



CATALINA

Community Wildfire Protection Plan



October 2007



LOGAN SIMPSON
DESIGN INC.

Catalina Community Wildfire Protection Plan

Prepared by:



LOGAN SIMPSON
DESIGN INC.

33 North Stone Avenue, Suite 1460
Tucson, Arizona 85701
(520) 884-5500
www.logansimpsondesign.com

October 2007

TABLE OF CONTENTS

Acronyms and Abbreviations	iv
I. Introduction	1
A. Background	2
B. Wildland-Urban Interface (WUI) and Delineation Process	4
C. Desired Future Condition and Wildfire Mitigation in the WUI	6
D. Goals for the CCWPP	8
E. Planning Process.....	8
II. CCWPP Community Assessment and Analysis	10
A. Fire Regime and Condition Class.....	12
B. Fuel Hazards	14
C. Conditions of Ignition and Past Fire Occurrence.....	25
D. Community Values at Risk	25
E. Summary of Community Assessment and Cumulative Risk Analysis.....	31
III. Community Mitigation Plan	35
A. Fuel Reduction Priorities	35
B. Prevention and Loss Mitigation	43
1. Improved Protection Capability and Reduction in Structural Ignitability.....	44
2. Promote Community Involvement and Improved Public Education, Information, and Outreach	44
3. Encourage use of woody material from WUI Fuel Mitigation Programs	45
IV. CCWPP Priorities: Action Recommendations and Implementation	46
A. Administrative Oversight.....	46
B. Priorities for Mitigation of Hazardous Wildland Fuels	46
C. Priorities for Protection Capability and Reduced Structural Ignitability.....	47
D. Priorities for Promoting Community Involvement through Education Information, and Outreach.....	49
E. Requested Funding for Implementation of the CCWPP	49
V. Monitoring Plan	50
A. Administrative Oversight, Monitoring, and CCWPP Reporting.....	50
B. Effectiveness Monitoring	51
VI. Declaration of Agreement and Concurrence	53
VII. References	54
VIII. Glossary of Fire Management Terms	57

APPENDIXES

Appendix A. Vegetation Association Descriptions	76
Appendix B. National Fire Danger Rating System Fuel Model Selection Key	81
Appendix C. Educational Resources	85
Appendix D. Information Data Sheet and Contacts	88

LIST OF TABLES

Table 2.1 Land Management within the WUI	10
Table 2.2 Fire regime information	12
Table 2.3 Fuel model, fire-danger ratings, and intensity levels on vegetative association in the WUI	15
Table 2.4 Fuel hazard components	23
Table 2.5 Ignition history and wildfire occurrence	25
Table 2.6 Community values	29
Table 2.7 Cumulative risk levels by percentage of the WUI area	33
Table 3.1 Identified treatment management units	37
Table 3.2 Fuel modification and treatment plans	39
Table 3.3 Acres of wildland fuels mitigation treatment conducted by ASLD Forestry Division Fire and Fuels Crew during an 8-hour on-site workday	42
Table 4.1 Action recommendations for construction of firebreaks in Catalina WUI	47
Table 4.2 Action recommendations for wildland fire protection and reduced ignitability	47
Table 4.3 Action recommendations for enhanced public education, information, and outreach	49
Table 4.4 CCWPP proposed budget	49
Table 5.1 Performance measures to assess CCWPP progress	52

LIST OF FIGURES

Figure 1.1 Analysis area	2
Figure 1.2 CCWPP Process	5
Figure 2.1 CCWPP WUI area	11
Figure 2.2 Catalina vegetation associations	17
Figure 2.3 Catalina flammability	18
Figure 2.4 Catalina fuel hazards	24
Figure 2.5 Catalina ignition history	26
Figure 2.6 Catalina community values	30
Figure 2.7 Catalina cumulative risk analysis	34
Figure 3.1 Catalina treatment management units	36

LIST OF PHOTOS

Photo 2.1	July 24, 2007, street flooding	12
Photo 2.2	Grassland vegetation association.....	19
Photo 2.3	Desert Scrub vegetation association	20
Photo 2.4	Shrublands vegetation association.....	21
Photo 2.5	Deciduous Southwest Riparian vegetation association.....	21
Photo 2.6	Developed lands within the WUI.....	22
Photo 2.7	Cottonwoods area of elevated concern	27
Photo 2.8	Unpaved road to Sutherland Heights	27

ACRONYMS AND ABBREVIATIONS

ASLD	Arizona State Land Department
ASP	Arizona State Parks
BLM	Bureau of Land Management
CCWPP	Catalina Community Wildfire Protection Plan
CDO	Cañada del Oro
CRP	Catalina Regional Park
CSP	Catalina State Park
CNF	Coronado National Forest
CWPP	community wildfire protection plan
CWG	collaborative working group
CVC	Greater Catalina Golder Ranch Village Council
dbh	diameter at breast height
drc	diameter at root collar
EOC	Emergency Operations Center
FONSI	finding of no significant impact
FS	Forest Service
FWS	United States Fish and Wildlife Service
GIS	geographic information system
GPS	Geographic Positioning System
GRFD	Golder Ranch Fire District
HFRA	Healthy Forests Restoration Act of 2003
IGA	intergovernmental agreement
ISO	Insurance Services Office
NFP	National Fire Plan
NRCS	Natural Resources Conservation Service
PCOEM	Pima County Office of Emergency Management
PNVG	potential natural vegetation group
Rx	prescribed fire
SR	state route
SWReGAP	Southwest Regional Gap Analysis Project
USDA	United States Department of Agriculture
USDI	United States Department of the Interior
WUI	wildland-urban interface

I. INTRODUCTION

The Catalina Community Wildfire Protection Plan (CCWPP) was developed for the at-risk community and remote at-risk private lands within the interface community of Catalina, Pima County, Arizona (see Figure 1.1). The CCWPP was developed in response to the Healthy Forests Restoration Act of 2003 (HFRA). This legislation established unprecedented incentives for communities to develop comprehensive wildfire protection plans in a collaborative, inclusive process. Furthermore, this legislation gives direction to the United States Department of the Interior (USDI) and Department of Agriculture (USDA) to address local community priorities in fuel reduction treatments on Federal and non-Federal lands.

The HFRA emphasizes the need for 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 community wildfire protection plan (CWPP). Priority areas include the wildland-urban interface (WUI), municipal watersheds, areas affected by windthrow or insect or disease epidemics, and critical wildlife habitat that would be negatively affected by a catastrophic wildfire. The HFRA contains a variety of provisions to expedite approval and implementations of hazardous-fuel reduction projects on specific types of Federal land that are at risk for wildland fire.

The requirements of a CWPP under the HFRA are as follows:

1. Collaborative process involving all community interests.
2. Agreement from local government entities and local fire chiefs.
3. Approval by the State Forester.
4. Concurrence from Federal agencies that manage public lands within or adjacent to the WUI of communities identified in the plan. The cooperating Federal agency for the CCWPP is the Coronado National Forest (CNF).
5. Community-driven effort to define the WUI of the at-risk communities as well as the area and types of wildland vegetative fuel mitigation treatments designed to protect the community from wildland fire.
6. Prioritization of risks in the community.
7. Identification of funding priorities and prioritization of wildland fire mitigation recommendations for the community.

The CCWPP was developed to assist Pima County, the Golder Ranch Fire District (GRFD), Arizona State Land Department (ASLD), CNF, and community residents in identifying lands at risk from severe wildfire threat. It also allows those entities to identify strategies for reducing vegetative fuels on wildlands while improving riparian and rangeland health, supporting local industry and economies, making recommendations for reducing structural ignitability, and improving public and firefighter safety and response capabilities.

Guidance for development of the CCWPP is based on *Preparing a Community Wildfire Protection Plan: A Handbook for Wildland-Urban Interface Communities* (Communities Committee of the Seventh American Forest Congress et al. 2004), and the CCWPP was collaboratively developed in consultation with the CNF using *The Healthy Forests Initiative and Healthy Forests Restoration Act: Interim Field Guide* (USDA Forest Service and USDI Bureau of Land Management 2004).

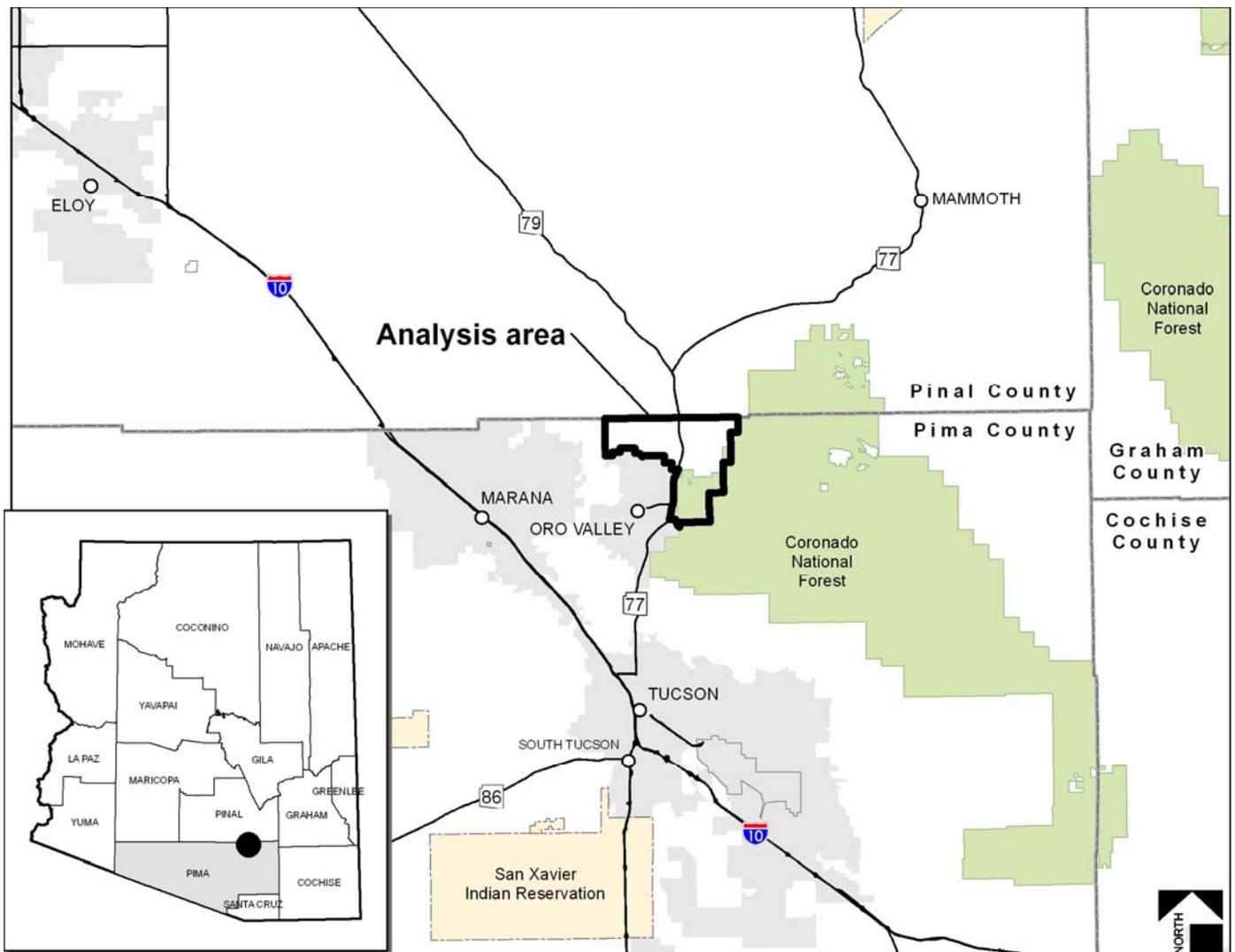


Figure 1.1. Analysis area

A. Background

The Pima County Office of Emergency Management (PCOEM) and the GRFD requested the CNF; the Arizona State Land Department (ASLD) Division of Forestry, Tucson District; Arizona State Parks (ASP), Catalina State Park (CSP); Pima County Natural Resources, Parks and Recreation; the Greater Catalina/Golder Ranch Village Council (CVC), and interested individuals throughout the Catalina area to participate in a collaborative working group (CWG) to develop the draft CCWPP. The CVC is a 501 (c)(3) corporation that was chartered to “function as an information conduit between the citizens in the unincorporated Catalina and Golder Ranch areas and the governmental bodies and other external entities that impact the community” (CVC 2004). Pima County is the local government authority for the Catalina community; however, the County and the CWG recognize the value of the CVC in conveying information from the CWG and local citizens. Therefore, the CWG will provide regular updates of the CCWPP development process at the regular monthly meetings of the CVC, and agrees that the CVC will be the core for general public involvement and information dissemination. The CWG ensures an open public process with the goal of all community interests being represented during the development of the CCWPP.

The CWG, in association with planned public involvement, meets all collaborative guidance criteria established by the Wildland Fire Leadership Council (2002).

The CWG and collaborators developed this CWPP to increase preparedness, reduce hazardous wildland fuels, reduce impacts from catastrophic wildfire, and increase communication with local, County, State, and Federal emergency response personnel by determining areas of high risk from catastrophic wildland fire, by developing mitigation measures to reduce hazardous wildland fuels, by improving emergency response to unplanned wildfire, by preventing wildfire ignitions within the WUI from spreading to adjacent State Trust and national forest system lands and becoming major conflagrations, and by reducing structural ignitability.

During initial analysis for the proposed wildland fuel mitigation recommendations, as well as the development of the overall plan, the CWG 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 (USDA and USDI 2001a, 2001b)
- *Field Guidance: Identifying and Prioritizing Communities at Risk* (National Association of State Foresters 2003)
- *Arizona Wildland Urban Interface Assessment* (Arizona State Forester 2004)
- *Arizona Communities at Risk List* (Arizona State Forester 2006)
- *Strategy for Restoring Arizona's Forests* (Statewide Strategy Subcommittee of the Governor's Forest Health Oversight Council 2007)
- *Forest Health Oversight Council 2006 Recommendations* (Governor's Forest Health Oversight Council 2006)
- *A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment: 10-Year Comprehensive Strategy Implementation Plan* (USDA and USDI 2002)
- *Pima County Multi-Jurisdictional Hazard Mitigation Plan* (Draft) (Pima County 2005)
- *Pima County Emergency Operations Plan* (PCOEM and Homeland Security 2005)
- *Wildland Fire Amendment to the Coronado National Forest Land and Resource Management Plan* (USDA Forest Service 2005b)
- *Fire Plan, Catalina State Park* (Arizona State Parks Department 2005)

The CWG also reviewed Section 101.16.B.iii of the HFRA to determine the area adjacent to an evacuation route for hazardous fuel reduction measures to provide safer evacuation from an at-risk community. The CWG has determined that the majority of wildfire starts around the community of Catalina have occurred within the Madrean Encinal and Chaparral vegetation associations immediately to the east of the community within the foothills of the Catalina Mountains. The 2003 Aspen Fire, originating on the CNF, burned over 87,000 acres and 333 structures and was successfully contained less than one mile to the east of the CCWPP WUI. Although landscape-scale fires have not been prevalent in the desert vegetation zones of the WUI, natural and human fire starts do occur and are suppressed and contained each year. The GRFD has responded to, and suppressed, 26 wildland fires within the WUI during the last three years. Continued extreme weather conditions, dry fuels, and increasing fuel loading on Federal and non-Federal lands contribute to the potential for catastrophic wildland fires within and around Catalina. As a result, the GRFD 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 the community with potential catastrophic wildfire.

Using the information gathered from these supporting documents, the GRFD, PCOEM, ASLD, CNF, and collaborators agree that the community of Catalina, as well as the outlying developed areas within the WUI, constitute an interface community (see USDA and USDI 2001a; ASLD State Forester 2007) at risk from wildland fire. The CWG, and collaborators, concur with the listing of Catalina within *Arizona—Identified Communities At Risk* (2006) as maintained by the Arizona State Forester. The CCWPP further refines components of wildland fire risk, and prioritizes community recommendations for reducing wildland fire potential through vegetative fuel management and public outreach/education and for reducing structural ignitability.

Figure 1.2 summarizes the process that CWG followed to produce the CCWPP. At the far right of each tier is the “product” resulting from the activities in that tier. These tiers correspond to the sections in the CCWPP and serve as a guide for the rest of this document.

B. Wildland-Urban Interface (WUI) and Delineation Process

In 2004, Catalina was included in the *Arizona Wildland Urban Interface Assessment* (2004), a Statewide analysis conducted by the Arizona State Forester that listed and rated communities at risk from catastrophic wildland fire throughout Arizona. Catalina was rated as a “moderate” risk from wildland fire. Catalina is currently included within *Arizona—Identified Communities At Risk* (2006), as maintained by the Arizona State Forester. According to the HFRA, an “(1) At-risk community . . . means 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” (Sec. 101.1.A.i–ii, 101.1.B, and 101.1.C).

The community of Catalina is adjacent to Federal lands, including CNF-managed lands, and is consistent with the definition of an interface community required by the Arizona State Forester as follows:

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. (Arizona State Forester 2007:1)

In addition to the community’s listing status, the current condition of the wildland fuels within and adjacent to Catalina significantly contribute to the possibility of a catastrophic wildfire that has the potential to damage or destroy 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 CCWPP.

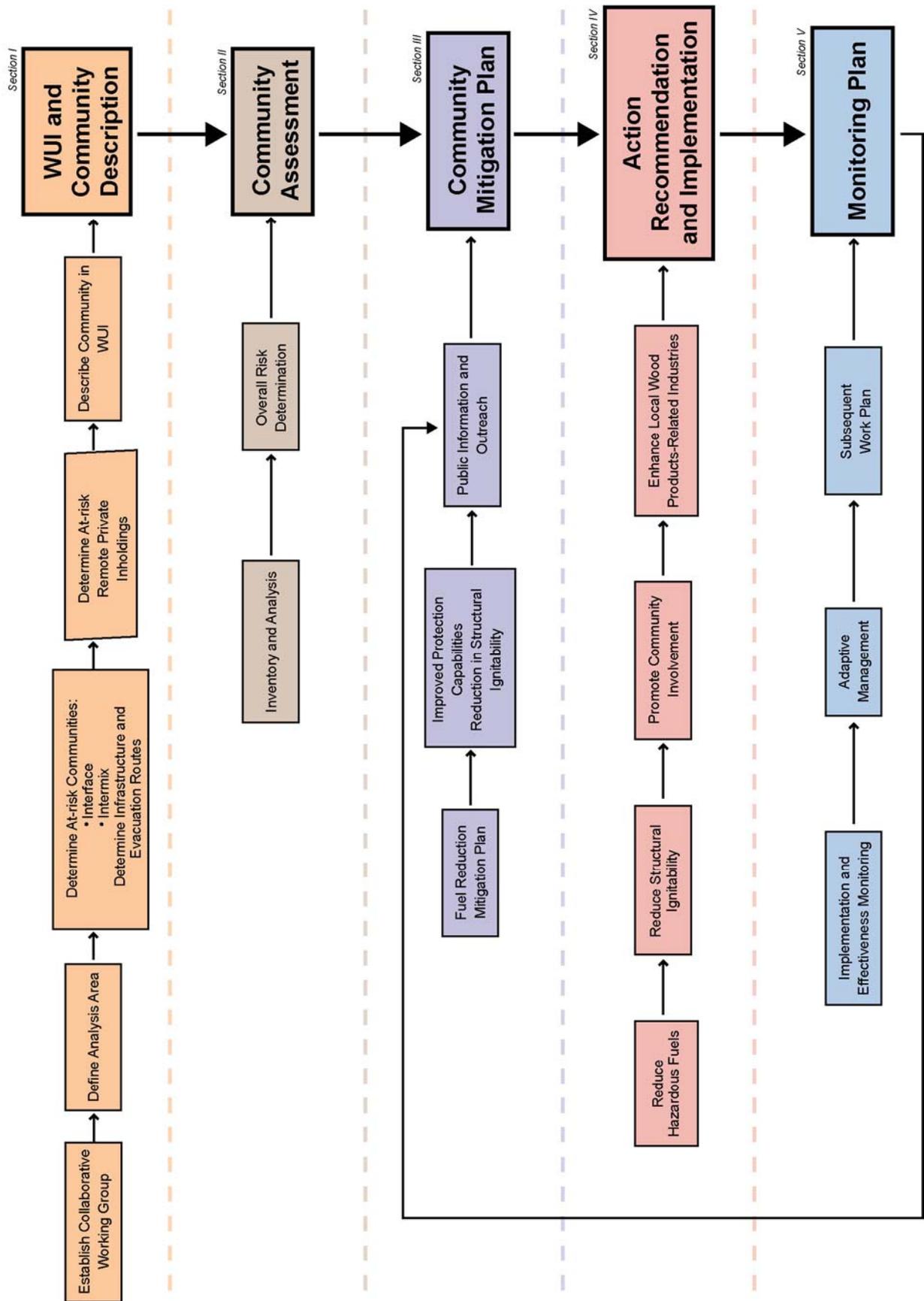


Figure 1.2. CCWPP process

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. Communities in the WUI face substantial risk to life, property, and infrastructure. Wildland fire in the WUI is one of the most dangerous and complicated situations firefighters face. Both the *National Fire Plan* (NFP) (USDA and USDI 2004), which is a response to catastrophic wildfires, and *A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment: 10-Year Comprehensive Strategy Implementation Plan* (USDA and USDI 2002), which is a plan for reducing wildland fire risk, place a priority on working collaboratively with communities in the WUI to reduce their risk from large-scale wildfire. The HFRA builds on existing efforts to restore healthy wildland conditions in the WUI by empowering local communities to determine the extent of the WUI; by determining appropriate wildland fuel mitigation measures; by enhancing public education for the prevention of wildland fire; and by authorizing expedited environmental assessments, administrative appeals, and legal review for qualifying projects on Federal land.

The CCWPP process of delineating the WUI boundary involved collaboration between local, State, and Federal government representatives. The identified WUI is the minimum area needed to provide protection to Catalina and its surrounding community values. The identified WUI includes a total of 22,504 acres composed of a mix of private, Pima County, State, and Federal lands. The WUI lands that surround the community are in a condition conducive to a large-scale wildland fire, and such a wildfire could threaten human life and property.

General elements used in creating the WUI for Catalina include the following:

- Fuel hazards, consideration of local topography, vegetative fuels, natural firebreaks
- Historical fire occurrence
- Community development characteristics
- Local firefighting preparedness
- Infrastructure and evacuation routes
- Recreation and wildlife values

C. Desired Future Condition and Wildfire Mitigation in the WUI

The desired future condition of CCWPP lands includes the maintenance of, or return to, wildland fire resiliency status and maintenance of, or return to, the vegetation component of the historic plant potential community, which is composed primarily of semidesert grasslands and Sonoran paloverde-mixed cacti desertscrub habitat with an associated shrub community (NatureServe SWReGAP 2004). The CWG intends the CCWPP to complement objectives of the *Fire Plan Catalina State Park (2005)*, the *Catalina Regional Park Plan* (Pima County Parks 2005), the *Wildland Fire Amendment to the Coronado National Forest Land and Resource Management Plan* (USDA Forest Service 2005b), and other applicable Federal, State, County, and local land management plans. The desired future condition of public lands is consistent with community wildfire protection, watershed and rangeland restoration, and protection of community values described by the CWG, including returning the native vegetation to historic wildfire return intervals. Vegetative types that are maintained in this historic condition allow natural processes, such as fire, to be incorporated into long-term management practices to sustain habitat health, which meets management goals of the CCWPP, while providing for community protection from unwanted wildland fire. Public

education and land treatment projects in the CCWPP area, coupled with current efforts of the GRFD and cooperating agencies, will create a better-informed constituency with a myriad of tools at its disposal for protection of at-risk communities through restoration efforts within the WUI. Federal wildfire reduction policy on public lands is planned and administered locally by the CNF, which is the governing agency for the Federal lands associated with the CCWPP planning area. The CNF manages wildland fire to help reduce unnaturally high wildland fuel loads that contribute to catastrophic wildland fire and encourage the return of fire to a more natural role in the ecosystem, to achieve ecosystem benefits, to reduce economic impacts, and to enhance public and firefighter safety.

The desired future condition of lands in the WUI is to have private landowners comply with Firewise standards recommended by the GRFD or meet Firewise-recommended home ignition zone landscaping. Firewise (www.Firewise.org) is a national program that helps communities reduce the risk of wildfires and provides them with information about organizing to protect themselves against catastrophic wildfires and mitigating losses from such fires. Within Arizona, the Arizona State Forester administers the Firewise certification program. GRFD personnel would like to build on previous efforts to make this information available to their citizens and encourage its application. Residential and other structures that comply with these standards significantly reduce the risk of fire igniting in a community and spreading to surrounding habitat. Additionally, structures that comply with Firewise recommendations are much more likely to survive wildland fires that spread into the community.

Undeveloped wildland and open space within the WUI is recommended to be managed to maintain or return to the natural potential vegetation community appropriate for the ecological site. (NRCS National Cooperative Soil Survey Rangeland Productivity and Plant Composition-Pima County, Eastern Part 2007). An ecological site is the product of all the environmental factors responsible for its development. The ecological site includes the characteristic soils that have been developed over time and the characteristic hydrology and plant community. The plant community on an ecological site is typified by an association of species that differ from that of other ecological sites in the kind or production of species or in total vegetation biomass production on the site.

The CWG is aware that the synergy of wildland fuel accumulations primarily associated with the invasion of woody species and nonnative grass, together with community growth in the WUI, has produced areas that are at high risk from catastrophic wildfire. The community aspires to achieve a restored, self-sustaining, biologically diverse area of mixed open space and developed areas that contribute to a quality of life demanded by local citizens. The CWG recognizes that protection from catastrophic wildland fire requires collaboration and implementation through all levels of government and through an informed and motivated public. The community considered ecosystem restoration to the historic potential natural plant community, community protection, and public and firefighter safety while developing this CWPP.

To date, Pima County has not developed community-based emergency evacuation plans specific to Catalina. Limited access routes in many rural communities within the County restrict planning options for residential evacuation. Plans outlining emergency procedures in case of evacuation, essential items to take when evacuating, registration/reception centers, transportation planning, home security, family communication, and animal and pet evacuation suggestions could be developed by individual communities in cooperation with Pima County in the future, if initiated by the local community. The GRFD would like to work with Pima County in developing such a notification and evacuation plan for Catalina.

Financial commitments required to reduce the risk of catastrophic wildfire can be extensive for County, State, and Federal governments, as well as for the small rural communities surrounded by public lands. Catalina, Pima County, and the CNF have implemented wildland fuel mitigation projects within or in proximity the WUI. The GRFD has improved wildland fire suppression response and continues public education and outreach programs concerning wildland fire threat and home ignition zone recommendations. The GRFD maintains a wildland fire response team supported by type 6 brush engines and other brush fire response equipment. The specially trained wildfire response team not only provides suppression response to brush fires but also provides community awareness programs, such as the Green Tag safety evaluation program, and structural fire risk assessments. The CWG, GRFD, and 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 CCWPP

To reduce the risks to life and property from catastrophic wildland fire, the CWG has agreed on the following primary goals of the CCWPP:

- 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
- Provide for community protection
- Recommend measures to reduce structural ignitability in the CCWPP area
- Encourage economic development in the community
- Promote development of wildfire emergency evacuation and communication plans
- Integrate use of the CWPP with surrounding community fire management plans

E. Planning Process

During initial analysis, and to aid in the overall development of this plan, the CWG reviewed the following documents and studies:

- 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 (USDA and USDI 2001a, 2001b)
- *National Fire Plan* (USDA and USDI 2004)
- *The Healthy Forests Initiative* (Presidential Policy 2002)
- HFRA
- *The Healthy Forests Initiative and Healthy Forests Restoration Act: Interim Field Guide* (USDA Forest Service and USDI Bureau of Land Management 2004)
- *Preparing a Community Wildfire Protection Plan: A Handbook for Wildland-Urban Interface Communities* (Communities Committee et al. 2004)

- *Field Guidance: Identifying and Prioritizing Communities at Risk* (National Association of State Foresters 2003)
- *Arizona Wildland Urban Interface Assessment* (Arizona State Forester 2004)
- *Arizona Communities at Risk Matrix* (Arizona State Forester 2005)
- *Identifying Arizona's Wildland/Urban Interface Communities at Risk: A Guide for State and Federal Land Managers* (Arizona State Forester 2007)
- *A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment: 10-Year Comprehensive Strategy Implementation Plan* (USDA and USDI 2002)
- *Arizona Statewide Land Use Plan Amendment for Fire, Fuels and Air Quality Management Finding of No Significant Impact (FONSI) and Environmental Assessment* (USDI Bureau of Land Management 2004)
- *The Sonoran Desert Conservation Plan* (Pima County 1998)
- *Pima County Comprehensive Plan* (Pima County 2001)
- *Coronado National Forest Land and Resource Management Plan* (USDA Forest Service 2005a)
- *Wildland Fire Amendment to the Coronado National Forest Land and Resource Management Plan* (USDA Forest Service 2005b)
- *Wildland Fire Use Implementation Procedures Reference Guide* (USDI et al. 2005)
- *Pima County Multi-Jurisdictional Hazard Mitigation Plan (Draft)* (Pima County 2005)
- *Fire Plan, Catalina State Park* (Arizona State Parks Department 2005)

Action recommendations for at-risk areas within the CCWPP WUI boundary 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 CCWPP will require collaboration by various resource management agencies and the private sector. The cooperating agencies must develop processes and systems that ensure recommended actions of the CCWPP comply with applicable local, State and Federal environmental regulations.

The dedication of the CWG and collaborators in implementing the CCWPP is an assurance that all agencies, groups, and individuals involved will develop any additional formal agreements necessary to ensure the CCWPP's timely implementation, monitoring, and reporting. The CWG was formed not only to meet collaborative requirements of the HFRA but also to represent all of the different interests of the Catalina community, with all parties involved being committed to the development and implementation of the CCWPP.

II. CCWPP COMMUNITY ASSESSMENT AND ANALYSIS

The community assessment is a risk analysis of the potential for catastrophic wildland fire to Catalina and the WUI identified by the CWG. This risk analysis incorporates the current condition class, wildfire fuel hazards, risk of ignition, wildfire occurrence, and at-risk community values. Local preparedness and protection capabilities are also factors that contribute to the delineation of areas of concern. The CWG has reviewed the Arizona State Forester's *Identifying Arizona's Wildland/Urban Interface Communities at Risk: A Guide for State and Federal Land Managers* (2007). The CWG has included all risk factors required by the Arizona State Forester in the analysis of this CCWPP. The areas of concern for wildland fuel hazards, risk of ignition and wildfire occurrence, and community values are evaluated to determine areas of highest wildland fire risk.

The CCWPP planning area is located in eastern Pima County between the communities of Oro Valley to the south and Oracle in Pinal County to the north. The CCWPP comprises 22,504 acres of land. The CCWPP planning area includes CSP (5,503 acres of forest system lands), Pima County (250 acres), CNF (324 acres), ASLD (10,264 acres), and private land (5,894 acres).

Primary land ownership in the CCWPP planning area is a mosaic of privately owned lands and lands administered by ASLD (see Table 2.1 and Figure 2.1). Much of the land within the CCWPP planning area is considered rural with minimal developments.

FS lands are located on the east and to the south of the WUI. The FS lands in proximity to the WUI provide hiking, camping, and recreational areas surrounding Catalina. FS accounts for 324 acres or 2 percent of WUI acres. The potential of escaped campfires or the need to evacuate the camping areas in the event of a wildfire warrants their inclusion in the CCWPP area. CSP is composed of national forest system lands managed by the ASP through a special-use permit. CSP accounts for 5,503 map acres, or 25 percent, of the WUI and is actively managed for public recreation.

Table 2.1. Land Management within the WUI

Ownership type	Total acres	% of total
Private	5,894	26
ASLD	10,264	46
CNF (not including CSP)	324	2
CSP	5,503	25
Pima County	250	1
Total	22,504	100

ASLD is the largest land manager in the WUI, accounting for 10,264 acres, or 46 percent, of the WUI. State lands were established in 1912 under the terms of the Arizona Enabling Act. At statehood, Arizona was granted ownership of four sections per township. The ASLD manages these State Trust lands to produce revenue for the Arizona State Trust beneficiaries, including the State's school system. With the CCWPP area, State Trust lands are managed primarily for livestock grazing.

Private land within the WUI composes the second largest ownership with the WUI at 5,894 acres, or 26 percent, of the WUI. Private lands are clustered near the community with some scattered private inholdings located throughout the WUI. Catalina is a residential community containing the majority of private land acreage within the WUI. The CCWPP WUI includes over 9,000 residents and 3,500 housing units and associated structures within the community boundary. Commercial structures are clustered along State Route (SR) 77, which has been and is planned to remain the principal commercial corridor for Catalina.

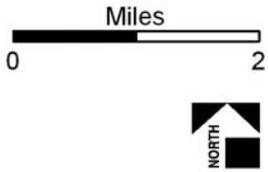
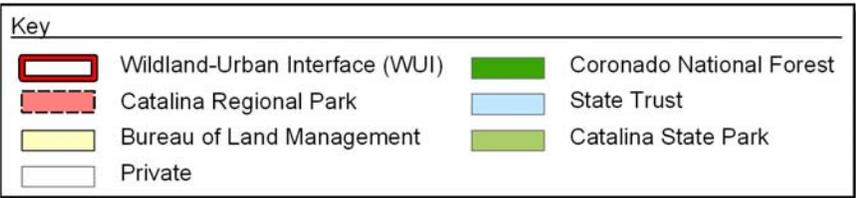
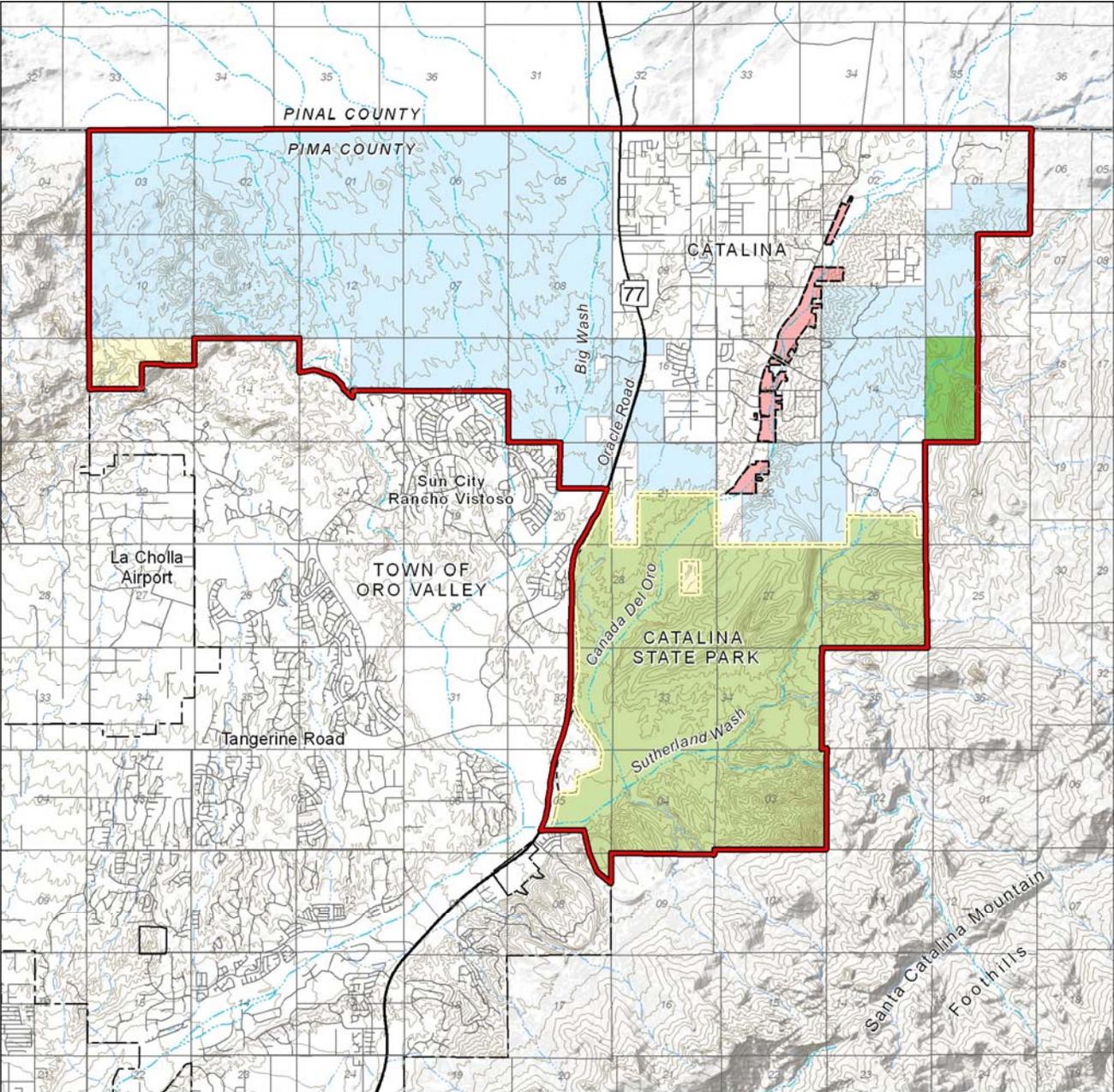


Figure 2.1. CCWPP WUI area

The CCWPP planning area boundary is identified in Figure 2.1. The climate of the area is semiarid with relatively low precipitation, low humidity, and high summer temperatures. Precipitation averages 13 inches per year depending on elevation and occurs primarily during two rainy periods—summer rainfall, which usually occurs in local torrential convection showers, and winter rainfall, which is usually slow and can occur over several days (Arizona Department of Commerce 2007).

The ephemeral riparian corridor of Cañada del Oro, flows during heavy rain or flood events (Photo 2.1). Furthermore, perennial surface water within the watershed is extremely rare, occurring in various quantities only at higher elevations of the Catalina Mountain foothills.



Photo 2.1. July 24, 2007, street flooding

A. Fire Regime and Condition Class

Prior to European settlement of North America, fire played a natural (historical) role in the landscape. Five historical fire regimes have been identified 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 (see Table 2.2).

Table 2.2. Fire regime information

	Frequency	Severity
Regime I	0–35 years	Low ^a
Regime II	0–35 years	High ^b
Regime III	35–100 years	Low
Regime IV	35–100 years	High
Regime V	200+ years	High

Source: Schmidt et al. 2002

^aLess than 75% of the dominant overstory vegetation replaced.

^bGreater than 75% of the dominant overstory vegetation replaced (stand replacement).

The Catalina WUI covers 22,504 acres including 4,429 acres of land classified as developed and low-density open space (20% of WUI acres). WUI lands analyzed include Fire Regimes II (589 acres), III (21,028 acres), and IV (887 acres) as described in *Development of Coarse-Scale Spatial Data for Wildland Fire and Fuel Management* (Schmidt et al. 2002). The condition class of wildland habitats describes the degree to which the current fire regime has been altered from its historical range, the risk of losing key ecosystem components, and the vegetative attribute changes from historical conditions. The following descriptions of condition classes are provided by the Arizona State Forester (2007 page 3):

Condition Class 1:

Fire regimes are within a historical range, and the risk of losing key ecosystem components is low. Vegetation attributes (species composition and structure) are intact and functioning within the historical range.

Condition Class 2:

Fire regimes have been moderately altered from their historical range. The risk of losing key ecosystem components is moderate. Fire frequencies have departed from historical frequencies by one or more return intervals (either increased or decreased). This results in moderate changes to one or more of the following: fire size, intensity and severity, and landscape patterns. Vegetation attributes have been moderately altered from their historical range.

Condition Class 3:

Fire regimes have been significantly altered from their historical range. The risk of losing key ecosystem components is high. Fire frequencies have departed from historical frequencies by multiple return intervals. This results in dramatic changes to one or more of the following: fire size, intensity, severity, and landscape patterns. Vegetation attributes have been significantly altered from their historical range.

The lands within the WUI are categorized as Condition Classes 1 (15,776 acres) and 2 (8 acres); 6,720 acres are classified as urban developed or agriculture. Because condition class categories are based on coarse-scale data that are intended to support national-level planning, any interpolation of this data for localized conditions may not be valid (Fire Regime Condition Class [FRCC] Interagency Working Group 2005b) as is evident in 4,205 acres (18%) within the WUI being classified as agriculture. Therefore, local agencies are asked to provide data for localized conditions (USDA Forest Service 2000). The amount of land disturbance causing growth of flammable annuals (pigweed and thistles) within areas such as Cañada del Oro and smaller wash areas, proliferation of nonnative grasses such as buffelgrass, and increasing woody species invasion indicates that the ephemeral riparian, mesquite uplands, and desert grasslands areas no longer conform to components of Condition Class 1 lands. As a result, local conditions indicate that the majority of wildland habitats within the WUI actually fall within Condition Classes 2 and 3.

The desired future condition of Federal land within the CCWPP area is to return to or maintain Condition Class 1, as described in *Fire Regime and Condition Class Field Procedures—Standard and Scorecard Methods* (USDA Forest Service 2003:10):

Open park-like savanna grassland, or woodland, or shrub structures maintained by frequent surface or mixed severity fires . . . Surface fires typically burn through the understory removing fire-intolerant species and small-size classes and removing less than 25 percent of the upper layer, thus maintaining an open single-layer overstory of relatively large trees . . . Mosaic fires create a mosaic of different-age, postfire grassland, savannah woodlands, or open shrub patches by leaving greater than 25 percent of the upper layer (generally less than 40 hectares [100 acres]). Interval[s] can range up to 50 [years] in systems with high temporal variability.

The historic climax plant community desired over the WUI landscape is an even mixture of perennial mid- and short grasses well dispersed throughout. The amount of basal cover of grasses and half shrubs should be uniform. Warm season perennials occur in both mid- and short-grass groups and can dominate the plant community. A cool-season plant component of low-growing shrubs and grasses is also significant to the vegetation community. Annuals are mostly present in mild wet years. Periodic severe drought occurs at least once during each decade, which impedes reproduction with considerable loss of perennial grass cover. Standing crop of a previous year's vegetation can persist in dry summers with herbaceous litter material providing 20 to 40 percent of the soil cover, peaking in May and June. There are no noxious or invasive species found in the historic climax plant community. Current vegetation conditions include areas invaded with buffelgrass and mesquite dominating some grasslands. Fire frequency within the climax plant community is 10 to 20 years, particularly on areas of moderate slopes.

B. Fuel Hazards

The arrangement of fuel, relative flammability, and fire potential of vegetation 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 could be threatened. Table 2.3 identifies the total amount of land in the WUI that was evaluated for overall wildland fire risk because of increased wildland vegetative fuel hazards. Historically, fire played an important role in keeping woody species in check in these grasslands (Gori and Enquist 2003). However, with the suppression of natural wildfires, within the last century, fire return intervals are extended and invasions of desert grasslands by woody shrub, mostly mesquite have altered native vegetative associations. The CWG reviewed the Natural Resource Conservation Service (NRCS 2007a 2007b) state soil geographic database (STATSGO) to describe the landscape within the WUI. The CWG also reviewed vegetation associations found within the WUI as identified and mapped using Southwest Regional Gap Analysis Project (SWReGAP) data (NatureServe 2004) (Figure 2.2). These datasets provide the level of landscape description, and vegetative land cover detail, necessary for aligning flammability with existing vegetation. Vegetation associations were field verified for the major distinguishing types.

The existing arrangement and flammability of vegetation associations largely determines wildland fire behavior. Flammability for Catalina is mapped in Figure 2.3. Evaluation of the vegetative fuels on Federal and non-Federal land in the WUI was conducted through spatial analysis using geographic information system (GIS) technology in a series of overlays that helped the CWG and collaborators to identify areas at risk from wildland fire. For the WUI, the vegetation type, density, and distribution were analyzed to help categorize areas of highest risk of fire ignition and spread from wildland fuels.

The use of vegetative data in predicting wildfire behavior was quantified by developing descriptions of associated fuel properties that are described as fuel models. The fuel model (as described by Anderson 1982) and vegetation fuel fire-risk rating within the CCWPP WUI are shown in Table 2.3. As described by the Arizona State Forester (2007:1),

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.

Table 2.3. Fuel model, fire-danger ratings, and intensity levels on vegetative associations in the WUI

Fuel type	Vegetative association	Fuel model	Wildfire risk rating ^a	Fire-danger rating model ^b	Flame length (ft)	Fire intensity level (FIL)	Rate of spread ft/hr (ch/hr)	Acres
Desert shrub-scrub	Sonoran-Mohave Creosote-White Bursage Desert Scrub	1 and 2	L	T	6	4	2,300 (35)	153
	Sonoran Mid-elevation Desert Scrub	2 and 6	L	F and T	4–6	3	2,300 (35)	2,733
	Sonoran Paloverde-Mixed Cacti Desert Scrub	1 and 2	L	L and T	4–6	3	2,300 (35)	11,702
Shrublands	Apacherian-Chihuahuan Mesquite Upland Scrub	1 and 2	M	F	6	4	2,300 (35)	805
	Madrean Encinal	1 and 3	M	B and T	6	4	2,100 (32)	2
	Madrean Pinyon-Juniper Woodland	2 and 3	H	F	6–12	4–6	2,100–4,950 (32-75)	1,387
	Mogollon Chaparral	1 and 3	H	B and T	6–12	6	400–4,950 (6–75)	18
	North American Warm Desert Riparian Mesquite Bosque	2 and 3	H	E and T	6–19	6	2,100–4,950 (32-75)	1,578
Deciduous Southwest Riparian	North American Warm Desert Lower Montane Riparian Woodland and Shrubland	6 and 8	H	E and T	6–19	6	400–4,950 (6–75)	5

Continued

Table 2.3. Fuel model, fire-danger ratings, and intensity levels on vegetative associations in the WUI

Fuel type	Vegetative association	Fuel model	Wildfire risk rating ^a	Fire-danger rating model ^b	Flame length (ft)	Fire intensity level (FIL)	Rate of spread ft/hr (ch/hr)	Acres
Other	North American Warm Desert Bedrock Cliff and Outcrop	NA	L	NA	NA	NA	NA	2
	Developed open space—low intensity	NA	L	NA	NA	NA	NA	3,996
	Developed, medium—high intensity	NA	L	NA	NA	NA	NA	123
Total								22,504

Source: National Fire Danger Rating System (Burgan 1988).

^aL = low, M = medium, and H = high, NA = not applicable.

^bSee Appendix B for the National Fire Danger Rating System definitions.

The CWG has reviewed the fire behavior potential in the Catalina WUI and finds the risk classification consistent with Situation 2 as described by the Arizona State Forester (2007:1):

Risk Factor 1: Fire Behavior Potential

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.

The ecological range site of the WUI is classified within the Southeastern Arizona Basin and Range Major Land Resource Area, which is characterized as a loamy upland ecological site. Precipitation ranges from 12 to 17 inches annually with a winter-summer rainfall ratio of 40:60. Summer rains occurring between July and September originate in the Gulf of Mexico and are usually brief in duration and of high intensity. Cool-season rains originating in the Pacific Ocean are generally frontal, tend to be widespread, and are long in duration and of low intensity. May and June are the driest months of the year with many natural fire ignitions occurring before the monsoon rains. Humidity is generally low, with mostly mild winters and hot summers. Some days in the dry months of May and June can exceed 100 degrees Fahrenheit. Cool-season vegetation growth begins in early spring, maturing in early summer. Warm-season vegetation initiate growth after the summer rains and may remain green throughout the year.

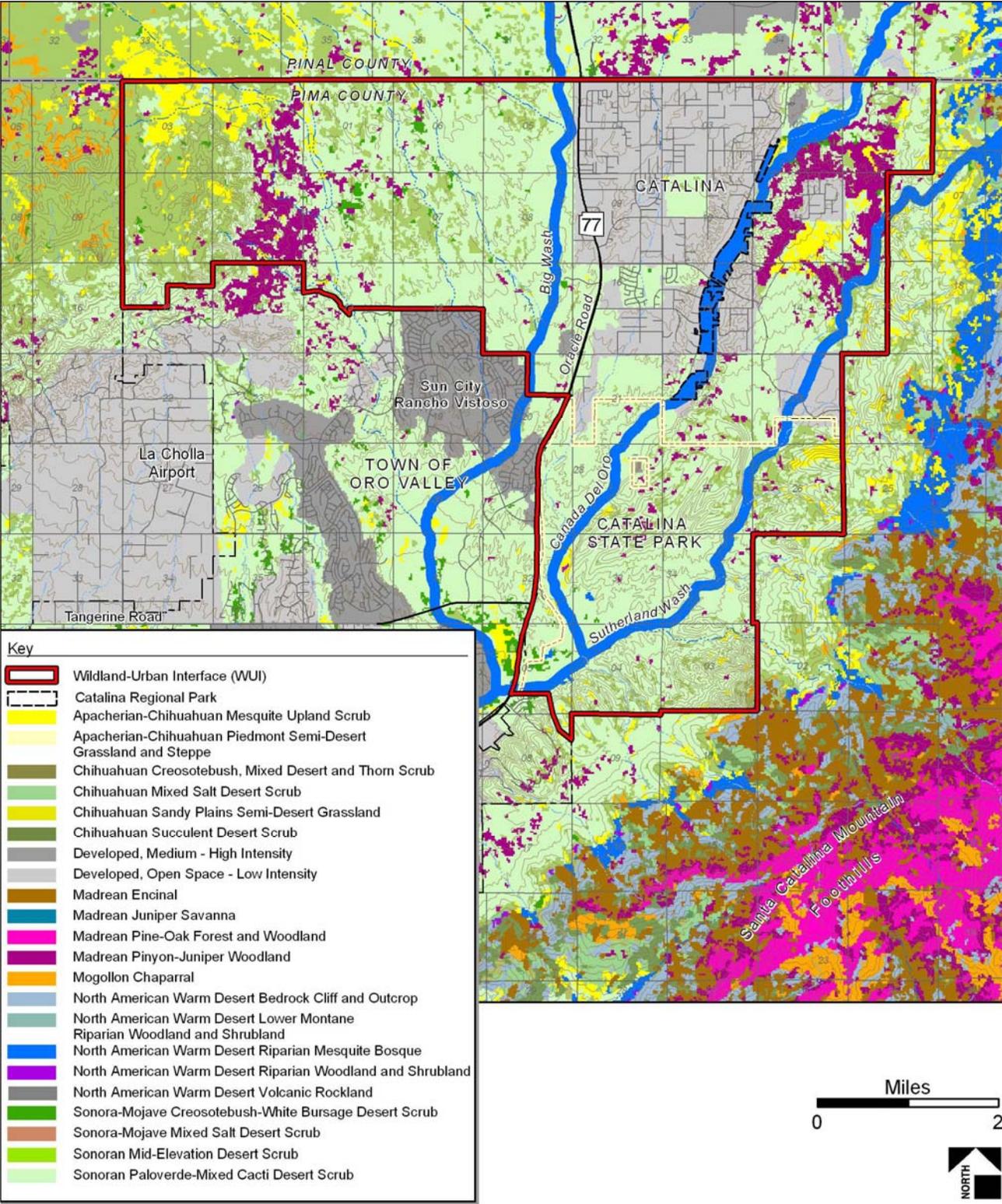


Figure 2.2. Catalina vegetation associations

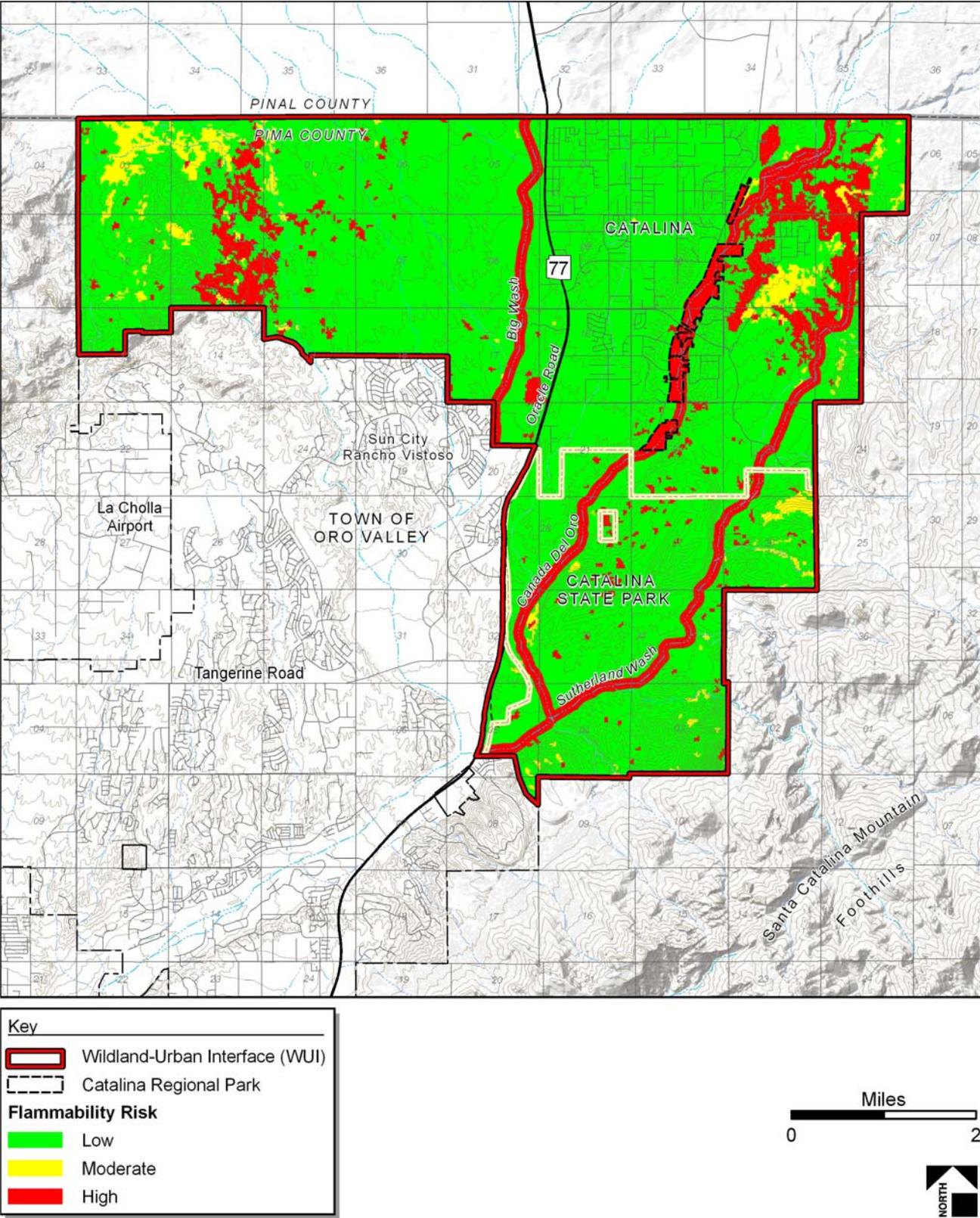


Figure 2.3. Catalina flammability

Vegetative and physical characteristics of the WUI include four major vegetation associations, one mostly nonvegetation association, and two open space, residential vegetation associations. These different vegetative communities are listed and described in Appendix A. Each vegetative community is assigned to a specific fuel model that predicts the rate of spread, flame length, and fire intensity levels possible for each vegetation association during average fire season and conditions. Assigning a fuel model to each vegetation association within the WUI will help predict wildfire behavior and thus proper suppression response (for detailed fuel model descriptions, see Anderson 1982).

Grassland associations (Photo 2.2) as described by Gori and Enquist (2003) “include a variety of herbaceous, scrub, and shrub species, with a shrub canopy ranging from less than 10 to 35 percent.” This vegetative community is poorly represented in the WUI and was not classified as an existing landform cover by the SWReGAP vegetative land cover data. Gori and Enquist (2003:4) have primarily classified the grasslands within the southern area of the WUI as follows: “shrub invaded nonnative grasslands, TYPE E: grassland with 10 to 35 percent total shrub cover and mesquite or juniper cover >15 percent and nonnative perennial grasses are common or dominant; again, a defining characteristic for this type is its potential for shrub reduction using prescribed burns and ‘restoration’ to TYPE D grassland.” Historical fire frequencies in southeastern Arizona grasslands have been estimated to occur as much as every 3 years and as little as every 22 years, but they most frequently occur somewhere between 7 and 10 years. (Huachuca Area Fire Partners 2005).

The mean fire interval of 10 years has a high degree of variability in habitat replacement due to drought, which reduces fire frequency, and moist periods, which increase fire frequency (FRCC Interagency Working Group 2005a: potential natural vegetation group Code DGRA3). Total wildland fuel load for grasslands in the WUI can exceed 3 tons per acre, producing flame lengths of 12 feet and rates of spread greater than 6,800 feet/hour (Anderson 1982).



Photo 2.2. Grassland vegetation association

The Desert Scrub vegetation associations occur on drier upland sites and include areas of bare ground and rock also supporting a variety of grass, herbaceous, scrub, and shrub species (Photo 2.3). The Desert Scrub vegetation association constitutes 14,588 acres (65% of WUI) and is the largest vegetation association within the CCWPP.



Photo 2.3. Desert Scrub vegetation association

The Shrublands vegetation association includes the Mesquite Bosque, Upland Mesquite/Grasslands, Pinyon-Juniper, Mogollon Chaparral, and Madrean Encinal associations and is the second largest vegetative type within the WUI, accounting for 3,790 acres (17% of the WUI). The Upland Mesquite associations vary from dense stands with canopies of 80 percent or higher to areas of mature trees with canopy cover of 35 to 60 percent (Photo 2.4). The Upland Mesquite community provides movement corridors and foraging areas for a variety of wildlife species. Adjacent vegetation associations are often a mix of Semidesert Grassland and Desert Scrub. The understory of the mesquite types will vary from a mix of nonnative Lehman to Johnson grass and pigweed with some areas of native grasses, depending on canopy closure. Areas of higher canopy closure (>60%) support little herbaceous and perennial grass cover, which limits fine fuels needed for fire laddering and limits rate of spread. Stands of mature mesquite include trees with trunks and limbs greater than 6 inches diameter at breast height (dbh), provide habitat for a variety of cavity-nesting bird species. The mesquite bosque areas within the WUI provide recreational use, day use, and camping areas. The Madrean Encinal association, dominated by evergreen oaks, occurs along the swales with a predominant graminoid layer, creating areas of open woodlands and savannas to areas of high canopy.



Photo 2.4. Shrublands vegetation association

The Deciduous Southwest Riparian association consisting of sycamore, cottonwood, walnut, ash, and willow can be intermixed with Grasslands associations. The Deciduous Southwest Riparian association accounts for less than 1 percent of all WUI acres, but this vegetation association may be underrepresented because of some riparian association acres included with the Mesquite Bosque association. This vegetation association, however, contributes significantly to vegetation and wildlife biodiversity as well as to the principal recreational use areas within the WUI (Photo 2.5). In general, riparian areas have characteristics that reduce the frequency and severity of fire relative to the surrounding uplands. These characteristics include less steep slopes, surface water, saturated soils, shade, fewer lightning ignitions, cooler air temperatures, lower daily maximum temperature, higher relative humidity, higher fuel moisture content, and lower wind speed. However, late seral-stage Class E riparian vegetation supports wildland fire similar to the surrounding potential natural vegetation group (PNVG) when a replacement fire occurs in surrounding PNVG during extreme drought and wind events. Late seral-stage riparian habitats can support nonreplacement fire in greater proportion of total fire frequency than surrounding PNVGs (FRCC Interagency Working Group 2005a: PNVG Code RIPA).



Photo 2.5. Deciduous Southwest Riparian vegetation association

Included within the total WUI are residential and open space community lands occurring in the developed areas of the community. Developed lands within the WUI account for 4,119 acres (18%) of lands evaluated for wildland fire potential (Photo 2.6). Developed Open Space-Low Intensity Lands include areas with a mixture of some construction materials, but mostly vegetation in the form of lawn grasses. Impervious surfaces account for less than 20 percent of total cover. These areas most commonly include large-lot single-family housing units, parks, golf courses, and vegetation planted in developed settings for recreation, erosion control, or aesthetic purposes. Developed, Low intensity: Includes areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 20 to 49 percent of total cover. These areas most commonly include single-family housing units. Developed, Medium-High Intensity Lands include areas with a mixture of constructed materials and vegetation. Impervious surface accounts for 50 to 79 percent of the total cover. These areas most commonly include single-family housing units, including highly developed areas where people reside or work in high numbers. Examples include apartment complexes, row houses, and commercial/industrial. Impervious surfaces account for 80 to 100 percent of the total cover. These lands may be considered at low risk for wildland fire. However, the threat of fire spreading from developed land to wildland has been considered in determining risk within the WUI.



Photo 2.6 Developed lands within the WUI

Several fuel hazards components, including vegetation type and density, previously burned areas, slope and aspect, and areas previously treated to reduce wildland fuel hazards, were analyzed for wildland fire potential. For example, areas of the WUI adjacent to Catalina are heavily dissected, with some areas having slopes exceeding 20 percent that are heavily vegetated with grass and shrubs. Slopes greater than or equal to 20 percent and areas with south-, southwest-, or west-facing slopes in areas of high wildland fuels were identified as having greater risks because of fuel-ladder fire effects associated with steep terrain and decreased humidity associated with the microclimates created by exposed aspects. Areas with moderate fuel hazards on slopes greater than or equal to 20 percent are considered a high fuel hazard, while the same fuel type on slopes less than 20 percent are still considered a moderate fuel hazard. 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. All other areas have a low risk from fuel hazards, including the areas that have been treated or burned within the last 10 years. The wildland fuel hazards component influence was compiled to depict areas of high, moderate, and low wildland fire potential based on vegetation type, density, and arrangement and to show areas with higher wildfire risk and therefore of greater concern to the CWG. Table 2.4 identifies these various fuel hazards components and their assigned values. Visual representations of these fuel hazard components are mapped in Figure 2.4.

Table 2.4. Fuel hazard components

Fuel hazards components	Influence^a
<i>Vegetation type and density</i>	
Shrublands in Fuel Model 3; Deciduous Riparian >100 stems/acre or moderate fuel types in slopes $\geq 20\%$	H
Mesquite Upland Scrub associations and Madrean Encinal vegetation in Fuel Models 1, 2, and 3	M
Desert Scrub, Shrublands vegetation associations, and bedrock	L
<i>Burned areas</i>	L
<i>Slopes $\geq 20\%$</i>	H
<i>Aspect (south-, southwest-, or west-facing slopes)</i>	M
<i>Treated areas</i>	L

Source: Logan Simpson Design Inc.

^a H = High, M = moderate, L = low

Riparian corridors, grasslands, and vegetative associations occurring in steep slopes with a south or southwest aspect are the greatest wildland fuel hazards within the CCWPP. Shrubland areas and early seral-stage riparian areas constitute the second greatest wildland fire risk in relation to high slopes and south or southwest aspects. In riparian vegetation associations where riparian deciduous tree species are located, total wildland fuels can exceed 20 tons per acre and produce flame lengths greater than 6 feet above the overstory with a rate of spread of over 525 feet (8 chains) per hour. In addition, some grasslands, such as sacaton grasses or grasslands with heavy invasions of nonnative grasses, can produce wildfires of high intensity and high rates of spread that are capable of igniting adjacent overstory vegetation associations. Moderate wildland fuel risk is associated with the ecotone of the riparian and desert upland vegetation associations. In areas where shrub canopy exceeds 35 percent, light fuels produced by the herbaceous understory are reduced because of overstory shading and competition from overstory shrub species. Under extreme fire conditions, upland mesquite communities can carry crown fires with moderate intensities and high rates of spread. Lower wildland fire risk occurs in desert scrub and desert shrub communities in which total fuel loading is low with no continuous arrangement of ground or aerial fuels. Desert upland vegetation associations are not fire-dependent communities, and wildfires within desert vegetation associations will be suppressed.

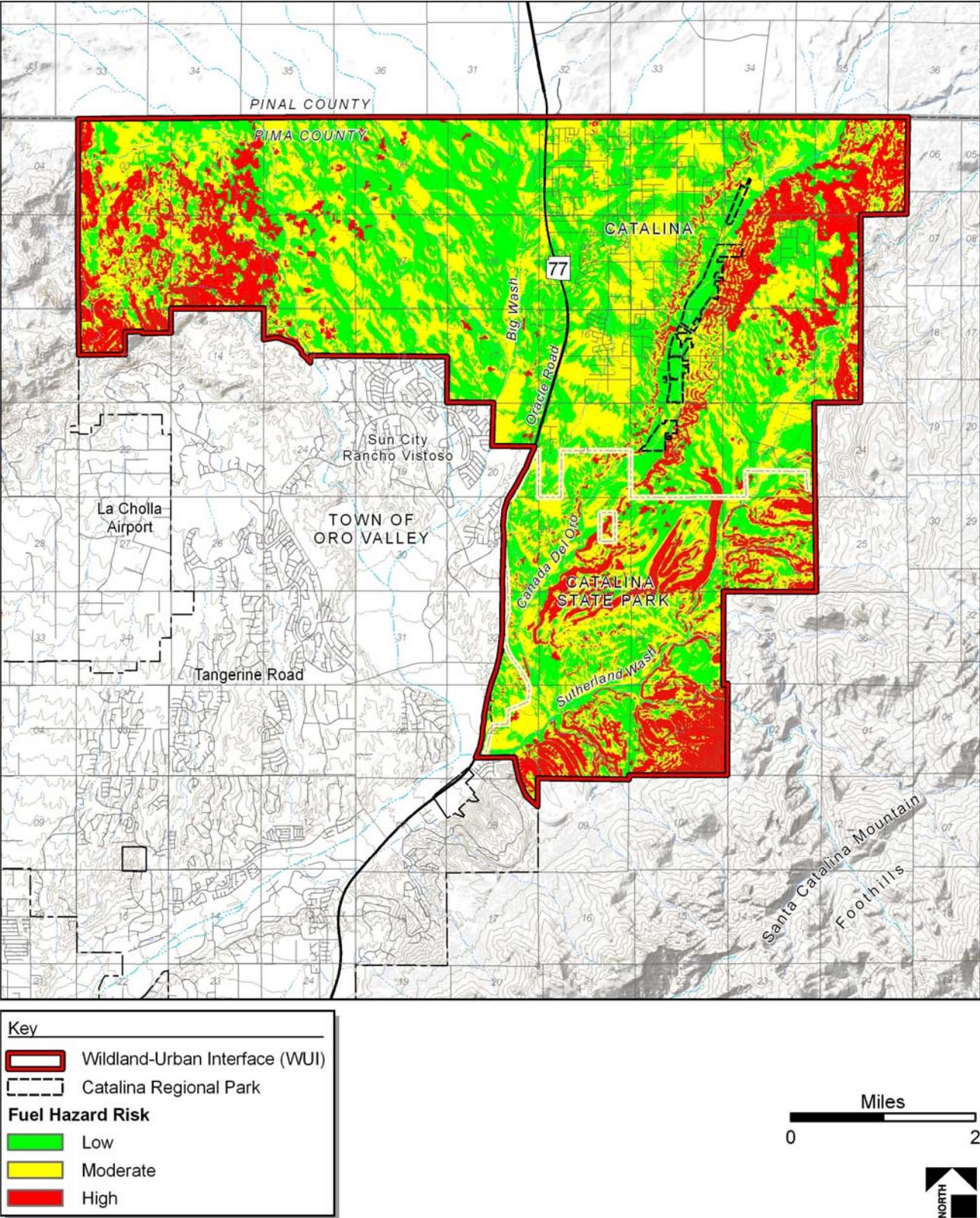


Figure 2.4. Catalina fuel hazards

C. Conditions of Ignition and Past Fire Occurrence

Past regional wildfire events are important for determining the potential of an area to support wildland fire. Because of the combination of current drought 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 occurred within or close to the WUI, has been included in this analysis to determine the most likely areas for wildland fire ignition, either natural or human ignition.

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. High-potential areas have the greatest number of fire starts per 1,000 acres. The areas with the greatest potential for fire ignition, either from natural or human (though unplanned) causes, is located along the eastern portion of the WUI, with other fires occurring in the xeroriparian corridors within and adjacent to the WUI (see Figure 2.5).

Table 2.5. Ignition history and wildfire occurrence

Ignition history and wildfire occurrence component		Value
0–2	Fire starts/1,000 acres	L
2–4	Fire starts/1,000 acres	M
>4	Fire starts/1,000 acres	H

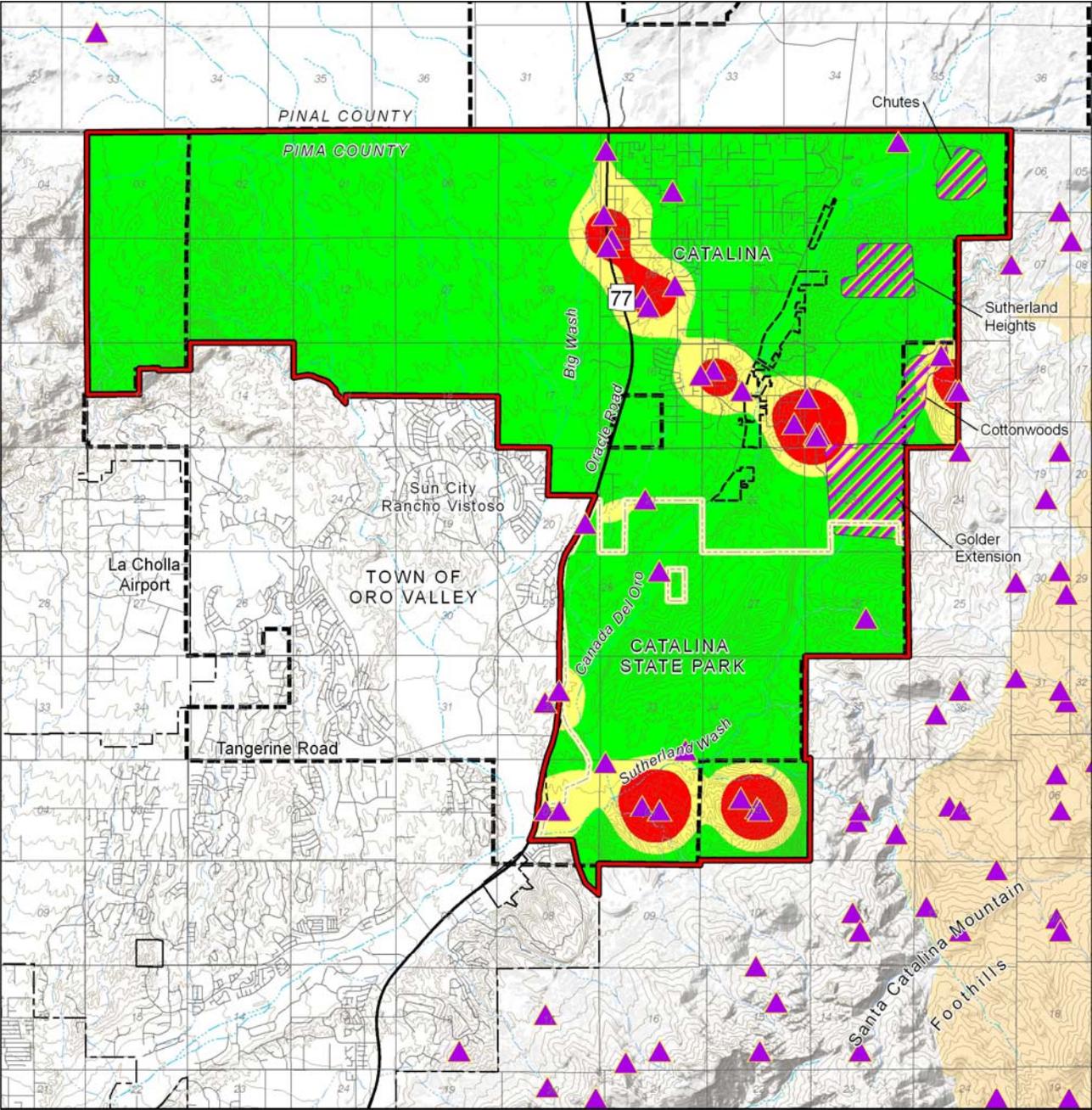
Source: Logan Simpson Design Inc., ASLD, BLM, and CNF

D. Community Values at Risk

Valued at-risk community resources include private and community structures, communication facilities, power lines, local recreation areas, cultural and historic areas, sensitive wildlife habitat, watersheds, natural resources, and air quality. As agreed to by the CWG, developed land and other infrastructures within the area of highest flammability were given the highest priority for protection. In areas where community values occur within or adjacent to areas of high risk due to the fuel hazards of vegetation associations, a cumulative risk from catastrophic wildland fire was created. These areas of cumulative risk are of greatest concern to the community. In accordance with Risk Factor 2: Risk to Social, Cultural and Community Resources identified by the Arizona State Forester (2007:2), the CWG has determined that the Catalina WUI is consistent with Risk Factor 2, Situation 2 (see Photo 2.7), as follows:

Risk Factor 2: Risk to Social, Cultural and Community Resources

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 defensible 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.



Key	
	Wildland-Urban Interface (WUI)
	Catalina Regional Park
	Golder Ranch Fire District
	Ignition Point
	Areas of Elevated Concern
	Recently Burned
Density of Fire Starts	
	0-1 (per 1000 acres)
	2-3 (per 1000 acres)
	>4 (per 1000 acres)

Miles

0 2

NORTH

Figure 2.5. Catalina ignition history



Photo 2.7. Cottonwoods area of elevated concern

The major concerns of the GRFD, ASLD, and collaborators are (1) delayed response time by available mutual aid fire departments, (2) obtainment of additional firefighting equipment, and (3) insufficient dispatch and communication capabilities on initial response units. Additionally, many residences in the identified WUI 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 (see Photo 2.8).



Photo 2.8. Unpaved road to Sutherland Heights

A short-range goal of the GRFD in conjunction with the CWG is the completion of individual wildland fire home assessments. The GRFD has conducted a triage system in portions of the WUI and has developed an incident action plan for sections of the WUI, but further assessments need to be completed. 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 or road signs and locating wells or surface water sources that could be used to replenish water supplies for fire response equipment—both ground-based drafting and aerial bucketing—by also placing water-source names on placards or road signs. The GRFD is researching the possibility of a reverse 911 system for emergency alert notifications within the WUI. The GRFD is also developing an Emergency Operations Center (EOC) that is scheduled to be functional in January 2008. The EOC will be able to provide a broad spectrum of radio communications and information collection and distribution, along with traditional emergency services such as emergency housing, fuel holding, and staging areas.

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

The CWG identified high-risk areas, including SR 77, which continues to be the focus of commercial development. Residential community development is occurring throughout the WUI in a mix of high-density, single-family, and multiacre parcels. Structures associated with housing and commercial development located in isolated subdivisions and in more dispersed areas of the WUI are also at high risk. The CWG also identified significant infrastructures, such as the health center, school, Catalina Regional Park (CRP), CSP, and the community center, within the designated WUI and has recommended fuel modification treatments that will reduce the potential threat of wildland fire to these facilities. The CWG identified transportation corridors that will serve as evacuation routes and resource distribution corridors during a wildland fire. The CWG has also recommended fuel modification treatments for evacuation corridors that will provide safe evacuation as well as emergency vehicle response during a catastrophic wildland fire in the WUI.

2. Recreation Areas/Wildlife Habitat

Recreational features, including recreational and camping areas associated with State and national forest lands, CRP, and CSP, within and adjacent to the WUI are located on Pima County, State, and Federal lands. These features are environmental, economic, and aesthetic resources for the surrounding communities. These areas have been analyzed as community values because of the benefits that these recreation areas provide to local citizens and community visitors.

The WUI also includes known and potential habitat areas of the desert tortoise (*Gopherus agassizii*). The land management agencies use conservation strategies to mitigate risk to the desert tortoise, a State sensitive species. The CWG has determined that habitat-enhancing treatments for reducing wildland fuel and lessening the threat of catastrophic wildland fire in the vegetative communities of the WUI would help preserve sensitive wildlife species and habitats in accordance with Section 102.a.5.B of the HFRA and would also protect the 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. 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. The lands within the Catalina WUI have an ISO rating of 3 because they are located within 5 miles of a GRFD fire station.

The GRFD is the primary wildland and structural fire response within the WUI, although CSP and the CNF provide support for initial wildland fire attack response for the CCWPP WUI. Initial attack response from additional local fire departments can occur under the authority of mutual aid agreements between individual departments or under the intergovernmental agreements (IGAs) each fire department or fire district has with the Arizona State Forester. The Catalina District of the CNF can provide initial attack response to wildland fire under the Joint Powers Agreement between the State of Arizona and the Federal Land Management Agencies (January 2004).

Catalina is accessible from the north and south by SR 77. The north-south corridor of Oracle Road (SR 77) links Catalina with the adjacent communities of Oracle in Pinal County and Oro Valley in Pima County, as well as with the Greater Tucson area. Arizona State Trust lands and private properties lie between the communities.

Land uses in the planning area consist primarily of residences; community businesses; and community services, such as the clinic, library, and school. Surrounding areas are dominated by State land, CNF lands, and private properties. Land uses within or close to the WUI include fuelwood cutting, hunting, and other recreational activities (e.g., hiking, bird watching, nature study, photography, and off-road vehicle use). Section II.E of this CWPP provides a more detailed community assessment.

The State is one of the primary landowners on the periphery of the planning area, and State Trust lands often surround developed private land parcels. State Trust lands are administered by the ASLD, are managed for a variety of uses, and account for 46 percent (10,264 acres) of the WUI. State Trust lands within and adjacent to the WUI could be identified for sale for residential and commercial development or leased for commercial land development.

The primary block of Federal land in the CCWPP area consists of portions of the CNF, which is found along the eastern and southern side of the WUI. CSP, established in 1982 by special-use permit from the CNF to provide outdoor recreation opportunities as outlined within the *Catalina State Park Plan* (ASP 1982), includes 5,503 acres of WUI lands (25% of the WUI).

Table 2.6 identifies the different values given to these community value components. Visual representations of these community value components are mapped in Figure 2.6.

Table 2.6. Community values

Community value component	Value
Housing and business structures and infrastructure in the WUI	H
Recreation areas	M
Wildlife habitat	M
All other areas	L

Source: Logan Simpson Design Inc.

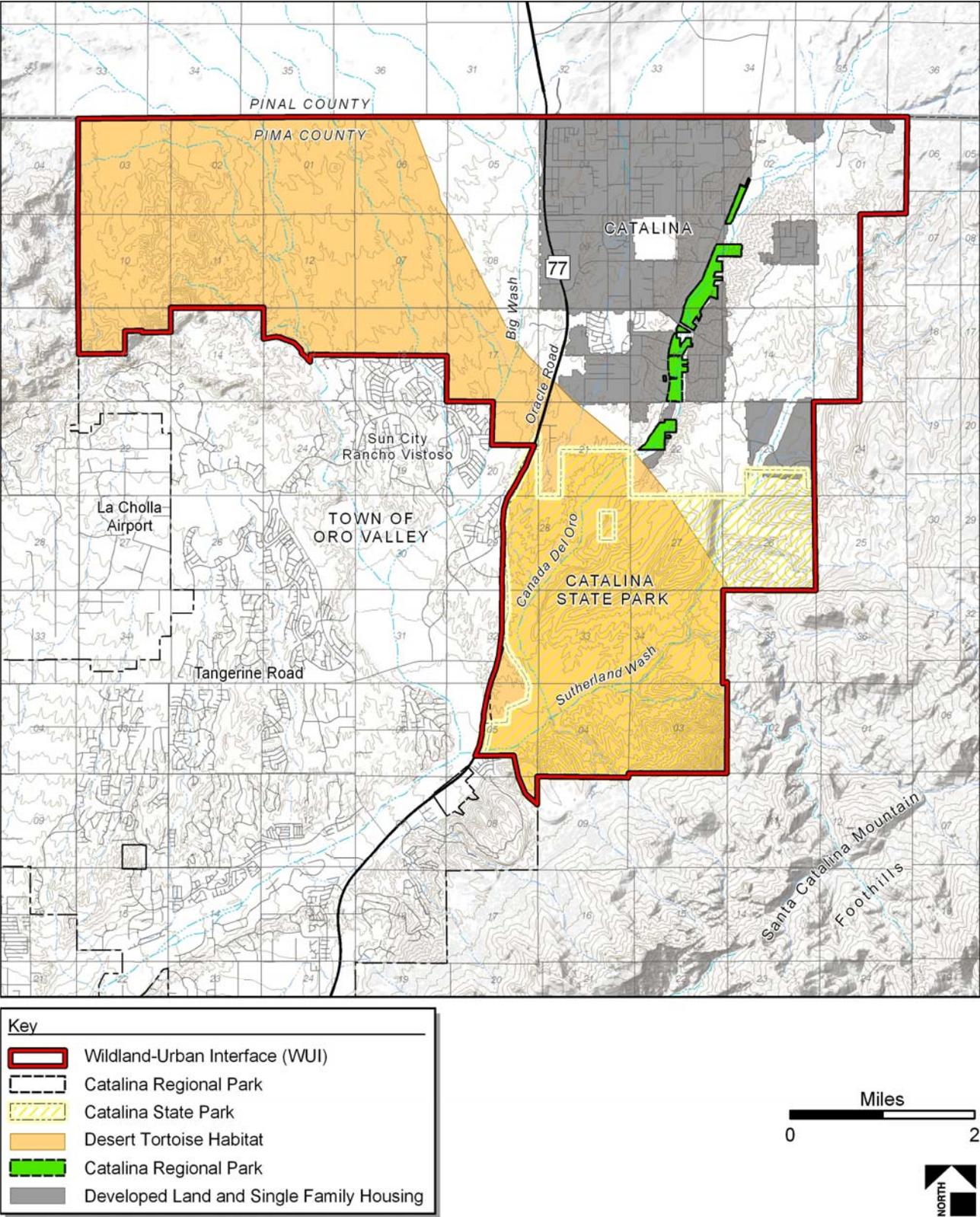


Figure 2.6. Catalina community values

E. Summary of Community Assessment and Cumulative Risk Analysis

1. Community of Catalina

Catalina, founded in 1950, is an unincorporated community approximately 14 miles north of Tucson, primarily as a residential retirement area. Catalina is largely rural but is becoming more urban and suburban with continued growth and development. Catalina's recorded population has grown from just under 5,000 residents in 1990 to approximately 8,500 residents in 2005, and its net assessed value has grown from 5 million dollars in 1990 to just under 500 million dollars in 2005. The current population estimate for the WUI area is just over 9,100 residents (PCOEM 2007 estimate). The 2005 labor force is estimated at nearly 4,000 residents, with many commuting to Tucson for employment; however, there is limited retail-trade and service-sector employment within the community. Single-family homes dominant the housing characteristics of the WUI, which is composed of approximately 3,600 total housing. Tourism and retirement developments contribute significantly to the local economy. The elevation of Catalina averages 3,000 feet above mean sea level, resulting in a temperature 5 to 10 degrees cooler and rainfall 50 percent more plentiful than nearby Tucson. Catalina's community values are mapped in Figure 2.6. The area surrounding Catalina provides substantial outdoor recreation, including large- and small-game hunting and camping, and supports visitation to CSP.

The CWG considered wildland fire threat to Catalina from the heavily vegetated upland habitats along the foothills of the Catalina Mountains. The CWG also considered the xeroriparian corridor of Cañada del Oro and the associated drainages where heavy xeroriparian vegetation associations occurs in relation to higher slopes and southerly and southwesterly exposures for increased risk of wildland fire. Catalina is composed of Condition Class 2 lands within the majority of uplands and Condition Class 3 lands associated with the woody-invaded uplands and xeroriparian corridors, where the fuel hazard rating is mostly high. An independent wildfire hazard assessment was coordinated with the GRFD and the CWG. The GRFD described areas of elevated concern of wildland fire due to known high fuel loading, delayed initial attack due to poor or limited access, and high fire response occurrence. These areas are collectively labeled as areas of elevated concern and shown on Figure 2.7. Because of the dense vegetation, sensitive watersheds, community values, and high fire-start occurrence, a defensible space for community wildfire protection is recommended for compatibility of land use designations of the WUI. Much of the undeveloped lands within Catalina lie where the alignment of vegetation and topography could encourage wildland fires to spread so rapidly that, without treatment, facilities and homes might be burned through before any effective suppression measures would be available. Catalina includes a variety of vegetative types, such as grassland, semidesert, and deciduous riparian species, and xeroriparian associations in the Cañada del Oro, Sutherland Wash, and Big Wash corridors. Resource damage potential is high from wildland fire within the watershed where fire has not previously occurred or where wildland fuels have not been mitigated. Mechanical or mechanical/chemical treatments will be the primary tool for wildland fuel mitigation in Catalina, especially for the removal of nonnatives and understory vegetation within the xeroriparian corridors and associated side channels and drainages. The combination of fuel load, topography, and areas of poor access increases the potential severity of wildland fire, as well as the risk to property and public and firefighter safety.

2. Catalina State Park (CSP)

CSP is located 9 miles north of Tucson on SR 77 adjacent to the south boundary of the WUI. CSP is open year-round and provides 120 campsites with restrooms, an equestrian center, group ramadas, and a ranger station, including an information center and gift shop. CSP encompasses 5,503 acres of semidesert grassland habitats, supporting a variety of desert wildflowers, cacti, and wildlife, including over 170 species of birds. Hiking, mountain biking, and horseback riding are the major activities of park visitors. CSP maintains eight trails of varying lengths and difficulty. Natural amenities of these trails include ruins of a prehistoric Hohokam village site, riparian canyons, perennial water pools, and connecting trails to the CNF, which continue on to Mount Lemmon at the top of the Catalina Mountains. Annual visitation averages 140,000 visitor days, with 50 percent occurring from February through April annually. The *Fire Plan, Catalina State Park* (2005) provides a detailed program of action to implement the CSP policy of immediate and total suppression of all wildfires. Within CSP, outdoor fires are confined to established barbecue grills and fire rings. A 10-foot clearance is maintained around all grills and fire rings, power lines, and working poles. Spark arrestors are required on all internal combustion engines utilized by park staff. A fire-danger-status warning sign is located roadside at the ranger station, with additional signage located throughout the park advising visitors of campfire restrictions. During extreme wildfire conditions, park staff coordinates with the CNF for restrictions and closure orders. In order to provide initial response to wildfire on CSP, a 10-person fire cache is maintained on-site, and water is available for engines or tenders through a 10,000-gallon storage tank and 2.5-inch hydrants maintained in the picnic area and maintenance yard. A helipad with an associated 5,000-gallon portable water tank is located within CSP. CSP will provide limited initial attack to fires and will cooperate fully with the GRFD for structural fires occurring within the park and with the CNF for wildland fires occurring within the park.

3. Catalina Regional Park (CRP)

CRP has approximately 170 acres of linear river park property along the Cañada del Oro Wash. The Pima County Flood Control District is the property owner, while Pima County Natural Resources, Parks & Recreation manages the park's resources.

Over the last couple of years, rain has contributed to large amounts of light fuels in the form of annual plants along the Cañada del Oro Wash (CDO). Additionally, prior to Pima County purchasing the residential properties along the CDO floodplain, many of the residents had trees and shrubs on their property, which now have died due to a lack of water. Both of these factors have left behind standing dead biomass in the form of light, medium, and heavy fuel loads. Pima County Natural Resources, Parks & Recreation has begun management of the CDO floodplain now known as CRP. Within the boundaries of CRP there are four designated management areas. The following is a brief description of the four management areas:

- Area 1 is at the northernmost end of the park and will primarily be used as a trail linkage to the CDO Wash and the 50-Year Trail. Area 1 will also have ramadas for light recreational use.
- Area 2 is the area just north of Golder Ranch Road and includes the White Dog Ranch area. Area 2 will primarily be used as an equestrian center. Additionally, the local 4-H Club will likely have a management agreement for the ranch and will hold livestock and animal shows at the facility.

- Area 3 is the area just south of Golder Ranch Road. It extends to Rollins Road on the south. Area 3 will be rehabilitated as a mesoriparian habitat type. Currently, there are remnants of previous residents in this area, including nonnative vegetation and foundations. Eventually, there will be access trails for horseback riders, hikers, and mountain bikers.
- Area 4 is the area south of Rollins Road. The Pima Pistol Range borders Area 4 on the south. Area 4 is considered important habitat for wildlife. A plan is in progress to modify the pond (which is now mostly dry) into a wetland area for birds and other wildlife. Because Area 4 is considered important habitat, limited public activities will be planned for the area. Once the wetland area is complete, interpretive programs will be conducted in Area 4.

All four areas have the following traits:

- Portions of the CDO flowing through it
- Private property on or within its boundaries
- Easy access by the public off Lago del Oro Parkway
- Illegal dumping and off-road vehicle use
- Increased risk of wildland fire starts
- Increased weed propagation and standing dead biomass

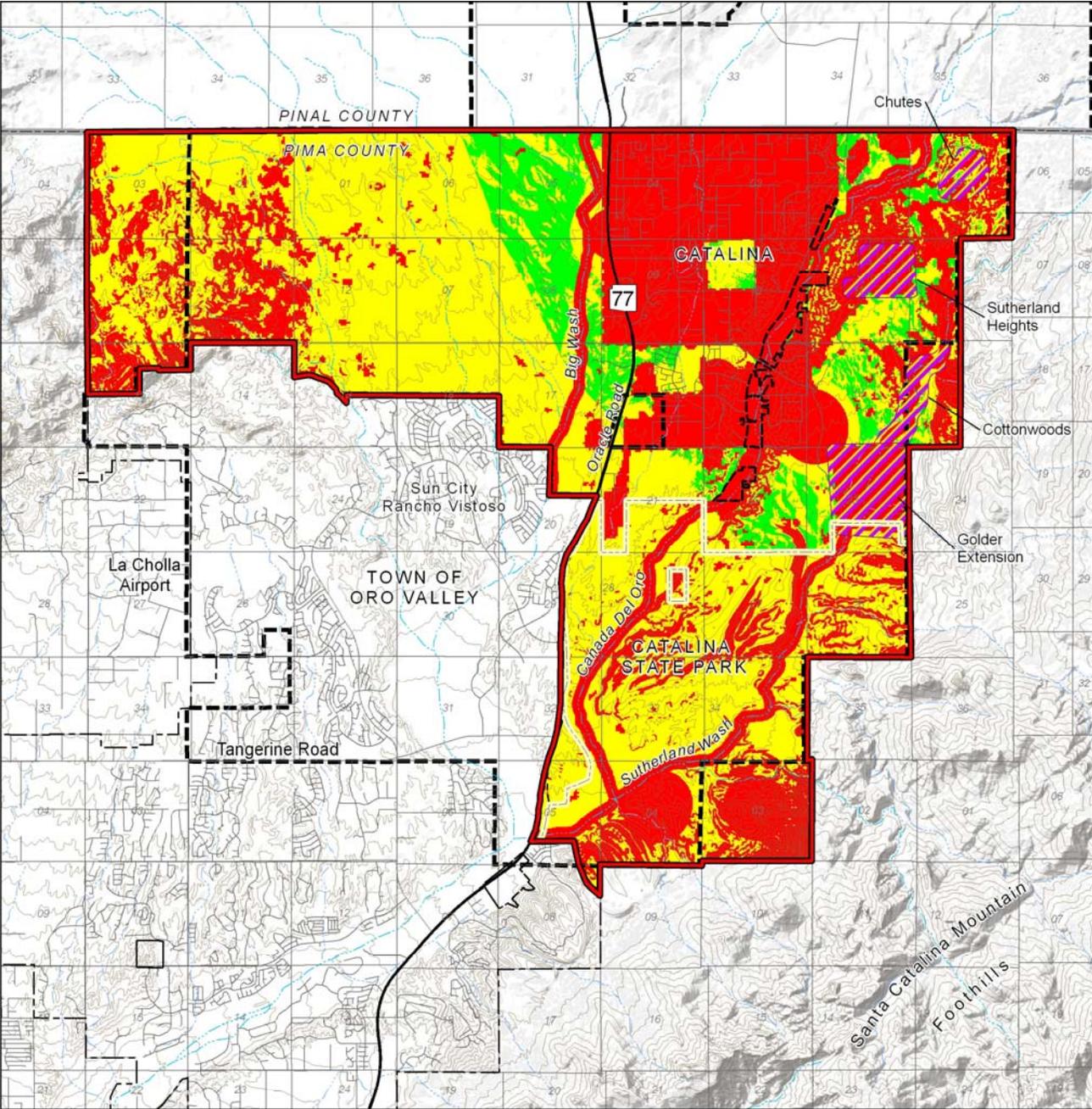
4. Cumulative Risk Analysis

The cumulative risk analysis synthesizes the risk associated with fuel hazards, wildfire ignition points, wildfire occurrence, and community values. These different components were analyzed spatially, and an overall cumulative risk for the WUI was calculated. Table 2.7 and Figure 2.7 display the results of the cumulative risk analyses, identifying the areas and relative percentages of WUI areas of high, moderate, and low risk.

Table 2.7. Cumulative risk levels by percentage of the WUI area

CCWPP community	High risk (%)	Acres	Moderate risk (%)	Acres	Low risk (%)	Acres	Total acres
Catalina	45	10,059	48	10,850	7	1,595	22,504

Source: Logan Simpson Design Inc.



Key	
	Wildland-Urban Interface (WUI)
	Catalina Regional Park
	Golder Ranch Fire District
	Areas of Elevated Concern
	Cumulative Analysis Low Risk
	Moderate Risk
	High Risk

Miles

0 2

NORTH

Figure 2.7. Catalina cumulative risk analysis

III. COMMUNITY MITIGATION PLAN

This section outlines CCWPP priorities for wildland fuels treatments as well as its recommended methods of treatment and management strategies for mitigating the potential spread of catastrophic wildland fire throughout the WUI. In addition, this section 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 CWG developed a series of proposed actions, including residential treatments, a series of firebreaks appropriate for the wildland fuel types, and fuel mitigation treatments for broader land areas (Table 3.2). Wildland fire mitigation projects have been proposed by the CWG for public and private lands classified as at risk. These proposed actions are recommended to prevent wildfire spread from public lands onto private land. Conversely, these treatments will reduce the risk of fires spreading from private property to public lands by reducing wildland fuels and creating a defensible space for wildland firefighters. A primary goal of the CCWPP is for proposed treatments to be continuous across property boundaries, allowing for the most effective protection from wildfires.

Hazardous fuels reduction recommendations on State Trust and other public lands vary by constituting either a single firebreak in appropriate width and length within the WUI or broader land treatment applications of wildland fuel reduction and habitat restorations adjacent to the WUI. Additional firebreaks or hazardous fuels reduction projects may be developed over time and will conform to the types of treatment recommendations developed by the CWG. Firebreak recommendations in vegetative fuel types were developed by the ASLD Forestry Division, the CNF, the GRFD, and the CWG participating resource specialist, based on firebrand movement during peak fire season under normal seasonal weather conditions in relation to slope 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.

The wildland vegetative fuel and firebreak recommended treatments meet the CCWPP goals of enhancing firefighter and public safety, reducing hazardous wildland fuels on both public and private lands, improving fire prevention and suppression, restoring riparian and rangeland health, involving the community, protecting the ecosystem, and expediting project implementation. To prioritize wildland fuel mitigation projects, the CWG analyzed wildland fuel hazards, fire history, and community values. This combined risk assessment was compiled in a single map of the community that depicts areas of low-, moderate-, and high-risk evaluations (Figure 2.7). These risk areas were further identified and categorized into management site-specific areas (management units) of the WUI, with an overall risk value determined for each area. In the CCWPP, 32 management units were identified and given overall risk values (Figure 3.1). The CWG described the location of each management unit in the WUI and then assigned recommended treatments for each unit (Table 3.1).

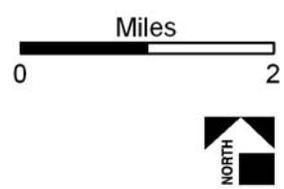
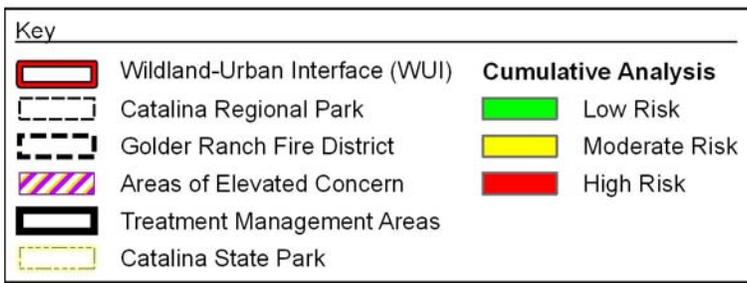
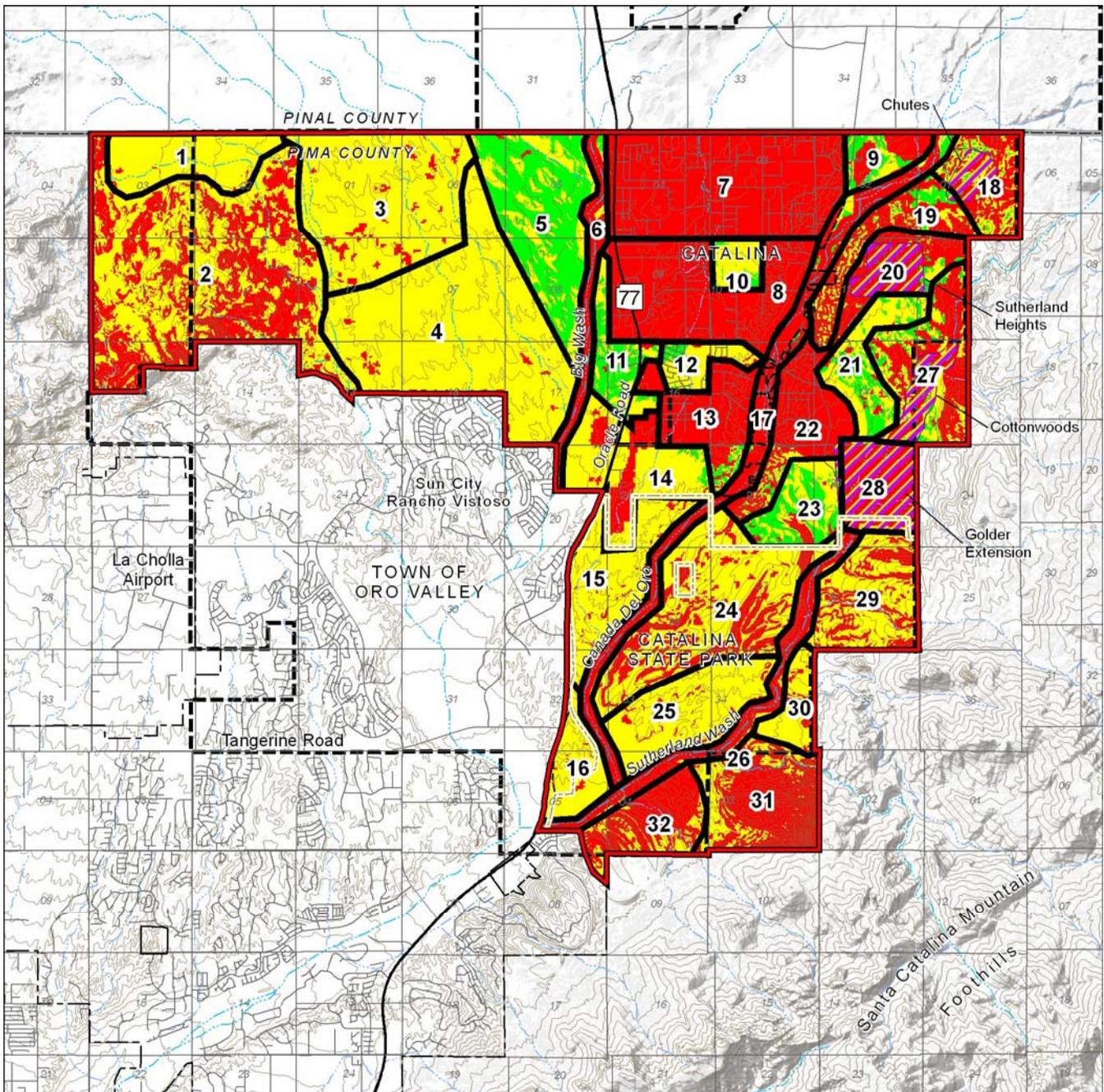


Figure 3.1. Catalina treatment management units

Table 3.1. Identified treatment management units

Treatment management area	Map ID	Risk value	Location and description	Recommended treatment ^a	Total acres	Federal acres	State Trust acres	Non-Federal acres
Catalina	C1	Moderate	Land in the northwest corner of the WUI	3,4,5,8,9	506	0	506	0
Catalina	C2	Moderate/High	Land in the far southwest corner of the WUI	3,4,5,8,9	2,575	238	2,237	100
Catalina	C3	Moderate	Area generally between Batamote Wash and Sahuarita Wash, to the north	3,4,5,8,9	1,375	0	1,375	0
Catalina	C4	Moderate	Area generally between Batamote Wash and Sahuarita Wash, to the south	3,4,5,8,9	2,002	0	1,968	34
Catalina	C5	Low	Area to the west of Big Wash	3,4,5,7,8,9	1,009	0	1,009	0
Catalina	C6	High	Riparian area along Big Wash	1,2,3,4,6,7,9	300	0	298	2
Catalina	C7	High	Area within Catalina, north of Mainsail Blvd.	1,2,3,4,6,9	1,493	0	9	1,484
Catalina	C8	High	Area within Catalina, south of Mainsail Blvd. and north of Golder Ranch Dr.	1,2,3,4,6,9	1,042	0	4	1,038
Catalina	C9	High	Land northeast of the community immediately west of Cañada del Oro	1,2,3,4,9	226	0	0	226
Catalina	C10	Moderate	Land within Catalina, bounded by Mainsail Blvd. to the north, and Haser St. to the south	1,2,3,4,6,9	153	0	0	153
Catalina	C11	Moderate/Low	Land east of Big Wash and crossing a portion of SR 77	3,4,5,9,	322	0	289	33
Catalina	C12	Moderate	Land within the community, bounded by Golder Ranch Dr. to the north, Bowman Rd. to the east, and Wilds Rd. to the south	1,2,3,4,6,9	200	0	0	200
Catalina	C13	High	Area west of Cañada del Oro and east of Hoot Owl Rd.	1,2,3,4,6,9	510	0	8	502
Catalina	C14	Moderate/High	Land between Big Wash and Cañada del Oro and near the intersection of Hoot Owl Rd. and Rollins Rd.	1,2,3,4,5,9	716	0	489	227
Catalina	C15	Moderate	Lands to the west and south of the WUI, between Oracle Rd. and Cañada del Oro	3,4,5,9	643	0	10	633
Catalina	C16	Moderate	Land west and south of the WUI, bounded by Oracle Rd. to the west, Cañada del Oro to the east, and Sutherland Wash to the south	1,2,3,4,6,9	322	147	0	175

Table 3.1. Identified treatment management units

Treatment management area	Map ID	Risk value	Location and description	Recommended treatment ^a	Total acres	Federal acres	State Trust acres	Non-Federal acres
Catalina	C17	High	Land along Cañada del Oro, including CRP	1,2,3,4,6,7,9	831	271	7	553
Catalina	C18	Moderate/High	Area in the far northeastern corner of the WUI	1,2,3,4,6,9	415	0	166	249
Catalina	C19	High	Area north and east of the community, between Cañada del Oro and Equestrian Trail	3,4,6,9	450	0	185	265
Catalina	C20	High	Land to the east of the community, including Sutherland Heights	1,2,3,4,6,9	422	0	216	206
Catalina	C21	Moderate/Low	Land to the east of the community, south of Sutherland Heights and west of the Cottonwoods	3,4,5,6,9	410	0	408	2
Catalina	C22	High	Land southeast of the community bounded by Cañada del Oro to the west and the Cottonwood to the east	1,2,3,4,6,9	533	0	291	242
Catalina	C23	Moderate	Land southeast of the community immediately south of Rollins Rd.	1,2,3,4,6,7,9	378	0	368	10
Catalina	C24	Moderate/High	Land within CSP, between Cañada del Oro and Sutherland Wash	3,4,5,6,7,8,9	1,324	1,240	29	55
Catalina	C25	Moderate	Area directly north of the confluence of Cañada del Oro and Sutherland Wash	4,5,6,8,9	670	670	0	0
Catalina	C26	High	Land surrounding Sutherland Wash southeast of the community	3,4,5,6,7,9,	469	461	2	6
Catalina	C27	Moderate/High	Area east of the community, north of Rollins Rd., including a portion of Golder Extension	1,2,3,4,6,7,8,9	740	322	382	36
Catalina	C28	High	Area south of Rollins Rd., including Golder Extension	1,2,3,4,6,7,8,9	412	54	16	342
Catalina	C29	Moderate/High	Land in the eastern corner of the WUI, east of Sutherland Wash	3,4,5,7,8,9	647	644	0	3
Catalina	C30	Moderate	Land in the southeastern corner of the WUI, east of Sutherland Wash	3,4,5,8,9	223	223	0	0
Catalina	C31	Moderate/High	Land in the southeastern corner of the WUI, south of Sutherland Wash	3,4,5,7,8,9	725	725	0	0
Catalina	C32	Moderate/High	Land in the southeastern corner of the WUI, south of Sutherland Wash	3,4,5,7,8,9	461	4610	0	0

Continued

Note: WUI = wildland-urban interface; CRP = Catalina Regional Park; CSP = Catalina State Park.

^a See Table 3.2 for recommended treatments.

Table 3.2. Fuel modification and treatment plans

Treatment No.	1 Developed private parcels less than 2 acres				2 Undeveloped private parcels or single-structure parcels more than 2 acres		3 Grassland fire breaks		4 Oak/pinyon/juniper and shrublands within the WUI	
	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 firebreaks	Firebreaks
Vegetation	<p>Remove ladder fuels by pruning the lower third of trees or shrubs up to a maximum of 10 feet to reduce flammable vegetation.</p> <p>Remove and destroy insect-infested, diseased, and dead trees and shrubs.</p> <p>Grasses and forbs may be cut with a mower to a 4-inch stubble.</p> <p>Remove dead plant material from ground; prune tree limbs overhanging roof; remove branches within 10 feet of chimney; remove flammable debris from gutters and roof surfaces</p>	<p>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.</p> <p>Create separation between trees, tree crowns, and other plants based on fuel type, density, slope, and other topographical features.</p> <p>Reduce continuity of fuels by creating a clear space around brush or planting groups.</p> <p>Grasses and forbs may be cut with a mower, to a 4-inch stubble.</p> <p>All snags and vegetation that may grow into overhead electrical lines; other ground fuels, ladder fuels, and dead trees; and the thinning from live trees must be removed</p>	<p>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.</p> <p>Maximum density of trees (whichever is greater: 60 BA at 80–100 trees/acre or average density of 100 trees/acre).</p> <p>Grasses and forbs may be cut with a mower to a 4-inch stubble.</p>	<p>For natural areas, thin selectively and remove highly flammable vegetation.</p> <p>Carefully space trees; choose Firewise plants.^a</p>	<p>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.</p> <p>Maximum density of trees (whichever is greater: 60 BA at 80–100 trees/acre or average density of 100 trees/acre)</p> <p>See fuel modification plan (this section) developed to promote riparian health, to prevent spread of fire to adjacent property, and to create defensible space with considerations for wildlife and groundwater protection.</p> <p>Single structure or structures on parcels in excess of 2 acres should include Treatment 1 in proximity of structures and Treatment 2 to remaining acres.</p>	<p>Remove dead, diseased, and dying trees. Fell dead trees away from stream channels with defined bed and banks.</p> <p>Areas should be hand-thinned and hand-piled; inaccessible areas may be treated with periodic Rx.</p> <p>Develop fuel modification plan (this section) for treatments.</p>	<p>Grassland types may be mechanically treated to reduce or remove vegetation, including mowing, chopping, or mastication, or grazing to a stubble of at least 4 inches. Ensure that removal of vegetation within a designed firebreak of more than one chain (66 feet) in width and length is sufficient to protect Federal, State, or private land values.</p> <p>Fuel reduction treatments within grassland vegetation types may include multiple-entry burns to maintain stand structure and reduce fine fuels. Trees and shrubs >8 inch drc should be thinned to variable distance of 15 to 35 feet between trees. Trees and shrubs <8 inches drc should be removed.</p> <p>Mechanical/chemical or grazing treatment may be used to maintain firebreaks on private lands.</p> <p>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.</p>	<p>Same as for slopes <20%. Fuels treatments may require hand-thinning and hand-piling or grazing in steep slopes. Rx may be used to reduce high fire potential (see Treatment 5). Designated fire breaks may be increased to no more than 2 chains in steep slopes where herbaceous (fine fuels) and subshrub species fuel loads increase to pretreatment levels within 3 years.</p> <p>See 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.</p>	<p>Spacing may be variable with a 20- to 35-foot minimum 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 and Rx (see Treatment 5) can be used to reduce vegetative fuels and move stands toward potential natural vegetation groups as described in the <i>FRCC Interagency Handbook</i> (FRCC Interagency Working Group 2005a) or grazed to like conditions. All trees >10 inches drc will be targeted as “leave trees” unless removal is necessary to achieve the desired spacing.</p>	<p>Woodland and shrub trees <8 inches drc will be thinned to a spacing of 15 feet between trees, or Rx will be applied to achieve like conditions. Shrub and tree trunks will be severed <4 inches from the ground. Mechanical treatments, such as crushing, chipping, mastication, and Rx may be used to create open stands producing flame lengths of ≤4 feet to minimize crown fire potential with fuels conducive to suppression action. Herbaceous and subshrub understory may be mechanically treated, including mowing, chopping, and masticating, or grazing to limit fine fuel loading while protecting soil integrity from rainfall runoff.</p>
Slash	<p>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.</p>	<p>Control soil erosion from small water flow channels by use of rock or noncombustible velocity-reducing structures.</p> <p>Remove all leaf litter to a depth of 1 inch.</p>	<p>Same as Zone 1 and 2.</p>	<p>Slash may be burned or piled and burned or chipped and removed. Slash from grassland treatments may be burned, removed, masticated, turned, or grazed for like treatment.</p>	<p>All slash, snags, and vegetation that may grow into overhead electrical lines; other ground fuels, ladder fuels, and dead trees; and the thinning from live trees must be removed, mechanically treated (chipped, etc.), or piled and burned along with existing fuels.</p>	<p>Clean dead and down debris in channels where debris may be mobilized in floods, thus creating downstream jams.</p> <p>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.</p>	<p>Slash from grassland treatments may be burned, removed, masticated, or turned (disked).</p>	<p>Same as for slopes < 20%; however, slash may be hand-piled and ignited with Rx as the primary slash reduction treatment.</p>	<p>Slash may be burned or piled and burned or chipped and removed. Slash from grassland treatments may be burned, removed, masticated, or turned.</p>	<p>Slash may be burned, piled and burned, or chipped and removed. Slash from grassland treatments may be burned, removed, masticated, or turned.</p>

Note: BA = basal area; Rx = prescribed fire; drc = diameter at root collar; ASLD = Arizona State Land Department; GRFD = Golder Ranch Fire Department; FS = Forest Service; WUI = wildland-urban interface

^aA list of Firewise plants can be found in the Firewise literature listed in Appendix C, Educational Resources.

Continued

Table 3.2. Fuel modification and treatment plans

Treatment No.	5 Prescribed fire	6 Escape and resource transportation corridors (Federal and non-Federal lands)	7 Riparian areas (Federal, non-Federal, and private lands)	8 Conditional suppression areas (Federal and non-Federal lands)	9 Mesquite removal for restoration purposes (Federal and non-Federal lands)	
Treatment category	Federal, State, or private lands	Federal, State, or local government where designated as escape route	Federal or State lands	Firebreaks private lands	Federal, State, or private lands	Federal, State, or private lands
Vegetation	<p>Rx will be used as a tool to accomplish specific resource management objectives in accordance with ASLD, GRFD, and/or FS standards and guides.</p> <p>Rx on federal land is authorized if part of an approved Rx burn plan. As additional areas within the WUI are identified, Rx may be used as a treatment tool provided that a wildland fire implementation plan is in effect and all conditions set forth have been met.</p> <p>Rx can occur at low, moderate, and high intensity. High-intensity fire will be used to create openings by removing all aboveground vegetation.</p>	<p>Reduce fuel loading by thinning trees <10 inches drc. Reduce trees to 15-foot spacing. Shrub and tree trunks will be severed no less than 4 inches from the ground. Stands will be variable across the landscape, such as retention of bands of higher-density vegetation with sufficient understory to maintain functionality of important wildlife movement corridors in areas of low structure density.</p> <p>Mechanical treatments may include chipping, piling and burning, or removal and Rx in the project area.</p> <p>Trees may be left in clumps with fuel ladders removed from below. Dead, diseased, and dying trees of all sizes will be emphasized for removal. Some trees >8 inches drc may be cut to reduce safety hazards or when needed to reach desired 15-foot spacing.</p> <p>Escape and resource transportation corridors may serve as firebreaks in all vegetative types.</p> <p>Firebreaks for each vegetative type, as described in this table, would be implemented at no more than 2 chains in each direction from the centerline of the escape and resource transportation corridors.</p> <p>Emphasis will be placed at removing nonnative and flammable species.</p> <p>Grasses and forbs may be cut with a mower to a 4-inch stubble.</p>	<p>Riparian treatments will be limited in scope. The majority of riparian areas that fall within the WUI boundary will be avoided unless deemed a fuel hazard.</p> <p>Clearing or cutting of any material within 10 feet of any stream on Federal land may be prohibited to prevent the risk of accelerating erosion.</p> <p>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).</p> <p>Treatments will emphasize nonnative species. Snags >8 inches may be retained. All presettlement trees including snags will be targeted for retention.</p> <p>Restricting the removal of the vegetative overstory in the riparian areas to the period of October 15–March 31 will prevent the disturbance of any nesting by neotropical migrant bird species, including the southwestern willow flycatcher. Fuels reduction should occur October 15–March 31 in riparian areas, as long as fire danger is not extreme.</p> <p>Emphasis will be placed on removing species listed in Appendix A.</p>	<p>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 8feet aboveground.</p> <p>All mechanized equipment must meet State and local fire department standards. Perform treatments October–March annually. Treatment of annuals may be best when they are green.</p>	<p>This prescription includes lands with desertshrub/scrub vegetative types in which no fuel modification treatments have been identified as necessary to provide protection from wildland fire. The threat from catastrophic wildland fire is low or nonexistent. This includes areas where fire never played a historical role in developing and maintaining ecosystems. Historically, in these areas, fire return intervals were very long. These are areas in the WUI where fire could have negative effects unless fuel modifications take place. These include areas in which the use of fire may have ecological, social, or political constraints and areas in which mitigation and suppression are required to prevent direct threats to life or property. Wildland fire growth within these areas will be monitored for private property, ecological, and cultural threats before initiating suppression. Agency and fire department policy provisions will determine suppression response.</p>	<p>Areas of monotypic mesquite or mesquite mixed with other invasive shrub or grass species may be treated mechanically, chemically, or by controlled burning and reburning to reduce stem density, canopy, and excessive fuel loading. Reduce canopy cover to 15% per acre to convert invaded areas to restore grasslands or to convert to a more diverse (non-monotypic) shrubland. Mechanical removal by cutting below the root collar during November–January is preferred. Mechanical whole-tree extraction may be considered a preferred treatment. Low-volume oil-based herbicide applications in late spring to early fall would be considered for control. Low-volume cut-stump herbicide applications will be considered in combination with mechanical treatment. Preferred phenological stage for burning is peak summer months and postavian breeding months. Black lines should be at least 700 feet wide, and headfire installed with temperatures 65°F to 95°F, relative humidity of 5% to 15%, and 20-foot wind speed <20 mph. Maintenance, revegetation, restoration, and monitoring should follow as needed for each treatment area.</p>
Slash	<p>Slash, jack piles, down logs when more than 600 feet from private property may be burned. Pile or Rx will be used to remove fuel when more than 600 feet from private land or as designated. Snags and down woody material may be retained in areas where fire resilience is not compromised.</p>	<p>Snags, slash, and down logs will be removed within 600 feet of private land. When more than 600 feet from private property, pile burning or Rx will be used to remove fuel. Snags and down woody material may be retained in areas where fire resilience is not compromised. Vehicle pullouts should be planned in appropriate numbers and locations where vegetation, slope, and terrain permit.</p>	<p>After removal of heavy woody fuels, fine fuels may be maintained by cool-season low-intensity Rx that moves slowly downslope or into prevailing winds to mid-slope. Large down woody material and snags (≥12 inches) may be retained in riparian areas.</p>	<p>Fuel treatments and woody material removal will occur on existing roads. Cool-season low-intensity Rx may be used for maintenance of fine fuels. Pile or jackpot burning will not occur in ephemeral, intermittent, or perennial stream channels.</p>	<p>Response will be full suppression when firefighter and public safety, property, improvements, or natural resources are threatened.</p>	<p>Created slash will be made available for woody biomass use. If not used for wood-related products, slash will be piled with preexisting fuels and burned, or otherwise used for soil stabilization. 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.</p>

Note: BA = basal area; Rx = prescribed fire; drc = diameter at root collar; ASLD = Arizona State Land Department; GRFD = Golder Ranch Fire Department; FS = Forest Service; WUI = wildland-urban interface

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 GRFD. Therefore, the CWG recommends that wildland fuel reduction treatments on small residential parcels normally include that slash be removed whole or chipped and transported to a disposal site. In addition to mechanical vegetative treatments, fire resiliency and vegetative management objectives have been met by grazing goats. The CWG is not opposed to an experimental grazing program within the WUI adjacent to state or federal lands to achieve wildland vegetative fuel mitigation objectives. The CWG also recommends that fallow agricultural lands be restored through the planting of native vegetation species in accordance with the *National Conservation Practice Standards, Range Planting, Code 550* (NRCS 2002). The CWG also recommends that firebreaks constructed on both public and private lands be maintained in accordance with the above mitigation measures and stipulations on a rotating 2- or 3-year interval to ensure the integrity of the firebreak through removal of fine and light vegetative fuels, therefore restricting wildland fire movement.

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 affect the cost of treatments. If wildland fuel modification prescriptions require follow-up pile burning or herbicide application after vegetation treatment, the total cost/acre treated could be as high as \$5,000.00/acre on small land parcels consisting mostly of individual plant treatments within a riparian corridor and as high as \$580.00/acre in upland areas (USDA Forest Service and New Mexico Energy, Minerals and Natural Resources Department, Forestry Division 2005). For private land treatments to be both fiscally reasonable and timely, the CWG investigated costs associated with the use of the ASLD Forestry Division Fire and Fuels Crew. The estimates of daily costs, which include a 20-person inmate labor crew and a chipper for a 100-mile roundtrip to the project site by an ASLD Forestry Division crew carrier, are as follows:

- 8-hour day—\$692.75
- 10-hour day—\$792.75
- 12-hour day—\$892.75

The CWG recommends that wildland fuel modification projects be contracted to the ASLD to ensure treatments are conducted in a timely fashion and at a reasonable cost. Cost estimates for treatments in the WUI are based on the estimates provided by the ASLD Forestry Division for the Fire and Fuels Crew costs for both Federal and non-Federal land treatments (see Table 3.3). The ASLD Forestry Division Fire and Fuels Crews do not remove hazard trees or provide “climbers” for pruning or segmented tree removal sometimes required on private lands. The CWG does support and encourage local business development that will complement wildland fuel mitigation needs within Federal and non-Federal lands of the WUI.

Table 3.3. Acres of wildland fuels mitigation treatment conducted by ASLD Forestry Division Fire and Fuels Crew during an 8-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 CWG recommends that private landowners who wish to adopt fuel modification plans other than those described in Table 3.2 should have the plan prepared or certified by a professional forester, a certified arborist, or other qualified individuals. Fuel modification plans for Federal and State lands within 0.5 mile of private land 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 where fire resiliency is not impaired and will not compromise public or firefighter safety. A fuel modification plan must 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 control and elimination of 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 accepted by all individual owners (subject to compliance with this section).

The 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 the 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. To meet conditions established by the Healthy Forest Initiative, the USDA and the USDI adopted two new categorical exclusions from the normal review steps of an environmental assessment or an environmental impact statement. These exclusions are for hazardous fuels reductions and for rehabilitation of resources and infrastructure damaged by wildfire. For a hazardous fuels reduction project on public lands to be categorically excluded from documentation of the results of an environmental assessment, the project must meet specific requirements:

- It must have less than 4,500 acres to be treated, with mechanical slash treatment restricted to no more than 1,000 acres.
- Its lands must be within current Condition Class 2 or 3.
- It must not be in a wilderness or wilderness study area.
- It must not include the use of pesticides, herbicides, or new road or infrastructure construction.
- It may include sale of vegetative products if the primary purpose is to reduce hazardous fuels.

The recommended treatments within the CCWPP have been developed with consistency with Federal land management action alternatives and are intended to be compliant with Categorical Exclusion 10, Fuel Reduction. The purpose of Categorical Exclusion 10, Fuel Reduction, is “to facilitate efficient planning and decision making concerning rehab of areas so as to reduce risks to communities caused by severe fires, and to restore fire-adapted ecosystems” (USDA Forest Service 2000).

B. Prevention and Loss Mitigation

The CCWPP will be used as a resource to help coordinate long-term interagency mitigation of catastrophic wildfire events in the community. The goals of the CCWPP area are to:

- improve fire prevention and suppression for firefighter and public safety and to protect private property,
- construct a series of fuelbreaks to disrupt continuous hazardous wildland fuels adjacent to private lands,
- promote community involvement and education,
- recommend measures to reduce structural ignitability in the CCWPP area,
- preserve the aesthetics and wildlife values within riparian areas,
- identify funding needs and opportunities,
- expedite project planning through partnerships with the ASLD, ASP, and other private and public entities in managing wildland fire risk within the WUI.

The CCWPP should be reviewed and updated as needed. Successful implementation of this plan will require a collaborative process among multiple layers of government entities as well as a broad range of community interests.

The CWG and collaborators have made the following action recommendations to meet the goals of the CCWPP:

1. Improved Protection Capability and Reduction in Structural Ignitability

The CCWPP considers the risks of wildland fire igniting and spreading throughout the WUI a serious threat. The GRFD, the ASLD, the CNF, Pima County, and the CWG believe that actions to reduce fire risks and promote effective responses to wildland fires must be undertaken. The following are recommendations to enhance protection capabilities in Catalina:

- a. Obtain a medium size water tender for GRFD use, strategically locate additional water storage tanks, wells or other water sources for tender filling throughout the district, maintain helicopter landing sites, and update mapping capabilities of the GRFD.
- b. Obtain a two fully functional type 6 engine for wildland fire response by the GRFD.
- c. Improve dispatch and alerting capabilities by establishing a community emergency alert system. The County and GRFD will continue to jointly investigate a reverse 911 system for emergency public communication.
- d. Obtain a chipper/shredder, tub grinder, air curtain destructor, and other equipment necessary for treatment and processing of vegetative slash for use by the GRFD for wildland fuel mitigation projects.
- e. Obtain one multipurpose utility vehicle with attachments for chipping, brush cutting, and mini-water tending tool, such as the Bobcat Toolcat.
- f. Implement GIS and GPS (Geographic Positioning System) software and laptops to update mapping capabilities of the GRFD.
- g. Arrange for the acquisition, operation, and maintenance of a green waste disposal site within reasonable proximity to the citizens and encourage the use of the disposal site for all vegetative material removed during wildland fuel treatments on private lands within the WUI.
- h. Provide enhanced and coordinated firefighting training including equipment for newly certified wildland fire fighters.
- i. Develop and maintain mutual aid agreements with neighboring fire departments and districts for wildland and structural fire response support and other emergency response.
- j. In coordination with PCOEM develop an emergency notification (reverse 911) and evacuation plan for the community.
- k. Develop a presuppression plan with CNF and CSP along the eastern and southern boundary of the WUI.
- l. Explore the adoption of a WUI Code or ordinance, based on the International Wildland Fire Code, such as was adopted by the Community of Summerhaven and Pima County.

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

Pima County, the GRFD, the ASLD Forestry Division, the CNF, and the CWG will continue development and implementation of public-outreach programs to help create an informed citizenry. The goal is to have residents support concepts of Firewise landscaping and naturally functioning wildland systems through restoration management and rapid response to wildland fire. The CCWPP is intended to be a long-term strategic instrument 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. Additional educational resources are listed in Appendix C. The components of such a structure include the following recommendations:

- a. Expand the use of current public information tools for Firewise residential treatments as an immediate action step. This will be accomplished through information mailers to homeowners, presentations by the GRFD, use of the Arizona Firewise Partners Public Information Trailer (BLM Tucson Field Office) at community events, and development of specific promotional materials by Pima County.
- b. Public awareness efforts should also be conducted during the fall hunting season, which brings a large number of visitors to the community.
- c. CCWPP recommends that fire-danger information signs be placed on major access roads throughout the WUI area. Community bulletins and other public service announcements concerning wildfire threat and preparedness should be developed with assistance from the ASLD Forestry Division, the CNF, the BLM, and Pima County.
- d. Place and maintain bilingual wildfire caution signs within camping areas and access routes in the riparian corridor of the WUI.
- e. Complete the wildland fire home assessment through the use of Redzone or equivalent software and hardware system and submit wildland fire hazard mitigation strategies for each private property assessed to landowners.
- f. Replace and maintain fencing adjacent to high-use and illegal off-road vehicle use areas within or adjacent to the WUI.

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

The CWG and its collaborators will continue to support and promote private contractors who perform fire-safe mitigation work. The community will continue to support and promote new businesses involved in the wildland fuel reduction market. Catalina is committed to encouraging, as appropriate, the use of vegetative by-products from the WUI fuel management program for commercial or community-service organization use. Possible by-product uses encouraged by the communities include the following:

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

IV. CCWPP PRIORITIES: ACTION RECOMMENDATIONS AND IMPLEMENTATION

The CWG has developed action recommendations (see Section III of this CWPP) necessary to meet the plan's objectives. A series of recommendations that will reduce structural ignitability and improve fire prevention and suppression have also been developed by the CWG. A unified effort to implement this collaborative plan requires timely decision making at all levels of government.

To meet CCWPP objectives, the CWG developed the following action recommendations. At the end of each year, projects implemented from these action recommendations will be monitored for effectiveness of meeting CCWPP objectives. For the life of the CCWPP, recommendations for additional projects will be made for each future year on the basis of project performance from the 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, delegating, implementing and monitoring the action recommendations of the CCWPP. Establishing a unified effort to collaboratively implement the CCWPP embraces adaptive management principles that enhance decision making and reduce inconsistency at all levels of government.

The CWG recommends the establishment of a community-driven Firewise committee to work with the GRFD to accomplish the recommendations for outreach and structural ignitability within the CCWPP WUI area, which includes fuel hazards removal on private lands within the WUI. The community group should consist of community members, members of the GRFD, and additional representation as needed by the PCOEM, ASLD, ASP, and CNF. The agencies involved in the formation of this plan, support community efforts and will work with the community as needed to accomplish action items. The CNF and ASLD will coordinate fuel mitigation projects on State and public lands within the WUI with the community-driven Firewise committee when established. The GRFD and the proposed community Firewise group will be responsible for submission of grants and solicitation of other opportunities to implement wildland fuel mitigation projects on private lands, and to support public information, education, and outreach within the WUI. The GRFD will work with all constituents within the WUI to reduce structural ignitability by continuing to explore the adoption of the Wildland Fire Code within the WUI, such as was adopted by Pima County for the community of Summerhaven. 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. The community group should work cooperatively with the PCOEM and the ASLD on the contracting work required for attaining work crews to implement fuels mitigation projects within the WUI boundary. The CNF and CSP will pursue funding to construct and maintain firebreaks as well as broader applications of wildland fuel mitigation projects within the WUI. Annual monitoring and reporting compiled by the community Firewise committee will provide information on additional measures necessary to meet CCWPP goals.

B. Priorities for Mitigation of Hazardous Wildland Fuels

Table 4.1 displays the priority for construction of firebreaks and landscape wildland fuel treatments within the WUI as recommended by the CWG. These action recommendations will reduce wildfire potential to the community and have "high" valuations for reducing wildland fire risk to Catalina.

Table 4.1. Action recommendations for construction of firebreaks in Catalina WUI

Management area	Location and description	Project partners	Estimated treatment costs ^a
C27	Firebreaks in section 14—Lands including the cottonwoods and area north of Golder Extension	GRFD, ASLD, CNF, and Pima County	740 acres of oak/mesquite woodland, 3 acres treated per 12-hour day = \$220,211.00
C28	Firebreaks in sections 23 and 22—Lands south of Rollins Rd. including Golder Extension	GRFD, ASLD, CNF, and Pima County	412 acres of oak/mesquite woodland, 3 acres treated per 12-hour day = \$122,604.00
C20	Firebreak in section 11—Land surrounding Sutherland Heights	GRFD, ASLD, CNF, and Pima County	422 acres of oak/mesquite woodland, 3 acres treated per 12-hour day = \$125,580.00
C17	Riparian treatments in Cañada del Oro within the WUI	GRFD, ASLD, and Pima County	831 acres of mesquite bosque, 2 acres treated per 10-hour day = \$328,388.00
C22	Firebreaks in section 21—southeast of the community bounded by Cañada del Oro to the west and the cottonwoods to the east	GRFD, ASLD, and Pima County	533 acres of oak/mesquite woodland, 3 acres treated per 10-hour day = \$140,845.00
C18	Firebreak in sections 1, 12 ,and 11—Area of the Chutes in the far northeast portion of the WUI	ASLD, CNF, GRFD, and Pima County	415 acres of oak/mesquite woodland, 3 acres treated per 12-hour day = \$123,497.00
Firebreak maintenance	One- to two-year rotating maintenance of fine and light fuels in Firebreaks C27, C28, C20, C17, C22, and C18	ASLD, CNF, GRFD, and Pima County	500 acres per year of light understory fuel treatments in excess of 4 acres treated per 10-hour day = \$99,093.00

^aTotal acres to be treated during the life of the plan

C. Priorities for Protection Capability and Reduced Structural Ignitability

The CWG and collaborators will evaluate, maintain, and, where necessary, upgrade community wildfire preparation and response facilities, capabilities, and equipment. Table 4.2 lists the priority action recommendations.

Table 4.2. Action recommendations for wildland fire protection and reduced ignitability

Partners	Project ^a	Equipment/expenses	Timeline
GRFD, ASLD, CNF, Pima County	E1 —Obtain a medium-size water tender for GRFD use (better able to traverse rural landscape than larger units)	1,500-gal capacity water tenders; 4-wheel drive: \$65,000	Acquire tender in FY 2007/08. Assess additional tender needs in FY 2009/10
GRFD, ASLD, CNF, Pima County	E2 —Obtain two fully functional type 6 engines	Type 6 fire response brush engine: \$60,000 each	Acquire 1 engine in FY 2007/08. Acquire second engine when crew is trained; implement use in FY 2007

Continued

Table 4.2. Action recommendations for wildland fire protection and reduced ignitability

Partners	Project^a	Equipment/expenses	Timeline
GRFD, ASLD, CNF, Pima County	E3 —Acquire and implement the reverse 911 emergency public notification system with trained operators	Enhancement of existing radio repeater and reverse 911 software and hardware	Assess costs in FY 2007; install in FY 2007/08
GRFD, ASLD, CNF, Pima County	E4 —Obtain one multipurpose utility vehicle with attachments for chipping, brush cutting, and mini-water tending, such as Bobcat Toolcat	Multipurpose utility vehicle: \$35,000	Acquire in FY 2007/08; implement use in FY 2007
GRFD, ASLD, CNF, Pima County	E5 —Develop GIS capability (software and hardware) within GRFD in coordination with agency partners to update the GRFD with current conditions, to deploy resources in response to threats and risk analysis, and to view details in field vehicle with laptop units	Purchase GIS computer for headquarters, ARC-INFO software, and basic training: \$10,000. Purchase four case-hardened laptops for field operations with GIS software: \$5,000 each	Begin in FY 2007/08: start with base computer and two laptops; purchase additional laptops as personnel increases
GRFD, ASLD, CNF, Pima County	I4 —Retrofit existing wells or water supplies for GRFD use (outlet pipes, valves, and hose thread adaptors); maintain sites. Cost-share hose and nozzle for immediate protection at site	Pipe and valve installation and site maintenance: \$10,000 initial, \$2,500 annually	Begin in FY 2007/08; maintain annually
GRFD, Pima County	I5 —Work with land agencies for the acquisition, operation, and maintenance of a green waste disposal site within reasonable proximity to community	Excavate pit and fence: \$20,000	Begin planning with agencies in FY 2007/08; implement in FY 2007/08
GRFD, ASLD, CNF, Pima County	P1 —Provide enhanced and coordinated firefighting training, including equipment for new enrollees	Initial and annual refresher and enhancement training and equipment for individual firefighters and annual multiagency training exercise: \$15,000.00 annually	Training for 15 firefighters annually beginning in FY 2007/08
GRFD, ASLD, CNF, Pima County	A1 —Develop and maintain written mutual aid agreements with neighboring fire departments and districts, for wildland fire, structure fire, and other emergency response	Staff time, coordination efforts, research, and meetings: \$5,000.00	Inventory existing agreements; determine deficiencies and implement any needed agreements in FY 2007/08
GRFD, ASLD, CNF, Pima County	A2 —Work with Pima 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 2007/08; implement in FY 2007/08
GRFD, ASLD, CNF, Pima County	A3 —Develop a presuppression plan with CNF and CSP along the eastern and southern boundary of the WUI area.	Staff time, coordination efforts, research and meetings: \$5,000.00	Begin planning in FY 2008/09; implement in FY 2009/10

^a Projects are designated by priority type (E = Equipment, I = Infrastructure, A = Administrative, P = personnel) and ranked in order of importance (1, 2, 3, 4).

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

The GRFD will implement public outreach and education programs for residents to heighten awareness and understanding of the threat that wildland fire poses to the community.

Table 4.3 displays the CCWPP priority recommendations to promote community involvement. Additional programs that could be used or developed to enhance community outreach and education may be developed and implemented in the future. The CWG will use the resources of the ASLD Forestry Division, Tucson District Office, as well as the CNF, for additional Firewise program community outreach. Community bulletins and other public service announcements concerning wildfire threat and preparedness should be developed with assistance from the ASLD, Forestry Division, Tucson District Office, and the CNF.

Table 4.3. Action recommendations for enhanced public education, information, and outreach

Partners	Project	Equipment/expense	Timeline
GRFD, CNF, Pima County, ASLD	Establish and maintain roadside fire-danger warning signs and other informational and directional road signs along major roads	Construction and placement: \$5,000.00	Construct and implement in FY 2007/08
	Create and distribute community bulletin	Development, printing, and distribution costs: \$5,000.00	Develop in FY 2007; distribute continually
	Acquire Redzone 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 2007/08; implement recommendations in FY 2007/08
	Encourage private businesses that perform fire-safe land treatments. Encourage market development of WUI by-products from vegetative fuel mitigation programs	Marketing plan to be developed	Initiate community marketing planning meetings in FY 2007
	Replace and maintain fencing adjacent to high OHV use areas	Assess in 2007, initial plan for one mile of new or repaired fencing	Estimate \$5,000.00m per mile of standard 4-wire fencing

E. Requested Funding for Implementation of the CCWPP

Table 4.4 summarizes the fiscal year 2007/08 funding necessary to initiate implementation of the CCWPP action recommendations.

Table 4.4. CCWPP proposed budget

CCWPP objective	Estimated cost
Wildland fuel mitigation	3,353 high-risk acres recommended for wildland fuel mitigation; treatments to be implemented on one-third of priority acres in FY 2007/08 at \$300.00/acre = \$335,300.00 per year
Wildland fire protection and reduced ignitability	FY 2007/08 = \$220,000
Public education, information, and outreach	FY 2007/08 = \$13,300
Total requested implementation funds	FY 2007/08 = \$568,600.00

V. MONITORING PLAN

Monitoring is essential to ensure that CCWPP goals are met. As CCWPP administrators, the GRFD, PCOEM, CRP, ASLD, ASP, and CNF will actively monitor the progress of the CCWPP action recommendations to determine the effectiveness of ongoing and completed projects in meeting CCWPP objectives, as well as to recommend future projects necessary to meet CCWPP goals.

In accordance with Section 102.g.5 of the HFRA, CCWPP communities will participate in any multiparty monitoring program established by State and Federal agencies or other interested parties, to assess progress toward meeting CCWPP objectives. This authority to participate in multiparty monitoring will be vested in the CCWPP administrators. The CWG 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 the CNF, CRP, ASP, and ASLD with land-management planning.

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

A. Administrative Oversight, Monitoring, and CCWPP Reporting

The CCWPP administrators will be mutually responsible for implementing and monitoring CCWPP action recommendations in coordination with a future established community-driven Firewise committee. The CCWPP administrators should identify appropriate grant and other funding mechanisms necessary to implement the action recommendations of the CCWPP. Grant information should be routinely searched to identify updated grant application cycles. In addition to Appendix C of this CWPP, the following is a list of Federal, State, and nongovernmental Web sites that can be monitored to obtain updated grant application cycle information:

Federal

- www.fs.fed.us/r3
- www.fs.fed.us/r3/partnerships/
- www.fireplan.gov
- www.firegrantsupport.com
- www.az.nrcs.usda.gov
- www.blm.gov/az
- www.firewise.org
- www.ncwg.gov

State

- www.azsf.az.gov
- www.azgfd.gov

- www.cals.arizona.edu/firewise
- www.southwestareagrants.org

Nongovernmental

- www.iwjv.org
- www.sonoran.org
- www.iafc.org

As needed, the CCWPP administrators in coordination with a future established community-driven Firewise Committee will produce a report detailing the success of CCWPP project implementation and overall progress toward meeting CCWPP goals. The administrators should report successful grant awards received for implementing the CCWPP action recommendations to CCWPP signatories. The CCWPP administrators report will also include recommendations to the signatories for updating the Community Mitigation Plan and the Prevention and Loss Mitigation Plan portions of the CCWPP, using adaptive management principles. This information will ensure timely decision making for all levels of government and will provide input necessary for the development of future work plans and for prioritization of project recommendations over the life of the CCWPP. Once the CCWPP is updated, it will be submitted to the PCOEM, the Arizona State Forester, CNF, and ASP for their concurrence. Once concurrence is achieved, the action recommendations of the updated CCWPP are to be forwarded for funding through the HFRA and other appropriate funding sources.

B. Effectiveness Monitoring

Table 5.1 shows the performance measures the CCWPP administrators will use to assess CCWPP performance against goals for the fiscal year. In addition to monitoring the listed performance measures, CCWPP administrators should assess the current status of wildland fuel hazards and look for any new or developing issues not covered by the CCWPP. As new issues arise, such as new invasive species infestations, further identification of risks and recommendations for treatment should be identified, and the CCWPP should be updated or amended as necessary to meet the CCWPP goals. To help track fuel treatments being planned and completed through local, State, and Federal programs, CCWPP administrators will cooperate by providing requested detailed mapping information to the Arizona State Forester's office.

Table 5.1. Performance measures to assess CCWPP progress

Goal	Performance measure
Improve fire prevention and suppression	<p data-bbox="511 241 1528 273">Reduction of wildland fire occurrence and acres burned (unplanned) in the WUI:</p> <ul data-bbox="560 283 1528 787" style="list-style-type: none"> <li data-bbox="560 283 1528 315">• GRFD has implemented the reverse 911 emergency notification program. <li data-bbox="560 315 1528 451">• Effectiveness monitoring of fire prevention and suppression will include <ul data-bbox="609 346 1528 451" style="list-style-type: none"> <li data-bbox="609 346 1528 378">– acres burned and degree of severity of wildland fire, <li data-bbox="609 388 1528 420">– percentage of wildland fire controlled on initial attack, <li data-bbox="609 430 1528 451">– number of homes and structures lost to wildland fire. <li data-bbox="560 462 1528 493">• New water sources developed in key areas and new tender acquired. <li data-bbox="560 504 1528 535">• Acquire two type 6 engines and one multipurpose vehicle. <li data-bbox="560 546 1528 577">• GPS location software and hardware installed in all wildland engines. <li data-bbox="560 588 1528 619">• Emergency response and evacuation plan developed and in use. <li data-bbox="560 630 1528 661">• Consistent fire management model and training in use. <li data-bbox="560 672 1528 703">• Green waste disposal and processing site secured and operational. <li data-bbox="560 714 1528 756">• Mutual-aid agreements with ASLD, CNF, and neighboring fire districts updated and approved. <li data-bbox="560 766 1528 787">• Pre-suppression plan in place with CNF, CSP, ASLD, and CRP.
Reduce hazardous forest fuels	<p data-bbox="511 819 1528 850">High-risk areas effectively treated by acre:</p> <ul data-bbox="560 861 1528 1060" style="list-style-type: none"> <li data-bbox="560 861 1528 945">• Number of treated acres of non-Federal WUI lands that are in Condition Class 2 or 3 are identified as high priority by the CCWPP, and are moved to Condition Class 1 or another acceptable level of wildland fuel. <li data-bbox="560 955 1528 1060">• Total acres treated through any fuel reduction measures, including Rx, that are conducted in, or adjacent to, the WUI. The change of condition class should be determined for small projects or treatment areas through the use of the <i>FRCC Guidebook</i> (FRCC Interagency Working Group 2005b).
Restore watershed health	<p data-bbox="511 1102 1528 1165">Acres of fuel reduction or watershed enhancement treatments that meet restoration treatment guidelines for riparian habitats:</p> <ul data-bbox="560 1176 1528 1249" style="list-style-type: none"> <li data-bbox="560 1176 1528 1249">• Coordination with and support of PCOEM, ASLD, ASP, and CNF in implementing and determining social, economic, and environmental effects of riparian restoration treatments (Treatment 9).
Promote community involvement	<p data-bbox="511 1302 1528 1333">Community-outreach programs initiated:</p> <ul data-bbox="560 1344 1528 1659" style="list-style-type: none"> <li data-bbox="560 1344 1528 1375">• Community and local Firewise committees initiated. <li data-bbox="560 1386 1528 1438">• Public-outreach programs and promotions implemented to enhance volunteer efforts to reduce hazardous fuels. <li data-bbox="560 1449 1528 1501">• Number and areas (community or dispersed residents) of private landowners supportive of and implementing fuel reduction projects. <li data-bbox="560 1512 1528 1564">• GRFD and Pima County developed and implemented evacuation plans for identified high-risk areas. <li data-bbox="560 1575 1528 1606">• Individual home assessment completed in WUI boundary high risk areas. <li data-bbox="560 1617 1528 1659">• Roadside fire-danger warning signs in English and Spanish installed at strategic points within the WUI.
Encourage economic development	<p data-bbox="511 1711 1528 1764">Wood-products industry growth and diversification to use all sizes of material removed by fuel reduction treatments:</p> <ul data-bbox="560 1774 1528 1879" style="list-style-type: none"> <li data-bbox="560 1774 1528 1806">• Arizona DOC crews used for wildland fuels treatments. <li data-bbox="560 1816 1528 1848">• Number of value-added wood products developed by the community. <li data-bbox="560 1858 1528 1879">• Number of new markets (local firewood sales) for local products created.

VI. DECLARATION OF AGREEMENT AND CONCURRENCE

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

Agreement

Richard Elias, Chairman
Pima County Board of Supervisors

Date

John Fink, Chief
Golder Ranch Fire Department

Date

Concurrence

Kirk Rowdabaugh
Arizona State Forester

Date

Neil Donkersley, Manager
Catalina State Park

Date

Larry Raley, Catalina District
Coronado National Forest

Date

VII. REFERENCES

- Anderson, H. E. 1982. *Aids to Determining Fuel Models for Estimating Fire Behavior*. INT-122. National Wildlife Coordinating Group, Washington, DC.
- Arizona Department of Commerce. 2007. Community Profile. Catalina. <http://www.azcommerce.com>.
- Arizona State Forester. 2004. *Arizona Wildland Urban Interface Assessment*. <http://www.azsf.az.gov>.
- Arizona State Forester. 2005. Arizona Communities at Risk Matrix. <http://www.azsf.az.gov>.
- Arizona State Forester. 2006. Arizona Communities at Risk List. <http://www.azsf.az.gov>.
- Arizona State Forester. 2007. *Identifying Arizona's Wildland/Urban Interface Communities at Risk: A Guide for State and Federal Land Managers*.
- Arizona State Parks Department. 1982. Catalina State Park Management Plan.
- Arizona State Parks Department. 2005. Fire Plan. Catalina State Park.
- Bahre, C. J. 1985. Wildfire in Southeastern Arizona Between 1859 and 1890. *Desert Plants* 7(4): 190–194.
- Burgan, Robert E. 1988. 1988 Revisions to the 1978 National Fire-Danger Rating System. Research Paper SE-273. USDA Forest Service, Southeastern Forest Experiment Station, Asheville, NC.
- Communities Committee of the Seventh American Forest Congress, the National Association of Counties, the National Association of State Foresters (NASF), Society of American Foresters, and the Western Governors' Association (WGA). 2004. *Preparing a Community Wildfire Protection Plan: A Handbook for Wildland-Urban Interface Communities*.
- Fire Regime Condition Class (FRCC) Interagency Working Group. 2003. Fire Regime Condition Class Definition. <http://www.frcc.gov/docs/FrccDefinitionsFinal.pdf>, accessed April 13, 2004.
- Fire Regime Condition Class (FRCC) Interagency Working Group. 2005a. *Fire Regime Condition Class (FRCC) Interagency Handbook Reference Conditions. Fire Regime Condition Class (FRCC) Potential Natural Vegetation Group (BpS) Descriptions*. <http://www.frcc.gov/pnvgSummaries.html>.
- Fire Regime Condition Class (FRCC) Interagency Working Group. 2005b. *Interagency Fire Regime Condition Class Guidebook. Fire Regime Condition Class Version 1.2*. http://www.frcc.gov/docs/1.2.2.2/Complete_Guidebook_V1.2.pdf.
- Gori, D. F., and C. A. F. Enquist. 2003. *An Assessment of the Spatial Extent and Condition of Grasslands in Central and Southern Arizona, Southwestern New Mexico and Northern Mexico*. The Nature Conservancy, Arizona Chapter.
- Governor's Arizona Forest Health Oversight Council. 2006. *2006 Status Report and Recommendations*. Executive Order 2003-16. Final. April 25, 2006

- Governor's Arizona Forest Health Oversight Council. 2007. Statewide Strategy for Restoring Arizona' Forests. Statewide Strategy Subcommittee of the Governor's Forest health Oversight Council. June 2007.
- Greater Catalina/Golder Ranch Village Council (CVC). 2004. By-Laws of the Greater Catalina/Golder Ranch Village Council, Inc. <http://catalinaaz.org/CouncilBylaws.htm>.
- Huachuca Area Fire Partners. 2005. *Restoring healthy Landscapes and Ecosystems. Fire Management Plan*. The Nature Conservancy of Arizona, Tucson.
- National Association of State Foresters. 2003. *Field Guidance: Identifying and Prioritizing Communities At Risk*. <http://www.stateforesters.org/reports/COMMUNITIESATRISKFG.pdf>.
- Natural Resource Conservation Service. 2002. *National Conservation Practice Standards, Range Planting, Code 550*.
- Natural Resource Conservation Service. 2006. *Altar Valley Fire Management Plan Public Review Draft*. Tucson District.
- Natural Resource Conservation Service. 2007a. National Cooperative Soil Survey Rangeland Productivity and Plant Composition-Pima County, Eastern Part 2007
- Natural Resource Conservation Service (NRCS) 2007b. State Soil Geographic Database (STATSGO)
- NatureServe. 2004. Southwest ReGAP Analysis Project- Land Cover Data Legend Descriptions. http://earth.gis.usu.edu/swregap/legend_desc.html
- Pima County. 1998. *The Sonoran Desert Conservation Plan*. Tucson, AZ.
- Pima County. 2001. *Pima County Comprehensive Plan*. Tucson, AZ.
- Pima County. 2005. *Multi-Jurisdictional Hazard Mitigation Plan*. Draft. Pima County, Tucson, AZ.
- Pima County Office of Emergency Management (PCOEM) and Homeland Security. 2005. *Pima County Emergency Services Operations Plan*. Pima County, Tucson, AZ.
- Pima County Parks Department. 2005. Natural Resources Division. Catalina Regional Park Management Plan.
- Presidential Policy. *Healthy Forests: An Initiative for Wildfire Prevention and Stronger Communities*. 2002. Presidential Policy. August 22, 2002.
- Schmidt, K. M., J. P. Menakis, C. C. Hardy, W. J. Hann, and D. L. Bunnell. 2002. *Development of Coarse-Scale Spatial Data for Wildland Fire and Fuel Management*. RMRS-87. USDA Forest Service, Washington, DC.

- United States Geological Survey (USGS) National GAP Analysis Program. 2005. Southwest Regional GAP Analysis Project—Land Cover Data Legend Descriptions. RS/GIS Laboratory, College of Natural Resources, Utah State University. http://ftp.nr.usu.edu/swgap/legend_desc.html.
- USDA and USDI. 2001a. Urban Wildland Interface communities within the vicinity of Federal lands that are at high risk from wildfire, *Federal Register* Vol. 66, no. 3, pp. 751–777. January 4.
- USDA and USDI. 2001b. Urban Wildland Interface communities within the vicinity of Federal lands that are at high risk from wildfire (update), *Federal Register* Vol. 66, no. 160, pp. 43383-43435. August 17.
- USDA and USDI. 2002 *A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment: 10-Year Comprehensive Strategy Implementation Plan*. Washington, DC.
- USDA and USDI. 2004. *National Fire Plan*. Washington, DC. <http://www.fireplan.gov>, accessed October 2006.
- USDA Forest Service. 2000. *USDA Forest Service Handbook 1909*. Washington, DC.
- USDA Forest Service. 2003. *Fire Regime and Condition Class (FC) Field Procedures—Standard and Scorecard Methods*. FIREMON v1.1 – 10/30/03-1. Washington, DC.
- USDA Forest Service. 2005a. *Coronado National Forest Land and Resource Management Plan*. Coronado National Forest, Tucson, AZ.
- USDA Forest Service. 2005b. *Wildland Fire Amendment to the Coronado National Forest Land and Resource Management Plan*. Coronado National Forest, Tucson, AZ.
- USDA Forest Service and New Mexico Energy, Minerals and Natural Resources Department, Forestry Division. 2005. *Strategy for Long-Term Management of Exotic Trees in Riparian Areas for New Mexico's Five River Systems, 2005-2014*.
- USDA Forest Service and USDI Bureau of Land Management. 2004. *The Healthy Forests Initiative and Healthy Forests Restoration Act: Interim Field Guide*. FS-799. Washington, DC.
- US Department of the Interior, US Department of Agriculture, et al. 2005. *Wildland Fire Use Implementation Procedures Reference Guide*.
- USDI Bureau of Land Management. 2004. *Arizona Statewide Land Use Plan Amendment for Fire, Fuels and Air Quality Management Finding of No Significant Impact (FONSI) and Environmental Assessment*. Phoenix, AZ.
- USDI Bureau of Land Management. 2004. *Wildland Fire Suppression (Including Wildland Fire Use) and Rehabilitation in Riparian and Aquatic Habitats (RA)*. Phoenix, AZ.
- Wildland Fire Leadership Council. 2002. *Wildland Fire Leadership Council Memorandum of Understanding*. <http://www.fireplan.gov/leadership/memorandum.html>.

VIII. GLOSSARY OF FIRE MANAGEMENT TERMS

A

Aerial Fuels: All live and dead vegetation in the forest canopy or above surface fuels, including tree branches, twigs and cones, snags, moss, and high brush.

Aerial Ignition: Ignition of fuels by dropping incendiary devices or materials from aircraft.

Air Tanker: A fixed-wing aircraft equipped to drop fire retardants or suppressants.

Agency: Any federal, state, county, or city government organization participating with jurisdictional responsibilities.

Anchor Point: An advantageous location, usually a barrier to fire spread, from which to start building a fire line. An anchor point is used to reduce the chance of firefighters being flanked by fire.

Appropriate Tools: Methods for reducing hazardous fuels including prescribed fire, wildland fire use, and various mechanical methods such as crushing, tractor and hand piling, thinning (to produce commercial or pre-commercial products), and pruning. They are selected on a site-specific case and are ecologically appropriate and cost effective.

Aramid: The generic name for a high-strength, flame-resistant synthetic fabric used in the shirts and jeans of firefighters. Nomex, a brand name for aramid fabric, is the term commonly used by firefighters.

Aspect: Direction toward which a slope faces.

B

Backfire: A fire set along the inner edge of a fireline to consume the fuel in the path of a wildfire and/or change the direction of force of the fire's convection column.

Backpack Pump: A portable sprayer with hand-pump, fed from a liquid-filled container fitted with straps, used mainly in fire and pest control. (see Bladder Bag)

Bambi Bucket: A collapsible bucket slung below a helicopter. Used to dip water from a variety of sources for fire suppression.

Behave: A system of interactive computer programs for modeling fuel and fire behavior that consists of two systems: BURN and FUEL.

Bladder Bag: A collapsible backpack portable sprayer made of neoprene or high-strength nylon fabric fitted with a pump. (see Backpack Pump)

Blow-up: A sudden increase in fire intensity or rate of spread strong enough to prevent direct control or to upset control plans. Blow-ups are often accompanied by violent convection and may have other characteristics of a fire storm. (see Flare-up)

Brush: A collective term that refers to stands of vegetation dominated by shrubby, woody plants, or low growing trees, usually of a type undesirable for livestock or timber management.

Glossary adapted from the NIFC, <http://www.nifc.gov/fireinfo/glossary.html>.

Brush Fire: A fire burning in vegetation that is predominantly shrubs, brush and scrub growth.

Bucket Drops: The dropping of fire retardants or suppressants from specially designed buckets slung below a helicopter.

Buffer Zones: An area of reduced vegetation that separates wildlands from vulnerable residential or business developments. This barrier is similar to a greenbelt in that it is usually used for another purpose such as agriculture, recreation areas, parks, or golf courses.

Bump-up Method: A progressive method of building a fire line on a wildfire without changing relative positions in the line. Work is begun with a suitable space between workers. Whenever one worker overtakes another, all workers ahead move one space forward and resume work on the uncompleted part of the line. The last worker does not move ahead until completing his or her space.

Burnable Acres: Any vegetative material/type that is susceptible to burning.

Burned Area Rehabilitation: The treatment of an ecosystem following fire disturbance to minimize subsequent effects. (1995 Federal Wildland Fire Policy.)

Burn Out: Setting fire inside a control line to widen it or consume fuel between the edge of the fire and the control line.

Burning Ban: A declared ban on open air burning within a specified area, usually due to sustained high fire danger.

Burning Conditions: The state of the combined factors of the environment that affect fire behavior in a specified fuel type.

Burning Index: An estimate of the potential difficulty of fire containment as it relates to the flame length at the most rapidly spreading portion of a fire's perimeter.

Burning Period: That part of each 24-hour period when fires spread most rapidly, typically from 10:00 a.m. to sundown.

Burn Intensity: The amount and rate of surface fuel consumption. It is not a good indicator of the degree of chemical, physical and biological changes to the soil or other resources. (see Fire Severity)

C

Campfire: As used to classify the cause of a wildland fire, a fire that was started for cooking or warming that spreads sufficiently from its source to require action by a fire control agency.

Candle or Candling: A single tree or a very small clump of trees that is burning from the bottom up.

Chain: A unit of linear measurement equal to 66 horizontal feet.

Closure: Legal restriction, but not necessarily elimination of specified activities such as smoking, camping, or entry that might cause fires in a given area.

Cold Front: The leading edge of a relatively cold air mass that displaces warmer air. The heavier cold air may cause some of the warm air to be lifted. If the lifted air contains enough moisture, the result may be cloudiness, precipitation, and thunderstorms. If both air masses are dry, no clouds may form. Following the

passage of a cold front in the Northern Hemisphere, westerly or northwesterly winds of 15 to 30 or more miles per hour often continue for 12 to 24 hours.

Cold Trailing: A method of controlling a partly dead fire edge by carefully inspecting and feeling with the hand for heat to detect any fire, digging out every live spot, and trenching any live edge.

Command Staff: The command staff consists of the information officer, safety officer and liaison officer. They report directly to the incident commander and may have assistants.

Community Impact Zone (CIZ): The zone around a community that may be impacted by wildfire. Similar to Defensible Space, but on a community level.

Complex: Two or more individual incidents located in the same general area, which are assigned to a single incident commander or unified command.

Condition Class: Based on coarse scale national data, Fire Condition Classes measure general wildfire risk as follows:

Condition Class 1. For the most part, fire regimes in this Fire Condition Class are within historical ranges. Vegetation composition and structure are intact. Thus, the risk of losing key ecosystem components from the occurrence of fire remains relatively low.

Condition Class 2. Fire regimes on these lands have been moderately altered from their historical range by either increased or decreased fire frequency. A moderate risk of losing key ecosystem components has been identified on these lands.

Condition Class 3. Fire regimes on these lands have been significantly altered from their historical return interval. The risk of losing key ecosystem components from fire is high. Fire frequencies have departed from historical ranges by multiple return intervals. Vegetation composition, structure and diversity have been significantly altered. Consequently, these lands verge on the greatest risk of ecological collapse. (Cohesive Strategy, 2002, in draft)

Contain a fire: A fuel break around the fire has been completed. This break may include natural barriers or manually and/or mechanically constructed line.

Control a fire: The complete extinguishment of a fire, including spot fires. Fireline has been strengthened so that flare-ups from within the perimeter of the fire will not break through this line.

Control Line: All built or natural fire barriers and treated fire edge used to control a fire.

Cooperating Agency: An agency supplying assistance other than direct suppression, rescue, support, or service functions to the incident control effort; e.g., Red Cross, law enforcement agency, telephone company, etc.

Coyote Tactics: A progressive line construction duty involving self-sufficient crews that build fire line until the end of the operational period, remain at or near the point while off duty, and begin building fire line again the next operational period where they left off.

Creeping Fire: Fire burning with a low flame length and spreading slowly.

Crew Boss: A person in supervisory charge of usually 16 to 21 firefighters and responsible for their performance, safety, and welfare.

Critical Ignition Zones: Those areas that are likely to be key in the formation of large wildfires if ignition occurs at that location. These include locations such as at the bottom of a hill, or in fuels that will ignite easily and sustain growth of fire with increasing flame lengths and fire intensity.

Crown Fire (Crowning): The movement of fire through the crowns of trees or shrubs more or less independently of the surface fire.

Curing: Drying and browning of herbaceous vegetation or slash.

D

Dead Fuels: Fuels with no living tissue in which moisture content is governed almost entirely by atmospheric moisture (relative humidity and precipitation), dry-bulb temperature, and solar radiation.

Debris Burning: A fire spreading from any fire originally set for the purpose of clearing land or for rubbish, garbage, range, stubble, or meadow burning.

Defensible Space: An area either natural or manmade where material capable of causing a fire to spread has been treated, cleared, reduced, or changed to act as a barrier between an advancing wildland fire and the loss to life, property, or resources. In practice, “defensible space” is defined as an area a minimum of 30 feet around a structure that is cleared of flammable brush or vegetation. (see Survivable Space)

Deployment: See Fire Shelter Deployment.

Detection: The act or system of discovering and locating fires.

Direct Attack: Any treatment of burning fuel, such as by wetting, smothering, or chemically quenching the fire or by physically separating burning from unburned fuel.

Dispatch: The implementation of a command decision to move a resource or resources from one place to another.

Dispatcher: A person employed who receives reports of discovery and status of fires, confirms their locations, takes action promptly to provide people and equipment likely to be needed for control in first attack, and sends them to the proper place.

Dispatch Center: A facility from which resources are directly assigned to an incident.

Division: Divisions are used to divide an incident into geographical areas of operation. Divisions are established when the number of resources exceeds the span-of-control of the operations chief. A division is located with the Incident Command System organization between the branch and the task force/strike team.

Dozer: Any tracked vehicle with a front-mounted blade used for exposing mineral soil.

Dozer Line: Fire line constructed by the front blade of a dozer.

Drip Torch: Hand-held device for igniting fires by dripping flaming liquid fuel on the materials to be burned; consists of a fuel fount, burner arm, and igniter. Fuel used is generally a mixture of diesel and gasoline.

Drop Zone: Target area for air tankers, helitankers, and cargo dropping.

Drought Index: A number representing net effect of evaporation, transpiration, and precipitation in producing cumulative moisture depletion in deep duff or upper soil layers.

Dry Lightning Storm: Thunderstorm in which negligible precipitation reaches the ground. Also called a dry storm.

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

E

Ecosystem: A spatially explicit, relative homogeneous unit of the Earth that includes all interacting organisms and components of any part of the natural environment within its boundaries. An ecosystem can be of any size, e.g., a log, pond, field, forest, or the Earth's biosphere (Society of American Foresters, 1998).

Ecosystem Integrity: The completeness of an ecosystem that at geographic and temporal scales maintains its characteristics diversity of biological and physical components, composition, structure, and function (Cohesive Strategy, 2000).

Energy Release Component (ERC): The computed total heat released per unit area (British thermal units per square foot) within the fire front at the head of a moving fire.

Engine: Any ground vehicle providing specified levels of pumping, water and hose capacity.

Engine Crew: Firefighters assigned to an engine. The Fireline Handbook defines the minimum crew makeup by engine type.

Entrapment: A situation where personnel are unexpectedly caught in a fire behavior-related, life-threatening position where planned escape routes or safety zones are absent, inadequate, or compromised. An entrapment may or may not include deployment of a fire shelter for its intended purpose. These situations may or may not result in injury. They include "near misses."

Environmental Assessment (EA): EAs were authorized by the National Environmental Policy Act (NEPA) of 1969. They are concise, analytical documents prepared with public participation that determine if an Environmental Impact Statement (EIS) is needed for a particular project or action. If an EA determines an EIS is not needed, the EA becomes the document allowing agency compliance with NEPA requirements.

Environmental Impact Statement (EIS): EISs were authorized by the National Environmental Policy Act (NEPA) of 1969. Prepared with public participation, they assist decision makers by providing information, analysis and an array of action alternatives, allowing managers to see the probable effects of decisions on the environment. Generally, EISs are written for large-scale actions or geographical areas.

Equilibrium Moisture Content: Moisture content that a fuel particle will attain if exposed for an infinite period in an environment of specified constant temperature and humidity. When a fuel particle reaches equilibrium moisture content, net exchange of moisture between it and the environment is zero.

Escape Route: A preplanned and understood route firefighters take to move to a safety zone or other low-risk area, such as an already burned area, previously constructed safety area, a meadow that won't burn, natural rocky area that is large enough to take refuge without being burned. When escape routes deviate from a defined physical path, they should be clearly marked (flagged).

Escaped Fire: A fire that has exceeded or is expected to exceed initial attack capabilities or prescription.

Extended Attack Incident: A wildland fire that has not been contained or controlled by initial attack forces and for which more firefighting resources are arriving, en route, or being ordered by the initial attack incident commander.

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

F

Faller: A person who fells trees. Also called a sawyer or cutter.

Field Observer: Person responsible to the Situation Unit Leader for collecting and reporting information about an incident obtained from personal observations and interviews.

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

Fingers of a Fire: The long narrow extensions of a fire projecting from the main body.

Fire Behavior: The manner in which a fire reacts to the influences of fuel, weather and topography.

Fire Behavior Forecast: Prediction of probable fire behavior, usually prepared by a Fire Behavior Officer, in support of fire suppression or prescribed burning operations.

Fire Behavior Specialist: A person responsible to the Planning Section Chief for establishing a weather data collection system and for developing fire behavior predictions based on fire history, fuel, weather and topography.

Fire Break: A natural or constructed barrier used to stop or check fires that may occur or to provide a control line from which to work.

Fire Cache: A supply of fire tools and equipment assembled in planned quantities or standard units at a strategic point for exclusive use in fire suppression.

Fire Crew: An organized group of firefighters under the leadership of a crew leader or other designated official.

Fire Defense System: The cumulative effect of the fire suppression system of a community, including fuels reduction programs, fire breaks, defensible space, and the response capabilities of emergency personnel.

Fire Frequency: The natural return interval for a particular ecosystem.

Fire Front: The part of a fire within which continuous flaming combustion is taking place. Unless otherwise specified the fire front is assumed to be the leading edge of the fire perimeter. In ground fires, the fire front may be mainly smoldering combustion.

Fire Hazard Reduction Zone: Home ignition zone area, where fuel reduction and home fire resistant projects should take place to reduce the risk of a wildfire damaging a structure.

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

Fire Line: A linear fire barrier that is scraped or dug to mineral soil.

Fire Load: The number and size of fires historically experienced on a specified unit over a specified period (usually one day) at a specified index of fire danger.

Fire Management Plan (FMP): A strategic plan that defines a program to manage wildland and prescribed fires and documents the Fire Management Program in the approved land use plan. The plan is supplemented by operational plans such as preparedness plans, preplanned dispatch plans, prescribed fire plans, and prevention plans.

Fire Management Planning: A generic term referring to all levels and categories of fire management planning, including: preparedness, prevention, hazardous risk assessment, and mitigation planning.

Fire Perimeter: The entire outer edge or boundary of a fire.

Fire-prone ecosystem: Ecosystems that historically burned intensely at low frequencies (stand replacing fires), those that burned with low intensity at a high frequency (understory fires), and those that burned very infrequently historically, but are not subject to much more frequent fires because of changed conditions. These include fire-influenced and fire-adapted ecosystems (Cohesive Strategy, 2000).

Fire Regime: A generalized description of the role fire plays in an ecosystem. It is characterized by fire frequency, predictability, seasonality, intensity, duration, scale (patch size), as well as regularity or variability. Five combinations of fire frequency, expressed as fire return interval in fire severity, are defined:

Groups I and II include fire return intervals in the 0 - 35 year range. Group I includes Ponderosa pine, other long needle pine species, and dry site Douglas fir. Group II includes the drier grassland types, tall grass prairie, and some Pacific chaparral ecosystems.

Groups III and IV include fire return intervals in the 35 - 100+ year range. Group III includes interior dry site shrub communities such as sagebrush and chaparral ecosystems. Group IV includes lodgepole pine and jack pine.

Group V is the long interval (infrequent), stand replacement fire regime and includes temperate rain forest, boreal forest, and high elevation conifer species.

Fire-Return Interval: The number of years between successive fire events at a specific site or an area of a specified size.

Fire Risk Reduction Zone: A zone targeted for risk reduction, including measures such as fuels reduction, access protection, and construction of structures to minimize the risk of ignition from wildfire.

Fire Season: (1) Period(s) of the year during which wildland fires are likely to occur, spread, and affect resource values sufficient to warrant organized fire management activities. (2) A legally enacted time during which burning activities are regulated by state or local authority.

Fire Severity: The amount of heat that is released by a fire and how it affects other resources. It is dependent on the type of fuels and the behavior of the fuels when they are burned. (see Burn Intensity)

Fire Shelter: An aluminized tent offering protection by means of reflecting radiant heat and providing a volume of breathable air in a fire entrapment situation. Fire shelters should only be used in life-threatening situations, as a last resort.

Fire Shelter Deployment: The removing of a fire shelter from its case and using it as protection against fire.

Fire Storm: A fire of great size and intensity that generates and is fed by strong inrushing winds from all sides; the winds add fresh oxygen to the fire, increasing the intensity.

Fire Triangle: Instructional aid in which the sides of a triangle are used to represent the three factors (oxygen, heat, fuel) necessary for combustion and flame production; removal of any of the three factors causes flame production to cease.

Fire Use Module (Prescribed Fire Module): A team of skilled and mobile personnel dedicated primarily to prescribed fire management. These are national and interagency resources, available throughout the prescribed fire season, that can ignite, hold and monitor prescribed fires.

Fire Use: The combination of wildland fire use and prescribed fire application to meet resource objectives.

Fire Weather: Weather conditions that influence fire ignition, behavior and suppression.

Fire Weather Watch: A term used by fire weather forecasters to notify using agencies, usually 24 to 72 hours ahead of the event, that current and developing meteorological conditions may evolve into dangerous fire weather.

Fire Whirl: Spinning vortex column of ascending hot air and gases rising from a fire and carrying aloft smoke, debris, and flame. Fire whirls range in size from less than one foot to more than 500 feet in diameter. Large fire whirls have the intensity of a small tornado.

Firewise: A public education program developed by the National Wildland Fire Coordinating Group that assists communities located in proximity to fire-prone lands. (For additional information visit the Web site at <http://www.firewise.org>.)

Firefighting Resources: All people and major items of equipment that can or potentially could be assigned to fires.

Flame Height: The average maximum vertical extension of flames at the leading edge of the fire front. Occasional flashes that rise above the general level of flames are not considered. This distance is less than the flame length if flames are tilted due to wind or slope.

Flame Length: The distance between the flame tip and the midpoint of the flame depth at the base of the flame (generally the ground surface); an indicator of fire intensity.

Flaming Front: The zone of a moving fire where the combustion is primarily flaming. Behind this flaming zone, combustion is primarily glowing. Light fuels typically have a shallow flaming front, whereas heavy fuels have a deeper front. Also called fire front.

Flanks of a Fire: The parts of a fire's perimeter that are roughly parallel to the main direction of spread.

Flare-up: Any sudden acceleration of fire spread or intensification of a fire. Unlike a blow-up, a flare-up lasts a relatively short time and does not radically change control plans.

Flash Fuels: Fuels such as grass, leaves, draped pine needles, fern, tree moss and some kinds of slash, that ignite readily and are consumed rapidly when dry. Also called fine fuels.

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

Fuel: Combustible material. Includes, vegetation, such as grass, leaves, ground litter, plants, shrubs and trees, that feed a fire. (see Surface Fuels)

Fuel Bed: An array of fuels usually constructed with specific loading, depth and particle size to meet experimental requirements; also, commonly used to describe the fuel composition in natural settings.

Fuel Loading: The amount of fuel present expressed quantitatively in terms of weight of fuel per unit area.

Fuel Model: Simulated fuel complex (or combination of vegetation types) for which all fuel descriptors required for the solution of a mathematical rate of spread model have been specified.

Fuel Moisture (Fuel Moisture Content): The quantity of moisture in fuel expressed as a percentage of the weight when thoroughly dried at 212 degrees Fahrenheit.

Fuel Reduction: Manipulation, including combustion, or removal of fuels to reduce the likelihood of ignition and/or to lessen potential damage and resistance to control. Incorporated within this are treatments to protect, maintain, and restore land health and desired fire cycles.

Fuel Type: An identifiable association of fuel elements of a distinctive plant species, form, size, arrangement, or other characteristics that will cause a predictable rate of fire spread or difficulty of control under specified weather conditions.

Fusee: A colored flare designed as a railway-warning device and widely used to ignite suppression and prescription fires.

G

General Staff: The group of incident management personnel reporting to the incident commander. They may each have a deputy, as needed. Staff consists of operations section chief, planning section chief, logistics section chief, and finance/administration section chief.

Geographic Area: A political boundary designated by the wildland fire protection agencies, where these agencies work together in the coordination and effective utilization of firefighting resources.

Ground Fuel: All combustible materials below the surface litter, including duff, tree or shrub roots, dried out dead wood, peat, and sawdust that normally support a glowing combustion without flame.

H

Haines Index: An atmospheric index used to indicate the potential for wildfire growth by measuring the stability and dryness of the air over a fire.

Hand Line: A fireline built with hand tools.

Hazard Reduction: Any treatment of a hazard that reduces the threat of ignition and fire intensity or rate of spread.

Hazardous Fuels Reduction: “Fuel Reduction” is defined as the manipulation or removal of fuels, including combustion, to reduce the likelihood of ignition and/or to lessen potential damage and resistance to control. Incorporated within this are treatments to protect, maintain, and restore land health and desired fire cycles. “Hazard Reduction” is defined as any treatment of a hazard that reduces the threat of ignition and fire intensity or rate of spread.

Head of a Fire: The side of the fire having the fastest rate of spread.

Heavy Fuels: Fuels of large diameter such as snags, logs, large limb wood, that ignite and are consumed more slowly than flash fuels.

Helibase: The main location within the general incident area for parking, fueling, maintaining, and loading helicopters. The helibase is usually located at or near the incident base.

Helispot: A temporary landing spot for helicopters.

Helitack: The use of helicopters to transport crews, equipment, and fire retardants or suppressants to the fire line during the initial stages of a fire.

Helitack Crew: A group of firefighters trained in the technical and logistical use of helicopters for fire suppression.

Holding Actions: Planned actions required to achieve wildland prescribed fire management objectives. These actions have specific implementation timeframes for fire use actions but can have less sensitive implementation demands for suppression actions.

Holding Resources: Firefighting personnel and equipment assigned to do all required fire suppression work following fireline construction but generally not including extensive mop-up.

Home Ignitability: The ignition potential within the Home Ignition Zone.

Home Ignition Zone: The home and its immediate surroundings. The home ignition zone extends to a few tens of meters around a home not hundreds of meters or beyond. Home ignitions and, thus, the WUI fire loss problem principally depend on home ignitability.

Hose Lay: Arrangement of connected lengths of fire hose and accessories on the ground, beginning at the first pumping unit and ending at the point of water delivery.

Hotshot Crew: A highly trained fire crew used mainly to build fireline by hand.

Hotspot: A particular active part of a fire.

Hotspotting: Reducing or stopping the spread of fire at points of particularly rapid rate of spread or special threat, generally the first step in prompt control, with emphasis on first priorities.

I

Incendiary: Causing or capable of causing fire.

Incident: A human-caused or natural occurrence, such as wildland fire, that requires emergency service action to prevent or reduce the loss of life or damage to property or natural resources.

Incident Action Plan (IAP): Contains objectives reflecting the overall incident strategy and specific tactical actions and supporting information for the next operational period. The plan may be oral or written. When written, the plan may have a number of attachments, including: incident objectives, organization assignment list, division assignment, incident radio communication plan, medical plan, traffic plan, safety plan, and incident map.

Incident Command Post (ICP): Location at which primary command functions are executed. The ICP may be co-located with the incident base or other incident facilities.

Incident Command System (ICS): The combination of facilities, equipment, personnel, procedure and communications operating within a common organizational structure, with responsibility for the management of assigned resources to effectively accomplish stated objectives pertaining to an incident.

Incident Commander: Individual responsible for the management of all incident operations at the incident site.

Incident Management Team: The incident commander and appropriate general or command staff personnel assigned to manage an incident.

Incident Objectives: Statements of guidance and direction necessary for selection of appropriate strategy(ies), and the tactical direction of resources. Incident objectives are based on realistic expectations of what can be accomplished when all allocated resources have been effectively deployed.

Indigenous Knowledge: Knowledge of a particular region or environment from an individual or group that lives in that particular region or environment, e.g., traditional ecological knowledge of American Indians (FS National Resource Book on American Indian and Alaskan Native Relations, 1997).

Infrared Detection: The use of heat sensing equipment, known as Infrared Scanners, for detection of heat sources that are not visually detectable by the normal surveillance methods of either ground or air patrols.

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

J

Job Hazard Analysis: This analysis of a project is completed by staff to identify hazards to employees and the public. It identifies hazards, corrective actions and the required safety equipment to ensure public and employee safety.

Jump Spot: Selected landing area for smokejumpers.

Jump Suit: Approved protection suite work by smokejumpers.

K

Keech Byram Drought Index (KBDI): Commonly used drought index adapted for fire management applications, with a numerical range from 0 (no moisture deficiency) to 800 (maximum drought).

Knock Down: To reduce the flame or heat on the more vigorously burning parts of a fire edge.

L

Ladder Fuels: Fuels that provide vertical continuity between strata, thereby allowing fire to carry from surface fuels into the crowns of trees or shrubs with relative ease. They help initiate and assure the continuation of crowning.

Large Fire: (1) For statistical purposes, a fire burning more than a specified area of land, e.g., 300 acres. (2) A fire burning with a size and intensity such that its behavior is determined by interaction between its own convection column and weather conditions above the surface.

Lead Plane: Aircraft with pilot used to make dry runs over the target area to check wing and smoke conditions and topography and to lead air tankers to targets and supervise their drops.

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

Lightning Activity Level (LAL): A number on a scale of 1 to 6 that reflects frequency and character of cloud-to-ground lightning. The scale is exponential, based on powers of 2 (i.e., LAL 3 indicates twice the lightning of LAL 2).

Line Scout: A firefighter who determines the location of a fire line.

Litter: Top layer of the forest, scrubland, or grassland floor, directly above the fermentation layer, composed of loose debris of dead sticks, branches, twigs, and recently fallen leaves or needles, little altered in structure by decomposition.

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

M

Micro-Remote Environmental Monitoring System (Micro-REMS): Mobile weather monitoring station. A Micro-REMS usually accompanies an incident meteorologist and ATMU to an incident.

Mineral Soil: Soil layers below the predominantly organic horizons; soil with little combustible material.

Mobilization: The process and procedures used by all organizations, federal, state and local for activating, assembling, and transporting all resources that have been requested to respond to or support an incident.

Modular Airborne Firefighting System (MAFFS): A manufactured unit consisting of five interconnecting tanks, a control pallet, and a nozzle pallet, with a capacity of 3,000 gallons, designed to be rapidly mounted inside an unmodified C-130 (Hercules) cargo aircraft for use in dropping retardant on wildland fires.

Mop-up: To make a fire safe or reduce residual smoke after the fire has been controlled by extinguishing or removing burning material along or near the control line, felling snags, or moving logs so they won't roll downhill.

Multi-Agency Coordination (MAC): A generalized term that describes the functions and activities of representatives of involved agencies and/or jurisdictions who come together to make decisions regarding the prioritizing of incidents and the sharing and use of critical resources. The MAC organization is not a part of the on-scene ICS and is not involved in developing incident strategy or tactics.

Mutual Aid Agreement: Written agreement between agencies and/or jurisdictions in which they agree to assist one another upon request, by furnishing personnel and equipment.

N

National Environmental Policy Act (NEPA): NEPA is the basic national law for protection of the environment, passed by Congress in 1969. It sets policy and procedures for environmental protection, and authorizes Environmental Impact Statements and Environmental Assessments to be used as analytical tools to help federal managers make decisions.

National Fire Danger Rating System (NFDRS): A uniform fire danger rating system that focuses on the environmental factors that control the moisture content of fuels.

National Wildfire Coordinating Group (NWCG): A group formed under the direction of the Secretaries of Agriculture and the Interior and comprised of representatives of the US Forest Service, Bureau of Land Management, Bureau of Indian Affairs, National Park Service, US Fish and Wildlife Service, and Association of State Foresters. The group's purpose is to facilitate coordination and effectiveness of wildland fire activities and provide a forum to discuss, recommend action, or resolve issues and problems of substantive nature. NWCG is the certifying body for all courses in the National Fire Curriculum.

Nomex: Trade name for a fire resistant synthetic material used in the manufacturing of flight suits and pants and shirts used by firefighters. (see Aramid)

Normal Fire Season: (1) A season when weather, fire danger, and number and distribution of fires are about average. (2) Period of the year that normally comprises the fire season.

O

Operations Branch Director: Person under the direction of the operations section chief who is responsible for implementing that portion of the incident action plan appropriate to the branch.

Operational Period: The period of time scheduled for execution of a given set of tactical actions as specified in the Incident Action Plan. Operational periods can be of various lengths, although usually not more than 24 hours.

Overhead: People assigned to supervisory positions, including incident commanders, command staff, general staff, directors, supervisors, and unit leaders.

P

Pack Test: Used to determine the aerobic capacity of fire suppression and support personnel and assign physical fitness scores. The test consists of walking a specified distance, with or without a weighted pack, in a predetermined period of time, with altitude corrections.

Paracargo: Anything dropped, or intended for dropping, from an aircraft by parachute, by other retarding devices, or by free fall.

Peak Fire Season: That period of the fire season during which fires are expected to ignite most readily, to burn with greater than average intensity, and to create damages at an unacceptable level.

Performance Measures: A quantitative or qualitative characterization of performance (Government Performance and Results Act of 1993).

Personnel Protective Equipment (PPE): All firefighting personnel must be equipped with proper equipment and clothing in order to mitigate the risk of injury from, or exposure to, hazardous conditions encountered while working. PPE includes, but is not limited to, 8-inch high-laced leather boots with lug soles, fire shelter, hard hat with chin strap, goggles, ear plugs, aramid shirts and trousers, leather gloves, and individual first aid kits.

Preparedness: Condition or degree of being ready to cope with a potential fire situation.

Prescribed Fire: Any fire ignited by management actions under certain, predetermined conditions to meet specific objectives related to hazardous fuels or habitat improvement. A written, approved prescribed fire plan must exist, and NEPA requirements must be met, prior to ignition.

Prescribed Fire Plan (Burn Plan): This document provides the prescribed fire burn boss information needed to implement an individual prescribed fire project.

Prescription: Measurable criteria that define conditions under which a prescribed fire may be ignited, guide selection of appropriate management responses, and indicate other required actions. Prescription criteria may include safety, economic, public health, environmental, geographic, administrative, social, or legal considerations.

Prevention: Activities directed at reducing the incidence of fires, including public education, law enforcement, personal contact, and reduction of fuel hazards.

Project Fire: A fire of such size or complexity that a large organization and prolonged activity is required to suppress it.

Pulaski: A combination chopping and trenching tool, which combines a single-bitted axe-blade with a narrow adze-like trenching blade fitted to a straight handle. Useful for grubbing or trenching in duff and matted roots. Well-balanced for chopping.

R

Radiant Burn: A burn received from a radiant heat source.

Radiant Heat Flux: The amount of heat flowing through a given area in a given time, usually expressed as calories/square centimeter/second.

Rappelling: Technique of landing specifically trained firefighters from hovering helicopters; involves sliding down ropes with the aid of friction-producing devices.

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

Reburn: The burning of an area that has been previously burned but that contains flammable fuel that ignites when burning conditions are more favorable; an area that has reburned.

Red Card: Fire qualification card issued to fire rated persons showing their training needs and their qualifications to fill specified fire suppression and support positions in a large fire suppression or incident organization.

Red Flag Warning: Term used by fire weather forecasters to alert forecast users to an ongoing or imminent critical fire weather pattern.

Rehabilitation: The activities necessary to repair damage or disturbance caused by wildland fires or the fire suppression activity.

Relative Humidity (Rh): The ratio of the amount of moisture in the air, to the maximum amount of moisture that air would contain if it were saturated. The ratio of the actual vapor pressure to the saturated vapor pressure.

Remote Automatic Weather Station (RAWS): An apparatus that automatically acquires, processes, and stores local weather data for later transmission to the GOES Satellite, from which the data is re-transmitted to an earth-receiving station for use in the National Fire Danger Rating System.

Resiliency: The capacity of an ecosystem to maintain or regain normal function and development following disturbance (Society of American Foresters, 1998).

Resources: (1) Personnel, equipment, services and supplies available, or potentially available, for assignment to incidents. (2) The natural resources of an area, such as timber, grass, watershed values, recreation values, and wildlife habitat.

Resource Management Plan (RMP): A document prepared by field office staff with public participation and approved by field office managers that provides general guidance and direction for land management activities at a field office. The RMP identifies the need for fire in a particular area and for a specific benefit.

Resource Order: An order placed for firefighting or support resources.

Response Time: The amount of time it takes from when a request for help is received by the emergency dispatch system until emergency personnel arrive at the scene.

Retardant: A substance or chemical agent that reduces the flammability of combustibles.

Restoration: The active or passive management of an ecosystem or habitat toward its original structure, natural complement of species, and natural functions or ecological processes (Cohesive Strategy, 2000).

Run (of a fire): The rapid advance of the head of a fire with a marked change in fire line intensity and rate of spread from that noted before and after the advance.

Running: A rapidly spreading surface fire with a well-defined head.

Rural Fire Assistance: The Department of the Interior Rural Fire Assistance program is a multi-million dollar program to enhance the fire protection capabilities of rural fire districts. The program will assist with training, equipment purchase, and prevention activities, on a cost-share basis.

S

Safety Zone: An area cleared of flammable materials used for escape in the event the line is outflanked or in case a spot fire causes fuels outside the control line to render the line unsafe. In firing operations, crews progress so as to maintain a safety zone close at hand allowing the fuels inside the control line to be consumed before going ahead. Safety zones may also be constructed as integral parts of fuel breaks; they are greatly enlarged areas, which can be used with relative safety by firefighters and their equipment in the event of a blow-up in the vicinity.

Scratch Line: An unfinished preliminary fire line hastily established or built as an emergency measure to check the spread of fire.

Severe Wildland Fire (catastrophic wildfire): Fire that burns more intensely than the natural or historical range of variability, thereby fundamentally changing the ecosystem, destroying communities and / or rare or threatened species /habitat, or causing unacceptable erosion (GAO / T-RCED-99-79) (Society of American Foresters, 1998).

Severity Funding: Funds provided to increase wildland fire suppression response capability necessitated by abnormal weather patterns, extended drought, or other events causing abnormal increase in the fire potential and/or danger.

Single Resource: An individual, a piece of equipment and its personnel complement, or a crew or team of individuals with an identified work supervisor that can be used on an incident.

Size-up: To evaluate a fire to determine a course of action for fire suppression.

Slash: Debris left after logging, pruning, thinning or brush cutting; includes logs, chips, bark, branches, stumps and broken understory trees or brush.

Sling Load: Any cargo carried beneath a helicopter and attached by a lead line and swivel.

Slop-over: A fire edge that crosses a control line or natural barrier intended to contain the fire.

Slurry: A mixture typically of water, red clay and fertilizer dropped from air tankers for fire suppression.

Smokejumper: A firefighter who travels to fires by aircraft and parachute.

Smoke Management: Application of fire intensities and meteorological processes to minimize degradation of air quality during prescribed fires.

Smoldering Fire: A fire burning without flame and barely spreading.

Snag: A standing dead tree or part of a dead tree from which at least the smaller branches have fallen.

Spark Arrester: A device installed in a chimney, flue, or exhaust pipe to stop the emission of sparks and burning fragments.

Spot Fire: A fire ignited outside the perimeter of the main fire by flying sparks or embers.

Spot Weather Forecast: A special forecast issued to fit the time, topography, and weather of each specific fire. These forecasts are issued upon request of the user agency and are more detailed, timely, and specific than zone forecasts.

Spotter: In smokejumping, the person responsible for selecting drop targets and supervising all aspects of dropping smokejumpers.

Spotting: Behavior of a fire producing sparks or embers that are carried by the wind and start new fires beyond the zone of direct ignition by the main fire.

Staging Area: Locations set up at an incident where resources can be placed while awaiting a tactical assignment on a three-minute available basis. Staging areas are managed by the operations section.

Strategy: The science and art of command as applied to the overall planning and conduct of an incident.

Strike Team: Specified combinations of the same kind and type of resources, with common communications, and a leader.

Strike Team Leader: Person responsible to a division/group supervisor for performing tactical assignments given to the strike team.

Structure Fire: Fire originating in and burning any part or all of any building, shelter, or other structure.

Suppressant: An agent, such as water or foam, used to extinguish the flaming and glowing phases of combustion when direction applied to burning fuels.

Suppression: All the work of extinguishing or containing a fire, beginning with its discovery.

Surface Fuels: Loose surface litter on the soil surface, normally consisting of fallen leaves or needles, twigs, bark, cones, and small branches that have not yet decayed enough to lose their identity; also grasses, forbs, low and medium shrubs, tree seedlings, heavier branchwood, downed logs, and stumps interspersed with or partially replacing the litter.

Survivable Space: The distance between vegetational fuels and a structure necessary to protect the building from radiant heat and its ignition mechanics. The separation distance was formerly called "Defensible Space" due to the implication that the fire department could intercede. The term "Survivable Space" eliminates the dependence on manual suppression and implies that the distance alone provides the protection. (see Defensible Space)

Swamper: (1) A worker who assists fallers and/or sawyers by clearing away brush, limbs and small trees. Carries fuel, oil and tools and watches for dangerous situations. (2) A worker on a dozer crew who pulls winch line, helps maintain equipment, etc., to speed suppression work on a fire.

T

Tactics: Deploying and directing resources on an incident to accomplish the objectives designated by strategy.

Tanker: Either a tank truck used to deliver water from a water source to the scene of a fire, or a fixed wing aircraft used for fire suppression by dropping slurry on the flank or head of a fire.

Temporary Flight Restrictions (TFR): A restriction requested by an agency and put into effect by the Federal Aviation Administration in the vicinity of an incident that restricts the operation of nonessential aircraft in the airspace around that incident.

Terra Torch: Device for throwing a stream of flaming liquid, used to facilitate rapid ignition during burn out operations on a wildland fire or during a prescribed fire operation.

Test Fire: A small fire ignited within the planned burn unit to determine the characteristic of the prescribed fire, such as fire behavior, detection performance and control measures.

Timelag: Time needed under specified conditions for a fuel particle to lose about 63 percent of the difference between its initial moisture content and its equilibrium moisture content. If conditions remain unchanged, a fuel will reach 95 percent of its equilibrium moisture content after four timelag periods.

Torching: The ignition and flare-up of a tree or small group of trees, usually from bottom to top.

Two-way Radio: Radio equipment with transmitters in mobile units on the same frequency as the base station, permitting conversation in two directions using the same frequency in turn.

Type: The capability of a firefighting resource in comparison to another type. Type 1 usually means a greater capability due to power, size, or capacity.

U

Uncontrolled Fire: Any fire that threatens to destroy life, property, or natural resources, and [definition completed from National Wildfire Coordinating Group, Glossary of Wildland Fire Terminology www.nwcg.gov/pms/pubs/glossary/ (a) is not burning within the confines of firebreaks, or (b) is burning with such intensity that it could not be readily extinguished with ordinary tools commonly available. (see Wildfire)

Underburn: A fire that consumes surface fuels but not trees or shrubs. (see Surface Fuels)

Unplanned and Unwanted Wildland Fires: An unplanned and unwanted fire is one burning outside the parameters as defined in land use plans and fire management plans for that location (including areas where the fire can be expected to spread) under current and expected conditions. Unplanned and unwanted fires include fires burning in areas where fire is specifically excluded; fires that exhibit burning characteristics (intensity, frequency, and seasonality) that are outside prescribed ranges, specifically including fires expected to produce severe fire effects; unauthorized human caused fires (arson, escaped camp fires, equipment fires, etc.); and fires that occur during high fire dangers, or resource shortage, where the resources needed to manage the fire are needed for more critical fire management needs. Unplanned is not the same as unscheduled. The time of a lightning fire ignition is not known; however, a lightning-caused fire could still be used to meet fuels and ecosystem management objectives if that type of fire is

expected to burn within the parameters of an approved plan; the fire is burning within the parameters for the area; is not causing, or has the potential to cause, unacceptable effects; and funding and resources to manage the fire are available.

V

Vectors: Directions of fire spread as related to rate of spread calculations (in degrees from upslope).

Volunteer Fire Department (VFD): A fire department of which some or all members are unpaid.

W

Water Tender: A ground vehicle capable of transporting specified quantities of water.

Weather Information and Management System (WIMS): An interactive computer system designed to accommodate the weather information needs of all federal and state natural resource management agencies. Provides timely access to weather forecasts, current and historical weather data, the National Fire Danger Rating System (NFDRS), and the National Interagency Fire Management Integrated Database (NIFMID).

Wet Line: A line of water, or water and chemical retardant, sprayed along the ground, that serves as a temporary control line from which to ignite or stop a low-intensity fire.

Wildfire: [definition added from National Wildfire Coordinating Group, Glossary of Wildland Fire Terminology www.nwccg.gov/pms/pubs/glossary/] An unplanned, unwanted wildland fire including unauthorized human-caused fires, escaped wildland fire use events, escaped prescribed fire projects, and all other wildland fire where the objective is to put the fire out. (see Uncontrolled Fire; Wildland Fire)

Wildland: [definition added from Wikipedia.org] wildland is an areas of land where plants and animals exist free of human interference. Ecologists assert that wildlands promote biodiversity, that they preserve historic genetic traits and that they provide habitat for wild flora and fauna.

Wildland Fire: Any nonstructure fire, other than prescribed fire, that occurs in the wildland.

Wildland Fire Implementation Plan (WFIP): A progressively developed assessment and operational management plan that documents the analysis and selection of strategies and describes the appropriate management response for a wildland fire being managed for resource benefits.

Wildland Fire Situation Analysis (WFSA): A decision-making process that evaluates alternative suppression strategies against selected environmental, social, political, and economic criteria. Provides a record of decisions.

Wildland Fire Use: The management of naturally ignited wildland fires to accomplish specific, planned resource management objectives in predefined geographic areas outlined in Fire Management Plans. Wildland fire use is not to be confused with "fire use," which includes prescribed fire.

Wildland Urban Interface (WUI): The line, area or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels (Glossary of Wildland Fire Terminology, 1996).

Wind Vectors: Wind directions used to calculate fire behavior.

APPENDIX A. VEGETATION ASSOCIATION DESCRIPTIONS

The following is general information about the SWReGAP landcover descriptions used for the vegetation analysis portion of this CWPP. The information contained in this appendix is taken from the Southwest Regional GAP Analysis Project—Land Cover Data Legend Descriptions (USGS 2005). The following includes the vegetation associations composing the WUI of the ASCWPP. For additional information, see the Southwest Regional Landcover Data Web site (<http://ftp.nr.usu.edu/swgap/landcover.html>).

DESERT SCRUB ASSOCIATIONS

S069 Sonoran-Mohave Creosote-White Bursage Desert Scrub

Concept Summary:

This ecological system forms the vegetation matrix in broad valleys, lower bajadas, plains and low hills in the Mojave and lower Sonoran deserts. This desert scrub is characterized by a sparse to moderately dense layer (2-50% cover) of xeromorphic microphyllous and broad-leaved shrubs. *Larrea tridentata* and *Ambrosia umosa* are typically dominants, but many different shrubs, dwarf-shrubs, and cacti may codominate or form typically sparse understories. Associated species may include *Atriplex canescens*, *Atriplex hymenelytra*, *Encelia farinosa*, *Ephedra nevadensis*, *Fouquieria splendens*, *Lycium andersonii*, and *Opuntia basilaris*. The herbaceous layer is typically sparse, but may be seasonally abundant with ephemerals. Herbaceous species such as *Chamaesyce* spp., *Eriogonum inflatum*, *Dasyochloa pulchella*, *Aristida* spp., *Cryptantha* spp., *Nama* spp., and *Phacelia* spp. are common.

S129 Sonoran Mid-elevation Desert Scrub

Concept Summary:

This transitional desert scrub system occurs along the northern edge of the Sonoran Desert in an elevational band along the lower slopes of the Mogollon Rim/Central Highlands region between 750-1300 m. Stands occur in the Bradshaw, Hualapai, and Superstition mountains among other desert ranges and are found above Sonoran Paloverde-Mixed Cacti Desert Scrub (CES302.761) and below Mogollon Chaparral (CES302.741). Sites range from a narrow strip on steep slopes to very broad areas such as the Verde Valley. Climate is too dry for chaparral species to be abundant, and freezing temperatures during winter are too frequent and prolonged for many of the frost-sensitive species that are characteristic of the Paloverde Mixed-Cacti Desert Scrub such as *Carnegiagigantea*, *Parkinsonia microphylla*, *Prosopis* spp., *Olneya tesota*, *Ferocactus* sp. and *Opuntia bigelovii*. Substrates are generally rocky soils derived from parent materials such as limestone, granitic rocks or rhyolite. The vegetation is typically composed of an open shrub layer of *Larrea tridentata*, *Ericameria linearifolia*, or *Eriogonum fasciculatum* with taller shrub such as *Fourqueria splendens*, *Canotia holacantha* (limestone or granite) or *Simmondsia chinensis* (rhyolite).. The herbaceous layer is generally sparse.

S063 Sonoran Paloverde-Mixed Cacti Desert Scrub

Concept Summary:

This ecological system occurs on hillsides, mesas and upper bajadas in southern Arizona and extreme southeastern California. The vegetation is characterized by a diagnostic sparse, emergent tree layer of *Carnegia gigantea* (3-16 m tall) and/or a sparse to moderately dense canopy codominated by xeromorphic deciduous and evergreen tall shrubs *Parkinsonia microphylla* and *Larrea tridentata* with *Prosopis* sp., *Olneya tesota*, and *Fouquieria splendens* less prominent. Other common shrubs and dwarf-shrubs include *Acacia greggii*, *Ambrosia deltoidea*, *Ambrosia dumosa* (in drier sites), *Calliandra eriophylla*, *Jatropha cardiophylla*, *Krameria erecta*, *Lycium* spp., *Menodora scabra*, *Simmondsia chinensis*, and many cacti including *Ferocactus* spp., *Echinocereus* spp., and *Opuntia* spp. (both cholla and prickly pear). The sparse herbaceous layer is composed of perennial grasses and forbs with annuals seasonally present and occasionally abundant. On slopes, plants are often distributed in patches around rock outcrops where suitable habitat is present.

SHRUBLANDS VEGETATION ASSOCIATIONS

S058 Apacherian-Chihuahuan Mesquite Upland Scrub

Concept Summary:

This ecological system occurs as upland shrublands that are concentrated in the extensive grassland-shrubland transition in foothills and piedmont in the Chihuahuan Desert. It extends into the Sky Island region to the west and the Edwards Plateau to the east. Substrates are typically derived from alluvium, often gravelly without a well-developed argillic or calcic soil horizon that would limit infiltration and storage of winter precipitation in deeper soil layers. *Prosopis* spp. and other deep-rooted shrubs exploit this deep soil moisture that is unavailable to grasses and cacti. Vegetation is typically dominated by *Prosopis glandulosa* or *Prosopis velutina* and succulents. Other desert scrub that may codominate or dominate includes *Acacia neovernicosa*, *Acacia constricta*, *Juniperus monosperma*, or *Juniperus coahuilensis*. Grass cover is typically low. During the last century, the area occupied by this system has increased through conversion of desert grasslands as a result of drought, overgrazing by livestock, and/or decreases in fire frequency. It is similar to Chihuahuan Mixed Desert and Thorn Scrub (CES302.734) but is generally found at higher elevations where *Larrea tridentata* and other desert scrub are not codominant. It is also similar to Chihuahuan Stabilized Coppice Dune and Sand Flat Scrub (CES302.737) but does not occur on eolian-deposited substrates.

S051 Madrean Encinal

Concept Summary:

Madrean Encinal occurs on foothills, canyons, bajadas and plateaus in the Sierra Madre Occidentale and Sierra Madre Orientale in Mexico, extending north into Trans-Pecos Texas, southern New Mexico and sub-Mogollon Arizona. These woodlands are dominated by Madrean evergreen oaks along a low-slope transition below Madrean Pine-Oak Forest and Woodland (CES305.796) and Madrean Pinyon-Juniper

Woodland (CES305.797). Lower elevation stands are typically open woodlands or savannas where they transition into desert grasslands, chaparral or in some cases desert scrub.

Common evergreen oak species include *Quercus arizonica*, *Quercus emoryi*, *Quercus intricata*, *Quercus grisea*, *Quercus oblongifolia*, *Quercus toumeyi*, and in Mexico *Quercus chihuahuensis* and *Quercus albocincta*. Madrean pine, Arizona cypress, pinyon and juniper trees may be present, but do not codominate. Chaparral species such as *Arctostaphylos pungens*, *Cercocarpus montanus*, *Purshia* spp., *Garrya wrightii*, *Quercus turbinella*, *Frangula betulifolia* (= *Rhamnus betulifolia*), or *Rhus* spp. may be present but do not dominate. The graminoid layer is usually prominent between trees in grassland or steppe that is dominated by warm-season grasses such as *Aristida* spp., *Bouteloua gracilis*, *Bouteloua curtipendula*, *Bouteloua rothrockii*, *Digitaria californica*, *Eragrostis intermedia*, *Hilaria belangeri*, *Leptochloa dubia*, *Muhlenbergia* spp., *Pleuraphis jamesii*, or *Schizachyrium cirratum*, species typical of Chihuahuan Piedmont Semi-Desert Grassland (CES302.735). This system includes seral stands dominated by shrubby Madrean oaks typically with a strong graminoid layer. In transition areas with drier chaparral systems, stands of chaparral are not dominated by Madrean oaks; however, Madrean Encinal may extend down along drainages.

S098 North American Warm Desert Riparian Mesquite Bosque

Concept Summary:

This ecological system consists of low-elevation (<1100 m) riparian corridors along intermittent streams in valleys of southern Arizona and New Mexico, and adjacent Mexico. Dominant trees include *Prosopis glandulosa* and *Prosopis velutina*. Shrub dominants include *Baccharis salicifolia*, *Pluchea sericea*, and *Salix exigua*. Vegetation, especially the mesquites, tap groundwater below the streambed when surface flows stop. Vegetation is dependent upon annual rise in the water table for growth and reproduction.

S020 North American Warm Desert Wash

Concept Summary:

This ecological system is restricted to intermittently flooded washes or arroyos that dissect bajadas, mesas, plains and basin floors throughout the warm deserts of North America. Although often dry, the intermittent fluvial processes define this system, which are often associated with rapid sheet and gully flow. This system occurs as linear or braided strips within desert scrub- or desert grassland-dominated landscapes. The vegetation of desert washes is quite variable ranging from sparse and patchy to moderately dense and typically occurs along the banks, but may occur within the channel. The woody layer is typically intermittent to open and may be dominated by shrubs and small trees such as *Acacia greggii*, *Brickellia laciniata*, *Baccharis sarothroides*, *Chilopsis linearis*, *Fallugia paradoxa*, *Hymenoclea salsola*, *Hymenoclea monogyra*, *Juglans microcarpa*, *Prosopis* spp., *Psoralea argemone*, *Prunus fasciculata*, *Rhus microphylla*, *Salazaria mexicana*, or *Sarcobatus vermiculatus*.

PINYON JUNIPER ASSOCIATIONS

S112 Madrean Pinyon-Juniper Woodland

Concept Summary:

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

S057 Mogollon Chaparral

Concept Summary:

This ecological system occurs across central Arizona (Mogollon Rim), western New Mexico and southwestern Utah and southeast Nevada. It often dominates along the mid-elevation transition from the Mojave, Sonoran, and northern Chihuahuan deserts into mountains (1000-2200 m). It occurs on foothills, mountain slopes and canyons in dryer habitats below the encinal and *Pinus ponderosa* woodlands. Stands are often associated with more xeric and coarse-textured substrates such as limestone, basalt or alluvium, especially in transition areas with more mesic woodlands. The moderate to dense shrub canopy includes species such as *Quercus turbinella*, *Quercus toumeyii*, *Cercocarpus montanus*, *Canotia holacantha*, *Ceanothus greggii*, *Forestiera pubescens* (= *Forestiera neomexicana*), *Garrya wrightii*, *Juniperus deppeana*, *Purshia stansburiana*, *Rhus ovata*, *Rhus trilobata*, and *Arctostaphylos pungens* and *Arctostaphylos pringlei* at higher elevations. Most chaparral species are fire-adapted, resprouting vigorously after burning or producing fire-resistant seeds. Stands occurring within montane woodlands are seral and a result of recent fires.

DECIDUOUS SOUTHWEST RIPARIAN ASSOCIATIONS

S094 North American Warm Desert Lower Montane Riparian Woodland and Shrubland

Concept Summary:

This ecological system occurs in mountain canyons and valleys of southern Arizona, New Mexico, and adjacent Mexico and consists of mid- to low-elevation (1100-1800 m) riparian corridors along perennial and seasonally intermittent streams. The vegetation is a mix of riparian woodlands and shrublands. Dominant trees include *Populus angustifolia*, *Populus deltoides* ssp. *wislizeni*, *Populus fremontii*, *Platanus wrightii*, *Juglans major*, *Fraxinus velutina*, and *Sapindus saponaria*. Shrub dominants include *Salix exigua*, *Prunus* spp., *Alnus oblongifolia*, and *Baccharis salicifolia*. Vegetation is dependent upon annual or periodic flooding and associated sediment scour and/or annual rise in the water table for growth and reproduction.

ADDITIONAL SPARSELY VEGETATED AND NONVEGETATED ASSOCIATIONS

S016 North American Warm Desert Bedrock Cliff and Outcrop

Concept Summary:

This ecological system is found from subalpine to foothill elevations and includes barren and sparsely vegetated landscapes (generally <10% plant cover) of steep cliff faces, narrow canyons, and smaller rock outcrops of various igneous, sedimentary, and metamorphic bedrock types. Also included are unstable scree and talus slopes that typically occur below cliff faces. Species present are diverse and may include *Bursera microphylla*, *Fouquieria splendens*, *Nolina bigelovii*, *Opuntia bigelovii*, and other desert species, especially succulents. Lichens are predominant lifeforms in some areas. May include a variety of desert shrublands less than 2 ha (5 acres) in size from adjacent areas.

N21—Developed, Open Space – Low intensity

Concept Summary:

Description: Open Space: Includes areas with a mixture of some construction materials, but mostly vegetation in the form of lawn grasses. Impervious surfaces account for less than 20 percent of total cover. These areas most commonly include large-lot single-family housing units, parks, golf courses, and vegetation planted in developed settings for recreation, erosion control, or aesthetic purposes. Developed, Low intensity: Includes areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 20-49 percent of total cover. These areas most commonly include single-family housing units.

N22—Developed, Medium – High Intensity

Source: NLCD draft legend, 25 July 2003

Description: Developed, Medium Intensity: Includes areas with a mixture of constructed materials and vegetation. Impervious surface accounts for 50-79 percent of the total cover. These areas most commonly include single-family housing units. Developed, High Intensity: Includes highly developed areas where people reside or work in high numbers. Examples include apartment complexes, row houses and commercial/industrial. Impervious surfaces account for 80 to 100 percent of the total cover.

APPENDIX B. NATIONAL FIRE DANGER RATING SYSTEM FUEL MODEL SELECTION KEY

I. Mosses, lichens, and low shrubs predominate ground fuels

A. Overstory of conifers occupies more than one-third of the site

Model Q

B. No overstory or it occupies less than one-third of the site

Model S

II. Marsh grasses and/or reeds predominate

Model N

III. Grasses and/or forbs predominate

A. Open overstory of conifer and/or hardwoods

Model C

B. No overstory

1. Woody shrubs occupy more than one-third, but less than two-thirds of the site

Model T

2. Woody shrubs occupy less than two-thirds of the site

a. The grasses and forbs are primarily annuals

Model A

b. Grasses and forbs are primarily perennials

Model L

IV. Brush, shrubs, tree reproduction or dwarf tree species predominate

A. Average height of woody plants is 6 feet or greater

1. Woody plants occupy two-thirds or more of the site

a. One-fourth or more of the woody foliage is dead

1) Mixed California chaparral

Model B

2) Other types of brush

Model F

b. Up to one-fourth of the woody foliage is dead

Model Q

- c. Little dead foliage

Model O

- 2. Woody plants occupy less than two-thirds of the site

Model F

- B. Average height of woody plants is less than 6 feet

- 1. Woody plants occupy two-thirds or more of the site

- a. Western United States

Model F

- b. Eastern United States

Model O

- 2. Woody plants occupy less than two-thirds but greater than one-third of the site

- a. Western United States

Model T

- b. Eastern United States

Model D

- 3. Woody plants occupy less than one-third of the site

- a. Grasses and forbs are primarily annuals

Model A

- b. Grasses and forbs are primarily perennials

Model L

V. Trees predominate

- A. Deciduous broadleaf species predominate

- 1. Area has been thinned or partially cut, leaving slash as the major fuel component

Model K

- 2. Area has not been thinned or partially cut

- a. Overstory is dormant; leaves have fallen

Model E

- b. Overstory is in full leaf

Model R

- B. Conifer species predominate

1. Lichens, mosses, and low shrubs dominate as understory fuels

Model Q

2. Grasses and forbs are the primary ground fuel

Model C

3. Woody shrubs and/or reproduction dominate as understory fuels

- a. Understory burns readily

- 1) Western United States

Model T

- 2) Eastern United States

- a) Understory is more than 6 feet tall

Model O

- b) Understory is less than 6 feet tall

Model D

- b. Understory seldom burns

Model H

4. Duff and litter, branch wood, and tree boles are the primary ground fuel

- a. Overstory is over mature and decadent; heavy accumulation of dead debris

Model G

- b. Overstory is not decadent; Only a nominal accumulation of debris

- 1) Needles are 2 inches or more in length (most pines)

- a) Eastern United States

Model P

- b) Western United States

Model U

- 2) Needles are less than 2 inches long

Model H

VI. Slash is the predominate fuel type

- A. Foliage is still attached; little settling

1. Loading is 25 tons/acre or greater

Model I

2. Loading is less than 25 tons/acre but greater than 15 tons/acre

Model J

3. Loading is less than 15 tons/acre

Model K

B. Settling is evident; foliage is falling off; grasses, forbs and shrubs are invading

1. Loading is 25 tons/acre or greater

Model J

2. Loading is less than 25 tons/acre

Model K

APPENDIX C. EDUCATIONAL RESOURCES

Firewise Information and Web Sites

Firewise Communities/USA national recognition program. <http://www.Firewise.org/USA>

The FireFree Program, sponsored by SAFECO Corporation, Wildfire Defense Get in the Zone, Reduce Your Risk of Wildfire pamphlet. <http://www.Safeco.com/Safeco/about/giving/firefree.org>

Living with Fire—A Homeowners' Guide. A 12-page tabloid, which is produced regionally by US Department of Interior agencies (Bureau of Indian Affairs, Bureau of Land Management, Fish and Wildlife Service, National Park Service), the USDA Forest Service, and state land departments. This is one of the most detailed pieces of Firewise information for landowners to reference when creating survivable space around their homes. <http://www.or.blm.gov/nwfire/docs/Livingwithfire.pdf>

Fire Information Clearinghouse Web site from the San Juan Public Lands Center.
<http://www.SouthwestColoradoFires.org>

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>

<http://www.firegrantsupport.com> Department of Homeland Security website for granting opportunities for Staffing for Adequate Fire and Emergency Services (SAFER) grants and provides other useful information.
<http://www.esri.com/grants> ESRI Grant Assistance program for GIS users

US Fire Administration—Assistance to Firefighters Grant Program. <http://www.usfa.fema.gov/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>

Arizona Wildfire and the Environment Series

Firewise publications from the University of Arizona: 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>

Other

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

National Fire Plan. http://www.fireplan.gov/community_assist.crm

National Fire Protection Association (NFPA) 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. Publications to help assist you with wildfire prevention. Colorado State Forest Service. <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 site. <http://www.nifc.nps.gov/fire>

PBS NOVA—"Fire Wars." <http://www.pbs.org/wgbh/nova/fire>

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

Pamphlets

Saving Homes from Wildfires: Regulating the Home Ignition Zone, by the American Planning Association (APA).

This May 2001 issue of the APA'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 (CSFS) and the Federal Emergency Management Agency (FEMA). This booklet is 38 pages of detailed home construction ideas to make a home Firewise. Various other publications are available from the CSFS on wildland urban interface issues.

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

Stephen Bridge, Road Fire Case Study, 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 USDI 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.

Other Publications

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

Wildfire Strikes Home! It Could Happen to You, How to Protect Your Home! / Homeowners Handbook, from the USDI Bureau of Land Management, the USDA Forest Service and state foresters (publication nos. NFES 92075 and NFES 92074).

APPENDIX D. INFORMATION DATA SHEET AND CONTACTS

D.1. CWPP Base Information Data Source

Name	Type	Source	Contact/Web address
Wildland-Urban Interface (WUI)	Shapefile	Logan Simpson Design Inc.	Richard Remington (480) 967-1343 rremington@lsdaz.com
Vegetation Zones	Raster	Southwest Regional Gap Analysis Project (2005)	http://earth.gis.usu.edu/swgap/
Fire Starts and Boundaries	Shapefile	State of Arizona	Glen Buettner, State of Arizona Forestry Division (602) 771-1400 www.azstatefire.org
Fire Starts	Shapefile	Coronado National Forest	Kristy Lund, Interagency Fire Management Officer (520) 733-5130 kristy_lund@nps.gov
Land Ownership	Shapefile	State of Arizona	http://www.land.state.az.us/alris/index.html
Catalina Regional Park Boundary	Shapefile	Pima County	Don Carter, Pima County Parks and Recreation (520) 887-6023 Don.Carter@pima.gov
Critical Habitat	Shapefile	US Fish and Wildlife Service	http://criticalhabitat.fws.gov/
Desert Tortoise Habitat	Shapefile	BLM	http://www.blm.gov/az/st/en/prog/maps/gis_files.html

All final analysis GIS data, including flammability analysis, fuel hazards analysis, ignition history and density, community values analysis, cumulative risk analysis, treatment management units, and areas of elevated concern, are located at the Pima County Office of Emergency Management and Logan Simpson Design Inc.

D.2. Catalina CWPP Contact personnel

Chief, Golder Ranch Fire Department
3885 East Golder Ranch Drive
Tucson, Arizona 85739
(520) 825-9001

Pima County Office of Emergency Management and Homeland Security
Program Coordinator
150 West Congress, Room 237
Tucson, Arizona 85701
(520) 740-3900

Richard Remington,
Senior Project Manager
Logan Simpson Design Inc
51 West Third Street, Suite 450
Tempe, Arizona 85281
(480) 967-1343