



# Arizona Forest Action Plan

## 2015 Status Report and Addendum

*A report on the strategic plan to address forest-related conditions, trends, threats, and opportunities as identified in the 2010 Arizona Forest Resource Assessment and Strategy.*

**November 20, 2015**



Arizona  
State Forestry

## Acknowledgements:

Arizona State Forestry would like to thank the USDA Forest Service for their ongoing support of cooperative forestry and fire programs in the State of Arizona, and for specific funding to support creation of this report.

We would also like to thank the many individuals and organizations who contributed to drafting the original 2010 Forest Resource Assessment and Resource Strategy (Arizona Forest Action Plan) and to the numerous organizations and individuals who provided input for this 2015 status report and addendum.

Special thanks go to Arizona State Forestry staff who graciously contributed many hours to collect information and data from partner organizations – and to writing, editing, and proofreading this document.



**Jeff Whitney**  
**Arizona State Forester**



## Granite Mountain Hotshots Memorial

On the second anniversary of the Yarnell Hill Fire, the State of Arizona purchased 320 acres of land near the site where the 19 Granite Mountain Hotshots sacrificed their lives while battling one of the most devastating fires in Arizona's history. This site is now the Granite Mountain Hotshots Memorial State Park.

"This site will serve as a lasting memorial to the brave hotshots who gave their lives to protect their community," said **Governor Ducey**. "While we can never truly repay our debt to these heroes, we can – and should – honor them every day. Arizona is proud to offer the public a space where we can pay tribute to them, their families and all of our firefighters and first responders for generations to come."

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## Background

### **The 2010 Forest Action Plan**

The development of *Arizona's Forest Resource Assessment and Strategy* (now known as *Arizona's "Forest Action Plan"*) was prompted by federal legislative requirements. The amended Cooperative Forestry Assistance Act of 2008 (commonly referred to as the Farm Bill) added new requirements for states to identify priority forest landscape areas (a statewide assessment of forest resources) and highlight work needed to address national, regional, and state forest management priorities (a statewide forest resource strategy).

States were required to complete the assessment and strategy to qualify to receive funds under the Cooperative Forestry Assistance Act (CFAA) - provided to states through the State and Private Forestry (S&PF) program of the USDA Forest Service. Currently, Arizona receives several million dollars annually to protect communities from wildfire, assist private forest landowners, promote healthy forest practices, and assist communities with their urban forests. Most CFAA funding received by Arizona State Forestry (AZSF) is given as grants to local organizations that provide matching funds and additional implementation resources. The combination of state and local efforts, along with coordination with federal, tribal and other land management agencies, provides substantial leveraging of these funds to benefit Arizona forests and citizens.

The responsibility for developing the Forest Action Plan belonged to the State Forester and Arizona State Forestry. The State Forester appointed a task group with diverse representation to work with agency staff to develop the final ***Arizona Forest Resource Assessment*** and ***Arizona Forest Resource Strategy***, and both documents were completed in June 2010.

### **Plan Review and Update:**

Recent direction from the State and Private Forestry Board (USDA Forest Service and the National Association of State Foresters) requires that each state forestry agency:

- 1) Review and report on highlights of the state plan implementation from the past five years
- 2) Add a new "National Priorities Section" to the state plan.
- 3) Plan for completion of a state plan update at least every 10 years.

This report meets the first two requirements:

- Section One summarizes the implementation of Arizona’s Forest Action Plan since the plan development in 2010.
- Section Two provides an overview of the implementation summarized by the three National Priorities. Incorporated as an addendum to Arizona’s current Forest Action Plan, this provides the required “National Priorities Section”.

To complete the required Forest Action Plan update, Arizona State Forestry plans to begin concentrated work with partner organizations and Arizona stakeholders in early 2016. The expectation is to develop and implement appropriate work processes and complete Arizona’s plan revision by late 2016 or early 2017.

### **Arizona’s Forest Landscape**

Arizona is a land of diverse landscapes. The diversity of Arizona forests ranges from riparian gallery forests traversing the low desert to sub-alpine and montane forests above 9,000 feet in elevation (O’Brien 2002). Forests cover roughly 27% of the state and occupy 19.4 million acres. These forests are comprised of 37 species of coniferous and hardwood trees. The majority of forestland is located above the Mogollon Rim with distinct areas scattered throughout the rest of the state. Juniper (*Juniperus* spp.) and pinyon juniper (*Pinusedulis-Juniperusspp.*) woodlands are the most abundant forest type in Arizona, occupying approximately 14.8 million acres, or 20.3% of the state. The rarest and most significant in ecological terms is riparian forest, which occupies less than one-half of 1% of Arizona’s land.

Land ownership within Arizona is also quite diverse. Federal and state agencies and Native American Tribes manage the majority of lands. Only a small portion is privately owned. *Arizona’s 2010 Forest Action Plan* is truly reflective of this diverse land base and draws on the strong relationships with many organizations and agencies. This collaborative “all lands” approach is critical for successful near-term and long-term outcomes on the landscape.

# **SECTION 1**

## **Arizona Critical Issues and Collaborative Goals**

Arizona’s 2010 Forest Action Plan identified 8 Critical Issues for Arizona and related collaborative goals for all Arizona stakeholders to pursue. This section provides highlights and examples of work completed to address these critical issues. Appendix I also provides a more in-depth listing of reported accomplishments related to each of the goals and objectives – and to specific actions planned for each.

### **Arizona Collaborative Goals**

#### **People and Forests**

- People and communities receive maximum benefits from forests and trees.
- Minimized negative impacts to trees and forests.

#### **Ecosystem Health**

- Resilient and diverse forest ecosystem structures, processes, and functions.
- Progress toward landscape scale outcomes, restoration of unhealthy ecosystems, and enhanced sustainability with negative impacts.

#### **Water and Air** (Reported in 2015 as separate goals)

- Improved water quality and quantity from forested watersheds.
- Improved health and resiliency of forested aquatic systems (riparian areas, springs, and wet meadows).
- Increased public understanding of the importance of forests to Arizona’s water quality.
- Improved air quality.

#### **Fire**

- Wildland ecosystems where appropriate fire regimes maintain health and resiliency of natural vegetation.
- “Fire Adapted Communities” that provide shared stakeholder responsibility for healthy landscapes and wildfire prepared communities.
- Enhanced wildland fire management capacity in Arizona.
- An Arizona public and government leadership that is well informed about wildland fire management, science, and prevention issues.

#### **Economics**

- Realized long-term economic potential of sustainable forest products and bioenergy (while achieving ecosystem health goals)
- Protection of areas with economic development potential related to ecosystem services.
- Community recognition of the economic importance of protecting healthy natural systems.

#### **Climate**

- Increased resilience of ecosystems to climate change.
- Reduced rate of future climate change through maximized carbon sequestration in Arizona forests and trees.
- Broad public and community understanding of climate change science – Arizona’s variable climate and current and future impacts.

#### **Culture**

- Improved communication between all land management agencies, indigenous tribes, and other cultural groups about varying perspectives and beliefs related to forests, trees, and other natural resources.
- Effective collaboration mechanisms for sharing of information about resources, priorities, policies, and management strategies between Tribes and non-Tribal organizations.

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# 1. PEOPLE AND FORESTS

## Critical Issue Description

Arizona’s population has grown for decades at a tremendous rate, and expectations are for continued growth through mid-century and beyond. This expansion brings people into ever-closer proximity to Arizona’s forests – allowing us to garner a broad array of benefits from the forests, yet affecting these ecosystems in many negative ways. What were once remote forest wildlands with occasional visitors are becoming backyards and crowded playgrounds to expanding suburban neighborhoods. People migrating from urban areas are often choosing to live within or adjacent to forests and thus face new challenges such as fire, smoke, forest access, water supply, and land use issues. At the same time, distant metropolitan areas continue to increase demand for some of our forest’s most precious commodities.

## Goals and Objectives

### **Goal 1: People and communities receive maximum benefits from Forests and Trees.**

Objectives:

- 1. *Connect people to trees and forests and improve their understanding of the benefits provided by Arizona's forests.*
- 2. *Enhance urban and community forests.*
- 3. *Improve energy conservation through tree planting and maintenance.*

### **Goal 2: Minimized negative human impacts to trees and forests.**

Objectives:

- 1. *Increase awareness of threats to Arizona's forests – and awareness of available tools to mitigate those threats.*
- 2. *Engage people in environmental stewardship activities.*
- 3. *Manage recreation impacts on Forests.*
- 4. *Minimize forest fragmentation from development.*



### **Observatory Mesa Open Space**

Arizona State Forestry assisted the City of Flagstaff in producing a long-term comprehensive forest management plan for 2,310 acres of city owned property. This forest land was purchased, and is to be managed as open space where recreation and public educational goals are a high priority.

Observatory Mesa is directly adjacent to the City of Flagstaff, and home to the historic Lowell Observatory, where the dwarf-planet, Pluto, was first observed in 1930.

The area provides unique opportunities for the public to connect with the forest, experience wildlife viewing opportunities, and learn about forest management. The recent Forest Stewardship plan is guiding forest management on Observatory Mesa and enabling the City of Flagstaff to reduce fire and forest health risks on over 600 acres within the wildland-urban interface. Through public interaction and effective management, the City will be able to meet multiple objectives into the future.



## Plan Accomplishments

During the five years since the development of Arizona's Forest Action Plan, significant accomplishments have been documented to support the goals and objectives to address this issue. There are many projects and activities being pursued by Arizona communities and organizations. Eleven partner organizations highlighted over 100 specific accomplishments as part of this report. (See Appendix I for a full listing of reported accomplishments). Partners who provided information related to these goals include:

- Arizona Community Tree Council
- Arizona Nursery Association
- ASU – Sustainable Cities Network
- Arizona State Forestry (AZSF)
- City of Flagstaff
- City of Phoenix
- City of Tucson
- Salt River Project
- Tucson Clean and Beautiful
- Tucson Electric Power
- Watershed Management Group

# GREEN STREETS

*Plant the water, grow the shade*



Through a community workshop native trees were planted to create shade for everyone.

**This rain garden will harvest over 12,000 gallons of rain every year from the school roof!**

This project was built by volunteers in 2014 through a partnership with Watershed Management Group, USDA Forest Service, Arizona State Forestry and the City of Tucson Bicycle & Pedestrian Program.

Want to learn more about Green Streets and rainwater harvesting?  
Visit us at [watershedmg.org](http://watershedmg.org)

**Treat Your Feet to a Shady Street!**  
You can plant trees in your front yard to shade your bike boulevard!

Watershed Management Group

### *Treat Your Feet to a Shady Street*

Watershed Management Group (WMG) worked with Robison Elementary school to develop a replicable model to create Bike Boulevard Greenways across the City of Tucson. Through this project, supported by a Community Challenge Grant from Arizona State Forestry and collaborative support of the City of Tucson's Bike and Pedestrian Program, over 40 adults and 200 children were exposed to water harvesting through hands-on activities and tours. Additional green infrastructure implementation has begun and there is considerable interest in scaling up these efforts.



## 2. ECOSYSTEM HEALTH

### Critical Issue Description

*Evidence of their declining health, function and sustainability is readily apparent throughout the forest ecosystems of Arizona. Dramatic signals of unraveling ecosystems include large, uncharacteristic crown fires; effects of prolonged drought; excessive fuel buildup; vegetative loss from insects and tree pathogens; and widespread decreases in the biodiversity of both plants and animals. Evidence-based ecological research indicates that some Arizona ecosystems are very different from historic conditions. These changes include alterations in nutrient cycling, decreases in understory species diversity, increases in exotic species, and disruption of natural fire regimes. It is essential that we accurately identify the reasons for decline in the health of forest ecosystems and respond appropriately.*



### **Arizona Prescribed Fire Initiative**

Prescribed fire is used to alter, maintain, or restore vegetation; achieve desired resource outcomes; and to protect life, property, and values that would be degraded by unplanned wildland fire. For fire-dependent ecosystems, fire is an essential ecological process.

Arizona's Prescribed Fire Initiative is being developed to provide consistent, statewide direction on how to implement prescribed fire in a safe, cost-effective manner to achieve life-safety and land management objectives.

The initiative provides direction to State Agencies and Arizona State Forestry partner organizations on achieving safe and effective prescribed fire in compliance with applicable regulations.

(Photo Credit: Arizona State Forestry)

### Goals and Objectives

**Goal 1: Resilient and diverse forest ecosystem structures, processes, and functions.**

*Objectives:*

1. Protect, conserve and enhance ecological integrity, in order to maintain sustainable forest ecosystems, preserve ecosystem services and avoid public safety hazards associated with large scale catastrophic events.
2. Protect, conserve, and enhance wildlife and fish habitat.
3. Identify and conserve unique high priority ecosystems and landscapes.
4. Identify and monitor threats to forests and ecosystem health.
5. Protect forests and other high priority ecosystems from fragmentation and conversion.

**Goal 2: Progress toward landscape scale outcomes, restoration of unhealthy ecosystems, and enhanced sustainability with limited negative impacts.**

*Objectives:*

1. Restore ecologically unhealthy forest, desert and grasslands impacted by current fire regimes, insect and disease outbreaks, land management practices/uses, and exotic invasive species.
2. Restore frequent fire regimes as part of forest restoration measures.
3. Integrate collaborative, science based, planning processes and public education into restoration treatments.



***Aerial Detection Surveys***

Arizona State Forestry partners with the US Forest Service to survey millions of acres of Arizona’s forest land from the air. Aerial Detection Surveys provide land managers and the public with information about landscape-level forest and woodland health conditions. When forest health issues exist, Forest Health staff offer this information to land managers locally – and data collected across the country can be accessed on the internet – allowing local land managers to take appropriate action. Arizona State Forestry staff typically survey 1-3 million acres annually, and US Forest Service personnel annually survey an additional 6-8 million acres of Arizona forest land.

**Plan Accomplishments**

Three organizations documented over 200 specific activities related to the 5-year Forest Action Plan (see Appendix I for a full listing.) Many of these activities included various additional partners, and some programs include support for multiple efforts in various parts of the state. Above and beyond these reported accomplishments, many local organizations are participating in activities to improve the health of Arizona’s various ecosystems. Partners who reported specific activities include:

- Arizona State Forestry (AZSF)
- Ecological Restoration Institute (ERI)
- The Nature Conservancy (TNC)

# 3. FIRE

## Critical Issue Description

Fire in Arizona is a complex issue. Recent trends show increasing size and severity of wildland fire occurrence, and increasing costs in fighting and managing these fires. Although fire is necessary in many forest types, it can occur as desirable fire, undesirable fire, or as a managed tool for achieving and sustaining desired ecological conditions. Fire is a key process in many forest ecosystems, but reestablishing natural fire regimes where appropriate remains an ongoing challenge. At the same time, protecting the safety of citizens and other important values--communities, infrastructure, and habitat for imperiled species--are critical concerns. A fundamental challenge facing Arizona is maximizing the many benefits of fire while reducing its significant costs.



### Federal Excess Property Program

From July 2010 through June 2015, Arizona State Forestry was able to acquire over \$6 million in federal excess equipment to aid state and local agencies in fire suppression efforts. Over this period, 152 pieces of equipment were acquired. Sixty-six of these were vehicles that were converted for fire response.

(Photo Credit: Arizona State Forestry)

## Goals and Objectives

**Goal 1: Wildland ecosystems where appropriate fire regimes maintain health and resiliency of natural vegetation.**

Objectives:

1. Manage forest structure to restore fire regimes and minimize negative impacts from unwanted wildfire (recognizing the diversity of federal, tribal, state and private landownership in Arizona.)
2. Use appropriate application of fire to meet resource and community protection objectives.
3. Use best available science to define appropriate levels (acceptance) of fire for different ecosystems or vegetation types.

**Goal 2: "Fire Adapted Communities" that provide shared stakeholder responsibility for healthy landscapes and wildfire prepared communities.**

Objectives:

1. Assist communities in planning for and reducing wildfire risks.
2. Design and implement effective smoke management strategies and protocols. (see AIR Strategy)
3. Develop additional fire adapted communities that meet Firewise standards and support increased local scale implementation.



**Goal 3: Enhanced wildland fire management capacity in Arizona.**

*Objectives:*

1. Increase Firefighting Response Capabilities and Efficiencies.
2. Assure adequate Wildland and Prescribed Fire Training is provided to all necessary personnel.

**Goal 4: An Arizona public and government leadership that is well informed about wildland fire management, science, and prevention issues.**

*Objectives:*

1. Develop and deliver Arizona specific educational information and tools to increase citizens and community awareness of wildland fire issues and preparedness.
2. Increase government leadership awareness of wildland fire preparedness and appropriate actions.

**Plan Accomplishments**

Over 100 specific activities were reported by key Arizona partner organizations since development of the Forest Action Plan five years ago. In addition, we know other partners have achieved many other significant successes that have not yet been captured in this report. (See Appendix I for a full listing of reported accomplishments)

Major accomplishments were reported by the following Arizona organizations:

- Arizona State Forestry (AZSF)
- Arizona Public Service
- US Forest Service
- Ecological Restoration Institute ERI)
- US Bureau of Land Management



***Firewise Communities / Fire Prevention***

The National Fire Protection Association’s Firewise Communities Program, implemented in Arizona by Arizona State Forestry, empowers neighbors to work together in reducing their wildfire risk. Using a five-step process, communities develop an action plan that guides their residential risk reduction activities, while engaging and encouraging their neighbors to become active participants in building a safer place to live.

Over the past 5 years, Arizona State Forestry has conducted 27 Firewise Assessor courses, certifying approximately 410 citizens and firefighters throughout Arizona, and presented Firewise and fire prevention principles during 75 events, reaching approximately 10,000 Arizona citizens.

*(Photo Credit: Arizona State Forestry)*

# 4. WATER

## Critical Issue Description

Water is arguably Arizona's most precious resource. Because forested watersheds produce a large proportion of the state's water supplies, proper forest management is essential to protect the quantity and quality of water supply for municipal, industrial, and agricultural uses as well as for riparian ecosystems that provide habitat for the broadest diversity of species in Arizona. Natural climate variability and global climate change have resulted in persistent drought for the past decade. Temperature increases have led to earlier spring runoff and loss of water storage. The challenge of forest management going into the future will be the wise use of practices that lessen the impacts of climate change through watershed management strategies that help to ensure adequate, good-quality water supplies for agriculture, industry, people, and the environment.

## Goals and Objectives

**Goal 1: Improved water quality and quantity from forested watershed.**

*Objectives:*

1. Collaboratively protect and enhance water quality and quantity of forested watersheds.
2. Maximize positive impacts of forest treatments on water quality.
3. Minimize negative impacts from wildfire in watersheds of concern.

**Goal 2: Improved health and resiliency of forested aquatic systems (riparian areas, springs, and wet meadows.)**

*Objectives:*

1. Manage impacts of forest management activities within aquatic systems.
2. Restore aquatic systems, and improve water availability.



## Joint Chiefs: Prescott Basin Cross Boundary Project

A partnership between the Natural Resources Conservation Service (NRCS) and the US Forest Service (USFS) is funding a landscape restoration project to improve the health and resiliency of forest ecosystems where public and private lands meet. Prescott National Forest has partnered with the NRCS, Arizona State Forestry, the City of Prescott, the Prescott Area Wildland Urban Interface Commission, the Highlands Center for Natural History, and private landowners to develop a cross-boundary project comprising 141,000 acres to reduce the likelihood of catastrophic wildfire near Prescott, Arizona.

The group is implementing an “all lands, all hands” approach to address fuel hazards and ecosystem health in the Prescott Basin Area within the Verde and Agua Fria River Watersheds. Federal funds in the amount of \$2.2M were set aside to complete this work over 3 years. Private, local and State resources will provide nearly \$1.5M in matching funds in the form of treatments of dense forests, woodlands and grasslands (pictured). Work across ownership boundaries will include prescribed burning, mastication, hand thinning, and tree shearing over many hundreds of acres in the Prescott Basin.

**Goal 3: Improved health and resiliency of forested aquatic systems (riparian areas, springs, and wet meadows.)**

*Objectives:*

1. Collaboratively develop information and education materials on watershed and riparian issues.
2. Collaboratively develop and implement outreach and education programs on watershed and riparian issues.
3. Encourage Public involvement.



***San Pedro River – The Nature Conservancy and Forest Legacy***

Arizona State Forestry partnered with The Nature Conservancy to secure funding through the National Forest Legacy Program, funded from the US Forest Service, for this project along the San Pedro River. Conservation easements on 4 private properties have been secured in perpetuity - protecting critical riparian Arizona habitat. This area is host to dozens of avian species, some of which are threatened or endangered. Increasing development, changing land uses, changing climate, and habitat fragmentation in the area put these species at great risk. In national competition with other Legacy projects, Arizona’s San Pedro River Project ranked higher than all other proposals from across the country.

**Plan Accomplishments**

During the five years since the development of Arizona’s Forest Action plan, significant accomplishments have been documented to support all of the goals and objectives to address this issue. Though there are many other known projects and activities being pursued by Arizona communities and organizations, 9 organizations submitted over 100 specific accomplishments for this report. (See Appendix I for a full listing.) These organizations all reported major efforts to address Arizona’s Water issues:

- Arizona State Forestry (AZSF)
- US Forest Service
- Upper Verde Coalition
- Eastern Counties Organization
- The Nature Conservancy
- US Fish and Wildlife Service
- Borderlands Restoration
- Salt River Project
- Arizona Dept. of Environmental Quality



# 5. AIR

## Critical Issue Description

Clean air, often taken for granted, is another precious resource. Arizona's forest lands play an important role in maintaining and enhancing air quality. Trees modify the atmosphere by absorbing carbon dioxide and producing oxygen; clear the air by filtering dust, ash, pollen, and smoke; intercept wind; provide shade; and moderate air temperature. However, forest management activities and fires can have negative effects on air quality by producing excessive smoke and releasing other particulates into the atmosphere. Careful planning and coordination are needed to improve forest management activities to limit smoke impacts and improve air quality.

## Goals and Objectives

### Goal 1: Improved air quality.

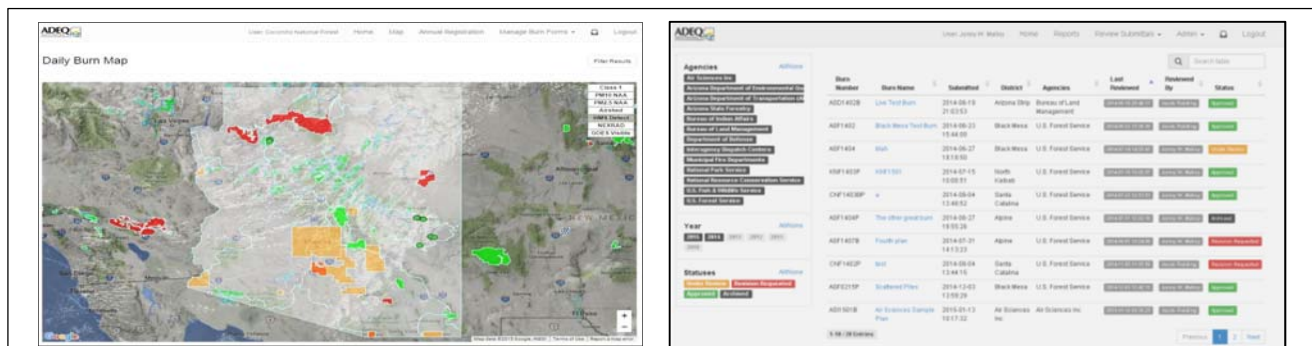
Objectives:

1. Enhance urban and community forests (see People & Forests Strategy).
2. Maintain or Improve health of existing forest lands (see Ecosystem Health Strategy).
3. Improve coordination of smoke management related to wildland fire and forest restoration treatments (Arizona Enhanced Smoke Management Program).
4. Reduce negative impacts of forest treatments on air quality.

### Goal 2: Increased public understanding of the importance and effects of fire on Arizona's air quality.

Objectives:

1. Enhance public outreach and education regarding fire management and air quality.



## Arizona Smoke Management Program

Identified as a priority in Arizona's 2010 Forest Action Plan, a new online database will streamline the prescribed fire permit request, approval, and management processes while promoting better coordination and improved efficiencies. The Arizona Smoke Management Program is coordinated by Arizona Department of Environmental Quality with additional resources from the US Forest Service and Department of Interior agencies. They will be testing the new database and user interface during the 2015 prescribed fire season.



## Plan Accomplishments

The Arizona Department of Environmental Quality leads the work to address Air Quality in Arizona. To strengthen efforts to mitigate impacts of smoke from wildland and prescribed fires, strong partnerships have developed with Arizona State Forestry, the US Forest Service, and US Department of Interior agencies. More than 25 specific actions have been identified to support Arizona's Forest Action Plan over the past five years. Other state agencies and local organizations are also taking steps to support these efforts, though specifics have not been captured within this report. (See Appendix I for a full listing of reported accomplishments.)

Organizations who contributed to this report include:

- Arizona State Forestry (AZSF)
- Arizona Department of Environmental Quality
- US Forest Service
- US Bureau of Indian Affairs



### ***Southwest Air Quality and Beyond***

This multi-state project was funded by a competitive grant from the USDA Forest Service to conduct urban forestry ecosystem services assessments in partnering communities. The project utilized i-Tree Eco to capture urban forestry data to assist communities in developing municipal and regional air quality goals. Partners in Arizona included Arizona State Forestry, Arizona Department of Environmental Quality, Maricopa County Air Quality, and the City of Phoenix. Data generated was summarized for Phoenix, AZ; El Paso TX; Las Cruces, NM; and Albuquerque, NM - with the goal to improve the urban forest, environmental health and community livability. Results of this project included 4 community summary reports, a website ([www.desertcanopy.org](http://www.desertcanopy.org)), brochures, factsheets, tree posters, and public outreach materials in English and Spanish.

# 6. ECONOMICS

## Critical Issue Description

Forests have always contributed to Arizona’s economy and quality of life. Historically, forests provided an abundance of natural resources--forage for cattle and sheep, trees for lumber, firewood, mine timbers and railroad ties, game for consumption, and water for irrigation and municipal uses. Arizona’s forests sustained a timber industry that helped fuel a century of rural development. Although tourism, watershed protection, and evolving forest management goals have more recently provided new challenges for rural and state economies, the importance of forests to Arizona’s economy has not changed. Forests remain the economic and aesthetic foundation of many rural communities. Today, Arizonans demand more goods and services from our forests than ever before, and balancing these demands presents ongoing management challenges as we strive to ensure long-term forest sustainability.

### Goals and Objectives

**Goal 1: Realized long-term economic potential of sustainable forest products and bioenergy (while achieving Ecosystem Health goals).**

Objectives:

1. Develop policies, plans and incentives to encourage the development and perpetuation of forest products businesses that will diversify the economy and facilitate forest restoration activities.
2. Federal, state, and local units of government should identify and enhance the use of small-diameter wood and biomass generated from forest treatments wherever possible.
3. Expand and support the coordination of multi-agency, collaborative, large landscape scale forest treatment projects that will be conducive to the development and support of a wood products industry.

**Goal 2: Protection of areas with economic development potential related to ecosystem services.**

Objectives:

1. Develop and maintain land use change and ecosystem services data for Arizona.
2. Focus and prioritize programs on communities that will experience significant urban growth, to assist local leaders in devising effective ways to grow, develop, and protect their communities while also integrating important economic contributions made by forest ecosystems and natural areas that will be impacted.
3. Prioritize / focus program delivery and agency resources into high priority landscapes where resource threats (wildfire, insect / diseases, land conversion) will most likely threaten /negatively impact critical forest landscapes across Arizona.
4. Recognizing the diversity of federal, tribal, state and private landownership in Arizona, maintain and enhance the economic benefits and values of natural resources.



### **AZ Commerce Authority – Healthy Forest Incentive Program**

This Waratah Processing head and John Deere tracked excavator were purchased under the Arizona Commerce Authority’s Healthy Forest Enterprises Incentives Program, allowing the owner to invest in equipment and expand his business. Arizona State Forestry works collaboratively with the Arizona Commerce Authority to promote and assist businesses with program enrollment.

### **Goal 3: Community recognition of the economic importance to protecting healthy natural systems.**

#### *Objectives:*

1. Develop and maintain information about available programs, suitability of lands, and recommendations for greatest benefits and efficiencies.
2. Promote economic value of urban and community forests and provide capacity to develop sustainable leadership and programs.
3. Provide comprehensive program leadership, for a variety of programs to address land management issues associated with the high priority landscapes.
4. Recognize and promote the economic benefits of "avoided costs" on state and local budgets through enhancing ecosystem health and community and urban forests.

### **Plan Accomplishments**

Governmental and non-governmental organizations reported more than 90 specific actions taken over the five years since completion of Arizona's Forest Action Plan in 2010.

There are numerous other examples of activities by local organizations and communities to improve the economics of forest related products and industry. Organizations that provided data for this report are listed below. For a full listing of reported activities, see Appendix I.

- Arizona State Forestry
- US Forest Service
- The Nature Conservancy
- Eastern Counties Organization
- Arizona Department of Transportation
- US Bureau of Indian Affairs
- Arizona Commerce Authority
- USDA Farm Service Agency
- Salt River Project
- Western Forestry Leadership Coalition



#### ***Arizona Department of Transportation – Healthy Forest Initiative***

In an effort to promote a healthy forest, improve commerce and protect the state's infrastructure following the devastating Wallow Fire, the Arizona Department of Transportation (ADOT) partnered with the Arizona State Forestry Division and the Eastern Arizona Counties Organization to launch the "Healthy Forest Initiative."

The recently launched two-year ADOT pilot project allows timber industry trucks to carry additional weight on several state highways in the White Mountains region. The higher truck weight limit will greatly enhance the ability of the wood industry to clear forests in the White Mountains and transport wood materials to saw mills, pellet plants and energy-generating plants in the region - while reducing the risk of further catastrophic forest fires.



# 7. CLIMATE

## Critical Issue Description

Arizona's climate has experienced wide swings in temperature and precipitation for thousands of years. A naturally variable climate has given rise to changes in fire frequency, wide variation in flood and drought severity, and has influenced native population shifts throughout the region. Recent changes in temperature and precipitation over several decades, caused in part by human activity, have increased the severity of forest insect outbreaks and have contributed to some of the largest wildfires in Arizona's history. While climate has always been variable over time, rapid climate change creates cascading effects of tree mortality, increased disturbance frequency and severity, and shifting zones of suitable habitat that could dramatically alter Arizona's forested landscapes.

## Goals and Objectives

### **Goal 1: Increased resilience of ecosystems to climate change.**

#### *Objectives:*

1. Develop and maintain threats analysis for Arizona's forests and other high priority ecosystems using the best available scientific information.
2. Develop adaptation plans for Arizona's forests and other high priority ecosystems to increase resilience to climate change.
3. Manage and restore trees, forests, and high priority ecosystems to mitigate effects and adapt to global climate change.
4. Support urban and community forestry programs to increase resiliency to climate change (see People and Forests strategies).

### **Goal 2: Reduced rate of future climate change through maximized carbon sequestration in Arizona forests and trees.**

#### *Objectives:*

1. Support landowners and land management practices which implement high quality mitigation practices that reduce carbon loss.
2. Support achievement of appropriate fire regimes to maintain health and resiliency of natural vegetation (see Fire strategies).
3. Support continued research to understand the effects of forest management on sequestration.

**Legend**

| Reclamation Offices | DOI Landscape Conservation Cooperatives     | Reclamation Regions               |
|---------------------|---|-----------------------------------|
| Area Office         | 1. Appalachian                              | 5. Great Basin                    |
| Region Office       | 2. California                               | 6. Great Northern                 |
| Reclamation Regions | 3. Desert                                   | 7. Great Plains                   |
| State Boundaries    | 4. Eastern Tallgrass Prairie and Big Rivers | 8. Gulf Coast Prairie             |
|                     | 5. Great Basin                              | 9. Gulf Coastal Plains and Ozarks |
|                     | 6. Great Northern                           | 10. North Pacific                 |
|                     | 7. Great Plains                             | 11. Plains and Prairie Potholes   |
|                     | 8. Gulf Coast Prairie                       | 12. Southern Rockies              |
|                     | 9. Gulf Coastal Plains and Ozarks           | 13. Upper Midwest and Great Lakes |

**Landscape Conservation Cooperatives**

Two Landscape Conservation Cooperatives encompass Arizona. The **Southern Rockies LCC** includes the northern part of the state and the **Desert LCC** includes the central and southern areas of Arizona. These two cooperatives currently include cooperators from 53 federal, state, tribal, and private organizations that provide scientific and technical support, coordination, and communication to inform resource management decisions that address climate change and other stressors.

**Goal 3: Broad public and community understanding of climate change science - Arizona's variable climate and current and future impacts.**

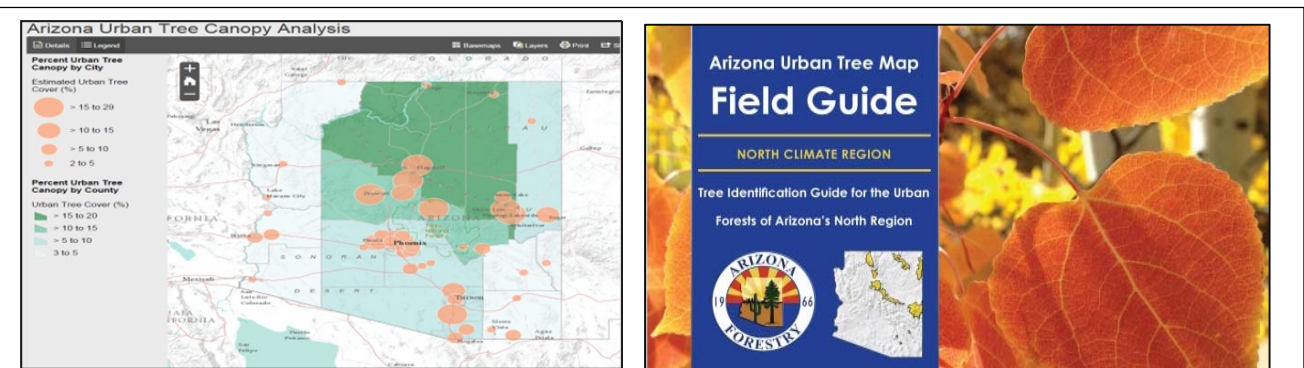
*Objectives:*

1. Develop and maintain science based reports and materials specific to Arizona that document the state of knowledge for climate exposure; species, community and watershed vulnerability; forest adaptation strategies and their effectiveness, as well as effectiveness of strategies focused on increasing carbon sequestration.
2. Develop outreach and education programs to disseminate information about climate change science to the public and community leaders.

**Plan Accomplishments**

More than 60 actions have been reported by multiple partners to support work toward these goals. State Universities, major non-profit organizations, and state and federal agencies are all contributing to this work. A full list of reported activities is available in Appendix I. Specific activities were reported from these organizations:

- US Forest Service
- Arizona State Forestry
- Northern Arizona University
- University of Arizona
- Landscape Conservation Cooperatives
- Sonoran Joint Venture
- Arizona State University
- Sky Island Alliance
- US Geological Survey
- The Nature Conservancy



**Supporting Resilient Communities**

Because forests must be understood before they can be properly managed for resiliency to climate change, Arizona State Forestry collaboratively implemented a statewide Integrated Urban Forest Resource Inventories (UFRI) project. Partners included the University of Arizona School of Natural Resources and the Environment, the Advanced Resource Technology Group, and six pilot communities across the state. The purpose was to (1) compile existing urban forest inventory and resource information from communities, towns, and rural areas; (2) implement a pilot project for gathering data in multiple Arizona communities while developing a GIS-enabled database to maintain statewide data; and (3) develop protocols for program sustainability and growth.

The overall goals were to encourage sustainably managed urban forests that are more resilient to the impacts of climate change. Project accomplishments included the completion of a needs assessment, a range of field and inventory guides, online tools, analysis reports and maps, tree inventory databases, and an analysis service to support urban tree inventories across Arizona.

# 8. CULTURE

## Critical Issue Description

*Human cultures and Arizona’s forests have been interdependent for more than 10,000 years. During this time, forests have provided human cultures with a variety of resources including shelter, building materials, wild game, water, seasonal fruits and seeds, ceremonial plants, medicines, minerals, land for farming and grazing, and a place of spiritual renewal. Human interaction with, and dependence on, forests will continue to be influenced by the specific set of values, norms, and beliefs held by different cultural groups. While there are many shared beliefs, values and uses across cultural groups, there are also distinct differences that require a balance among competing interests. While challenging, the integration of an array of cultural values in the management of our forests represents a more holistic approach and helps increase the interaction and collaboration between groups.*



### **Iskashitaa Refugee Network**

Iskashitaa Refugee Network (IRN) is a non-profit organization that works with refugees from 20 countries who have been resettled to Tucson. Their mission and programs have always had the feeding of families at their core. IRN is a leader in demonstrating sustainable options by identifying, harvesting and educating the community on edible forest products within the community. Working with refugees, they identify and record locations of urban edible trees (both native and cultivated) predominantly growing on private property. IRN programs assist in the acculturation of United Nations refugees using food as the common denominator, allowing for rich opportunities for cross-culture exchange, education and volunteerism. IRN conducts harvest and gleaning events, food preparation workshops using gleaned fruit, and documents food preservation techniques and multiethnic fruit uses.

### **Goals and Objectives**

**Goal 1: Improved communication between all land management agencies, indigenous tribes, and other cultural groups about varying perspectives and beliefs related to forests, trees, and other natural resources.**

*Objectives:*

1. Build trust, communication networks, and problem solving strategies between land management agencies, communities, and stakeholders about the diverse cultural perspectives of forest users and Indigenous Tribes.
2. Improve broader understanding of various cultural perspectives as they relate to forest resources, fire management, and other natural resource issues.
3. Educate the public, government officials, and community leaders about the role and importance of cultural perspectives in restoration sustainable forest and wood products businesses, fire management, and community protection needs and responsibilities.

**Goal 2: Effective collaboration mechanisms for sharing of information about resources, priorities, policies, and management strategies between Tribes and non-Tribal organizations.**

*Objectives:*

1. Where appropriate, share data and implementation strategies to leverage successful outcomes on tribal and adjacent lands with similar management objectives.
2. Improve information sharing about available resources to address needs of indigenous tribes and other cultural groups in Arizona.



## Plan Accomplishments

Work by Arizona State Forestry and the US Forest Service have been focused on achieving these identified Forest Action Plan goals (Appendix I has a full list of reported activities.) Other national, state, and local organizations are also furthering these efforts through day-to-day operations, collaborative agreements, and project-specific efforts.

In 2010, Arizona State Forestry hired a time-limited Tribal Outreach Specialist to improve communications with all Arizona Tribes, and the US Forest Service currently has designated tribal relations staff on each National Forest in Arizona.

Though there are other activities occurring on a regular basis, these two organizations reported specific accomplishments toward these Forest Action Plan goals:

- Arizona State Forestry
- US Forest Service



### **Arizona State Forestry Tribal Outreach**

Arizona State Forestry's Tribal Outreach Specialist helped organize multiple events and meetings to share information.

A riparian restoration workshop organized by the Colorado River Indian Tribes and Arizona State Forestry highlighted riparian restoration work done on the 'Ahakkav Tribal Preserve and also enabled the Colorado River Indian Tribes to learn more about Arizona's Cooperative Forestry programs.



### **Arizona State Forestry Provides Technical Support for Tribal Saw Mills**

Arizona State Forestry staff provides Tribes with technical expertise on saw mill setup, operation, and maintenance.

State Forestry's Utilization Forester provided information to the Navajo Nation Forestry Department who recently acquired a portable saw mill. State Forestry staff also provided local contacts to help the White Mountain Apache Timber Company restart the saw mill on the Fort Apache Reservation. Reopening of the mill provided employment for tribal members and a market to offset the costs of forest treatment projects for Fort Apache foresters.



# **SECTION 2**

## **National Priorities**

The US Forest Service and State Foresters developed three national priorities and 11 objectives that were incorporated into Arizona’s original 2010 Forest Action Plan. This section provides an overview and selected highlights of Arizona activities that align with these national priorities. Appendix II provides a detailed list of reported activities and how they align with these national themes.

This section will be included as an addendum to Arizona’s Forest Action Plan and meets the requirement of a “National Priorities Section” to be incorporated into state action plans.

### **National Priorities and Objectives:**

#### **1. Conserve Working Forest Landscapes**

- 1.1. Identify and conserve high priority forest ecosystems and landscapes.
- 1.2. Actively and sustainably manage forests.

#### **2. Protect Forests from Harm**

- 2.1. Restore fire-adapted lands and reduce risk of wildfire impacts.
- 2.2. Identify, manage, and reduce threats to forest and ecosystem health.

#### **3. Enhance Public Benefits from Trees and Forests**

- 3.1. Protect and enhance water quality and quantity.
- 3.2. Improve air quality and conserve energy.
- 3.3. Assist communities in planning for and reducing forest health risks.
- 3.4. Maintain and enhance the economic benefits and values of trees and forests.
- 3.5. Protect, conserve, and enhance wildlife and fish habitat.
- 3.6. Connect people to trees and forests, and engage them in environmental stewardship activities.
- 3.7. Manage trees and forests to mitigate and adapt to global climate change.

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# CONSERVE WORKING FOREST LANDS

## Priority Overview

Across the state of Arizona, forests and other open space landscapes are being fragmented and converted for development. Placing an emphasis on understanding and preserving the economic values of working forest lands and integrating them into planning efforts will help in the identification, protection, and maintenance of important forest landscapes.

Appendix II identifies over 100 reported activities since completion of Arizona’s Forest Action plan that align with the national theme of Conserving Working Forest Lands. A few Arizona projects are highlighted here.



### ***Four Forests Restoration Initiative (4-FRI)***

The City of Williams, Arizona is home to two newly commissioned saw mills that are tooled specifically for the processing of small diameter ponderosa pine. These businesses were attracted to northern Arizona by the Four Forest Restoration Initiative (4FRI), a collaborative effort to restore forest ecosystems on portions of four National Forests - Coconino, Kaibab, Apache-Sitgreaves, and Tonto - along the Mogollon Rim in northern Arizona.

The vision of 4FRI is restored forest ecosystems that support natural fire regimes, functioning populations of native plants and animals, and forests that pose little threat of destructive wildfire to thriving forest communities, as well as support sustainable forest industries that strengthen local economies while conserving natural resources and aesthetic values. Collectively this influx of forest enterprises has also helped ensure that private landowners have a financial incentive to conserve their forested lands and maintain them as working forests. (Photo credit: Andrew Owen)





### ***Flagstaff Watershed Protection Project (FWPP)***

The first area thinned as part of the Flagstaff Watershed Protection Project (FWPP) generated this log deck on Arizona State Trust Land near Flagstaff, Arizona. The FWPP – a partnership effort between the State, City, and Coconino National Forest to help reduce the risk of devastating wildfire and post-fire flooding in the Rio de Flag and Lake Mary watersheds – was approved by Flagstaff voters in a \$10M bond vote in 2012.

There are only a handful of examples in the country where forest restoration work on the National Forests is being funded by a municipality, and this is the only known instance where such an effort is funded from municipal bonds. Projections indicate that a wildfire on the steep slopes above Flagstaff could have major impacts on large portions of the City of Flagstaff, and that a wildfire and subsequent erosion on the steep slopes of Mormon Mountain could render 50% of the city's water supply unsuitable.

Work on this State Trust Lands parcel, called Equestrian Estates, was completed by hand crews and mechanical thinning operations. Log decks from the mechanical thinning were marketed to local sawmills and by-products from the hand thinning work were left for fuelwood gathering by local residents.

The proximity to private residences tested local acceptance in preparation for larger scale forest thinning treatments slated for other areas of the watershed protection project. Overall, the majority of residents were happy to see the hazardous fuels reduction projects being implemented and they support the ongoing efforts. (Photo credit: AZ State Forestry)

# PROTECT FORESTS FROM HARM

## Priority Overview

A healthy landscape has the capacity for renewal and for recovery from a wide range of disturbances while continuing to provide public benefits and ecosystem services. Providing economically viable solutions to forest restoration and management actions will help protect, restore, and sustain forest resources. Two critical aspects of this will be: 1) restoring healthy forest landscapes to achieve acceptable fuel loads that reduce threats to resources and communities from uncharacteristic wildfire, and 2) support existing, and develop new, sustainable wood products industries that can provide the resources necessary to accomplish landscape-scale forest restoration.

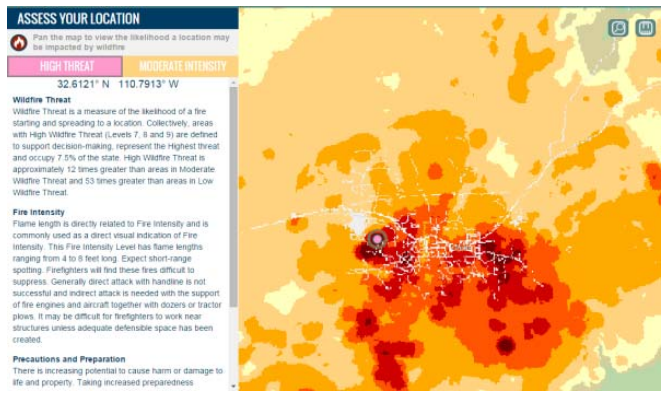
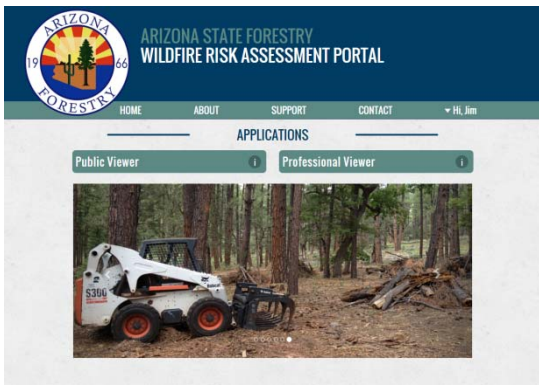
Appendix II identifies over 500 reported activities since completion of Arizona’s Forest Action plan that align with the national theme of Protecting Forests from Harm. A few Arizona projects are highlighted here.



### ***Verde River Watershed Protection***

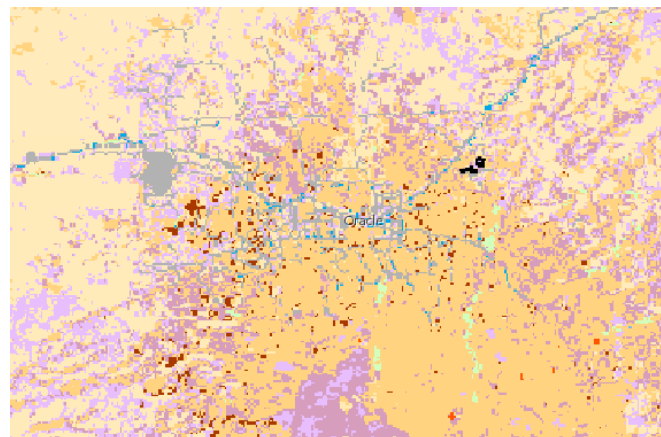
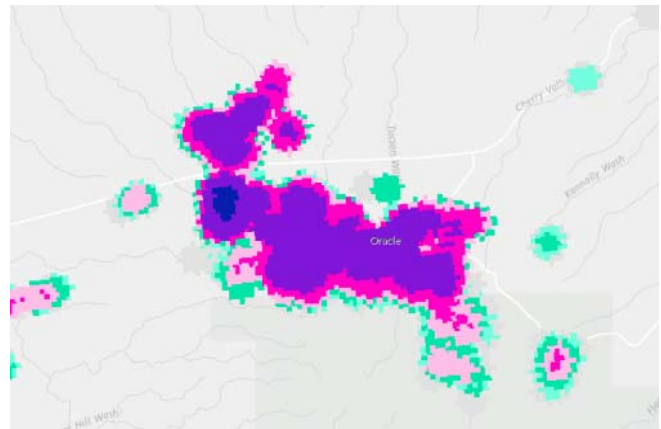
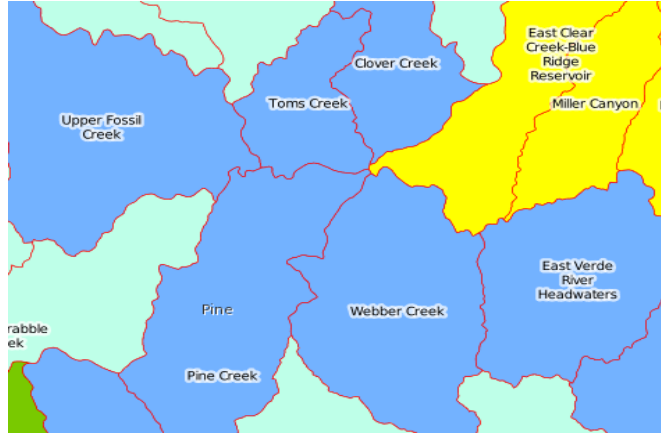
The Verde River watershed of central and northern Arizona is identified as a priority landscape and sustains the Verde River and its riparian forest. In Arizona, riparian forest is extremely rare at less than 0.5% of all land. Numerous Arizona State Forestry projects have been implemented within this valuable and threatened landscape to control invasive plants and support riparian forest restoration. Investment and collaboration from numerous partners such as the USDA Forest Service, Verde Watershed Restoration Coalition, Friends of Verde River Greenway, Walton Family Foundation, The Nature Conservancy, US Fish and Wildlife Service, Northern Arizona University, Tamarisk Coalition, Arizona State Parks, Arizona Game and Fish Department, and over 200 private land owners utilize their collective knowledge to ensure a successful partnership.





## Arizona Wildfire Risk Assessment Portal (AzWRAP)

Wildfire continues to threaten people, property, and natural resources across Arizona. Rapid population growth into Wildland Urban Interface areas and increasing effects of long term drought and increased fuel loading conditions represent major concerns moving forward into the future. Heightened awareness of wildfire threat, prevention and mitigation are becoming increasingly important to ensure safety. The Arizona Wildfire Risk Assessment Portal is the primary mechanism for Arizona State Forestry to deploy wildfire risk information (Westwide Wildfire Risk Assessment data) and create awareness about wildfire issues across the state. It is comprised of a suite of applications tailored to support specific workflow and information requirements for the public, local community groups, private landowners, government officials, hazard-mitigation planners, and wildland fire managers. Collectively these applications will provide the baseline information needed to support mitigation and prevention efforts across the state.



# ENHANCE PUBLIC BENEFITS FROM TREES AND FORESTS

## Priority Overview

Restoration, conservation, and protection of forest resources will enhance the economic, environmental, and social benefits from trees and forests. This includes urban forestry as well as the management of all forested lands to provide a multitude of benefits to the people of Arizona. This goal recognizes that our nation’s federal, state, urban and private forests are the natural backyards for many communities and serve as society’s connection to nature. Forest management strategies will conserve and enhance a green infrastructure that effectively connects people and their cultures with the natural environment.

Appendix II identifies over 150 reported activities since completion of Arizona’s Forest Action plan that align with the national theme of Enhancing Public Benefits from Trees and Forests. A few Arizona projects are highlighted here.



### ***Tucson Bark Beetle Response***

Most pine trees planted in lower elevations of central and southern Arizona are Mediterranean species which are known to survive in dry climates in their native range. Many of these pines were planted over 50 years ago and have reached maturity in the southern Arizona climate. However, following years of drought and inadequate irrigation practices, many have become stressed and susceptible to insects. Recently, many pines in the Tucson area, mostly Aleppo pines (*Pinus halepensis*), have succumbed to a native bark beetle, *Ips calligraphus* (six-spined engraver), though that insect has not previously been reported to thrive in the upper Sonoran Desert. These beetles are now infesting a significant number of trees and threaten many more. It is not known if its lifecycle will mimic that of beetles in the higher elevations where they are commonly found, or if there will be a difference because of the lack of cold temperatures in the Tucson desert. Funding from the US Forest Service is enabling a partnership between Arizona State Forestry and the University of Arizona to study the extent and lifecycle of the six-spined engraver in the Tucson area.



## ***Diversifying Urban Forests with Edible Trees***

The Southwest urban forest contains a variety of tree species – native and nonnative – some of which produce edible seeds, nuts, fruits and pods. Edible trees are under-used resources that provide a wide range of environmental services and meet important community food and sustainability needs. Use of historically, culturally and genetically significant edible heritage tree species increases diverse public engagement in urban forest stewardship. Specific project deliverables include: 1) synthesis of water use by edible trees; 2) development of criteria for selecting climate-appropriate edible tree species and providing guidance for site design, planting, water provision, maintenance, and harvesting of edible trees; and 3) conducting broad outreach to actively engage people with forests. (Photo credit: Barbara Rose/Bean Tree Farm)



## Access the Full Report:

This full report is available electronically in PDF format, along with all appendices, at:

[www.azsf.az.gov/forestry-community-forestry](http://www.azsf.az.gov/forestry-community-forestry)

### **APPENDICES Include:**

- I. Stakeholder Accomplishments by Arizona Collaborative Goals (154 pages)
- II. Stakeholder Accomplishments by National Priorities (164 pages)
- III. Stakeholder Summary (10 pages)
- IV. Abbreviations and Acronyms (5 pages)

## Contributing Organizations:

Many organizations have contributed to efforts supporting this plan. Those organizations that have provided specific information included in this report are listed below. (For more information about these organizations, please see Appendix III, or visit the individual organization websites)

|   |  |
|---|--|
| Arizona State Forestry                                | <a href="http://www.azsf.az.gov">www.azsf.az.gov</a>                                 |
| Arizona Commerce Authority                            | <a href="http://www.azcommerce.com">www.azcommerce.com</a>                           |
| Arizona Department of Environmental Quality           | <a href="http://www.azdeq.gov">www.azdeq.gov</a>                                     |
| Arizona Department of Transportation                  | <a href="http://www.azdot.gov">www.azdot.gov</a>                                     |
| Arizona Game and Fish Department                      | <a href="http://www.azgfd.gov">www.azgfd.gov</a>                                     |
| Arizona Nursery Association                           | <a href="http://www.azna.org">www.azna.org</a>                                       |
| Arizona Public Service                                | <a href="http://www.aps.com">www.aps.com</a>   |
| Arizona State University – Sustainable Cities Network | <a href="http://www.sustainablecities.asu.edu">www.sustainablecities.asu.edu</a>     |
| Borderlands Restoration                               | <a href="http://www.borderlandsrestoration.org">www.borderlandsrestoration.org</a>   |
| Desert Landscape Conservation Cooperative             | <a href="http://www.usbr.gov/dlcc">www.usbr.gov/dlcc</a>                             |
| Ecological Restoration Institute                      | <a href="http://www.nau.edu/ERI">www.nau.edu/ERI</a>                                 |
| Eastern Arizona Counties Organization                 |  |
| Flagstaff, City of                                    | <a href="http://www.flagstaff.az.gov">www.flagstaff.az.gov</a>                       |
| Landscape Conservation Cooperatives                   | <a href="http://www.lccnetwork.org">www.lccnetwork.org</a>                           |
| Northern Arizona University                           | <a href="http://www.nau.edu">www.nau.edu</a>   |
| Phoenix, City of                                      | <a href="http://www.phoenix.gov">www.phoenix.gov</a>                                 |
| Salt River Project                                    | <a href="http://www.srpnet.com">www.srpnet.com</a>                                   |
| Sky Island Alliance                                   | <a href="http://www.skyislandalliance.org/">www.skyislandalliance.org/</a>           |
| The Nature Conservancy                                | <a href="http://www.nature.org">www.nature.org</a>                                   |
| Tucson, City of                                       | <a href="http://www.tucsonaz.gov">www.tucsonaz.gov</a>                               |
| Tucson Clean and Beautiful – Trees for Tucson         | <a href="http://www.tucsoncleanandbeautiful.org">www.tucsoncleanandbeautiful.org</a> |
| Tucson Electric Power                                 | <a href="http://www.tep.com">www.tep.com</a>   |
| University of Arizona                                 | <a href="http://www.arizona.edu">www.arizona.edu</a>                                 |
| Upper Verde River Watershed Protection Coalition      | <a href="http://www.uvrwpc.org">www.uvrwpc.org</a>                                   |
| US Bureau of Indian Affairs                           | <a href="http://www.bia.gov">www.bia.gov</a>   |
| US Bureau of Land Management                          | <a href="http://www.blm.gov">www.blm.gov</a>   |
| US Fish and Wildlife Service                          | <a href="http://www.fws.gov">www.fws.gov</a>   |
| USDA Farm Service Agency                              | <a href="http://www.fsa.usda.gov">www.fsa.usda.gov</a>                               |
| USDA Forest Service                                   | <a href="http://www.fs.fed.us">www.fs.fed.us</a>                                     |
| US Geological Survey                                  | <a href="http://www.usgs.gov/">www.usgs.gov/</a>                                     |
| Watershed Management Group                            | <a href="http://www.watershedmg.org">www.watershedmg.org</a>                         |
| Western Forestry Leadership Coalition                 | <a href="http://www.wflccenter.org">www.wflccenter.org</a>                           |



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