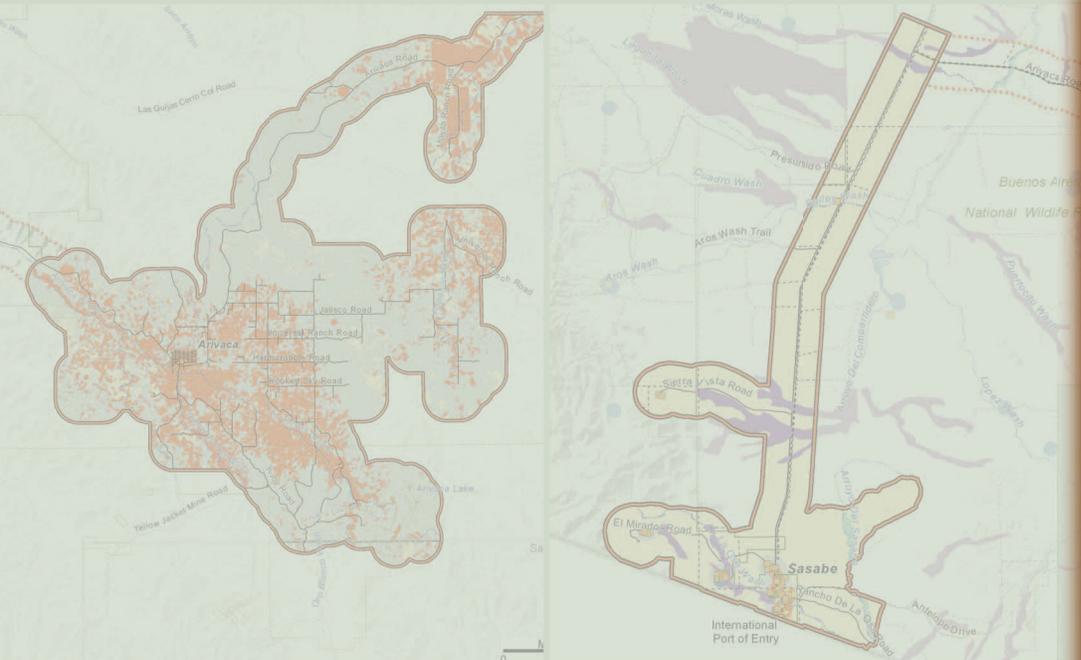


Arivaca Sasabe Community Wildfire Protection Plan

Arivaca ■ Sasabe



JANUARY 2007

- Community of Arivaca
- Community of Sasabe
- Arivaca Volunteer Fire Department
- Pima County, Arizona
- Arizona State Land Department
- United States Fish and Wildlife Services, Buenos Aires National Wildlife Refuge
- United States Forest Service, Coronado National Forest, Nogales Ranger District
- Bureau of Land Management, Tucson Field Office



Arivaca Sasabe Community Wildfire Protection Plan

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ACRONYMS AND ABBREVIATIONS

| | |
|---------|---|
| AFD | Arivaca Volunteer Fire Department |
| ASCWAC | Arivaca Sasabe Community Wildfire Action Coalition |
| ASCWPP | Arivaca Sasabe Community Wildfire Protection Plan |
| ASLD | Arizona State Land Department |
| AVFMP | Altar Valley Fire Management Plan Public Review Draft |
| AVCA | Altar Valley Conservation Alliance |
| AZGFD | Arizona Game and Fish Department |
| BLM | Bureau of Land Management |
| BANWR | Buenos Aires National Wildlife Refuge |
| CCP | Buenos Aires National Wildlife Refuge Comprehensive Conservation Plan |
| CNF | Coronado National Forest |
| CWPP | Community Wildfire Protection Plan |
| dbh | Diameter at breast height |
| drc | Diameter at root collar |
| EMAOP | Emergency Mutual Assistance Operating Plan |
| FONSI | Finding of No Significant Impact |
| FS | Forest Service |
| FWS | United States Fish and Wildlife Service |
| GIS | Geographic information system |
| HCP | Habitat Conservation Plan |
| HFRA | Healthy Forests Restoration Act of 2003 |
| IGA | Intergovernmental Agreement |
| NFP | National Fire Plan |
| NRCS | Natural Resources Conservation Service |
| PCOEM | Pima County Office of Emergency Management |
| PNVG | Potential Natural Vegetation Group |
| RMP | Resource management Plan |
| Rx | Prescribed Fire |
| SR | State Route |
| SWReGAP | Southwest Regional Gap Analysis Project |
| TFO | Tucson Field Office |
| TNC | The Nature Conservancy |
| USDA | United States Department of Agriculture |
| USDI | United States Department of Interior |
| WFU | Wildland Fire Use |
| WUI | Wildland-urban interface |

I. INTRODUCTION

The Arivaca Sasabe Community Wildfire Protection Plan (ASCWPP) was developed for the at-risk communities and remote at-risk private lands surrounding the communities of Arivaca and Sasabe in Pima County, Arizona (see Figure 1.1). The ASCWPP was developed in response to the Healthy Forests Restoration Act of 2003 (HFRA). This recent 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 nonfederal 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 HFRA helps States, rural communities, and landowners restore healthy riparian and rangeland conditions on Federal, State, and private lands.

The requirements of a CWPP under 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 wildland urban interface (WUI) of communities identified in the plan. The cooperating Federal agencies for the ASCWPP are the Coronado National Forest (CNF); the United States Fish and Wildlife Service (FWS), Buenos Aires National Wildlife Refuge (BANWR) and the Bureau of Land Management (BLM), Tucson Field Office (TFO);
5. Community-driven effort to define the WUI around at-risk communities as well as the identification of what length of ground is needed to protect the communities.
6. Prioritization of risks in the community.
7. Identification of funding priorities and prioritization of wildland fire mitigation recommendations for the communities.

The ASCWPP was developed to assist local governments, the fire department, and residents identify lands at risk from severe wildfire threat. It also allows those entities to identify strategies for reducing fuels on wildlands while improving riparian and rangeland health, supporting local industry and economies, and improving public and firefighter safety and response capabilities.

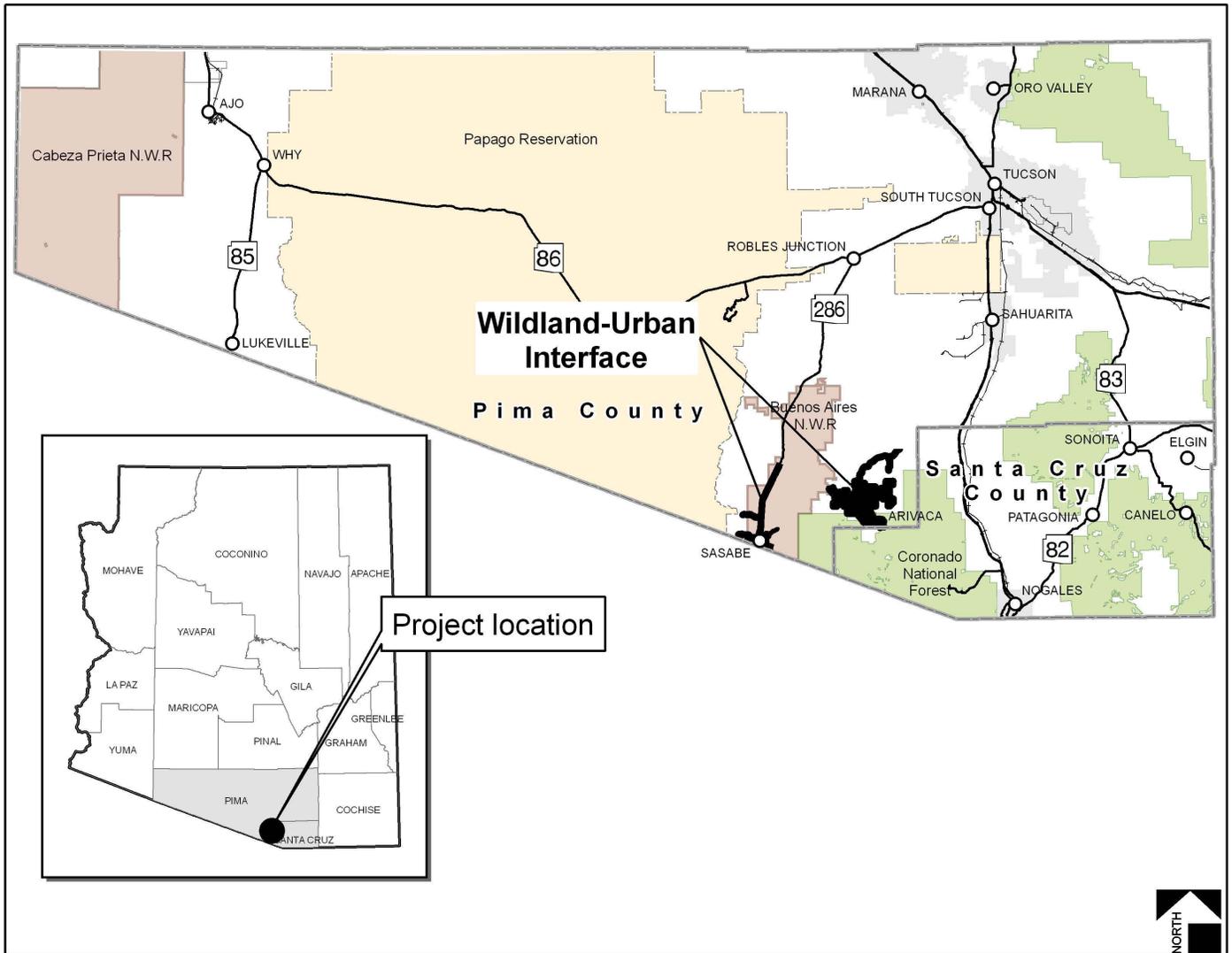


Figure 1.1. Analysis area

Guidance for development of the ASCWPP is based on *Preparing a Community Wildfire Protection Plan: A Handbook for Wildland-Urban Interface Communities* (Communities Committee et al. 2004) and was collaboratively developed in consultation with BLM TFO using *The Healthy Forests Initiative and Healthy Forests Restoration Act: Interim Field Guide* (USDA and USDI 2004) and in consultation with the United FWS using *BANWR Fire Management Plan* (2005).

A. Background

The Arivaca Sasabe Community Wildfire Action Coalition (ASCWAC) was formed to develop the ASCWPP at a local level with representatives from local, regional, State, and Federal agencies. The ASCWAC is also composed of representatives from the communities of Arivaca and Sasabe; the Pima County Office of Emergency Management (PCOEM); the Arivaca Volunteer Fire Department (AFD); CNF; the Arizona State Land Department (ASLD) Division of Forestry, Tucson District; BLM TFO; US Customs and US Border Patrol; Pima County Parks; the FWS BANWR; the Arivaca Clinic; and the Arivaca Division of Human

Resources; as well as local ranch owners and other interested individuals from throughout the Arivaca Sasabe area. The ASCWAC has been the core of the public involvement process for this CWPP and meets all collaborative guidance criteria established by the Wildland Fire Leadership Council (Wildland Fire Leadership Council MOU 2002)

ASCWAC reviewed the *Altar Valley Fire Management Plan Public Review Draft* (AVFMP), (Natural Resource Conservation Service [NRCS] 2006) for consistency in wildland fire planning and riparian and rangeland restoration. The AVFMP is a programmatic plan that encompasses the entire Altar Valley planning area and addresses three types of fire management: (1) wildfire prevention and suppression, (2) prescribed fire (Rx) in which fire is deliberately ignited and managed, and (3) on federally owned land only, wildland fire use (WFU) in which naturally started fires (i.e., lightning) are allowed to burn in a managed fashion or with a limited suppression response to accomplish specific prestated resource management objectives. The plan also improves public and firefighter safety from wildland fire by monitoring wildland fuel mitigation projects and by creating adaptive fire suppression response strategies that include managing natural fire starts for resource benefit on federally administered lands only and allowing for change in suppression response requirements on federally administered lands only. The area surrounding the communities of Arivaca and Sasabe are described as “full suppression zones” in AVFMP, in which it is recommended that these communities develop a CWPP. Therefore, the ASCWPP has been designed by ASCWAC for use in conjunction with the existing AVFMP Public Review Draft.

The majority of wildfire starts around the communities of Arivaca and Sasabe have occurred within the riparian corridor of Arivaca Creek within and adjacent to the community of Arivaca. Wildland fire also occurs in the vicinity of Sasabe within the upland vegetative types primarily within the vicinity of Altar Wash and State Route (SR) 286. 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. 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 the Arivaca-Sasabe communities. As a result, AFD 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.

The ASCWAC developed this CWPP to increase preparedness, reduce hazardous wildland fuels, 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, and by reducing structural ignitability.

During initial analysis for the proposed wildland fuel mitigation recommendations, as well as to develop the overall plan, ASCWAC also 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, No. 3 (USDA and USDI 2001a)
- *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)
- *A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment: 10-Year Comprehensive Strategy Implementation Plan* (USDA and USDI 2002)
- *Altar Valley Fire Management Plan Public Review Draft* (Natural Resource Conservation Service 2006)
- *Buenos Aires National Wildlife Refuge Fire Management Plan for the 2005–2008 Burn Season* (USDI Fish and Wildlife Service 2005)
- *Pima County Office of Emergency Operations Plan* (Pima County 2005a)
- *Pima County Multi Jurisdictional Hazard Management Plan Draft* (Pima County 2005b)
- *Wildland Fire Amendment to the Coronado National Forest Land and Resource Management Plan* (USDA Forest Service 2005b)

ASCWAC also reviewed Section 101.16.B.iii of HFRA to determine the area required adjacent to an evacuation route for hazardous fuel reduction measures to provide safer evacuation from an at-risk community. Using the information gathered from these supporting documents, the Arivaca Fire Chief, ASLD, and BANWR agreed that the communities of Arivaca and Sasabe, as well as the outlying unincorporated areas within the WUI, qualify as intermix communities (see USDA and USDI 2001a) at risk from wildland fire. The ASCWAC, therefore, will petition the Arizona State Forester to maintain the communities of Arivaca Sasabe and the outlying areas of the WUI within the Arizona Communities At Risk Matrix (Arizona State Forester 2005) when next updated.

Figure 1.2 summarizes the process that ASCWAC followed to produce the ASCWPP. 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 ASCWPP and serve as a guide for the rest of this document.

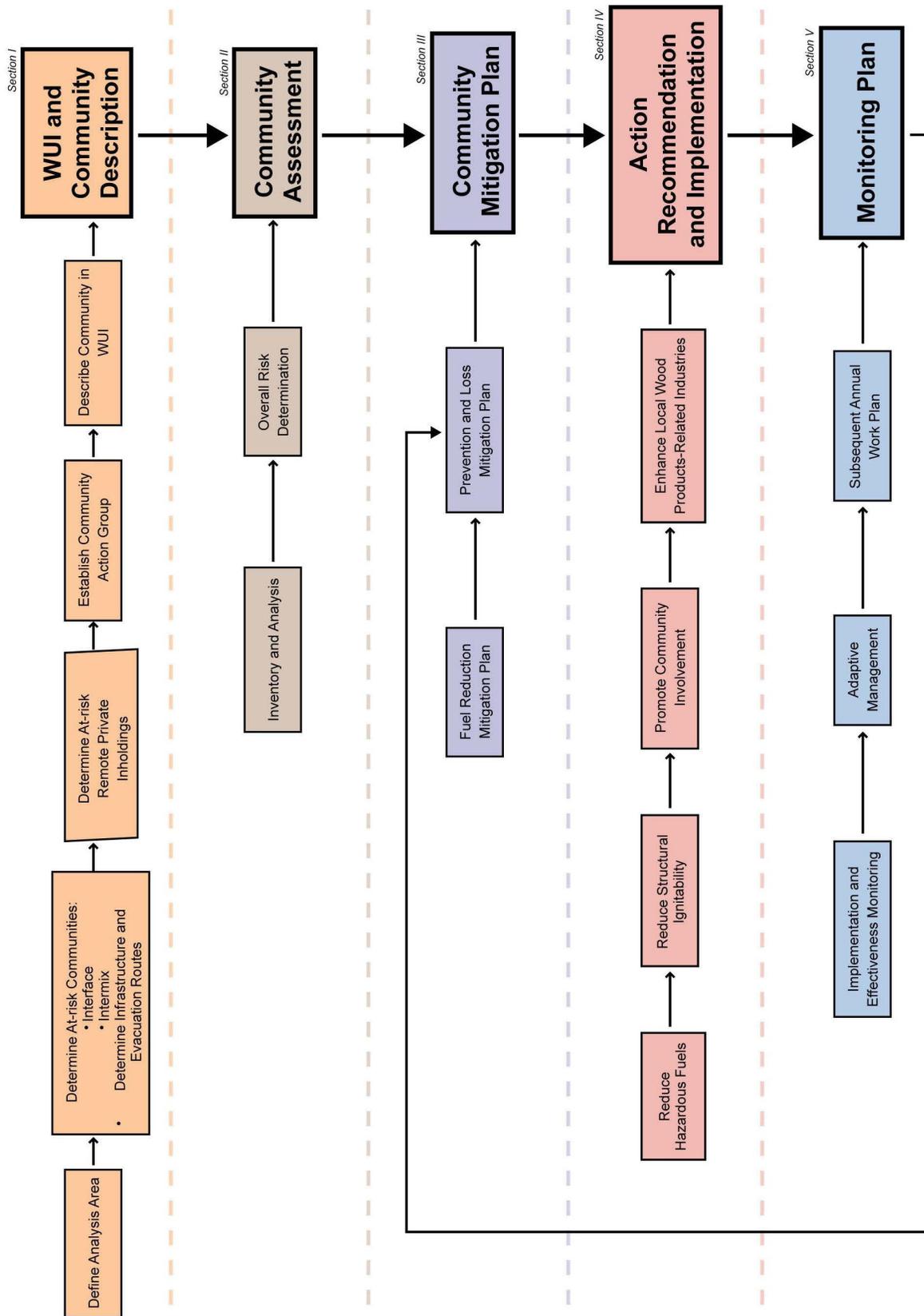


Figure 1.2. Process followed to produce the ASCWPP

B. Wildland Urban Interface (WUI) and Delineation Process

In January 2001 the communities of Arivaca and Sasabe were listed as at-risk communities in the *Federal Register* (USDA and USDI 2001a). According to HFRA, an (1) “At-Risk Community means (A) an area that is comprised of (i) an interface community...(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” (HFRA Sec 101.1.A.i., ii. B. C.). Both Arivaca and Sasabe are close to Federal lands, which include portions of BANWR, CNF, and BLM lands. In 2004, Arivaca and Sasabe were included in the Arizona State Forester’s Identified Communities at Risk list. Additionally, the BANWR Fire Management Plan concluded that a “Refuge-wide Constraint” to implementing BANWR FMP is “the need to prevent wildland fires from moving off the refuge and threatening structures and property in the wildland-urban interface, especially in the Sasabe and Arivaca area, will necessitate an aggressive response in these areas” (USDI Fish and Wildlife Service 2005).

In addition to the communities’ listing status, the current condition of the wildland fuels within and adjacent to Arivaca and Sasabe 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 fire fighter safety, in the event of a catastrophic wildfire event remains the overriding priority recommendation of the ASCWPP.

A 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) (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* (2001), 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 and by authorizing expedited environmental assessments, administrative appeals, and legal review for qualifying projects on Federal land.

The ASCWPP 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 the communities and surrounding community values. The WUI identified includes a total of 50,752 WUI acres surrounding the communities of Arivaca and Sasabe made up of private, State and Federal lands. The lands that surround the community are in such condition that they are 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 the communities 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 Relevant Wildfire Mitigation Projects

1. Federal Lands within the WUI

The desired future condition of ASCWPP lands include the maintenance of, or return to, natural fire resiliency status and maintenance of, or return to, the vegetation component of the historic plant potential community, which is composed primarily of perennial grasslands habitat with an associated shrub community (Meyer 2000). The ASCWAC intends the ASCWPP to complement Objectives 3 and 6 of the *BANWR Comprehensive Conservation Plan* (USDI Fish and Wildlife Service 2003). The desired future condition of refuge lands is consistent with community wildfire protection, watershed and rangeland restoration, and protection of community values described by ASCWAC. Vegetative types that are maintained in Condition Class I, allow natural processes such as fire, to be incorporated into long-term management practices to sustain habitat health, which meets BANWR management goals while providing for community protection from unwanted wildland fire. Public education and land treatment projects in the ASCWPP area, coupled with current efforts of the Altar Valley Conservation Alliance (AVCA), BANWR, and cooperating agencies, will create a better-informed constituency with a myriad of tools at their disposal for treatment of at-risk communities and restoration efforts within the natural areas contained in this plan. Federal wildfire reduction policy on public lands (e.g., BANWR) is planned and administrated locally through BANWR, CNF, and BLM TFO, which are the governing agencies for the Federal lands associated with the ASCWPP planning area. Under the Proposed Action described in the *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), BLM-administered public lands are assigned one of two land use allocations for fire management. BLM administered lands suitable for prescribed fire and wildland fire use for resource management benefit are considered allocation 1 lands. BLM administered lands that are not suitable for prescribed fire or wildland fire use for resource benefit are considered allocation 2 lands. With the exception of a small amount of desert shrub vegetation associations, most of the wild lands within the WUI are included within Allocation 1 lands where habitat enhancing treatments could include prescribed fire and wildland fire use.

2. Nonfederal Lands within the WUI

The desired future condition of nonfederal lands in the WUI is to have private landowners comply with Firewise standards recommended by AFD. 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. The AFD personnel would like to build on previous efforts to make this information available to their citizens and encourages 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.

The ASCWAC is aware that the synergy of wildland fuel accumulations primarily associated with the invasion of woody species and nonnative grass and community growth in the WUI, has produced areas at high risk from catastrophic wildfire. The communities aspire 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 ASCWAC 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, 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 the communities of Arivaca and Sasabe. Limited access routes to 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 AFD would like to work with Pima County in developing such a notification and evacuation plan for the community. Currently, local ham radio enthusiasts provide much of the emergency notification during any emergencies within the planning area.

3. Specific Community Fuels Mitigation Projects

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. Additional wildland fuel mitigation and grassland and rangeland enhancement efforts within the planning area include those by BANWR and AVCA. The AVCA accomplishments include a number of reports, maps, and other products:

- *Altar Valley Watershed Resource Assessment* (Meyer 2000), which documents current ecological conditions in the watershed
- *Historical conditions in the watershed* (Sayre 2000)
- *Proposed Altar Wash Sediment Retention Structure Environmental Assessment* (Westland Resources 2000)
- *Framework for a Habitat Conservation Plan (HCP) in the Altar Valley Watershed* (Sayre 2002)
- *Altar Valley Natural Fire Management Plan Draft* and maps (Natural Resource Conservation Service 2006)
- Maps showing the land ownership, vegetation, soils, range conditions, and cultural features of the Altar Valley

Recently, NRCS, ASLD, and Altar Valley ranchers have been working together to develop coordinated Resource Management Plans (RMPs) for some ranches. The RMPs establish specific range management goals for a subject ranch; describe the grazing systems that the rancher agrees to implement; and details

planned improvements (fencelines, stocktanks, etc.) and monitoring strategies. The ASCWAC is supportive of the RMPs and encourages their continued use to help prevent the spread of fire from outside the ASCWPP planning area to areas inside the WUI boundary.

In addition to fuels reduction efforts made by local ranches, BANWR has implemented significant fuels reduction on Refuge System Lands within and adjacent to the surrounding areas of the ASCWPP planning area through the implementation of Rx. The ASCWAC supports the continued use of Rx and wildland fire use (WFU) to reduce fuels and to promote ecosystem health on BANWR properties.

The communities of Arivaca and Sasabe, Pima County, and BANWR would like to further implement fuel mitigation projects for wildland fire suppression. Currently, some homeowners have taken the initiative to clear around their homes using Firewise principles. The AFD has also been proactive in acquiring wildland fire grants and pursuing wildland fire response enhancement. (See Table 1.1).

Table 1.1. Arivaca Sasabe wildland fire grants and wildland fire response enhancements

| Project | Grant number | Description | Grant monies received |
|--|---------------------|--|------------------------------|
| | Grant #1 | 2001, Rural Assistance Grant for Personal Protective Equipment | \$28,803.00 |
| | Grant #2 | 2003, Pro Neighborhoods Grant for installation of a safety fence at the fire station | \$995.00 |
| Grants received by the Arivaca Fire Department | Grant #3 | 2004, White elephant grant, Green Valley | \$25,000.00 |
| | Grant #4 | 2005, White elephant grant | \$50,000.00 |
| | Grant #5 | 2006, Trico grant, paid direct to Barbeau Auto for vehicle repairs | \$3,000.00 |
| | Grant #6 | 2006, Tohono Oodam tribal grant | \$25,000.00 |
| | Grant #7 | 2006, White elephant grant | \$19,000.00 |
| | Grant #8 | 2006, Rural Assistance Grant for firefighting and safety Equipment | \$20,000.00 |
| Total | | | \$171,798.00 |

Source: BANWR, Pima County, Arivaca Volunteer Fire Department, ASLD

D. Goals for the ASCWPP

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

- 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 ASCWPP area

- Encourage economic development in the community
- Promote development of wildfire emergency evacuation and communication plans
- Integrate use of the CWPP with surrounding fire management plans

E. Fire History of the Planning Area

Historically, fire played an important role in the Altar Valley's ecology before Euro-American settlement. According to Bahre (1985), fires were "fairly frequent" in southern Arizona grasslands before 1882 and much larger in aerial extent within the grasslands; cessation of major grassland fire preceded the brush invasion of the 1890s. Kaib (1998) further suggests that desert grasslands in this area likely burned once every 8–12 years. In addition, evidence suggests that both Native Americans and early settlers in the Altar Valley used fire as a management tool (Sayre 2000). Those fire regimes likely played a crucial role in maintaining the area's grasslands by suppressing woody species and encouraging new growth (Sayre 2000, 2002). However, fire incidence in the Altar Valley has decreased dramatically during most of the 20th century as a result of several factors:

- Discontinuation of managed range fires with the introduction of wood fencing during the second and third decades of the twentieth century
- Lack of sufficient herbaceous cover to sustain fires
- Increasingly effective and thorough fire suppression policies
- Endangered Species Act considerations
- Air quality issues and considerations

ASLD Division of Forestry, through the Arizona State Forester, is responsible for wildland fire suppression on State trust lands (Arizona Revised Statutes [ARS] §37-623). The ASLD Division provides for the prevention and suppression of wildfires on State and private lands—located outside incorporated municipalities—through the use of cooperative agreements with local fire departments, other State and Federal agencies, and persons organized to prevent and suppress wildfires. The ASLD Division of Forestry also maintains in-house overhead and firefighting capabilities through its own employees. The primary criteria for choosing fire suppression strategies and tactics are to ensure the safety of the public and firefighting resources while minimizing suppression costs, resource loss, environmental damage, and the threat of wildland fire spreading to non-State lands.

F. Planning Process

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

- Urban Wildland Interface communities within the vicinity of Federal lands that are at high risk from wildfire (USDA and USDI 2001a, 2001b)
- *The National Fire Plan* (USDA and USDI 2004)
- *The Healthy Forests Initiative* (HFI)
- *The Healthy Forests Restoration Act* (HFRA)

- *The HFRA and HFI Interim Field Guide* (USDA Forest Service and USDI Bureau of Land Management 2004)
- *Preparing a CWPP: 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)
- *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)
- *Buenos Aires National Wildlife Refuge Fire Management Plan for the 2005–2008 Burn Season* (USDI Fish and Wildlife Service 2005)
- *Buenos Aires National Wildlife Refuge Comprehensive Conservation Plan* (USDI Fish and Wildlife Service 2003)
- *Altar Valley Fire Management Plan Public Review Draft* (Natural Resource Conservation Service 2006)
- *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 2005a)
- *Gila District Resource Management Plan* (USDI Bureau of Land Management 1991)
- *Wildland Fire Use Implementation Procedures Reference Guide* (USDI et al. 2005)
- *Pima County Multi Jurisdictional Hazard Mitigation Plan Draft* (Pima County 2005)

Action recommendations for at-risk areas within the ASCWPP WUI boundary will be developed as part of the ASCWPP. Treatment recommendations and mitigation measures should be implemented in specific time frames and will be monitored for measurable outcomes.

Successful implementation of the ASCWPP 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 ASCWPP comply with applicable local, State and Federal environmental regulations.

The dedication of ASCWAC is an assurance that all agencies and groups involved will continue to develop any formal agreements necessary to ensure the ASCWPP's timely implementation, monitoring, and reporting. The ASCWAC was formed not only to meet collaborative requirements of HFRA but also to

represent the different aspects of the communities of Arivaca and Sasabe. All parties involved are committed to the ASCWPP development and implementation.

II. ASCWPP COMMUNITY ASSESSMENT AND ANALYSIS

The community assessment is a risk analysis of the potential for catastrophic wildfire to the communities of Arivaca and Sasabe and the outlying areas identified by ASCWAC. 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 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 ASCWPP planning area is located primarily in Pima County, including a small portion of Santa Cruz County near Arivaca Lake and south of Ruby Road. The ASCWPP comprises 50,752 acres of land. The planning area includes portions of BANWR (13,817 acres) along with the communities and outlying areas of Arivaca and Sasabe. Arivaca is located adjacent to BANWR at the extreme southeastern end of the Altar Valley. Sasabe is situated at the southernmost end of the valley along the US Mexico border.

Primary land ownership in the ASCWPP planning area is a mosaic of privately owned lands and lands administered by ASLD, FWS, FS and BLM TFO, (see Table 2.1). Much of the land within the ASCWPP planning area is considered rural with minimal developments.

In addition to FWS, BLM TFO and FS own and administer small portions of land within the ASCWPP area. The BLM TFO lands include approximately 1,289 acres, or 3% of the planning area, and include livestock-grazing allotments managed in association with private and State land-grazing operations. FS land accounts for 1,784 acres, or 4%, located at the extreme southeastern tip of the WUI. The FS lands compose only a small portion of the entire WUI, but they contain the camping and recreational areas surrounding Arivaca

Lake. The potential of escaped campfires or the need to evacuate the camping areas in the event of a wildfire warrants their inclusion in the ASCWPP area. The FWS properties account for the second largest acreage of federal land within the WUI consisting of approximately 14,000 acres of the WUI, managed by BANWR. Formerly a private ranch, BANWR was established to support the reintroduction of the masked bobwhite quail. Management goals of BANWR are compatible with wildland fire management and community coordination.

ASLD is the largest land manager in the WUI, accounting for 18,083 acres or 35% 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 ASCWPP area state trust lands are managed primarily for livestock grazing.

Table 2.1. Land ownership in the planning area

| Ownership type | Total acres | % of total |
|----------------|---------------|------------|
| Private | 13,806 | 28 |
| ASLD | 18,083 | 35 |
| AZGFD | 206 | <1 |
| FWS | 13,817 | 27 |
| FS | 1,784 | 4 |
| BLM | 1,289 | 3 |
| Pima County | 1,761 | 3 |
| Other | 6 | <1 |
| Total | 50,752 | 100 |

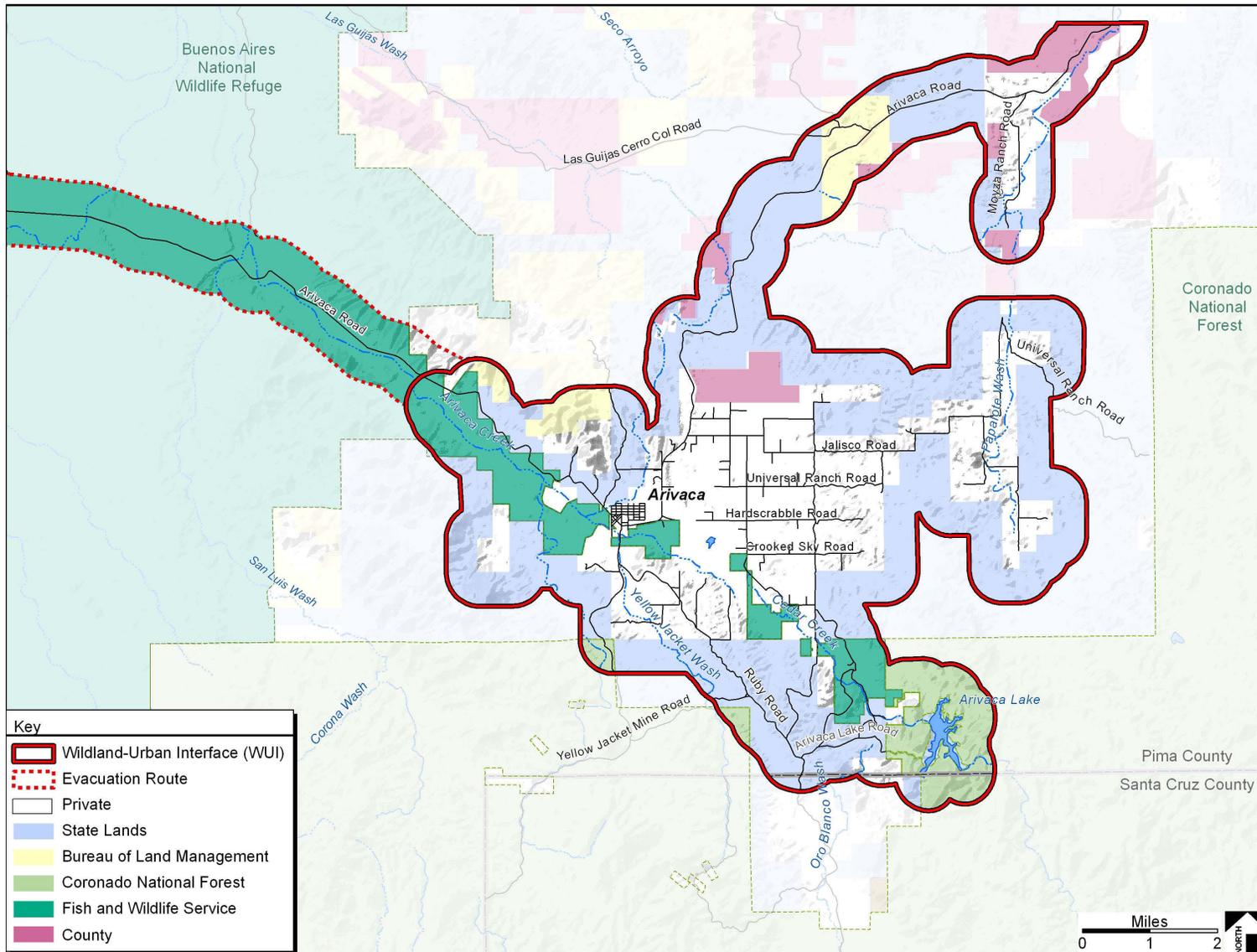


Figure 2.1. Arivaca portion of the ASCWPP WUI area

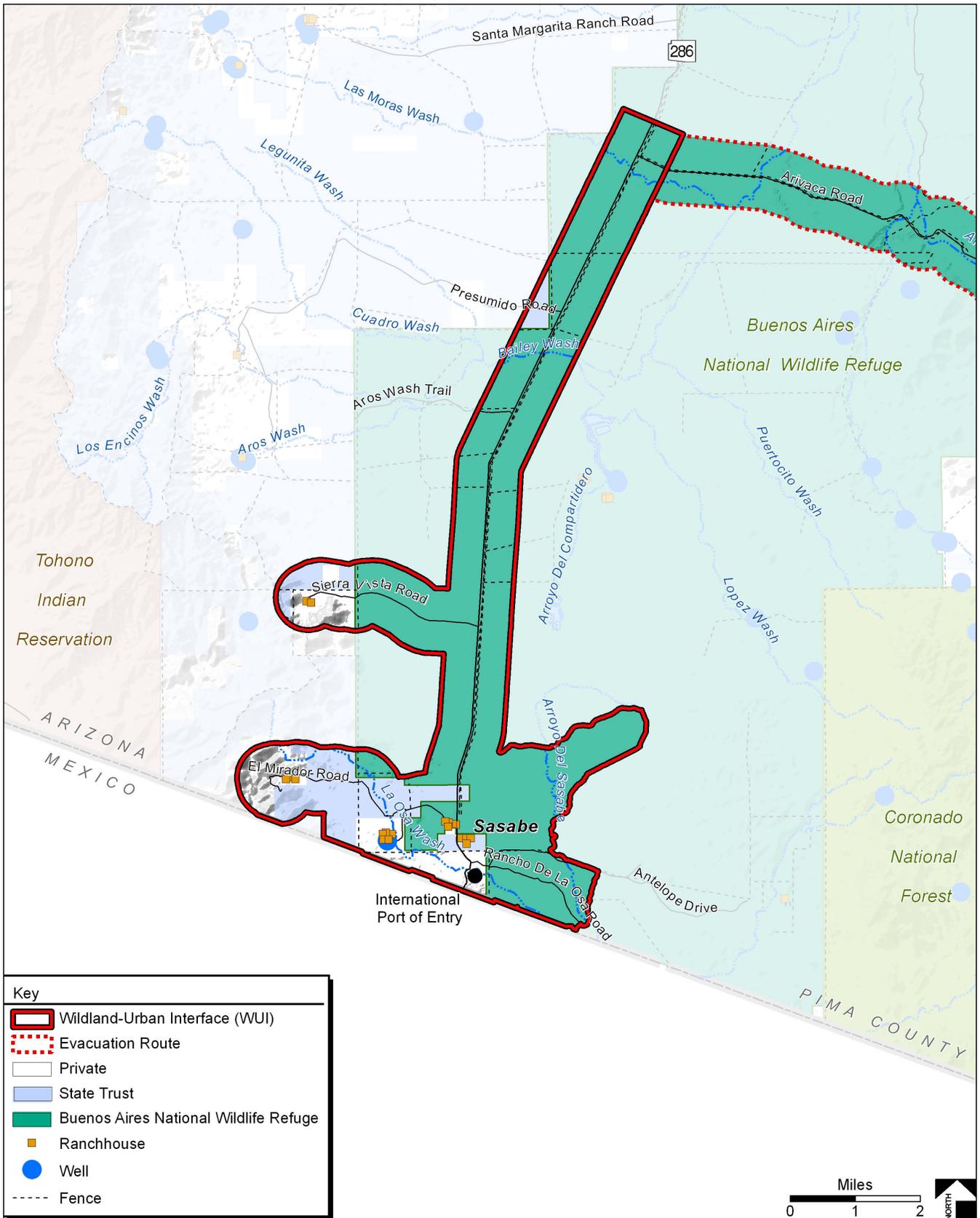


Figure 2.2. Sasabe portion of the ASCWPP WUI area

The ASCWPP planning area boundaries are identified in Figures 2.1–2.2. The climate of the area is semiarid with relatively low precipitation, low humidity, and high summer temperatures. Precipitation averages 12 to 24 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 (Westland Resources 2000).

Geologically, the area consists of four major zones: (1) mountains, in the upper reaches of the watershed; (2) pediments, which run from the base of the mountains to an average of 1 mile below the mountains; (3) alluvial fans or bajadas, where eroded sediment has fanned out below the pediments; and (4) the central bottomlands or floodplain, which contains Altar Wash (Andrews 1937). The bajadas and central bottomlands consist of deep, unconsolidated material and generally represent the valley’s richest soils.

This geologic makeup determines the hydrology of the WUI. Rainfall quickly runs off the mountains surrounding the valley, across the pediments, and into the alluvia of the bajadas and bottomlands where it sinks into the groundwater. As a result, some riparian corridors, such as the Altar Wash, do not support perennial water but flow during heavy rain or flood events. Furthermore, perennial surface water within the watershed is extremely rare, occurring in various quantities only at Arivaca Creek, Arivaca Cienega, Brown Canyon, Thomas Canyon, San Luis Creek, and Sabino Creek. Groundwater is abundant, and water levels in the deep wells across the valley have remained constant according to historical records (Sayre 2000).

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).

Total WUI acres for Arivaca and Sasabe combined is 50,752 acres. All lands analyzed within the WUI are consistent with Fire Regimes II (3,401 acres), III (488 acres), and IV (45,609 acres) as described in *Development of Coarse-Scale Spatial Data for Wildland Fire and Fuel Management* (Schmidt et al. 2002). However, 1,254 acres could not be resolved because of the coarse scale of the data set. 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. For example, a habitat in Condition Class 1 is a habitat system in its natural fire range and at low risk for losing ecosystems components from wildland fire. Condition Class 2 habitat has moderately departed from its historical fire-occurrence range and has a moderate risk of losing habitat components. Condition Class 3 habitats have significantly departed from their historical fire-regime ranges, and their risk of losing key habitat components is high (FRCC Interagency Working Group 2003).

The lands within the WUI are categorized as Condition Classes 1 (49,132 acres) and 2 (383 acres); 1,237 acres could not be resolved because of the coarse scale of the data set. 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 (FRCC Interagency Working Group 2005b). Therefore, local agencies are asked to provide data for localized conditions (USDA Forest Service 2000). The amount of land disturbance which causes growth of flammable annuals (pigweed and thistles) within the WUI riparian areas, proliferation of nonnative grasses, and increasing woody species invasion indicate that the riparian and mesquite uplands and desert grasslands areas no longer conform to components of Condition Class 1 lands. In addition to the vegetative changes, past land management practices have also substantially altered the hydrologic function of the Arivaca Wash from a historical condition of a shallow floodplain dominated by sacaton grass to an eroding channel with a lowering water table (Meyer 2000). As a result, local conditions indicate that the riparian area of the WUI actually falls within Condition Classes 2 and 3.

The desired future condition of Federal land within the ASCWPP area is a return to 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% 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% 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 desired future condition of Desert Scrub communities within the ASCWPP is as described in the *Proposed 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 2004:2–3)

. . . adequate cover and mix of natural plant species that have good vigor. In terms of fire management and fire ecology, the Desired Future Conditions are for fire to control or reduce the exotic annual weeds such as red brome and to limit woody vegetation to non-hazardous levels.

The desired future condition of Riparian vegetative communities within the ASCWPP is also as described in the *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 2004:2–3).

. . . annual weed cover and density is controlled and ladder fuels and downed woody debris are limited or not present. Disturbances such as livestock grazing, mining, and off road vehicle travel, that can potentially reduce natural vegetation cover and vigor are managed to maintain adequate cover and mix of natural plant species.

These desired future conditions are consistent with Objectives 3 and 6 of the draft BANWR Comprehensive Plan (USDI Fish and Wildlife Service 2003):

Objective 3: Restore and enhance native Sonoran savanna grasslands on the Refuge. The Refuge should eventually be recognized internationally as a unique grassland ecosystem. The estimated habitat of the Refuge will be comprised of 85% Sonoran savanna grassland, 10% desert scrub, and 5% riparian forest.

Objective 6: Improve the efficiency of the Refuge Fire Program to assist in the management of the masked bobwhite quail (*Colinus virginianus ridgwayi*) and restoration of native grasslands. The Refuge will restore 15,000 acres of mesquite/grasslands annually.

These two objectives are intertwined, since fire is the main tool available for restoring Sonoran grasslands on the Refuge.

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, and/or condition of vegetation such that if the fuel were ignited, an at-risk community or its community 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. What was once Sonoran savanna grassland is now largely semidesert grassland in the southern Altar Valley. Large shrubs and trees have spread throughout the valley on a large scale. This is due principally to the introduction of cattle and horses coupled with periods of severe drought. Poor grazing management resulted in soil erosion converting the savannas into semidesert. Historically, fire played an important role in keeping woody species in check in these grasslands (USDI Fish and Wildlife Service 2003). The vegetation associations found within the WUI were identified and mapped using Southwest Regional Gap Analysis Project (SWReGAP) data (United States Geologic Service 2005) (Figures 2.3 and 2.4). This data set provides the level of vegetative detail necessary for aligning flammability with existing vegetation. The existing arrangement and flammability of vegetation associations largely determines wildland fire behavior. Flammability for Arivaca and Sasabe is mapped in Figures 2.5 and 2.6. 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 ASCWAC 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 has been 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 ASCWPP WUI are shown in Table 2.3.

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 Grassland | Apacherian-Chihuahuan Piedmont Semidesert Grassland and Steppe | 1-3 | H | L and N | 12-20 | 6 | 6,825 (104) | 10,255 |
| Desert Scrub | Chihuahuan, Mixed Desert and Thorn Scrub | 2 and 6 | L | F and T | 6-32 | 4-6 | 2,300 (35) | 2,097 |
| | Chihuahuan Mixed Salt Desert Scrub | 1 and 2 | L | T | 6 | 4 | 2,300 (35) | 1,847 |
| | Chihuahuan Stabilized Coppice Dune and Sand Flat Scrub | 2 and 6 | L | T | 4-7 | 3 | 2,300 (35) | 18 |
| | Chihuahuan Succulent Desert Scrub | 2 and 6 | L | F and T | 4-6 | 3 | 2,300 (35) | 43 |
| | Sonoran Paloverde-Mixed Cacti Desert Scrub | 1 and 2 | L | L and T | 4-6 | 3 | 2,300 (35) | 119 |
| Shrublands | Apacherian-Chihuahuan Mesquite Upland Scrub | 1 and 2 | M | F | 6 | 4 | 2,300 (35) | 31,705 |
| | Madrean Encinal | 1 and 3 | M | B and T | 6 | 4 | 2,100 (32) | 784 |
| | North American Warm Desert Wash | 2 and 3 | H | F | 6-12 | 4-6 | 2,100-4,950 (32-75) | 8 |
| | Madrean Juniper Savanna | 1 and 3 | H | B and T | 6-12 | 6 | 400-4,950 (6-75) | 3 |
| 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) | 33 |
| | North American Warm Desert Riparian Mesquite Bosque | 2 and 3 | H | E and T | 6-19 | 6 | 2,100-4,950 (32-75) | 1,139 |
| | North American Arid West Emergent Marsh | 2 and 3 | H | N | 6-12 | 6 | 6,825 (104) | 548 |

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 | 223 |
| | Open Water | NA | L | NA | NA | NA | NA | 94 |
| | Recently Burned | NA | L | NA | NA | NA | NA | 1,836 |
| Total | | | | | | | | 50,752 |

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

^a“L= low”, “M = medium”, and “H = high”.

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

Vegetative and physical characteristics of the WUI include 13 vegetation associations and 3 mostly nonvegetation associations that are grouped into 4 major vegetation associations and 1 nonvegetation association. These different vegetation associations are listed and described in Appendix A. Each fuel model predicts the rate of spread, flame length, and fire intensity levels possible for each vegetation association. Assigning a fuel model to each vegetation association within the WUI will assist in predicting wildfire behavior and thus proper suppression response (see Anderson [1982] for detailed fuel model descriptions).

The Grassland associations (Photo 2.1) include a variety of herbaceous, scrub, and shrub species, with a shrub canopy ranging from less than 10% to 35%. This is an extensive area of the WUI, covering 10,255 acres (20% of WUI acres). Gori and Enquist (2003:4) have classified the grasslands within the southern area of the WUI, including Sasabe, as primarily “shrub invaded nonnative grasslands, TYPE E: grassland with 10–35% total shrub cover and mesquite or juniper cover > 15% 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.” Gori and Enquist (2003:4) have also classified the majority of the Arivaca WUI area as “shrubland-former grassland TYPE F: former grassland with < 15% canopy cover of mesquite and juniper and/or > 35% total shrub cover; perennial grass canopy cover usually < 1%, always < 3%; type conversation to shrubland that is either permanent or will require 40+ years of livestock exclusion for partial recovery of perennial grasses.” The very eastern portion of this WUI area has been classified as “shrub invaded native grassland with restoration potential, TYPE B: grasslands composed of native perennial grasses and herbs (non-natives absent or uncommon) with 10–35% total shrub cover and mesquite or juniper cover < 15%. A key characteristic of this type is its restoration potential—that is, shrub cover can be reduced using prescribed burns and site restored back to TYPE A grassland either immediately or after some period of grazing rest (< 15 years) when sufficient fine fuels have accumulated for fire spread” (Gori and Enquist 2003:4). 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 most frequently occurs somewhere between 7 and 10 years. (Huachuca Area Fire Partners 2005). The

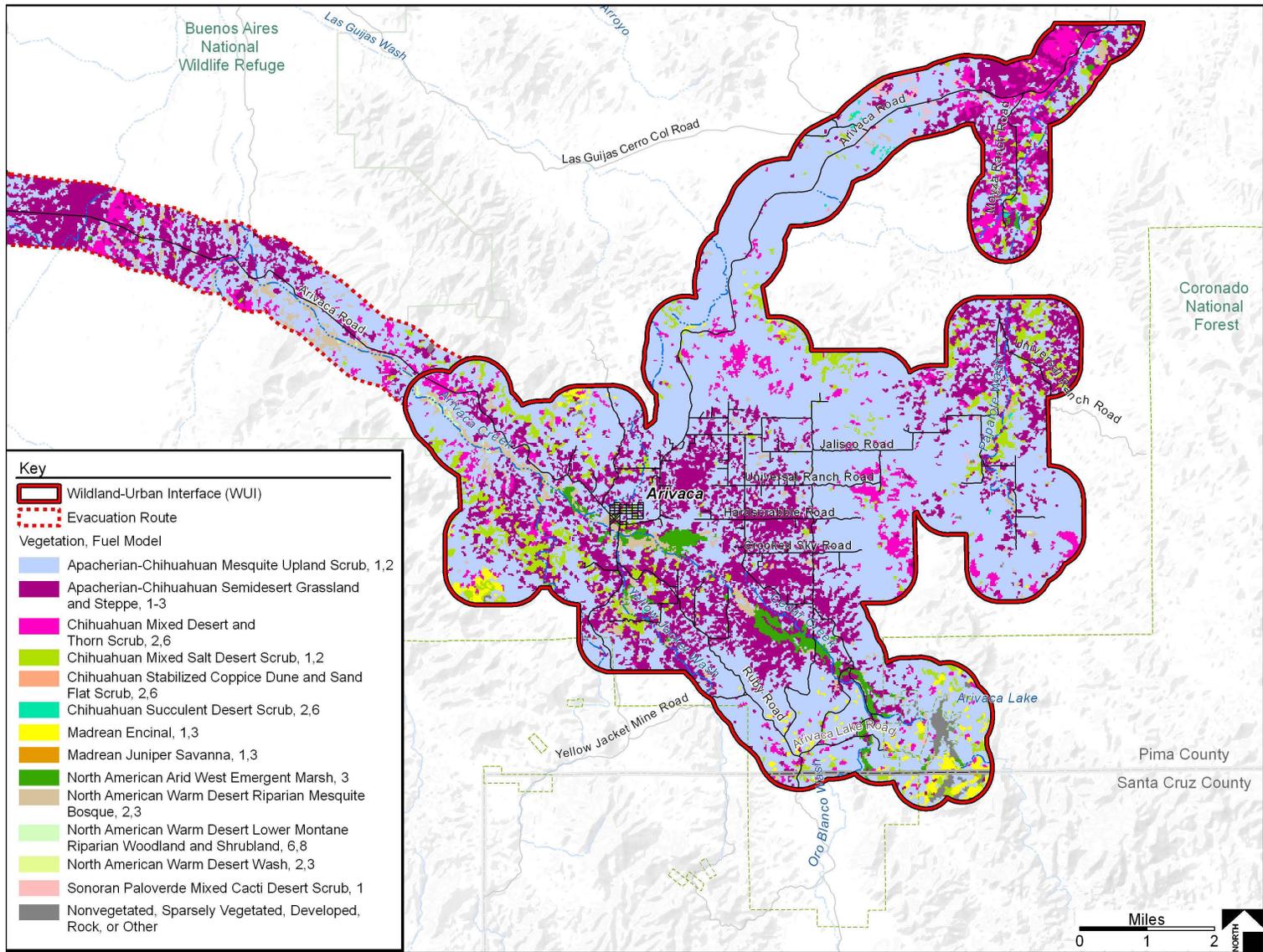


Figure 2.3. Arivaca vegetation associations

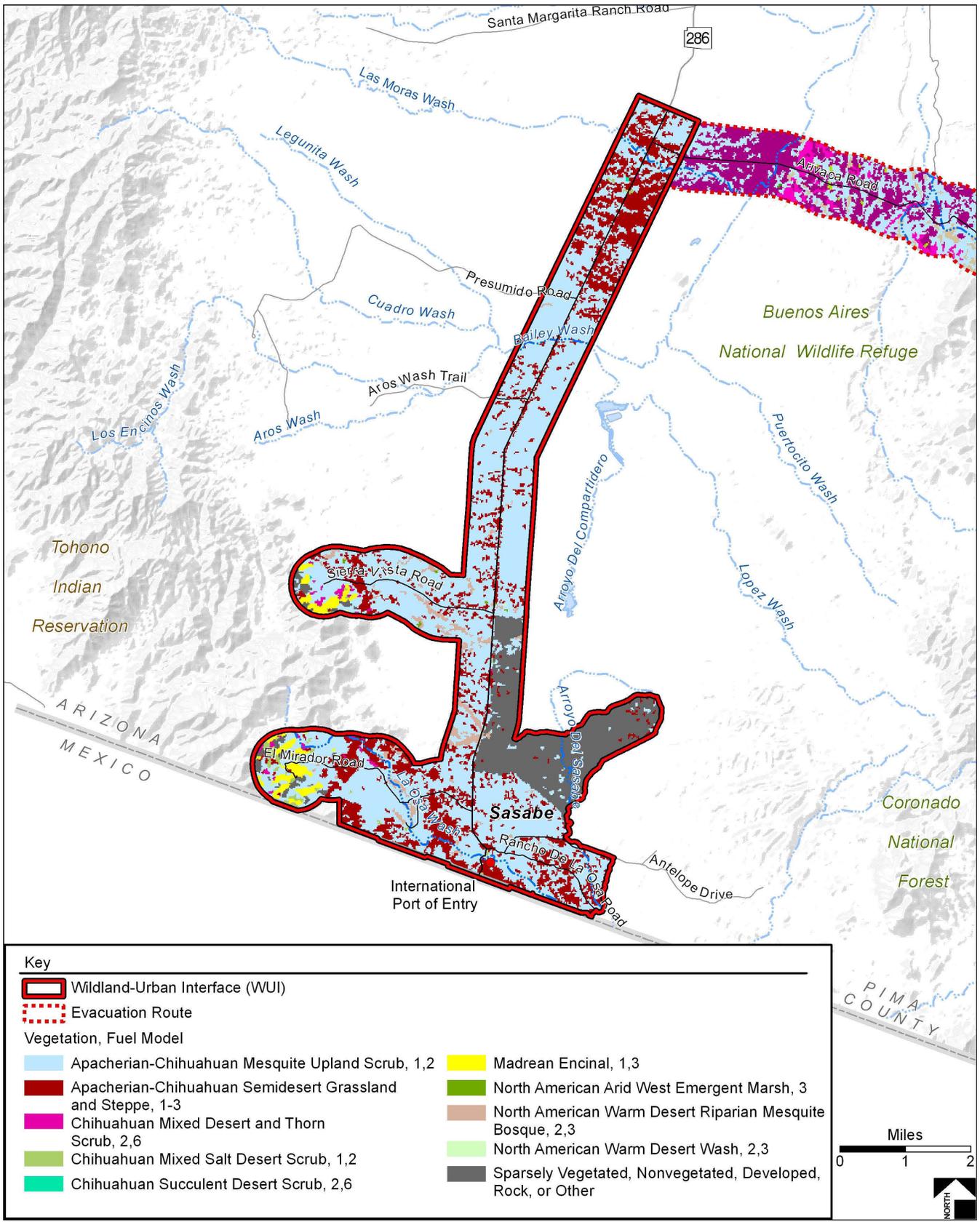


Figure 2.4. Sasabe vegetation associations

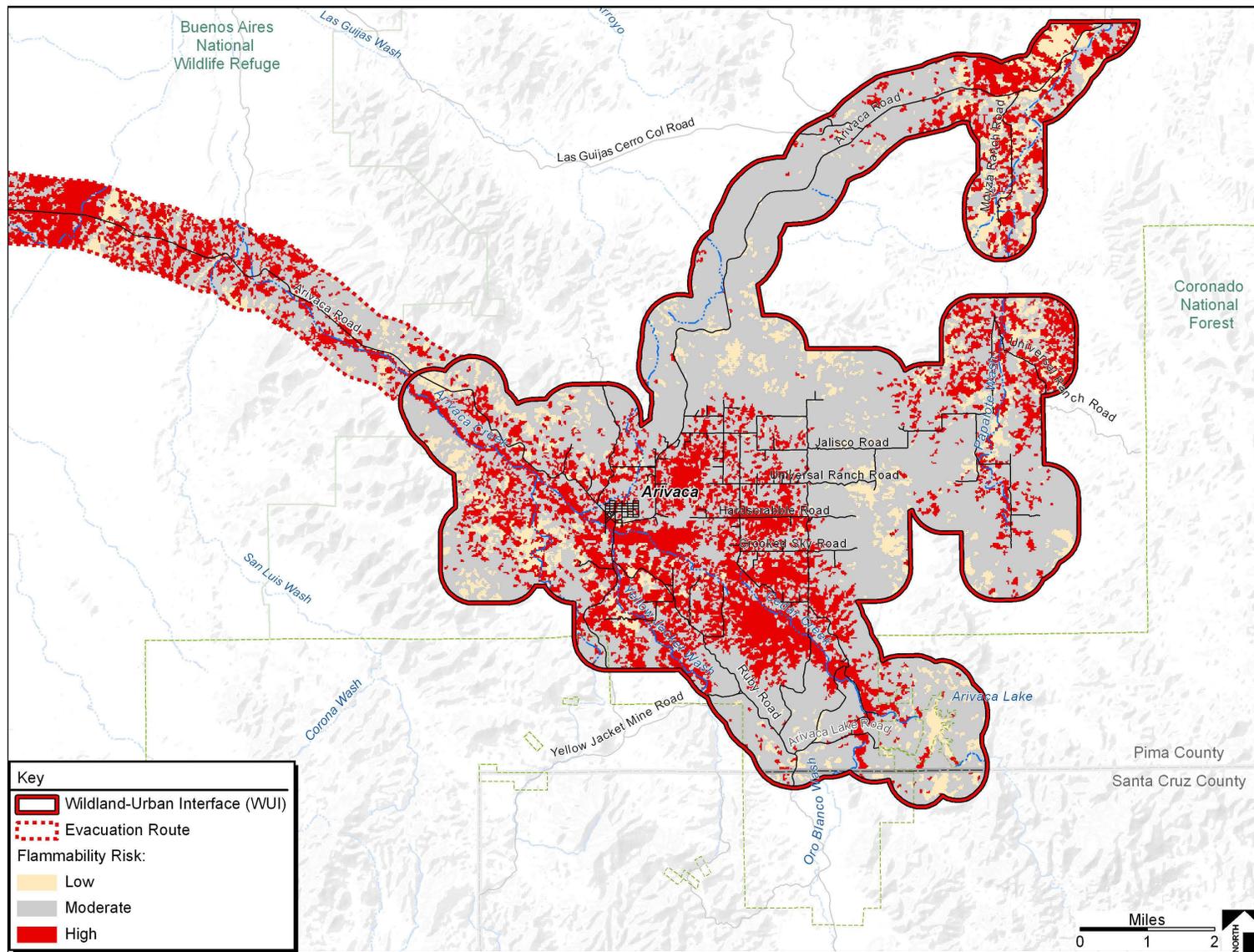


Figure 2.5. Arivaca flammability

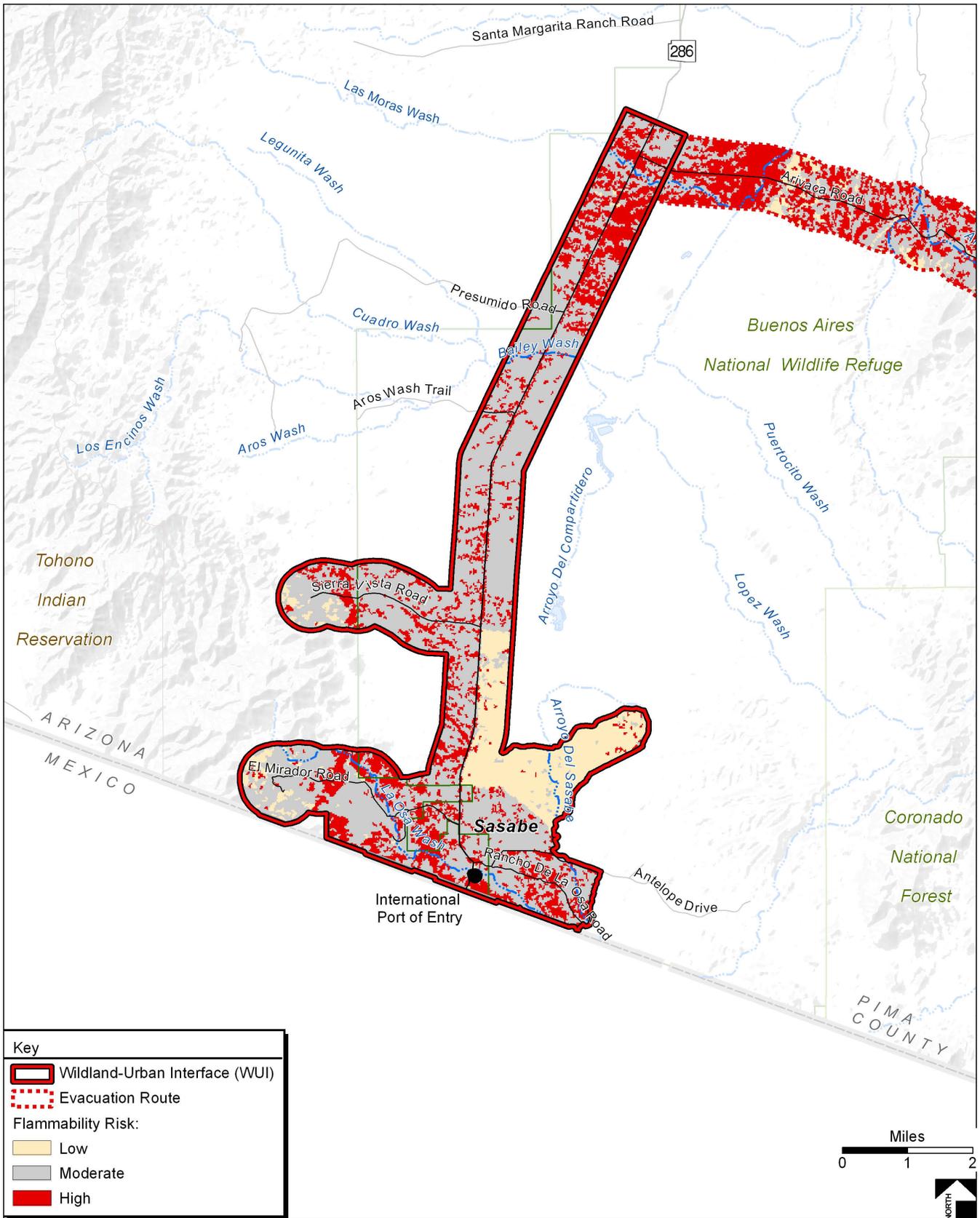


Figure 2.6. Sasabe flammability

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, that increase fire frequency (FRCC Interagency Working Group PNVG Code DGRA3 2005a). 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 > 6,800 feet/hour (Anderson 1982).



Photo 2.1. Grassland vegetation association

The Desert Scrub vegetation associations occur on dryer upland sites and include areas of bare ground and rock also supporting a variety of grass, herbaceous, scrub, and shrub species (Photo 2.2). The Desert Scrub vegetation association constitutes 4,005 acres (8% of WUI) and is the third largest vegetation association within the ASCWPP.



Photo 2.2. Desert Scrub vegetation association

The shrubland vegetative communities include Mesquite Bosque, Upland Mesquite/Grasslands, Desert Wash associations, and Madrean Encinal associations and are the largest vegetative type within the WUI, accounting for 32,619 acres (64% of the WUI). The Upland Mesquite associations vary from dense stands with canopies of 80% or higher to areas of mature trees with canopy cover of 35% to 60% (Photo 2.3). The mesquite upland 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, occur along the swales with a predominate graminoid layer creating areas of open woodlands and savannas to areas of high canopy.



Photo 2.3. Shrublands vegetation association

The Deciduous Southwest Riparian associations of sycamore, cottonwood, walnut, ash and willow can be intermixed with Grasslands associations. The Deciduous Southwest Riparian association accounts for 1,720 acres (3% of the WUI) contributing significantly to vegetation and wildlife biodiversity as well as to the principal recreational use areas within the WUI (Photo 2.4). 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 serial stage riparian habitats can support non-replacement fire in greater proportion of total fire frequency than surrounding PNVGs (FRCC Interagency Working Group PNVG Code RIPA 2005a).

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 the community of Arivaca are heavily dissected, with some areas having slopes exceeding 20% that are heavily vegetated with grass and shrubs. Slopes $\geq 20\%$ and areas with south-, southwest-, or west-facing slopes in areas of high wildland fuels were identified as having greater risks because of the fuel-ladder fire effects associated with steep terrain and decreased humidity associated with the microclimates created by exposed aspects. Areas with moderate fuel hazards in high slopes, areas $\geq 20\%$, are considered a high fuel hazard, while the same fuel type on slopes $< 20\%$ 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 moderate risk from fuel hazards. All other areas have a low risk from fuel hazards, including the areas that have been previously treated or burned. 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 ASCWAC. Table 2.4 identifies the different values given to these various fuel hazards components. Visual representations of these different fuel hazard components are mapped in Figures 2.7 and 2.8.



Photo 2.4. Deciduous Southwest Riparian vegetation association

Table 2.4. Fuel hazard components

| Fuel Hazards Components | Influence^a |
|--|------------------------------|
| <i>Vegetation type and density</i> | |
| Grasslands in Fuel Model 3; Deciduous Riparian, > 100 stems/acre or moderate fuel types in slopes \geq 20% | H |
| Mesquite associations in Fuel Model 3 and Riparian vegetation in Fuel Models 6 and 8 | M |
| Mixed shrubland, Semidesert Grasslands and Desert Scrub vegetation | 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 ASCWPP. 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 Lehman's lovegrass, 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%, 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.

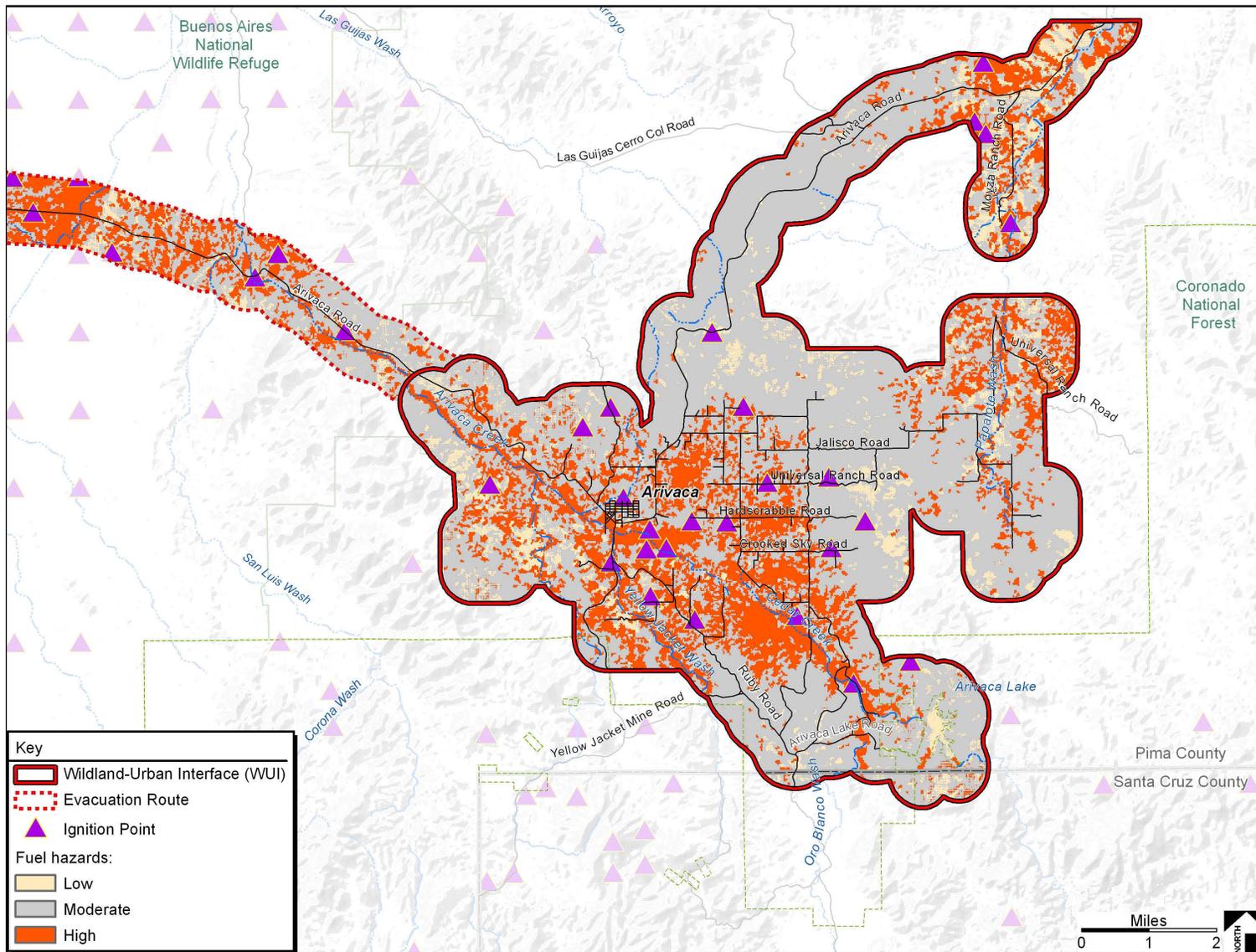


Figure 2.7. Arivaca fuel hazards

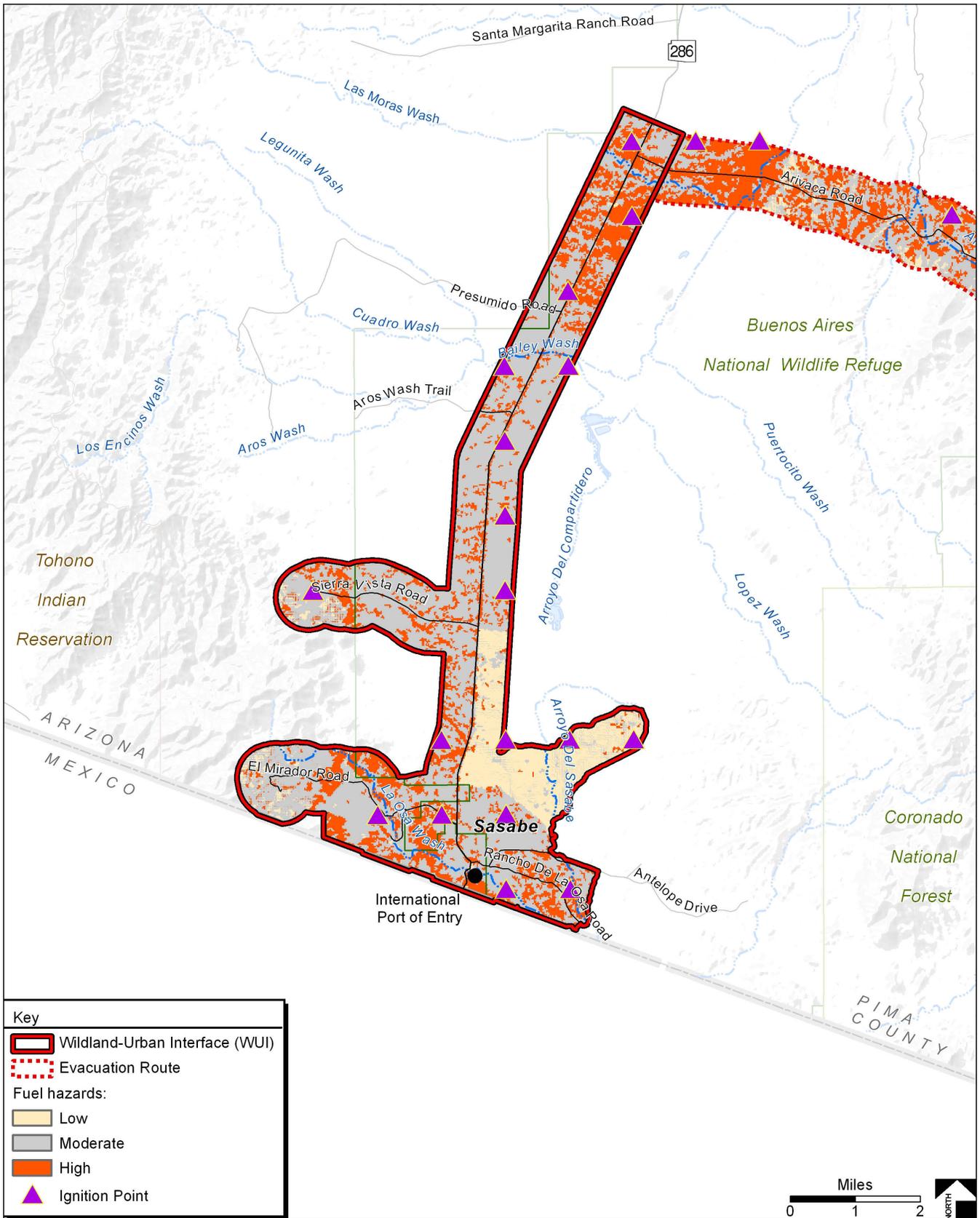


Figure 2.8. Sasabe fuel hazards

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 within high public-use areas. High-potential areas have the greatest number of fire starts per 1,000 acres. The combined potential of ignition and wildfire occurrence is shown in Figures 2.9 and 2.10. The areas with the greatest potential for fire ignition, either from natural or human (though unplanned) causes, is located along Altar Wash, Arivaca Creek, Arivaca Road, and within the community of Arivaca.

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 ASCWAC, 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.

The major concerns of AFD, ASLD, and the BANWR Fire Management Officer include: (1) delayed response time by available mutual aid fire departments, (2) obtainment of additional firefighting equipment, and (3) insufficient dispatch and communication capabilities. 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.

A short-range goal of AFD in conjunction with ASCWAC is the completion of individual wildland fire home assessments through the use of Redzone software, a commercially produced software package designed for use on handheld personal data recorders. The software is used to collect locations and data about structures, water sources, and other information (www.redzonesoftware.com). 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 name or address on 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 identification placards or road signs.

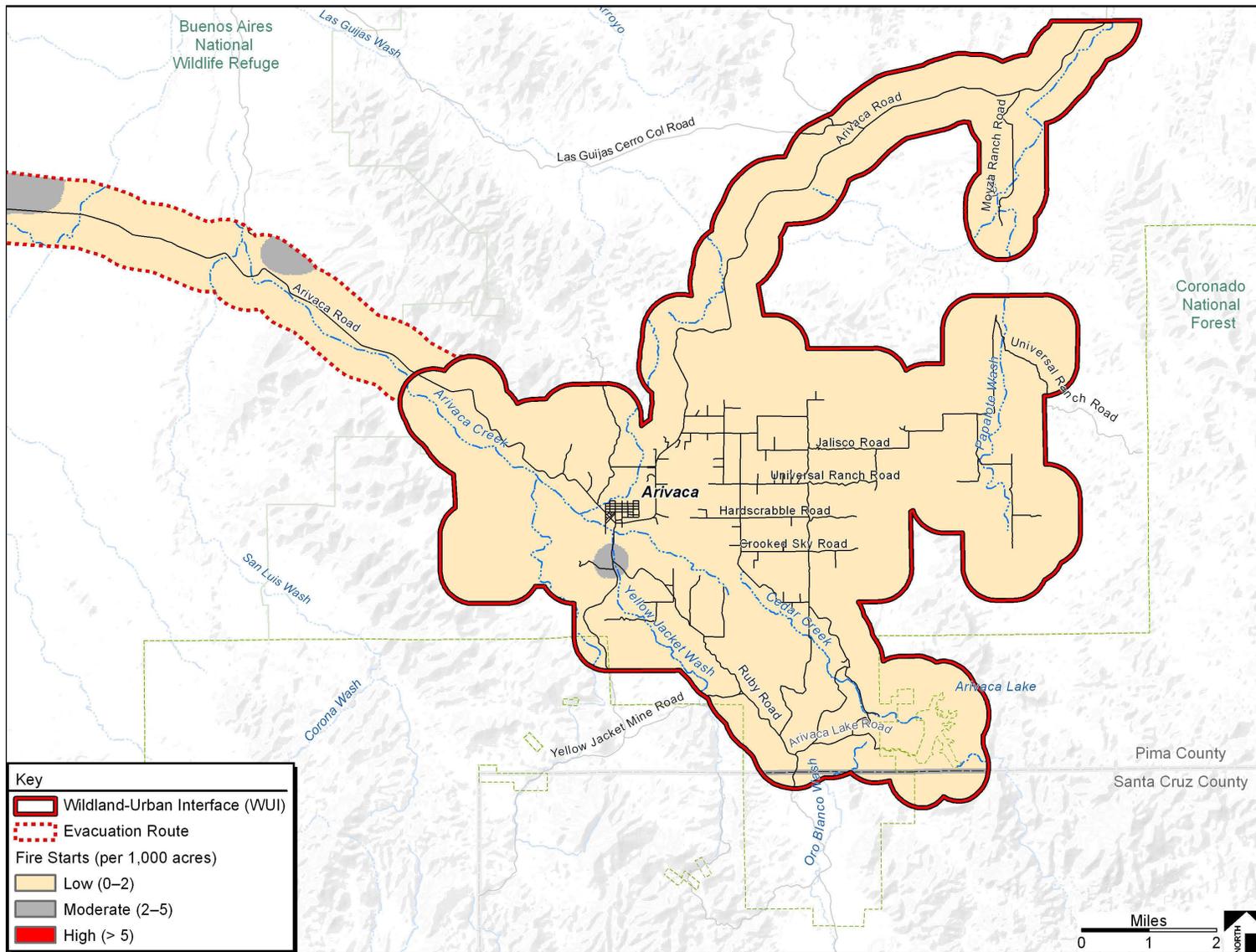


Figure 2.9. Arivaca ignition history

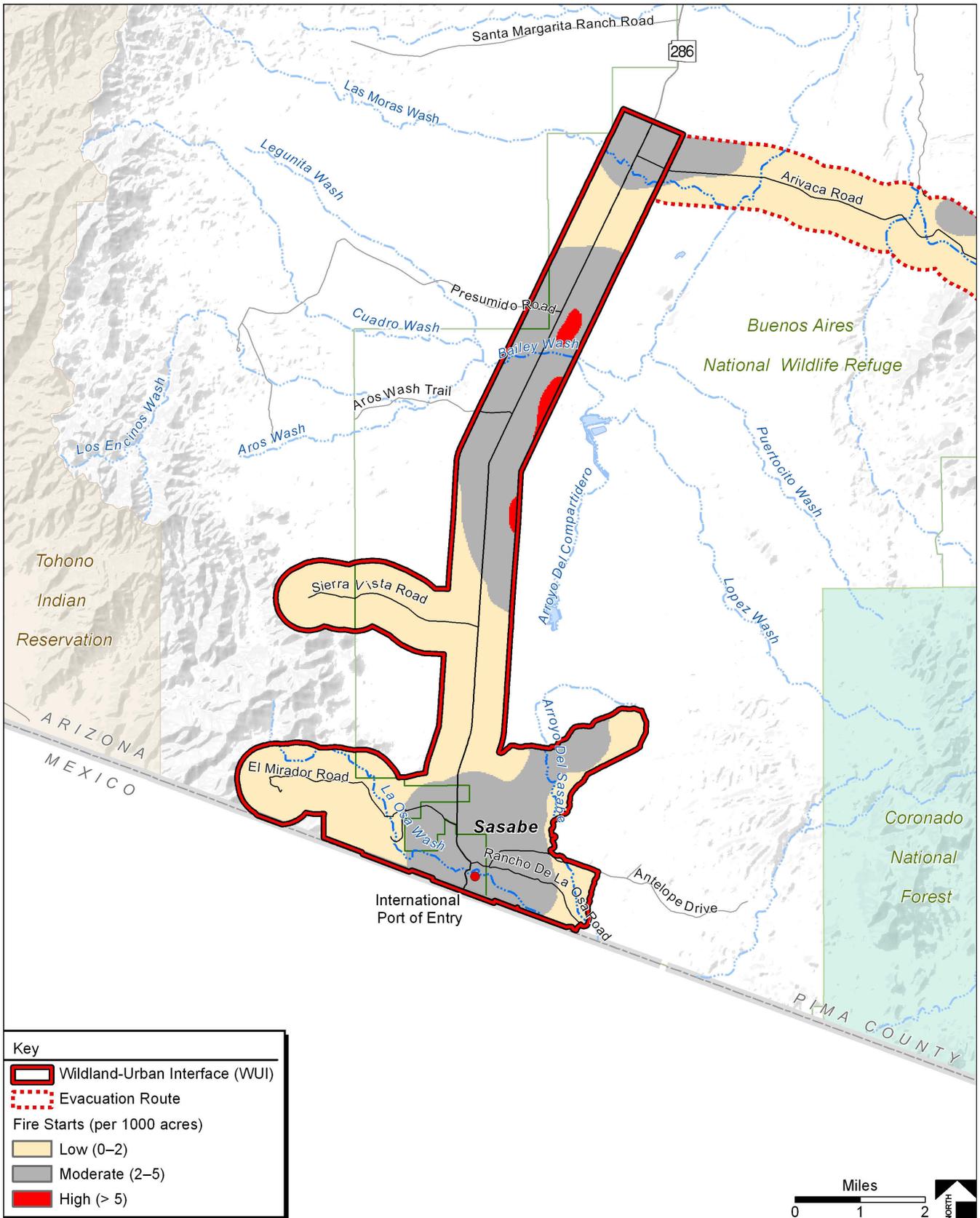


Figure 2.10. Sasabe ignition history

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

ASCWAC identified high-risk areas, including SR 286 and Arivaca Road, which have been and continue to be the focus of community development. Structures associated with housing and commercial development located in isolated subdivisions and in more dispersed areas of the county are also at high risk. The ASCWAC also identified significant infrastructures, such as the Sasabe Port of Entry, Arivaca Health Center, and the Arivaca Community Center within the designated WUI, and recommends fuel modification treatments that will reduce the potential threat of wildland fire to these facilities. The ASCWAC identified transportation corridors between WUI communities that will serve as evacuation routes and resource distribution corridors during a wildland fire. The ASCWAC also recommends 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 the recreational and camping areas associated with Arivaca Lake, the Arivaca Creek trail, the Arivaca Community Center, the ghost town of Ruby, and the access areas to BANWR, are located on both private and Federal lands within the WUI. 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 for the Pima pineapple cactus (*Coryphantha scheeri* var. *robustispina*) and the cactus ferruginous pygmy owl (*Glaucidium brasilianum cactorum*). The land management agencies use conservation strategies to mitigate risk to both the pineapple cactus, a species listed as threatened or endangered under the Endangered Species Act (ESA) and the pygmy owl which was once listed and may become re-listed. The ASCWAC has determined that habitat-enhancing treatments for reducing wildland fuel and lessening the threat of catastrophic wildland fire in the riparian corridors would help preserve sensitive riparian habitat and wildlife species in accordance with Section 102.a.5.B of the HFRA and would also protect the recreational values local residents and visitors associate with these riparian systems.

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% 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% of the rating. The lands within the Arivaca Sasabe WUI have an ISO rating of 10 based on their location in relation to the abovementioned factors.

Protection Capability for Vegetation Fires and Structure Protection:

Local fire departments and federal land management agencies can provide initial attack response for the ASCWPP WUI. Local fire departments most likely to provide initial attack response for the ASCWPP WUI include AFD, Elephant Head Volunteer Fire Department, Tubac Fire District, Green Valley Fire District, Helmet Peak Volunteer Fire Department, Three Points Fire District and Rio Rico District. Initial attack response from the local fire departments can occur under the authority of mutual aid agreements between the individual departments or under the Intergovernmental Agreements (IGAs) each fire department or fire district has with the Arizona State Forester. The FS CNF Nogales Ranger District and the FWS BANWR can provide initial attack response under the Joint Powers Agreement between the State of Arizona and the Federal Land Management Agencies of the Department of Interior and the USDA Forest Service January 2004.

Protection Capability for Structure and Other Nonvegetation Fires:

Federal land management agencies are not able to provide initial attack response for non-wildland fires for the ASCWPP WUI. Federal resources from CNF and BANWR can provide structure protection for the ASCWPP WUI under the Joint Powers Agreement between the State of Arizona and the Federal Land Management Agencies of the Department of Interior and the USDA Forest Service January 2004. Local fire departments and fire districts can provide initial attack response for non-vegetation fires under the authority of mutual aid agreements between the individual departments. Local fire departments and fire districts can provide structure protection for the ASCWPP WUI under the authority of mutual aid agreements between the individual departments or under the IGA's each fire department or fire district has with the Arizona State Forester.

The ASCWPP includes the communities of Arivaca and Sasabe and is mostly contained within the AVFMP area. Sasabe is accessible from the north by way of SR 286, or from the south through Mexico. Arivaca is accessible from Arivaca Road either from I-19 to the east or from SR 286 to the west. The east-west corridor of Arivaca Road links the two communities. BANWR, Arizona State Trust lands, BLM TFO lands and private properties lie between the two communities. Private lands within the ASCWPP planning area are found primarily in three areas: Arivaca, Sasabe, and the outlying area of Moyza Ranch.

Land uses in the planning area consist primarily of residences; community businesses, such as the Arivaca Mercantile and the Sasabe Store; community services, such as the Arivaca Clinic, Caviglia Arivaca Library, and Carivaca (an assisted-living facility). Surrounding areas are dominated by BANWR and private properties. Land uses within or close to the WUI include mining, fuelwood cutting, hunting, and other recreational activities (e.g., hiking, bird watching, nature study, photography, and off-road vehicle use). A more detailed community assessment is found in Section II.E below.

The State is one of the primary landowners on the periphery of the planning area; State Trust lands often surround developed private land parcels. State Trust lands are administered by ASLD, are managed primarily for livestock grazing, and account for 36% (18,145 acres) of the WUI. The primary block of Federal land in the ASCWPP area consists of portions of the 116,000-acre BANWR, which runs north to

south in the middle of the planning area and is administered by the FWS. Formerly a private ranch, the FWS established BANWR to support the restoration of native grasslands and the reintroduction of the masked bobwhite quail. Management goals of BANWR are outlined in its *Comprehensive Conservation Plan* (USDI Fish and Wildlife Service 2003). Livestock grazing has been excluded from the area since its conversion to a wildlife refuge. The ASCWPP includes 13,817 acres of BANWR lands (27% 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 Figures 2.11 and 2.12.

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.

E. Summary of Community Assessment and Cumulative Risk Analysis

1. Community of Arivaca

Arivaca is located 11 miles north of the US border with Mexico and is primarily a retirement and residential area. Many residents commute to Tucson and Green Valley for employment; however, there is limited retail-trade and service-sector employment within the community. Tourism and agriculture contribute significantly to the local economy. The name Arivaca is derived from *la Aribac*, an Indian word meaning “small springs.” The area was originally mapped by Father Kino in 1695 and has some of the nation’s oldest mines. Spaniards settled the area of Arivaca in the nineteenth century, and in 1833 the Mexican Government approved the formation of the Aribac Ranch on 8,677 acres to raise cattle and horses. Arivaca has been recognized as a community since 1878 and includes significant community assets ranging from the ghost town of Ruby to the Arivaca Health Services Clinic. Arivaca’s community values are mapped in Figure 2.11. The area surrounding Arivaca provides substantial outdoor recreation, including large- and small-game hunting, fishing and camping at nearby Arivaca Lake, and supports visitation to BANWR. The demographic profile derived from the 2000 census shows a population of over 900 residents and 550 housing units. The AFD provides structural and wildland fire protection to the community. The ASCWPP considered wildland fire threat to the community of Arivaca from the heavily vegetated riparian corridor of Arivaca Creek and the associated drainages where heavy riparian vegetation associations occur in relation to higher slopes and southerly and southwesterly exposures. Arivaca is composed of Condition Class 2 lands within the majority of uplands and Condition Class 3 lands associated with the riparian corridor, where the fuel hazard rating is mostly high. The extensive private developments within and adjacent to the riparian corridor of Arivaca Creek has complicated AFD’s structural and wildland fire response.

Because of the riparian 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 riparian areas. Much of the undeveloped lands within Arivaca 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. Some residents in Arivaca have poor ingress and egress routes, limited communication capabilities, and limited effective evacuation and firefighting response during daytime hours because of the limited availability of the department's volunteer staff.

Arivaca includes a variety of vegetative types, such as grassland, semidesert, and deciduous riparian species, in the Arivaca Creek corridor. 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 Arivaca, especially for the removal of nonnatives and understory riparian vegetation within the creek corridor 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. Community of Sasabe

The community of Sasabe is adjacent to the US-Mexico Border and includes a US Customs and Border Protection port of entry. The Sasabe Port of Entry is designed and authorized to accept entries of merchandise, to collect duties, to allow for travel, and to enforce the various provisions of the customs and navigation laws (19 CFR §101.1) with Mexico. Sasabe is also home to the Rancho De La Osa Guest Ranch, the Sasabe Store and gas station, outlying ranches, and local residences. Sasabe's community values are mapped in Figure 2.12. The proximity of Sasabe to the US-Mexico border does create unique considerations for wildfire suppression and management within and adjacent to the WUI. The demographic profile derived from the 2000 census shows a population of over 120 residents and 75 housing units. The BANWR, through an agreement with ASLD, provides wildland fire protection to the community. ASCWAC considered wildland fire threat to the community of Arivaca from desert grassland and shrubland vegetation associations that occur in relation to higher slopes and southerly and southwesterly exposures. Sasabe is primarily composed of Condition Classes 2 and 3 lands within the majority of upland vegetative types, where the fuel hazard rating is mostly moderate with the exception of areas that are heavily infested with Lehman's lovegrass. The private developments within and adjacent to the US-Mexico border complicates fire response for management within the WUI. An ignition in Mexico poses a unique wildland fire threat to Sasabe residents, as suppression resources in Mexico are limited to nonexistent. US firefighting forces have the ability to respond to wildland fires within 10 miles of the US Mexico border under the Emergency Mutual Assistance Operating Plan (EMAOP). The ability of US Fire responders to implement the International EMAOP should be evaluated and rehearsed. This would assist the adjoining El Sasabe and help prevent fire crossing the International border. The ASCWPP recommends wildland fuel reduction treatments adjacent to private residents, critical infrastructures, and the port of entry to ensure protection during wildland fire.

3. Buenos Aires National Wildlife Refuge (BANWR)

BANWR is located primarily within the Altar Valley in southeastern Arizona. The BANWR extends about 25 miles north from the international border with Mexico. The headquarters is 65 miles from Tucson. The twin border towns of Sasabe, Arizona, and El Sasabe, Sonora, lie adjacent to the southwestern corner of the Refuge. The BANWR is a landscape consisting of rippling grassland flanked by mountains, as well as riparian zones rich in bird life. The BANWR provides approximately 118,000 acres of habitat for threatened and endangered plants and animals. The semidesert grassland supports the reintroduction of pronghorns and masked bobwhite quails. Prescribed and natural fires play a major role in maintaining and restoring the sea of grass that once filled the Altar Valley. Riparian areas along Arivaca Cienega and Creek attract an abundance of birds. Brown Canyon is nestled in the Baboquivari Mountains, where a sycamore-lined stream meanders through oak woodland. Wildland Fire Management and Refuge goals state that

. . . fire is a critical part of the ecological processes in the Refuge effort to produce (and then maintain) habitat for the masked bobwhite quail. The Refuge CCP states that, 'Prescribed burning is essentially the only management technique available to assist in the management of the masked bobwhite quail and restoration of native grasslands.' (USDI Fish and Wildlife Service 2005:4)

The BANWR Fire Management Plan provides a detailed program of action to implement fire management policies and objectives (see USDI Fish and Wildlife Service 2005:9). 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 Figures 2.13 and 2.14 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

| ASCWPP communities | High risk (%) | Acres | Moderate risk (%) | Acres | Low risk (%) | Acres | Total acres |
|---------------------------|----------------------|---------------|--------------------------|---------------|---------------------|--------------|--------------------|
| Arivaca area | 19 | 9,597 | 47 | 23,864 | 5 | 2,629 | 36,090 |
| Sasabe area | 9 | 4,748 | 18 | 8,939 | 2 | 975 | 14,662 |
| Total WUI acres | 28 | 14,345 | 65 | 32,803 | 7 | 3,604 | 50,752 |

Source: Logan Simpson Design Inc.

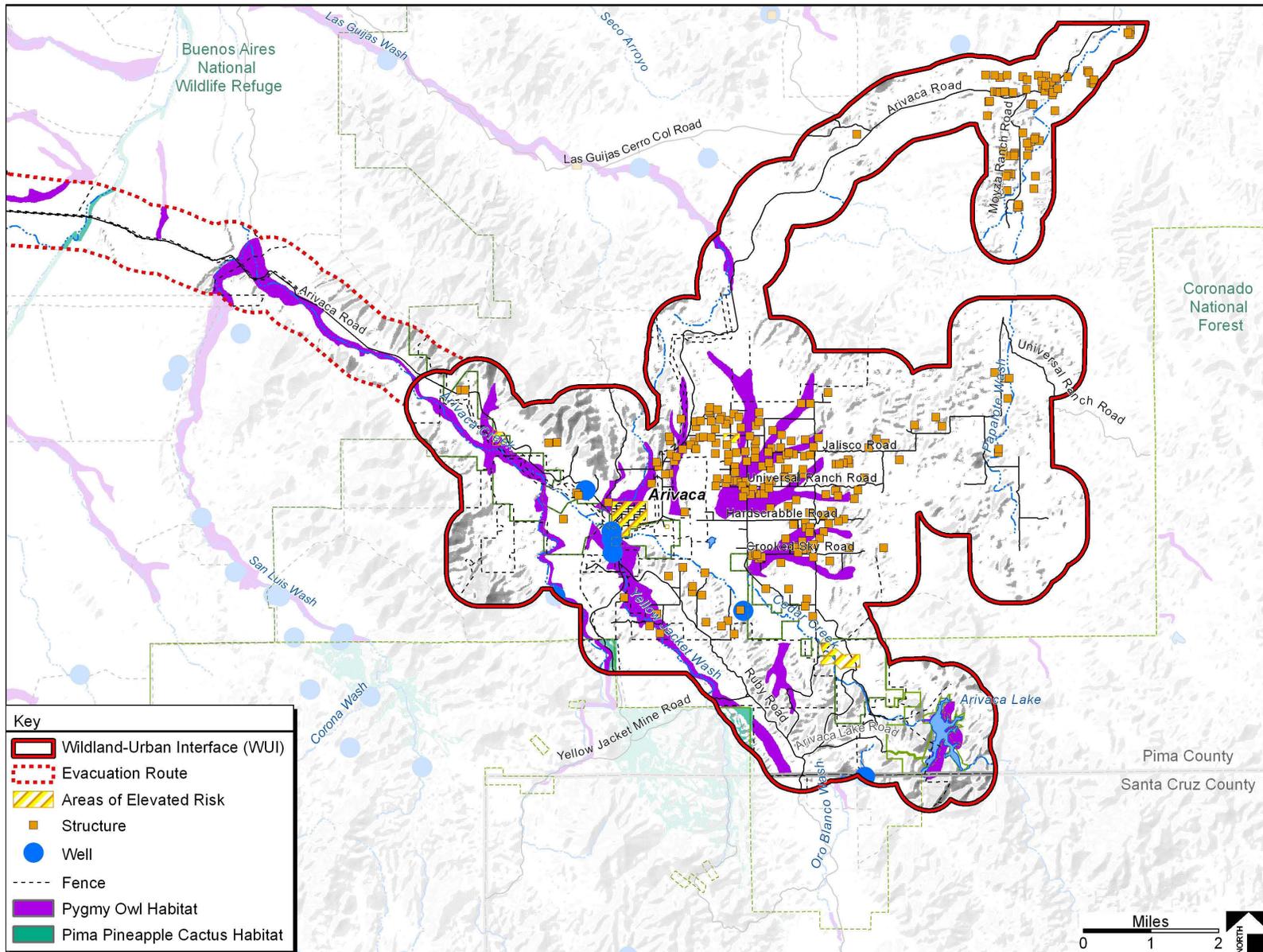


Figure 2.11. Arivaca community values

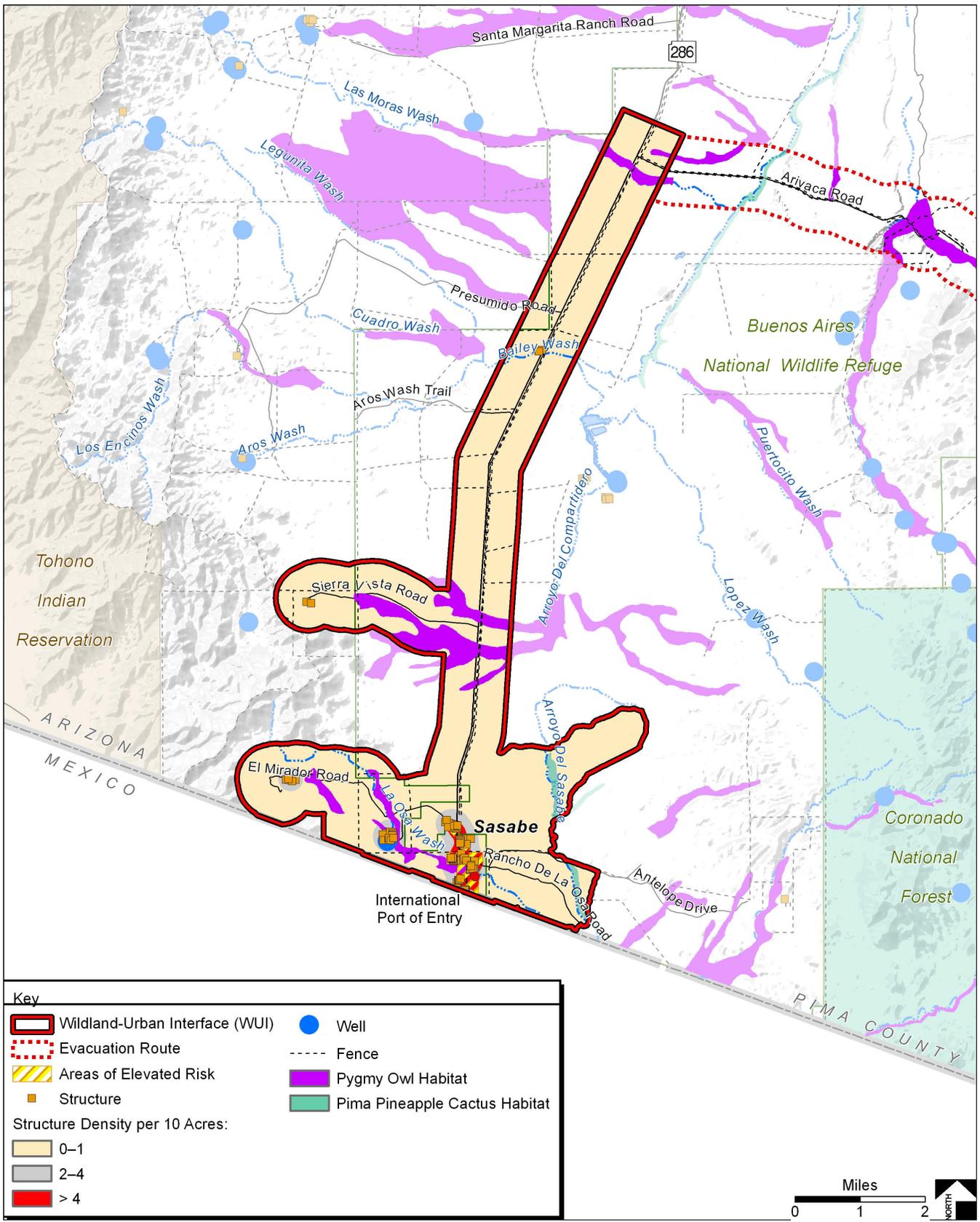


Figure 2.12. Sasabe community values

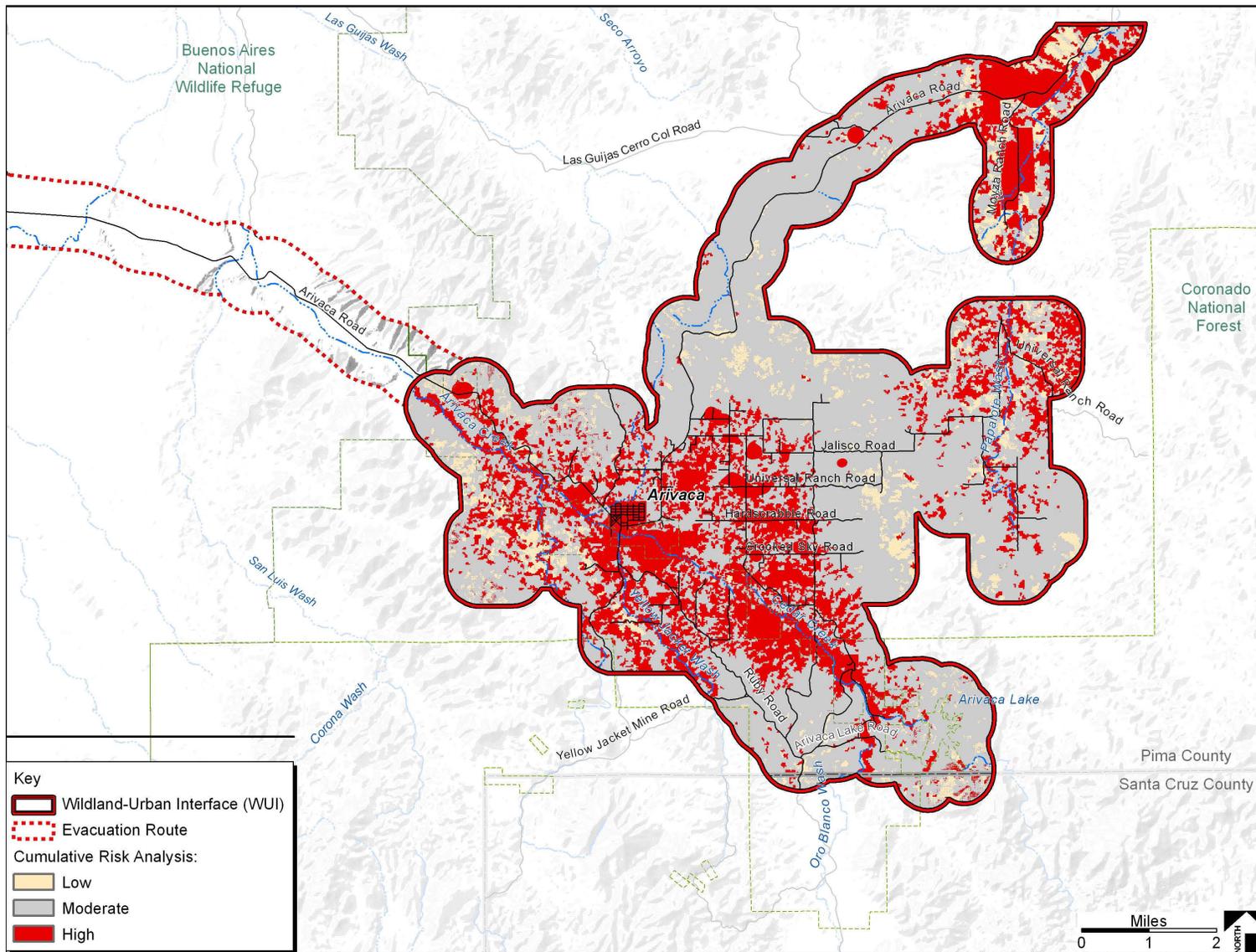
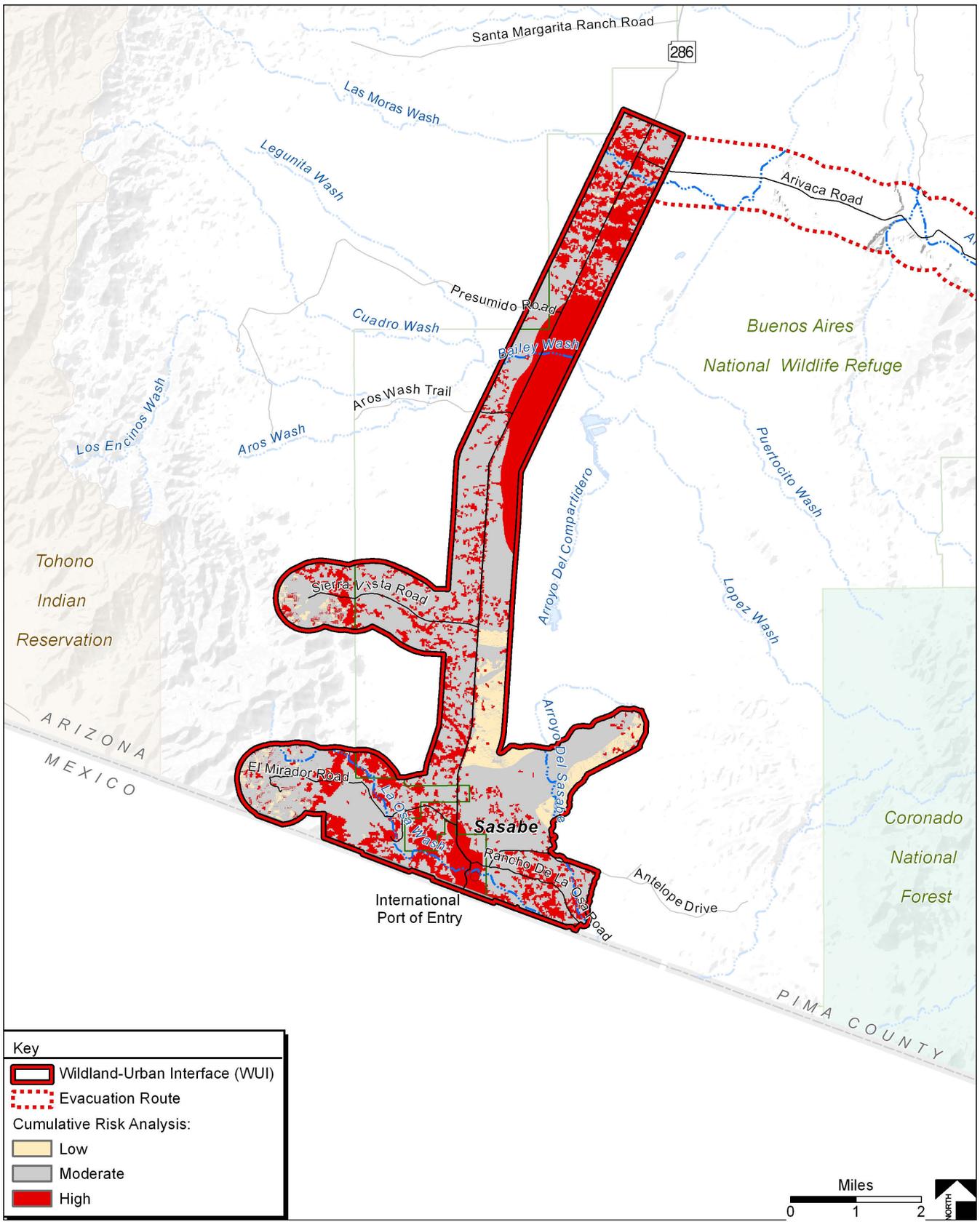


Figure 2.13. Arivaca cumulative risk analysis



III. COMMUNITY MITIGATION PLAN

This section outlines ASCWAC's 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 Arivaca and Sasabe's 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), ASCWAC developed a series of proposed actions, including residential treatments; a series of firebreaks appropriate for the wildland fuel type; and fuel mitigation treatments for broader land areas. Wildland fire mitigation projects have been proposed by BANWR and ASLD Forestry Division as well as by ASCWAC 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 creating a defensible space for wildland firefighters. These recommendations will allow fire managers to reduce the wildfire hazard on public and private lands through the reduction of hazardous fuels. A primary goal of ASCWAC is for proposed treatments to be continuous across property boundaries, allowing for the most effective protection from wildfires.

Hazardous fuels reduction recommendations on BANWR, State Trust, and other public lands varies by constituting either a single firebreak in appropriate width and length within the WUI or in 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 ASCWAC. Firebreak recommendations in vegetative fuel types were developed by BANWR, ASLD Forestry Division, and the ASCWAC participating resource specialist, based on firebrand movement during peak fire season under normal weather conditions in relation to slope and fuel type. The recommended land treatments and fuel breaks will enhance public and firefighter safety, provide for community value protection, enhance restoration of native vegetation, and provide for wildlife habitat needs.

The recommended wildland fuel and fire break recommended treatments meet the ASCWPP goals of enhancing firefighter and public safety, reducing hazardous wildland fuels on both public and private lands, improving fire prevention and suppression, restoring riparian health, involving the community, protecting the ecosystem, and expediting project implementation. To prioritize wildland fuel mitigation projects, ASCWAC analyzed wildland fuel hazards, fire history, and community values. This combined risk assessment was compiled onto a single map for each community that depicts areas of low-, moderate-, and high-risk evaluations (Figures 2.13 and 2.14). 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 addition, each management area has been labeled according to the community in which the management area is located. In the ASCWPP, 49 management units were identified and given overall risk values (Figures 3.1 and 3.2). These management units were then given a general description as to location in the WUI, and recommended treatments were assigned (Table 3.1).

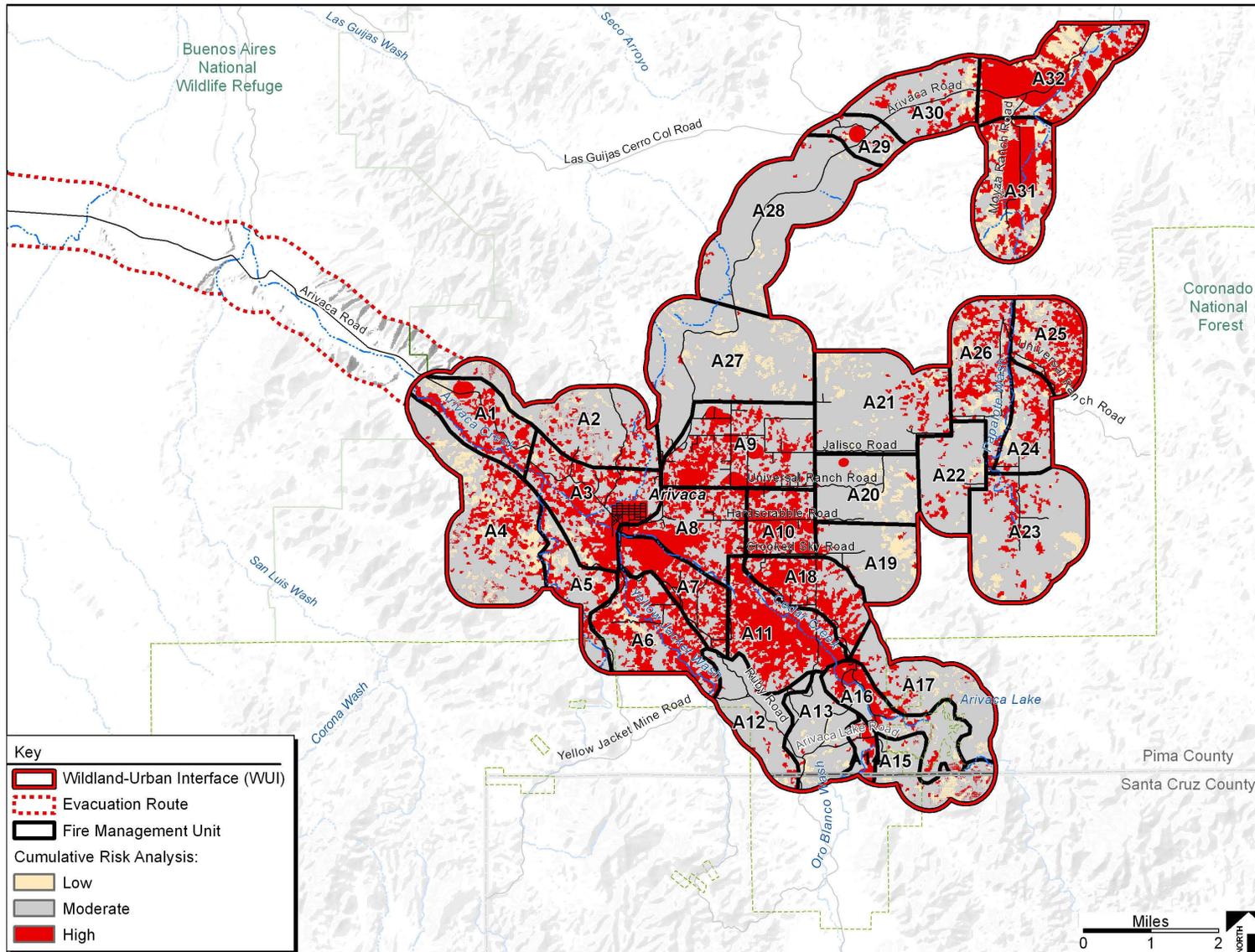


Figure 3.1. Arivaca treatment management units

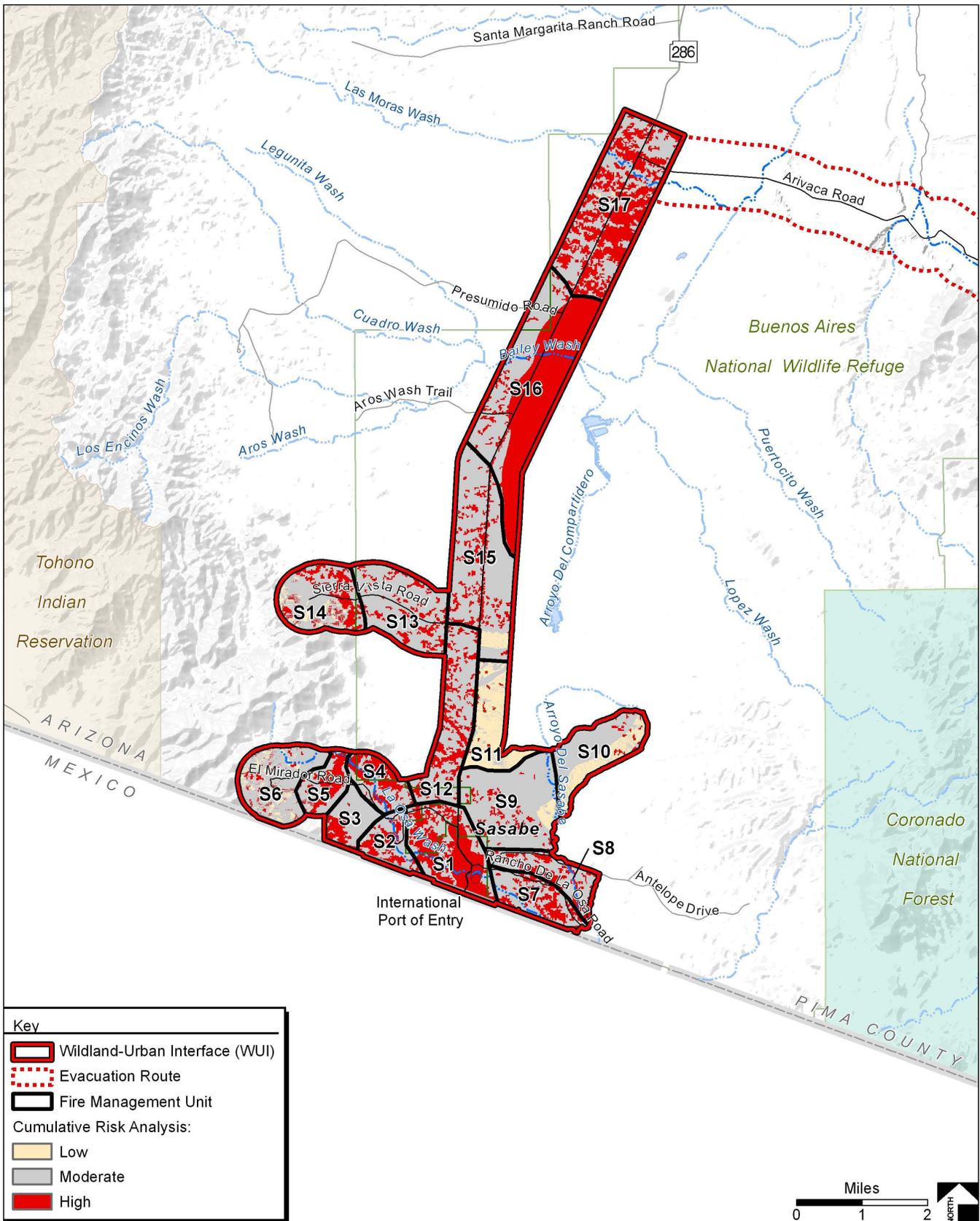


Figure 3.2. Sasabe treatment management units

Arivaca Sasabe Community Wildfire Protection Plan
January 2007

Table 3.1. Identified treatment management units

| Treatment management area | Map ID | Risk value | Location and description | Recommended treatment^a | Total acres | Federal acres | Non-Federal acres |
|----------------------------------|---------------|-------------------|--|--|--------------------|----------------------|--------------------------|
| Arivaca | A1 | High | Along Arivaca Road west of the community | 3,4,5,6 | 907 | 636 | 271 |
| Arivaca | A2 | Moderate/ Low | Land north of the community | 1,2,3,4,5 | 1,403 | 511 | 892 |
| Arivaca | A3 | High | Lands including and immediately surrounding the community | 1,2,3,4,5 | 1,380 | 377 | 1,003 |
| Arivaca | A4 | Moderate/ Low | Area to the southwest of the community | 3,4,5 | 1,995 | 560 | 1,435 |
| Arivaca | A5 | Moderate | Lands south of the community bordered by Yellow Jacket Wash on the north | 3,4,5 | 688 | 222 | 466 |
| Arivaca | A6 | High | Land to the south and east of the community, including Yellow Jacket Wash | 1,2,3,4,5,6,7,9 | 1,234 | 35 | 1,199 |
| Arivaca | A7 | High | Land southeast of the community immediately south of Ruby Road | 1,2,3,4,5,6,7,9 | 775 | 87 | 688 |
| Arivaca | A8 | High | Land east of the community immediately north of Ruby Road | 1,2,3,4,5,6 | 1,022 | 137 | 885 |
| Arivaca | A9 | High | Land northeast of the community immediately north of Universal Ranch Road | 1,2,3,4,5,6 | 1,677 | 0 | 1,677 |
| Arivaca | A10 | High | Area south of Universal Ranch Road and north of Crooked Sky Road | 1,2,3,4,5,6 | 655 | 1 | 654 |
| Arivaca | A11 | High | Land surrounding Cedar Creek southeast of the community | 3,4,5,7,9, | 1,270 | 319 | 951 |
| Arivaca | A12 | Moderate | Area west of Ruby Road and the Arivaca Lake Road junction | 3,4,5,8 | 873 | 105 | 768 |
| Arivaca | A13 | Moderate | Area east of Ruby Road and the Arivaca Lake Road junction | 3,4,5,8 | 791 | 51 | 740 |
| Arivaca | A14 | High | Land surrounding Yellow Jacket Wash east of Ruby Road and south of Arivaca Lake Road | 3,4,5,7,9 | 206 | 4 | 202 |
| Arivaca | A15 | Moderate/ Low | Lands to the west and south of Arivaca Lake | 3,4,5,7,8,9 | 722 | 501 | 221 |
| Arivaca | A16 | High | Land following Cedar Creek, including the area surrounding Arivaca Lake | 3,4,5,6,7,8,9 | 871 | 689 | 182 |
| Arivaca | A17 | Moderate/ Low | Land east and north of Arivaca Lake | 3,4,5,8 | 1,082 | 1,001 | 81 |

Continued

Table 3.1. Identified treatment management units

| Treatment management area | Map ID | Risk value | Location and description | Recommended treatment^a | Total acres | Federal acres | Non-Federal acres |
|----------------------------------|---------------|-------------------|--|--|--------------------|----------------------|--------------------------|
| Arivaca | A18 | High | Land north of Cedar Creek and east of the community | 1,2,3,4,5,6 | 868 | 47 | 821 |
| Arivaca | A19 | Low | Land east of Crooked Sky Road | 1,2,3,4,5,6 | 886 | 0 | 886 |
| Arivaca | A20 | Low | Lands immediately east of Universal Ranch Road | 1,2,3,4,5,6 | 1,006 | 0 | 1,006 |
| Arivaca | A21 | Low | Land north of Jalisco Road | 1,2,3,4,5,6,8 | 1,772 | 0 | 1,772 |
| Arivaca | A22 | Moderate | Land east of A20, southwest of Papalote Wash | 3,4,5,8 | 875 | 0 | 875 |
| Arivaca | A23 | Moderate | Uplands southeast of Papalote Wash | 1,2,3,4,5,6 | 1,856 | 0 | 1,856 |
| Arivaca | A24 | Moderate | Area east of Papalote Wash and south of Universal Ranch Road | 1,2,3,4,5,6 | 660 | 0 | 660 |
| Arivaca | A25 | High | Land northeast of Universal Ranch Road in the far east-central portion of the WUI | 1,2,3,4,5,6 | 810 | 0 | 810 |
| Arivaca | A26 | High | Area west of Papalote Wash and west of Universal Ranch Road in the far east-central portion of the WUI | 1,2,3,4,5,6 | 1,139 | 0 | 1,139 |
| Arivaca | A27 | Low | Area northeast of the community along Arivaca Ranch Road | 3,4,5,6,8 | 2,321 | 0 | 2,321 |
| Arivaca | A28 | Low | Area along Arivaca Ranch Road southwest of the junction with Las Guijas Cerro Col Road | 3,4,5,6,8 | 2,117 | 322 | 1,795 |
| Arivaca | A29 | High | Area along Arivaca Ranch Road and north of the junction with Las Guijas Cerro Col Road | 1,2,3,4 | 378 | 326 | 52 |
| Arivaca | A30 | Moderate | Area along Arivaca Ranch Road west of Moyza Ranch Road | 3,4,5,6 | 1,023 | 128 | 895 |
| Arivaca | A31 | High | Lands surrounding Moyza Ranch Road south of Arivaca Ranch Road | 1,2,3,4,5,6 | 1,352 | 0 | 1,352 |
| Arivaca | A32 | High | Area to the east of the Arivaca Ranch Road and Moyza Ranch Road junction | 1,2,3,4,5,6 | 1,478 | 0 | 1,478 |
| Sasabe | S1 | High | Land along SR 286 at the community center including the port of entry adjacent to the Mexico border | 1,2,3,4,6,9 | 907 | 360 | 547 |

Continued

Table 3.1. Identified treatment management units

| Treatment management area | Map ID | Risk value | Location and description | Recommended treatment^a | Total acres | Federal acres | Non-Federal acres |
|----------------------------------|---------------|-------------------|---|--|--------------------|----------------------|--------------------------|
| Sasabe | S2 | High | Land west of the community, along the Mexico border | 1,2,3,4,6,9 | 355 | 7 | 348 |
| Sasabe | S3 | Moderate | Land west of S2 south of El Mirador Road adjacent to the Mexico border | 3,4,5,8 | 340 | 0 | 340 |
| Sasabe | S4 | High | Area along La Oso Wash northwest of the community and El Mirador Road | 3,4,5,6,8,9 | 395 | 142 | 253 |
| Sasabe | S5 | High | Area surrounding El Mirador Road | 1,2,3,4,6 | 344 | 0 | 344 |
| Sasabe | S6 | Low | Southwestern-most portion of the WUI adjacent to the Mexico border | 3,4,5,8 | 738 | 0 | 738 |
| Sasabe | S7 | Moderate | Area east of the community and south of Rancho De La Oso Road adjacent to the Mexico border | 3,4,5,6,8 | 487 | 0 | 487 |
| Sasabe | S8 | Moderate | Area east of the community and north of Rancho De La Oso Road | 3,4,5,6,8 | 479 | 477 | 1 |
| Sasabe | S9 | Moderate | Area northeast of the community immediately west of Arroyo del Sasabe | 5,6,8 | 1,159 | 1,118 | 41 |
| Sasabe | S10 | Low | Area to the northeast of the community and east of Arroyo del Sasabe | 5,6,8 | 709 | 709 | 0 |
| Sasabe | S11 | Low | Area north of the community immediately west of SR 286 and south of the Sierra Vista Road | 3,4,5,6,8 | 619 | 619 | 0 |
| Sasabe | S12 | Moderate | Area north of the community immediately east of SR286 and south of the Sierra Vista Road | 3,4,5,6,8 | 954 | 848 | 106 |
| Sasabe | S13 | Moderate | Area north of the community immediately east of SR 286 and including Sierra Vista Road south of the Sierra Vista Road | 3,4,5,6 | 936 | 926 | 10 |
| Sasabe | S14 | High | Area east side of Sierra Vista Road, including the Sierra Vista Ranch | 1,2,3,4,5,6 | 762 | 43 | 719 |
| Sasabe | S15 | Moderate | Area along SR 286 north of the Sierra Vista Road junction | 3,4,5,6,8 | 1,552 | 1,552 | 0 |
| Sasabe | S16 | High | Area along SR 286, including the Aros Wash Trail, and Presumido Road junction | 3,4,5,6,8 | 2,121 | 1,961 | 160 |
| Sasabe | S17 | Moderate | Area along SR 286 from the Presumido Road junction to the junction with Arivaca Road | 3,4,5,6,8 | 1,803 | 1,803 | 0 |

^aFor recommended treatment codes, see Table 3.2.

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 | Stream beds, channels, and slopes ≥ 20 | Slopes < 20 | Slopes ≥ 20 | Landscape treatment outside of firebreaks | Firebreaks |
| Vegetation | <p>Remove ladder fuels by pruning the lower third of trees or shrubs up to a maximum of 8 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 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>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>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>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 piled; inaccessible areas may be treated with periodic prescribed fire (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, 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 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 in steep slopes. Rx may be used to reduce unmanageable 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.</p> <p>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). All trees > 10 inches drc will be targeted as leave trees unless 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 applied to achieve like conditions. Shrub and tree trunks will be severed less than 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, to limit fine fuel loading while protecting soil integrity from rainfall runoff.</p> |
| Slash | <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; and reduce natural flammable material 2–4 feet above the ground around improvements.</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 2.</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 < 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> | |

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

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 FS and BLM standards and guides.</p> <p>Rx on BLM 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 over 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. 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 BLM land is 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 8 feet 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 desert shrub/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 in order 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 down slope 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> |

Notes: BA = basal area; drc = diameter at root collar

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 AFD. Therefore, ASCWAC recommends that wildland fuel reduction treatments on small residential parcels normally include that slash will be removed whole or chipped and transported to a disposal site. The ASCWAC 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* (National Resource Conservation Service 2002). The ASCWAC 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 fuel wood. Commercial use of the woody material from fuel reduction treatments is also primarily limited to fuel wood, and any commercial value of treatment by-products will not affect 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 the 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, ASCWAC investigated costs associated with the use of the Arizona Department of Corrections (DOC) Inmate Fire and Fuels Crew through the established agreement with ASLD Division of Forestry. 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 ASLD Division of Forestry Crew Carrier, are as follows:

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

The ASCWAC recommends that the wildland fuel modification project be contracted to the DOC 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 ASLD Forestry Division for the DOC fire and fuel inmate crew costs for both Federal and nonfederal land treatments. The DOC fire and fuels mitigation crews do not remove hazard trees or provide “climbers” for pruning or segmented tree removal sometime required on private lands. The ASCWAC 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 DOC 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 associations | 1 to 2 acres per day (depending on fuel loading) |
| Grassland associations | 2 to 4 acres per day (depending on grass type and fuel loading) |

The ASCWAC 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 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 property 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; the removal of other ground fuels, ladder fuels, and diseased, dying, and dead trees; and the 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 must be 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 ASCWPP 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 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) and to be consistent with the BANWR Fire Management Plan and also complement the Altar Valley Fire Management Plan.

B. Prevention and Loss Mitigation

The ASCWPP will be used as a resource to assist in the coordination of long-term interagency mitigation of catastrophic wildfire events in the communities. The goals of the ASCWPP area are to

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

The ASCWPP 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 communities of Arivaca and Sasabe have made the following action recommendations:

1. Improved Protection Capability and Reduction in Structural Ignitability

The ASCWAC considers the risks of wildland fire igniting and spreading throughout the WUI a serious threat. The AFD, BANWR, ASLD, CNF, and ASCWAC believe actions to reduce fire risks and promote effective responses to wildland fires must be undertaken. The following are recommendations to enhance protection capabilities in the communities of Arivaca and Sasabe:

- a. Obtain water tender for AFD use, maintain helicopter landing sites, and update mapping capabilities of AFD.
- b. Obtain a new type 6 engine for wildland fire response by AFD.
- c. Improve dispatch and alerting capabilities by establishing a community emergency alert system; the County, communities, and Federal and State agencies should jointly investigate this. The alerting system could include the development of a community warning system through a local “phone tree” and the use of local ham radio operators.
- d. Obtain a chipper/shredder for use by AFD for wildland fuel mitigation projects.
- e. Implement GIS software, laptops and GPS to update mapping capabilities of AFD.
- f. Obtain property for a permanent headquarters and housing structure for AFD.
- g. Construct a permanent headquarters and housing structure for AFD.
- h. Obtain OSHA compliant fuel pad for AFD.
- i. Retrofit wells for AFD use and maintain helicopter landing sites.
- j. Site and construct burn pits for use in the local area.
- k. Additional comprehensive and frequent training for firefighters should be jointly conducted by BANWR, ASLD, Pima County Fire Association, CNF, BLM Gila District and AFD. A common training activity should be conducted once a year before the fire season for the purpose of emphasizing tactics of WUI suppression and interagency coordination. Continuing WUI fire suppression training must be made available to volunteer firefighters of AFD.
- l. Develop a volunteer recruitment and retention plan for AFD.
- m. Pursue and maintain mutual aid agreements for structure fire response within the WUI and work with Mexico to provide fire assistance across the international border under the EMAOP.
- n. Develop and deploy firehouse message signs including current fire danger signs, bilingual wildfire caution signs for camping areas within the riparian corridor, roadside identification and directional signage to residences, water sites for firefighting use, and helicopter landing sites.
- o. Work with Pima County to develop a notification and evacuation plan for the community.
- p. Develop a presuppression plan with CNF along the southern boundary of the Arivaca WUI area.

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

The County and communities will develop and implement public outreach programs to help create an informed citizenry. The goal is to have residents support concepts of Firewise landscaping and naturally functioning riparian systems through restoration management and rapid response to wildland fire. The ASCWPP 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 education 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 AFD, use of the BLM Fire Prevention Public Information Trailer at community events, and the development of specific promotional materials by BANWR. Efforts should also be made to coordinate outreach effort with hunting season, which brings a large number of visitors to the community. ASCWAC 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 ASLD Forestry Division, BLM, and FWS.
- b. Place and maintain bilingual wildfire caution signs within camping areas and access routes in the riparian corridor of the WUI.
- c. Complete the wildland fire home assessment through the use of Redzone software and submit wildland fire hazard mitigation strategies for each private property to landowners.
- d. Replace and maintain fencing adjacent to the riparian corridor to prevent illegal off-road vehicle use.

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

The County and communities will continue to support and promote private contractors who perform fire-safe mitigation work. The communities will continue to support and promote new businesses involved in the wildland fuel reduction market. The communities of Arivaca and Sasabe are committed to encouraging, as appropriate, the use of vegetative by-products from the WUI fuel management program. 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. ASCWPP PRIORITIES: ACTION RECOMMENDATIONS AND IMPLEMENTATION

ASCWAC 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 ASCWAC. A unified effort to implement this collaborative plan requires timely decision making at all levels of government.

To meet ASCWPP objectives, ASCWAC developed the following action recommendations. At the end of each year, projects implemented from these action recommendations will be monitored for effectiveness of meeting ASCWPP objectives. For the life of the ASCWPP, 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 ASCWPP. Establishing a unified effort to collaboratively implement the ASCWPP embraces adaptive management principles that enhance decision making and reduce inconsistency at all levels of government.

Therefore, ASCWAC and the Arivaca Fire Chief recommend the establishment of a community-driven Firewise committee to work with the AFD to accomplish the recommendations for outreach and structural ignitability within the ASCWPP WUI area, which includes fuel hazards removal on private lands within the WUI. The community group should consist of community members, members of the AFD and additional representation as needed by PCOEM, ASLD, FWS, and CNF. The agencies involved in the formation of this plan support community efforts and will work with the communities as needed to accomplish action items. The BANWR, CNF, ASLD, and BLM will be responsible for fuel mitigation projects on public lands within the WUI. The AFD and the established community Firewise committee will be responsible to submit requests for resources. 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, the Department of Homeland Security and the Pima County Cooperative Extension on the contracting work required for attaining work crews to implement fuels mitigation projects within the WUI boundary. The BANWR, CNF and BLM 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 ASCWPP goals.

B. Priorities for Mitigation of Hazardous Wildland Fuels

Tables 4.1 and 4.2 display the priority for construction of firebreaks and landscape wildland fuel treatments within the WUI as recommended by ASCWAC. These action recommendations will reduce wildfire potential to the community and have "high" valuations for reducing wildland fire risk to the communities of Arivaca and Sasabe.

Table 4.1. Action recommendations for construction of firebreaks in Arivaca portion of WUI

| Management area | Location and description | Project partners | Estimated treatment costs^a |
|------------------------|---|---------------------------------|---|
| A3 | Firebreak #1- Lands including and immediately surrounding the community | AFD, FWS, ASLD, and Pima County | 1,003 acres to be treated for \$300.00/acre = \$300,900 |
| A7 | Firebreak #2- Land southeast of the community immediately south of Ruby Road | AFD, FWS, ASLD, and Pima County | 775 acres to be treated for \$300.00/acre = \$232,500 |
| A11 | Firebreak #3- Land surrounding Cedar Creek southeast of the community | AFD, FWS, ASLD, and Pima County | 1,270 acres to be treated for \$300.00/acre = \$381,000 |
| A8 | Firebreak #4- Lands east of the community of Arivaca | AFD, FWS, ASLD, and Pima County | 1,023 acres to be treated for \$300.00/acre = \$306,900 |
| A31 | Firebreak #5- Lands surrounding Moyza Ranch Road south of Arivaca Ranch Road | AFD, ASLD, and Pima County | 1,352 acres to be treated for \$300.00/acre = \$405,600 |
| A32 | Firebreak #6- Area to the east of the Arivaca Ranch Road and Moyza Ranch Road junction | AFD, ASLD, and Pima County | 1,478 acres to be treated for \$300.00/acre = \$443,400 |
| Firebreak maintenance | One- to two-year rotating maintenance of fine and light fuels in Firebreaks 1 through 6 | FWS, ASLD, CNF, and Pima County | 6,901 acres to be maintained on a 3-year interval |

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

Table 4.2. Action recommendations for construction of firebreaks in Sasabe portion of WUI

| Management area | Location and description | Project partners | Estimated treatment costs^a |
|------------------------|---|----------------------------|---|
| S1 | Firebreak #1- Land along SR 286 at the community center including the port of entry adjacent to the Mexico border | FWS, ASLD, and Pima County | 907 acres to be treated for \$300.00/acre = \$272,100 |
| S2 | Firebreak #2- Land west of the community, along the Mexico border | FWS, ASLD, and Pima County | 355 acres to be treated for \$300.00/acre = \$106,500 |
| S6 | Firebreak #3- Area surrounding El Mirador Ranch | FWS, ASLD, and Pima County | 738 acres to be treated for \$300.00/acre = \$221,400 |
| S14 | Firebreak #4- Area east side of Sierra Vista Road including the Sierra Vista Ranch | FWS, ASLD, and Pima County | 762 acres to be treated for \$300.00/acre = \$228,600 |
| S7 | Firebreak #5- Area east of the community and south of Rancho De La Oso Road adjacent to the Mexico border | FWS, ASLD, and Pima County | 487 acres to be treated for \$300.00/acre = \$146,100 |
| S16 | Firebreak #6- Lands north of Sasabe along the east side of SR 286 containing an area of high ignition potential | FWS, ASLD, and Pima County | 2,121 acres to be treated for \$300.00/acre = \$636,300 |
| Firebreak maintenance | One- to two-year rotating maintenance of fine and light fuels in Firebreaks 1 through 6 | FWS, ASLD, and Pima County | 5,370 acres to be maintained on a 3-year interval for |

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

C. Priorities for Protection Capability and Reduced Structural Ignitability

The ASCWPP communities will evaluate, maintain, and, where necessary, upgrade community wildfire preparation and response facilities, capabilities, and equipment. Table 4.3 lists the priority action recommendations.

Table 4.3. Action recommendations for wildland fire protection and reduced ignitability

| Partners | Project ^a | Equipment/expenses | Timeline |
|--------------------------------------|--|---|---|
| AFD, ASLD, CNF, Pima County and FWS. | E1- Obtain three medium-size water tenders (better able to traverse rural landscape than larger units) | 1,500-gal capacity water tenders; two 4-wheel drive:\$65,000 one 2-wheel drive:\$55,000 | Acquire 1 tender in FY2007/08; Acquire 2 additional tenders in FY 2009/10 |
| AFD, ASLD, CNF, Pima County and FWS. | E2- Obtain two fully functional type 6 engines | Type 6 fire response brush engine: \$60,000 each | Acquire 1 engine in FY 2007/2008; Acquire second engine when crew is trained; implement use in FY 2007 |
| AFD, ASLD, CNF, Pima County and FWS. | E3- Enhance dispatch and alerting capabilities including GPS units for field operations | Enhancement of existing radio repeater for alert-paging capabilities | Assess costs in FY 2007; install in FY 2007/08 |
| AFD, ASLD, CNF, Pima County and FWS. | E4- Obtain one multipurpose utility vehicle with attachments for chipping, brush cutting, and min-water tending, such as Bobcat Toolcat | Multipurpose utility vehicle: \$35,000 | Acquire in FY 2007/08; implement use in FY 2007 |
| AFD, ASLD, CNF, Pima County and FWS. | E5- Develop GIS capability (software and hardware) within AFD in coordination with agency partners to update CWPP 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 |
| AFD, ASLD, CNF, Pima County and FWS. | I1- Acquire 5 acres adjacent to existing station for new command, training, and quarters building | Purchase 5 acres (use nonprofit status to give tax break to seller): \$45,000. | Acquire in FY 2007/08 |
| AFD, ASLD, CNF, Pima County and FWS. | I2- Construct OSHA-compliant command, training, and quarters facility for fire personnel to include 24-hr response capability | Modular building using green building as practical; passive solar heating and cooling: \$100,000.00 | Construct in FY 2008/09 |
| AFD, ASLD, CNF, Pima County and FWS. | I3- Construct OSHA-compliant pad for fuel station; transfer fuel tanks on loan to AFD to station | Construct pad and hire crane to lift tanks: \$18,000. | Construct in FY2007/08 |

Continued

Table 4.3. Action recommendations for wildland fire protection and reduced ignitability

| Partners | Project ^a | Equipment/expenses | Timeline |
|--------------------------------------|--|--|--|
| AFD, ASLD, CNF, Pima County and FWS. | I4- Retrofit existing wells or water supplies for AFD 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 |
| AFD, ASLD, CNF, Pima County and FWS. | I5- Work with land agencies to construct two or three "burn pits" for slash too small to use and noxious weeds not good for compost | Excavate pit and fence: \$20,000 | Begin planning with agencies FY 2007/08; implement FY 2007/08 |
| AFD, ASLD, CNF, Pima County and FWS. | 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 |
| AFD, ASLD, CNF, Pima County and FWS. | P2- Develop a volunteer recruitment and retention plan for AFD | Staff time, coordination efforts, research and meetings. \$5000.00 | Begin planning with agencies FY 2007/08; implement FY 2007/08 |
| AFD, ASLD, CNF, Pima County and FWS. | 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. \$5000.00 | Inventory existing agreements; determine deficiencies and implement any needed agreements in FY 2007/08. |
| AFD, ASLD, CNF, Pima County and FWS. | A2- Work with Pima County to develop a notification and evacuation plan for the community | Staff time, coordination efforts, research and meetings. \$5000.00 | Begin planning FY 2007/08; implement FY 2007/08 |
| AFD, ASLD, CNF, Pima County and FWS. | A3- Develop a presuppression plan with CNF along the southern boundary of the Arivaca WUI area. | Staff time, coordination efforts, research and meetings. \$5000.00 | Begin planning FY 2008/09; implement 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 AFD 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 4.4 displays the ASCWPP 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 ASCWAC will use the resources of the Office of the State Forester, and its District Offices 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 Office of the State Forester and its District Offices.

Table 4.4. Action recommendations for enhanced public education, information, and outreach

| Partners | Project | Equipment/expense | Timeline |
|--|---|--|--|
| | 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 |
| AFD, Pima County, BANWR, ASLD, and BLM Gila District | Acquire Redzone or equivalent software and field data recorders or PDA's to complete home fire assessments and implement fire-safe recommendations | Software and data recorder: \$1300.00 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 |

E. Requested Funding for Implementation of the ASCWPP

Table 4.5 summarizes the fiscal year 2007/08 funding necessary to initiate implementation of the ASCWPP action recommendations.

Table 4.5. ASCWPP proposed budget

| ASCWPP objective | Estimated cost |
|---|---|
| Wildland fuel mitigation | 12,271 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 = \$1,227,100 |
| Wildland fire protection and reduced ignitability | FY 2007/08 = \$385,000; FY 2008/09 = \$202,500; FY 2009/10 = \$137,500 |
| Public education, information, and outreach | FY 2007/08 = \$25,000 |
| Total requested implementation funds | FY 2007/08 = \$1,637,100 |

V. MONITORING PLAN

Monitoring is essential to ensure that ASCWPP goals are met. The AFD, community Firewise Committee, PCOEM, ASLD, BANWR, and CNF, as ASCWPP administrators, will actively monitor the progress of the ASCWPP action recommendations to determine the effectiveness of ongoing and completed projects in meeting ASCWPP objectives, as well as to recommend future projects necessary to meet ASCWPP goals.

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

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

A. Administrative Oversight, Monitoring, and ASCWPP Reporting

The ASCWPP administrators will be mutually responsible for implementing and monitoring ASCWPP action recommendations. The ASCWPP administrators should identify appropriate grant and other funding mechanisms necessary to implement the action recommendations of the ASCWPP. 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.az.nrcs.usda.gov
- www.blm.gov/az
- www.firewise.org
- www.ncwg.gov

State

- www.azsf.az.gov
- www.cals.arizona.edu/firewise
- www.southwestareagrants.org

Nongovernmental

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

Annual reporting to ASCWPP signatories by ASCWPP administrators should include successful grant awards received for implementing the action recommendations of the ASCWPP. As needed, ASCWPP administrators will produce a report detailing the success of ASCWPP project implementation and overall progress toward meeting ASCWPP goals. The ASCWPP administrators report will also include recommendations to the signatories for update of the Community Mitigation Plan and the Prevention and Loss Mitigation Plan portions of the ASCWPP, 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 both annually, and over the life of the ASCWPP. Once the ASCWPP is updated it will be submitted to PCOEM, the Arizona State Forester, CNF, BANWR and the BLM TFO for their concurrence. Once concurrence is achieved, the action recommendations of the updated ASCWPP are to be forwarded for funding through HFRA and other appropriate funding sources.

B. Effectiveness Monitoring

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

Table 5.1. Performance measures to assess ASCWPP progress

| Goal | Performance measure |
|---|--|
| Improve fire prevention and suppression | <p>Reduction of wildland fire occurrence and acres burned (unplanned) in the WUI:</p> <ul style="list-style-type: none"> • The AFD has recruited and trained 10 new firefighters during 2007. • Effectiveness monitoring of fire prevention and suppression will include <ul style="list-style-type: none"> –acres burned and degree of severity of wildland fire, –percentage of wildland fire controlled on initial attack, –number of homes and structures lost to wildland fire. • New water sources developed in key areas. • Firefighter incentive program initiated. • Emergency response plan developed and in use. • Consistent fire management model in use. |
| Reduce hazardous forest fuels | <p>High-risk areas effectively treated by acre:</p> <ul style="list-style-type: none"> • Number of treated acres of non-Federal WUI lands that are in Condition Class 2 or 3, are identified as high priority by the ASCWPP communities, and are moved to Condition Class 1 or another acceptable level of wildland fuel. • Total acres treated through any fuel reduction measures, including Rx, that are conducted in the WUI. The change of condition class should be determined for small projects and/or treatment areas through the use of the <i>FRCC Guidebook</i> (FRCC Interagency Working Group 2005b) |
| Restore watershed health | <p>Acres of fuel reduction or watershed enhancement treatments that meet restoration treatment guidelines for riparian habitats:</p> <ul style="list-style-type: none"> • Coordination with and support of the PCOEM, the ASLD, the BANWR, and the CNF in implementing and determining social, economic, and environmental effects of riparian restoration treatments. |
| Promote community involvement | <p>Community outreach programs initiated:</p> <ul style="list-style-type: none"> • Community Firewise Committee initiated. • Public outreach programs and promotions implemented to enhance volunteer efforts to reduce hazardous fuels. • Number and areas (community or dispersed residents) of private landowners supportive of and implementing fuel reduction projects. • Communities and Pima County developed and implemented evacuation plans for identified high-risk areas • Individual home assessment completed in intermix communities |
| Encourage economic development | <p>Wood-products industry growth and diversification to use all sizes of material removed by fuel reduction treatments:</p> <ul style="list-style-type: none"> • Arizona DOC crews used for wildland fuels treatments. • Number of value-added wood products developed by the community. • Number of new markets (local firewood sales) for local products created. |

VI. DECLARATION OF AGREEMENT AND CONCURRENCE

The following partners in the development of this 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

Samantha Beal, Chief
Arivaca Fire Department

Date

Concurrence

Kirk Rowdabaugh
Arizona State Forester

Date

Mitch Ellis, Manager
Buenos Aires National Wildlife Refuge

Date

Keith Graves, Nogales District Ranger
Coronado National Forest

Date

Bonnie Winslow
Bureau of Land Management, Gila District Manager (Acting)

Date

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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)

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

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.

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 compliment 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 rate 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.nwccg.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 (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>).

GRASSLAND ASSOCIATIONS

S077 Apacherian-Chihuahuan Semi-Desert Grassland and Steppe

Concept Summary:

This ecological system is a broadly defined desert grassland, mixed shrub-succulent or xeromorphic tree savanna that is typical of the Borderlands of Arizona, New Mexico and northern Mexico [Apacherian region] but extends west to the Sonoran Desert, north into the Mogollon Rim and throughout much of the Chihuahuan Desert. It is found on gently sloping bajadas that supported frequent fire throughout the Sky Islands and on mesas and steeper piedmont and foothill slopes in the Chihuahuan Desert. It is characterized by typically diverse perennial grasses. Common grass species include *Bouteloua eriopoda*, *Bouteloua hirsuta*, *Bouteloua rothrockii*, *Bouteloua curtipendula*, *Bouteloua gracilis*, *Eragrostis intermedia*, *Muhlenbergia porteri*, *Muhlenbergia setifolia*, *Pleuraphis jamesii*, *Pleuraphis mutica*, and *Sporobolus airoides*, succulent species of *Agave*, *Dasyllirion*, and *Yucca*, and tall-shrub/short-tree species of *Prosopis* and various oaks (e.g., *Quercus grisea*, *Quercus emoryi*, *Quercus arizonica*). Many of the historical desert grassland and savanna areas have been converted, some to Chihuahuan Mesquite Upland Scrub (CES302.733) (*Prosopis* spp.-dominated), through intensive grazing and other land uses.

DESERT SCRUB ASSOCIATIONS

S062 Chihuahuan Mixed Desert and Thorn Scrub

Concept Summary:

This widespread Chihuahuan Desert land cover type is composed of two ecological systems the Chihuahuan Creosotebush Xeric Basin Desert Scrub (CES302.731) and the Chihuahuan Mixed Desert and Thorn Scrub (CES302.734). This cover type includes xeric creosotebush basins and plains and the mixed desert scrub in the foothill transition zone above, sometimes extending up to the lower montane woodlands. Vegetation is characterized by *Larrea tridentata* alone or mixed with thornscrub and other desert scrub such as *Agave lechuguilla*, *Aloysia wrightii*, *Fouquieria splendens*, *Dasyllirion leiophyllum*, *Flourensia cernua*, *Leucophyllum minus*, *Mimosa aculeaticarpa* var. *biuncifera*, *Mortonia scabrella* (= *Mortonia sempervirens* ssp. *scabrella*), *Opuntia engelmannii*, *Parthenium incanum*, *Prosopis glandulosa*, and *Tiquilia greggii*. Stands of *Acacia constricta*, *Acacia neovernicosa* or *Acacia greggii* dominated thornscrub are included in this system, and limestone substrates appear important for at least these

species. Grasses such as *Dasyochloa pulchella*, *Bouteloua curtipendula*, *Bouteloua eriopoda*, *Bouteloua ramosa*, *Muhlenbergia porteri* and *Pleuraphis mutica* may be common, but generally have lower cover than shrubs.

S116 Chihuahuan Mixed Salt Desert Scrub

Concept Summary:

This system includes extensive open-canopied shrublands of typically saline basins in the Chihuahuan Desert. Stands often occur on alluvial flats and around playas. Substrates are generally fine-textured, saline soils. Vegetation is typically composed of one or more *Atriplex* species such as *Atriplex canescens*, *Atriplex obovata*, or *Atriplex polycarpa* along with species of *Allenrolfea*, *Flourensia*, *Salicornia*, *Suaeda*, or other halophytic plants. Graminoid species may include *Sporobolus airoides*, *Pleuraphis mutica*, or *Distichlis spicata* at varying densities.

S068 Chihuahuan Stabilized Coppice Dune and Sand Flat Scrub

Concept Summary:

This ecological system includes the open shrublands of vegetated coppice dunes and sandsheets found in the Chihuahuan Desert. Usually dominated by *Prosopis glandulosa* but includes *Atriplex canescens*, *Ephedra torreyana*, *Ephedra trifurca*, *Poliomintha incana*, and *Rhus microphylla* coppice sand scrub with 10-30% total vegetation cover. *Yucca elata*, *Gutierrezia sarothrae*, and *Sporobolus flexuosus* are commonly present.

S061 Chihuahuan Succulent Desert Scrub

Concept Summary:

This ecological system is found in the Chihuahuan Desert on colluvial slopes, upper bajadas, sideslopes, ridges, canyons, hills and mesas. Sites are hot and dry. Gravel and rock are often abundant on the ground surface. The vegetation is characterized by the relatively high cover of succulent species such as *Agave lechuguilla*, *Euphorbia antisiphilitica*, *Fouquieria splendens*, *Ferocactus* spp., *Opuntia engelmannii*, *Opuntia imbricata*, *Opuntia spinosior*, *Yucca baccata*, and many others. Perennial grass cover is generally low. The abundance of succulents is diagnostic of this desert scrub system, but desert shrubs are usually present. This system does not include desert grasslands or shrub-steppe with a strong cacti component.

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 desertscrub.

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.

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

S115 Madrean Juniper Savanna

Concept Summary:

This Madrean ecological system occurs in lower foothills and plains of southeastern Arizona, southern New Mexico extending into west Texas and Mexico. These savannas have widely spaced mature juniper trees and moderate to high cover of graminoids (>25% cover). The presence of Madrean *Juniperus* spp. such as

Juniperus coahuilensis, *Juniperus pinchotii*, and/or *Juniperus deppeana* is diagnostic. *Juniperus monosperma* may be present in some stands, and *Juniperus deppeana* has a broader range than this Madrean system and extends north into southern stands of Southern Rocky Mountain Juniper Savanna and Woodland (CES306.834). Stands of *Juniperus pinchotii* may be short and resemble a shrubland. Graminoid species are a mix of those found in Western Great Plains Shortgrass Prairie (CES303.672) and Chihuahuan Piedmont Semi-Desert Grassland (CES302.735), with *Bouteloua gracilis* and *Pleuraphis jamesii* being most common. In addition, these areas include succulents such as species of *Yucca*, *Opuntia*, and *Agave*. Juniper savanna expansion into grasslands has been documented in the last century.

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.

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.

S100 North American Arid West Emergent Marsh

Concept Summary:

This widespread ecological system occurs throughout much of the arid and semi-arid regions of western North America, typically surrounded by savanna, shrub steppe, steppe, or desert vegetation. Natural marshes may occur in depressions in the landscape (ponds, kettle ponds), as fringes around lakes, and along slow-flowing streams and rivers (such riparian marshes are also referred to as sloughs). Marshes are frequently or continually inundated, with water depths up to 2 m.

Water levels may be stable, or may fluctuate 1 m or more over the course of the growing season. Water chemistry may include some alkaline or semi-alkaline situations, but the alkalinity is highly variable even within the same complex of wetlands. Marshes have distinctive soils that are typically mineral, but can also accumulate organic material. Soils have characteristics that result from long periods of anaerobic conditions in the soils (e.g., gleyed soils, high organic content, redoximorphic features). The vegetation is characterized by herbaceous plants that are adapted to saturated soil conditions. Common emergent and floating vegetation includes species of *Scirpus* and/or *Schoenoplectus*, *Typha*, *Juncus*, *Potamogeton*, *Polygonum*, *Nuphar*, and *Phalaris*. This system may also include areas of relatively deep water with floating-leaved plants (*Lemna*, *Potamogeton*, and *Brasenia*) and submergent and floating plants (*Myriophyllum*, *Ceratophyllum*, and *Elodea*).

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.

N11 Open Water

Concept Summary:

Areas of open water, generally with less than 25% cover of vegetation or soil.

D02 Recently Burned

Concept Summary:

Areas that have burned in the recent past that are clearly evident in the imagery (images acquired between 1999-2001).

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](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>

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>

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 ROM

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).