal issues. Environmental impact of residue being left on-site is still being studied.
Prescribed fire	Can be very cost effective for public land but not close to the city. Ecologically beneficial. Can be used as training opportunities for firefighters. May require manual or mechanical pretreatment. Carries risk of escape. Unreliable scheduling due to weather and smoke management constraints.
Feller buncher	Mechanical treatment on slopes more than 30 percent or of materials more than 10 inches in diameter may require a feller buncher rather than a masticator. Costs tend to be considerably higher than masticator.
Grazing (goats)	Can be cost effective. Ecologically beneficial. Can be applied on steep slopes and shrubby and flashy fuels. Requires close management.

Manual Treatment

Manual treatment refers to crew-implemented cutting with chainsaws. Although it can be more expensive than mechanized treatment, crews can access many areas that are too steep or otherwise inaccessible with machines. Treatments can often be implemented with more precision than prescribed fire or mechanized methods allow. Merchantable materials and firewood can be removed while non-merchantable materials are often lopped and scattered, chipped, or piled and burned on-site. Care should be exercised to not increase the fire hazard by failing to remove or treat discarded material in a site-appropriate manner.

Strategic timing and placement of fuels treatments is critical for effective fuels management practices and should be prescribed based on the conditions of each treatment area. Some examples of this would be to place fuel breaks in areas where the fuels are heavier and in the path of prevailing winds and to mow grasses just before they cure and become flammable. Also, fuel reductions on slopes/ridgelines extending from the WUI to enhance community protection. In areas where the vegetation is sparse and not continuous, fuels treatments may not be necessary to create a defensible area where firefighters can work. In this situation, where the amount of fuel to carry a fire is minimal, it is best to leave the site in its current condition to avoid the introduction of exotic species.

Mechanized Treatments

Mechanized treatments include mowing, mastication (ground-up timber), and whole tree felling. These treatments allow for more precision than prescribed fire and are often more cost-effective than manual treatment.

Mowing, including ATV and tractor-pulled mower decks, can effectively reduce grass fuels adjacent to structures and along highway rights-of-way and fence lines. For heavier fuels, several different masticating machines can be used, including drum- or blade-type masticating heads mounted on machines and ranging in size from a small skid-steer to large front-end loaders. Some masticators can grind standing timber up to 10 inches in diameter. Other masticators are more effective for use in brush or surface fuels. Mowing and mastication do not actually reduce the amount of on-site biomass but alter the fuel arrangement to a less combustible profile.

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

Mechanical shears mounted on feller bunchers are used for whole tree removal. The stems are typically hauled off-site for utilization while the limbs are discarded. The discarded material may be masticated, chipped, or burned in order to reduce the wildfire hazard and to speed the recycling of nutrients.

Grazing

Fuel modifications targeted toward decreasing both vertical and horizontal continuity in fuels is critical as a prevention method against fire proliferation. The primary objectives for these modifications are treating surface fuels and producing low-density and vertically disconnected stands. Goat grazing is an effective, nontoxic, nonpolluting, and practically carbon-neutral vegetation treatment method. A goat grazing system typically consists of a high density of goats enclosed by a metallic or electrified fence guided by herders. Goats feed on a variety of foliage and twigs from herbaceous vegetation and woody plants (Lovreglio et al. 2014).

Prescribed Burning

Prescribed burning is also a useful tool to reduce the threat of extreme fire behavior by removing excessive standing plant material, litter, and woody debris while limiting the encroachment of shrubby vegetation (see Figures K.5. and K.6.). Where possible, prescribed fire could occur on public land since fire is ecologically beneficial to this fire-adapted vegetation community and wildlife habitat. The New Mexico Prescribed Fire Council offers informational resources on implementing prescribed fire on both public and private land (Appendix G). The USFS and local departments are already implementing prescribed burning in Torrance County (Figure K.7.).

All prescribed fire operations will be conducted in accordance with federal and state laws and regulations. Public safety would be the primary consideration in the design of any prescribed burn plan so as to not negatively impact the WUI. Agency use of prescribed fire on public land would be carried out within the confines of the agency's fire management planning documents and would require individual prescribed burn plans that are developed for specific burn units and consider smoke management

concerns and sensitive receptors within the WUI. Smoke monitors could be placed in areas where smoke concerns have been raised in the past.

Following any type of fuels reduction treatment, post-treatment monitoring should continue to ensure that management actions continue to be effective throughout the fire season. The vegetation within this ecosystem 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. To learn more about firing techniques, visit the EFIRE Fire Techniques webpage: https://efire.cnr.ncsu.edu/efire/fire-techniques/.

Several burns may be needed to meet full resource management objectives, so a solid maintenance plan is needed to ensure success.

Cultural Burning

Within the Southwest, fire has historically been a means forest management and restoration by Indigenous communities for thousands of years (Raish et al. 2005). Although cultural burning is included under the umbrella of prescribed burns, it holds a different meaning and has more purposes than a typical prescribed burn (Fire Adapted Communities New Mexico [FACNM] 2021). Cultural burns are "pertinent and substantial to the cultural livelihood" with over 70 identified purposes (FACNM 2021).

Rather than focusing solely on fuel reduction, or as a means of wildfire mitigation, cultural burning is done with a more holistic view, under the philosophy of "reciprocal restoration," meaning, as stewardship responsibilities to the land are fulfilled, those actions will in turn benefit the peoples who depend on those ecosystems (Long et al. 2021). Cultural burning is typically performed with a variety of objectives, such as landscape management, ecosystem and species biodiversity and health, transmission of environmental and cultural knowledge, ceremonies and spiritual wellbeing, a sense of place, and material services (i.e., food, medicine, plan materials, etc.). Extensive site preparation is typically done before a burn, and post-burn monitoring and additional cultural practices are a common factor of the land stewardship tradition (Long et al. 2021).

> *"Cultural burning by Native Americans interconnected them not only to the land but to their animal, reptile, bird and plant spiritual relatives. Therefore, conducting a cultural burn relates to what they burned, how they burned it, and why they burned it." - Ron W. Goode, Tribal Chair, North Fork Mono Tribe*

Impacts of Prescribed Fire on Communities

Prescribed fires can have impacts on air quality that may impact local communities. Impacts on a regional scale are typically only acute when many acres are burned on the same day, which is rare in this region. Local problems are occasionally acute due to the large quantities of smoke that can be produced in a given area during a short period of time. Residents with respiratory problems may be impacted during these burning periods since smoke consists of small particles of ash, partly consumed fuel, and liquid droplets that are considered air pollutants. Other combustion products include invisible gases such as carbon monoxide, carbon dioxide, hydrocarbons, and small quantities of nitrogen oxides. Oxides of nitrogen are usually produced at temperatures only reached in piled or windrowed slash or in very intense wildfires that are uncommon in the region. In general, prescribed fires produce inconsequential amounts of these gases. Inappropriate management of prescribed fires can be bothersome to residents, and it can negatively affect community health.

Managing smoke from prescribed fires is an important part of planning for prescribed burning. Smoke from burning vegetation produces air pollutants that are regulated by both the U.S. Environmental

Protection Agency (EPA) and the State of New Mexico. Therefore, effective smoke management is a vital component of planning and conducting prescribed fires. The New Mexico Environment Department, Air Quality Bureau has outlined smoke management guidelines within the New Mexico Smoke Management Program Guidance Document to protect the health and welfare of New Mexicans from the impacts of smoke (New Mexico Environment Department, Air Quality Bureau 2005). In addition, the New Mexico Environment Department offers a webpage specifically for wildfire and prescribed fire smoke resources: https://www.env.nm.gov/air-quality/fire-smoke-links/.

Furthermore, the NWCG released the NWCG Smoke Management Guide for Prescribed Fire in 2020 (NWCG 2020). This plan is designed to act as a guide to all those who use prescribed fire. Smoke management techniques, air quality regulations, public perception of prescribed fire, foundational science behind prescribed fire, modeling, smoke tools, air quality impacts, and more are all discussed in this plan. The document is meant to pair with NWCG's Interagency Prescribed Fire Planning and Implementation Procedures Guide for planning and addressing smoke when prescribed fire is used (NWCG 2020). To view the plan, please visit: https://www.nwcg.gov/sites/default/files/publications/pms420-3.pdf.

Fire managers must obtain a permit from the Air Quality Bureau to start a prescribed burn and can only do so during optimal conditions for smoke management. During a burn, lighting patterns can be altered to change how smoke is generated. Generally, the impacts of smoke from prescribed burning are far less than those from wildfire events. Prescribed burns aid in reducing the potential smoke impacts of high-intensity, extensive wildfires (Greater Santa Fe Fireshed Coalition 2022).

Effects of smoke can be managed by burning on days when smoke will blow away from smoke-sensitive areas. Precautions are taken when burning near populated areas, highways, airports, and other smoke sensitive areas. Any smoke impact downwind is considered before lighting a fire. Smoke management is a significant component of all prescribed burn plans. Other mitigating actions include alerting the public of upcoming burning activities, including the purpose, best conditions for ensuring good smoke dispersal, duration, size, and location of projects. Local radio, newspapers, social media, and TV can provide broad coverage for alerts. Land management agencies in the planning area consistently work with concerned citizens regarding smoke management and attempt to provide solutions such as the placement of smoke monitors at sensitive sites.

Figure K.7. Photograph showing a prescribed burn in Manzano Mountains being conducted by the Cibola National Forest.
Photo source: Albuquerque News (KRQE)

Thinning and Prescribed Fire Combined

Combining thinning and prescribed fire can be the most effective treatment (Graham et al. 2004). In forests where fire exclusion or disease has created a buildup of hazardous fuels, prescribed fire cannot be safely applied, and pre-burn thinning is required. The subsequent use of fire can further reduce residual fuels and reintroduce this ecologically imperative process.

APPENDIX L:

Post Fire-Response and Restoration

This page intentionally left blank.

POST-FIRE RESPONSE AND REHABILITATION

The recent increase in severe fires has highlighted the numerous complexities of post-fire response.

Following a fire, heavy rains may result in widespread floods and debris flows carrying trees, boulders, and soil through canyons, ultimately damaging communities, water supply and systems, and critical infrastructure.

Soil cover is dramatically reduced in areas with moderate soil burn severity (SBS), leading to increased water repellency and runoff. By contrast, soil cover is nearly non-existent in areas experiencing high SBS and the surface mineral soil has been burned to fine powder. Exposed, granular mineral soil is readily transported during rain events resulting in elevated soil erosion and sediment loading in streams, creeks, and rivers (USFS 2010).

There are many facets to post-fire recovery, including but not limited to:

- Ensuring public health and safety—prompt removal of downed and hazard trees, addressing watershed damage, and mitigating potential flooding.
- Rebuilding communities and assessing economic needs—securing the financial resources necessary for communities to rebuild homes, business, and infrastructure.
- Restoring the damaged landscape—restoration of watersheds, soil stabilization, and tree planting.
- Reducing fire risk in the future—identifying hazard areas and implementing mitigation.
- Prioritizing the needs of vulnerable and disadvantaged communities during response and disaster recovery efforts.
- Reducing post-fire recovery time by replanting native species.
- Ensuring fire protection measures enhance sustainability of restoration projects e.g., introducing prescribed fire to a fire-dependent ecosystem where fire had previously been excluded.
- Retaining downed logs for erosion control and habitat maintenance.
- Evaluating and updating disaster recovery plans every 5 years to respond to changing needs and characteristics of the community.
- Coordinating with planning, housing, health and human services, and other local, regional or state agencies to develop contingency plans for meeting short-term, temporary housing needs of those displaced during a catastrophic wildfire event.
- Incorporating forecasted impacts from climate change intro trends and projections of future risk and consideration of policies to address identified risk.
- Updating codes and ordinances to specify procedures and standards for planning and permitting the reconstruction of buildings destroyed by wildfire.

Recovery of the vegetated landscape is often more straightforward than recovery of the human environment. Assessments of the burned landscape are often well-coordinated through the use of interagency crews who are mobilized immediately after a fire to assess the post-fire environment and make recommendations for rehabilitation efforts.

For the community impacted by fire, however, there is often very little planning at the local level to guide their return after the fire. Residents impacted by the fire need assistance making insurance claims; finding temporary accommodation for themselves, pets, and livestock; rebuilding or repairing damaged property; removing debris and burned trees; stabilizing the land for construction; mitigating potential flood damage; repairing infrastructure; reconnecting to utilities; and mitigating impacts to health. Oftentimes, physical impacts can be mitigated over time, but emotional impacts of the loss and change to surroundings are long-lasting and require support and compassion from the community.

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.

Avoid storm channels and arroyos as flash floods can be a potentially deadly hazard after a wildfire. Use extreme caution around trees, power poles, and any other tall objects that may have been weakened by the fire as they are at risk for falling. Keep a battery-powered radio on hand for emergency updates, reports of weather, and news updates (EMNRD Forestry Division and USFS 2022).

Even if the fire did not damage your house, do not expect to return to normal routines immediately. Expect that utility infrastructure may have been damaged and repairs may be necessary. Upon returning home, check for hazards, such as gas or water leaks and electrical shorts. Turn off damaged utilities if you did not do so previously. Request that the fire department or utility companies turn the utilities back on once the area is secured. Similarly, water supply systems may have been damaged; do not drink from the tap until you have been advised that it is safe to do so. Finally, keep a "fire watch"; look for smoke or sparks in houses and other buildings (EMNRD Forestry Division et al. 2022).

Note any changes of address with the U.S. Postal Service, banks, utilities, credit card companies, and newspapers. If you do stay elsewhere, try to locate any legal documents, medications, valuables, etc. before relocating (EMNRD Forestry Division et al. 2022).

Insurance Claims

Your insurance agent is the best source of information for submitting a claim. It is recommended you take photographs of your home, of both the inside and outside, in preparation of an emergency. Keep the photographs in a safe place as this will make the insurance claim process easier when you need to show damage. Expenses incurred during the time you are forced to live elsewhere may be reimbursed, so be sure to keep all receipts. Do not start any repairs without the approval of your claims adjuster (EMNRD Forestry Division et al. 2022).

Natural disasters aren't always predictable, but there are steps homeowners can make to better prepare for an emergency.

- Review your insurance policy annually to see if your home is adequately insured
- Know your "loss of use" section—this section covers living expenses should your home become unlivable due to fire, smoke, or otherwise

You can view a guide on creating a home inventory here: https://www.iii.org/article/how-create-home-inventory

Community Safety: Post-Fire Floods and Debris Flows

There are numerous natural hazards after a wildfire. Perhaps most dangerous are potential flash floods and landslides following rainfall in a burned area upstream from a community. Wildfires increase risk of flooding because burned soil is unable to absorb rainfall and it becomes hydrophobic. Even small rainfall can cause a flash flood, transporting debris and damaging homes and other structures. Listen and look for emergency updates, weather reports, and flash flood warnings. Develop an evacuation plan with your

family and stay away from waterways, storm channels, and arroyos (EMNRD Forestry Division et al. 2022).

Checklists to prepare for flooding are available at: https://www.afterwildfirenm.org/flood-information/before-the-flood-checklists.

Mobilizing Your Community

When your community is safe and capable of monitoring potential storms, coordination for recovery efforts can begin. Depending on community size, one person or a team of post-fire coordinators can be appointed to work directly with agencies or teams helping with wildfire response. It is important that this person have demonstrated management and computer skills, community knowledge, and experience with federal and state agencies. The post-fire coordinator(s) can delegate any identified recovery tasks or needs to volunteers; however, it may be helpful to specifically appoint a volunteer coordinator. Responsibilities of a volunteer coordinator include creating a volunteer database, recruitment, management, and coordination of community volunteers (EMNRD Forestry Division et al. 2022). The recovery coordinator should become familiar with representatives from local, state, and federal government agencies that will be helping with coordination or funding of post-fire recovery.

The following are resources may be helpful for the post-fire and volunteer coordinators (Coalition for the Upper South Platte [CUSP] 2016):

- New Mexico Department of Homeland Security and Management
- Federal Emergency Management Agency (FEMA)
- American Red Cross
- EMNRD Forestry Division
- Continuing Authorities Program & Emergency Flood Protection: U.S. Army Corps of Engineers
- Emergency Watershed Protection (EWP): Natural Resources Conservation Service (NRCS)
- Food Assistance and Farm Service Agency: USDA
- Forest Restoration Assistance: EMNRD Forestry Division
- Conservation Districts
- USFS
- NRCS, including Earth Team
- Disaster Distress Helpline

Any large wildfire will also involve an Incident Command System (ICS), an appropriately sized team assigned to aid in post-fire recovery. Learn more at https://www.nps.gov/articles/wildland-fire-incident-command-system-levels.htm.

The following should be considered when assessing community needs (EMNRD Forestry Division et al. 2022):

- Are there paid staff that will be dedicated to helping with recovery?
- Who is familiar with the ICS?
- Who has technical skills to help with post-fire treatments?
- Which community members will be able to write grants and apply for assistance? Who has accounting skills? Management skills?
- How much money will the community need? How can it be acquired?
- How will the community address immediate needs such as shelter, food, and health care? Counseling and mental health?

Communication

After a team is assembled and immediate tasks are identified, find the best way to spread information in your community. You may distribute flyers, set up a voicemail box, work to find pets or livestock that have been displaced, develop a mailing list for property owners, hold regular public meetings, etc. It is important that a long-term communications plan is developed (CUSP 2016). Communication ideas include the following (EMNRD Forestry Division et al. 2022):

- Newspaper communications with emergency information (and phone numbers for emergency services) for flooding, landslides, and debris flows.
- Published information about ongoing flood and landslide mitigation projects.
- Information about safe flooding responses: stay out of cars and off roads, escape to dry land as soon as possible, do not attempt to cross flowing water.
- Remind residents to listen to weather reports and remain aware of rainfall. Be alert for changes in water flow and stay away from areas prone to landslides and flooding.
- Information regarding volunteer needs and planned repair projects.

Post-Fire Rehabilitation and Resources

Wildfires that cause extensive damage necessitate dedicated efforts to avert issues afterwards. As aforementioned, loss of vegetation increases soil susceptibility to erosion; water runoff may increase and lead to flooding; sediments and debris may be transported downstream and damage properties or saturate reservoirs putting endangered species and water reserves at risk (EMNRD, Forestry Division 2020a). Following a fire, the primary priority is emergency stabilization to prevent additional damage to life, property, or natural resources. The soil stabilization work starts immediately and may proceed for up to a year. The rehabilitation effort to restore damage caused by the fire starts after the fire is out and may persist for various years. For the most part, rehabilitation efforts focus on the lands not likely to recover naturally from wildfire damage (USDA, Natural Resources Conservation Service, New Mexico 2022).

The USFS's post-fire emergency stabilization program is called the Burned Area Emergency Response (BAER) program. The goal of the BAER program is to discover post-wildfire threats to human life and safety, property, and critical natural or cultural resources on USFS lands and take appropriate actions to mitigate unacceptable risks (USFS 2010). BAER groups are composed of trained professionals in different fields: soil scientists, engineers, hydrologists, biologists, botanists, archaeologists, and others who quickly assess the burned area and advise emergency stabilization treatments.

The NRCS EWP program provides technical and financial services for watershed repair on **public (state and local) and private land**. The goal is reduced flood risk via funding and expert advice for land treatments. The EWP program can provide up to 75% of funds; remaining funds can be paid with in-kind volunteer labor (CUSP 2016). This funding is used by the State Emergency Rehabilitation Team (a multi-agency group assembled by the NRCS) to develop specific recovery and treatment plans.

Examples of potential treatments include (USFS 2021b):

- Hillside stabilization (for example, placing bundles of straw parallel to the slope to slow erosion)
- Hazard tree cutting
- Felling trees perpendicular to the slope contour to reduce runoff
- Mulching areas seeded with native vegetation
- Stream enhancements and construction of catchments to control erosion, runoff, and debris flows
- Planting or seeding native species to limit spread of invasive species

A comparison of potential hillside, channel, and road treatments is available at: https://www.afterwildfirenm.org/post-fire-treatments/which-treatment-do-i-use

Specific Treatment Details

Hillslope Treatments

Cover Applications:

Dry mulch: provides immediate ground cover with mulch to reduce erosion and downstream flow.

Wet mulch (hydromulch): provides immediate cover to hold moisture and seeds on slopes using a combination of organic fibers, glue, suspension agents, and seeds (most effective on inaccessible slopes).

Slash spreading: provides ground cover to reduce erosion by felling trees in burned areas.

Seeding: reduces soil erosion over time with an application of native seed mixtures (most successful in combination with mulching). Breaking up and loosening topsoil to break down the hydrophobic layer on top of the soil is also effective.

Erosion Barrier Applications:

Erosion control mat: organic mats staked on the soil surface to provide stability for vegetation establishment.

Log erosion barrier: trees felled perpendicular to the hillslope to slow runoff.

Fiber rolls (wattles): rolls placed perpendicular to the hillslope to reduce surface flows and reduce erosion.

Silt fencing: permeable fabric fencing installed parallel to the slope contour to trap sediment as water flows down the hillslope.

Channel Treatments

Check dam: small dams built to trap and store sediment in stream channels.

In-channel tree felling: felling trees in a staggered pattern in a channel to trap debris and sediment.

Grade stabilizer: structures made of natural materials placed in ephemeral channels for stabilization.

Stream bank armoring: reinforcing streambanks with natural materials to reduce bank cutting during stream flow.

Channel deflector: an engineered structure to direct flow away from unstable banks or nearby roads.

Debris basin: constructed to store large amounts of sediment moving in a stream channel.

Road and Trail Treatments

Outsloping and rolling dips (water bars): alter the road shape or template to disperse water and reduce erosion.

Overflow structures: protect the road by controlling runoff and diverting stream flow to constructed channels.

Low water stream crossing: culverts replaced by natural fords to prevent stream diversion and keep water in the natural channel.

Culvert modification: upgrading culvert size to prevent road damage.

Debris rack and deflectors: structure placed in a stream channel to collect debris before reaching a culvert.

Riser pipes: filter out debris and allow the passage of water in stream channels.

Catchment-basin cleanout: using machinery to clean debris and sediment out of stream channels and catchment basins.

Trail stabilization: constructing water bars and spillways to provide drainage away from the trail surface.

These treatments and descriptions are further detailed at: https://afterwildfirenm.org/post-fire-treatments/treatment-descriptions

For more information about how to install and build treatments, see the Wildfire Restoration Handbook at: https://www.rmfi.org/sites/default/files/hero-content-files/Fire-Restoration-HandbookDraft_2015_2.compressed_0.pdf

Timber Salvage

Many private landowners may decide to harvest trees killed in the fire, a decision that can be highly controversial. Any remaining trees post-fire can be instrumental for soil and wildlife habitat recovery. Furthermore, burned soils are especially susceptible to soil compaction and erosion. Therefore, timber salvage must be performed by professionals. Several programs assist landowners with timber salvage, including the NRCS Environmental Quality Incentives Program (EQIP) (CUSP 2016).

Invasive Species Management and Native Revegetation

Wildfire provides opportunity for many invasive species to dominate the landscape because many of these species thrive on recently burned landscapes. It is imperative that landowners prevent invasive establishment by eradicating weeds early, planting native species, and limiting invasive seed dispersal (CUSP 2016).

Planting native seeds is an economical way to restore a disturbed landscape. Vegetation provides protection against erosion and stabilizes exposed soils. In order to be successful, seeds must be planted during the proper time of year and using correct techniques. Use a native seed mixture with a diversity of species and consider the species' ability to compete with invasive species. Before planting, the seedbed must be prepared with topsoil and by raking to break up the hydrophobic soil layer. If you choose to transplant or plant native species, consider whether the landscape has made a sufficient recovery to ensure the safety of the individuals (CUSP 2016).

Long-Term Community Recovery

On non-federal land, recovery efforts are the responsibility of local governments and private landowners. Challenges associated with long-term recovery include homes that were severely damaged or were

saved but are located in high-severity burn areas. Furthermore, homes saved but located on unstable slopes or in areas in danger of flooding or landslides present a more complicated challenge. Economically, essential businesses that were burned or were otherwise forced to close pose a challenge to communities of all sizes. Given these complications, rebuilding and recovery efforts can last for years, with invasive species control and ecosystem restoration lasting even longer (CUSP 2016). It is critical that a long-term plan is in place and there is sufficient funding and support for all necessary ecosystem and community recovery. To learn about more post-fire recovery resources, visit the After the Flames website here: https://afterthe flames.com/resources/.

Additional information relating to actions before, during, and after a wildfire can be found here: https://www.cabq.gov/fire/safety-information/wildfire-safety/before-during-and-after-a-wildfire

Additional resources regarding post-fire return and recovery can be found in Appendix G.