COCHISE COUNTY

Community Wildfire Protection Plan

December 2014

Cochise County Board of Supervisors
City of Benson
City of Bisbee
City of Douglas
City of Sierra Vista
City of Tombstone
City of Willcox
7X Fire District
Benson Fire Department
Bisbee Fire Department
Bowie Fire District
Cascabel Volunteer Fire Department
Chiricahua Trails Volunteer Fire Department
Douglas Fire Department
Elfrida Fire District
Fry Fire District
Huachuca City Fire Department
Mescal-J6 Fire District
Naco Fire District
Palominas Fire District
PBW Fire District
Pirtleville Fire District
Pomerene Fire District
Portal Rescue Inc.
San Jose Fire District
San Simon Fire District
Sierra Vista Fire Department
Sonoita-Elgin Fire District
St. David Fire District
Sunnyside Fire District
Sunsites-Pearce Fire District
Tombstone Volunteer Fire Department
Whetstone Fire District
Willcox Fire Department
The Nature Conservancy
Arizona State Forestry Division
Bureau of Land Management
Coronado National Forest
Chiricahua National Monument
Fort Bowie National Historic Site
Coronado National Memorial

TABLE OF CONTENTS

Acronyms and Abbreviations iv

I. Introduction 1
- A. Background 3
- B. WUI and Delineation Process 7
- C. Desired Future Condition and Wildfire Mitigation in the WUI 12
- D. Goals for the Cochise County CWPP 14

II. Cochise County CWPP Community Assessment and Analysis 17
- A. Fire Regime and Condition Class 23
- B. Fuel Hazards 24
- C. Conditions of Ignition and Past Fire Occurrence 40
- D. Community Values at Risk 44
  - 1. Housing, Businesses, Essential Infrastructure, and Evacuation Routes 44
  - 2. Recreation Areas/Wildlife Habitat 45
  - 3. Local Preparedness and Protection Capability 45
- E. Summary of Community Assessment and Cumulative Risk Analysis 50
  - 1. Community WUI Descriptions and Risk Rating 50

III. Community Mitigation Plan 80
- A. Fuel Reduction Priorities 80
- B. Prevention and Loss Mitigation 92
  - 1. Administer and Implement the Cochise County CWPP 93
  - 2. Improve Protection Capability and Reduction in Structural Ignitability 93
  - 3. Promote Community Involvement and Improved Public Education, Information, and Outreach 95
  - 4. Encourage Use of Woody Material from WUI Fuel Mitigation Programs 96

IV. Cochise County CWPP Priorities: Action Recommendations and Implementation 98
- A. Administrative Oversight 98
- B. Priorities for Mitigation of Hazardous Wildland Fuels 100
- C. Identified Action Items for Protection Capability and Reduced Structural Ignitability 101
- D. Priorities for Promoting Community Involvement through Education, Information, and Outreach 104

V. Monitoring Plan 106
- A. Administrative Oversight, Monitoring, and Cochise County CWPP Reporting 106
- B. Effectiveness Monitoring 107

VI. Declaration of Agreement and Concurrence 110

VII. References 114

APPENDIX A. Educational Resources 119

APPENDIX B. Information Data Sheet and Contacts 126

APPENDIX C. Invasive Species 128

LIST OF TABLES

Table 1.1. Cochise County CWPP Recommended At-Risk Communities 8
Table 2.1. Land Management within Community WUIs 17
Table 2.2. Fire Regime Information 23
Table 2.3. Fuel Model, Fire-Danger Ratings, and Intensity Levels on Vegetative Associations in the WUI 30
Table 2.4. Fuel Hazard Components 40
Table 2.5. Ignition history and wildfire occurrence 40
Table 2.6. Wildland Fire Ignitions during Each Calendar Quarter Beginning in 1980 41
Table 2.7. Community Values 47
Table 2.8. Cumulative Risk Levels, by Percentage of the WUI Area 78
Table 3.1. Fuel Modification and Treatment Plans 82
Table 3.2. Identified Treatment Management Units 86
Table 3.3. Acres of Wildland Fuels Mitigation Treatment Conducted by ASFD Fire and Fuels Crew during a 10-Hour On-Site Workday 91
Table 4.1. Action Recommendations for Wildland Fuel Modification 100
Table 4.2. Action Recommendations for Structural Ignitability and Public Outreach 101
Table 4.3. Future Recommendations for Wildland Fire Protection and Reduced Ignitability 103
Table 4.4. Future Recommendations for Enhanced Public Education, Information, and Outreach 104
Table 5.1. Performance Measures to Assess Cochise County CWPP Progress 107

LIST OF FIGURES

Figure 1.1. Cochise County CWPP Planning Area 2
Figure 2.1. Cochise County CWPP WUI Area 19
Figure 2.2. Cochise County CWPP Vegetation Associations 28
Figure 2.3. Cochise County CWPP Wildland Fuel Hazards during Extraordinary Rainfall Years 38
Figure 2.4. Cochise County CWPP WUI Ignition History 42
Figure 2.5. Cochise County CWPP Community Values Assessment 48
Figure 2.6. Cochise County CWPP Cumulative Risk Analysis 76
Figure 3.1. Cochise County CWPP Treatment Management Units 84

LIST OF PHOTOS

Photo 1.1. 2011 Horseshoe 2 Wildfire in Cochise County (courtesy of CNF) 11

ACRONYMS AND ABBREVIATIONS

ASFD	Arizona State Forestry Division
ASLD	Arizona State Land Department
AZ-WIPWG	Arizona-Wildlands Invasive Plant Working Group
BLM	Bureau of Land Management
BWG	Buffelgrass Working Group
CCOES	Cochise County Office of Emergency Services
CNF	Coronado National Forest
CWPP	community wildfire protection plan
EMA	ecosystem management area
FFD	Fry Fire District
FMP	fire management plan
FRCC	fire regime condition class
GIS	geographic information system
GPS	Global Positioning System
HFRA	Healthy Forests Restoration Act of 2003
I-10	Interstate 10
ISO	Insurance Services Office
MBG	Malpai Borderlands Group
MDC	Missouri Department of Conservation
MLRA	Major Land Resource Area
NMEMNRD	New Mexico Energy, Minerals and Natural Resources Department
NPS	National Park Service
PPE	personal protective equipment
PFD	Palominas Fire District
SJCWG	San Juan County Watershed Group
SPRNCA	San Pedro Riparian National Conservation Area
SR	state route
SVFD	City of Sierra Vista Fire Department
SWReGAP	Southwest Regional Gap Analysis Project
TES	threatened, endangered, and sensitive species
US 80	US Highway 80
US 90	US Highway 90
US 92	US Highway 92

USDA	US Department of Agriculture
USDI	US Department of the Interior
USFS	US Forest Service
VCC	vegetation condition class
WFLC	Wildland Fire Leadership Council
WUI	wildland-urban interface

I. INTRODUCTION

The Cochise County Community Wildfire Protection Plan (CWPP) was developed in response to the Healthy Forests Restoration Act (HFRA) of 2003 for the at-risk cities and unincorporated areas in Cochise County, Arizona (Figure 1.1), located around public lands administered by the following agencies: the Bureau of Land Management (BLM) Gila District Office; the Coronado National Forest (CNF) Douglas and Sierra Vista Ranger Districts; the US Fish and Wildlife Service; and the National Park Service (NPS) Chiricahua National Monument, Fort Bowie National Historic Site, and Coronado National Memorial. HFRA established unprecedented incentives for communities to develop comprehensive wildfire protection plans in a collaborative, inclusive process. Furthermore, this legislation directs the US Forest Service (USFS) and BLM to address local community priorities in fuel reduction treatments, even on nonfederal lands.

HFRA requires federal agencies to collaborate with communities in developing hazardous fuel reduction projects and places priority on treatment areas identified by communities through the development of a CWPP. Priority areas include the wildland-urban interface (WUI), municipal watersheds, areas affected by windthrow or by insect or disease epidemics, and critical wildlife habitat that would be negatively affected by a catastrophic wildfire.

In compliance with Title 1 of HFRA, the CWPP requires agreement among local governments, local fire departments and districts, and the state agency responsible for forest management. For the Cochise County CWPP, this agency is the Arizona State Forestry Division (ASFD). The CWPP must also be developed in consultation with interested parties and the applicable federal agency managing the public lands surrounding the at-risk communities. The majority of lands surrounding the at-risk communities and unincorporated intermixed community zones within Cochise County are “public lands” and “lands of the National Forest System,” as defined in Sections 3.1.A and 3.1.B of HFRA, and Arizona State Trust lands.

The Cochise County CWPP has been developed to assist local governments, fire departments and districts, and residents to identify lands—including federal lands—at risk from severe wildfire threat and to identify strategies for reducing hazardous vegetative fuels within the WUI while improving watershed and rangeland health, supporting local industry and local economies, and improving public and firefighter safety and response capabilities. The Cochise County CWPP is based on the *Approved Arizona Statewide Land Use Plan Amendment for Fire, Fuels, and Air Quality Management and Decision Record* (BLM 2004a); the *Arizona BLM Gila District Fire Management Plan* (BLM 2013); the *Coronado National Forest Plan* (USFS 1988, as amended); the *Coronado Fire Management Plan* (USFS 2013); and the Arizona FireScape Project (http://www.azfirescape.org). It is also based on guidance from *Preparing a Community Wildfire Protection Plan: A Handbook for Wildland-Urban Interface Communities* (Communities Committee et al. 2004), the *Southwest Community Wildfire Protection Plan Guide* (Southwest Strategy 2009), and the *Statewide Strategy for Restoring Arizona’s Forests* (Governor’s Forest Health Councils 2007).

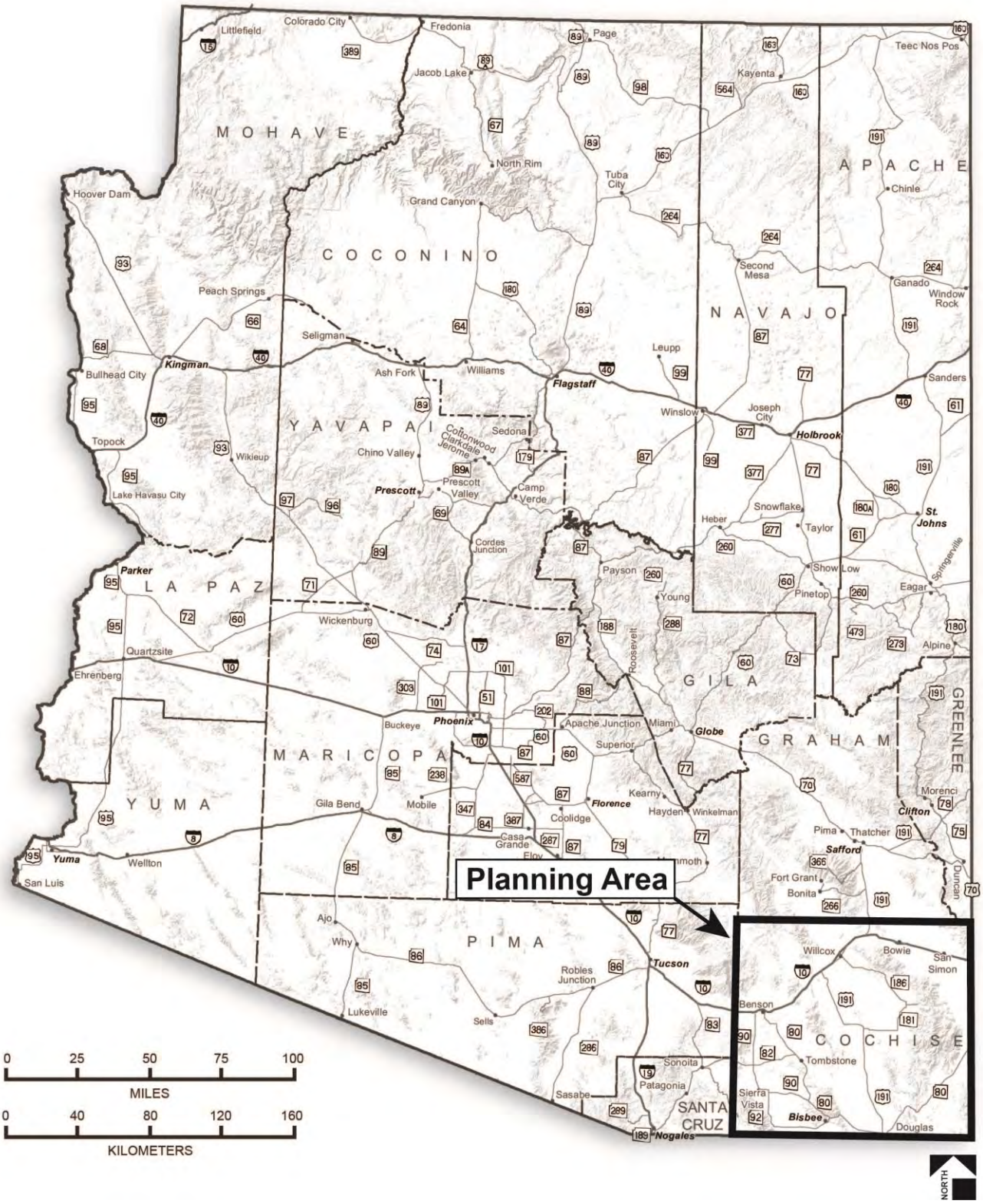

Figure 1.1. Cochise County CWPP Planning Area

The ASFD (2009a) has previously identified 10 at-risk communities in Cochise County: Chiricahua Headquarters, Cascabel, Bisbee, San Pedro, Fort Huachuca, Paradise, Parker Canyon, Portal, Sierra Vista, and West Turkey Creek. The communities of Palominas, Cascabel, and Bisbee have completed a CWPP, and Fort Huachuca manages wildfire response within its boundaries. The remaining communities, however, are not included in any CWPP (ASFD 2009a). The Cochise County CWPP was developed to ensure that all at-risk communities within Cochise County are included within a compliant CWPP.

To ensure that all residents of Cochise County were represented in this planning process, a team, referred to as the "Core Team," was formed to implement the agency and public collaboration necessary to develop a CWPP compliant with HFRA. The Core Team represented incorporated and unincorporated communities and agencies within the Cochise County CWPP planning area (Figure 1.1).

The Core Team agreed to and established the development process for the Cochise County CWPP. The Core Team analyzed approximately 3,980,000 acres of federal, state, and private lands for potential risk of wildland fire and identified 52 communities composed of 700,765 acres within 38 separate community WUIs at potential risk from catastrophic wildland fire within Cochise County (Table 1.1).

The following sections detail the background and process used to develop the Cochise County CWPP and define the associated WUI. In addition, they describe the desired future condition of lands covered by the Cochise County CWPP, identify current fire policies and programs and discuss future needs, and present the goals of the Cochise County CWPP.

A. Background

The process for developing this CWPP consisted of evaluating Cochise County to identify communities, infrastructure, and remote private lands at risk from catastrophic wildland fire. During this analysis the Cochise County Office of Emergency Services (CCOES) requested that local governments, fire departments and districts, and interested individuals throughout Cochise County, along with Fort Huachuca, BLM, CNF, NPS, and ASFD, participate in the Core Team to develop the Cochise County CWPP. The Core Team was created to define and locate interface and intermix communities in which significant community values and infrastructure are at risk because of the potential of wildland fire.[1] According to census data, there were over 131,000 people living in Cochise County in 2010, and the population has increased about 0.3 percent per year. Cochise County is the local government authority for the unincorporated communities identified as at risk, while the city councils of Bisbee, Benson, Douglas, Sierra Vista, Tombstone, and Willcox and the town council of Huachuca City are the appropriate municipal government authorities for cooperating fire departments in developing and

[1] *Interface communities* exist where structures directly abut wildland fuels; *intermix communities* exist where structures are scattered throughout a wildland area (USDA and USDI 2001a).

agreeing to the Cochise County CWPP. To ensure information dissemination and an open public process, with the goal of representing all community interests during the development of the CWPP, Cochise County and the Core Team requested that a 30-day public review period for the CWPP be provided before submission to the Cochise County Board of Supervisors for approval. The Core Team, in association with planned public involvement, meets all collaborative guidance criteria established by the Wildland Fire Leadership Council (WFLC 2002).

The Core Team recognized that wildfires affecting the built environment (WUI) are generally more costly in terms of loss of life, personal injury, and property damage than those affecting only the natural environment (Rehm et. al. 2002).The Core Team and collaborators developed this CWPP to increase preparedness, to reduce hazardous wildland fuels, to reduce impacts from catastrophic wildfire, and to prepare recommendations for reducing structural ignitability. In addition, the Core Team developed this CWPP to increase communication with local, county, state, and federal emergency response personnel by determining areas of high risk from unwanted wildland fire; by developing mitigation measures to reduce hazardous wildland fuels; by improving emergency response to unplanned wildfire; by preventing wildfire ignitions from state and public lands from spreading into the WUI; and by preventing wildfire ignitions within the WUI from spreading to adjacent state and public lands.

During initial analyses for the proposed wildland fuel mitigation recommendations, as well as the development of the Cochise County CWPP, the Core Team reviewed the following documents:

- "Urban Wildland Interface Communities within the Vicinity of Federal Lands That Are at High Risk from Wildfire," *Federal Register* Vol. 66, Nos. 3 and 160 (US Department of Agriculture [USDA] and US Department of the Interior [USDI] 2001a and 2001b)
- *Field Guidance: Identifying and Prioritizing Communities at Risk* (National Association of State Foresters 2003)
- *Arizona Wildland Urban Interface Assessment* (ASFD 2004)
- *Identifying Arizona's Wildland/Urban Interface Communities at Risk: A Guide for State and Federal Land Managers* (ASFD 2007)
- *Arizona-Identified Communities at Risk* (ASFD 2009a)
- *Statewide Strategy for Restoring Arizona's Forests* (Governor's Forest Health Councils 2007)
- *Arizona Forest Resource Assessment* (ASFD 2010a)
- *Arizona Forest Resource Strategy* (ASFD 2010b)
- *Wildland Fire Use Implementation Procedures Reference Guide* (USDI and USDA 2005)
- *Forest Health Landscape-Scale Restoration Recommendations* (Western Governors' Association 2010)
- *A National Cohesive Wildland Fire Management Strategy-Phase II National Report*. (WFLC 2012)

- *A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment: 10-Year Comprehensive Strategy Implementation Plan* (USFS and BLM 2002)
- *Landscape Conservation and Restoration Strategic Action Plan* (USFS 2011)
- *Approved Arizona Statewide Land Use Plan Amendment for Fire, Fuels, and Air Quality Management and Decision Record* (BLM 2004a)
- "Wildland Urban Interface (WUI)," Chapter 5140.5 (Definitions) of *FSM 5100 – Fire Management* (USFS 2010)
- *Healthy Forests: An Initiative for Wildfire Prevention and Stronger Communities* (Presidential Policy 2002)
- *Preparing a Community Wildfire Protection Plan: A Handbook for Wildland-Urban Interface Communities* (Communities Committee et al. 2004)
- *Community Guide to Preparing and Implementing a Community Wildfire Protection Plan. A supplemental guide to Preparing a Community Wildfire Protection Plan: A Handbook for Wildland-Urban Interface Communities* (Communities Committee et al. 2008)
- *Wildland Fire Suppression (Including Wildland Fire Use) and Rehabilitation in Riparian and Aquatic Habitats (RA)* (BLM 2004b)
- *Guidance for Implementation of Federal Wildland Fire Management Policy* (USDA and USDI 2009)
- *Coronado National Forest Plan* (USFS 1988)
- *Coronado Fire Management Plan* (USFS 2013)
- *Arizona BLM Gila District Fire Management Plan* (BLM 2013)
- *Bisbee Community Wildfire Protection Plan* (Bisbee Fire Department 2007)
- *Cascabel Community Wildfire Protection Plan* (Cascabel Fire Department 2006)
- *Community Wildfire Protection Plan* (Palominas Firewise Community Board 2004)
- *Fire Management Plan* (Huachuca Area Fire Partners 2005)
- *Sonoita-Elgin Community Wildfire Protection Plan* (Sonoita-Elgin Fire Department 2007)
- *Environmental Assessment: Huachuca FireScape Project* (USFS 2009)
- *Biological Opinion: Huachuca FireScape Project* (US Fish and Wildlife Service 2009)
- *Upper San Pedro Watershed Wildfire Hazard Assessment and Mitigation Plan Summary Report* (BLM 2003)
- *Upper San Pedro Community Wildfire Protection Plan* (BLM 2008)
- *Chiricahua National Monument Fire Management Plan* (NPS 2005a)

- *Fort Bowie National Historic Site Fire Management Plan* (NPS 2005b)
- *Coronado National Memorial Fire Management Plan* (NPS 2005c)
- *Fort Huachuca Integrated Wildland Fire Management Plan* (US Army 2006)
- *Fire Management Plan* (Malpai Borderlands Group 2012)

From 1980 through 2012, over 2,822 wildfire ignitions have been recorded within Cochise County. Large wildfires have become increasingly common, especially in lower elevations, where nonnative grasses are prevalent. Lehmann's lovegrass, a nonnative species, has greatly increased fuel loads in and below the oak belt compared to native grassland species. Since 2000, a total of 54 large wildfires have burned 318,025 acres within the Cochise County WUI. County fire departments and districts, CNF, BLM, and Fort Huachuca have responded to and suppressed numerous wildland fires within the WUI during the past several years. Many of these wildland fire ignitions have occurred adjacent to roadways within grassland and shrubland vegetation associations and higher-elevation chaparral and woodland vegetation associations in conditions conducive for catastrophic wildland fire which often threaten at-risk Cochise County communities. Recent significant fires include the Monument and Horseshoe 2 Fires in 2011 and the Ryan Fire in 2002, which collectively burned over 100 structures. Continued extreme weather conditions, dry fuels, increased nonnative invasive vegetation, and increased fuel loading on federal and nonfederal lands contribute to the potential for catastrophic wildland fires within Cochise County. Therefore, the fire departments and districts and governmental agencies have initiated fire preparedness and land-treatment planning efforts to deal with the types and densities of wildland fuels that significantly threaten communities with potential catastrophic wildfire.

The CNF has an active fuels and restoration program that includes using mechanical treatments and prescribed fire, as well as managing lightning-caused fires. In 2013, Fort Huachuca and the Sierra Vista Ranger District marked their eighth year of partnering to conduct joint prescribed burning on Fort Huachuca land. To date, approximately 24,000 acres on Fort Huachuca have been successfully treated with prescribed burns. Local cooperators have also been instrumental in accomplishing these burns. In 2005, the USFS amended the *Coronado Land and Resource Management Plan* to allow the CNF to use unplanned, naturally ignited wildfire , where and when appropriate, as a forest-wide management tool for resource benefit. Approximately 23,000 acres of CNF land within Cochise County have been treated with naturally ignited wildfire since 2005. Mechanical treatments such as mastication (the mechanical shredding and chipping of small trees and shrubs) and thinning have accounted for approximately 2,500 acres of treatment. Since 2006, the CNF, in conjunction with adjacent landowners, has treated over 77,000 acres within Cochise County. The CNF is currently exploring joint funding opportunities with the US Border Patrol for mastication.

Since 2007 NPS thinned and limbed 47 acres around the headquarters area of the Coronado National Memorial and its evacuation route. Slash from these treatments was either removed or chipped. Additionally, two prescribed burns totaling 41 acres were conducted near the headquarters and

adjacent to private homes on a private inholding. Herbicides have also been used to try to control nonnative grasses. Since 2003, 19 treatments totaling over 1,800 acres were completed at Chiricahua National Monument. Most treatments consisted of prescribed burning; however, thinning, limbing, chipping, pile-and-burn, and herbicide treatments were also conducted. At Fort Bowie National Historic Site, about 45 acres have been thinned, piled, and burned since 2005.

In 2003, Governor Janet Napolitano created the Forest Health Advisory Council and the Forest Health Oversight Council in response to the increasing number, frequency, and intensity of unwanted wildfires threatening Arizona communities and forests (Executive Order 2003-16). The councils were directed to develop scientific information and policy recommendations to advise the Governor's administration on matters of forest health, unnaturally severe forest fires, and community protection. In 2005, the councils established a subcommittee to begin work on a 20-year strategy to restore forest health, protect communities from fire, and encourage forest-based economic activity. Governor Napolitano approved and signed the *Statewide Strategy for Restoring Arizona's Forests* in June 2007. Governor Janice Brewer issued Executive Order 2007-17 on July 9, 2009, which reestablished the Forest Health Council. The Core Team has reviewed the strategy—specifically, the Sky Islands landscape—to ensure that the recommendations adopted by the Core Team and presented within the Cochise County CWPP comply with, and complement, the *Statewide Strategy for Restoring Arizona's Forests*. Using the information gathered from these supporting documents, the Core Team and collaborators agreed that the Cochise County communities listed in the *Arizona-Identified Communities at Risk* (ASFD 2009a), as well as other developed areas identified as at risk within the Cochise County CWPP WUI, constitute interface or intermix communities (see USDA and USDI 2001a; ASFD 2007) at risk from wildland fire.

B. WUI and Delineation Process

In 2009, 10 Cochise County communities including the Chiricahua Headquarters, Cascabel, Bisbee, San Pedro, Fort Huachuca, Paradise, Parker Canyon, Portal, Sierra Vista and West Turkey Creek were listed in the *Arizona-Identified Communities at Risk* (ASFD 2009a) and were given a WUI risk rating for catastrophic wildland fire. The communities of Cascabel and Bisbee have current CWPPs, and the Chiricahua Headquarters is included in the *Chiricahua National Monument Fire Management Plan.* The Core Team and collaborators concur with this 2009 listing of at-risk communities, as maintained by the Arizona State Forester. The Core Team and collaborators recommend revising the listing of those 10 communities and, given the Cochise County CWPP wildland fire analysis, further recommend including 52 additional Cochise County communities, along with their associated WUI risk ratings as identified by the Core Team, in the *Arizona-Identified Communities at Risk* list (see Table 1.1).

The Cochise County CWPP analyzes risk and makes recommendations to reduce the potential for unwanted wildland fire within the 52 at-risk communities in Cochise County. There are additional private lands within the WUI analysis area that are at risk from wildland fire; however, they are not within a fire district and therefore are not specifically listed Table 1.1. See Section II of this CWPP for additional community detail descriptions. The Cochise County CWPP analysis further refines components of wildland fire risk and prioritizes community recommendations for reducing wildland fire potential through

vegetative fuel management and increased public outreach/education and for reducing structural ignitability. According to HFRA (Secs. 101.1.A.i–ii, 101.1.B, and 101.1.C), an "at-risk community" is defined as "an area – (A) that is comprised of – (i) an interface community . . . or (ii) a group of homes and other structures with basic infrastructure and services . . . within or adjacent to Federal land; (B) in which conditions are conducive to a large-scale wildland fire disturbance event; and (C) for which a significant threat to human life or property exists as a result of a wildland fire disturbance event."

Table 1.1. Cochise County CWPP Recommended At-Risk Communities

Community WUI	WUI Risk	Communities within WUI	Fire Department/ District	Community WUI	WUI Risk	Communities within WUI	Fire Department/ District
Benson	Low	Benson	Benson Fire Department	Parker Canyon [a]	Moderate	Lake View Parker canyon	None
Bisbee [a/*]	See Bisbee CWPP	Bisbee Banning Creek Highland Park Naco South Bisbee Warren	Bisbee Fire Department Naco Fire District San Jose Fire District	Pedregosa	Moderate	Pedregosa	None
Box Canyon	Low	Box Canyon	None	Pinery Canyon	High	Pinery Canyon	None
Cascabel [a/*]	See Cascabel CWPP	Cascabel	Cascabel Volunteer Fire Department	Pomerene	Moderate	Pomerene	Pomerene Fire District
Chiricahua Headquarters [a]	High	Chiricahua Headquarters	None	Price Canyon	Moderate	Price Canyon	None
Cochise Stronghold/ Pearce	Moderate	Cochise Pearce Sunsites	Sunsites-Pearce Fire District	Rucker Canyon	Moderate	Rucker Canyon	None
Douglas/ Sunnyside	Moderate	Calumet Douglas Pirtleville Sunnyside	Douglas Fire Department / Sunnyside Fire District/ Pirtleville Fire District	Rustler Park	High	Rustler Park	None
Doz Cabezas/ Butterfield	Moderate	Doz Cabezas	Chiricahua Trails Volunteer Fire Department	Saint David	Moderate	Curtiss Escalante Crossing Saint David	St. David Fire District
Dragoon	Moderate	Dragoon	None				

Table 1.1. Cochise County CWPP Recommended At-Risk Communities

Community WUI	WUI Risk	Communities within WUI	Fire Department/ District	Community WUI	WUI Risk	Communities within WUI	Fire Department/ District
Dragoon Mountain Ranch	Moderate	Dragoon Mountain Ranch	None	Sierra Vista [a]/ Palominas	Moderate	Bledsoe Hereford Miracle Valley Nicksville Palominas Ramsey Sierra Vista Sierra Vista Estates Sierra Vista Southeast Stark	Sierra Vista Fire Department Fry Fire District Palominas Fire District
Emigrant Canyon	Moderate	Emigrant Canyon	None	Skeleton Canyon	Moderate	Skeleton Canyon	None
Escapule Estates	Moderate	Escapule Esates	None	Sonoita-Elgin	Moderate	Sonoita-Elgin	Sonoita-Elgin Fire District
Fort Bowie	High	Fort Bowie	None	Tex Canyon	Low	Tex Canyon	None
Gleeson/ High Lonesome Estates	Moderate	Gleeson High Lonesome Eststes	None	Turquoise Hills	Moderate	Fenner	None
Granite Spring	Moderate	Granite Spring	None	West Gate	Moderate	West Gate	None
Huachuca City	Low	Campstone Huachuca City Whetstone	Whetstone Fire Department PBW Fire District	West Turkey Creek [a]/ Sunizona	Moderate	West Turkey Creek Sunizona	None
Lyle Canyon	Low	Lyle Canyon	None	Willcox	Moderate	Willcox	Willcox Fire Department
Mescal-J6	Moderate	Mescal	Mescal-J6 Fire District	Willow Lakes	Moderate	Willow Lakes	None
Methodist Camp	High	Methodist Camp	None	Wood Canyon	Moderate	Wood Canyon	None
Paradise [a] / Portal	Moderate	Galeyville Hilltop Paradise Portal Whitetail Canyon	Portal Fire and Rescue Inc.				

[a] These communities are listed in the Arizona-Identified Communities at Risk (ASFD 2009a).

* Existing CWPP.

The at-risk communities within Cochise County are adjacent to federal lands, including public lands administered by BLM, NPS, and CNF, and are consistent with the Arizona State Forester's definition of an *intermix* or *interface community*:

> The Intermix Community exists where structures are scattered throughout a wildland area. There is no clear line of demarcation; wildland fuels are continuous outside of and within the developed area. The developed density in the intermix community, ranges from structures very close together to one structure per forty acres. Local fire departments and/or districts normally provide life and property fire protection and may also have wildland fire protection responsibilities.
>
> The Interface Community exists where structures directly abut wildland fuels. There is a clear line of demarcation between wildland fuels and residential, business, and public structures. Wildland fuels do not generally continue into the developed area. The development density for an interface community is usually three or more structures per acre, with shared municipal services. Fire protection is generally provided by a local fire department with the responsibility to protect the structure from both an interior fire and an advancing wildland fire. (ASFD 2007:1)

In addition to a community's listing status, the current condition of the wildland fuels within and adjacent to at-risk communities significantly contributes to the possibility of a catastrophic wildfire capable of damaging or destroying community values, such as houses, infrastructure, recreational sites, businesses, and wildlife habitats. Establishing a CWPP to enhance the protection of community values and to minimize the potential loss of property while ensuring public and firefighter safety during a catastrophic wildfire remains the overriding priority recommendation of the Cochise County CWPP.

The WUI is commonly described as the zone where structures and other features of human development meet and intermingle with undeveloped wildland or vegetative fuels. USFS defines *WUIs* as follows:

> . . . those areas of resident populations at imminent risk from wildfire, and human developments having special significance. These areas may include critical communications sites, municipal watersheds, high voltage transmission lines, observatories, church camps, scout camps, research facilities, and other structures that if destroyed by fire, would result in hardship to communities. These areas encompass not only the sites themselves, but also the continuous slopes and fuels that lead directly to the sites, regardless of the distance involved. (USFS 2010: Chap. 5140.5)

The Arizona State Forester defines a *structure* as follows:

> For the purposed of applying these categories and the subsequent criteria for evaluating risk to communities, a *structure* is understood to be either a residence or a business facility, including Federal, State and local government facilities. Structures do not include small improvements such as fences and wildlife watering devices. (ASFD 2007:1).

The Cochise County CWPP process of delineating WUI boundaries for at-risk communities involved collaboration among local, state, and federal government representatives, as well as interested individuals within the communities. The Core Team reviewed Section101.1.16 of HFRA for the definition of a WUI, including “areas adjacent to an evacuation route for an at-risk community that the Secretary determines, in cooperation with the at-risk community, requires hazardous fuel reduction to provide safer evacuation from the at-risk community” (HFRA Sec.101.1.16.B.iii.). After review of HFRA and discussion with federal and state wildland fire and resource specialists, the Core Team determined the WUI boundary for at-risk communities in the CWPP analysis area to include the following: private lands within a defined community boundary with a surrounding buffer determined by the Core Team, private lands not within a defined community boundary (described primarily as “occluded” communities) with a surrounding buffer determined by the Core Team, and significant federal lands included as USFS WUI (ASFD 2007). The Core Team believes that the Cochise County CWPP community WUI boundaries are the minimum area needed to provide protection to each community and its surrounding community values. The identified WUI includes a total of 700,765 acres composed of a mix of private, county, state, and federal lands. The WUI lands surrounding the communities are or could be, under extraordinary rainfall years, in a condition conducive to large-scale wildland fire, and such a wildfire could threaten human life and properties (see Photo.1.1).

Photo 1.1. 2011 Horseshoe 2 Wildfire in Cochise County (courtesy of CNF)

General elements used in creating the WUI for Cochise County at-risk communities include the following:

- Fuel hazards, local topography, vegetative fuels, and natural fuelbreaks
- Historical fire occurrence
- Community development characteristics
- Firefighting preparedness and response capabilities
- Infrastructure
- Recreational values
- Economic impacts on local economies from unwanted wildland fire

C. Desired Future Condition and Wildfire Mitigation in the WUI

The desired future condition of Cochise County CWPP lands includes more natural conditions, which are more resilient to wildfire, in order to protect community values. Most plant communities in Cochise County historically burned fairly frequently. Frequent fire reduced fuel loads and selected for plant species that are adapted to fire. Maintaining or returning to more natural conditions and using fire as a tool would make plant communities more resilient and reduce fire severity. The historical potential plant community is composed of desert shrub-scrub; shrublands (mesquite uplands); deciduous southwest riparian corridors; grasslands; and woodlands, including chaparral, oak woodland, pinyon-juniper, and mixed conifer woodlands. All of these plant communities have an associated understory of grasses and shrubs, and some are also composed of invasive grasses and woody species (NatureServe 2004; Gori and Enquist 2003). In lower-elevation desert scrub-shrubland associations, wildland fire has played a very limited role in the development and maintenance of these vegetative communities. In these habitats wildfire has a long return interval, and fires could have negative effects on the ecosystem unless some form of mitigation is instituted. In these vegetative associations, mitigation practices could include biological (grazing), chemical, or mechanical means to manage invasive vegetation species and to reduce vegetative fuel loads in order to meet land management resource objectives and to minimize adverse effects of fire, protecting firefighter and public safety.

The Cochise County CWPP is composed of the Madrean Archipelago Sky Islands landscape, which is a complex of forested mountain ranges in southeastern Arizona dominated by woodland vegetation associations of both tropical and temperate origins that typically support a high level of biodiversity (Governor's Forest Health Councils 2007). The Core Team intends the Cochise County CWPP to complement BLM, CNF, and NPS objectives; the *Statewide Strategy for Restoring Arizona's Forests* (Governor's Forest Health Councils 2007); the *Approved Arizona Statewide Land Use Plan Amendment for Fire, Fuels, and Air Quality Management and Decision Record* (BLM 2004a); the *Arizona BLM Gila District Fire Management Plan* (BLM 2013); the *Coronado National Forest Land and Resource Management Plan* (USFS 1988, as amended); the *Chiricahua National Monument Fire Management Plan* (NPS 2005a); the *Fort Bowie National Historic Site Fire Management Plan* (NPS 2005b); and the

Coronado National Memorial Fire Management Plan (NPS 2005c). Federal wildfire reduction policy on public lands is planned and administered primarily by BLM, CNF, the US Fish and Wildlife Service, and NPS, which are the federal governing agencies for the public lands in Cochise County. BLM and CNF manage wildland fire to help reduce unnaturally high wildland fuel loads that contribute to catastrophic wildland fire and also to help encourage the return of fire to a more natural role in fire-adapted ecosystems, to achieve ecosystem benefits, to reduce economic impacts from wildland fire, and to enhance public and firefighter safety. The NPS manages wildland fire for the safety of visitors, neighbors, employees, and firefighters and for the protection of facilities and cultural and natural resources. The goal is to use safe, aggressive suppression response with minimum damages to resources (NPS 2005a, 2005b, 2005c).

The desired future condition of federal lands includes improving public and firefighter safety from wildland fire, using wildland fire as a management tool to achieve resource objectives, managing hazardous wildland fuels within and adjacent to the WUI, providing adaptive wildland fire response and suppression, and returning public lands to fire-resilient ecosystems through reintroducing fire into fire-adapted ecosystems where practicable. Once this condition is achieved, natural processes such as fire can be incorporated into long-term management practices to sustain habitat health. Current federal fire guidelines state that “initial action on human-caused wildfire will be to suppress the fire at the lowest costs with the fewest negative consequences with respect to firefighter and public safety” (USDA and USDI 2009:07). However, “a wildland fire may be concurrently managed for one or more objectives and objectives can change as the fire spreads across the landscape. Objectives are affected by changes in fuels, weather, topography, varying social understanding and tolerance; and involvement of other government jurisdictions having different missions and objectives” (USDA and USDI 2009:07). The BLM, CNF, and NPS adhere to federal policy when managing all unplanned wildfire ignitions on public lands within the WUI. Federal policy for reducing wildfires on public lands (that is, BLM and USFS lands) is planned and administered locally through the BLM’s field offices and the CNF’s Sierra Vista and Douglas Ranger Districts.

The desired future condition of private lands in the WUI is for landowners either to comply with the National Firewise Communities program (http://www.firewise.org/), meet home-ignition-zone landscaping or fire-safe landscaping recommended by the Cochise County CWPP fire departments and districts in compliance with local ordinances or follow the Malpai Borderlands Group Fire Management Plan if within the borderlands region of the WUI. Firewise is a national program that helps communities reduce wildfire risks and provides them with information about protecting themselves against catastrophic wildfires and mitigating losses from such fires. Within Arizona, the State Forester administers the Firewise certification program. Fire departments and districts and local governments in Cochise County would like to make this information available to their citizens and to encourage its application. Residential and other structures that comply with Firewise standards significantly reduce fire-ignition risks in a community, as well as the potential for fires to spread to surrounding habitats. Additionally, structures that comply with Firewise recommendations are more likely to survive wildland fires that do spread into a community (Cohen 2008). The goal of the Malpai Borderlands Group Fire

Management Plan (2012) is to restore and maintain the natural processes that create and protect a healthy, unfragmented landscape in order to support a diverse, flourishing community of human, plant, and animal life in the borderlands region.

The Core Team is aware that wildland fuel accumulations primarily associated with the invasion of woody species, native and nonnative grasses, and decades of fire suppression, together with community growth in the WUI, have produced areas at high risk from catastrophic wildfire. The Core Team aspires to achieve restored, self-sustaining, biologically diverse habitats of mixed open space and developed areas that contribute to a quality of life demanded by Cochise County citizens. The Core Team recognizes that protection from catastrophic wildland fire requires collaboration and implementation through all levels of government and through an informed and motivated public. The Core Team considered ecosystem restoration or maintenance of fire-resilient ecosystems through reintroducing fire into fire-adapted ecosystems, community protection, and public and firefighter safety while developing this CWPP (see Photo 1.1).

Financial commitments required to reduce the risk of catastrophic wildfire can be extensive for municipal, county, state, and federal governments; for fire districts; and for the small rural communities surrounded by public lands (Ingalsbee 2010). CNF, NPS, and BLM have implemented wildland fuel mitigation projects within or near the Cochise County CWPP WUI. Fire departments and districts have improved wildland fire suppression response and continue public education and outreach programs concerning wildland fire threat and home-ignition-zone recommendations. Cochise County fire departments and districts have standing mutual-aid agreements to enhance initial and sustained wildland response**.** Additionally, the fire departments and districts have taken proactive measures to encourage willing property owners to reduce fire risk on private property (HFRA, Sec. 103.d.2.B). The Core Team, BLM, NPS, and CNF collaborators are proposing additional wildland fuel treatments and wildland fire suppression enhancements and have been proactive in pursuing funding for wildland fire public outreach programs and fire-suppression training and equipment.

D. Goals for the Cochise County CWPP

To reduce the risks to life and property from catastrophic wildland fire, the Core Team agreed on the following primary goals of the Cochise County CWPP:

- Improve fire prevention and suppression, emphasizing firefighter and public safety
- Reduce hazardous fuels, emphasizing public and private property protection
- Restore forest, rangeland, and riparian health
- Promote community involvement and provide for community protection
- Recommend measures to reduce structural ignitability in the WUI
- Encourage economic development in the communities from vegetative treatments
- Use the CWPP in conjunction with surrounding community and agency fire management plans

- Encourage high-risk communities to become safe Fire Adapted Communities
- Reduce potential economic loss to communities from unwanted wildland fire

Action recommendations for at-risk areas within the Cochise County CWPP WUI boundaries have been developed as part of this planning process. Treatments for wildland vegetative fuels and additional wildland fire mitigation measures are recommended to be implemented in specific time frames and with associated monitoring to determine and document measurable outcomes. Successful implementation of the Cochise County CWPP will require collaboration between fire departments and districts, governments, resource-management agencies, and private landowners. The cooperating agencies must develop processes and systems that ensure recommended actions of the Cochise County CWPP comply with applicable local, state, and federal environmental regulations. The Core Team and collaborators encourage all agencies, groups, and individuals involved to develop any additional formal agreements necessary to ensure the Cochise County CWPP's timely implementation, monitoring, and reporting. The Core Team was formed not only to meet collaborative requirements of HFRA but also to represent all Cochise County communities and their interests, with all parties being involved and being committed to the development and implementation of the Cochise County CWPP.

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II. COCHISE COUNTY CWPP COMMUNITY ASSESSMENT AND ANALYSIS

The community risk assessment is an analysis of the potential for catastrophic wildland fire to Cochise County communities and lands within the WUI identified by the Core Team. This risk analysis incorporates the current fire regime condition class, wildfire fuel hazards, risk of ignition, local preparedness and protection capabilities, and at-risk community values. The Core Team has reviewed the Arizona State Forester's *Identifying Arizona's Wildland/Urban Interface Communities at Risk: A Guide for State and Federal Land Managers* (ASFD 2007) to ensure that the Cochise County CWPP is compatible with and complementary to statewide CWPP planning efforts. The Core Team has included all risk factors required by the Arizona State Forester in the analysis of this CWPP. The areas of concern for wildland fuel hazards, risk of ignition and wildfire occurrence, local preparedness and protection capabilities, and loss of community values are evaluated to determine areas of highest wildland fire risk.

The Cochise County CWPP analysis area includes all of Cochise County, which is almost 4 million acres, or over 6,100 square miles (Figure 2.1). In this community wildland fire assessment the Cochise County Core Team has identified 700,900 acres of land considered by the Core Team to be at risk of wildland fire and to be included in a community WUI (Table 2.1; Figure 2.1).

Table 2.1. Land Management within Community WUIs

Ownership Type	Total Acres	% of Total*
Private	481,977	69
CNF	110,716	16
State Trust	77,543	11
BLM	22,347	3
NPS	6,143	1
Arizona Game and Fish	1,003	<1
Arizona State Parks	727	<1
DOD	534	<1
Total	700,900	100

Note: BLM = Bureau of Land Management; CNF = Coronado National Forest; DOD = Department of Defense; NPS = National Park Service.

*Actual total may not add to 100% because of rounding.

Primary landownership in the Cochise County CWPP planning area is a mosaic of privately owned lands and federal lands administered by BLM, CNF, NPS, and the Arizona State Land Department (ASLD) (Table 2.1). Of the federal lands within the WUI, CNF manages the most land—110,716 acres, or 16.0 percent— within the WUI.

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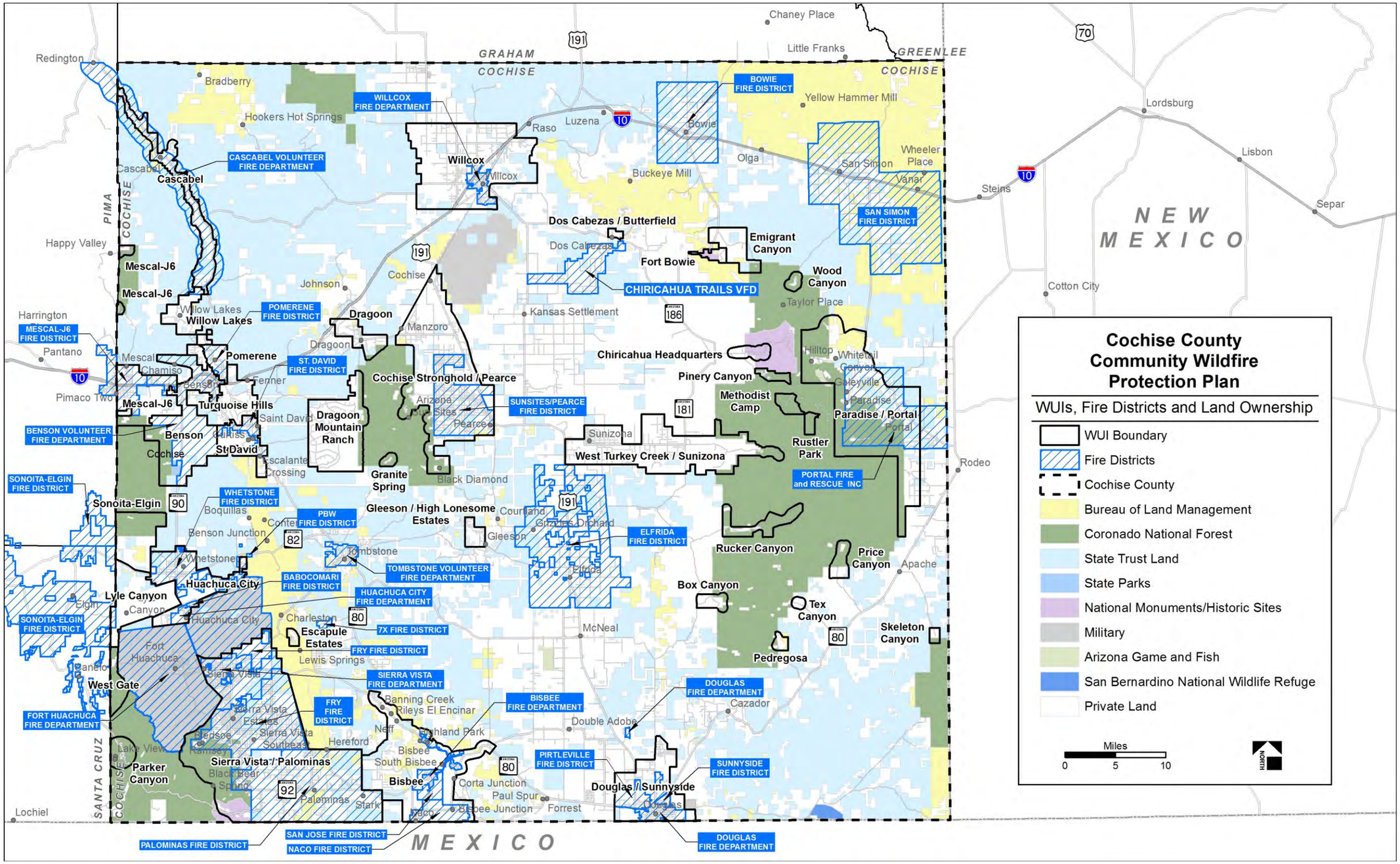
Cochise County
Community Wildfire
Protection Plan
WUIs, Fire Districts and Land Ownership
WUI Boundary
Fire Districts
Cochise County
Bureau of Land Management
Coronado National Forest
State Trust Land
State Parks
National Monuments/Historic Sites
Military
Arizona Game and Fish
San Bernardino National Wildlife Refuge
Private Land
Miles
0
5
10
NORTH
GRAHAM
COCHISE
GREENLEE
COCHISE
PIMA
COCHISE
SANTA CRUZ
COCHISE
NEW MEXICO
MEXICO
WILLCOX FIRE DEPARTMENT
BOWIE FIRE DISTRICT
CASCABEL VOLUNTEER FIRE DEPARTMENT
SAN SIMON FIRE DISTRICT
CHIRICAHUA TRAILS VFD
MESCAL-J6 FIRE DISTRICT
POMERENE FIRE DISTRICT
ST. DAVID FIRE DISTRICT
SUNSITES/PEARCE FIRE DISTRICT
BENSON VOLUNTEER FIRE DEPARTMENT
PORTAL FIRE and RESCUE INC
SONOITA-ELGIN FIRE DISTRICT
WHETSTONE FIRE DISTRICT
PBW FIRE DISTRICT
ELFRIDA FIRE DISTRICT
TOMBSTONE VOLUNTEER FIRE DEPARTMENT
BABOCOMARI FIRE DISTRICT
HUACHUCA CITY FIRE DEPARTMENT
7X FIRE DISTRICT
FRY FIRE DISTRICT
SIERRA VISTA FIRE DEPARTMENT
FRY FIRE DISTRICT
BISBEE FIRE DEPARTMENT
DOUGLAS FIRE DEPARTMENT
FORT HUACHUCA FIRE DEPARTMENT
PIRTLEVILLE FIRE DISTRICT
SUNNYSIDE FIRE DISTRICT
PALOMINAS FIRE DISTRICT
SAN JOSE FIRE DISTRICT
NACO FIRE DISTRICT
DOUGLAS FIRE DEPARTMENT
Redington
Bradberry
Hookers Hot Springs
Cascabel
Happy Valley
Mescal-J6
Willow Lakes
Harrington
Pantano
Pimaco Two
Pomerene
Turquoise Hills
Benson
St David
Dragoon
Dragoon Mountain Ranch
Cochise Stronghold / Pearce
Granite Spring
Sonoita-Elgin
Boquillas
Benson Junction
Whetstone
Huachuca City
Lyle Canyon
Elgin
Fort Huachuca
West Gate
Sierra Vista / Palominas
Parker Canyon
Lochiel
Willcox
Raso
Luzena
Buckeye Mill
Olga
Chaney Place
Little Franks
Yellow Hammer Mill
Wheeler Place
Vanar
Steins
Lordsburg
Lisbon
Separ
Cotton City
Rodeo
Johnson
Cochise
Manzoro
Kansas Settlement
Dos Cabezas / Butterfield
Dos Cabezas
Fort Bowie
Emigrant Canyon
Wood Canyon
Taylor Place
Chiricahua Headquarters
Pinery Canyon
Methodist Camp
Hilltop
Whitetail Canyon
Gateyville
Paradise
Paradise / Portal
Portal
Rustler Park
Sunizona
West Turkey Creek / Sunizona
Black Diamond
Gleeson / High Lonesome Estates
Gleeson
Courtland
Grizzlies Orchard
Elfrida
Tombstone
Rucker Canyon
Price Canyon
Apache
Box Canyon
Tex Canyon
Skeleton Canyon
Pedregosa
McNeal
Charleston
Escapule Estates
Lewis Springs
Banning Creek
Rileys El Encinar
Neff
Highland Park
Hereford
Bisbee
South Bisbee
Double Adobe
Cazador
Corta Junction
Paul Spur
Bisbee Junction
Forrest
Douglas / Sunnyside
Douglas
Stark
Palominas
Sierra Vista Estates
Sierra Vista Southeast
Lake View
Black Bear Spring
Hereford
Tenner
Saint David
Curtiss
Escalante Crossing
Contention
Pearce
Arizona Sites
Sunizona
Raso
Willcox
Mescal
Chamiso
Benson
Cochise
Elfrida
Apache
Paradise
Portal
Douglas
Bisbee
Paloma
Stark
Neco
Bisbee Junction
Forrest
Cochise
Dragoon
Manzoro
Kansas Settlement
Taylor Place
Chiricahua Headquarters
Pinery Canyon
Methodist Camp
Rustler Park
West Turkey Creek / Sunizona
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Rucker Canyon
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Box Canyon
Tex Canyon
Skeleton Canyon
Pedregosa
McNeal
Dos Cabezas / Butterfield
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Tex Canyon
Skeleton Canyon
Pedregosa
McNeal
Dragoon
Cochise Stronghold / Pearce
Granite Spring
Willcox
Sierra Vista / Palominas
Parker Canyon
Bisbee
Douglas / Sunnyside
Huachuca City
Escapule Estates
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South Bisbee
Double Adobe
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Corta Junction
Paul Spur
Bisbee Junction
Forrest
Douglas
Stark
Palominas
Neco
Highland Park
Neff
Banning Creek
Rileys El Encinar
Lewis Springs
Charleston
Huachuca City
Fort Huachuca
Sierra Vista
Elgin
Canelo
Lyle Canyon
Canyon
Whetstone
Benson Junction
Boquillas
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Cochise
Johnson
Willow Lakes
Mescal
Chamiso
Benson
Curtiss
Saint David
Tenner
Escalante Crossing
Raso
Luzena
Buckeye Mill
Olga
Bowie
Yellow Hammer Mill
Wheeler Place
Vanar
San Simon
Steins
Little Franks
Chaney Place
Redington
Bradberry
Hookers Hot Springs
Cascabel
Happy Valley
Mescal-J6
Harrington
Pantano
Pimaco Two
Mescal-J6
Turquoise Hills
Benson
Cochise
St David
Sonoita-Elgin
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Willcox
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Luzena
Buckeye Mill
Olga
Bowie
Yellow Hammer Mill
Wheeler Place
Vanar
San Simon

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Private land within the WUI composes 481,892 acres, or roughly 69 percent, of the WUI. Private lands are mostly clustered near communities, with some scattered private inholdings located throughout the WUI. The municipalities/unincorporated communities of Benson, Bisbee, Cascabel, Douglas, Dos Cabezas, Dragoon, Dragoon Mountain Ranch, Escapule Estates, Gleeson, Hereford, High Lonesome Estates, Huachuca City, Lyle Canyon, Mescal, Naco, Palominas, Paradise, Pearce, Pirtleville, Pomerene, Portal, St. David, Sierra Vista, Sonoita-Elgin, Sunnyside, Sunizona, Sunsites, West Turkey Creek, Whetstone, Willcox, Willow Lakes, and Turquoise Hills contain the majority of private land acreage within the WUI. Commercial structures are clustered along state and federal highways in community centers, and they are assumed to remain as the principal commercial corridors within the Cochise County at-risk communities.

Much of the land within the Cochise County is rural with minimal development, with the exception of urban development in proximity to the Benson, Sierra Vista, Fort Huachuca community complex and the cities of Douglas and Willcox.

State Trust lands were established in 1912 under the terms of the Arizona Enabling Act. With statehood, Arizona was granted ownership of four sections per township. ASLD manages State Trust lands to produce revenue for the Arizona State Trust beneficiaries, including the state's school system. Within the Cochise County CWPP WUI, 77,543 acres (11 percent) of State Trust lands are managed primarily for recreation, natural resource protection, and livestock grazing. Additional state-managed lands within the WUI are managed by the Arizona Game and Fish Department, 1,003 acres (<1 percent), and by Arizona State Parks, 727 acres (<1 percent).

The Department of Defense owns and manages approximately 534 acres (<1 percent) within the WUI consisting of Fort Huachuca and lands east of Douglas. Of the remaining federal lands within the WUI, BLM manages approximately 22,347 acres (3 percent) and NPS manages approximately 6,143 acres (1 percent). These federal lands provide extensive and popular hiking, hunting, and recreational areas within or adjacent to the WUI. The potential for escaped campfires or the need to evacuate camping areas during a wildfire warrants including these lands in the Cochise County CWPP. These lands also contain residences for government employees and volunteers, as well as visitor centers, maintenance facilities, and other structures.

The diverse climate of Cochise County produces a varied landscape—from semiarid desert shrub-scrub to riparian corridors, and grasslands to oak and pinyon-juniper and mixed conifer woodlands (NRCS 2011). Most of Cochise County is in the Mexican Highland Section of the Basin and Range province of the Intermontane Plateaus of the Southeastern Arizona Basin and Range Major Land Resource Area (MLRA) 41 (NRCS 2011). Elevation ranges from 2,620 to 4,590 feet in most areas of the WUI. The average annual precipitation is 9 to 20 inches in most of this area. Generally, more than half of the precipitation occurs as high-intensity, convective thunderstorms during July, August, and September. Because of Pacific frontal storms, a second rainy season occurs from December to March. Snow falls occasionally in winter. The average annual air temperature is 47 to 68 degrees Fahrenheit; however, during May and June, temperatures can exceed 100 degrees Fahrenheit. The dominant soil

orders in MLRA 41 are Aridisols, Entisols, Alfisols, and Mollisols; these soil orders can be very shallow to very deep and are well drained (Hendricks 1985).

Cool-season vegetation growth normally begins in late winter and early spring and matures in early summer. Warm-season vegetation growth occurs after the summer rains and may remain green throughout the year in lower elevations (NRCS 2011). The potential plant community on lower elevations and gentler slopes is dominated by warm-season perennial grasses with a fair component of cool-season perennial grasses and small shrubs. Cool-season grasses tend to be clumped and not evenly dispersed. Several species of shrubs, cacti and other succulents, and forbs are represented in the plant communities. Higher-elevation plant communities include Madrean Pine-Oak Forest and Woodland, with Madrean Upper Montane Conifer-Oak Forest and Woodland at highest elevations. Vegetative production is over 2,500 pounds per acre in higher-elevation rangeland sites that are in the 12- to 16-inch precipitation zone during normal precipitation years.

The major riparian corridor in the analysis area includes the San Pedro River, a direct tributary of the Gila River. The San Pedro River flows south to north through the western half of Cochise County. It begins near Cananea, Sonora, Mexico, and joins the Gila River in Pinal County near Winkelman. The San Pedro River flows across the US-Mexico border and Cochise county line and passes through the Sierra Vista/Palominas WUI for about 8 miles; 6 of those 8 total miles are administered by BLM as the San Pedro Riparian National Conservation Area (SPRNCA). SPRNCA protects the corridor northward to the St. David Cienega. The Fremont cottonwood–Goodding willow riparian vegetation provides habitat for abundant wildlife, most prominently for migratory and resident birds and recently introduced beavers. The continuous riparian forest is thought to be a change from a historical condition that was more cienega-like along much of the river. Heavy upland use by livestock and drought in the late 1880s (and later) contributed to erosion, scouring, and downcutting of the channel.

The sacaton uplands that once covered much of the bottom adjacent to the river have been reduced to fragments, with nonnative Lehmann lovegrass replacing it in some areas. Encroachment by woody species, particularly mesquite, has changed the character of the San Pedro bottomlands. Fire management goals for BLM include protecting the cottonwood-willow riparian forest and maintaining grassy uplands. Funds for proactive management have been scarce. From the border to Pomerene, fire protection is continuous and is provided by BLM and local fire districts. North of Pomerene to the Pima and Graham County lines, only the modestly staffed and equipped Cascabel Volunteer Fire Department is close by, though ASFD and BLM respond as quickly as they can. This stretch of river is characterized by private farming and ranching ownership, as well as conservation overlays. A number of properties are managed by The Nature Conservancy to protect riparian corridor values. Some properties serve as formal mitigation for degraded stream systems elsewhere, and fire management that maintains those values is important. The San Pedro River provides plenty of fire management challenges. On the lower half of the river in Cochise County, drier salt cedar–dominated stretches are fire prone. Adjacent Chihuahuan Desert uplands are not fire adapted. There are scattered homes, ranch infrastructure, and

small developments along the entire San Pedro River. In recent decades, fires attributed to undocumented border crossers have occurred along the river.

In 2008 the *Upper San Pedro Community Wildfire Protection Plan* was created, which combined seven Wildfire Hazard Assessment and Mitigation Plans that were originally created in 2003. It provided a comprehensive analysis of wildfire-related hazards and risks in the WUI in areas of the Upper San Pedro Watershed—specifically within seven areas adjacent to the SPRNCA that included Tombstone, St. David, Babocomari, Lewis Springs, Palominas, Hereford, and associated rural areas.

A large portion of southeast Cochise County along the New Mexico border is managed by the Malpai Borderlands Group (MBG) in conjunction with Federal and State agencies. The MBG was established in 1993 with the goal of restoring and maintaining the natural processes that create and protect healthy landscapes that contribute to plant and animal life in the region. In 2012 the Malpai Borderlands Group Fire Management Plan was developed to expand upon the original 1997 Bootheel Fire Management Plan. The 2012 plan combines the New Mexico and Arizona MPG areas as well as combining relevant Federal and State fire management plans and other pertinent documents. There are three general fire management actions that will be implemented within the Malpai Borderlands region which include using lightning-caused fires to achieve resource benefit, wildfire suppression, and prescribed fire.

A. Fire Regime and Condition Class

Before European settlement of North America, fire played a natural (historical) role in many of the Cochise County vegetated landscapes. Five historical fire regimes have been identified; these regimes are based on the average number of years between fires (fire frequency) combined with the severity (amount of overstory replacement) of fire on the dominant overstory vegetation (Interagency Fire Regime Condition Class [FRCC] Guidebook Version 3.0, 2010) (Table 2.2).

Table 2.2. Fire Regime Information

Group	Frequency	Severity[a]	Severity Description
I	0–35 years	Low / mixed	Generally low-severity fires replacing less than 25% of the dominant overstory vegetation; can include mixed-severity fires that replace up to 75% of the overstory
II	0–35 years	Replacement	High-severity fires replacing greater than 75% of the dominant overstory vegetation
III	35–100 years	Mixed / low	Generally mixed-severity; can also include low severity fires
IV	35–100 years	Replacement	High-severity fires
V	200+ years	Replacement / any severity	Generally replacement severity; can include any severity type in this frequency range

Source: FRCC Guidebook version 3.0, September 2010.

[a]Low = less than 75% of the dominant overstory vegetation replaced. High = greater than 75% of the dominant overstory vegetation replaced (stand replacement).

The vegetation condition class (VCC) of wildland habitats quantifies the amount that current vegetation has departed from the simulated historical vegetation reference conditions. Three condition classes describe low departure (VCC 1), moderate departure (VCC 2), and high departure (VCC 3). VCC is calculated based on changes to vegetation composition, structural stage, and canopy closure using methods described in the Interagency Fire Regime Condition Class Guidebook (FRCC Interagency Working Group 2005b). LANDFIRE VCC is based on departure of current vegetation conditions from reference vegetation conditions only, whereas the Interagency Fire Regime Condition Class Guidebook approach includes departure of current fire regimes from those of the reference period. Data obtained from LANDFIRE.gov (http://www.landfire.gov/NationalProductDescriptions10.php, accessed December 2013) simulates historical vegetation reference conditions using the Vegetation Dynamics Development Tool, which is a vegetation and disturbance dynamics model. Current vegetation conditions are then derived from a classification of existing vegetation type, cover, and height.

The following descriptions of vegetation condition classes are provided by LANDFIRE.

> Condition Class 1:
>
> Vegetation attributes (species composition and structure) are intact and functioning within the historical range.
>
> Condition Class 2:
>
> Vegetation attributes have been moderately altered from their historical range.
>
> Condition Class 3:
>
> Vegetation attributes have been significantly altered from their historical range.

The Cochise County WUI includes 25,520 acres of land classified as urban, water, and sparsely vegetated and barren landscapes (3.6 percent of WUI acres) and 21,620 acres of agricultural land (3.1 percent of WUI acres). The WUI also includes 19,610 acres (2.8 percent of WUI acres) of VCC 1 lands; 390,630 acres (55.8 percent of WUI acres) of VCC 2 lands; and 243,440 acres (34.7 percent of WUI acres) of VCC 3 lands (http://www.landfire.gov/NationalProductDescriptions10.php, accessed December 2013). Therefore, over 90 percent of WUI acres are not considered to be within the natural range of variation of reference vegetation conditions.

B. Fuel Hazards

The existing arrangement and flammability of vegetation associations largely determine wildland fire behavior. The Core Team and collaborators identified areas at risk from wildland fire by evaluating fire behavior models based on vegetative fuels and the arrangement of those fuels by slope and aspect as they occur on federal and nonfederal land in the WUI. The wildland fire risk assessment was conducted through spatial analysis using geographic information system (GIS) technology in a series of overlays.

For each community WUI, the vegetation type, density, and distribution were analyzed to help categorize areas at highest risk for fire intensity and spread from wildland fuels.

The arrangement of vegetative fuel, relative flammability, and potential of vegetation to support wildland fire varies throughout the WUI. Wildland fuel hazards depend on a specific composition, type, arrangement, or condition of vegetation such that if the fuel were ignited, an at-risk community or its infrastructure would be threatened. Historically, fire played an important role in keeping woody species in check and light ground fuels low (BLM 2004b:3–8; Gori and Enquist 2003) in fire-adapted vegetative communities. However, with the suppression of natural wildfires within the last century, fire return intervals have increased, and invasions of semidesert grasslands by woody shrubs (such as mesquite and juniper species) and nonnative perennial grass invasions of shrubland associations (such as Lehmann's lovegrass, and Johnsongrass) have altered native vegetated landscapes. In addition to continuous drought, severe freezes (especially in 2011) have killed or top-killed oaks in some areas, making them much more flammable. Freeze damage and damage and stress from drought have contributed to extreme fire behavior, which was observed during the 2011 Monument Fire. The Core Team reviewed vegetation associations within the WUI that were identified and mapped using Southwest Regional Gap Analysis Project (SWReGAP) data and FireScape Vegetation overlay for Chiricahua-Dragoon and Huachuca-Whetstone Mountains (USGS 2005; NatureServe 2004, http://www.azfirescape.org/huachuca, accessed October 2013). Vegetation overlay descriptions from these sources were normalized to produce a consistent landcover depiction of Cochise County (Figure 2.2). These datasets provide the level of landscape description and vegetative landcover detail necessary for aligning wildland fuel flammability with existing vegetation. Each vegetation association consists of various fuel properties that produce differing wildfire behavior which is assigned to distinguishable fuel models.

A locally calibrated LANDFIRE Fuel Model layer was utilized to assign fuel models, as a prediction of fire danger, to the vegetative associations of all vegetative overlays in Cochise County. The normalized vegetative data and associated range of assigned fuel models for predicting wildfire behavior for each vegetation association is shown in Table 2.3. For each vegetation association, the Core Team determined the representative vegetative fuel model. The predicted flame length from the representative fuel model was utilized to determine the high, moderate, or low wildland fire risk to communities from the existing vegetative landcover. The relationship of surface-fire flame length to suppression actions is the basis for assigning wildland fire risk. Wildland fire with flame lengths under 4 feet can generally be attacked at the head of the fire using hand tools. Fuel models with a predicted flame length of under 4 feet is assigned low risk. Flame lengths from 4 to 8 feet are too intense for direct attack and equipment such as fire trucks; therefore, aircrafts may be needed. Fuel models with a predicted flame length of 4 to 8 feet are assigned moderate risk. Flame lengths over 8 feet present serious control problems, including crown fires with fire spotting from fire brands, and major fire runs are possible. Fuel models with a predicted flame length of over 8 feet are assigned high risk (Heinsch and Andrews 2010).

The Arizona State Forester has established the following guidelines for evaluating risk (ASFD 2007:1):

> **Evaluate Risk to Communities:** Not all structures and/or communities that reside in an "interface" area are at significant risk from wildland fire. It is a combination of factors, including the composition and density of vegetative fuels, extreme weather conditions, topography, density of structures, and response capability that determines the relative risk to an interface community. The criteria listed below are intended to assist interagency teams at the state level in identifying the communities within their jurisdiction that are at significant risk from wildland fire. The application of these risk factors should allow for greater nationwide consistency in determining the need and priorities for Federal projects and funding.

The Core Team reviewed the fire behavior potential in the WUI and determined that the risk classification is consistent with Situations 1, 2, and 3 as described by the Arizona State Forester (ASFD 2007:1–2):

> Risk Factor 1: Fire Behavior Potential
>
> Situation 1: In these communities, continuous fuels are in close proximity to structures. The composition of surrounding fuels is conducive to crown fires or high intensity surface fires. Likely conditions include steep slopes, predominantly south aspects, dense fuels, heavy duff, prevailing wind exposure and/or ladder fuels that reduce fire fighting effectiveness. There is a history of large fire and/or high fire occurrence.
>
> Situation 2: In these communities, intermittent fuels are in proximity to structures. Likely conditions include moderate slopes and/or rolling terrain, broken moderate fuels, and some ladder fuels. The composition of surrounding fuels is conducive to torching, spotting, and/or moderate intensity surface fires. These conditions may lead to moderate fire fighting effectiveness. There is a history of some large fires and/or moderate fire occurrence.
>
> Situation 3: In these communities, fine and/or sparse fuels surround structures. There is infrequent wind exposure and flat terrain to gently rolling terrain. The composition of surrounding fuels is conducive to low intensity surface fires. Fire fighting generally is highly effective. There is no large fire history and/or low fire occurrence.

The Cochise County community WUIs includes six major vegetative fuel types composed of 23 vegetation communities (not including agricultural lands), 3 mostly nonvegetation associations, and 2 open-space residential developed land covers (USGS 2005; NatureServe 2004; http://www.azfirescape.org/huachuca, accessed October 2013). Each vegetative community is assigned to specific fuel models that predict the rate of spread, flame length, and fire intensity levels possible for each vegetation association during an average fire season under average weather conditions (Table 2.3). Assigning a fuel model to each vegetation association within each community

WUI will help predict wildfire behavior and thus proper suppression response (for detailed fuel model descriptions, see Anderson 1982; Scott and Burgan 2005).

The average historical fire return interval is highly variable among vegetation associations across the WUI. Habitat-replacement wildfires or wildfires resulting in a major loss of habitat components, in conjunction with drought, will be reduced in frequency and intensity in lower desert habitats. However, moist periods may increase fire frequency and intensity in desert and grassland habitats because of increased production of annual grasses and forbs and increased annual growth of perennial grasses and shrubs (FRCC Interagency Working Group 2005a) in synergy with increased production of native grasses and forbs (Arizona Wildlands Invasive Plant Working Group 2005). Wet years that create abundant fine fuels such as grass and brush followed by drought years have in the past led to years with many large fires over fairly wide areas (Swetnam and Baisan 1996). Climate change may compound this and make fire behavior more intense and fire seasons longer (Stephens et al. 2013; Karl et al 2009; McDonald 2009).

Wildfire behavior as predicted by fuel models are influenced by topographic features such as slope and aspect. Slope affects both the rate of spread and flame length, becoming greater as slope increases because the flame is tilted over the unburned fuel allowing it to ignite more quickly (Rothermel 1983). Aspect effects fire behavior by the amount of solar radiation, creating the driest fuel moistures on slopes that face the afternoon sun, which would be the south and southwest aspects in the northern hemisphere. Additionally, during the summer months wind direction is primarily from the south-southeast during pre-monsoonal months. A southerly aspect will increase fire behavior by producing a greater effective wind speed if it is blowing up a slope rather than down it because the wind and slope are in alignment (Scott 2012). The Core Team recognizes the influencing factor of slope and aspect on wildfire behavior and have included these influencing factors in determining wildfire risk.

During a normal fire season, low-risk vegetation associations would be elevated to a moderate risk level by the influencing effects of slope and aspect. In a similar manner, moderate-risk vegetation associations would be elevated to high risk from these same influencing factors. Other untreated or unburned areas that fall under the category of moderate ground fuels and that do not overlap areas with steep slopes or with south, southwest, or west aspects are considered a moderate risk from fuel hazards. The wildland fuel hazard components influence was compiled to depict areas of high, moderate, and low wildland fire potential based on vegetation type, density, and arrangement on the landscape. This analysis depicts areas with higher wildfire risk, which are of greater concern to the Core Team during years of extraordinary rainfall because of the abundance of winter annuals and perennial invasive and native vegetation that can, when cured, enhance fire conditions and thus create extreme fire behavior, particularly in lower-elevation vegetation associations. Table 2.3 identifies these various fuel hazard components and their assigned influencing values on the fuel hazards assessment. Figure 2.3 visually depicts these fuel hazard components during extreme fire seasons. Table 2.4 identifies the influencing factor of the fuel hazard components.

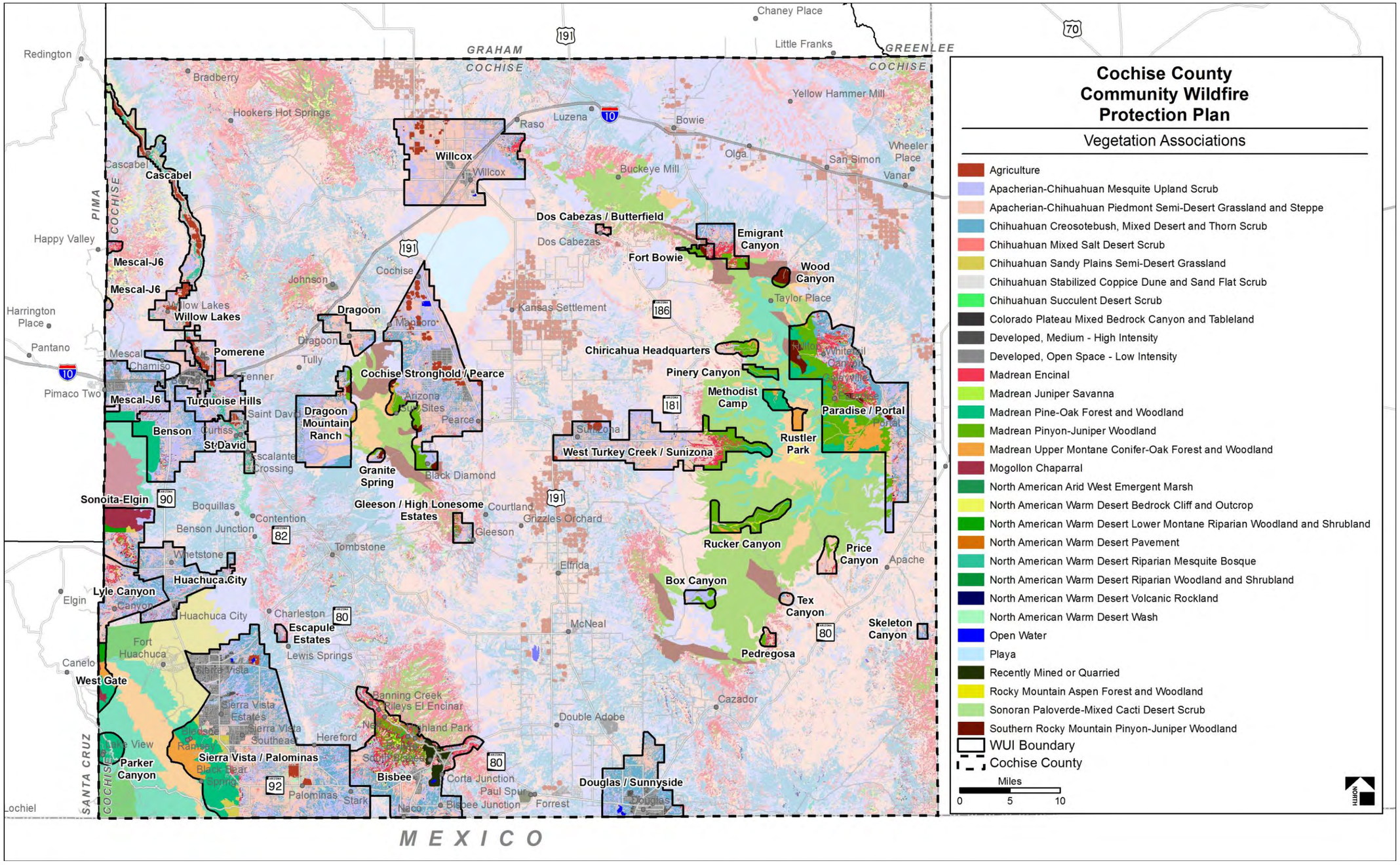

Figure 2.2. Cochise County CWPP Vegetation Associations

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Table 2.3. Fuel Model, Fire-Danger Ratings, and Intensity Levels on Vegetative Associations in the WUI

Fuel Type	Vegetation Association	Wildfire Risk Rating[a]	Anderson Fuel Model	Fire-Danger Rating Model[b]	Flame Length (ft)	Fire Intensity Level from Fire-Danger Rating Model[c]	Rate Of Spread ft/hr (ch/hr)	Typical Fuel Model	Fire Behavior Fuel Model[d]	Flame Length (ft) Low Dead Fuel Moisture	Fire Intensity Level from Fire Behavior Fuel Model[e]	Rate of Spread ft/hr (ch/hr)—Low Dead Fuel Moisture	Acre (%)
Desert Shrub-Scrub	Chihuahuan Creosotebush Mixed Desert, and Thorn Scrub	L	5-6	L and T	1–5	1-3	0–1188	SH2	GR1	0.5–1.7	GR1, 1	GR1, 0–990 (0–15)	99,869
							(0–18)		GR2	1.0–8.0	GR2, 1–4	GR2, 0–7920 (0–15)	(14%)
									SH1	0.2–0.7	SH1,1	SH1, 7–132 (0– 2)	
									GR4	1.0–22	GR4, 1–4	GR4, 0–33,000 (0–500)	
									GS1	1.0–6.0	GS1, 1–3	GS1, 0–3960 (0–60)	
									GS2	1.5–>10.0	GS2, 1–5	GS2, 0–>6600 (0–100)	
									SH2	1.0–4.5	SH2, 1–3	SH2, 0-1188 (0–18)	
									SH5	4.0–>25.0	SH5, 2–6	SH5, 0–16500 (0–250)	
									SH7	4.0–>25.0	SH7, 2–6	SH 7, 0–11889 (0–180)	
									TL1	0.0–0.5	TL1, 1	TL1, 0–66 (0–1)	
									TL2	0.3–1.0	TL2, 1	TL2, 0–132 (0–2)	
									TL3	0.4–1.3	TL3, 1	TL3, 0–198 (0–3)	
									TL6	1.0–7.0	TL6, 1-4	TL6, 2–1650 (2–25)	
									TL8	1.0–8.0	TL8, 1–5	TL8. 0–2640 (0–40)	
									TU1	1.0–4.0	TU1, 1–3	TU1, 0–990 (0–15)	
									TU2	1.0–8.0	TU2, 1–5	TU2, 0–5,280 (0–80)	
	Sonoran Paloverde-Mixed Cacti Desert Scrub	M	5	L and T	2-10	2-6	0–6600	GS2	GR1	0.5–1.7	GR1,1	GR1, 0–990 (0–15)	1,726
							(0–100)		GR2	1.0–8.0	GR2, 1–4	GR2, 0–7920 (0–120)	(0.25%)
									GR4	1.0–22	GR4, 1–4	GR4, 0–33,000 (0–500)	
									GS1	1.0–6.0	GS1, 1–3	GS1, 0–3960 (0–60)	
									GS2	1.5–>10.0	GS2, 1–5	GS2, 0–>6600 (0–100)	
									SH1	0.2–0.7	SH1, 1	SH1, 7–132 (0– 2)	
									SH4	1.0–16	SH4, 1–6	SH4, 0–11880 (0–180)	
									SH5	4.0–>25.0	SH5, 2–6	SH5, 0–16500 (0–250)	
									SH7	4.0–>25.0	SH7, 2–6	SH 7, 0–11889 (0–180)	
									TL2	4.0–>25.0	TL2, 2–6	TL2, 0–132 (0–2)	
									TL6	1.0–7.0	TL6, 1–4	TL6, 2–1650 (2–25)	
									TU2	1.0–8.0	TU2, 1–5	TU2, 0–5,280 (0–80)	

Table 2.3. Fuel Model, Fire-Danger Ratings, and Intensity Levels on Vegetative Associations in the WUI

Fuel Type	Vegetation Association	Wildfire Risk Rating[a]	Anderson Fuel Model	Fire-Danger Rating Model[b]	Flame Length (ft)	Fire Intensity Level from Fire-Danger Rating Model[c]	Rate Of Spread ft/hr (ch/hr)	Typical Fuel Model	Fire Behavior Fuel Model[d]	Flame Length (ft) Low Dead Fuel Moisture	Fire Intensity Level from Fire Behavior Fuel Model[e]	Rate of Spread ft/hr (ch/hr)— Low Dead Fuel Moisture	Acre (%)
	Chihuahuan Mixed-Desert Scrub	L	6-7	L and T	1–5	1-3	0–1188	SH2	GR1	0.5–1.7	GR1, 1	GR1, 0–990 (0–15)	18,601
	Chihuahuan Succulent Desert Scrub						(0–18)		GR2	1.0–8.0	GR2, 1–4	GR2, 0–7920 (0–120)	(2%)
									GR4	1.0–22	GR4, 1–4	GR4, 0–33,000 (0–500)	
									GS1	1.0–6.0	GS1, 1–3	GS1, 0–3960 (0–60)	
									GS2	1.5–>10.0	GS2, 2–5	GS2, 0–>6600 (0–100)	
									SH1	0.2–0.7	SH1, 1	SH1, 7–112 (0.1–1.7)	
									SH2	1.0–4.5	SH2, 1–3	SH2, 0–1188 (0–18)	
									SH4	1.0–16	SH4, 1–6	SH4, 0–11880 (0–180)	
									SH5	4.0–>25.0	SH5, 3–6	SH5, 0–16500 (0–250)	
									SH7	4.0–>25.0	SH7, 3–6	SH 7, 0–11889 (0–180)	
									TL1	0.0–0.5	TL1, 1	TL1, 0–66 (0–1)	
									TL2	0.3–1.0	TL2, 1	TL2, 0–132 (0–2)	
									TL3	0.4–1.3	TL3, 1	TL3, 0–198 (0–3)	
									TL4	1.5–2.0	TL4,1-3	TL4, 0–396 (0-6)	
									TL6	1.0–7.0	TL6, 1-4	TL6, 2–1650 (2–25)	
									TL8	1.0–8.0	TL8, 1–5	TL8. 0–2640 (0–40)	
									TU1	1.0–4.0	TU1, 1–3	TU1, 0–990 (0–15)	
									TU2	1.0–8.0	TU2, 1–5	TU2, 0–5,280 (0–80)	
Shrublands	Apacherian-Chihuahuan Mesquite Upland Scrub	M	1,2	A (B) and T	1–8	4-6	0–7920	GR2	GR1	0.5–1.7	GR1, 1	GR1, 0–990 (0–15)	156,418
	Apacherian-Chihuahuan Semi-Desert Grassland						(0–120)		GR2	1.0–8.0	GR2, 1–4	GR2, 0–7920 (0–120)	(22%)
	Chihuahuan Stabilized Coppice Dune and Sand Flat Scrub								GR4	1.0–22	GR4, 1–4	GR4, 0–33,000 (0–500)	
									GS1	1.0–6.0	GS1, 1–3	GS1, 0–3960 (0–60)	
									GS2	1.5–>10.0	GS2, 2–5	GS2, 0–>6600 (0–100)	
									SH1	0.2–0.7	SH1, 1	SH1, 7–112 (0.1–1.7)	
									SH2	1.0–4.5	SH2, 1–3	SH2, 0–1188 (0–18)	
									SH4	1.0–16	SH4, 1–6	SH4, 0–11880 (0–180)	
									SH5	4.0–>25.0	SH5, 3–6	SH5, 0–16500 (0–250)	
									SH7	4.0–>25.0	SH7, 3–6	SH 7, 0–11889 (0–180)	
									TL1	0.0–0.5	TL1, 1	TL1, 0–66 (0–1)	
									TL2	0.3–1.0	TL2, 1	TL2, 0–132 (0–2)	
									TL3	0.4–1.3	TL3, 1	TL3, 0–198 (0–3)	
									TL4	1.5–2.0	TL4,1-3	TL4, 0–396 (0-6)	
									TL6	1.0–7.0	TL6, 1-4	TL6, 2–1650 (2–25)	
									TL8	1.0–8.0	TL8, 1–5	TL8. 0–2640 (0–40)	
									TU1	1.0–4.0	TU1, 1–3	TU1, 0–990 (0–15)	
									TU2	1.0–8.0	TU2, 1–5	TU2, 0–5,280 (0–80)	

Table 2.3. Fuel Model, Fire-Danger Ratings, and Intensity Levels on Vegetative Associations in the WUI

Fuel Type	Vegetation Association	Wildfire Risk Rating[a]	Anderson Fuel Model	Fire-Danger Rating Model[b]	Flame Length (ft)	Fire Intensity Level from Fire-Danger Rating Model[c]	Rate Of Spread ft/hr (ch/hr)	Typical Fuel Model	Fire Behavior Fuel Model[d]	Flame Length (ft) Low Dead Fuel Moisture	Fire Intensity Level from Fire Behavior Fuel Model[e]	Rate of Spread ft/hr (ch/hr)— Low Dead Fuel Moisture	Acre (%)
Grasslands	Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe	M	1,2	F and T	1-8	4-6	0–7920	GR2	GS1	1.0–6.0	GS1, 1–3	GS1, 0–3960 (0–60)	
							(0–120)		GS2	1.0–.10.0	GS2, 1–5	GS2, 0–6600 (0–100)	211,026
	Chihuahuan Sandy Plains Semi-Desert Grassland								GR1	0.5–1.7	GR1, 1	GR1, 0–990 (0–15)	(30%)
									GR2	1.0–8.0	GR2, 4	GR2, 0–7920 (0–120)	
									GR4	1.0–22	GR4, 1–6	GR4, 0–33,000 (0–500)	
									SH1	0.2–0.7	SH1, 1	SH1, 7–112 (0– 2)	
									SH2	1.0–4.5	SH2, 1–3	SH2, 0–1188 (0–18)	
									SH4	1.0–16	SH4, 1–6	SH4, 0–11880 (0–180)	
									SH5	4.0–>25.0	SH5, 3–6	SH5, 0–16500 (0–250)	
									SH7	4.0–>25.0	SH7, 3–6	SH7, 0–11889 (0–180)	
									TL1	0.0–0.5	TL1, 1	TL1, 0–66 (0–1)	
									TL2	0.3–1.0	TL2, 1	TL2, 0–132 (0–2)	
									TL3	0.4–1.3	TL3, 1	TL3, 0–198 (0–3)	
									TL4	1.5–2.0	TL4,1-3	TL4, 0–396 (0-6)	
									TL6	1.0–7.0	TL6, 1-4	TL6, 2–1650 (2–25)	
									TL8	1.0–8.0	TL8, 1–5	TL8. 0–2640 (0–40)	
									TU1	1.0–4.0	TU1, 1–3	TU1, 0–990 (0–15)	
									TU2	1.0–8.0	TU2, 1–5	TU2, 0–5,280 (0–80)	
Woodlands	Chaparral	H	4-5	B and T	4–25	3-6	0–16500	SH5	GR1	0.5–1.7	GR1, 1	GR1, 0–990 (0–15)	10,933
							(0–250)		GR2	1.0–8.0	GR2, 1–4	GR2, 0–7920 (0–120)	(2%)
									GR4	1.0–22	GR4, 1–4	GR4, 0–33,000 (0–500	
									GS1	1.0–6.0	GS1, 1–3	GS1, 0–3960 (0–60)	
									GS2	1.5–>10.0	GS2, 1–5	GS2, 0–6600 (0–100)	
									SH1	0.2–0.7	SH1, 1	SH1, 7–112 (0– 2)	
									SH2	1.0–4.5	SH2, 1–3	SH2, 0–1188 (0–18)	
									SH4	1.0–16	SH4, 1–6	SH4, 0–11880 (0–180)	
									SH5	4.0–>25.0	SH5, 3–6	SH5, 0–16500 (0–250)	
									SH7	4.0–>25.0	SH7, 3–6	SH7, 0–11889 (0–180)	
									TL1	0.0–0.5	TL1, 1	TL1, 1	
									TL2	0.3–1.0	TL2, 1	TL2, 0–132 (0–2)	
									TL3	0.4–1.3	TL3, 1	TL3, 0–198 (0–3)	
									TL4	1.5–2.0	TL4,1-3	TL4, 0–396 (0-6)	
									TL5	4.0–4.5	TL5. 1-3	TL5, 0- 1452 (0-22)	
									TL6	1.0–7.0	TL6, 1-4	TL6, 2–1650 (2–25)	
									TL8	1.0–8.0	TL8, 1–4	TL8, 0–2640 (0–40)	
									TU1	1.0–4.0	TU1, 1–3	TU1, 0–990 (0–15)	
									TU2	1.0–8.0	TU2, 1–4	TU2, 0–5,280 (0–80)	

Table 2.3. Fuel Model, Fire-Danger Ratings, and Intensity Levels on Vegetative Associations in the WUI

Fuel Type	Vegetation Association	Wildfire Risk Rating[a]	Anderson Fuel Model	Fire-Danger Rating Model[b]	Flame Length (ft)	Fire Intensity Level from Fire-Danger Rating Model[c]	Rate Of Spread ft/hr (ch/hr)	Typical Fuel Model	Fire Behavior Fuel Model[d]	Flame Length (ft) Low Dead Fuel Moisture	Fire Intensity Level from Fire Behavior Fuel Model[e]	Rate of Spread ft/hr (ch/hr)— Low Dead Fuel Moisture	Acre (%)
	Madrean Encinal Oak Woodland	H	4-5	B and T	4-25	4-6	0–16500	SH5	GR1	0.5–1.7	GR1, 1	GR1, 0–990 (0–15)	21,701
							(0–250)		GR2	1.0–8.0	GR2, 1–4	GR2, 0–7920 (0–15)	(3%)
									GS1	1.0–6.0	GS1, 1–3	GS1, 0–3960 (0–60)	
									GS2	1.5–>10.0	GS2, 1–5	GS2, 0–6600 (0–100)	
									SH1	0.2–0.7	SH1, 1	SH1, 7–112 (0.– 2)	
									SH2	1.0–4.5	SH2, 1–3	SH2, 0–1188 (0–18)	
									SH4	1.0–16	SH4, 1–6	SH4, 0–11880 (0–180)	
									SH5	4.0–>25.0	SH5, 3–6	SH5, 0–16500 (0–250)	
									SH7	4.0–>25.0	SH7, 3–6	SH 7, 0–11889 (0–180)	
									TL1	0.0–0.5	TL1, 1	TL1, 1	
									TL2	0.3–1.0	TL2, 1	TL2, 0–132 (0–2)	
									TL3	0.4–1.3	TL3, 1	TL3 0–198 (0–3)	
									TL4	1.5–2.0	TL4,1-3	TL4, 0–396 (0-6)	
									TL5	4.0–4.5	TL5. 1-3	TL5, 0- 1452 (0-22)	
									TL6	1.0–7.0	TL6, 1-4	TL6, 2–1650 (2–25)	
									TL8	1.0–8.0	TL8, 1–4	TL8, 0–2640 (0–40)	
									TU1	1.0–4.0	TU1, 1.0–4.0	TU1, 0–990 (0–15)	
									TU2	1.0–8.0	TU2, 1.0–8.0	TU2, 0–5,280 (0–80)	
									TU5	2.0–13.0	TU5, 2–6	TU5, 0–2,772 (0–42)	
	Pinyon-Juniper Woodland	H	4-5	B and T	4-25	4-6	0–16500	SH5	GR1	0.5–1.7	GR1, 1	GR1, 0–990 (0–15)	53,784
	Madrean Juniper Woodlands						(0–250)		GR2	1.0–8.0	GR2, 1–4	GR2, 0–7,920 (0–15)	(8%)
									GS1	1.0–6.0	GS1, 1–3	GS1, 0–3960 (0–60)	
									GS2	1.5–>10.0	GS2, 1–5	GS2, 0–6600 (0–100)	
									SH1	0.2–0.7	SH1, 1	SH1, 7–112 (0–2)	
									SH2	1.0–4.5	SH2, 1–3	SH2, 0–1188 (0–18)	
									SH4	1.0–16.0	SH4, 1–6	SH4, 0–11880 (0–180)	
									SH5	4.0–>25.0	SH5, 3–6	SH5, 0–16500 (0–250)	
									SH7	4.0–>25.0	SH7, 3–6	SH 7, 0–11889 (0–180)	
									TL1	0.0–0.5	TL1, 1	TL1, 0–66 (0–1)	
									TL2	0.3–1.0	TL2, 1	TL2, 0–132 (0–2)	
									TL3	0.4–1.3	TL3, 1	TL3, 0–198 (0–3)	
									TL4	1.5–2.0	TL4,1-3	TL4, 0–396 (0-6)	
									TL5	4.0–4.5	TL5. 1-3	TL5, 0- 1452 (0-22)	
									TL6	1.0–7.0	TL6, 1-4	TL6, 2–1650 (2–25)	
									TL8	1.0–8.0	TL8, 1–5	TL8. 0–2640 (0–40)	
									TU1	1.0–4.0	TU1, 1–3	TU1, 0–990 (0–15)	
									TU2	1.0–8.0	TU2, 1.0–8.0	TU2, 0–5,280 (0–80)	
									TU5	2.0–13.0	TU5, 2–6	TU5, 0–2,772 (0–42)	

Table 2.3. Fuel Model, Fire-Danger Ratings, and Intensity Levels on Vegetative Associations in the WUI

Fuel Type	Vegetation Association	Wildfire Risk Rating[a]	Anderson Fuel Model	Fire-Danger Rating Model[b]	Flame Length (ft)	Fire Intensity Level from Fire-Danger Rating Model[c]	Rate Of Spread ft/hr (ch/hr)	Typical Fuel Model	Fire Behavior Fuel Model[d]	Flame Length (ft) Low Dead Fuel Moisture	Fire Intensity Level from Fire Behavior Fuel Model[e]	Rate of Spread ft/hr (ch/hr)— Low Dead Fuel Moisture	Acre (%)
	Juniper Savanna	M	6-7	F and T	1-16	2-6	0–11880	SH4	GR1	0.5–1.7	GR1, 1	GR1, 0–990 (0–15)	4,531
	Juniper Mesquite Grasslands						(0–180		GR2	1.0–8.0	GR2, 1–4	GR2, 0–7,920 (0–15)	(1.0%)
	North American Warm Desert Riparian Mesquite Bosque								GS1	1.0–6.0	GS1, 1–3	GS1, 0–3960 (0–60)	
									GS2	1.5–>10.0	GS2, 1–5	GS2, 0–6600 (0–100)	
									SH1	0.2–0.7	SH1, 1	SH1, 7–112 (0–2)	
									SH4	1.0–16.0	SH4, 1–6	SH4, 0–11880 (0–180)	
									SH5	4.0–>25.0	SH5, 3–6	SH5, 0–16500 (0–250)	
									SH7	4.0–>25.0	SH7, 3–6	SH 7, 0–11889 (0–180)	
									TU1	1.0–4.0	TU1, 1–3	TU1, 0–990 (0–15)	
Timber	Madrean Upper Montane Conifer–Oak Forest and Woodland	H	4-5	B and T	4-25	4-6	0–16500	SH5	GR1	0.5–1.7	GR1, 1	GR1, 0–990 (0–15)	17,123
	Rocky Mountain Aspen Forest and Woodland						(0–250)		GR2	1.0–8.0	GR2, 1–4	GR2, 0–7,920 (0–15)	(2%)
									GR4	1.0–22.0	GR4, 1–6	GR4, 0–33,000 (0–500)	
									GS1	1.0–6.0	GS1, 1–3	GS1, 0–3960 (0–60)	
									GS2	1.5–>10.0	GS2, 1–5	GS2, 0–6600 (0–100)	
									SH1	0.2–0.7	SH1, 1	SH1, 7–112 (0– 2)	
									SH2	1.0–4.5	SH2, 1–3	SH2, 0–1188 (0–18)	
									SH4	1.0–16.0	SH4, 1–6	SH4, 0–11880 (0–180)	
									SH5	4.0–>25.0	SH5, 3–6	SH5, 0–16500 (0–250)	
									SH7	4.0–>25.0	SH7, 3–6	SH 7, 0–11889 (0–180)	
									TL1	0.0–0.5	TL1, 1	TL1, 0–66 (0–1)	
									TL2	0.3–1.0	TL2, 1	TL2, 0–132 (0–2)	
									TL3	0.4–1.3	TL3, 1	TL3, 0–198 (0–3)	
									TL4	1.5–2.0	TL4,1-3	TL4, 0–396 (0-6)	
									TL5	4.0–4.5	TL5. 1-3	TL5, 0- 1452 (0-22)	
									TL6	1.0–7.0	TL6, 1-4	TL6, 2–1650 (2–25)	
									TL8	1.0–8.0	TL8, 1–5	TL8. 0–2640 (0–40)	
									TU1	1.0–4.0	TU1, 1–3	TU1, 0–990 (0–15)	
									TU2	1.0–8.0	TU2, 1.0–8.0	TU2, 0–5,280 (0–80)	
									TU5	2.0–13.0	TU5, 2–6	TU5, 0–2,772 (0–42)	

Table 2.3. Fuel Model, Fire-Danger Ratings, and Intensity Levels on Vegetative Associations in the WUI

Fuel Type	Vegetation Association	Wildfire Risk Rating[a]	Anderson Fuel Model	Fire-Danger Rating Model[b]	Flame Length (ft)	Fire Intensity Level from Fire-Danger Rating Model[c]	Rate Of Spread ft/hr (ch/hr)	Typical Fuel Model	Fire Behavior Fuel Model[d]	Flame Length (ft) Low Dead Fuel Moisture	Fire Intensity Level from Fire Behavior Fuel Model[e]	Rate of Spread ft/hr (ch/hr)— Low Dead Fuel Moisture	Acre (%)
	Pine-Oak Forest and Woodland	M	6-7	F and T	1-16	2-6	0–11880	SH4	GR1	0.5–1.7	GR1, 1	GR1, 0–990 (0–15)	38,508
							(0–180		GR2	1.0–8.0	GR2, 1–4	GR2, 0–7,920 (0–15)	(6%)
									GR4	1.0–22.0	GR4, 1–6	GR4, 0–33,000 (0–500)	
									GS1	1.0–6.0	GS1, 1–3	GS1, 0–3960 (0–60)	
									GS2	1.5–>10.0	GS2, 1–5	GS2, 0–6600 (0–100)	
									SH1	0.2–0.7	SH1, 1	SH1, 7–112 (0– 2)	
									SH4	1.0–16.0	SH4, 1–6	SH4, 0–11880 (0–180)	
									SH5	4.0–25.0	SH5, 3–6	SH5, 0–16500 (0–250)	
									SH7	4.0–>25.0	SH7, 3–6	SH 7, 0–11889 (0–180)	
									TL1	0.0–0.5	TL1, 1	TL1, 0–66 (0–1)	
									TL2	0.3–1.0	TL2, 1	TL2, 0–132 (0–2)	
									TL3	0.4–1.3	TL3, 1	TL3, 0–198 (0–3)	
									TL8	1.0–8.0	TL8, 1–4	TL8, 0–2,649 (0–40)	
									TU1	1.0–4.0	TU1, 1–3	TU1, 0–990 (0–15)	
									TU5	2.0–14.0	TU5, 2–6	TU5, 0–2,772 (0–42)	
Deciduous Southwest Riparian	North American Warm Desert Lower Montane Riparian Woodland and Shrubland	H	4-5	B and T	4-25	4-6	0–16500	SH5	GR1	0.5–1.7	GR1, 1	GR1, 0–990 (0–15)	5,857
							(0–250)		GR2	1.0–8.0	GR2, 1–4	GR2, 0–7,920 (0–15)	(1.0%)
	North American Arid West Emergent Marsh								GS1	1.0–6.0	GS1, 1–3	GS1, 0–3960 (0–60)	
									GS2	1.5–>10.0	GS2, 1–5	GS2, 0–6600 (0–100)	
	North American Warm Desert Riparian Woodland and Shrubland								SH1	0.2–0.7	SH1, 1	SH1, 7–112 (0– 2)	
									SH4	1.0–16.0	SH4, 1–6	SH4, 0–11880 (0–180)	
	North American Warm Desert Wash								SH5	4.0–25.0	SH5, 3–6	SH5, 0–16500 (0–250)	
									SH7	4.0–>25.0	SH7, 3–6	SH 7, 0–11889 (0–180)	
									TL1	0.0–0.5	TL1, 1	TL1, 0–66 (0–1)	
									TL2	0.3–1.0	TL2, 1	TL2, 0–132 (0–2)	
									TL3	0.4–1.3	TL3, 1	TL3 0–198 (0–3)	
									TL6	1.0–7.0	TL6, 1–4	TL6, TL6 0–1650 (2–25)	
									TL8	1.0–8.0	TL8, 1–4	TL8, 0–2,649 (0–40)	
									TU1	1.0–4.0	TU1, 1–3	TU1, 0–990 (0–15)	
									TU2	1.0–8.0	TU2, 1–4	TU2, 0–5,280 (0–80)	
Other	Agriculture	L	NA	NA	NA	NA	NA		NB3	NA	NA	NA	17,207 (2%)
	Developed, Open Space–Low Intensity	M	1,2	A (B) and T	1-8	4-6	0-7920 (0-120)	GR2	GR2	1.0-8.0	GR2, 1-4	GR2, 0–7920 (0–120)	17,376 (3%)
	Developed, Medium–High Intensity	L	NA	NA	NA	NA	NA	NB1	NB1	NA	NA	NA	18,370 (3%)

Table 2.3. Fuel Model, Fire-Danger Ratings, and Intensity Levels on Vegetative Associations in the WUI

Fuel Type	Vegetation Association	Wildfire Risk Rating[a]	Anderson Fuel Model	Fire-Danger Rating Model[b]	Flame Length (ft)	Fire Intensity Level from Fire-Danger Rating Model[c]	Rate Of Spread ft/hr (ch/hr)	Typical Fuel Model	Fire Behavior Fuel Model[d]	Flame Length (ft) Low Dead Fuel Moisture	Fire Intensity Level from Fire Behavior Fuel Model[e]	Rate of Spread ft/hr (ch/hr)— Low Dead Fuel Moisture	Acre (%)
	Barren Lands, Non-Specific	L	NA	NA	NA	NA	NA	NB9	NB9	NA	NA	NA	2,750 (0.2%)
	Recently Mined or Quarried	L	NA	NA	NA	NA	NA	NB9	NB9	NA	NA	NA	4,146 (1.0%)
	Open Water	L	NA	NA	NA	NA	NA	NB9	NB9	NA	NA	NA	844 (0.1%)
												Total	100%

Source: National Fire Danger Rating System (Bradshaw, L.S., J.E. Deeming, R.E. Burgan, and J. D. Cohen (compilers). 1984. The 1978 National Fire-Danger Rating System: technical documentation. General Technical Report INT-169. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station. 44 p.
).

[a] L = low; M = moderate; H = high; NA = not applicable.

[b] National Fire Danger Rating System .

[c] Fire behavior fuel models are designed for wildland vegetation and do not accurately predict fire behavior when structures are involved.

[d] Ecological unit map legends included in vegetation associations from http://www.azfirescape.org/catalina/ecounit_map.

[e] Fire Intensity Level (FIL) is an expression of fireline intensity based on flame length as an indicator of fire intensity, FIL1 = 0–2′ Flame length (FL in feet): FIL2 = 2.1–4′ FL; FIL3 = 4.1–6′ FL; FIL4 = 6.1–8′ FL; FIL5 = 8.1–12′ FL; FIL6 > 12′ FL.

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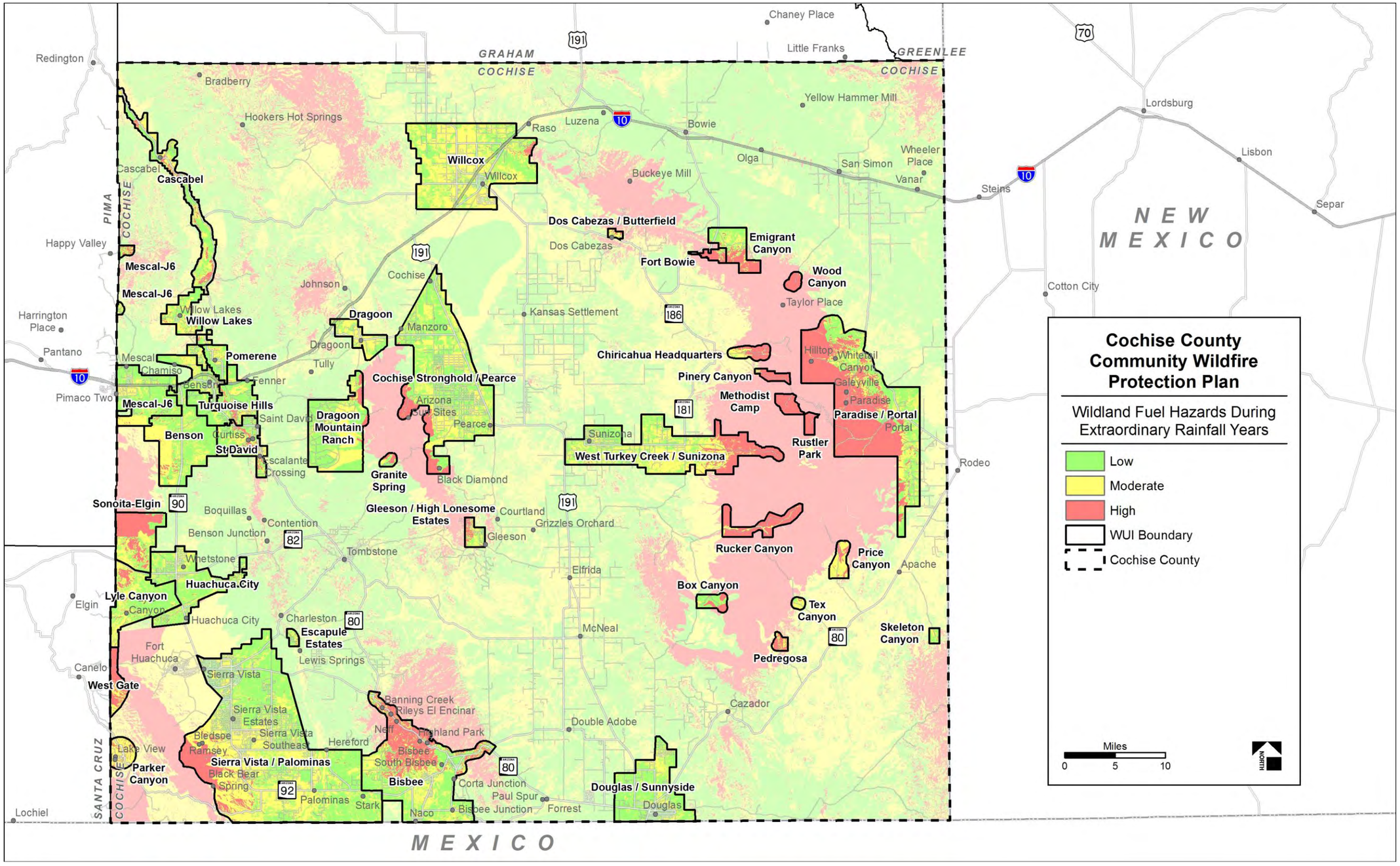

Figure 2.3. Cochise County CWPP Wildland Fuel Hazards during Extraordinary Rainfall Years

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Table 2.4. Fuel Hazard Components

Component	Influence[a]
Vegetation type and density	
• Grasslands and Woodlands in Fuel Models SH5,and SH4, GS2, GR2 fuel types in slopes ≥20% in south and west aspect	H
• Upland Shrubland and grassland associations in Fuel Models SH4, GS2, GR2	M
• Desert Scrub associations in Fuel Model SH2, barren land types, and agriculture and developed areas	L
Slopes ≥20%	H
Aspect (south-, southwest-, or west-facing slopes)	M

Source: Logan Simpson Design Inc.

[a] H = high; M = moderate; L = low.

C. Conditions of Ignition and Past Fire Occurrence

Past regional wildfire events are important for determining the potential occurrence of unwanted wildland fire in any area of the WUI. Because of the combination of recurring dry conditions and a regional history of fires, there will be wildland fire ignitions within the WUI that must be suppressed. The fire history of the planning area, including recent large wildfires that have occurred within or adjacent to the WUI, has been included in this analysis to determine the most likely areas for either natural or human-caused wildland fire ignition (Figure 2.4).

Table 2.5 details the high, moderate, and low positive-influence values assigned to fire-start incidents. These include concentrated areas of lightning strikes and human-caused ignitions with high-potential areas having the greatest number of fire starts per 1,000 acres. Wildland fire ignition data were obtained from the Federal Wildland Fire Occurrence Internet Mapping Service Web site and database (http://wildfire.cr.usgs.gov/firehistory/), from the CNF, and from the Arizona State Forester's Office (ASFD 2009b). All three data sets were combined with redundant ignitions counted as a single ignition. The largest large wildfire boundary from all data sets for each mapped fire was used to depict fire boundaries. The datasets used in the Internet Mapping Service Web site are based on official fire occurrence data collected from five federal and state agencies that have been merged into one fire-history point layer. According to these data, over 990 wildfire ignitions have been reported within the WUI from 1980 through 2012.

Table 2.5. Ignition history and wildfire occurrence

Wildfire Occurrence	Value
0-4 fire starts/square mile	L
4–8 fire starts/square mile	M
>8 fire starts/ square mile	H

Ignition point occurrence data was sorted by calendar quarter for each decade beginning in 1980 using combined data provided by USGS, ASFD, CNF and NPS which ranges from 1980 to 2012. 2010 to 2013 data was not included due to limited data for the overall WUI. Wildfire ignitions have increased each decade since 1980 primarily during winter/spring quarters (see Table 2.6). As a result of warmer temperatures and continued drought, the wildland fire "season" has become near year round (Westerling et al. 2006). A growing body of evidence shows that the climate has changed substantially since 1900, that this change is accelerating, and that even greater change is likely to occur in the next 100 years (USDA 2012); such climate change will alter natural ecosystems and affect their ability to provide goods and services (USDA 2012). Additionally, post-wildfire conditions and fire management activities can create ideal opportunities for invasions by nonnative plants that undermine the benefits of fire management actions (Brooks and Lusk 2008; Brooks 2008). As an example of the new type of fire problems that firefighting agencies face, on December 10, 2013 BLM and USFS crews responded to an active/moving fire (approximately 0.25 acre) in light fuels that was caused by a rock strike from a mower. Fuels consisted of short to medium grasses which had a long cure time and were easily ignitable even with recent snow precipitation. This area had previously burned during the Monument Fire in 2011, which removed some agaves and mesquites, but the small shrub and grass fuels such as desert broom have regenerated quickly as a result of monsoon rains and are ready to burn in a relatively short time period.

Table 2.6. Wildland Fire Ignitions during Each Calendar Quarter Beginning in 1980

Quarter	1980s	1990s	2000s	Total
Q1	25	166	251	442
Q2	155	539	615	1,309
Q3	128	291	288	707
Q4	13	90	150	253
Total	321	1,086	1,304	2,711

Note: Q1 = January–March; Q2 = April–June; Q3 = July–September; Q4 = October– December.

The Core Team determined that the majority of wildfire ignitions within the county have occurred within the Chiricahua and Huachuca Mountains; adjacent to Interstate 10 (I-10); State Route (SR) 80; and lands adjacent to the Canelo Hills and north of the Dragoon Mountains. Many of these wildland fire ignitions have occurred adjacent to roadways within woodland and higher-elevation chaparral and woodland vegetation associations that threaten the at-risk communities of Cochise County with the potential for catastrophic wildland fire.

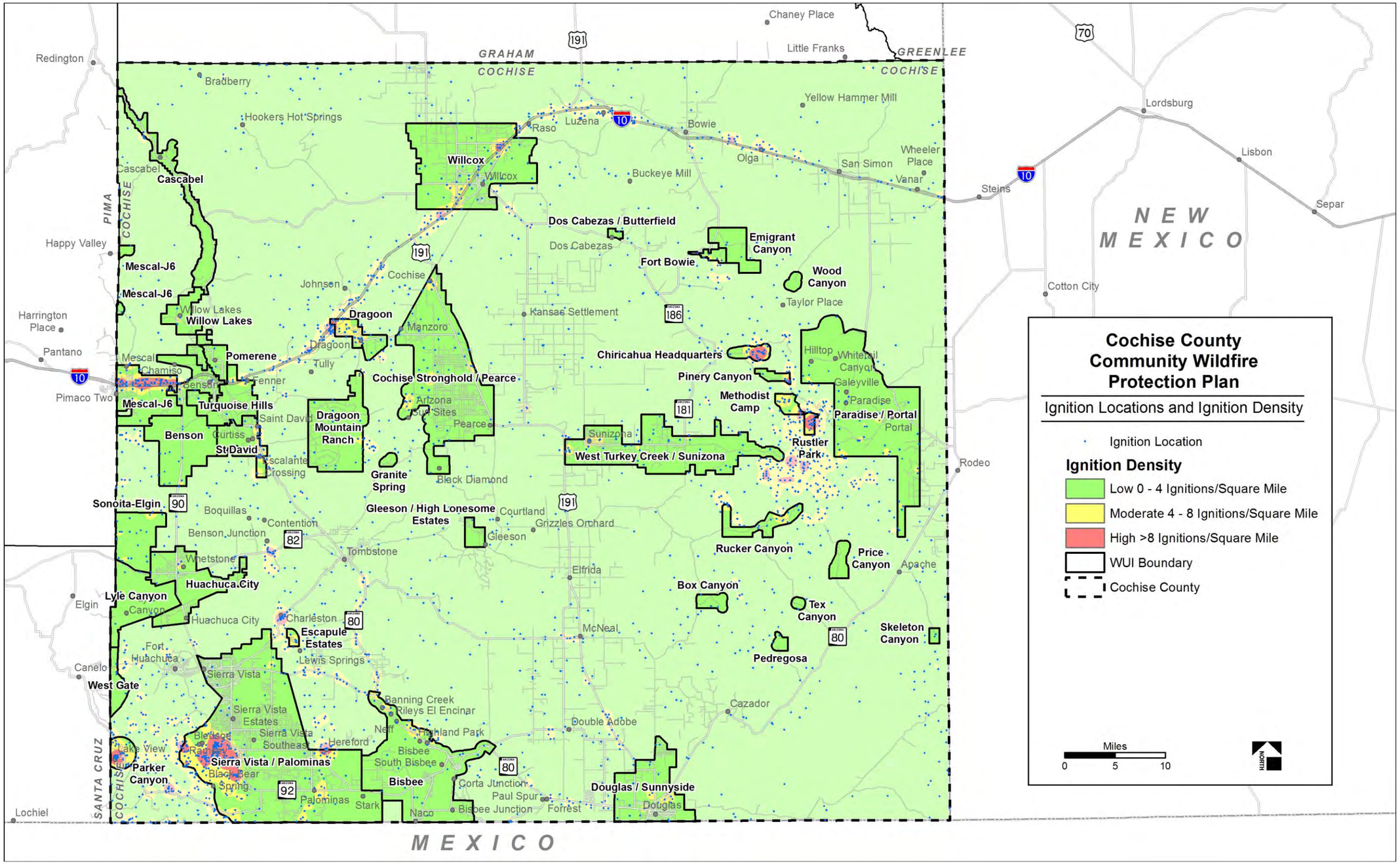

Figure 2.4. Cochise County CWPP WUI Ignition History

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D. Community Values at Risk

Valued at-risk community resources include private and community structures, communication facilities, local recreation areas, cultural and historic areas, sensitive wildlife habitat, watersheds, and natural resources. As agreed to by the Core Team, developed land and other infrastructures within the area of highest flammability were given the highest risk of wildland fire. In accordance with the risk to "Social, Cultural and Community Resources" identified by the Arizona State Forester (ASFD 2007:2), the Core Team has determined that the Cochise County WUI does include areas consistent with Risk Factor 2, Situations 1, 2, and 3, as follows:

> Risk Factor 2: Risk to Social, Cultural and Community Resources
>
> Situation 1: This situation most closely represents a community in an urban interface setting. The setting contains a high density of homes, businesses, and other facilities that continue across the interface. There is a lack of survivable space where personnel can safely work to provide protection. The community watershed for municipal water is at high risk of being burned compared to other watersheds within the geographic region. There is a high potential for economic loss to the community and likely loss of housing units and/or businesses. There are unique cultural, historical or natural heritage values at risk.
>
> Situation 2: This situation represents an intermix or occluded setting, with scattered areas of high-density homes, summer homes, youth camps, or campgrounds that are less than a mile apart. Efforts to create survivable space or otherwise improve the fire-resistance of a landscape are intermittent. This situation would cover the presence of lands at risk that are described under state designations such as impaired watersheds or scenic byways. There is a risk of erosion or flooding in the community of vegetation burns.
>
> Situation 3: This situation represents a generally occluded setting characterized by dispersed single homes and other structures that are more than a mile apart. This situation may also include areas where efforts to create a more fire-resistant landscape have been implemented on a large scale throughout a community or surrounding watershed.

1. Housing, Businesses, Essential Infrastructure, and Evacuation Routes

The Core Team identified high-risk areas—including the major community cores and portions of major highways and roadways within each community WUI. Residential community development is occurring throughout the WUI in a mix of high-density, single-family, and multi-acre parcels. The Core Team reviewed the most current structure data for each land parcel within each community WUI (Cochise County Assessor's Office 2013) to determine structure distribution and density within private lands to determine areas of low, moderate, and high structural density. This data were then portioned into risk

categories according to the density of structures and presence of natural or developed landcover types. This includes areas of highly developed lands that lack significant open space or natural land covers, moderately developed private lands where an intermingling of public and private lands occur and where the major portion of the landscape is composed of natural landcover types, and lightly developed private lands where the majority of land cover is composed of natural land cover. Areas of highest development and areas lacking development are considered at low risk for wildfire; areas of moderate development where the majority of land cover is composed of natural land cover are considered at high risk for wildfire; and areas of light development are considered areas at moderate risk for wildfire.

2. Recreation Areas/Wildlife Habitat

Recreational features within and adjacent to the WUI—including camping and recreation areas associated with designated camping and recreation areas in the CNF and on BLM-managed public lands; and major USFS trailheads—are located throughout Cochise County. These parks and recreational areas provide camping and scenic vistas of deep canyons, dry washes, sheer cliffs, distant mountain ranges, colorful soils and rock formations, and a mosaic of vegetation; they also provide access to other popular recreational destinations.

The WUI also includes known and potential habitat areas for several threatened, endangered, and sensitive (TES) plants and animals. The land management agencies use conservation strategies to mitigate risk to these species by implementing programs that meet goals and objectives of natural-resource management. Wildland fuel and vegetative restoration treatments within TES species' habitat may require additional site-specific analysis because of the extraordinary circumstances created by the presence of TES species or their habitats. Before any vegetation treatment by CNF, NPS, or BLM, a biological assessment and evaluation will be conducted by the appropriate agency to determine the extent of impacts the proposed treatments will have on TES species and habitats. The Core Team reviewed Section 102.a.5.B of HFRA and understands that site-specific evaluations of individual recommended projects will determine whether TES species and habitats would benefit from wildland fire mitigation treatments that would reduce wildland fuels, and thereby lessen the threat of catastrophic wildland fire, while protecting the natural-resource and recreational values local residents and visitors associate with the community.

3. Local Preparedness and Protection Capability

For many years, the Insurance Services Office (ISO) has conducted assessments and rated communities on the basis of available fire protection. The rating process grades each community's fire protection on a scale from 1 to 10 (1 is ideal and 10 is poor) based on the ISO's Fire Suppression Rating Schedule. Five factors make up the ISO fire rating: water supply—the most important factor—accounts for 40 percent of the total rating, while type and availability of equipment, personnel, ongoing training, and the community's alarm and paging system account for the remaining 60 percent of the rating. Additionally, the Core Team determined the ISO rating for the fire protection services within each community WUI or, in many cases the lack of any fire protection services. ISO ratings will vary within

fire departments and districts depending on housing densities and the distance of structures that are isolated (usually 3 to 5 miles) from a fire station. The Core Team determined that the majority of the WUI includes area of high ISO ratings. Many local fire departments are composed of split ISO ratings—lower ratings where hydrants and other water sources are present and higher ratings in areas within the district where no water source is available. The Core Team also recognized that housing densities and ISO ratings tend to reflect compounding influences factors. Where housing density is high, ISO ratings are low—both essentially representing the same influence of risk to structures, infrastructures, subdivisions, and communities. Therefore, the Core Team determined that housing density would be the overriding influence factor for structures, infrastructures, subdivisions, and community values.

The wildland and structural fire response within the WUI is provided by local fire departments and districts. BLM, CNF, ASFD, and local fire departments and districts provide support for initial wildland fire attack for areas within and adjacent to the Cochise County WUI. Structural protection for the USFS "involves the use of standard wildland fire suppression tactics and control methods; including the use of standard equipment, fire control lines, and the extinguishing of spot fires near or on the structure when safe and practical" (USFS 2009:1). Initial-attack response from local fire departments and districts can occur under the authority of mutual-aid agreements between individual departments or under the intergovernmental agreements that individual fire departments and districts have with the Arizona State Forester.

Land use in the community WUIs consists primarily of residences, mining, livestock production, farming, community businesses, and community-based services and facilities. Surrounding areas are dominated by state lands, BLM, CNF, and NPS lands, and private properties. Land uses within or close to the WUI include fuelwood cutting, hunting, and other recreational activities (for example, hiking, hunting, fishing, bird watching, nature study, photography, and off-road-vehicle use). Section II.E of this CWPP provides more detailed community assessments.

The Core Team recognize not only the occurrence of high-use recreation areas throughout Cochise County but also the significance and special risk these areas pose as potential ignition sources and complications in safe evacuations from wildland fire. Many of these areas have limited access for evacuation and responding firefighting resources. Outdoor recreation and tourism is a major industry in Cochise County, and the loss of or inability of the public to access recreational areas could create significant effects to local economies. Due to high public use, limited access and communications, and economic value of recreational areas, risk to community values is increased within and adjacent to high-use recreational areas. Several CNF recreation areas include USFS structures. As defined by the ASFD (2007:1), "a *structure* is understood to be either a residence or a business facility, including Federal, State and local government facilities." In addition to structure density within sub-WUIs an additional influencing factor is assigned to high use recreational areas. Subsequently a sub-WUI rated as moderate risk from structure density may be elevated to high risk if it is also considered a high use recreation area.

However, the Core Team realizes that local populations within the Cochise County sub-WUIs will determine the extent of initial attack; sustained responses; structural protection; and public safety protection, including potential evacuation of a community. Therefore, the Core Team used the most current structure density estimates and presence of high use recreation areas for each sub-WUI to provide the influence factor for the community values risk assessment.

Table 2.7 identifies the different influencing factor weightings given to these community value components; these components were also mapped and are depicted in Figure 2.5.

Table 2.7. Community Values

Component	Value[a]
0.4 - 1 structures/acre	H
0.1 < 0.4 structures/acre	M
0 or <1 structures/acre	L
High-Use Recreation Area	+1 Value

Source: Logan Simpson Design Inc.

[a] H= high; M = moderate; L = low.

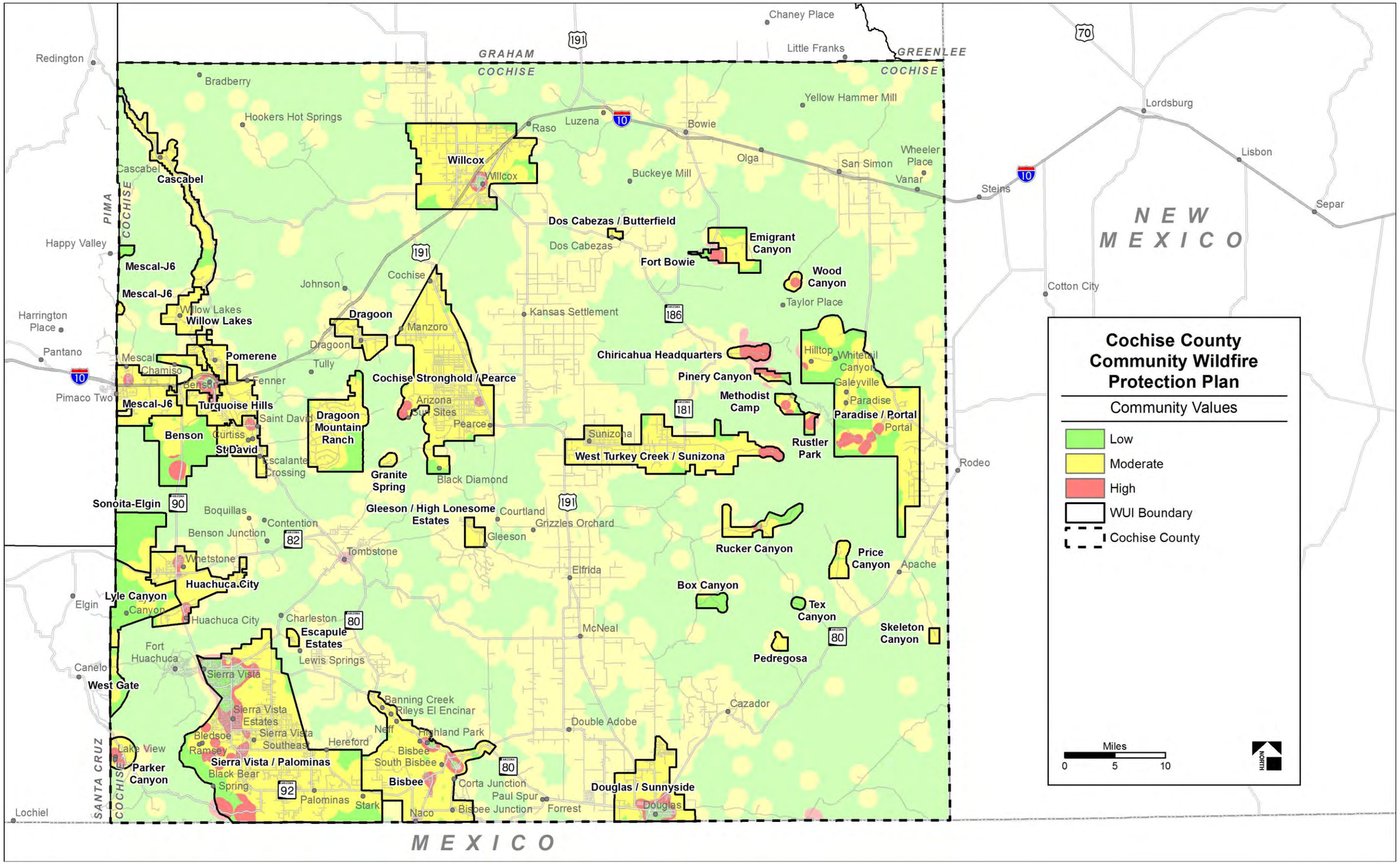

Figure 2.5. Cochise County CWPP Community Values Assessment

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E. Summary of Community Assessment and Cumulative Risk Analysis

The major concerns identified by the Core Team during the development of the Cochise County CWPP include (1) delayed response time by available mutual-aid fire departments; (2) obtainment of additional firefighting equipment and training; (3) insufficient dispatch and communication capabilities on initial response units; and (4) structures, subdivisions, and communities that do not have fire protection because they are not within the jurisdiction of a fire department or district. Additionally, many residences in the identified WUIs were not designed with adequate general or emergency vehicle access. Private structures without adequate access and readily available water supplies increase the risk of greater habitat and structural losses from large wildland fires. The Core Team recommends that the CNF continue to conduct wildland fuel treatments in high-value community areas. Recommendations to landowners for wildfire risk mitigation are included in Section III of this CWPP. Additional recommendations for remote private lands include identifying properties by placing names or addresses on identification placards, road signs, and wells or surface-water sources that could be used to replenish water supplies for fire response equipment—both ground-based drafting and aerial bucketing. The Core Team recommends researching the possibility of an emergency contact autophone redial system for emergency alert notifications within portions of the WUI where this service has not been instituted.

The communities within each WUI are described below in more detail. The community descriptions include data on population and housing units, major transportation routes, and major vegetation associations and a summary of where in the WUI the highest risk of wildland fire occurs. Population and housing data was obtained from the US Census Bureau 2010 data unless noted otherwise.

1. Community WUI Descriptions and Risk Rating

Benson Community WUI

The Benson Community WUI, which is composed of private, state, and federal lands within and adjacent to the city limits, is located in western Cochise County adjacent to I-10 near the Cochise County–Pima County border approximately 8 miles east of Mescal. The Benson Community is encompassed by the communities of St. David to the southeast and Pomerene to the northeast. The Benson Fire Department provides fire, rescue, and emergency services to the city of Benson and neighboring communities. The fire department also covers I-10, SR 80, and SR 90 for fire and emergency services response, and it responds to wildland fires throughout southern Arizona in accordance with requests from ASLD, USFS, and BLM. The fire department operates as a combination department; it responded to 365 calls for service in 2011 and has responded to 288 calls for service as of September 4, 2012. The population of the Benson Community WUI is estimated to be 6,054 residents occupying 3,367 housing units. The Benson Community WUI has an ISO rating of 5. The Cochise County CWPP analyzed 33,351 acres within the Benson Community WUI for the potential risk to wildland fire.

The primary transportation corridors in the WUI communities are I-10 traversing the WUI from the east and west, SR 80 and SR 90 are to the south providing a north-south corridor in the WUI. The Union Pacific Railroad bisects Benson from southeast to northwest.

Major vegetation associations include desert wash/xeroriparian corridors, Apacherian-Chihuahuan mesquite upland scrub, Apacherian-Chihuahuan semi-desert grasslands and steppe, and Chihuahuan-creosotebush mixed desert and thorn scrub vegetations in lower elevations, with Madrean Pine-Oak forest and woodland associations occurring in higher elevations toward the foothills of the Whetstone Mountains to the west of the WUI. The areas of highest wildfire risk are located along the numerous desert washes and grassland fan terraces originating from the mountain foothills. The southern portion of the WUI does include areas of high risk in lower elevations during extreme rainfall years within the desert grasslands, particularly from increased light fuels produced from winter annual and perennial native and invasive grasses. Areas with a moderate history of wildfire ignitions occur along I-10 near the western edge of the WUI adjacent to the Mescal J-6 WUI and in the southern portion of the WUI along SR 90. Public use within the WUI is considered low. The WUI is composed of a mix of large developed urban parcels and traditional housing subdivisions closer to Benson and dispersed residential properties of varied assessed value throughout the remaining areas of the WUI. The combination of mixed housing density, vegetation with low to moderate fire potential, and low wildfire ignition history creates areas of moderate-high risk to community values.

The Cochise County CWPP analyses determined that less than 1 percent of the Benson Community WUI is at high risk and that 43 percent is at moderate risk for wildland fire. Due to areas of moderate-low wildfire risk, low ignition history, and overall moderate community values, the overall wildland fire risk rating of the Benson Community WUI is low.

Bisbee Community WUI

See the Bisbee CWPP (Bisbee Fire Department 2007) for description.

Box Canyon Community WUI

The Box Canyon WUI is composed of private and USFS lands on the southwest portion of the Chiricahua Ecosystem Management Area (EMA). Multiple structures including private residence, ranch buildings and infrastructure are located on private land adjacent to the CNF boundary. Other range improvements including fence and water-holding structures extend onto the CNF. The Cochise County CWPP analyzed 2,887acres within the Box Canyon Community WUI for the potential risk to wildland fire.

The combination of housing density, intermixed with areas of vegetative associations with low to high fire potential, and low wildfire ignition history creates an overall low risk to community values.

The Cochise County CWPP analyses determined that less than 1 percent of the Box Canyon Community WUI is at high risk and that 40 percent is at moderate risk for wildland fire. Due to areas of

moderate-low wildfire risk, low ignition history, and low community values, the overall wildland fire risk rating of the Box Canyon Community WUI is low.

Cascabel Community WUI

See the Cascabel CWPP (Cascabel Fire Department 2006) for description.

Chiricahua Headquarters Community WUI

This Chiricahua Headquarters Community WUI includes the headquarters of Chiricahua National Monument and some private property near it. Within the WUI boundary are 15 private residences. Inside the monument boundary are 11 government residences for employees and temporary housing for interns and scientists. There is a 25-space campground, which is busiest during spring and fall. Other administrative buildings are included, such as a visitor center, administrative offices, a maintenance shop, and storage buildings. The historic buildings of Faraway Ranch are also included. The number of people within this WUI ranges from about 30 to 400, with the highest during the busiest tourist season (January to May). Nearly all of the monument burned in the 2011 Horseshoe 2 Fire, but the area around the buildings was part of burnout operations. Burn severity around the buildings was low; the fire removed some vegetation, but what remained is regrowing rapidly. Thinning before and after the fire has also reduced fuel load. The western part of the area is grassy, with much heavy Lehmann lovegrass. Updrainage to the east, terrain becomes steeper with more woody vegetation. Rapid rate of spread and intense fire behavior with spot fires is possible when wind is upcanyon. Vegetation is native grassland; invaded Lehmann lovegrass grassland; and woodland with oak, manzanita, and areas of dense juniper. The Cochise County CWPP analyzed 3,339 acres within the Chiricahua Headquarters Community WUI for the potential risk to wildland fire.

The combination of low housing density with limited egress routes, vegetation with high fire potential, and high wildfire ignition history create areas of high risk to community values.

The Cochise County CWPP analyses determined that 67 percent of the Chiricahua Headquarters Community WUI is at high risk and that 32 percent is at moderate risk for wildland fire. Due to areas of high-moderate wildfire risk, areas of high ignition history, and high community values, the overall wildland fire risk rating of the Chiricahua Headquarters Community WUI is high.

Cochise Stronghold/Pearce-Sunsites Community WUI

The Cochise Stronghold/Pearce-Sunsites Community WUI is composed of the unincorporated towns of Pearce and Sunsites located in the Sulphur Springs Valley at an elevation of about 4,500 feet. The community, which lies 85 miles southeast of Tucson and 30 miles southwest of Willcox, has a population of 2,440 residents and has approximately 1,636 structures. The Sunsites-Pearce Fire District is a full-time all-hazards fire department providing fire, rescue, basic- and advanced-life-support emergency services, and life-safety education programs to a response area that covers approximately 1,623 square miles; the fire district also provides wildland firefighting support through a cooperative

agreement with ASLD. The fire district has a full-time staff supplemented by part-time reserves, as well as by volunteers. The fire district has an established evacuation plan for the district in the event of fire, flood or hazardous-material emergencies. The Cochise Stronghold/Pearce-Sunsites Community WUI has an ISO rating of 10. The Cochise County CWPP analyzed 64,815 acres within the Cochise Stronghold/Pearce-Sunsites Community WUI for the potential risk to wildland fire.

The ghost town of Pearce, which is known for its gold production in the beginning of the nineteenth century, lies 1 mile south of Sunsites. More than 15 million dollars in gold was produced by the Commonwealth Mine in Pearce. The historic Old Pearce General Store, and other old buildings and ruins from the late eighteenth and early nineteenth centuries. To the west of the valley lies Cochise Stronghold, which is a woodland area in the Dragoon Mountains within the CNF. Cochise Stronghold offers many recreational activities such as hiking, camping, picnicking, rock climbing, and bird watching.

Major vegetation associations include desert wash/xeroriparian corridors, Apacherian-Chihuahuan semi-desert grasslands and steppe, Apacherian-Chihuahuan mesquite upland scrub and Chihuahuan-creosotebush mixed desert and thorn scrub vegetations in lower elevations. The areas of highest wildfire risk are located along the numerous desert washes and grassland fan terraces originating from the Dragoon Mountain foothills to the west of the WUI. The western portion of the WUI does include areas of high risk during extreme rainfall years within the pinyon-juniper woodlands that occur within the Dragoon Mountains. Areas with a high and moderate history of wildfire ignitions occur within Stronghold Canyon and within the grassland steppe of the lower elevations. Public use within the WUI is considered moderate. The WUI is composed of large tracks of undeveloped and partially developed parcels associated with ranching and agricultural practices. The combination of dispersed housing density, vegetation with high fire potential, and moderate wildfire ignition history create areas of low-moderate risk to community values.

The Cochise County CWPP analyses determined that 3 percent of the Cochise Stronghold/ Pearce-Sunsites Community WUI is at high risk and that 49 percent is at moderate risk for wildland fire. Due to areas of high-moderate wildfire risk along the western WUI, areas of moderate ignition history, and an overall low density of high community values, the overall wildland fire risk rating of the Cochise Stronghold / Pearce-Sunsites Community WUI is moderate.

Douglas/Sunnyside Community WUI

The Douglas/Sunnyside Community WUI is composed of lands within the Douglas Fire Department boundary and the Pirtleville and Sunnyside Fire Districts, which consist primarily of private and state lands located adjacent to these boundaries. The Douglas/Sunnyside Community WUI lies north of the U.S-Mexico border adjacent to the Mexican city of Agua Prieta and east of the city of Bisbee along SR 80. The Douglas/Sunnyside Community WUI also includes the communities of Pirtleville which lies to the west of the city boundary of Douglas. The Douglas area has a history of cattle ranching, agriculture and mining. The primary transportation corridors in the Douglas/Sunnyside Community WUI are US Highway191 providing access to the north and SR 80 providing access to the west and northeast.

The City of Douglas Fire Department serves an 8-square-mile area for fire suppression response and a 1,500-square-mile area for emergency medical response. The fire department consists of 1 fire chief, 2 administration staff members, and 24 full-time paid personnel and provides 24-hour emergency service. Additionally, the Sunnyside and Pirtleville Fire Districts provide fire protection for communities surrounding Douglas. The population in the Douglas/Sunnyside Community WUI is estimated to be 19,305 residents occupying approximately 7,167 housing units. The Douglas/ Sunnyside Community WUI has an overall ISO rating of 4. The Cochise County CWPP analyzed 25,684 acres within the Douglas/ Sunnyside Community WUI for the potential risk to wildland fire.

Major vegetation associations include desert wash/xeroriparian corridors, Chihuahuan-creosotebush mixed desert and thorn scrub, Apacherian-Chihuahuan semi-desert grasslands and steppe and Apacherian-Chihuahuan mesquite upland scrub. Approximately 22 percent of the WUI is categorized as developed. Areas with a high and moderate history of wildfire ignitions occur along major roadways and along the US-Mexico border. The WUI is composed of a mix of large developed private land parcels and traditional housing subdivisions of varied assessed value. The combination of mixed housing density, vegetation with low fire potential, and moderate wildfire ignition history create areas of low-moderate risk to community values.

The Cochise County CWPP analyses determined that 1 percent of the Douglas/Sunnyside Community WUI is at high risk and that 72 percent is at moderate risk for wildland fire. Due to areas of relatively low wildfire risk, isolate areas of moderate ignition history, and a low density of high community values, the overall wildland fire risk rating of the Douglas/ Sunnyside Community WUI is moderate.

Dos Cabezas/Butterfield Community WUI

The Dos Cabezas/Butterfield Community WUI is composed of private lands that are located south of the Dos Cabezas Mountains. The Dos Cabezas/Butterfield WUI lies north of and adjacent to SR 186, which is the major transportation corridor linking Dos Cabezas with the city of Willcox. The population of the Dos Cabezas/Butterfield Community WUI is estimated to be 88 residents occupying approximately 71 housing units. There are no fire departments within the Dos Cabezas/Butterfield Community WUI. The Dos Cabezas/Butterfield Community WUI has an ISO rating of 10. The Cochise County CWPP analyzed 762 acres within the Dos Cabezas/Butterfield Community WUI for the potential risk to wildland fire.

Major vegetation associations include desert wash/xeroriparian corridors, Apacherian-Chihuahuan semi-desert grasslands and steppe and Apacherian-Chihuahuan mesquite upland scrub with Mogollon Chaparral and Madrean Encinal species occurring in higher elevations toward the foothills of the Dos Cabezas Mountains to the north of the WUI. The areas of highest wildfire risk are located along the foothills of the Dos Cabezas Mountains in the northern portion of the WUI. Wildfire ignitions are low and occur at higher elevations within the Dos Cabezas Mountains and along SR 186. Public use within the WUI is considered low. The WUI is composed of dispersed housing clusters near SR 186. The

combination of mixed housing density, vegetation with moderate fire potential, and a low wildfire ignition history create areas of moderate risk to community values.

The Cochise County CWPP analyses determined that 5 percent of the Dos Cabezas/Butterfield Community WUI is at high risk and that 92 percent is at moderate risk for wildland fire. Due to areas of high-moderate wildfire risk, areas of low ignition history, and moderate community values, the overall wildland fire risk rating of the Dos Cabezas/Butterfield Community WUI is moderate.

Dragoon Community WUI

The Dragoon Community WUI, which is located approximately 15 miles northeast of Benson, is composed of private, state, and federal lands that include CNF and BLM Gila District lands adjacent to the Dragoon Mountains. There are no fire departments within the Dragoon Community WUI. The population of the Dragoon Community WUI is estimated to be 346 residents occupying approximately 194 housing units. The Dragoon Community WUI has an ISO rating of 10. The Cochise County CWPP analyzed 6,674 acres within the Dragoon Community WUI for the potential risk to wildland fire.

Major vegetation associations include desert wash/xeroriparian corridors, Apacherian-Chihuahuan semi-desert grasslands and steppe, Chihuahuan-creosotebush mixed desert and thorn scrub and Apacherian-Chihuahuan mesquite upland scrub. The areas of highest wildfire risk are located along the foothills of the Dragoon Mountains adjacent to the WUI. This WUI does include areas of moderate risk in lower elevations during extreme rainfall years within the desert grasslands, particularly from increased light fuels produced from winter annual and perennial native and invasive grasses. Areas with a moderate-high history of wildfire ignitions occur along I-10 and within the western portion of the WUI near I-10. Public use within the WUI is considered low. The WUI is composed of developed private land parcels and traditional housing clusters of varied assessed value. The combination of mixed housing density, vegetation with moderate fire potential, and moderate wildfire ignition history create areas of moderate risk to community values.

The Cochise County CWPP analyses determined that 2 percent of the Dragoon Community WUI is at high risk and that 79 percent is at moderate risk for wildland fire. Due to areas of moderate wildfire risk, areas of high ignition history, and moderate community values, the overall wildland fire risk rating of the Dragoon Community WUI is moderate.

Dragoon Mountain Ranch Community WUI

The Dragoon Mountain Ranch Community WUI is a gated residential community situated between the San Pedro River valley and the base of the Dragoon Mountains, east of the town of St. David. The average elevation of the Dragoon Mountain Ranch is approximately 4,400 feet. Dragoon Mountain Ranch consists of 392 privately owned parcels, each 36-plus acres in size and lies adjacent to CNF and state lands that comprise the Dragoon Mountain Ranch Community WUI. There are no fire departments within the Dragoon Mountain Ranch Community WUI. The population of the Dragoon

Community WUI is estimated to be 434 residents occupying approximately 210 housing units. The Dragoon Mountain Ranch Community WUI has an ISO rating of 10. The Cochise County CWPP analyzed 27,257 acres within the Dragoon Mountain Ranch Community WUI for the potential risk to wildland fire.

Major vegetation associations include desert wash/xeroriparian corridors, Apacherian-Chihuahuan mesquite upland scrub, Apacherian-Chihuahuan semi-desert grasslands and steppe, and Chihuahuan-creosotebush mixed desert and thorn scrub vegetations in lower elevations, with Madrean Pinyon-Juniper woodland occurring in elevations toward the foothills of the Dragoon Mountains to the east. The areas of highest wildfire risk are located along the foothills of the Dragoon Mountains adjacent to the WUI. This WUI does include areas of moderate risk in lower elevations during extreme rainfall years within the desert grasslands, particularly from increased light fuels produced from winter annual and perennial native and invasive grasses. Areas with a high and moderate history of wildfire ignitions occur within and adjacent to the eastern portion of the WUI at the base of the Dragoon Mountains. Public use within the WUI is considered high. The WUI is composed of a mix of large developed private land parcels and traditional housing subdivisions of varied assessed value. The combination of mixed housing density, vegetation with moderate-high fire potential, and isolated areas of moderate wildfire ignition history create areas of moderate risk to community values.

The Cochise County CWPP analyses determined that 1 percent of the Dragoon Mountain Ranch Community WUI is at high risk and that 73 percent is at moderate risk for wildland fire. Due to areas of moderate wildfire risk, isolated areas of moderate ignition history, and moderate community values, the overall wildland fire risk rating of the Dragoon Mountain Ranch Community WUI is moderate.

Emigrant Canyon Community WUI

The Emigrant Canyon WUI is located on the northwest corner of the Chiricahua EMA (CNF), extending onto state, private and BLM lands. A ranch property, which includes residential structures, a barn, and other range improvements (fences, corrals, water tanks, etc.), lies directly north of the CNF boundary. The Cochise County CWPP analyzed 8,023 acres within the Emigrant Canyon Community WUI for the potential risk to wildland fire.

The combination of mixed structures, vegetation associations with low to high fire potential, and low wildfire ignition history create areas of moderate risk to community values.

The Cochise County CWPP analyses determined that less than 4 percent of the Emigrant Canyon Community WUI is at high risk and that 56 percent is at moderate risk for wildland fire. Due to areas of low-high wildfire risk, low ignition history, and moderate community values, the overall wildland fire risk rating of the Emigrant Canyon Community WUI is moderate.

Escapule Estates Community WUI

The Escapule Estates Community WUI is composed of private and public lands located east of Sierra Vista between Lewis Springs and Charleston along the San Pedro River National Conservation Area. There are no fire departments within the Escapule Estates Community WUI. The population of the Escapule Estates Community WUI is estimated to be 37 residents occupying approximately 31 housing units. The Escapule Estates Community WUI has an ISO rating of 10. The Cochise County CWPP analyzed 1,072 acres within the Escapule Estates Community WUI for the potential risk to wildland fire.

Major vegetation associations include desert wash/xeroriparian corridors, Apacherian-Chihuahuan mesquite upland scrub, Apacherian-Chihuahuan semi-desert grasslands and steppe, and Chihuahuan-creosotebush mixed desert and thorn scrub vegetations. The areas of highest wildfire risk are located along the numerous desert washes and grasslands. This portion of the WUI does include areas of moderate risk during extreme rainfall years within the desert grasslands, particularly from increased light fuels produced from winter annual and perennial native and invasive grasses. Areas with a high and moderate history of wildfire ignitions occur north of the WUI in the area of Charleston along South Charleston Road. Isolated ignitions within the WUI have occurred near the southeast corner of the WUI. Public use within the WUI is considered low. The WUI is composed of a private land parcels and dispersed residences of varied assessed value. The combination of mixed housing density, vegetation with low-moderate fire potential, and moderate wildfire ignition history create areas of moderate risk to community values.

The Cochise County CWPP analyses determined that approximately 9 percent of the Escapule Estates Community WUI is at high risk and that 85 percent is at moderate risk for wildland fire. Due to areas of high-moderate wildfire risk, areas of high ignition history, and high community values, the overall wildland fire risk rating of the Escapule Estates Community WUI is moderate.

Fort Bowie Community WUI

The Fort Bowie Community WUI includes the headquarters of Fort Bowie National Historic Site and about 30 homes as well as other structures, on adjacent private property. On NPS land are three government residences for employees and temporary housing for interns and scientists. Other administrative buildings are included, such as visitor center, administrative office, maintenance shop, and storage buildings. The historic adobe ruins of Fort Bowie are also included. There are two full-time employees with temporary workers and interns also present. The number of people within this WUI range from about 50 to 100, with the highest during the busy tourist season, January to April. The area is grassy, with native grass, some heavy Lehmann lovegrass, mesquite grassland or mesquite scrubland, and some oak and juniper in places. Rapid rate of spread is possible during a fire. The Cochise County CWPP analyzed 1,875 acres within the Fort Bowie Community WUI for the potential risk to wildland fire. The combination of mixed housing density, vegetation with high fire potential, and areas of moderate wildfire ignition history create areas of high risk to community values.

The Cochise County CWPP analyses determined that 40 percent of the Fort Bowie Community WUI is at high risk and that 56 percent is at moderate risk for wildland fire. Due to areas of high-moderate wildfire risk, areas of moderate ignition history, and high community values, the overall wildland fire risk rating of the Fort Bowie Community WUI is high.

Gleeson/High Lonesome Estates Community WUI

The Gleeson/High Lonesome Estates Community WUI consists of dispersed residential and historical properties adjacent to state and private lands southeast of the Dragoon Mountains. There are no fire departments within the Gleeson/High Lonesome Estates Community WUI. The population of the Gleeson/High Lonesome Estates Community WUI is estimated to be 111 residents occupying approximately 106 housing units. The Dragoon Community WUI has an ISO rating of 10. The Cochise County CWPP analyzed 3,087 acres within the Gleeson/ High Lonesome Estates Community WUI for the potential risk to wildland fire. The major transportation corridor in this community is West Gleeson Road, which provides direct access from the town of Elfrida to the east.

Major vegetation associations include desert wash/xeroriparian corridors, Apacherian-Chihuahuan semi-desert grasslands and steppe, Apacherian-Chihuahuan mesquite upland scrub, and Chihuahuan-creosotebush mixed desert and thorn scrub vegetations in lower elevations, with Madrean Encinal associations occurring in higher elevations toward the foothills of the southern Dragoon Mountains to the west of the WUI. The areas of highest wildfire risk are located along the foothills of the southern Dragoon Mountains. This portion of the WUI does include areas of moderate risk in lower elevations during extreme rainfall years within the desert grasslands, particularly from increased light fuels produced from winter annual and perennial native and invasive grasses. Wildfire ignitions are low within and adjacent to the WUI. Public use within the WUI is considered low. The WUI is composed of dispersed residential properties of varied assessed value. The combination of low housing density, vegetation with moderate-high fire potential, and low wildfire ignition history create areas of moderate risk to community values.

The Cochise County CWPP analyses determined that less than 1 percent of the Gleeson/ High Lonesome Estates Community WUI is at high risk and that 79 percent is at moderate risk for wildland fire. Due to areas of moderate wildfire risk, low ignition history, and high community values, the overall wildland fire risk rating of the Gleeson/ High Lonesome Estates Community WUI is moderate.

Granite Spring Community WUI

The Granite Spring WUI is composed of USFS and private lands. The private land inholding, Three Sisters Ranch has been a working cattle ranch since 1888. Numerous structures and range improvements are located primarily in a canyon bottom surrounded by USFS land. The Cochise County CWPP analyzed 1,164 acres within the Granite Spring Community WUI for the potential risk to wildland fire.

The combination of mixed structure density, vegetation with low to moderate fire potential, and low wildfire ignition history create areas of moderate-high risk to community values.

The Cochise County CWPP analyses determined that 9 percent of the Granite Spring Community WUI is at high risk and that 76 percent is at moderate risk for wildland fire. Due to areas of low-high wildfire risk, low ignition history, and moderate community values, the overall wildland fire risk rating of the Granite Spring Community WUI is moderate.

Huachuca City Community WUI

The Huachuca City Community WUI consists of dispersed residential and commercial properties adjacent to state and private lands north of Sierra Vista. The major transportation routes through the WUI are SR 90 running north and south from I-10 through Sierra Vista and SR 82 that runs from Tombstone to the west toward Sonoita in Santa Cruz County. Fire protection for the Huachuca City Community WUI is provided by the Whetstone, PBW, and Babocomari Fire Districts. The Whetstone Fire District operates with paid and paid-on-call staff, the PBW and Babocomari Fire District operates with volunteer staff. The population of the Huachuca City Community WUI is estimated to be 5,453 residents occupying approximately 2539 housing units. The Huachuca City Community WUI has an ISO rating of 10. The Cochise County CWPP analyzed 22,078 acres within the Huachuca City Community WUI for the potential risk to wildland fire.

Major vegetation associations include desert wash/xeroriparian corridors, Apacherian-Chihuahuan mesquite upland scrub, Apacherian-Chihuahuan Piedmont semi-desert grasslands and steppe, and Chihuahuan-creosotebush mixed desert and thorn scrub. The areas of highest wildfire risk are located along the numerous desert washes and grassland fan terraces within the WUI. This WUI does include areas of low to moderate risk in lower elevations during extreme rainfall years within the desert grasslands, particularly from increased light fuels produced from winter annual and perennial native and invasive grasses. This WUI has a relatively low history of wildlife ignitions, which have occurred in areas along SR 90 and within the northern portion of the WUI within the vicinity of Whetstone. Public use within the WUI is considered low. The WUI is composed of a mix of large developed private land parcels and traditional housing subdivisions of varied assessed value. The combination of mixed housing density, vegetation with low fire potential, and moderate wildfire ignition history in isolated locations, create areas of moderate-high risk to community values.

The Cochise County CWPP analyses determined that 1 percent of the Huachuca City Community WUI is at high risk and that 45 percent is at moderate risk for wildland fire. Due to areas of low wildfire risk, areas of moderate ignition history, and moderate-high community values, the overall wildland fire risk rating of the Huachuca City Community WUI is low.

Lyle Canyon Community WUI

The Lyle Canyon Community WUI is composed of private, public and state lands adjacent to the Cochise-Pima County border north of Fort Huachuca and south of SR 82, which is the major transportation corridor within the Lyle Canyon Community WUI. There are no fire departments within the Lyle Canyon Community WUI. The population of the Lyle Canyon Community WUI is estimated to be 111 residents occupying approximately 106 housing units. The Dragoon Community WUI has an ISO rating of 10. The Cochise County CWPP analyzed 18,524 acres within the Lyle Canyon Community WUI for the potential risk to wildland fire.

Major vegetation associations include desert wash/xeroriparian corridors, Apacherian-Chihuahuan semi-desert grasslands and steppe, Apacherian-Chihuahuan mesquite upland scrub and Chihuahuan-creosotebush mixed desert and thorn scrub vegetation in lower elevations. The areas of highest wildfire risk are located along the numerous desert washes and grassland fan terraces originating from the Mustang Mountain foothills. This portion of the WUI does include areas of high risk in lower elevations during extreme rainfall years within the desert grasslands, particularly from increased light fuels produced from winter annual and perennial native and invasive grasses. This WUI has a relatively low history of wildfire ignitions, which have occurred in areas along SR 82 and within the western portion of the WUI in the eastern foothills of the Mustang Mountains. Public use within the WUI is considered low. The WUI is composed of a mix of large developed private land parcels and dispersed residences of varied assessed value. The combination of low housing density, vegetation with moderate-high fire potential, and areas of moderate wildfire ignition history create areas of moderate risk to community values.

The Cochise County CWPP analyses determined that less than 1 percent of the Lyle Canyon Community WUI is at high risk and that 32 percent is at moderate risk for wildland fire. Due to areas of moderate wildfire risk, areas of moderate ignition history, moderate community values, the overall wildland fire risk rating of the Lyle Canyon Community WUI is low.

Mescal-J6 Community WUI

The Mescal-J6 Community WUI is composed of private and public lands within and adjacent to the Mescal-J6 Fire District, located in western Cochise County adjacent to I-10 at the Cochise County–Pima County border. The Pima County CWPP also evaluated the Mescal-J6 Community WUI for lands within and associated with Pima County. The Mescal-J6 Fire District provides fire, rescue, and emergency services to the Mescal, J6, Skyline, Empire Acres, and Salcido Acres communities. The Mescal-J6 Fire District also covers the Titan and Dark Star road areas just west of the Benson City limits and I-10 from Mileposts 302 to 289 for fire response. The Mescal-J6 Fire District covers approximately 14 square miles with a total response area of approximately 225 square miles. The Mescal-J6 Fire District responds to wildland fires throughout Southern Arizona in accordance with requests from ASLD, USFS, and BLM. The Mescal-J6 Fire District still operates in a strictly volunteer capacity with no full-time personnel employed. The Mescal-J6 Fire District responded to 365 calls for

service in 2011 and has responded to 288 calls for service as of September 4, 2012. The population of the Mescal-J6 Community WUI is estimated to be 2,860 residents occupying 1,401 housing units. The Mescal-J6 Community WUI has an ISO rating of 10. The Cochise County CWPP analyzed 19,783 acres within the Mescal-J6 Community WUI for the potential risk to wildland fire.

The primary transportation corridors in the WUI communities are I-10 traversing the WUI from the east and west, Mescal Road to the north, and South J6 Ranch Road to the south providing a north-south corridor in the WUI. The Union Pacific Railroad parallels I-10 to the north. The major business and community services are located adjacent to the I-10 frontage road or to Mescal and South J6 Ranch roads.

Major vegetation associations include desert wash/xeroriparian corridors, Apacherian-Chihuahuan mesquite upland scrub, Apacherian-Chihuahuan semi-desert grasslands and steppe, and Chihuahuan-creosotebush mixed desert and thorn scrub vegetations in lower elevations. The areas of highest wildfire risk are located along the numerous desert washes and grassland fan terraces originating from the mountain foothills. Areas with a high and moderate history of wildfire ignitions occur along I-10 and within the central portion of the WUI. Public use within the WUI is considered high and is associated with I-10. The WUI is composed of a mix of large developed private land parcels and traditional housing subdivisions of varied assessed value. The combination of mixed housing density, vegetation with relatively low fire potential, and high wildfire ignition history create areas of moderate risk to community values.

The Cochise County CWPP analyses determined that 8 percent of the Mescal-J6 Community WUI is at high risk and 58 percent is at moderate risk for wildland fire. Due to areas of low wildfire risk, areas of high ignition history, and moderate community values, the overall wildland fire risk rating of the Mescal-J6 Community WUI is moderate.

Methodist Camp Community WUI

The Methodist Camp WUI is located in the north central portion of the Chiricahua EMA on USFS land. This WUI is comprise of the Pine Canyon United Methodist Camp which consist of 11 cabins, lodge, large dining hall, and various other associated structures and recreational features. Other values of interest include Goshawk and Mexican Spotted Owl habitat. The Cochise County CWPP analyzed 2,639 acres within the Methodist Camp Community WUI for the potential risk to wildland fire.

The combination structure density, vegetation with high fire potential, and low wildfire ignition history create areas of moderate-high risk to community values.

The Cochise County CWPP analyses determined that 73 percent of the Methodist Camp Community WUI is at high risk and that 28 percent is at moderate risk for wildland fire. Due to areas of moderate-low wildfire risk, moderate ignition history, and moderate-high community values, the overall wildland fire risk rating of the Methodist Camp Community WUI is high.

Paradise/Portal Community WUI

The Paradise/Portal Community WUI is composed of private, public and state lands within and adjacent to the Portal Rescue Inc. response area located adjacent to the Chiricahua National Forest in eastern Cochise County. Portal Rescue provides fire, rescue, and emergency services to the Portal, Paradise, Galeyville, Whitetail Canyon, and Hilltop communities. Portal Rescue responds primarily to wildland fires throughout southern Arizona in accordance with requests from ASLD, USFS, and BLM. Portal Rescue operates in a strictly volunteer capacity with no full-time personnel employed. Portal Rescue responds to about 50 emergency service calls and 1 to 12 wildland fire calls per year.

The 2010 population of the Paradise/ Portal Community WUI is estimated to be 274 residents occupying 296 housing units. The Paradise Portal Community WUI has an ISO rating of 10. The Cochise County CWPP analyzed 72,919 acres within the Paradise/ Portal Community WUI for the potential risk to wildland fire.

The primary transportation corridors in the WUI communities consist of secondary roadways, such as Portal Road and Foothills Road. There are no major interstates or highways within the WUI.

Major vegetation associations include desert wash/xeroriparian corridors, Madrean Pinyon-Juniper woodland, Apacherian-Chihuahuan semi-desert grasslands and steppe, Apacherian-Chihuahuan mesquite upland scrub, with pine-oak transition associations occurring in higher elevations toward the foothills of the Chiricahua Mountains within the WUI. The areas of highest wildfire risk are located along the numerous canyons and drainages originating from the Chiricahua Mountains foothills. Areas with a high and moderate history of wildfire ignitions occur west of the WUI at higher elevations within the Chiricahua Mountains and in isolated areas within the southern portion of the WUI. Public use within the WUI is considered high with a large percentage of recreational users. The WUI is composed of a mix of large developed private land parcels, residences and business of varied assessed value. The combination of mixed housing density, vegetation with high fire potential, and areas of moderate wildfire ignition history create areas of moderate-high risk to community values.

The Cochise County CWPP analyses determined that 11 percent of the Paradise/Portal Community WUI is at high risk and that 65 percent is at moderate risk for wildland fire. Due to areas of high-moderate wildfire risk, areas of moderate ignition history, and moderate-high community values, the overall wildland fire risk rating of the Paradise/ Portal Community WUI is moderate.

Parker Canyon Community WUI

The Parker Canyon WUI is composed of private and USFS lands. Numerous residential structures including the Parker Lake View Estates and other nearby private ranch properties comprise a majority of the private land. The USFS lands include Parker Canyon Lake Recreation Area. This recreation area includes a 130-acre lake; marina and store; restrooms; drinking water; a boat ramp; a fishing pier; a lakeside trail; and a 65-space campground with restrooms, picnic tables, and grills. The Cochise

County CWPP analyzed 4,340 acres within the Parker Canyon Community WUI for the potential risk to wildland fire.

The combination of structure density, vegetation with moderate fire potential, and high wildfire ignition history create areas of moderate-high risk to community values.

The Cochise County CWPP analyses determined that 41 percent of the Parker Canyon Community WUI is at high risk and that 59 percent is at moderate risk for wildland fire. Due to areas of moderate-high wildfire risk, high ignition history, and moderate-high community values, the overall wildland fire risk rating of the Parker Canyon Community WUI is moderate.

Pedregosa Community WUI

The Pedregosa WUI is composed of private, BLM, and USFS lands. This area is located in the south eastern corner of the Chiricahua EMA. This WUI contains ranch properties, including ranch headquarters for the Boss and Husted ranches. Numerous structures and range improvements occupy this area. The Cochise County CWPP analyzed 1,424 acres within the Pedregosa Community WUI for the potential risk to wildland fire.

The combination of structure density, vegetation with high fire potential, and low wildfire ignition history create areas of moderate risk to community values.

The Cochise County CWPP analyses determined that less than 16 percent of the Pedregosa Community WUI is at high risk and that 83 percent is at moderate risk for wildland fire. Due to areas of high wildfire risk, low ignition history, and moderate community values, the overall wildland fire risk rating of the Pedregosa Community WUI is moderate.

Pinery Canyon Community WUI

The Pinery Canyon WUI is located adjacent to and south of Chiricahua National Monument. Landownership is primarily USFS with a few private land inholdings, including a ranch with residential and other related structures at the mouth of the canyon. Approximately o.25 mile up the road on USFS land is the Pinery Cabin administrative site and associated out buildings. Pinery Canyon is a popular area for bird watching and wildlife viewing. The Cochise County CWPP analyzed 1,923 acres within the Pinery Canyon Community WUI for the potential risk to wildland fire.

The combination of structure density, vegetation with high fire potential, and isolated areas of high wildfire ignition history create areas of moderate-high risk to community values.

The Cochise County CWPP analyses determined that less than 58 percent of the Pinery Canyon Community WUI is at high risk and that 42 percent is at moderate risk for wildland fire. Due to areas of high wildfire risk, isolated areas of high ignition history, and moderate-high community values, the overall wildland fire risk rating of the Pinery Canyon Community WUI is high.

Pomerene Comunity WUI

The Pomerene Community WUI is composed of private and state lands located northeast of Benson along North Pomerene Road. Pomerene Volunteer Fire Department provides fire, rescue, and emergency services to the Pomerene community and operates in a volunteer capacity with no full-time personnel employed. The population of the Pomerene Community WUI is estimated to be 1,157 residents occupying approximately 506 housing units. The Pomerene Community WUI has an ISO rating of 10. The Cochise County CWPP analyzed 4,156 acres within the Pomerene Community WUI for the potential risk to wildland fire.

Major vegetation associations include desert wash/xeroriparian corridors, agriculturel, Apacherian-Chihuahuan mesquite upland scrub, and Apacherian-Chihuahuan semi-desert grasslands and steppe. Few wildfire ignitions have been identified within or adjacent to the WUI. The WUI is composed of a mix of large developed private land parcels, residences and agricultural fields of varied assessed value. The combination of mixed housing density, vegetation with low-moderate fire potential, and low wildfire ignition history create areas of moderate risk to community values.

The Cochise County CWPP analyses determined that less than 1 percent of the Pomerene Community WUI is at high risk and that 85 percent is at moderate risk for wildland fire. Due to areas of moderate wildfire risk, areas of low ignition history, and moderate community values, the overall wildland fire risk rating of the Pomerene Community WUI is moderate.

Price Canyon Community WUI

The Price Canyon WUI is composed of USFS and private lands. The private land inholding includes the Price Canyon Ranch. Price Canyon Ranch is a working cattle ranch, as well as a guest ranch featuring a lodge with 10 guest rooms. In addition to the 10-room guest lodge, 4 new buildings that can sleep 10 people each are located on the property, along with a new 1,500-foot meeting/training room. There is another ranch property south of the forest boundary with residential structures and associated ranch infrastructure. The Cochise County CWPP analyzed 3,588 acres within the Price Canyon Community WUI for the potential risk to wildland fire.

The combination of structure density, vegetation with moderate-high fire potential, and low wildfire ignition history create areas of moderate risk to community values.

The Cochise County CWPP analyses determined that 2 percent of the Price Canyon Community WUI is at high risk and that 93 percent is at moderate risk for wildland fire. Due to areas of moderate-high wildfire risk, low ignition history, and moderate community values, the overall wildland fire risk rating of the Price Canyon Community WUI is moderate.

Rucker Canyon Community WUI

The Rucker Canyon WUI is composed of private and USFS lands. The lower part of the canyon has three residential structures including a mining claim and a USFS work station with a total of 8 structures. This area also includes USFS recreation sites (Bathtub, Camp Rucker, Rucker Forest, and Cypress Campgrounds) with associated facilities. Camp Rucker host several historical sites used by the US Army during the1870s and 1880s. The Cochise County CWPP analyzed 7,158 acres within the Rucker Canyon Community WUI for the potential risk to wildland fire.

The combination of structure density, vegetation with high fire potential, and low-moderate wildfire ignition history create areas of moderate-high risk to community values.

The Cochise County CWPP analyses determined that 19 percent of the Rucker Canyon Community WUI is at high risk and that 81 percent is at moderate risk for wildland fire. Due to areas of high wildfire risk, low-moderate ignition history, and low-moderate community values, the overall wildland fire risk rating of the Rucker Canyon Community WUI is moderate.

Rustler Park Community WUI

The Rustler Park WUI is adjacent to the Methodist Camp WUI in the Chiricahua EMA on the Coronado National Forest. This area is in the higher elevations and includes various USFS recreation sites and administrative facilities including Rustler Park campground and Barfoot and Long Parks, which are world renowned for uncommon bird and reptile species. This WUI area also includes Goshawk and Mexican Spotted Owl habitat. The Cochise County CWPP analyzed 1,441 acres within the Rustler Park Community WUI for the potential risk to wildland fire.

The combination of structure density, vegetation with high fire potential, and high wildfire ignition history create areas of high risk to community values.

The Cochise County CWPP analyses determined that 89 percent of the Rustler Park Community WUI is at high risk and that 11 percent is at moderate risk for wildland fire. Due to areas of high wildfire risk, high ignition history, and high community values, the overall wildland fire risk rating of the Rustler Park Community WUI is high.

St. David Community WUI

The St. David Community WUI is composed of private and state lands located east-southeast of Benson along SR 80 and the San Pedro River corridor. The Saint David Fire District provides fire, rescue, and emergency services to the St. Daid community. The St. David Volunteer Fire Department operates in a volunteer capacity with no full-time personnel employed. The 2010 population of the St. David Community WUI is estimated to be 2710 residents occupying approximately 1270 housing units. The St. David Community WUI has an ISO rating of 10. The Cochise County CWPP analyzed 10,568 acres within the St. David Community WUI for the potential risk to wildland fire.

Major vegetation associations include desert wash/xeroriparian corridors, Apacherian-Chihuahuan mesquite upland scrub, Apacherian-Chihuahuan semi-desert grasslands and steppe, and warm desert riparian mesquite bosque. The areas of highest wildfire risk are located along the San Pedro River corridor. This WUI does include areas of moderate risk in during extreme rainfall years within the desert grasslands, particularly from increased light fuels produced from winter annual and perennial native and invasive grasses. Areas with a moderate history of wildfire ignitions occur along SR 80 in the southern portion of the WUI near Escalante Crossing. Public use within the WUI is considered low. The WUI is composed of a mix of large developed private land parcels and traditional residences of varied assessed value and sizes. The combination of mixed housing density, vegetation with varied fire potential, and areas of moderate wildfire ignition history create an overall moderate risk to community values.

The Cochise County CWPP analyses determined that 4 percent of the St. David Community WUI is at high risk and that 64 percent is at moderate risk for wildland fire. Due to areas of high-moderate wildfire risk, areas of moderate ignition history, and moderate community values, the overall wildland fire risk rating of the St. David Community WUI is moderate.

Sierra Vista/Palominas Community WUI

The Sierra Vista/Palominas Community WUI is located in western Cochise County between the Huachuca Mountains and the SPRNCA. This WUI is a heterogeneous but contiguous area composed of private, state, and federal lands within and adjacent to the city limits. The Sierra Vista/Palominas Community WUI includes the incorporated city of Sierra Vista and the unincorporated areas of Hereford and Palominas. The primary transportation corridors in the WUI communities are SR 90 and SR 92, connecting Sierra Vista to Bisbee to the east and the towns of Huachuca City, Whetstone, Benson, and I-10 to the north. The Union Pacific Railroad formerly ran through the SPRNCA from Benson to the southeast.

The area receives fire protection from the City of Sierra Vista Fire Department (SVFD), Fry Fire District (FFD), the Palominas Fire District (PFD), the USFS, and BLM. The SVFD and FFD are operationally integrated and provide fire, rescue, and emergency services to the city of Sierra Vista and the surrounding area north of Three Canyons Road, west of the SPRNCA, and south and east of Fort Huachuca. The PFD provides fire, rescue, and emergency services to the towns of Palominas and Hereford and their adjoining communities, as well as mutual aid to SVFD and FFD. The SVFD, FFD, PFD, USFS, and BLM respond to wildland fires throughout the area.

The population of the Sierra Vista/Palominas Community WUI is estimated to be 59,276 residents occupying 27,008 housing units. The WUI is a mix of urban and ex-urban—large developed commercial and private land parcels with traditional housing subdivisions and dispersed residences of varied assessed value. The Sierra Vista/Palominas Community WUI has an ISO rating of 4 within the borders of the city of Sierra Vista, north of Buffalo Soldier Trail. Areas south of the city of Sierra Vista have

limited water available for fire suppression, resulting in higher risk. Cochise County CWPP analyzed 133,901 acres within the Sierra Vista/Palominas Community WUI for the potential risk to wildland fire.

Major vegetation associations include desert wash/xeroriparian corridors, Apacherian-Chihuahuan semi-desert grasslands and steppe, Apacherian-Chihuahuan mesquite upland scrub and Chihuahuan creosotebush mixed desert and thorn scrub vegetations in lower elevations, with Madrean UpperMontane Conifer-Oak forest and woodland associations occurring in higher elevations of the Huachuca Mountains in the western portion of the WUI.

Public use within the WUI is considered high. Areas with a high and moderate history of wildfire ignitions occur in the west-central portion of the WUI in the eastern foothills of the Huachuca Mountains in the area of Ramsey Canyon and surrounding Hereford. The Sierra Vista/Palominas WUI is further broken down into three management areas: SVP1, SVP2, and SVP3 (see Figure 3.1).

SVP1 is the area southwest of Buffalo Soldier Trail, west of SR 92 as it continues south, and then west of Coronado Memorial Road on a line that continues south to the US-Mexico border. It includes the canyons on the east side of the Huachucas, and the grassland, mesquite, oak woodland, and pine-oak vegetation types are present. The southern canyons burned during the 2011 Monument Fire (Ash, Stump, Hunter, Miller, and parts of Carr) resulting in extreme fire behavior and loss of many homes. To the north, parts of Carr, Ramsey, and Brown Canyons remain unburned. The area includes three public attractions—Brown Canyon Ranch, the Arizona Folklore Preserve, and The Nature Conservancy's Ramsey Canyon Preserve—as well as many residential neighborhoods and recreational forest areas. Fire risk in these areas is compounded by narrow roads, with few turnouts, heavy fuel loading, and limited water supply infrastructure.

The SVP1 management area also includes the headquarters of Coronado National Memorial and two private residences on an inholding within the memorial boundary near the entrance. Just outside the memorial boundary are several private homes with medium to large-size lots. Within the memorial boundary is government housing for several park employees, and temporary housing for interns and scientists. There is also a picnic ground. Other administrative structures are included, such as a visitor center, administrative offices, maintenance shop, and storage buildings, and a US Border Patrol observation tower. The number of people within this area ranges from about 15 to 550, with the lowest during May and June, the quietest tourist season. Occasionally busloads of tourists stop in.

Nearly all of the area burned in the 2011 Monument Fire, but the area right around the buildings were part of burnout operations. Burn severity was low around the buildings, and although the fire removed some vegetation, some was left, and it is regrowing rapidly. Thinning before and after the fire has also reduced fuel load. The eastern part of the area is grassy, with much heavy Lehmann lovegrass, and updrainage to the west, terrain becomes steeper with more woody vegetation. Rapid rate of spread and intense fire behavior with spot-fires is possible, especially when wind blows upcanyon. Vegetation is native grassland, invaded Lehmann lovegrass grassland, and woodland with oak, juniper, and

manzanita, which is dense in places. There is only one good way in and one way out of this drainage. Going out over Montezuma Pass during a fire would be slow, and people could be caught by the fire.

SVP2 is the area east of Buffalo Soldier Trail and north of Hereford Road and includes low risk urban development and moderate risk lower density areas interspersed within grassland, mesquite, and desertscrub vegetation types.

SVP3 is the area east of SR 92 and Coronado Memorial Road as it continues south, south of Hereford Road. This area of ex-urban development consists of residential lots no smaller than 4 acres each. This WUI does include areas of moderate risk in lower elevations after extreme rainfall years within the desert grasslands, particularly from increased light fuels produced from perennial native and invasive grasses.

The combination of mixed housing density, vegetation with high fire potential, and high wildfire ignition history create an overall moderate risk to community values with high risk to community values in areas closer to the Huachuca Mountains, as shown on Figure 3.1.

For the overall Sierra Vista/Palominas Community WUI (133,876 acres), the analyses determined approximately 9 percent (11,831 acres) as high risk, 54 percent (72,889 acres) moderate risk, and 37 percent (49,146) low risk (Table 2.8). The three management areas present distinctly different risk levels:

Treatment Management Unit	High Risk	Moderate Risk	Low Risk
SVP1	36.19%	58.93%	4.88%
SVP2	0.09%	40.92%	58.99%
SVP3	1.03%	63.81%	35.15%

Skeleton Canyon Community WUI

The Skeleton Canyon WUI is located in the northwestern portion of the Peloncillo EMA, about 8 miles southeast of Apache, Arizona, at the mouth of Skeleton Canyon. USFS and private lands compose this WUI. Just north of the forest boundary on private land, lies a ranch property with numerous residential structures and associated infrastructure. The area is rich in history, with Geronimo's last known surrender site being located at the Skeleton Canyon Ranch. The Cochise County CWPP analyzed 963 acres within the Skeleton Canyon Community WUI for the potential risk to wildland fire.

The combination of structure density, vegetation with low to moderate fire potential, and low wildfire ignition history create areas of moderate risk to community values.

The Cochise County CWPP analyses determined that less than 1 percent of the Skeleton Canyon Community WUI is at high risk and that 63 percent is at moderate risk for wildland fire. Due to areas of

moderate-low wildfire risk, low ignition history, and moderate community values, the overall wildland fire risk rating of the Skeleton Canyon Community WUI is moderate.

Sonoita-Elgin Community WUI

The Sonoita-Elgin Community WUI is composed of private, state and federal lands within and adjacent to the Whetstone and Mustang Mountains in western Cochise County, northwest of Huachuca City. The Sonoita-Elgin Community WUI adjoins the Pima-Cochise County border and is adjacent to the Sonoita-Elgin Fire District boundary. The population of the Sonoita-Elgin Community WUI is estimated to be 31 residents occupying 12 housing units. There are no fire departments within the Sonoita-Elgin Community WUI. The Sonoita-Elgin Community WUI has an ISO rating of 10. The Cochise County CWPP analyzed 14,157 acres within the Sonoita-Elgin Community WUI for the potential risk to wildland fire. The primary transportation corridors in the WUI community is SR 82 traversing the WUI from the east and west at its southern perimeter.

Major vegetation associations include desert wash/xeroriparian corridors, Apacherian-Chihuahuan mesquite upland scrub, Apacherian-Chihuahuan semi-desert grasslands and steppe, and Chihuahuan-creosotebush mixed desert and thorn scrub vegetations in lower elevations, with Mogollon Chaparral associations occurring in higher elevations toward the foothills of the Whetstone Mountains to the north of the WUI. The areas of highest wildfire risk are located in the northern portion of the WUI and are associated with the chaparral vegetation associations within the Whetstone Mountains. This WUI does include areas of moderate risk in lower elevations during extreme rainfall years within the desert grasslands, particularly from increased light fuels produced from winter annual and perennial native and invasive grasses. Wildfire ignitions are few and are dispersed throughout the WUI. Public use within the WUI is considered low. The WUI is composed of dispersed residences located in the southern portion of the WUI. The combination of low housing density, vegetation with high-moderate fire potential and isolated areas of moderate wildfire ignition history create a low-moderate risk to community values.

The Cochise County CWPP analyses determined that 1 percent of the Sonoita-Elgin Community WUI is at high risk and that 74 percent is at moderate risk for wildland fire. Due to areas of high-moderate wildfire risk, areas of moderate ignition history, and moderate community values, the overall wildland fire risk rating of the Sonoita-Elgin Community WUI is moderate.

Tex Canyon Community WUI

The Tex Canyon WUI is located just north of the Pedregosa WUI adjacent to USFS land. The Krentz Ranch headquarters is located just east of the forest boundary. Values at risk include residential structures and associated range improvements (fence, water tanks, windmills). Other values include Chiricahua Leopard Frog habitat. The Cochise County CWPP analyzed 893 acres within the Tex Canyon Community WUI for the potential risk to wildland fire.

The combination of structure density, vegetation with moderate fire potential, and low wildfire ignition history creates a low risk to community values.

The Cochise County CWPP analyses determined that the Tex Canyon Community WUI is not at high risk and that 24 percent is at moderate risk for wildland fire. Due to areas of moderate-low wildfire risk, low ignition history, and low community values, the overall wildland fire risk rating of the Tex Canyon Community WUI is low.

Turquoise Hills Community WUI

The Turquoise Hills Community WUI is composed of private and state lands located northeast of Benson along I-10, SR 80 and the San Pedro River corridor. There are no fire departments within the Turquoise Hills Community WUI. The population of the Turquoise Hills Community WUI is estimated to be 2,193 residents occupying approximately 1,001 housing units. The Turquoise Hills Community WUI has an ISO rating of 10. The Cochise County CWPP analyzed 14,3028 acres within the Turquoise Hills Community WUI for the potential risk to wildland fire.

Major vegetation associations include desert wash/xeroriparian corridors, Apacherian-Chihuahuan mesquite upland scrub, Apacherian-Chihuahuan semi-desert grasslands and steppe, Chihuahuan-creosotebush mixed desert and thorn scrub and Chihuahuan mixed salt desert scrub. The areas of highest wildfire risk are located along the San Pedro River corridor. This WUI does include areas of moderate risk in during extreme rainfall years within the desert grasslands, particularly from increased light fuels produced from winter annual and perennial native and invasive grasses. Areas with a moderate history of wildfire ignitions occur along I-10 in the northern portion of the WUI near Fenner. Public use within the WUI is considered low. The WUI is composed of a mix of large developed private land parcels and traditional residences of varied assessed value and sizes. The combination of mixed housing density, vegetation with moderate-high fire potential, and overall low wildfire ignition history create areas of moderate risk to community values.

The Cochise County CWPP analyses determined that less than 1 percent of the Turquoise Hills Community WUI is at high risk and that 65 percent is at moderate risk for wildland fire. Due to areas of high-moderate wildfire risk, areas of low ignition history, and moderate community values, the overall wildland fire risk rating of the Turquoise Hills Community WUI is moderate.

West Gate Community WUI

The West Gate WUI is primarily FS land with a few private land inclusions. This WUI is situated at the northwest corner of the Huachuca Mountains between the Sonoita-Elgin CWPP boundary, which includes the West Gate subdivision, Lyle and Brushy Canyons, and the residences and structures associated with these communities and the West Gate of Fort Huachuca. The Cochise County CWPP analyzed 4,630 acres within the West Gate Community WUI for the potential risk to wildland fire.

The combination of structure density, vegetation with high fire potential, and low-moderate wildfire ignition history create areas of moderate risk to community values.

The Cochise County CWPP analyses determined that 5 percent of the West Gate Community WUI is at high risk and that 92 percent is at moderate risk for wildland fire. Due to areas of high wildfire risk, low ignition history, and moderate community values, the overall wildland fire risk rating of the West Gate Community WUI is moderate.

West Turkey Creek/Sunizona Community WUI

The West Turkey Creek/Sunizona Community WUI is composed of private, state and federal lands within and adjacent to the Chiricahua Mountains in eastern Cochise County, near the town of Pearce. There are no fire departments within the West Turkey Creek/ Sunizona Community WUI. The population of the West Turkey Creek/Sunizona Community WUI is estimated to be 690 residents occupying 519 housing units. The West Turkey Creek/ Sunizona Community WUI has an ISO rating of 10. The Cochise County CWPP analyzed 45,405 acres within the West Turkey Creek/ Sunizona Community WUI for the potential risk to wildland fire. The primary transportation corridor is SR 181, which traverses the WUI from the east and west, with East Turkey Creek Road providing access to far eastern portions of the WUI.

Major vegetation associations include desert wash/xeroriparian corridors, Apacherian-Chihuahuan semi-desert grasslands and steppe, Apacherian-Chihuahuan mesquite upland scrub and Madrean Pinyon-Juniper woodland occurring in higher elevations toward the foothills of the Chiricahua Mountains to the east of the WUI. The areas of highest wildfire risk are located within the canyons and low foothills associated with the Chiricahua Mountains. This portion of the WUI does include areas of moderate risk in lower elevations during extreme rainfall years within the desert grasslands, particularly from increased light fuels produced from winter annual and perennial native and invasive grasses. Areas with a high and moderate history of wildfire ignitions occur adjacent to the eastern portions of the WUI in the western foothills of the Chiricahua Mountains. Public use within the WUI is considered high. The WUI is composed of a mix of large developed private land parcels and dispersed residences of varied assessed value. The combination of mixed housing density, vegetation with high fire potential and, moderate wildfire ignition history create areas of high risk in the eastern portion of the WUI and moderate risk in the remainder of the WUI to community values.

The Cochise County CWPP analyses determined that 6 percent of the West Turkey Creek/ Sunizona Community WUI is at high risk and that 86 percent is at moderate risk for wildland fire. Due to areas of high-moderate wildfire risk, areas of moderate ignition history, and moderate community values, the overall wildland fire risk rating of the West Turkey Creek/Sunizona Community WUI is moderate.

Willcox Community WUI

The Willcox Community WUI is composed of private and state lands north of the Willcox Range in north-central Cochise County. The Willcox Volunteer Fire Department provides fire, rescue, and emergency services to the Willcox Community WUI out of two fire stations stations. The population of the Willcox Community WUI is estimated to be 6,659 residents occupying 2,979 housing units. The Willcox Community WUI has an ISO rating of 10. The Cochise County CWPP analyzed 56,352 acres within the Willcox Community WUI for the potential risk to wildland fire. The primary transportation corridor is I-10, which bisects the WUI from southwest to northeast.

Major vegetation associations include desert wash/xeroriparian corridors, Apacherian-Chihuahuan semi-desert grasslands and steppe and Apacherian-Chihuahuan mesquite upland scrub. The areas of highest wildfire risk are located along the numerous desert washes and grasslands. This WUI does include areas of moderate risk in lower elevations during extreme rainfall years within the desert grasslands, particularly from increased light fuels produced from winter annual and perennial native and invasive grasses. Areas with a moderate history of wildfire ignitions occur along I-10 bisecting the WUI from southwest to south east. Public use within the WUI is considered low. The WUI is composed of a mix of large developed private land parcels and traditional housing subdivisions of varied assessed value. The combination of mixed housing density, vegetation with low-moderate fire potential, and moderate-high wildfire ignition history create areas of moderate-high risk to community values.

The Cochise County CWPP analyses determined that less than 1 percent of the Willcox Community WUI is at high risk and that 75 percent is at moderate risk for wildland fire. Due to areas of moderate wildfire risk, areas of high ignition history, and moderate-high community values, the overall wildland fire risk rating of the Willcox Community WUI is moderate.

Willow Lakes Community WUI

The Willow Lakes Community WUI is composed of private and state lands north of the Benson and Pomerene WUI's at the base of the Little Rincon Mountains, adjacent to the San Pedro River corridor in west-central Cochise County. There are no fire departments within the Willow Lakes Community WUI. The population of the Willow Lakes Community WUI is estimated to be 1,343 residents occupying 682 housing units. The Willow Lakes Community WUI has an ISO rating of 10. The Cochise County CWPP analyzed 9,764 acres within the Willow Lakes Community WUI for the potential risk to wildland fire.

Major vegetation associations include desert wash/xeroriparian corridors, Apacherian-Chihuahuan semi-desert grasslands and steppe, Apacherian-Chihuahuan mesquite upland scrub and agriculture. Wildfire ignitions are moderate and are isolated in the center if the WUI. Public use within the WUI is considered low. The WUI is composed of a mix of large developed private land parcels and residences of varied assessed value. The combination of mixed housing density, vegetation with low-moderate fire potential, and low wildfire ignition history create areas of moderate risk to community values.

The Cochise County CWPP analyses determined that less than 1 percent of the Willow Lakes Community WUI is at high risk and that 63 percent is at moderate risk for wildland fire. Due to areas of low-moderate wildfire risk, areas of low ignition history, and moderate community values, the overall wildland fire risk rating of the Willow Lakes Community WUI is moderate.

Wood Canyon Community WUI

The Wood Canyon WUI is located on the north end of the Chiricahua EMA. It is composed of USFS land with a private land inholding. The private land includes a ranch property in the bottom of Wood Canyon. The ranch includes a residential dwelling, along with various out buildings and associated ranch infrastructure including corrals. The Cochise County CWPP analyzed 1,584 acres within the Wood Canyon Community WUI for the potential risk to wildland fire.

The combination of structure density, vegetation with high fire potential, and low wildfire ignition history create areas of moderate-high risk to community values.

The Cochise County CWPP analyses determined that 32 percent of the Wood Canyon Community WUI is at high risk and that 67 percent is at moderate risk for wildland fire. Due to areas of high wildfire risk, low ignition history, and moderate-high community values, the overall wildland fire risk rating of the Wood Canyon Community WUI is moderate.

Malpai Borderland Group

The Malpai Borderlands Group (MBG) was formally organized as a non-profit organization in 1994. Since then, the group has pursued activities in several program areas directed at protecting and restoring the ecological diversity and productivity of lands within an 800,000-acre region that extends from the foot of the Chiricahua Mountains in Arizona east to the Playas Valley in southwestern New Mexico. According to the MBG Web site (http://www.malpaiborderlandsgroup.org/),

> The Malpai Borderlands Group is organized and led by ranchers who live and work primarily in Southeast Arizona and Southwest New Mexico. It is a collaborative effort that is built around goals shared by neighbors within our community. Our group originated as a series of informal discussions among ranching neighbors who recognized that a way of life, and a wild landscape, that they all loved was being threatened by spread of development and subdivision from nearby towns.

In 2012 the MBG developed a fire management plan (FMP) to recognize that “fire is a key natural process that has maintained a healthy, resilient, productive and diverse landscape for centuries . . . Allowing fire back into the ecosystem is a strategy for restoring the natural and their renowned diversity” (MBG 2012). Fire management goals established in the MBG FMP include the following:

- Maintain firefighter and public safety for all fire management activities
- Reduce the risk of wildfire damages to communities
- Minimize resource damage
- Maintain the health and integrity of the Malpai Borderlands landscape by allowing appropriate use of fire
- Maintain a collaborative, partnership-based fire management program

The MBG FMP describes three general fire management actions that will be employed to meet the MBG FMP goals. These include fire for resource benefit, wildfire suppression, and prescribed fire. The MBG and the Cochise County CWPP Core Team recognize the similarity and complementary goals of the CWPP and the MBG FMP and encourage continued coordination between the Cochise County CWPP Core Team and the MBG Board of Directors.

Cumulative Risk Analysis

The cumulative risk analysis synthesizes the risk associated with fuel hazards, wildfire ignitions, wildfire occurrence, and community values. These different components were analyzed spatially, and an overall cumulative risk for the WUI was calculated. Figure 2.6 and Table 2.8 display the results of the cumulative risk analyses, identifying the areas and relative percentages of WUI areas of high, moderate, and low risk.

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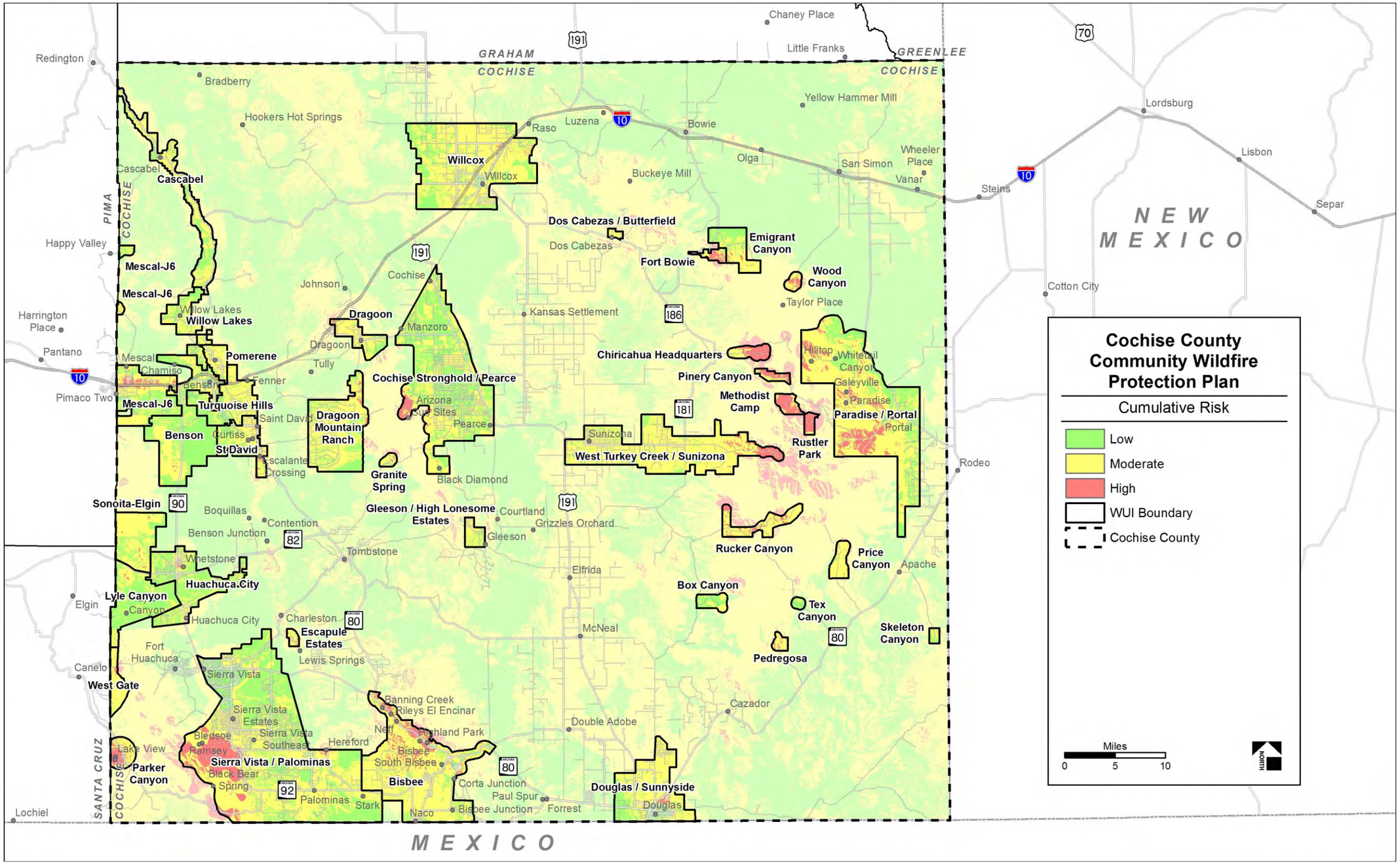

Figure 2.6. Cochise County CWPP Cumulative Risk Analysis

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Table 2.8. Cumulative Risk Levels, by Percentage of the WUI Area

Cochise County CWPP Sub-WUI	High Risk (%)	Acres	Moderate Risk (%)	Acres	Low Risk (%)	Acres	Total Acres
Benson	<1	140	43	14,174	57	19,038	33,351
Bisbee [a]/*	10	5,465	80	40,994	11	5,705	52,164
Box Canyon	<1	1	40	1,141	60	1,746	2,887
Cascabel [a]/*	<1	14	72	11,707	28	4,629	16,350
Chiricahua Headquarters [a]	67	2,222	32	1077	1	40	3,339
Cochise Stronghold/ Pearce	3	1,626	49	31,464	49	31,725	64,815
Douglas/ Sunnyside	1	361	72	18,425	27	6,898	25,684
Dos Cabezas/ Butterfield	5	41	93	704	2	17	762
Dragoon	2	135	79	5,291	19	1,253	6,679
Dragoon Mountain Ranch	1	380	73	19,860	26	7,016	27,257
Emigrant Canyon	4	309	56	4,473	40	3,240	8,023
Escapule Estates	9	91	85	914	6	67	1,072
Fort Bowie	40	757	56	1,045	4	73	1,875
Gleeson High Lonesome	<1	25	79	2,432	20	631	3,087
Granite Spring	9	104	76	882	15	178	1,164
Huachuca City	1	220	45	9,982	54	11,875	22,078
Lyle Canyon	<1	80	32	5,950	67	12,495	18,524
Mescal-J6	8	1,503	58	11,470	34	6,811	19,783
Methodist Camp	73	1,921	28	718	0	0	2,639
Paradise/Portal [a]	11	7,852	65	47,415	24	17,652	72,919
Parker Canyon [a]	41	1,776	59	2,552	<1	13	4,340
Pedregosa	16	229	83	1,185	<1	10	1,424
Pinery Canyon	58	1,117	42	806	0	0	1,923
Pomerene	<1	0	85	3,553	15	603	4,156
Price Canyon	2	80	93	3,333	5	176	3,588
Rucker Canyon	19	1,337	81	5,814	<1	7	7,158
Rustler Park	89	1,288	11	153	0	0	1,441
Sierra Vista/ Palominas [a] (includes Coronado National Memorial)	9	11,831	54	72,889	37	49,146	133,876
Skeleton Canyon	<1	1	63	603	37	359	963
Sonoita-Elgin	1	160	74	10,419	25	3,578	14,157
St. David	4	446	64	6,711	32	3,412	10,568
Tex Canyon	0	0	24	212	76	682	893
Turquoise Hills	<1	34	65	9,330	35	4,938	14,302
West Gate	5	248	92	4,259	3	123	4,630
West Turkey Creek [a]/ Sunizona	6	2,492	86	38,836	9	4,087	45,416

Table 2.8. Cumulative Risk Levels, by Percentage of the WUI Area

Cochise County CWPP Sub-WUI	High Risk (%)	Acres	Moderate Risk (%)	Acres	Low Risk (%)	Acres	Total Acres
Willcox	<1	267	75	42,502	24	13,593	56,352
Willow Lakes	<1	13	63	6,169	37	3,582	9,764
Wood Canyon	32	508	67	1,064	<1	12	1,584
Total	6.0	45,076	63.00	440,506	31.00	215,408	700,990

Source: Logan Simpson Design Inc.

[a] These communities are listed in the *Arizona Identified Communities at Risk* (ASFD 2009a).

* Existing CWPP.

III. COMMUNITY MITIGATION PLAN

This section outlines Cochise County CWPP priorities for wildland fuels treatments, as well as the recommended methods of treatment and management strategies for mitigating the potential spread of catastrophic wildland fire throughout the WUI. This section also presents recommendations for enhanced wildland fire protection capabilities and public education, information, and outreach.

A. Fuel Reduction Priorities

After determining the areas at greatest risk for wildland fire (Section II of this CWPP), the Core Team developed a series of proposed actions that include residential treatments, fuelbreaks appropriate for the wildland fuel types, and fuel mitigation treatments for undeveloped landscapes (Table 3.1). The Core Team has proposed wildland fire mitigation projects for at-risk federal, public, and private lands. These proposed actions are recommended to prevent wildfire spread from public lands onto private land and, conversely, to reduce the risk of fires spreading from private land onto public lands by reducing wildland fuels and creating a survivable space. A “survivable space” is the area around a structure where the vegetation has been managed to reduce fire intensity as a wildfire nears and to reduce the chance of fire from reaching and burning the structure. A primary goal of the Cochise County CWPP is for proposed treatments to be continuous across property boundaries, both federal and private, allowing for the most effective protection from wildfires. Hazardous fuels reduction recommendations on federal and private lands vary by constituting a single fuelbreak in appropriate width and length within the WUI or implementing broader land treatment applications of wildland fuel reduction within or adjacent to the WUI (NPS 2005a, 2005b, 2005c; USFS 2013; BLM 2013). Additional fuelbreaks or hazardous fuels reduction projects may be developed over time and will conform to the types of treatment recommendations developed by the Core Team. The Core Team recognizes the responsibility of private landowners in creating and maintaining survivable wildland fire space on their lands to enhance protection of values within their properties. The Core Team supports and encourages private landowners to become involved with wildland fire protection and the creation of survivable space. The CCOES, ASFD, CNF, NPS, BLM, local fire departments and districts, and the Core Team’s participating resource specialists developed wildland fuel reduction recommendations by vegetative fuel types. These recommendations are based on firebrand movement during the peak fire season under normal seasonal weather conditions in relation to slope, aspect, and fuel type. The recommended land treatments and fuelbreaks will enhance public and firefighter safety, provide for community value protection, enhance restoration of native vegetation, and provide for wildlife habitat needs. In this plan, *fuelbreak* means a strip of land where vegetation has been modified so that fires burning into it can be more readily controlled.

Several designated wilderness areas are within or adjacent to the Cochise County CWPP WUI: Miller Peak and Chiricahua Wilderness areas (USFS); Redfield Canyon, Peloncillo Mountains, and Dos Cabezas Mountains Wilderness areas (BLM); and Chiricahua National Monument Wilderness (NPS). Wildland fuel mitigation treatments within wilderness areas will be conducted by BLM, NPS, and CNF under appropriate wilderness regulations. The Core Team may recommend fuelbreaks along specific

identified private inholdings adjacent to wilderness boundaries to allow BLM and CNF access for wildfire response (NPS 2005a, 2005b, 2005c; USFS 2013; BLM 2013).

The wildland vegetative fuel and fuelbreak recommended treatments meet the Cochise County CWPP goals of enhancing firefighter and public safety, reducing hazardous wildland fuels on public and private lands, improving fire prevention and suppression, restoring riparian and forest and rangeland health, involving the community, and expediting project implementation. To prioritize wildland fuel mitigation projects, the Core Team analyzed wildland fuel hazards, fire history, and community values. This combined risk assessment was compiled in a single community base map depicting areas of low-, moderate-, and high-risk evaluations (see Figure 2.6). These risk areas were further identified and categorized into a total of 57 treatment management units within 38 community WUIs, with an overall risk value determined for each treatment management unit (Figure 3.1).

Table 3.1. Fuel Modification and Treatment Plans

Treatment No.	1 Developed Parcels <2 Acres				2 Undeveloped private parcels or single-structure parcels >2 acres		3 Grassland Fuelbreaks		4 Oak/Pinyon/Juniper and Shrublands within the WUI	
Treatment Category	**Zone 1 (0–10 feet from structures)**	**Zone 2 (10–30 feet from structures)**	**Zone 3 (30–100 feet from structures)**	**Zone 4 (100–600 feet around home)**	**Slopes <20%**	**Streambeds, Channels, and Slopes ≥20%**	**Slopes <20%**	**Slopes ≥20%**	**Landscape Treatment outside Fuelbreaks**	**Fuelbreaks**
Vegetation	Remove ladder fuels by pruning the lower third of trees or shrubs up to a maximum of 10 feet to reduce flammable vegetation. Remove and destroy insect-infested, diseased, and dead trees and shrubs. Grasses and forbs may be cut with a mower to a 4-inch stubble. Remove dead plant material from ground; prune tree limbs overhanging roofs; remove branches within 10 feet of chimneys; remove flammable debris from gutters and roof surfaces.	Remove ladder fuels by pruning the lower third of trees or shrubs up to a maximum of 10 feet; remove and destroy insect-infested, diseased, and dead trees. Create separation between trees, tree crowns, and other plants according to fuel type, density, slope, and other topographical features. Reduce continuity of fuels by creating a clear space around brush or planting groups. Grasses and forbs may be cut with a mower to a 4-inch stubble. All snags and vegetation that may grow into overhead electrical lines, other ground fuels, ladder fuels, dead trees, and thinning from live trees must be removed. Control soil erosion from small waterflow channels by using rock or noncombustible velocity-reducing structures.	Remove ladder fuels by pruning the lower third of trees or shrubs up to a maximum of 10 feet; remove and destroy insect-infested, diseased, and dead trees. Maximum density of trees (whichever is greater: 60 basal area at 80–100 trees/acre *or* average density of 100 trees/acre). Grasses and forbs may be cut with a mower to a 4-inch stubble.	For natural areas, thin selectively and remove highly flammable vegetation. Carefully space trees; choose Firewise plants (see online list: http://www.firewise.org/usa/fw_plantlists.htm).	Remove ladder fuels by pruning the lower third of trees or shrubs up to a maximum of 8 feet; remove and destroy insect-infested, diseased, and dead trees. Maximum density of trees should reflect fire resiliency status appropriate for the fire-adapted vegetation community See the Fuel Modification Plan (this section) developed to promote riparian health, to prevent spread of fire to adjacent property, and to create survivable space with considerations for wildlife and groundwater protection. Single structure or structures on parcels exceeding 2 acres should include Treatment 1 in proximity to structures and Treatment 2 for remaining acres.	Remove dead, diseased, and dying trees. Fell dead trees away from stream channels with defined bed and banks. Areas should be hand-thinned and hand-piled; inaccessible areas may be treated with periodic prescribed fire. Develop a fuel modification plan (this section) for treatments.	Grassland types may be mechanically treated, including mowing, baling, chopping, or mastication, to reduce or remove vegetation or may be grazed to a suitable stubble height. Ensure that treatment of vegetation within a designed fuelbreak of >1 chain (66 feet) in width and length is necessary to enhance protection of federal, state, or private land values. Fuel reduction treatments within grassland vegetation types may include multiple-entry burns to maintain stand structure and reduce fine fuels. Trees and shrubs should be thinned to a variable distance to reflect fire resiliency status appropriate for the fire-adapted vegetation community. Mechanical/chemical or grazing treatment may be used to maintain fuelbreaks on private lands. See the Fuel Modification Plan (this section) developed to prevent spread of fire to adjacent property and to create defensible space with considerations for wildlife and groundwater protection.	Same as for slopes <20%. Fuel treatments may require hand-thinning and hand-piling or grazing in steep slopes. Prescribed fire may be used to reduce high fire potential (see Treatment 5). Designated fuelbreaks may be increased to more than 2 chains in steep slopes where herbaceous (fine fuels) and subshrub species fuel loads increase to pretreatment levels within 3 years. See the Fuel Modification Plan (this section) developed to promote forest health, to prevent spread of fire to adjacent property, and to create defensible space with considerations for wildlife and groundwater protection.	Spacing may be variable to promote (1) wildlife habitat while breaking horizontal fuel loading, which allows for patches of closely spaced trees for adequate cover, and (2) other habitat components while incorporating openings to increase herbaceous forage production, to maximize edge effect, and to promote fire-resilient stands. Mechanical thinning, mastication, and prescribed fire (see Treatment 5) can be used to reduce fuels by removing dead standing oaks and junipers to move stands toward potential natural vegetation groups as described in the *FRCC Interagency Handbook* (FRCC Interagency Working Group 2005b) or grazed to like conditions. All trees >10 inches diameter should be targeted as "leave trees" unless treatment is necessary to reflect fire resiliency status appropriate for the fire-adapted vegetation community	Woodland and shrub trees should be thinned to reflect fire resiliency status appropriate for the fire-adapted vegetation community, or prescribed fire should be applied to achieve like conditions. Shrub and tree trunks should be severed <4 inches from the ground. Mechanical treatments, such as crushing, chipping, mastication, and prescribed fire, may be used to create open stands to minimize crown-fire potential and to produce fuel conditions conducive to suppression action. Herbaceous and subshrub understory may be mechanically treated, including mowing, chopping, and masticating, or may be grazed to limit fine-fuel loading while protecting soil integrity .Herbicide application may be used to prevent resprouting/regrowth of trees, and broad-scale invasions of woody species.
Slash	Remove or reduce natural flammable material 2–4 feet above the ground around improvements. Remove vegetation that may grow into overhead electrical lines, ladder fuels, and dead trees; thinning from live trees must be removed (chipped, etc.). Remove all leaf litter to a depth of 1 inch.	Remove all leaf litter to a depth of 1 inch.	Same as Zones 1 and 2.	Slash may be burned, piled and burned, or chipped and removed. Slash from grassland treatments may be burned, removed, masticated, turned, or grazed for like treatment.	All slash, snags, and vegetation that may grow into overhead electrical lines; other ground fuels; ladder fuels; dead trees; and thinning from live trees must be removed, mechanically treated (chipped, etc.), or piled and burned along with existing fuels.	Clean dead and down debris in channels where debris may be mobilized in floods and thus create downstream jams. Some slash and debris can be scattered and retained in small, ephemeral streambeds in which slash can help retain runoff and sediment and provide headcut stabilization.	Slash from grassland treatments may be burned, removed, masticated, or turned (disked).	Same as for slopes <20%; however, slash may be hand-piled and ignited with prescribed fire as the primary slash reduction treatment.	Slash may be burned, piled and burned, or chipped and removed. Slash from grassland treatments may be burned, removed, masticated, or turned.	Slash may be burned, piled and burned, or chipped and removed. Slash from grassland treatments may be burned, removed, masticated, or turned.

Treatment No.	5 Prescribed Fire	6 Riparian Areas (federal, nonfederal, and private lands)		7 Saltcedar Removal for Restoration Purposes (federal and nonfederal lands)	8 Forest Types (federal and nonfederal lands)	
Treatment category	**Federal, State, or Private Lands**	**Federal or State Lands**	**Fuelbreaks on Private Lands**	**Federal, State, or Private Lands**	**Thinning**	**Shaded Fuelbreaks**
Vegetation	Prescribed fire should be used as a tool to accomplish specific resource management objectives in accordance with standards and guidelines from ASLD, ASFD, NPS, CNF, BLM, or all of the above. Prescribed fire on federal land is authorized if part of an approved prescribed-fire plan. As additional areas within the WUI are identified, prescribed fire may be used as a treatment tool provided that a prescribed fire plan has been approved and that all conditions set forth have been met. Prescribed fire can occur at low, moderate, and/or high intensity depending on the vegetation type and treatment objectives.	Riparian treatments should be limited in scope. The majority of riparian areas that fall within the WUI boundary will be avoided unless deemed a fuel hazard. Clearing or cutting of any material by mechanized equipment adjacent to any stream on federal land may be prohibited to prevent the risk of accelerating erosion. Treatments may include some overstory removal of deciduous riparian trees and shrubs in areas where encroachment has increased heavy woody fuels (emphasizing removal and control of saltcedar and other invasive trees). Treatments will emphasize nonnative species. Snags may be retained in accordance with agency guidelines. Presettlement trees, including snags, will be targeted for retention.	Private land treatment should use hand tools, chain saws, or mowers. Dead vegetation and slash should be removed. Ladder fuels, including limbs and branches, should be removed up to a maximum of 8 feet aboveground. All mechanized equipment must meet state and local fire-department/district standards. Perform treatments October–March annually. Chemical treatment of annuals may be best when annuals are green.	Areas of monotypic saltcedar, or saltcedar in mix with mesquite or other riparian tree species, may be treated mechanically or chemically or by controlled burning and reburning to reduce stem density, canopy, and excessive fuel loading. Mechanical removal for saltcedar by cutting below the root collar during November–January is preferred. Mechanical whole-tree extraction has achieved as high as 90% mortality on initial treatments and may be considered a preferred treatment. Low-volume oil-based herbicide applications in late spring through early fall would be considered for controlling small plants (<2 inch-diameter at root collar). Low-volume cut-stump herbicide applications should be considered in combination with mechanical treatment. Preferred phenological stage for burning is peak summer months and after bird breeding season. Black lines and appropriate headfires should be initiated depending on site-specific vegetative and burning conditions (Zouhar 2003). Maintenance, revegetation, restoration, and monitoring should follow as needed for each treatment area.	Lands may be thinned from below to reduce understory vegetation. Residual stocking levels for sites of predominantly ponderosa pine, or mixed conifer overstory would be reduced to reflect fire resiliency status appropriate for the fire-adapted vegetation community. All trees larger than agency diameter limits stated would not be cut even if the desired stocking level is not being met. In those cases, all tress smaller may be cut, but with some vegetation retained to provide a mosaic pattern.	Shaded fuelbreaks would only be planned around residential areas. A shaded fuelbreak is a type of fuelbreak within forested lands in which a band of larger mature trees (that are more fire resistant) are left in place with a relatively open understory. Enough mature trees are left to provide shade to keep the understory from redeveloping. The fuelbreak is designed to significantly slow the speed of a wildfire, All dead standing trees, of any size, would be removed. A shaded fuelbreak width of approximately 330 feet is necessary to reduce fire crowning.
Slash	Slash, piles of small-diameter dead trees or tree limbs (jackpots), and down logs may be burned as appropriate in consideration of local conditions and distance from private property. Pile or prescribed fire can be used to remove fuel from private land as designated. Snags and down woody material may be retained in areas where fire resilience is not compromised.	After removal of heavy woody fuels, fine fuels may be maintained by cool-season low-intensity prescribed fire that moves slowly downslope or into prevailing winds to midslope. Large down woody material and snags (≥12 inches) may be retained in riparian areas.	Fuel treatments and woody material removal should occur on existing roads. Cool-season low-intensity prescribed fire may be used for maintenance of fine fuels. Pile burning or burning stands of small diameter trees (jackpot burning) should not occur in ephemeral, intermittent, or perennial stream channels.	Created slash should be made available for woody biomass use. If not used for wood-related products, slash should be piled with preexisting fuels and burned. Disturbed areas should be immediately revegetated with a native plant community that contains no invasive species and meets other land use objectives, such as wildlife habitat enhancements or recreational-use benefits.	Slash may be lopped and scattered to a thickness of no more than 2 feet deep, then treated later as part of a broadcast burn. Slash may also be piled by hand or machine, and later burned.	Slash would be piled and burned.

Note: ASFD = Arizona State Forestry Division; ASLD = Arizona State Land Department; BLM = Bureau of Land Management; CNF = Coronado National Forest; NPS = National Park Service.

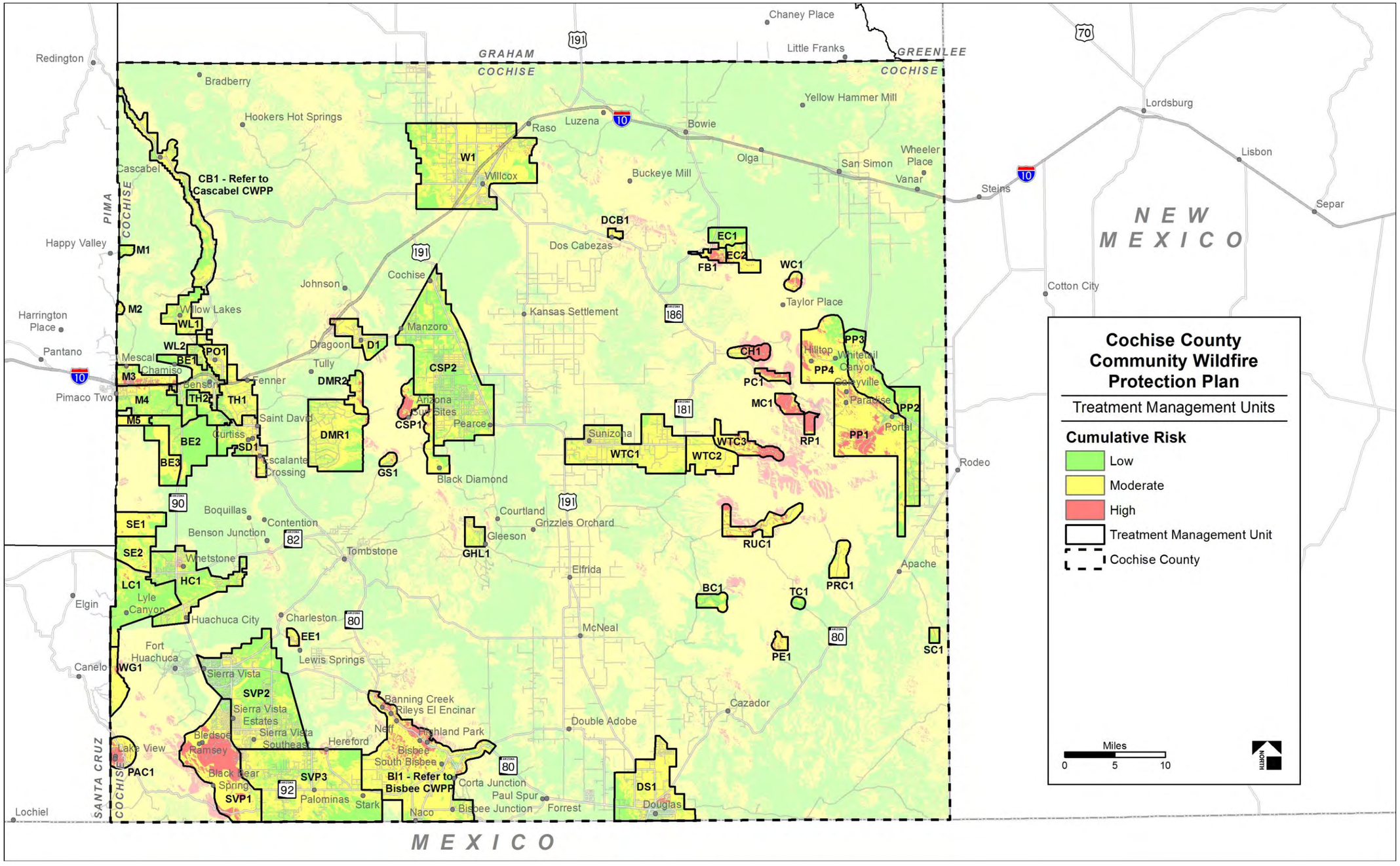

Figure 3.1. Cochise County CWPP Treatment Management Units

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The Core Team described the location of each treatment management unit in the WUI and then assigned recommended treatments for each unit (Table 3.2). The management units listed in Table 3.2 do not always coincide with fire department or district boundaries. Some management units are not located within a fire department or district and therefore have no structural fire protection. For example, the Willow Lakes community sub-WUI is not included within a fire district and the Portal community sub-WUI is much larger than the fire district boundary.

Table 3.2. Identified Treatment Management Units

Treatment Management Unit	Map ID	Risk Value	Location and Description	Recommended Treatment[a]	Total Acres	Federal Acres	State Trust Acres	Nonfederal Acres
Benson	BE1	M	North and south of I-10 including east of SR 90 to Cooperative Way	1,2,3,4,5	11,176	0	2,264	89,912
	BE2	L	South of Cooperative Way; west to BE2; east to SD1	1,2,3,4,5	14,952	362	533	14,058
	BE3	M	West of SR 90; includes portion of Whetstone Mountains	1,2,3,4,5,8	7,225	4,918	763	1,544
Bisbee	BI1	See the *Bisbee CWPP* (2007) for description of the Bisbee treatment management units						
Box Canyon	BC1	L	Northeast of East Summerland Road; adjacent to CNF	1,2,3,4,5	2,888	815	0	2,073
Cascabel	CB1	See the *Cascabel CWPP* (2006) for description of the Cascabel treatment management units						
Chiricahua Headquarters	CH1	H	Along SR 181 and Bonita Canyon Road	1,2,3,4,5,6,7,8	3,339	2,027	0	1,312
Cochise Stronghold/ Pearce	CSP1	H	Eastern Dragoon Mountain foothills east to Cochise Stronghold Road	1,2,3,4,5,8	9,351	6,479	9	2,862
	CSP2	L	Lands adjacent to and west of US 191; south of Manzora Road; north of Earp Street	1,2,3,4,5	55,467	956	4,598	49,913
Douglas/ Sunnyside	DS1	M	WUI surrounding the city of Douglas and Sunnyside	1,2,3,4,5	25,689	102	1127	24,460
Doz Cabezas/ Butterfield	DCB1	M	Adjacent to SR 186; north along Mascot Mine Road	1,2,3,4,5	762	0	13	749
Dragoon	D1	M	WUI east of I-10 along East Dragoon Road to Lizard Lane	1,2,3,4,5	6,674	845	673	5,155
Dragoon Mountain Ranch	DMR1	M	WUI east of CSP2 south of Dragoon Mountain Road north of East Naiche Road	1,2,3,4,5	23,793	1,908	586	21,299

Table 3.2. Identified Treatment Management Units

Treatment Management Unit	Map ID	Risk Value	Location and Description	Recommended Treatment[a]	Total Acres	Federal Acres	State Trust Acres	Nonfederal Acres
	DMR2	M	Western foothills of Dragoon Mountains west to North Dragoon Ranch Road	1,2,3,4,5	3,464	1,422	120	1,922
Emigrant Canyon	EC1	L	East of Apache Pass Road; north of South Mulkins Ranch Road	1,2,3,4,5	3,995	1	650	3,344
	EC2	M	South of Mulkins Ranch Road; west of Wood Canyon Road	1,2,3,4,5,8	4,027	1,045	875	2,108
Escapule Estates	EE1	M	WUI east of Charleston Road along East Escapule Estates Road	1,2,3,5	1,073	718	0	354
Fort Bowie	FB1	H	West of EC1 adjacent to Red Wing Ranch Road	1,2,3,5,6,7	1,875	1,149	0	726
Gleeson High Lonesome	GHL1	M	West of Gleeson-Pearce Road; north of Gleeson Road; south of West Cross C Ranch Road	1,2,3,4,5	3,087	0	382	2,705
Granite Spring	GS1	M	North of North Bennett Ranch Road; east of DMR1 within Dragoon Mountains	1,2,3,4,5	1,164	1,062	1	102
Huachuca City	HC1	L	Lands adjacent to SR 90 and SR 82	1,2,3,4,5	22,078	148	2,491	19,439
Lyle Canyon	LC1	L	South of SR 82; west of SR 90; north of Babacomari Ranch Road	1,2,3,4,5	18,531	159	3,054	15,318
Mescal-J6	M1	L	Along Happy Valley Road to Cochise County line; within Rincon Mountains	1,2,3,4,5	962	722	0	240
	M2	M	Along North Mescal Road to Cochise County line; within Rincon Mountains	1,2,3,4,5	482	384	0	98
	M3	H	Northern WUI, north of I-10	1,2,3,4,5	5,382	0	68	5,314
	M4	L	Southcentral WUI, south of I-10	1,2,3,4,5	10,838	4	1948	8,887
	M5	M	Southern WUI; includes northern foothills of Whetstone Mountains	1,2,3,4,5,8	2,126	1,645	0	481
Methodist Camp	MC1	H	South of Pine Canyon Road near Pine Creek	1,2,3,4,5,8	2,639	2639	0	0

Table 3.2. Identified Treatment Management Units

Treatment Management Unit	Map ID	Risk Value	Location and Description	Recommended Treatment[a]	Total Acres	Federal Acres	State Trust Acres	Nonfederal Acres
Paradise/ Portal	PP1	H	Southwest WUI west of Foothills Road, south of West Hilltop Road	1,2,3,4,5,8	30,202	25,323	385	4,495
	PP2	L	Eastern WUI west of Community Road; south of White Tail Canyon Road	1,2,3,4,5	12,820	0	5,537	7,283
	PP3	M	Northeast WUI north of Foothills Road; east of South Noland Road	1,2,3,4,5	12,605	2754	3514	6338
	PP4	H	Northwest WUI west of South Noland Road	1,2,3,4,5,8	17,284	12,065	1145	4,074
Parker Canyon	PAC1	H	WUI within Huachuca Mountains; includes Parker Canyon Lake	1,2,3,4,5,8	4,342	4,159	0	184
Pedregosa	PE1	M	Southeast of BC1 along Boss Ranch Road	1,2,3,4,5	1,424	715	11	698
Pinery Canyon	PC1	H	WUI located adjacent to Pinery Canyon Road and west of North Fork Road	1,2,3,4,5,8	1,923	1,659	0	264
Pomerene	PO1	M	Northeast of I-10 adjacent to Pomerene Road	1,2,3,4,5	4,157	NA	122	4,035
Price Canyon	PRC1	M	WUI west of Apache along North Price Canyon Road to terminus	1,2,3,4,5	3,589	2,106	227	1,255
Rucker Canyon	RUC1	H	WUI within Chiricahua Mountains along Rucker Canyon Road	1,2,3,4,5,8	7,159	6,257	0	902
Rustler Park	RP1	H	Within Chiricahua Mountains terminus of Forest Road 42D	1,2,4,5,8	1,442	1,442	0	0
Sierra Vista /Palominas **(includes Coronado National Memorial)**	SVP1	H	Western portion of WUI along SR 92 to intersection Buffalo Soldier Trail.	1,2,3,4,5,6,7,8	31,008	21,158	984	8,866
	SVP2	L	Northern WUI north of Hereford Road includes north of SR 90 and North of Charleston Road	1,2,3,5	48,139	1,620	9,922	36,597
	SVP3	M	Southern WUI south of Herford Road to US-Mexico border	1,2,3,5	54,730	5,692	9,889	39,149

Table 3.2. Identified Treatment Management Units

Treatment Management Unit	Map ID	Risk Value	Location and Description	Recommended Treatment[a]	Total Acres	Federal Acres	State Trust Acres	Nonfederal Acres
Skeleton Canyon	SC1	M	WUI located near New Mexico border along Skeleton Canyon Road adjacent to and within CNF	1,2,3,4,5	963	321	3	638
Sonoita-Elgin	SE1	M	Northern WUI within Whetstone Mountains, west of SR 90	1,2,4,5,8	7,107	7,053	5	51
	SE2	M	Southern WUI north of SR 82	1,2,3,4,5	7,052	1,094	1,216	4,741
St. David	SD1	M	East of BE2 along SR 80; north of SPRNCA	1,2,3,4,5	10,569	362	28	10,179
Tex Canyon	TC1	M	Community located near Rucker Canyon Road and North Tex Canyon Road	1,2,3,4,5	894	50	39	805
Turquoise Hills	TH1	M	Eastern WUI; east of SR 80	1,2,3,4,5,6,7	9,589	0	1,062	8,527
	TH2	L	Western WUI; West of SR 80	1,2,3,4,5	4,713	0	2,160	2,553
West Gate	WG1	M	West of Ft. Huachuca, north of PC1; south of LC1	1,2,4,5,8	4,635	4,321	0	314
West Turkey Creek/ Sunizona	WTC1	M	West of SR 181 to US 191	1,2,3,4,5	29,001	0	784	28,217
	WTC2	M	East of SR 181to base of foothills	1,2,3,4,5	9,665	772	78	8,815
	WTC3	H	Corridor along Turkey Creek Road east of WTC2	1,2,3,4,5,8	6,742	3,600	0	3,142
Willcox	W1	M	Wilcox and surrounding community adjacent to I-10	1,2,3,4,5	56,354	0	8278	48,076
Willow Lakes	WL1	M	Community South of CB1 along San Pedro Corridor	1,2,3,4,5,6,7	7,059	0	355	6,703
	WL2	M	Adjacent to communities of Pomerene and Benson	1,2,3,4,5,6,7	2,706	0	19	2,687

Table 3.2. Identified Treatment Management Units

Treatment Management Unit	Map ID	Risk Value	Location and Description	Recommended Treatment[a]	Total Acres	Federal Acres	State Trust Acres	Nonfederal Acres
Wood Canyon	WC1	H	Along and at terminus of Wood Canyon Road within Chiricahua Mountains	1,2,4,5	1,584	1,392	29	163
				Total Acres	700,900	139,740	77,543	483,707

Note: L = low; M = moderate; H = high; SPRNCA = San Pedro Riparian National Conservation Area; SR = state route; US = US highway; WUI = wildland-urban interface.

[a] See Table 3.1 for recommended treatments.

Treatment of wildland fuels within the WUI is expected to generate considerable slash and vegetative waste material. Private individual use of wood products from fuel reduction treatments within the WUI is primarily for fuelwood. Commercial use of the woody material from fuel reduction treatments is also primarily limited to fuelwood, and any commercial value of treatment by-products will not significantly affect land treatment costs. Recent costs of fuels mitigation treatment on BLM lands within the WUI include $100.00 per acre for mowing and $300.00 per acre for mastication. Recent costs of fuels mitigation treatment on BLM lands within the WUI include mesquite grubbing at $525.00 per acre for stewardship contracting; $400.00 per acre for service contracting; and $250.00 to $350.00 per acre in-house. If wildland fuel modification prescriptions require follow-up pile burning or herbicide application after vegetation treatment, the total cost per acre could include $21.00 for burning and $370.00 for foliar herbicide application (BLM, pers. comm. 2013).

Costs for herbicide applications to buffelgrass-invaded sites varies widely based on distance from roads and trails, amount of buffelgrass and size of patches, method used, and other variables. In 2010–2012, costs for USFS, BLM, and NPS have ranged from $30 to $370 per acre, averaging $200–$250 per acre. Small areas treated by private contractors may have a similar range of costs per acre.

Private land treatments in the WUI typically occur on small land parcels near power lines, structures, and other obstacles. In many cases, cut trees and slash cannot be piled and burned on small private land parcels, or it is not the preferred slash treatment by the owner of a small residential lot or by the local fire departments. Therefore, the Core Team recommends that slash from wildland fuel reduction treatments on small residential parcels be removed, whole or chipped, and transported to a disposal site. The Core Team does not oppose alternative vegetative treatments, such as an experimental grazing program using primary grazers within the WUI, to achieve wildland fuel mitigation objectives adjacent to state or federal lands. The Core Team also recommends that fallow agricultural lands be restored through the planting of native vegetation species in accordance with Code 550 (Range Planting) of the *National Conservation Practice Standards* (NRCS 2002). The Core Team also recommends that fuelbreaks constructed on public and private lands to restrict wildland fire movement be maintained in accordance with the above-mentioned mitigation measures and stipulations on a

rotating 2- or 3-year interval, or as deemed necessary, to ensure the integrity of the fuelbreak through removal of fine and light vegetative fuels.

The Core Teams recommend that when available, wildland fuel modification projects be contracted to ASFD to ensure that treatments are conducted in a timely fashion and at a reasonable cost. The estimates of daily costs, which include a 20-person labor crew and a chipper for a 100-mile roundtrip to the project site by an ASFD crew carrier, are as follows:

- 10-hour day—$1,400.00
- 12-hour day—$1,580.00

Cost estimates for treatments in the WUI are based on the estimates provided by the ASFD for the Fire and Fuels Crew costs for both federal and nonfederal land treatments (Table 3.3). The ASFD Fire and Fuels Crew does not remove hazard trees or provide “climbers” for pruning or segmented tree removal that is sometimes required on private lands. The Core Team does support and encourage local business development that will complement wildland fuel mitigation needs within federal and nonfederal lands of the WUI. Vegetative fuel mitigation costs for this CWPP are estimated to be $350.00 per acre, which is comparable to the estimated cost of the ASFD Fire and Fuels Crew and estimated fuel mitigation costs on adjacent federal lands. However, the availability of federal, state, and local funding for mitigation of wildland fire risk, enhanced response, and public education will drive the ability of the Core Team to meet the goals of the Cochise County CWPP.

Table 3.3. Acres of Wildland Fuels Mitigation Treatment Conducted by ASFD Fire and Fuels Crew during a 10-Hour On-Site Workday

Vegetation Association	Average Acres per Day Treated
Ponderosa pine/mixed conifer	0.5 to 1 acre per day
Pinyon/juniper	1 to 2 acres per day
Mesquite woodland	3 to 4 acres per day
Oak woodland	3 to 4 acres per day
Riparian	1 to 2 acres per day (depending on fuel loading)
Grassland	2 to 4 acres per day (depending on grass type and fuel loading)

The Core Team recommends that private landowners who wish to adopt fuel modification plans other than those described in Table 3.1 have the plan prepared or certified by a professional forester, by a certified arborist, by other qualified individuals, or in conjunction with recommendations from local fire departments or fire districts that reference Firewise or fire-safe guidelines. Fuel modification plans for federal and state lands within 0.5 mile of private lands may be prepared for wildlife and watershed benefits—including the retention of large snags or vegetative patches of high wildlife value in areas more than 600 feet from private lands in which fire resiliency is not impaired and will not compromise public or firefighter safety. A fuel modification plan should identify the actions necessary to promote rangeland, wildlife, or watershed health and to help prevent the spread of fire to adjacent properties by

establishing and maintaining defensible space. The action identified by the fuel modification plan should be completed before development of the property or identified during project initiation on federal and state lands.

Alternate Federal, State, or Private Land Wildland Fuel Modification Plan

A fuel modification plan for federal and state lands will follow agency procedures, standards, and guidelines. Fuel modification treatment plans for private land parcels should at least include the following information:

- A copy of the site plan
- Methods and timetables for controlling, changing, or modifying fuels on the properties in a timely and effective manner
- Elements for removal of slash, snags, and vegetation that may grow into overhead electrical lines; removal of other ground fuels, ladder fuels, and diseased, dying, and dead trees; and thinning of live trees
- Methods and timetables for controlling and eliminating diseased or insect-infested vegetation
- A plan for the ongoing maintenance of the proposed fuel reduction and control measures for disease and insect infestations
- A proposed vegetation management plan for groupings of parcels under multiple ownership that has been accepted by all individual owners (subject to compliance with this section)

HFRA was designed to expedite administrative procedures for conducting hazardous wildland fuel reduction and restoration projects on federal lands. Regardless of priority treatments selected for federal lands, an environmental assessment must be conducted for fuel reduction projects. Although HFRA creates a streamlined and improved process for reviewing fuel reduction and restoration treatments, it still requires that appropriate environmental assessments be conducted and that collaboration be maintained (USDA and USDI 2004).

The recommended treatments within the Cochise County CWPP have been developed to be consistent with federal land-management action alternatives and are intended to comply with and facilitate efficient planning and decision making concerning fuels mitigation treatments or habitat rehabilitation of public and private lands in order to reduce risks to communities caused by severe fires and to restore fire-adapted ecosystems (USFS 2000).

B. Prevention and Loss Mitigation

The Cochise County CWPP will be used as a resource to help coordinate long-term interagency mitigation of potential catastrophic wildfire events in at-risk communities within Cochise County. The

Cochise County CWPP Core Team established specific goals for wildland fire prevention and loss mitigation as follows:

- Improve fire prevention and suppression for firefighter and public safety and to protect private property
- Promote community collaboration, involvement, and education
- Recommend measures to reduce structural ignitability in the Cochise County CWPP WUI
- Preserve the aesthetics within riparian areas which include plant and wildlife values
- Identify funding needs and opportunities
- Expedite project planning through partnerships with ASFD, BLM, CNF, and private and public entities in managing wildfire risk within the WUI
- Reduce economic impacts to local communities as a result of unwanted wildland fire

The Cochise County CWPP will be reviewed annually and updated every 5 years, or as needed. Successful implementation of this CWPP will require collaboration among numerous government entities and community interests. To maintain acceptable wildland fuel conditions within existing utility corridor rights-of-way and easements adjacent to private lands within the WUI that are at high risk from wildland fire, cooperation from utility and transportation agencies is recommended. Cochise County and the Core Team recognizes the importance and benefits of this collaboration. The Core Team acknowledges existing agreements between utility and transportation agencies with federal, state and local governments, and private landowners for vegetative treatments within rights-of-way and easements, and agrees that future cooperative vegetative treatments which would complement the objectives of the Cochise County CWPP and utility and transportation agencies should be pursued.

The Core Team and collaborators have made the following action recommendations to meet the goals of the Cochise County CWPP.

1. Administer and Implement the Cochise County CWPP

- Establish a Cochise County CWPP Working Group—composed of Cochise County fire chiefs, CCOES, ASFD, BLM, NPS, CNF, community members, concurring agencies, County and local planning and zoning departments and members of the Core Team—to coordinate individual agency implementation of the recommendations for fuel modification, public outreach, protection capability, and structural ignitability within the Cochise County CWPP WUI, including fuel hazards removal on private lands within the WUI.

2. Improve Protection Capability and Reduction in Structural Ignitability

The Cochise County CWPP Core Team considers the risks of wildland fire igniting and spreading throughout the WUI a serious threat. The Core Team and collaborators believe that actions to reduce

risk and promote effective responses to wildland fires must be undertaken. The following are recommendations to enhance protection capabilities for at-risk communities within Cochise County:

- Obtain a medium-size water tender for use by local fire departments and districts; strategically locate additional water-storage tanks, wells, or other water sources for tender filling throughout the fire departments and districts; maintain helicopter landing sites; and update mapping capabilities of local fire departments and districts.
- Establish a countywide public emergency mass notification system.
- Encourage fire departments and districts to participate in annual multiagency wildfire safety training before the fire season.
- Encourage subdivisions and communities that are not within a fire department or district to take actions necessary to be annexed by an existing fire district or to establish their own fire department to provide viable fire protection services.
- Obtain a chipper/shredder, tub grinder, air curtain destructor, and other equipment necessary for treatment and processing of vegetative slash for use by local fire departments and districts for wildland fuel mitigation projects.
- Obtain one multipurpose utility vehicle with attachments for chipping, brush cutting, and mini-water tending, such as the Bobcat Toolcat.
- Acquire GIS and GPS (Global Positioning System) software and laptops to update mapping capabilities of local fire departments and districts.
- Arrange for the acquisition, operation, and maintenance of a green-waste disposal site within reasonable proximity to the Cochise County communities and encourage the use of the disposal site for all vegetative material removed during wildland fuel treatments on private lands within the WUI.
- Provide enhanced and coordinated firefighting training and equipment, such as personal protective equipment (PPE) and second-generation fire shelters, for newly certified wildland firefighters and volunteer firefighters.
- Develop and maintain mutual-aid agreements with neighboring fire departments or districts for wildland and structural fire response support and other emergency response.
- Develop a pre-suppression plan with BLM, NPS, Fort Huachuca, and CNF along the community WUI boundaries.
- Develop additional wildland fire preplans for all high-hazard locations across Cochise County where they have not been adopted.
- Meet annually, immediately before the fire season, to coordinate early suppression deployment and to determine training and equipment needs.

3. Promote Community Involvement and Improved Public Education, Information, and Outreach

Cochise County, BLM, NPS, CNF, ASFD, local fire departments and districts, and the Core Team will continue developing and implementing public outreach programs to help create an informed citizenry. The goal is to have residents support concepts Fire Adapted Communities by wildfire prevention and preparedness.. The Cochise County CWPP is intended to be a long-term strategic plan containing prescriptive recommendations to address hazardous fuels. A grassroots collaborative structure of individual citizens, supported by local governments as full partners, will provide the most effective long-term means to achieve these goals and to maintain community momentum. The components of such a structure include the following recommendations:

- Assist in implementing a Firewise Communities/USA Recognition program in communities where the program is supported by the local fire departments and districts. The Firewise Communities approach emphasizes community and individual responsibility for safer home construction and design, landscaping, and maintenance. The Core Team will also help identify high-priority communities that would most benefit from a Firewise Communities program.
- Expand the use of Fire Adapted Communities (see http://www.fireadapted.org/) as an immediate action step. This will be accomplished through information mailers to homeowners, presentations by the CCOES, ASFD, BLM, NPS, CNF and local fire departments and districts, and the development of specific promotional materials by the Core Team.
- Place fire-danger information signs on major access roads throughout the WUI. Community bulletins and other public service announcements concerning wildfire threat and preparedness should be developed with assistance from ASFD, BLM, NPS, CNF, and Cochise County fire departments.
- Place and maintain bilingual wildfire caution signs within camping areas and access routes in some areas of the WUI.
- Complete wildfire home assessments through the use of Redzone software, or an equivalent software system, and submit wildfire hazard mitigation strategies to landowners for each private property assessed within highest-risk communities.
- Replace and maintain fencing adjacent to high-use and illegal off-road-vehicle use areas within or adjacent to the WUI.

4. Encourage Use of Woody Material from WUI Fuel Mitigation Programs

The Core Team and their collaborators will continue to support and promote private contractors who perform Firewise or fire-safe mitigation work. The County will continue to support and promote new businesses involved in the wildland fuel reduction market. Cochise County, NPS, CNF, BLM, and local fire departments and districts are committed to encouraging, as appropriate, the use of vegetative by-products from the WUI fuel management program for use by commercial entities or community service organizations. Possible by-product uses encouraged by the Core Team include the following:

- Bagged mesquite wood for sale to visitors and larger community markets as “campfire cooking” for commercial or personal culinary uses
- Firewood marketed to local residents, visitors, and adjacent communities
- Mesquite, pinyon, juniper, and manzanita wood marketed for artwork, furniture, and other specialty wood products

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IV. COCHISE COUNTY CWPP PRIORITIES: ACTION RECOMMENDATIONS AND IMPLEMENTATION

The Core Team has developed action recommendations (see Section III of this CWPP) necessary to meet Cochise County CWPP objectives. A series of recommendations that will reduce structural ignitability, improve fire prevention and suppression, and enhance public outreach have also been developed by the Core Team.

At the end of each year, projects implemented from these action recommendations will be monitored for effectiveness of meeting Cochise County CWPP objectives. For the life of the Cochise County CWPP, recommendations for additional projects will be made for each future year on the basis of project performance from previous implemented projects.

A. Administrative Oversight

Generally, the most efficient way to manage the mitigation of wildland fire threat in the WUI is through identifying, implementing, and monitoring the action recommendations of the Cochise County CWPP. Establishing a unified effort to collaboratively implement the Cochise County CWPP embraces adaptive management principles that enhance decision making and reduces inconsistency at all levels of government.

The Core Team recommends the establishment of a Cochise County Community CWPP Working Group to work with the Core Team and concurring agencies to accomplish the recommendations for outreach and structural ignitability within the Cochise County CWPP WUI area, which include fuel hazards removal on private lands within the WUI. Additionally, recommendation of components of the International Urban-Wildland Interface Code should be considered during Working Group and Core Team discussions. The CWPP Working Group should consist of representatives from local fire departments and districts and, as needed, representatives from CCOES, ASFD, ASLD, CNF, NPS, BLM, county and local planning and zoning departments, and other concurring agencies. The Core Team may solicit communities that are not serviced by a fire department or district, as well as other interested individuals or agencies, to participate in the CWPP Working Group. CCOES will be the lead agency in coordinating the CWPP Working Group and producing monitoring reports and any updates to the CWPP.

The CWPP Working Group will prioritize wildland fuel modification, structural ignitability, protection capability, and public outreach projects listed in the Cochise County CWPP, and will review these priority recommendations for possible reprioritization. Fuel modification and community planning and outreach will be prioritized by the CWPP Working Group as a whole; other projects involving firefighter training, equipment, communications, facilities, and apparatus will be recommended by the fire chiefs from Cochise County or their representatives in the CWPP Working Group.

The CWPP Working Group is expected to be an advocate for and provide support to fire departments and districts or other agencies in the submittal of grant applications and the solicitation of other funding opportunities to implement wildland fuel modification, structural ignitability, protection capability, and public outreach projects established as priorities by the CWPP Working Group. Additionally, individual agencies and fire departments and districts will be able to seek letters of support from the CWPP Working Group or partner agencies in applying for funding to implement projects identified as priorities by the CWPP Working Group.

The CWPP Working Group will also compile monitoring and reporting documents from cooperating agencies to provide information on additional measures necessary to meet Cochise County CWPP goals, including additional future recommendations from fire departments and districts and other agencies for inclusion in the priorities list. The CWPP Working Group may also act as an advisory group to the Cochise County Planning and Zoning Department and to developers in outlying areas to enhance public safety access and to provide vegetation mitigation and landscaping recommendations, water supplies for emergency services, and recommendations for establishing and funding fire services and equipment in residential and commercial developments.

The following general criteria will be used for prioritizing proposed projects and action items:

1. Geographic/fuel-load/residential density:
    a. In any given year, the CWPP Working Group will evaluate countywide weather, vegetation, and fuel-load conditions and projections, as well as current residential and commercial densities, to determine short-term priority adjustments for projects in all WUI areas of the county for that year.
    b. In any given year, the CWPP Working Group will evaluate the progress of new developments and increasing residential and commercial densities to determine potential needs and priorities within the WUI for the next 3 years following that given year.
2. Categorical/functional criteria—priorities will generally be established as listed below; these priorities are subject to review and change by the CWPP Working Group on an ongoing basis:
    a. Fuel modification projects (those in the WUIs listed in Table 4.1 that are within the jurisdictions of fire departments and districts, CNF, BLM, NPS, or ASFD will have first priority)
    b. Enhanced wildland firefighter training and acquisition of personal protective equipment (PPE)
    c. Wildland-fire suppression equipment and tools, including brush engines and tenders
    d. Water-storage sites and supply facilities
    e. Community planning and outreach activities, including warning signs/systems and identification and improvement of evacuation routes

f. Helicopter landing pads for firefighter deployment or evacuation

g. Fire stations in areas with sufficiently high threat and population densities as determined annually by the CWPP Working Group

The agencies involved in the formation of this plan support local community efforts and will work with the communities as needed to accomplish action items. For coordination purposes, it is recommended that BLM, CNF, NPS, ASFD, CCOES, fire departments and districts communicate with the future-established CWPP Working Group, any planned fuel mitigation projects on lands within the WUI managed by local, state, and federal government agencies, as well as those on private lands. The Core Team and the proposed CWPP Working Group will be responsible for submitting grants and soliciting other opportunities to implement wildland fuel mitigation projects on private lands and to support public information, education, and outreach within the WUI. Successful award of grant funds will be used to implement the action recommendations for private land treatments, mitigation features for reduced structural ignitability, firefighting response, and public outreach. BLM, CNF, NPS, ASFD, CCOES, fire departments and districts, and the Core Team will pursue funding to construct and maintain fuelbreaks as well as broader applications of wildland fuel mitigation projects within the WUI. Monitoring and reporting compiled by the CWPP Working Group will provide information on additional measures necessary to meet Cochise County CWPP goals.

B. Priorities for Mitigation of Hazardous Wildland Fuels

Table 4.1 displays the priority for constructing fuelbreaks and landscape wildland fuel treatments within the WUI as recommended by the Core Team. These action recommendations will reduce wildfire potential to the communities and have high valuations for reducing wildland fire risk. The Core Team recognizes that not all acres within a high-risk landscape can be treated. Site-specific analysis will determine treatment acres and methods that produce a fire-resilient vegetative stand appropriate for the habitat.

Table 4.1. Action Recommendations for Wildland Fuel Modification

Management Area	Location and Description	Project Partner	Estimated Treatment Cost[a]
PP1	Southwest WUI west of Foothills Road, south of West Hilltop Road	CCOES, CNF, and Portal Rescue Inc.	30,202 high-risk acres, 30% of lands to be treated over 3 years estimated to be 3,020 acres/year in FY 2015-18 @ $350.00/acre = $1,057,000.00/year
SVP1	Western portion of WUI along SR 92 to intersection Buffalo Soldier Trail.	CCOES, CNF, NPS and ASFD	31,008 high-risk acres, 30% of lands to be treated over 3 years estimated to be 3,100 acres/year year in FY 2015-18 @$350.00/acre = $1,085,00.00/year
WTC3	Corridor along Turkey Creek Road east of West Turkey Creek 2	CCOES and ASFD	6,742 high-risk acres, 30% of lands to be treated over 3 years estimated to be 674 acres/year year in FY 2015-18 @$350.00/acre = $235,900.00/year

Table 4.1. Action Recommendations for Wildland Fuel Modification

Management Area	Location and Description	Project Partner	Estimated Treatment Cost[a]
Fuelbreak maintenance	1- to 3-year rotating maintenance of fine and light fuels in fuelbreaks	ASLD, ASFD, NPS, CNF, CCOES, and participating fire departments and districts	600 acres/year of light understory fuel treatments in excess of 4 acres treated/10-hour day at $1,400.00/day costs = $210,000.00/year

Note: ASFD = Arizona State Forestry Division; ASLD = Arizona State Land Department; CCOES = Cochise County Office of Emergency Services; CNF = Coronado National Forest; FY = fiscal year; NPS = National Park Service.

[a] Total acres to be treated during the life of the plan; 30% of acres estimated to be treated based on site-specific analysis, which will determine actual acres available for treatment in each area.

C. Identified Action Items for Protection Capability and Reduced Structural Ignitability

The Core Team and collaborators will evaluate; maintain; and, where necessary, upgrade community wildfire preparation and response facilities, capabilities, and equipment. Table 4.2 lists the identified action items proposed by the Core Team for consideration by individual fire departments and districts for reduced structural ignitability and public outreach within their respective jurisdictions. Table 4.3 lists the future recommendations for wildland fire protection and reduced ignitability.

After the ASFD's final approval of the Cochise County CWPP, the CWPP Working Group will meet to prioritize projects for the upcoming year and, thereafter, will meet at least annually to reevaluate projects and reallocate priorities as needed. Such countywide prioritization will not impinge on or interfere with the fire departments' and districts' rights to independently seek funding for projects within their jurisdictions without CWPP Working Group support.

Table 4.2. Action Recommendations for Structural Ignitability and Public Outreach

Project Partner	Project[a]	Specific Recommendation	Estimated Cost	Timeline
CCOES and Cochise County fire departments and districts	**E1**—Wildland Fire Protection and Reduced Ignitability	Purchase one Type 3 fire engine.	New acquisition with standard equipment: $360,000.00	Begin grant applications in FY 2014; purchase in FY 2015.
CCOES and Cochise County fire departments and districts	**E2**—Wildland Fire Protection and Reduced Ignitability	Purchase one Type 6 fire engine.	New acquisition with standard equipment: $131,000.00	Begin grant applications in 2014/2015; purchase in 2015/2016.
CCOES, CNF, NPS, ASFD, ASLD, and associated fire departments and districts	**A1**—Wildland Fire Protection and Reduced Ignitability	Construct a series of 5,000-gallon water-storage facilities located strategically throughout residential areas.	Install water-storage facilities/year: $6,500.00/facility	Locate and install one water-storage facility in FY 2016.

Table 4.2. Action Recommendations for Structural Ignitability and Public Outreach

Project Partner	Project[a]	Specific Recommendation	Estimated Cost	Timeline
CCOES and associated fire departments and districts	**A2**—Enhanced Public Education, Information, and Outreach	Develop wildfire public education brochures (e.g., Arizona 7 Steps brochure, and "Living with Wildfire" booklet).	Development, printing, and distribution costs: $5,000.00	Begin grant applications in 2014; continue on an ongoing basis starting in 2015.
CCOES, CNF, ASFD, ASLD, and associated fire departments and districts	**A3**—Enhanced Public Education, Information, and Outreach	Work with land-management agencies for the acquisition, operation, and maintenance of a green-waste disposal site within reasonable proximity to community.	Locate and coordinate with land-management agency; excavate pit and fence: $20,000.00	Begin planning with agencies in FY 2014/2015; implement in FY 2016/2017.
CCOES, CNF, ASFD, ASLD, and associated fire departments and districts	**A4**—Enhanced Public Education, Information, and Outreach	Create fire-safety and fire-awareness prevention and preparation posters for public places.	Development, printing, and distribution costs: $5,000.00	Solicit funds for production and printing in FY 2014; publish and post in FY 2015.
CCOES, CNF, ASFD, ASLD, NPS, and associated fire departments	**A5—**Enhanced Public Education, Information, and Outreach	Include links to relevant Firewise websites on project-partner websites. CWPP Working Group should check links annually for validity and notify partners of changes.	Staff time to add links. $1,000 per participating agency.	Implement with roll-out of CWPP. Update annually if needed.
CCOES, CNF, ASFD, ASLD, NPS, and associated fire departments	**A6—**Enhanced Public Education, Information, and Outreach	One project partner hosts the videos on the "Protect Your Investment" CD on its website. Or CWPP Working Group identifies a website that could host the video that partner websites can link to.	Staff time to add links. $1,000 per participating agency.	Begin agency coordination and agreement for host site in 2014; update each year.
Fire departments	**A7—**Enhanced Public Education, Information, and Outreach; Structural Ignitability	Conduct hazard assessments for homeowners. Use Firewise or similar door tags	Order free generic Firewise doortags from Firewise.org, or low-cost tags through ASFD State Fire Information and Prevention Officer. Utilize volunteer staff time for distribution	Acquire door tags in 2014; distribute in 2014/2015.
CCOES, CNF, ASFD, ASLD, NPS, associated fire departments, ADOT, and county DOT	**A8—**Enhanced Public Education, Information, and Outreach	Establish and maintain bilingual roadside fire-danger warning signs and other informational and directional road signs along major roads as determined by the Cochise County Fire Chiefs Association	Construction and placement: $5,000.00	Install in FY 2014; start with roads with highest fire incidence/risk. Solicit grants from Federal Highway Administration
CCOES, CNF, ASFD, ASLD, associated fire and police departments, and Cochise County Sheriff's Office	**A9—**Enhanced Public Education, Information, and Outreach	Issue PSAs, do media spots, use social media about safe use of fireworks and open burning and reporting illegal use.	Staff time. $3,000 per participating agency annually.	Begin in FY 2014. Around July 4 and January 1.

Table 4.2. Action Recommendations for Structural Ignitability and Public Outreach

Project Partner	Project[a]	Specific Recommendation	Estimated Cost	Timeline
CCOES, CNF, ASFD, ASLD and associated fire departments	**A10—**Enhanced Public Education, Information, and Outreach	Establish countywide fire restriction ordinance based on common trigger points.	Costs associated with development and coordination of approximately $10,800.00.	Begin planning with agencies in FY 2014; implement in FY 2015.
CCOES, CNF, ASFD, ASLD, NPS, and associated fire departments	**A11—**Enhanced Public Education, Information, and Outreach	Establish countywide public emergency mass notification system.	Annual operational cost of approximately $20,000.00.	Begin planning with agencies in FY 2014; implement in FY 2015.
CCOES, CNF, ASFD, ASLD, NPS, and associated fire departments	**A12—** Enhanced Public Education, Information, and Outreach; Structural Ignitability	Establish Firewise Communities	Estimate will be determined during formulation specific community programs. Apply for Firewise and Fire Adapted Community grants to offset associated costs.	Begin planning with in FY 2015; implement in FY 2016.

Note: ASFD = Arizona State Forestry Division; ASLD = Arizona State Land Department; CCOES = Cochise County Office of Emergency Services; CNF = Coronado National Forest; DOT = department of transportation; FY = fiscal year; NPS = National Park Service; PSA = public service announcement.

[a] Projects are designated by project type (E = equipment; A = administrative) but not ranked in order of importance.

Table 4.3. Future Recommendations for Wildland Fire Protection and Reduced Ignitability

Project Partner	Project[a]	Equipment/Expense	Timeline
CCOES, ASFD, CNF, BLM, and associated fire departments and districts	**E3**—Obtain a medium-size water tender to better traverse rural landscape than larger units	1,500-gallon water tenders, 4-wheel drive: $185,000.00	Acquire tender in FY 2016/17; assess additional tender needs in FY 2017/18
CCOES, ASFD, CNF, NPS, BLM, and associated fire departments and districts	**A13**—Work with Cochise County to develop a notification and evacuation plan for the community	Staff time, coordination efforts, research, and meetings: $5,000.00	Begin planning in FY 2014/15; implement in FY 2016
CCOES, ASFD, CNF, BLM, APS, SRP, and associated fire departments and districts	**A14**—Work with utility and transportation agencies on vegetative management treatments within and adjacent to utility corridors where opportunities exist on private lands	Staff time, coordination efforts, research, and meetings: $5,000.00	Begin planning in FY 2014/15; implement in FY 2016

Note: APS = Arizona Public Service; ASFD = Arizona State Forestry Division; BLM = Bureau of Land Management; CCOES = Cochise County Office of Emergency Services; CNF = Coronado National Forest; FY = fiscal year; NPS = National Park Service; SRP = Salt River Project.

[a] Projects are designated by project type (E = equipment; A = administrative) but not ranked in order of importance.

D. Priorities for Promoting Community Involvement through Education, Information, and Outreach

The CCOES and the Core Team will implement public outreach and education programs for residents to heighten awareness and understanding of the threat that wildland fire poses to the communities.

Table 4.4 lists the Core Team's priority recommendations for promoting community involvement. Additional programs that could be used or developed to enhance community outreach and education may be implemented in the future. The Core Team will use the resources of the ASFD, CNF, NPS, and BLM for additional public education programs and community outreach. Community bulletins and other public service announcements concerning wildfire threat and preparedness should be developed with assistance from local fire departments and districts, ASFD, CNF, NPS, and BLM.

Table 4.4. Future Recommendations for Enhanced Public Education, Information, and Outreach

Project Partner	Project[a]	Equipment/Expense	Timeline
CCOES, CNF, BLM, NPS, ASFD, and associated fire departments and districts	**A7**—Establish and maintain roadside fire-danger warning signs and other informational and directional road signs along major roads as determined by the CWPP Working Group	Construction and placement: $5,000.00	Construct and implement in FY 2015/2016
CCOES, CNF, BLM, NPS, ASFD, and associated fire departments and districts	**I2**—Acquire Redzone software, or equivalent software, and field data recorders or PDAs to complete home fire assessments and implement fire-safe recommendations	Software and data recorder: $1,300.00 Assessment completion: $2,000.00	Acquire software and complete assessments in FY 2015/2016; implement recommendations in FY 2016
CCOES, CNF, BLM, NPS, ASFD, and associated fire departments and districts	**I3**—Encourage private businesses that perform Firewise land treatments; encourage market development of WUI by-products from vegetative fuel mitigation programs	Estimate will be determined during formulation of marketing plan.	Initiate community marketing planning meetings in FY 2015
CCOES, CNF, BLM, NPS, ASFD, and associated fire departments and districts	**I4**—Replace and maintain fencing adjacent to high OHV use areas	Estimate $6,000.00m per mile of standard 4-wire fencing	Assess in 2014; initial plan for 1 mile of new or repaired fencing

Note: ASFD = Arizona State Forestry Division; BLM = Bureau of Land Management; CWPP = community wildfire protection plan; CCOES = Cochise County Office of Emergency Services ; CNF = Coronado National Forest; FY = fiscal year; NPS = National Park Service; OHV = off-highway vehicle; PDA = personal digital assistant; WUI = wildland-urban interface.

[a] Projects are designated by project type (A = administrative; I = infrastructure) but not ranked in order of importance.

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V. MONITORING PLAN

Monitoring is essential to ensure that Cochise County CWPP goals are met. The Cochise County CWPP Core Team, local fire departments and districts, CCOES, ASFD, CNF, NPS, and BLM should actively monitor the progress of the Cochise County CWPP action recommendations to determine the effectiveness of ongoing and completed projects in meeting Cochise County CWPP objectives, as well as to recommend future projects necessary to meet Cochise County CWPP goals.

In accordance with Section 102.g.5 of HFRA, Cochise County CWPP communities will endeavor to participate in any multiparty monitoring program established by state and federal agencies, or other interested parties, to assess progress toward meeting Cochise County CWPP objectives, including Burn Area Emergency Response to post wildfire events. The Core Team believes that participation in multiparty monitoring will provide effective and meaningful ecological and socioeconomic feedback on landscape and site-specific fuel reduction projects and watershed enhancements and will also help BLM, CNF, NPS, ASFD, ASLD, CCOES, Cochise County municipalities, and fire departments and districts with future land-management planning.

This section details the performance measures that will be used to assess the effectiveness of implementing the Cochise County CWPP action recommendations. Monitoring will include assessing and evaluating the implementation of individual Cochise County CWPP projects and a given project's effectiveness in furthering Cochise County CWPP objectives.

A. Administrative Oversight, Monitoring, and Cochise County CWPP Reporting

The CWPP Working Group—composed of Cochise County fire chiefs, CCOES, CNF, ASFD, ASLD, NPS, and BLM—will mutually work toward furthering and monitoring Cochise County CWPP action recommendations in coordination with a future-established CWPP Working Group. The CWPP Working Group should identify appropriate grant and other funding mechanisms necessary to implement the action recommendations of the Cochise County CWPP. Grant information should be routinely searched to identify updated grant application cycles. Potential grant and funding resources are listed in Appendix A of this CWPP.

As a product of the annual plan review, the CCOES, in coordination with the future-established countywide Community CWPP Working Group will produce a report detailing the success of Cochise County CWPP project implementation and overall progress toward meeting Cochise County CWPP goals. The CWPP Working Group should report successful grant awards received for implementing the Cochise County CWPP action recommendations to the Cochise County CWPP signatories. The CWPP Working Group's report will also include recommendations to the signatories for updating the Community Mitigation Plan and the Prevention and Loss Mitigation Plan portions of the Cochise County CWPP, through the use of the principles of adaptive management. This information will ensure timely decision making for all levels of government and will provide input necessary for developing future work

plans and for prioritizing project recommendations over the life of the Cochise County CWPP. Appendix B provides information on the data used in the analysis of the Cochise County CWPP and the appropriate contacts for updating the CWPP. Once the CWPP is updated, it will be submitted to the Cochise County fire chiefs, CCOES, Cochise County Board of Supervisors, CNF, ASFD, ASLD, NPS, and BLM for their concurrence or approval. Once concurrence/approval is achieved, the action recommendations of the updated Cochise County CWPP are to be forwarded for funding through HFRA and other appropriate funding sources.

B. Effectiveness Monitoring

Table 5.1 outlines the performance measures that the CWPP Working Group will monitor and will use to assess status in meeting CWPP performance goals. Cochise County CWPP administrators should assess the current status of wildland fuel hazards and look for any new or developing issues not covered by the Cochise County CWPP. As new issues arise, such as new invasive species infestations, further risks and recommendations for treatment should be identified, and the Cochise County CWPP should be updated or amended as necessary to meet the CWPP goals. To help track fuel treatments being planned and completed through local, state, and federal programs, the Cochise County CWPP administrators will cooperate by providing requested detailed mapping information to the Arizona State Forester's office.

Table 5.1. Performance Measures to Assess Cochise County CWPP Progress

Goal	Performance measure

Improve fire prevention and suppression	Reduction of wildland fire occurrence and acres burned (unplanned) in the WUI:
	• Type 3 fire engine acquired.
	• Type 6 brush truck acquired.
	• Effectiveness monitoring of fire prevention and suppression will include the following include the following, calculated on a per year basis and a 10-year rolling average:
	  • Acres burned and degree of severity of wildland fire
	  • Percentage of wildland fire controlled on initial attack
	  • Number of homes and structures lost to wildland fire
	• New water sources developed in key areas.

Reduce hazardous vegetative fuels	Effective treatment of high-risk areas by acre: • Number of treated acres of nonfederal WUI lands in Condition Class 2 or 3 identified as high priorities by the Cochise County CWPP and moved to Condition Class 1 or another acceptable level of wildland fuel loading and continuity. • Acres treated to acceptable fuel levels within priority treatment management areas. • Total acres treated through any fuel-reduction measures, including prescribed fire, that are conducted in, or adjacent to, the WUI. The change of vegetation condition class should be determined for large projects or treatment areas through the use of the LANDFIRE database.

Table 5.1. Performance Measures to Assess Cochise County CWPP Progress

Goal	Performance measure
Restore watershed health	Acres of fuel reduction or watershed enhancement treatments that meet restoration treatment guidelines for riparian habitats: • Coordination with and support of CCOES, ASFD, ASLD, CNF, NPS, and BLM in implementing and determining social, economic, and environmental effects of riparian restoration treatments (Treatments 6 and 9, see Table 3.1 in the Community Mitigation Plan section). • Acres of saltcedar-invaded riparian areas identified and undergoing restoration treatments.
Promote community involvement	Initiation of public outreach programs: • Countywide Community CWPP Working Group initiated. • Public outreach programs and promotions implemented to enhance volunteer efforts to reduce hazardous fuels. • Number and areas (community or dispersed residences) of private landowners supporting and implementing fuel reduction projects. • CCOES and local fire departments and districts developed and implemented evacuation plans for identified high-risk areas. • Roadside fire-danger warning signs in English and Spanish installed at strategic points within the WUI. • Homeowner assessments initiated. • Fire-safety awareness program, posters, and information available in public places.
Encourage economic development	Wood-products industry growth and diversification to use all sizes of material removed by fuel reduction treatments (wood-product examples: furniture, fence posts, charcoal, grilling chips, mulch, compost): • Number of value-added wood products developed by the community. • Number of new markets (local firewood sales) for local products created.

Note: ASFD = Arizona State Forestry Division; ASLD = Arizona State Land Department; BLM = Bureau of Land Management ; CCOES = Cochise County Office of Emergency Services; CNF = Coronado National Forest; CWPP = community wildfire protection plan; NPS = National Park Service; PPE = personal protective equipment; WUI = wildland-urban interface.

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VI. DECLARATION OF AGREEMENT AND CONCURRENCE

The following partners in the development of the Cochise County Community Wildfire Protection Plan have reviewed and do mutually agree or concur with its contents.

Agreement

Cochise County Board of Supervisors	10.8.14 Date
City of Benson	9/24/2014 Date
City of Douglas	7-23-14 Date
City of Sierra Vista	9/25/14 Date
City of Tombstone	7-8-2014 Date
City of Willcox	7/17/14 Date
Chief, Benson Fire Department	9-24-14 Date
Chief, Cascabel Volunteer Fire Department	7-9-2014 Date
Chief, Elfrida Fire District	6/9/14 Date
Chief, Fry Fire District	6-18-14 Date

Chief, Palominas Fire District	Date 7/28/2014
Fire Chief, Portal Rescue Inc.	Date 16 July 2014
Chief, Sierra Vista Fire Department	Date 10/14/14
Chief, Sonoita-Elgin Fire District	Date 7-14-2014
Chief, Sunnyside Fire District	Date 08-09-2014
Chief, Sunsites-Pearce Fire District	Date 7/23/14
Chief, Tombstone Volunteer Fire Department	Date 6-9-14
Chief, Willcox Fire Department	Date JULY 18, 2014
The Nature Conservancy	Date 7-9-14

Concurrence

Arizona State Forester, Arizona State Forestry Division	12/2/14 Date
Gila District Manager, Bureau of Land Management	10/15/2014 Date
Forest Supervisor, Coronado National Forest	6/9/2014 Date
Superintendent, Chiricahua National Monument, Fort Bowie National Historic Site, Coronado National Memorial	10/17/2014 Date

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APPENDIX A. EDUCATIONAL RESOURCES

Firewise Information and Web Sites

Firewise Communities/USA National Recognition Program.
http://www/Firewise.org/USA

University of Arizona Cooperative Extension Arizona Firewise Resources.
http://cals.arizona.edu/firewise/

Arizona State Forestry Division Firewise Information.
http://www.azsf.az.gov/fire_managment/firewise_communities/

MyFireCommunity Arizona Firewise Resources.
http://www.myfirecommunity.net/Neighborhood.aspx?ID=367

Arizona Interagency Fire Prevention and Information Resources.
http://wildlandfire.az.gov/
http://wildlandfire.az.gov/links.asp#Firewise

Ready,Set,Go! Personal Wildfire Action Plan. Describes defensible space, pre-fire preparation planning, approaching fire, and evacuation planning.
http://www.iafc.org/associations/4685/files/wild_readySetGoWildfireActionPlan.pdf

"Preparing for a Wildfire." Public Service Announcement.
http://www.firewise.org/wildfire-preparedness/video/for-the-general-public.aspx

Best-Management Practices and Tools for Collaboration

The Collaboration Handbook, Red Lodge Clearinghouse.
http://www.rlch.org/content/view/261/49

Ecosystem Management Initiative at the University of Michigan.
http://wwwsnre.umich.edu/ecomgt.collaboration.htm

Western Collaborative Assistance Network.
http://www.westcanhelp.org

BLM Partnership.
http://www.blm.gov/partnerships/tools.htm

Forest Service Partnership Resource Center.
http://www.partnershipresourcescenter.org/index.shtml

International Association of Fire Chief's *Leader's Guide for Developing a Community Wildfire Protection Plan*.
http://wwwcsfs.colostate.edu/librar/.pdfs/cwpp/CWPP_LG.pdf

Joint Fire Sciences Collaboration and CWPP Presentation.
http://www.jfsp.fortlewis.edu/KTWorkshops.asp

Fire Adapted Communities.
http://www.fireadapted.org/

International Urban-Wildland Interface Code. International Code Council. 2012

Grant Web Sites

Southwest Area Forest, Fire, and Community Assistance Grants. This Web site lists grants that are available to communities to reduce the risk of wildfires in the urban interface.
http://www.SouthwestAreaGrants.org

Department of Homeland Security. This Web site lists granting opportunities for Staffing for Adequate Fire and Emergency Services (SAFER) grants and provides other useful information.
http://www.firegrantsupport.com

ESRI Grant Assistance Program for GIS users.
http://www.esri.com/grants

US Fire Administration—Assistance to Firefighters Grant Program.
http://www.usfa.fema.gove/dhtml/inside-usfa/grants.cfm

National Association of State Foresters Listing of Grant Sources and Appropriations.
http://www/stateforesters.org/S&PF/FY_2002.html

Stewardship and Landowner Assistance—Financial Assistance Programs.
http://www.na.fs.fed.us/spfo/stewardship/financial.htm

The Fire Safe Council.
http://www.FireSafeCouncil.org

Pre-Disaster Mitigation Program.
http://www/cfda/gov/public/viewprog.asp?progid=1606

Firewise.
http://www.firewise.org/usa/funding.htm

Environmental Protection Agency.
http://cfpub.epa.gov/fedfund

Rural Fire Assistance and other State Forestry Grants.
http://www.azsf.az.gov/grant_information.

Grant opportunities.
http://www.grants.gov.

Arizona Wildfire and the Environment Series

Firewise publications from the University of Arizona: *Am I at Risk?; Forest Home Fire Safety*; *Fire-Resistant Landscaping*; *Creating Wildfire-Defensible Spaces for Your Home and Property*; *Homeowners' "Inside and Out" Wildfire Checklist*; *Firewise Plant Materials for 3000 Feet and Higher Elevations*; *Soil Erosion Control After a Wildfire*; *Recovering from Wildfire*; *A Guide for Arizona's Forest Owners*; *Wildfire Hazard Severity Rating Checklist for Arizona Homes and Communities*.
http://cals.arizona.edu
http://cals.arizona.edu/pubs

Southern Arizona Buffelgrass Coordination Center. The Center's mission is to provide a regional information center that emphasizes an integrated management approach to control buffelgrass (*Pennisetum ciliare*) in Southern Arizona.
http://www.buffelgrass.org/

Monitoring and Evaluation Resources

US Forest Service Collaborative Restoration Program. Multiparty Monitoring Guidelines.
http://www.fs.fed.us/r3/spf/cfrp/monitoring/index.shtml

Rural Voices for Conservation Coalition. Multiparty Monitoring Issue Paper.
http://ewp.uoregon.edu/sites/ewp.uoregon.edu/files/downloads/multiparty_monitoring_2005.pdf

i-Tree: Tools for Assessing and Managing Community Forests.
http://www.itreetools.org/

Other

Federal Emergency Management Agency (FEMA) State Hazard Mitigation Offices.
http://www.floods.org/shmos.htm

National Fire Protection Association (NFPA) standards:
NFPA 299 (*Standard for Protection of Life and Property from Wildfire*); NFPA 295 (*Standard for Wildfire Control*); NFPA 291 (*Recommended Practice for Fire Flow Testing and Marking of Hydrants*); NFPA 703 (*Standard for Fire Retardant Impregnated Coatings for Building Materials*); NFPA 909 (*Protection of Cultural Resources*); NFPA 1051 (*Standard for Wildland Fire Fighter Professional Qualifications*);

NFPA 1144 (*Standard for Protection of Life and Property from Wildfire*); NFPA 1977 (*Standard on Protective Clothing and Equipment for Wildland Fire Fighting*).
http://www.nfpa.org
http://www.nfpa.org/Catalog.

National Fire Lab.
http://www.firelab.org/fbp/fbresearch/WUI/home.htm

Protect Your Home from Wildfire, Colorado State Forest Service. Publications regarding wildfire prevention.
http://www.colostate.edu/Depts/CSFS/homefire.html

US Fire Administration, FEMA, US Department of Homeland Security.
http://www.usfa.fema.gov
http://www.fema.gov/regions/viii/fires/shtm
http://www.fema.gov/kidswldfire

Fire Education Materials.
http://www.symbols.gov

National Interagency Fire Center, National Park Service fire Web site.
http://www.nifc.nps.gov/fire

"Fire Wars," PBS NOVA.
http://www.pbs.org/wgbh/nova/fire

D'Goat Ranch, LLC. Jason Garn. (801) 440-2149. Leasing and goat herding for vegetative mitigation projects.

Pine Needle Raking. Forest Insect & Disease Bulletin, Arizona State Forestry Division. February 2014

Firewise Plant Materials for 3000' and Higher Elevations.
http://www.ag.arizona.edu/pubs/natresources/az1289.pdf

Woody Biomass Utilization Desk Guide.
http://www.forestsandrangelands.gov/woody_biomass/documents/biomass_deskguide.pdf

Managing Slash to Minimize Colonization of Residual Trees by Ips and Other Bark Beetle Species Following Thinning in Southwestern Ponderosa Pine, Arizona Cooperative Extension. May 2008.
http://cals.arizona.edu/pubs/natresources/az1449.pdf

The Pinion Ips Bark Beetle, Arizona Cooperative Extension. March 2013.
http://cals.arizona.edu/pubs/insects/az1394.pdf

Cypress Bark Beetles, Arizona Cooperative Extension. June 2003.
http://cals.arizona.edu/pubs/insects/az1316.pdf

Pamphlets

Saving Homes from Wildfires: Regulating the Home Ignition Zone, American Planning Association, May 2001. This issue of the American Planning Association's Zoning News examines the wildfire threat to the wildland-urban interface zone and shows how development codes can be used to save residential areas.

Books

Everyone's Responsibility: Fire Protection in the Wildland Urban Interface, NFPA, 1994. This National Fire Protection Association book shows how three communities dealt with interface problems.

Firewise Construction Design and Materials Publication, sponsored by the Colorado State Forest Service and FEMA. This 38-page booklet details home construction ideas to make a home Firewise. Various other publications are available from the Colorado State Forest Service on wildland-urban interface issues.

Is Your Home Protected from Wildfire Disaster? A Homeowner's Guide to Wildfire Retrofit, Institute for Business and Home Safety, 2001. This book provides homeowners with guidance on ways to retrofit and build homes to reduce losses from wildfire damage.

Road Fire Case Study, Stephen Bridge, NFPA, 1991. Provides information to assist planners, local officials, fire service personnel, and homeowners.

Wildland Fire—Communicator's Guide. This is a guide for fire personnel, teachers, community leaders, and media representatives.

CD-ROMs

Arizona Firewise Communities Educator's Workshop, Payson, AZ, February 18–19, 2003.

Burning Issues, Florida State University and the US Bureau of Land Management. 2000. Interactive multimedia program for middle and high school students to learn about the role of fire in the ecosystems and the use of fire managing rural areas.

Wildland Fire Communicator's Guide. This interactive CD-ROM compliments the book.
http://www.nifc.gov/prevEdu/prevEdu_communicatorGuide.html

Other Publications

It Can't Happen to My Home! Are You Sure? A 12-page publication by the US Forest Service, Southwestern Region.

Wildfire Strikes Home! (Publication no. NFES 92075); *It Could Happen to You, How to Protect Your Home!* (Publication no. NFES 92074). Homeowners' handbooks from the US Bureau of Land Management, the US Forest Service, and state foresters.

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APPENDIX B. INFORMATION DATA SHEET AND CONTACTS

B.1. CWPP Base Information Data Source

Name	Type	Source	Contact / Web Address
Wildland Fuel Hazards	Shapefile	Logan Simpson Design Inc.	Roy Baker (480) 967-1343; rbaker@logansimpson.com
Wildland-Urban Interface (WUI)	Shapefile	Logan Simpson Design Inc.	Roy Baker (480) 967-1343; rbaker@ logansimpson.com
Vegetation Zones	Raster	Southwest Regional Gap Analysis Project (US Geological Survey 2005)	http://earth.gis.usu.edu.swgap
Land Ownership	Shapefile	Arizona State Land Department	Land Resources Information System Published October 29, 2007 Gary Irish, (602) 542-2605
Chiricahua-Dragoon Ecological Units	Shapefile	Coronado National Forest	Coronado National Forest Chris Stetson, (520) 388-8360
Huachuca-Whetstone Ecological Units	Shapefile	Coronado National Forest	Coronado National Forest Chris Stetson, (520) 388-8360
Land Parcel Data	Shapefile	Cochise County	Cochise County IT Department Walter Domann, (520) 432-8339
Parcel Structure Data	Access Database	Cochise County	Cochise County Assessor Philip Leiendecker, (520) 432-8650
Ignition History	Shapefile	US Geological Survey	http://wildfire.cr.usgs.gov/firehistory/
Ignition History	Excel Table	Arizona State Forester	Arizona State Forestry Division
Ignition History	Shapefile	Coronado National Forest	Coronado National Forest Chris Stetson, (520) 388-8360
Chiricahua National Monument Ignition History	Excel Table	National Park Service	National Park Service Perry Grissom, (520) 733-5134
Coronado National Memorial Ignition History	Excel Table	National Park Service	National Park Service Perry Grissom, (520) 733-5134

All final-analysis GIS data—including flammability analysis, fuel hazards analysis, ignition history and density, community values analysis, cumulative risk analysis, and treatment management units—are located at the Cochise County Office of Emergency Services and at Logan Simpson Design Inc.

B.2. Cochise County CWPP Contacts

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APPENDIX C. INVASIVE SPECIES

Nonnative species that arrive in an area sometimes exhibit explosive growth, which leads to domination of native plants. They can quickly change the amount of available fuel on the land, which changes fire behavior and how fires must be handled. The following information is presented by the Core Team to assist municipal, state, and federal land managers with basic recommendations for the management of nonnative invasive plants that are contributing to elevated fire risk.

Lehmann lovegrass (*Eragrostis lehmanniana*)

Much of the information about Lehmann lovegrass is from the US Forest Service's *Field Guide for Managing Lehmann and Weeping Lovegrasses* (USFS 2012a). Lehmann lovegrass was introduced for forage production and erosion control; however, it is becoming invasive in the Southwest and is listed as a noxious weed in Arizona and portions of New Mexico.

It is the most abundant non-native plant in the county. The natural fire regime in desert-grassland communities has been altered as Lehmann lovegrass has increased, resulting in more intense wildfires that occur with greater frequency. Dead stems are slow to decompose and can build up a heavy layer along the ground, resulting in intense fires with long residence time, which can harm less fire-adapted plant species. The live stems are upright, giving Lehmann lovegrass patches an upright, airy character that can burn in flashy, fast-moving fires.

Lehmann lovegrass is commonly found growing away from areas where it was seeded and is still moving into new areas. The benches and flats on the east side of the Huachuca Mountains and the west side of the Chiricahua Mountains have extensive near-monocultures of Lehmann lovegrass, and it is widespread and locally common in Cochise County and throughout southern and central Arizona.

Lehmann lovegrass establishes quickly, and produces numerous viable seed during its first season of growth. Huge quantities of its tiny seeds accumulate in the soil. Seed is spread by wind, water, animals, and vehicles. This grass is eaten by livestock, but it has wiry stems and is not preferred compared to native grasses.

It may be impractical to replace Lehmann lovegrass where it is widespread or well established. In some areas it may be feasible to lessen densities to reduce fire risk. In areas not dominated by Lehmann lovegrass, it is desirable to limit new infestations by preventing excessive grazing of natives and/or reseeding areas with desirable native grasses and forbs after disturbance. Combining mechanical, biological, and chemical treatment methods are required for effective management.

Hand pulling, grubbing, and hoeing can be effective (but difficult) year-round methods for control. Hand removal is easiest when soil is moist, temperatures are cool, and plants are in their early life stage. To prevent seed dispersal, pulled plants should be placed in plastic bags and properly disposed of in sanitary landfills. For areas too remote for transport with plastic bags, plants may be piled and left on-site. Treated sites should be revisited after rain to pull or spray new seedlings.

Use vehicle-mounted spraying equipment to broadcast treat or backpack sprayers. Glyphosate, imazapyr, and sethoxydim are recommended herbicides. For glyphosate, best results are achieved if lovegrass is at least 50 percent green. Fall or spring spraying is recommended for imazapyr when lovegrass is actively growing, as indicated by bright green and glossy leaves. Sethoxydim should be sprayed on warmer days of spring or fall, preferably when the lovegrass is less than 6–10 inches high. All three of these herbicides may damage desirable plant species, and it is best to spray when the lovegrass is green and desirable species are dormant and will not take up herbicide. Non-target plants, including desirable forbs and woody plants, may be killed or injured by transfer of imazapyr from the lovegrass through intertwined root systems. Sethoxydim is selective; it affects most grasses but not forbs or shrubs. Consider tank mixes of glyphosate/imazapyr for increased control. See USFS (2012a) for more details, and always read herbicide labels and follow instructions.

Burning alone is not recommended since it will likely result in increased densities. Consider burning in combination with herbicide spraying. Tilling has potential in arable sites, but it will not eradicate seed in the soil. Tilled areas would need to be reseeded with desirable species, especially a mixture of native seed that is adapted to the local area and soil type.

Lehmann lovegrass tends to green up 2 to 4 weeks before native grasses in the spring and often stays greener later into the fall and winter. This offers a narrow opportunity for grazing or spraying lovegrass while minimizing damage to desirable species. However, grazing animals may need to be quarantined for 10 days after grazing Lehmann lovegrass to avoid spreading its seed to new areas.

Combinations of types of treatments, such as using herbicides to follow up pulling, grazing, or burning offer higher likelihood of success. Follow-up treatments are required, and several consecutive years of any treatment are required to eliminate an infestation completely. Seeding of native species may be needed if they have been eliminated or greatly reduced in the site. Thoroughly wash equipment that is driven in it or used to mow or otherwise treat infestations to remove seeds and prevent further spread.

Saltcedar (also known as tamarisk, *Tamarix* species)

Information about invading saltcedar tree species is excerpted from the USDA's online Fire Effects Information System (Zouhar 2003), the USFS's *Field Guide for Managing Saltcedar in the Southwest* (USFS 2012b), the *Strategy for Long-Term Management of Exotic Trees in Riparian Areas for New Mexico's Five River Systems, 2005–2014* (USFS and NMEMNRD 2005), and the *San Juan Basin Watershed Management Plan* (SJCWG 2005). Several species occur in Arizona, and they are difficult to distinguish. They are fairly similar in many aspects and are often discussed as a whole. Saltcedar escaped from cultivation and is one of the most widely distributed nonnative invasive plants along watercourses in the southwestern United Sates. Saltcedar-dominated communities are often monocultures, although cottonwood and willow are commonly present. It is highly flammable and has contributed to some intense, hard-to-fight wildfires near Benson and other areas in Arizona and the Southwest.

Saltcedar is a perennial, deciduous, small shrub or tree ranging from 5 to 25 feet tall. It has small, scaly, bluish-green, flat leaves that resemble evergreen “needles.” Saltcedar’s root system has shallow, lateral rhizomes and deep roots that penetrate to a depth of 30 feet or more. It flowers March through October and can reproduce by both seed and sprouting. The saltcedar root system is dominated by a root crown that lies 12 to 18 inches below the soil surface. Buds on the root crown and shallow lateral roots will sprout new stems rapidly when aerial portions of the plant are removed.

Dense saltcedar stands usually have fewer native birds than native riparian plant communities; however, it does provide habitat for a number of bird species including white-winged and mourning doves, the endangered southwestern willow flycatcher, and yellow-billed cuckoo (a candidate for endangered species protection). To avoid harm to these species, contact the US Fish and Wildlife Service (602-242-0210) before implementing treatment of saltcedar stands of 0.25 acre or more in riparian or wetland areas.

Increases in fire size, intensity, or frequency have been reported for river systems infested with saltcedar. This is attributed to a number of factors, including an increase in the number of fires and the way saltcedar grows and burns. The structure of saltcedar stands is more conducive to repeated fire than that of native vegetation. Saltcedar has volatile compounds in its leaves, and its dense canopy creates fuel ladders, thereby increasing the likelihood of horizontal fire spread and intense crown fires.

Once established in large stands, saltcedar can rarely be controlled or eradicated with a single method, and many researchers and managers recommend combining physical, biological, and chemical control methods. Removing saltcedar must also be accompanied by an ecologically healthy plant community that is weed resistant. The best growth period to burn saltcedar to reduce density, canopy, and hazardous fuel loads is during the peak of summer, presumably due to ensuing water stress. Use of fire alone to control saltcedar, however, is generally ineffective, only killing aboveground portions of the plant and leaving the root crown intact and able to produce vigorous resprouts.

Saltcedar in dense stands that have not burned in 25–30 years can exhibit extreme fire behavior and crown fire at almost any time of year due to closed canopy. They can have flame lengths exceeding 140 feet, resulting in near-complete fuel consumption. Stands reburned after 5 to 6 years show vastly different fire behavior, carrying fire only if there is adequate fine-fuel load and continuity. Saltcedar fires can produce numerous spot fires 500 feet downwind or more, making prescribed burning and firefighting difficult.

Mechanical and chemical methods are commonly employed for saltcedar control. November through January is the most effective time to kill saltcedar by cutting below the root collar, likely because the plants are entering dormancy at that time and translocating resources into their roots. Whole tree extraction through use of equipment such as the patented Boss Tree Extractor (http://www.bossreclamation.com) has achieved 90 percent control. To prevent rerooting, grubbed saltcedar should be piled, dried, and then burned or mulched rather than left on the surface. In areas

where native riparian vegetation species or other habitat issues create a need for agile specific treatment designs, whole tree removal may be the preferred treatment.

Herbicide application can be done as a basal bark treatment to whole plants using a backpack sprayer with triclopyr or imazapyr. Applications on older stems with thick, furrowed bark should be avoided since success may be limited. Always read herbicide labels and follow instructions. Herbicide can also be applied immediately after cutting. Triclopyr or imazapyr painted or sprayed on cut stumps within 15 minutes of cutting has been successful, with the exception of spring months when sap is moving up from the root mass. In addition, foliar spray may be used to control small saltcedar plants that are less than 5 feet in height and cover relatively small areas. Extraction and mulching of saltcedar will require treatments of resprouts by mechanical or chemical control methods.

Livestock will browse saltcedar, but the foliage has little nutritional value, and animals usually feed on other vegetation first. Grazing with goats may be used to suppress resprouting after other treatments have been made. Tamarisk beetles in the genus *Diorhabda* have been released in Nevada, Utah, Colorado, California, and Texas. Adult beetles and larvae consume the foliage of saltcedar, which can kill the plant over a period of several years. The beetles have spread beyond their intended release areas, and their use for biological control has been suspended for now because they can potentially impact saltcedar habitat used by the endangered southwestern willow flycatcher.

Johnsongrass (*Sorghum halepense*)

Johnson grass is a coarse perennial grass with stalks reaching from 1 to 7 feet in height. It is a Mediterranean-region native that now occurs worldwide by virtue of deliberate introduction as cultivated forage. It readily escapes cultivation and can be spread by water, wind, livestock, wildlife, and contaminated vehicles, crops, or machinery. Once a population of Johnson grass is established, most growth is from asexual regeneration by rhizomes. It is a serious agricultural weed worldwide.

In the San Pedro Valley and along roadsides and in riparian areas throughout Cochise County and Arizona, the species is well established along bottomlands, roadsides, drainages, and river banks where other grasses, especially sacaton (*Sporobolus wrightii*), once proliferated. It begins its growth cycle in June or July with the onset of the summer rains or earlier if soil moisture is available. Seed heads mature in late summer and the plant becomes dormant in mid- to late autumn. Through winter it persists as dry, dense stands which are highly susceptible to fire. In riparian areas these can burn with great intensity in any season, especially in summer. Cottonwoods and other native species are usually killed or scarred, while Johnson grass regrows vigorously from subsurface rhizomes and spreads once the tree canopy is removed. Some reaches of the San Pedro River have been subject to one or more hot-season wildfires and are now dominated by Johnson grass along the stream banks.

The USGS Weeds in the West project addresses the Johnson grass relationship to fire below (Guertin and Halvorson 2003). A summary of the literature suggests the following:

- Spring burning may encourage Johnson grass, and it is not generally recommended as a control method, though results in Texas with late April burning reduced it enough to allow native grasses to establish.
- Fire, combined with herbicide treatment of sprouts, can be an effective control.
- Johnson grass survives fire with its deeply buried rhizomes that can subsequently sprout, and it can increase following a fire.
- When costs were significantly lower, the preferred method of *Sorghum halepense* control in the Southwest was torching fields by using butane-propane burners.

Other measures to control the spread of Johnson grass include the following:

- After visiting locations prone to Johnson grass, shake off grass debris from clothes and shoes in a manner that will not lead to future spreading.
- Use guaranteed Johnson grass–free seed for livestock feed and erosion control.
- Clean vehicles (radiators and undercarriages especially).

Find control methods at http://www.fs.fed.us/database/feis/plants/graminoid/sorhal/all.html. Most Johnson grass control studies were conducted in agricultural settings, and less is known from noncultivated areas.

Yellow bluestem (also known as King Ranch bluestem or KR bluestem, *Bothriochloa ischaemum*)

Yellow bluestem is native to the grasslands of Europe and Asia but has been widely planted in the United States for erosion control and livestock forage due to its ease of establishment, vigor, rapid maturity, high productivity, forage quality, high seed production, adaptability, and tolerance of grazing. However, it has been found to be invasive and is now widely viewed as a weed (Ruffner 2012). It is found across the southern half of the United States and in some northern states. Planting history here is not known, but the earliest collection in Arizona herbaria is from 1961 west of Rodeo, New Mexico. In the 1980s it was noted in sizable patches in Arizona along roads near Sierra Vista and near Willcox. Since 2000, there have been numerous collections in Chihuahuan desertscrub, mesquite shrubland, and grassland scattered across Cochise County, up to 5,200 feet in elevation. South of Sonoita, in neighboring Santa Cruz County, it is dominating one pasture, and the cattle “were eating everything but.” It is reported as appearing relatively “suddenly” (B. Gebow, personal observation). It was noted as producing large amounts of biomass. This species has the potential to increase fuel loading for wildfires and create more intense fire behavior.

It is a bunchgrass, so spread is by seed. Seed dispersal is fastest along roads possibly because of mowing or the movement of seeds by vehicles. Otherwise it moves on “advancing fronts” outward from invaded sites. It produces relatively large amounts of biomass, but is considered by some as fair to poor forage. Gabbard and Fowler (2006) found that it invaded all sites they studied in central Texas,

except those with more than 75 percent cover of trees or shrubs. It was increasing in all sites, and they anticipated that it would continue to do so. It crowds out native plants and makes near monocultures, which have lower native grass and forb abundance and diversity (see Gabbard and Fowler 2006). Because of that, it can reduce the abundance of birds (Hickman et al. 2006). Yellow bluestem is highly tolerant of grazing and fire, and it appears to be able to spread with or without grazing, fire, or other disturbance (Gabbard and Fowler 2006).

There has been a little research about how to control yellow bluestem, but researchers and managers generally agree that it and related species are difficult to control. Herbicide alone can provide temporary reduction. Glyphosate (at 2 to 4 pounds per acre) was found to be “reasonably effective” if treatments were repeated, but glyphosate also kills native grasses and other plants. Imazapyr (at 1 to 1.25 pounds per acre) can be effective, and research has found that it was less harmful to native plant species at that site (MDC 2010). Harmoney et al. (2004) found that the herbicides imazapic, glyphosate, sulfometuron, bromacil, and imazapyr all reduced yellow bluestem by 54 to 94 percent, but results varied greatly by year. Imazapyr was most effective. Harmoney et al. found that sethoxydim and clethodim, two grass-specific herbicides that would not affect native forbs or woody plants much, had little impact on yellow bluestem. Changing the time of year and multiple treatments may improve results with any herbicide. Ruffner (2012) found that spraying imazapyr, glyphosate, and imazapyr plus glyphosate temporarily reduced yellow bluestem, especially combined with pretreatment disking.

Simmons et al. (2007) found that mowing had no effect on yellow bluestem. Prescribed burning during its growing season and herbicide application were effective. Non-target plant species responded differently and variably to the treatments. Prescribed burning in the middle of its growing season may suppress yellow bluestem best. Ruckman et al. (2011) reduced yellow bluestem five times better with September rather than October burns in Texas.

Mowing or burning before applying herbicide may also help reduce yellow bluestem because old leaves are removed. Those leaves intercept some herbicide and reduce the amount of herbicide absorbed by the plant. The mowing or burning may also stress the bluestem plants and make them more susceptible to the herbicide.

If yellow bluestem has formed large stands before it is treated, it is so aggressive that many or all of these treatments can be viewed as suppression and not eradication. Because yellow bluestem is such a prolific seeder, and because herbicides and fire may temporarily harm plants but not kill them, treatments will be needed for multiple years or will need to be repeated at intervals to maintain native grass communities.

Careful monitoring is needed to find the best types of treatments, combinations of treatments, frequency, and timing of treatment. Monitoring would also need to include native plant species in order to find the best strategy for retarding yellow bluestem and enhancing native species. Other factors such as soil type, soil moisture, rainfall, and temperature influence the responses of yellow bluestem and native plants, making it difficult to find the best treatment strategy. Because dense yellow bluestem

stands have eliminated many native plant species and because these treatments are so severe, native plant species will likely need to be reseeded or planted after treatment.

Buffelgrass

Information for buffelgrass is largely excerpted from the USDA's online Fire Effects Information System (Hauser 2008). Additional information is available from *Invasive Non-Native Plants that Threaten Wildlands in Arizona: A Categorized List Developed by the Arizona Wildlands Invasive Plant Working Group* (AZ-WIPWG 2005) and from the *Southern Arizona Buffelgrass Strategic Plan* (BWG 2008).

Buffelgrass has only been found in a few places in Cochise County so far, but it is abundant and increasing in Pima County, Mexico, Texas, and many parts of the United States and the warmer parts of the world. It is adapted to elevations below approximately 4,500 feet, but cold-tolerant varieties are being developed, and it is unknown how predicted increasing temperatures will affect its elevational range. It is native to Africa, India, and western Asia. It was introduced into the Southwest beginning in the 1930s for livestock forage and erosion control. Buffelgrass can establish in disturbed sites and also establish and spread on undisturbed sites. It has spread considerably from the areas where it has been introduced. Williams and Baruch (2000) describe buffelgrass as "one of the world's most notorious invaders." It is listed as a noxious weed by the state of Arizona.

Buffelgrass grows in dense stands, spreads aggressively, and can double as rapidly as every 2 to 3 years (USFS 2012c). The two greatest impacts of buffelgrass invasions are the alteration of plant communities and the alteration of fire regimes. In areas where buffelgrass occurs, it often out-competes native species for limited water and nutrient resources by germinating earlier, growing faster, and creating denser stands than native plants. Buffelgrass can reduce native plant species richness in areas where it is dominant (Olsson et al. 2012; McDonald and McPherson 2013).

Buffelgrass is a fire-adapted species. It resprouts rapidly from belowground parts after a fire (or mowing or grazing) and may reestablish from on-site seeds or from seeds coming in from elsewhere. New buffelgrass growth can appear as soon as 5–10 days following complete top-kill by summer fires. The plant buffelgrass grows into a compact, bushy form, accumulating flammable material over several years. Buffelgrass fuel loads are generally much higher than fine fuel loads from native plants in arid and semi-arid environments. That means that fires in buffelgrass stands may have longer flame lengths, faster rates of spread, higher temperatures, and longer duration than fires in native vegetation. In the Sonoran Desert, headfires in buffelgrass have been documented reaching temperatures of 1,400 to 1,650 degrees Fahrenheit, much hotter than historical fires (McDonald and McPherson 2013).

In a news article, a fire inspector in Tucson, described the desert surrounding Tucson as formerly "fire resistant," but 15 to 20 buffelgrass-fueled fires occurred within a 6-week period during the summer of 2007 (High Country News, 2007, http://www.hcn.org/issues/352/17167). Similarly, in Hermosillo, Sonora, Mexico, fires were rare in the 1940s before the establishment of buffelgrass. Over time the number and size of fires has increased; by the late 1990s buffelgrass fires had increased to one fire every 2 days during the summer. Since that time wooden utility poles have been wrapped with metal to

protect them from fire. People in Pima County have banded together to attempt to control buffelgrass (see http://www.buffelgrass.org/).

This information on control methods is from USFS (2012c) and www.buffelgrass.org. For immediate removal of fuel for wildfires, use manual pulling, grubbing, or hoeing. Care should be taken to remove the base of the stems where the roots branch from to prevent it from resprouting. Many seedlings can germinate with the next warm, rainy period following pulling, and they can be easily controlled by spot-spraying. Pulling is slow and expensive for large patches. Herbicide application using backpack spraying, ground broadcast spraying, or aerial spraying can be done economically on larger areas. Herbicides kill buffelgrass but do not remove the fuel for wildfires immediately. The plants do disintegrate and decompose and, within 3 years may be reduced so much that a fire may not spread (McDonald and McPherson 2013).

The primary herbicides used for buffelgrass are glyphosate and imazapyr. These are broad-spectrum chemicals, which can impact non-target plant species, including many woody and broadleaf species. Always read herbicide labels and follow instructions. Buffelgrass plants should be at least 50 percent green before spraying. Best control is obtained when plants are actively growing and are more than 80 percent green. This generally occurs within 2 to 6 weeks following heavy summer rains. If possible, herbicide should be applied when desirable species that grow with buffelgrass are dormant.

Recent research by Travis Bean and William McClosky at the University of Arizona shows *dormant* buffelgrass control with imazapyr. This research was conducted in the Santa Catalina Mountains and Avra Valley. Bean and McClosky have not yet published their results but have presented them at the November 2013 Southwest Vegetation Management Association annual meeting and other venues. The Coronado National Forest is beginning limited winter dormant imazapyr applications using backpack sprayers for individual plant treatments. They will be carefully investigating possible non-target effects that may occur due to movement of imazapyr in soil. Treating during winter dormancy avoids the extremely small and variable summer window of opportunity for treating green buffelgrass and also serious safety concerns for crews working in extreme summer heat.

Revisit pulled or sprayed sites after rain and in the following growing season to remove new buffelgrass seedlings and previously unnoticed plants. Seeds are relatively long-lived; they may survive 3 or more years in the soil and germinate later.

Other Plants

Other nonnative invasive plants that are becoming established in Cochise County, or are widespread but not common, which could become a fire problem in the future include Bermudagrass, yellow star-thistle, and Malta star-thistle.

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