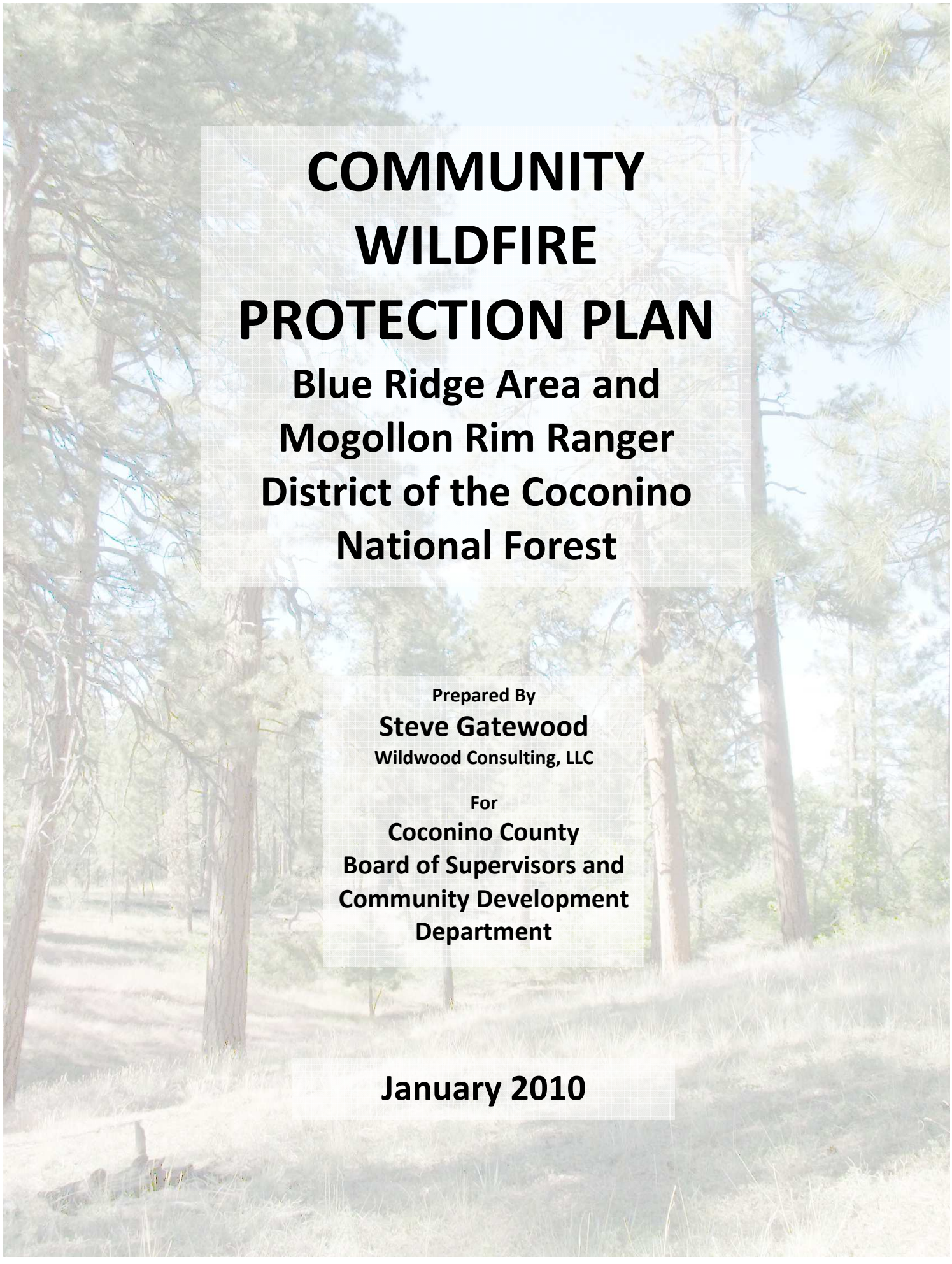

COMMUNITY WILDFIRE PROTECTION PLAN

Blue Ridge Area and Mogollon Rim Ranger District of the Coconino National Forest

Prepared By

Steve Gatewood

Wildwood Consulting, LLC

For

Coconino County Board of Supervisors and Community Development Department

January 2010

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Developed Under Contract For The
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TABLE OF CONTENTS

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1.0 INTRODUCTION

Forested ecosystems of the Mogollon Rim are both dependent on fire for maintaining forest health, and subject to destruction by fire when forest health is degraded. Historically, lightening ignited wildfire moved through open ponderosa pine forests at ground level – a "cool" fire burning grasses, shrubs and small trees, with occasional flare-ups through dense thickets and into low hanging branches and tree crowns. Hundreds to thousands of acres might burn over a few weeks, with burn severity typically low and few patches of mature trees consumed by fire.

Mixed conifer forests scattered throughout the Rim were characterized by a different natural fire regime, less frequent and with greater opportunities for "hot" fires in the mid-story and crowns due to the generally denser vegetation. These fires would burn through in a few days with burn severity much higher over large areas and with areas of stand-replacing fire common. Pinyon pine/juniper woodlands would have a mix of both fire types depending on tree density and ground cover characteristics.

With Euro-American settlement, various land use and resource management approaches (fire suppression, grazing, large tree logging) have resulted in much denser vegetation structure over wider areas that supports uncharacteristically severe fire behavior. Now tens to hundreds of thousands of acres can burn fairly quickly with significant areas of very high burn severity throughout all forest and woodland types.

Human communities who have chosen to live in or visit these fire-adapted ecosystems must always be aware of the prospect for fire on the horizon. Will the "next one" (not if, but when) be a fast moving and destructive wildfire, difficult to contain, that roars through the Wildland/Urban Interface (WUI) burning forests and homes alike; or will it be a more natural fire approaching slowly, manageable by fire fighters and moving around and through the WUI in a controlled way with minimal property and resource damage? As one of the goals of the National Fire Plan states, a "Community-based approach to wildland fire issues combines cost-effective fire preparedness and suppression to protect communities and the environment with a proactive approach that recognizes fire as part of a healthy, sustainable ecosystem."

Community Wildfire Protection Plans (CWPP) are authorized by the Healthy Forests Restoration Act of 2003. A CWPP is one of the best ways to evaluate local conditions and risks from fire, and to design and implement a plan to address all aspects of community protection and wildfire mitigation. As stated in the Greater Flagstaff CWPP, after which this Blue Ridge Area CWPP has been modeled:

> "Community protection and preparedness is a critical step toward mitigating immediate fire hazards and restoring adjacent wildlands. A combination of fuel management, FireWise standards, and appropriate wildfire suppression response across ownerships within and adjacent to at-risk communities will reduce threats to life and property, protect values-at-risk, and create a safe context for the use of fire in subsequent forest ecosystem restoration efforts. This plan outlines actions needed to prepare and equip the … community to live and thrive within our fire-adapted ponderosa pine forests."

A CWPP is a strategic plan as well as an action plan: it generates a broad operating framework for landowners and resource managers within the area, and identifies community protection priorities. Site specific planning and implementation remains the responsibility of each owner/management agency, generally operating within the guidelines developed within "their" plan. After all, "they/we" should all be involved in our communities CWPP development. However, it is necessary to supplement information in a CWPP with site-specific data during the

planning and design of site-specific projects for implementation. This may require adjustments to priorities, locations and treatments.

The goal of a CWPP is to protect communities from destructive wildfire within a context of ecological restoration and maintenance of forest health. That is accomplished through achieving common and specific objectives such as:

1 – Reducing the excessive numbers of small diameter trees;
2 – Restoration of ground cover conditions that support frequent, low intensity fire;
3 – Retention of large trees and maintenance of wildland forests with diverse forest composition, structure and function;
4 – Creation of fire protection buffers around private land and critical community infrastructure;
5 – Acceptance of prescribed burning and natural fire across the landscape;
6 – Implementation of FireWise techniques to reduce structure ignitability and provide defensible space on private land;
7 – Creation and encouragement of an educated and involved public, both residents and visitors alike, that is actively engaged with community protection and forest health efforts; and
8 – Creation and maintenance of sustainable local businesses that support community protection and ecological restoration.

Foundational principles adopted from both the Flagstaff and Rim Country CWPPs, and used in the development of this plan, include:

- **Fuel Management:** Reduction of target hazardous fuels is based upon known fire risk, fire behavior, and threats to values-at-risk.
- **Social and Political:** Social and political concerns play a major part in defining treatments and their locations.
- **Operational:** Due to financial, infrastructure, and personnel constraints, emphasis must be placed on strategically located fuel treatments designed to protect key values-at-risk, and that can serve as anchor points for larger, landscape-scale treatments.
- **Ecosystem:** Reduction of hazardous fuels should be integrated with overall ecosystem conservation, restoration and management goals.
- **Economic:** Implementation and maintenance of fuel treatment benefits greatly outweigh their costs -
    - They save money by avoiding suppression expenditures, rehabilitation costs, and compensation for property damage
    - They are an investment in protecting firefighter and civilian lives
    - They present new opportunities for rural economic development
    - They may help address issues related to the availability of homeowner's insurance in fire prone forest ecosystems
- **Ethical:** The continuing decline in forest health and the increasing probability of catastrophic fires, and their potential impact on the Blue Ridge area, is a reality. The need to act now to restore forest health and reverse this dangerous downward trend is of utmost importance.

In addition, the Arizona Governor's Forest Health Council's ***Guiding Principles for Forest Restoration and Community Protection*** are included as Appendix A (page 39) and were used during development of this plan.

The area addressed by this CWPP is located between three existing CWPPs: the ***Community Wildfire Protection Plan for Flagstaff and Surrounding Communities in the Coconino and Kaibab National Forests of Coconino County, Arizona*** (January 2005) to the north and northwest, the ***Community Wildfire Protection Plan for At-Risk Communities of the Sitgreaves National Forest in Apache, Coconino and Navajo Counties*** (May 2004) to the east, and the ***Rim Country Community Wildfire Protection Plan*** (October 2004) to the south and southeast. Various approaches and information from these plans have been adopted in the development of this Blue Ridge Area CWPP, as appropriate.

This plan is posted on the following websites:
Coconino County – www.coconino.az.gov
Arizona State Forestry Division – www.azsf.az.gov

Coordination and review of the implementation of this plan will be conducted by Coconino County staff and/or contractors, as well as local Fire Districts and the Blue Ridge Community FireWise Partnership.

2.0 COMMUNITY IDENTIFICATION AND DESCRIPTION

The Blue Ridge CWPP *Analysis Area* is identified in Map 1 (page 26), along with dominant vegetation cover, general relief and private land ownership. The *Analysis Area* includes the southeast corner of Coconino County, several unincorporated communities/neighborhoods (Starlight Pines, Clear Creek Units, Blue Ridge Units, Pine Canyon, Stoneman Lake, Clints Well, etc.), the Mogollon Rim Ranger District of the Coconino National Forest and associated infrastructure (ranger stations, recreational sites, maintenance facility, etc.), several major roads and power lines, and numerous scattered private land parcels (Happy Jack Resort, Camp Colley, Hay Lake Ranch Headquarters, etc.) or leased federal land (Discovery Channel Telescope) with varying levels of development. Acreage breakouts for the *Analysis Area* are listed in Table 1 (page 22).

The roughly 870-square mile *Analysis Area* is centered on the Mogollon Rim, and includes rolling hills and valleys, steep ravines with perennial and ephemeral streams, steep slopes dropping off of the Rim, several lakes, ponds and wetlands, extensive ponderosa pine and mixed conifer forests, and pinyon/juniper woodlands. The area supports diverse wildlife populations, including several listed and sensitive species, and many miles of critical aquatic habitat.

The full-time population of the area is very low (approximately 500 permanent residents) with a relatively large number of seasonal residents (approximately 1,500). Several thousand visitors are in the area on any given weekend. The focus of describing a wildland/urban interface for the CWPP are the scattered communities & subdivisions and developed or developing private land parcels, as well as key infrastructure.

Only three major paved roads traverse the area (CR 487/FR 3, CR 260, SR 87). There is a network of improved and unimproved unpaved roads running throughout the region that provides access to private land, recreation areas and remote sites, as well as access for hunters and agency staff to conduct land management activities. A major electric transmission line (650 KV) runs north-south through the western side of the *Analysis Area*. Salt River Project (SRP), Bureau of Reclamation and Phelps/Dodge constructed a dam with a reservoir (C.C. Cragin Reservoir, formerly Blue Ridge Reservoir) on East Clear Creek in the eastern section, and it will soon begin providing municipal water to the City of Payson below the Mogollon Rim through a pipeline/power line corridor area that also runs north-south through the southeastern portion of the *Analysis Area*. The pipeline is above ground in 20 locations where it crosses side drainages and the 33kv powerline is on wooden power poles. A pumphouse and 2 million gallon storage tank are also part of the reservoir infrastructure. The new Discovery Channel Telescope is also within the area.

Values, Risk and Threats: To facilitate identification and establishment of the *Wildland/Urban Interface*, a stakeholder group was surveyed for values at risk and significant resources, as well as influences on planning and treatment options (see Appendix B, page 48). Several parameters were selected and emphasized in the final assessment. Table 2 (page 22) summarizes these values and risk factors, which include:

1. Communities, private land & infrastructure
2. Municipal watersheds (C.C. Cragin Reservoir) and critical aquatic habitat
3. Crown bulk density
4. Steep slopes in proximity to private land
5. Areas upwind of at-risk communities/private land/infrastructure

Items which influenced the selection of these five parameters included:

1. Residential areas, businesses, private lands and infrastructure are the basis of a CWPP – Map 1 (page 26). We chose buffers of ½ mile around private land and other at-risk residential/developed areas (telescope). Linear infrastructure (major roads and powerlines) were buffered with 1/4 or 1/8 mile.
2. The Cragin Reservoir watershed will provide water to urban areas below the Rim starting in 2014 and could suffer significant degradation (watershed erosion, sedimentation, etc.) from wildfire, as could watersheds supporting significant and critical aquatic habitat – Map 2 (page 27).
3. Crown bulk density indicates where the potential for intense fire is greatest - Map 3 (page 28).
4. Due to significant variation in topography, steep slopes adjacent to and upwind of private land and developed areas create significant threats to values at risk – Map 4 (page 29).
5. Wildfires typically move from the SW to NE during prime fire seasons, can move very quickly under the right conditions, and tend to throw fire brands (burning embers) ahead of the actual line of fire. For these reasons, generous buffers – ranging from 1½ to 4 miles depending on conditions - upwind of at risk private land and the telescope are proposed.

As depicted in Table 3 (page 22), the Threat Level was divided into two categories: High and Low. Three important items to consider in reviewing threat information are:

1. **High Threat Levels** were recognized around most private land and developed areas with high crown bulk density forest nearby or significant areas of steep slopes within the 4-mile upwind buffer. **Low Threat Levels** occur in all other areas. (To ensure some level of protection, a minimum ½ mile buffer was included around all private land parcels regardless of threat level.)
2. Steep slopes associated with creeks and ravine systems are considered "fire corridors" where topography, dense vegetation and other resource issues create **High Threat Levels** and may restrict the ability to conduct large-scale treatments. Effective FireWise building standards on private property must be implemented downwind of these corridors.
3. This analysis is based upon a landscape-scale study: threats to some areas are not clearly depicted, but do exist. Site-specific interpretation is required by local experts, owners, and land management agencies.

Wildland/Urban Interface: Because of the rural nature of this area, the *Wildland/Urban Interface* (WUI) includes all private land and infrastructure in the Blue Ridge Area. The WUI is primarily encompassed within a single jurisdiction - the Mogollon Rim Ranger District (with a small part of the Red Rock Ranger District) of the Coconino National Forest. This plan incorporates

these private communities and subdivisions and their associated infrastructure sites into a single regional CWPP, rather than separate plans for each aggregation of private land. This *Wildland/Urban Interface* is identified as an area where public safety is the over-riding goal. It is sufficiently large to:

1) Reduce the potential of a high intensity fire from entering private land
2) Create an area whereby fire suppression efforts will be more successful
3) Limit large amounts of wind-driven embers or "fire brands" from settling in the communities/subdivisions
4) Protect critical infrastructure

Infrastructure outside of identified at-risk private land and communities was also incorporated into the *Wildland/Urban Interface*. We chose to buffer major infrastructure by a 1/2 mile treatment zone (1/4 mile either side): High Voltage Overhead Power Lines and Major Transportation Corridors (State Highway 87 and County Roads 487 & 260). The smaller power line associated with the Cragin Reservoir pumping system is buffered with a ¼ mile treatment zone – 1/8 mile on each side.

When the mapped risks (crown bulk density, steep slopes, upwind areas) and communities, subdivisions, infrastructure and municipal watershed buffers were combined, the *Wildland/Urban Interface* for this CWPP was established as depicted on Map 5 (page 30), with acreage breakouts shown in Table 4 (page 23).

We have included all private land in the Blue Ridge Area, along with the DC telescope on leased federal land, within the designated *Wildland/Urban Interface.* Therefore, in order for the CWPP to be successful, all owners must undertake appropriate mitigation efforts or cooperative ventures between themselves and the adjacent landowner, private or public. Inclusion of every parcel of private land within the *Wildland/Urban Interface* is desirable for this CWPP.

3.0 COMMUNITY ASSESSMENT

Fuel Hazard: Prior to European settlement in the 1860's, the forest of the Mogollon Rim was comprised of relatively open stands of large-diameter ponderosa pine with scattered oaks, aspen, and other species, and intermingled with denser mixed conifer forests in canyons, steep slopes, and on northern aspects. Open meadows and grasslands (parks) were also common. Tree numbers averaged 30-50 per acre with basal areas averaging 40-80 sq ft/acre, and trees were typically arranged in small clumps and larger groups. While some young thickets and open meadows were undoubtedly present, a savanna community structure dominated the ponderosa pine landscape. Fires were relatively frequent, returning every 5-30 years, and were generally low-intensity in nature.

Beginning in the 1880's, and until fairly recently, area forests were subjected to societal demands that resulted in intense livestock grazing, over-harvesting of large-diameter trees, and a policy of fire suppression that embraced fire exclusion. These actions led to profound changes within the forest and set-the-stage for the intense wildfires that are common today.

Many pine stands are presently overstocked with small (3" to 9" dbh) and mid-sized (10" to 16" dbh) second-growth trees. Basal areas can range from 100 to well over 200 square feet per acre, and tree density from several hundred to over a thousand trees per acre. Canopy closure typically varies from 50% to 70% but often approaches 100%. Juniper, pinyon pine, Douglas fir, white fir, Gambel oak, limber pine and aspen occur among the pine stands. Insect and disease problems in these stands include dwarf mistletoe and periodic episodes of various bark beetles and other insects and disease (rusts & cankers).

Fires are natural events, have been present since before humans occupied this area, and will continue to occur. What has changed, however, is the severity of fires we now experience. Our ponderosa pine ecosystem did not evolve with the fire intensity of today's fires, whether natural or human caused.

Three factors influence the spread of wildfire: fuel, weather, and topography. Of these, we can only manage fuel to reduce the intensity and spread of wildfire.

Fuel – This area is part of the largest continuous ponderosa pine forest in the world. Natural fuel amounts have increased dramatically in the past 80 years. Homes and flame-able structures are simply another source of fuel.

Weather – Historically, due to prevailing wind pattern, our local fire spread pattern is from the southwest to northeast. We also experience two other fire weather factors on a fairly routine basis that, like wind, are beyond our ability to control: low relative humidity and high temperature. The southwest is also in the midst of a persistent drought that has greatly increased vegetation mortality, thus increasing fire potential.

Topography -- Fires burn faster upslope than down. Canyons, ridges, and drainages funnel wind. South facing slopes dry quicker and burn more readily. Steep slopes present challenges for treating hazardous fuels, thus reinforcing the need to treat adjacent, more easily accessible areas, in a more intensive manner and at a greater scale.

The question is not "if" a wildfire will occur - it is "when" and "where" it will happen.

Fire Regime Condition Class (FRCC) is a n assessment that can be used as a tool for wildland fire and fuel management. Three national Fire Regime ratings are given to land. These include Class 1, 2, and 3. The data collected for determination of Fire Regime Condition Class characterize the size of the area, geographic location, biophysical conditions, and fire regime characteristics. Ecological information can be used to classify the landscape fire regime and determine similarity, departure and ecological sustainability risks.

The majority of forested lands within the analysis area are currently described as within Condition Class 2 or 3 (530,380 acres, 95%). These ratings are developed from Potential Natural Vegetation, such as Ponderosa Pine Type, as the primary historical natural vegetation type and the historical fire regime. In this area natural fire occurred in 2-30 year intervals with low severity, and where that still occurs Condition Class 1 is assigned. Current Condition Class 2 (169,895 ac) assumes that land has been moderately altered from historic fire regimes, there is a moderate risk of loss of key ecosystem components, and the size, frequency, intensity and severity of wildland fire has been altered. Current Condition Class 3 (360,285 ac) include lands that have been significantly altered from historic fire regimes, have significant risk of loss of key ecosystem components, and exhibit dramatic changes in the size, frequency, intensity or severity of wildfires present on the landscape. Map 6 (page 31) identifies FRCC for the CWPP area.

To achieve ***community protection***, forest treatments and FireWise standards focused on public safety must begin in the WUI. First priority should be given to treating areas of dangerous fuels adjacent to communities (1/2 mile) with mainly intensive treatments, and then working outward in the WUI through the 1 1/2 mile buffer (mostly moderate treatments), and into the 4-mile buffer (mostly low intensity treatments) – see page 51. The overall scope of work is immense and the need to act quickly and decisively in this priority area is paramount. For ***community benefit,*** treatments in the ***Analysis Area*** focused on ecological needs and forest health, but reflecting the need to reduce fire threat, should also occur throughout the area.

Important community protection and forest health restoration work has been implemented throughout the *Analysis Area* during the past several years, and plans are underway to continue treatments. Map 7 (page 32) identifies areas that have been treated within the CWPP, as well as planned treatment areas.

Risk of Ignition and Occurrence: Wildfire is the #1 fire threat to the Blue Ridge Area. Statistics from the entire Coconino National Forest, which includes significant area outside the *Analysis Area,* illustrate both risk and occurrence:

Total Fires - 1970 thru 2003:			
Lightning Fires	10,377	Average per year (Lightning)	314
Human Caused Fires	6,131	Average per year (Human)	185
Total Fires (1970-2003)	**16,508**	Average per year (Total)	**499**

Locations of some previous fires occurring in and around the CWPP area are depicted in Map 8 (page 33).

Forest closure to public access based on fire danger has been quite variable over the years, but has been for several weeks each year, including 6 weeks in 1996, 3 weeks in 2000, and 9 weeks in 2003.

Community Preparedness and Protection Capability: Several neighborhoods have been active in FireWise community preparedness. Data from the Blue Ridge Community FireWise Partnership (BRCFP - membership identified in Appendix C, page 49) through July 2009 indicates the extent of work that has been completed:

Subdivision: Number of Lots, Number of Lots Cleaned Up – Percentage

Blue Ridge Estates: 193, 191 - 98.5%

Camp Colley: 100%

Clear Creek Pines # 1: 68

Clear Creek Pines # 2: 67

Clear Creek Pines # 3 & 7: 193, 33 - 17%

Clear Creek Pines # 4, 5 & 6: 244, 48 – 19.6%

Clear Creek Pines # 8 & 9: 475, 174 – 37%

Mogollon Ranch: 233, 46 - 19.7%

Moqui Ranchettes: 31, ? – 15%

Pine Canyon: 245, 73 - 30%

Ponderosa Pines: 42, 7 - 17%

Starlight Pines: 613, 605 - 99%

Starlight Pines Ranchettes: 125, 41(?) – 35%

Tamarron Pines: 411, 300 - 73%

Timber Ridge: 9, 4 - 45%

Coconino County government has in place both an ***Emergency Operations Plan*** (May 2005) and a ***Multi-Hazard Mitigation Plan*** (August 2005, but currently under revision). Both documents are available on the County web site: www.coconino.az.gov. In addition, the US Forest Service has in place a ***Coconino National Forest Fire Prevention Management Plan***, which is available on their web page at: www.fs.fed.us/r3/coconino.

In the Blue Ridge area, the Blue Ridge Fire District has been established and the Clear Creek Volunteer Fire Department organized.

4.0 COMMUNITY MITIGATION PLAN

Desired Future Conditions: Actions and treatments will leave both the landscape and at-risk private lands and neighborhoods resistant to catastrophic fire. Ponderosa pine stands will generally range from 30-100 larger-diameter trees/acre plus smaller recruitment trees and basal area of 40-80/acre, will be arranged in groups in varying degrees of interlocking canopy, and will be

separated by openings of various sizes. This pattern of tree groups and openings will be variable and provide for a diverse, rich, robust and healthy ecosystem. Further, it will avoid a structurally homogenous, tree plantation appearance. Thicker groupings of trees, including all sizes, are found scattered throughout the area, especially where mixed conifer forest occurs. But areas of healthy, open forest will predominate where surface fires can maintain forest health and severe fire is limited to individual groups of trees or stands within the forest.

Fuel Hazard Reduction: As indicated in the Introduction section, the BRCWPP is both a strategic plan and action plan: it provides a broad operating framework for all agencies and ownerships – private, city, county, state, and federal – within the area and identifies priority areas and treatments. Specific site prescription planning and implementation is the responsibility of each landowner or land management authority, acting with consideration of the guidelines expressed within this plan.

Mitigation actions designed to reduce dangerous fuel accumulations within the *Analysis Area* are based, in part, on the ***Guiding Principles for Forest Ecosystem Restoration and Community Protection*** promulgated by the Governor's Arizona Forest Health Advisory Council (see Appendix A, page 39). These principles include:

> ***The overall strategy is dynamic, adaptive, and coordinated.*** Given the current continuing decline in forest health, and the increasing threat of catastrophic wildfire, our actions to reverse this trend must be bold, large-scale, and undertaken immediately. All actions must be considered against the certain results of inaction, and must be continually monitored and revised as necessary.
>
> ***A sustainable community, with associated values-at-risk, is linked to a sustainable ecosystem.*** Appropriate treatments must be based on social and ecological needs, and be geared toward reducing risk of destructive wildfire and restoring functioning ecosystems. Restoration efforts should be directed toward protecting and promoting development of old-growth and large trees, but not at the expense of adequate fire protection to communities at-risk. Fire hazard reduction must be linked to the reintroduction of fire as a keystone ecological process. An active program of prescribed fire, including maintenance burns, and natural wildland fire use (currently referred to as planned and unplanned fire), with implementation by land-managers on a site-specific need and basis, is essential. Vegetative treatments, and the pace of their implementation, will vary across the landscape, thereby creating an opportunity for biodiversity to exist and flourish.
>
> ***The immediate, but not exclusive, focus is on protecting communities.*** A fire-resistive condition will be accomplished by modifying forest fuels at sufficient distances from structures and communities so as to reduce severe fire behavior, establishing defensible neighborhoods, and widespread use of fire resistant construction materials and architectural design.
>
> ***Necessary treatments, both-first entry efforts and maintenance activities, implemented and continued on site-specific needs, require a sustained commitment of public interest, political will, and financial investment.*** Reducing wildfire risk and improving forest health is a long-term process measured in decades. Because we are dealing with a living and dynamic ecosystem, intervention activities may essentially be required forever.

Treatment Guidelines: This plan provides recommendations for successful outcomes, and not prescriptive options for treatment of ponderosa pine and mixed conifer forests. The following discussion is intended to serve as a general guide and framework within which site-specific prescriptions should be developed. Modification of these concepts will be required and is encouraged.

Tree Selection **-** Selective thinning from below, initially focusing on over-topped pines, is a priority. If possible, "leave" trees should be left in a grouped pattern rather than evenly spaced. Openings created by the group leave-tree pattern allow a fire to either drop to the ground or stay on the ground permitting effective suppression action. Groups can vary from 1/10th acre up to as large as 1 or more acres in size. The number of trees in a group may range from as few as two to 15 or more, with 50 or more occurring in a limited number of groups throughout specific project areas. Trees, including the crown area, will generally occupy areas ranging from 40-60% of the area. Openings will range from less than one to several acres in size and constitute a variable of 60-40% of the area. Linear, contiguous openings and interspaces are preferred.

In general, trees designated for removal exhibit one-or-more of the following characteristics:

1. Contributes to crown-fire behavior: ladder effect into the overstory canopy, low crown-base heights, dense interlocking canopies, etc.
2. Are vulnerable to drought or insect infestation: suppressed, reduced vigor, etc.
3. Currently infested with insects that threaten to spread to other trees, unless the tree is to remain for other benefits.
4. Infected with dwarf mistletoe: Stands with high infestation levels of dwarf mistletoe can be thinned or pruned to reduce crown fire potential during the inevitable wildfire. Small pockets of mistletoe can be isolated from non-infected trees by a barrier of fifty feet (to reduce further spread of the parasite), or removed.

Conversely, trees considered for retention, unless other issues or benefits prevail, will be those which are often:

1. Clustered around evidences of historic forest structure (ex: downed logs, stumps, stump-pits, etc) or, alternatively, based on the best existing forest structure.
2. The largest diameter trees that exhibit high crown-base heights and are the most fire resistant:
3. Old ponderosa pine trees exhibiting yellow bark; large, old growth mixed-conifer trees.
4. Oaks, aspen, or other species of wildlife or ecological value

NOTE: a) Some variation is needed: trees may vary in-height and stands should include small intermediate size trees, saplings and seedlings, but none of these should threaten larger, older trees during a fire.
b) In the absence of prescribed fire, groups may be prone to loss due to high surface fuel loadings: retention of groups requires periodic use of fire.

Removal of the larger diameter trees in a stand, including standing dead snags, should be avoided unless cutting is required to adequately reduce fire risk, provide for public safety or for protection of improvements (ex: trees leaning over home, play area, power line, road, or hiking trail), or for some other specific ecological benefit.

When designating trees for removal, personnel must be aware of fire behavior alignments such as prevailing wind direction, shading, slope, fuel arrangement and continuity, including interlocking crowns, and potential suppression strategy and tactics best-suited to the individual site.

Wind-driven fires are typical in this area. To provide optimal protection, treatments are required upwind of at-risk communities – south and west – to a greater distance (in the 1 1/2 to 4 mile buffers) to provide adequate protection. Conversely, treatment distance north and east of at-risk communities can be reduced (1/2 mile buffers) unless circumstances dictate otherwise. However, one should be mindful that plume dominated fire behavior results in extreme fire spread from spotting of several miles in all directions and should be expected.

Topographic features – such as ravines and canyons – directly influence fire behavior, but may be impractical to treat due to slope, soil sensitivity, safety, expense, and other values such as critical wildlife habitat. This lends

emphasis to enlarging treatments where fire is expected to emerge from a canyon and where firefighting forces have the best opportunity for control.

Overall, this approach is considered to be an intermediate-intense modification of most existing stands, involving removal of 50-75% of the existing trees. Experience has shown that over the entire area, most, but not all, of the trees to be removed will be smaller diameter (less than 16" dbh).

Cutting Techniques - The type of mechanized operation is obviously important when conducting treatments. A traditional harvesting operation may be the preferred method in some areas, while in others it may not. For the latter, a "micro" harvesting approach may be required: trees are cut either using hand-crews with power saws or by a small shear, and wood can be moved by an All-Terrain-Vehicle (ATV) with a trailer or some other small-equipment approach. Such an approach, however, will likely lengthen the time required to treat the parcel, and may result in higher costs and pose an increased risk to the operator.

Restricting hours of operation in response to local conditions and neighborhood concerns may be warranted. For example, if an operation is immediately adjacent to homes or a neighborhood, activity may need to be restricted to normal working hours within a reasonable distance to lessen the impact to residents. However, doing so should be done with the realization the operation will extend further into the future.

Stumps should be cut as low to the ground and as level as possible. This not only improves post-treatment visual quality, but also permits easy access for wood removal and other subsequent land management needs. However, potential adverse impacts from unrestricted post-treatment access (ex: soil compaction, erosion, etc) should be addressed in the planning phase of a project, and subsequently managed.

Utilization - The majority of material available for wood production from the Blue Ridge Area will be small diameter ponderosa pine and mixed conifers. Opportunities for using this material are constrained by a number of factors including high harvesting costs, structural properties associated with juvenile wood, and a lack of consistent markets and processing facilities. Harvesting costs associated with forest restoration and community wildfire protection, including transportation and handling of raw material, are often quite high even where larger, high-value trees can be harvested. These costs can be prohibitive for smaller businesses.

Northern Arizona is uniquely situated to capitalize on contemporary opportunities for solid wood and biomass utilization. Solid wood applications in which businesses are actively exploring or have already invested in the area, include pallet stock, raw wood cants, roundwood construction, composite products like oriented strand board (OSB) and wood/plastic materials, and engineered lumber like glue-laminate beams and finger-jointed lumber. Biomass applications include wood chips for baseload energy production, densified fuel pellets for heating, and biochemical extractives. Other products for which small diameter trees are currently being used in the region include firewood, posts and poles, landscaping timbers, ground cover or mulch, and crafts.

Slash Treatment – Four general slash-disposal methods exist and each may be utilized under the appropriate circumstances. Regardless of the method selected, the required work (such as piling) should be completed as soon as possible after it is generated.

Hand Piles: This is a common practice of handling slash. Hand piles should be a minimum of six feet tall and six feet wide. Piles should be located in openings to minimize scorching leave trees when the piles are later burned. Likewise, placing piles on top of old stumps or logs should be avoided to reduce both the amount of smoke and the chance for "creep" when the piles are later burned.

Machine Piles: This method is usually feasible and widely utilized. It is particularly appropriate on larger projects and in more open areas. Piles are typically much larger than those created by hand piling. Whole tree skidding may also be used with the piles created at the landings. Windrows may also be built using dozers.

Chip or Grind: Although occasionally used, this technique is comparatively expensive and chips decompose slowly in our area. If future under-burning is anticipated for the site, chips may add to smoke management problems. The material can, however, be used for mulch or decorative landscaping. Hauling chips away is expensive, but this technique will be used more often as biomass energy plants are established in the area.

Lop-and-Scatter: This method, where material is cut so it is less than 12-24 inches above ground-level and then left on-site, should be carefully considered on sites immediately adjacent to structures. If the amount of slash is light and the manager can complete a broadcast burn as soon as the material has dried, it may be effective. However, due to the increased fire hazard, as well as visual concerns, this method is not as common as it once was, and if adjacent to homes, this method should never be left in-place for an extended period.

Pile Burning **-** Piles should be burned only when consumption will be greater than 90%. All pile burns should be conducted under conditions intended to minimize scorch to leave trees and smoke impacts to communities. Where appropriate or necessary, material can be moved to centralized burn pits.

Because the ultimate intent for many treatment sites is to conduct a broadcast burn, some existing dead-and-downed material can be piled during the thinning operation. These piles could then be burned alongside thinning-material slash piles. Although there are financial costs of doing so, which may be prohibitive depending upon the site, removing these materials during the pile burn phase does result in decreased smoke emissions during the subsequent broadcast burn.

Hand Piles: As a standard practice, these piles are burned either when snow cover exists or during an extended wet weather episode. Once ignited and as they burn-down, the piles can be periodically consolidated to ensure complete and timely consumption. Ignited piles should, if at all possible, burn-down by nightfall to minimize smoke impacts to area residents.

Machine Piles: Like pile burns, this type operation requires either snow or an extended wet weather episode. These type piles typically are larger than hand-piles, and will therefore burn longer once ignited. The advantage is that there are fewer piles per acre and they can often be burned under wetter conditions than is possible for hand-pile burning.

Ultimately, minimization of pile burning should be a goal as utilization opportunities arise. This will reduce scarified soil, smoke impacts, costs and CO_2 emissions.

Broadcast Burning **-** Treating ground fuels is a critical component of any effort designed to reduce fire threat, and it has added ecological benefits, such as recycling nutrients. Once an area has been thinned and the slash has been treated, or where a burn only treatment is designated, the site can be broadcast burned. Fire lines are usually constructed by hand or with a drag pulled by an ATV, or the burn crew can use natural breaks or roads/trails as a containment line.

Where site objectives dictate that standing dead trees and large downed woody material need to be protected, they can be either hand lined or otherwise excluded from the burn block. Extra protection measures may not be necessary for many fire-tolerant cultural or archaeological sites: treating these areas with prescribed fire has the advantage of protecting them from emergency suppression activities during a wildfire.

Deep duff and needle accumulation at the base of the larger older trees will often smolder for days. This essentially bakes the cambium layer and can lead to tree death 1-2 years, or more, after the burn. To avoid this potential loss, the site should be evaluated prior to ignition. If necessary, duff and needle material can be raked-away from high-risk trees: usually raking to a distance of one foot from the bole is sufficient.

Historically, large-scale broadcast burning has occurred in the fall, and to a lesser extent, during breaks in the summer monsoon season. Within the past few years, however, in response to smoke management objectives, burning is also occurring in the spring. As the demands to boost prescribed fire use increase, one option to enlarge the burn "window" is to shift more burns into the spring and summer months to recreate the historical fire regime. This, however, is a more challenging time to use prescribed fire and will depend on the availability and preparedness of appropriate resources at the local, regional and national levels. Summer burning should become easier, from a fire behavior standpoint, once a site has been previously burned and excessive accumulations of fuel are removed.

Under-burning in pine stands generally calls for target flame lengths of 1 to 3 ft, although some sites require a "hotter" burn to achieve resource objectives.

Ignition by hand with drip torches or with ATV-mounted torches is preferred. Burn operations usually begun by mid-morning following the break-up of the night time temperature inversion and the establishment of the day time wind pattern. Completion of ignition should be targeted early enough to ensure adequate smoke dispersal prior to the onset of cooler nighttime temperatures.

Every burn is to have a completed burn plan. Among many items in this plan are specific objectives for the burn. These may include, but are not limited to, such items as:

1. Fuel Reduction (fuel size classes, %'s, etc)
2. Tree Mortality
3. Scorch

Extensive public notification is an essential element of the burn program. This can be achieved by posting signs in the area announcing the proposed burn, news releases, and in many cases, door to door contact throughout the nearby neighborhood(s). A continuing education program through talks to civic groups, service clubs, and others to inform the community of the importance and benefits of the burn program are important as they generate understanding and support for the effort.

Local experience has shown that a previously notified neighborhood is willing to tolerate smoke for a day, but after 2-3 days, patience wears thin. If a particular log, stump, or site within a burn unit becomes a major concern to nearby resident(s), the responsible fire manager may decide to extinguish it the first night.

Burn units should be designed so they are dispersed throughout the area and will not constantly impact the same neighborhood(s). Neighborhood air sheds, indicated by diurnal smoke flows, are key to managing nighttime smoke impacts.

Maintenance - Once thinning, slash treatment, and first under-burning have been completed, the treated area constitutes an effective fuel-break for the next several years. Follow-up thinning and maintenance burns must be scheduled as necessary to ensure forests remain healthy and treated areas remain free of the risk of catastrophic wildfire. Adequate access must be assured, not only to conduct needed follow-up treatments, but also to permit rapid response of fire suppression forces. As part of a long-term maintenance and fire management program, fire containment and wildland fire use (now planned & unplanned ignitions) should be emphasized as appropriate management options for fire restoration.

Community Involvement **-** Throughout any treatment operation, contact with potentially affected residents must be maintained. Input and concerns from such persons must be considered, and where possible, incorporated into the overall effort. Treatments bordering neighborhoods should be explained to residents: one approach would be to go door to door to each residence, explain the project, and gather first-hand comments.

Costs **-** Individual project expenses vary tremendously from site-to-site based on ownership, size, complexity, and need. It is difficult to compare one site to another, especially initial treatment vs. maintenance requirements. "Average" costs associated with CWPP treatment recommendations (page 19) can be used to establish a ball-park figure of what it may cost to implement this plan.

While the cost will be very high, what should also be considered is the cost of doing nothing. For our area, it is no longer a question of "if" a wildfire will occur, but "when", "where", and "how much damage" will result. Working with residents before the wildfire, not during or after it, is preferred.

Benefits **–** Experience with wildfires burning in previously treated areas demonstrates the following:

- Improved access for fire fighters and apparatus
- Increased efficiency when locating and constructing fire lines
- Easier detection and suppression of spot fires
- Decreased mop up time and effort
- Reduced fire intensity, torching and mortality
- Improved public safety
- Reduction of loss
- Reduction of air emissions

Wildfire Prevention and Fire Loss Mitigation One document and one area-of-emphasis contribute greatly to community protection. They include: ***Coconino NF Prevention Management Plan*****:** Describes the ongoing prevention efforts of the USFS. For detailed annual activities under the plan, visit their web site at: www.fs.fed.us/r3/coconino. ***Structure Ignitability***: Implementation of measures to reduce fire risk and improve community protection are not restricted to federal, state, county, or city lands - they must also occur on private property. Especially important are FireWise and other actions to reduce the ignitability and burn characteristics of structures: use of fire resistant building materials, like Hardy board and metal roofing; covering of vents under roof eaves to prevent entry of embers; removal of firewood from near structures and decks; etc. Wildfire suppression will always be needed, but preparing and equipping homes and neighborhoods to live in a fire-environment is just as critical. Developers and property owners can greatly enhance protection of their investments by establishing a FireWise property and neighborhood. For treating the property, Table 5 (page 24) identifies key activities that can be implemented.

Detailed information for structures and landscaping is available at the FireWise web page: www.firewise.org.

Improved Protection Capabilities: Several potential activities and efforts should be initiated or further developed, thereby increasing community protection and preparedness. These include, but are by no means limited to, the following:

1. Develop an interagency agreement between the Blue Ridge Fire District, Clear Creek Volunteer Fire Department, and other fire prevention/suppression entities
2. Secure funding for implementation of additional FireWise treatments, cost share programs for fuel reduction and forest health treatments on private land, and continued education of and involvement by the general public, both residents, property owners and visitors
3. Investigate the adoption of fire codes and/or wildland/urban interface codes by "governmental entities" at the local level (Blue Ridge Fire District, homeowners associations, etc.) and at the County level

4. Coordinate with the Discovery Channel Telescope (operated under permit on USFS land north of the Happy Jack Ranger Station) for all prescribed burns in the CWPP/District to minimize potential negative impacts to celestial viewing programs.
5. Implement protection activities associated with private businesses, i.e. – Long Valley Store, Garage & Café; Happy jack Lodge & Campground; Sunnyside Resort; DC Telescope; etc.
6. Coordinate with SRP on treatment/burn activities in Cragin Reservoir watershed & along utility corridor.
7. Assist USFS with prescribed burns, training, etc. and sign USFS volunteer agreement.
8. Seek FireWise recognition via AZ State Forestry Division.

5.0 IMPLEMENTATION AND MONITORING

Community Mitigation Treatments: The combined effects of fuel reduction treatments implemented through past projects with proposed treatments identified and prioritized in this plan will not create a completely "fire safe" community, nor eliminate the need for suppression operations. Due to conditions outside our control, such as drought, climate change or extreme weather conditions, no one can guarantee total safety from wildfire. However, this plan is based upon both science and experience, and implementation will greatly reduce fire threat and create a defensible environment.

Rather than recommending specific treatments or prescriptions, we have chosen to present treatment guidelines. Variations of these guidelines have been successfully utilized by property owners and land managers in the area for a number of years.

Five treatment types are recommended - three utilizing mechanical removal of trees followed by prescribed (broadcast) burning, and two burn-only treatments (also see page 51, Appendix D). They include:

Mechanical Thinning Followed by Prescribed Burn:

Low Intensity = Light thinning followed by prescribed fire; representative of a maintenance fuel reduction or light restoration

Intermediate Intensity = Moderate thinning followed by prescribed fire; representative of a moderate fuels reduction or moderate restoration

High Intensity = Heavy thinning followed by prescribed fire; representative of a heavy fuels reduction or full restoration

Prescribed Fire Only:

Light Burn = No mechanical thinning (not required); maintenance burn (one goal is low tree mortality) on sites with light fuels

Heavy Burn = No mechanical thinning (restricted or impractical); thin with fire (one goal is higher tree mortality) on sites with heavy fuels

Treatment locations are proposed utilizing the "coarse-filter" approach. We recognize that site-specific planning will need to occur prior to implementation of any treatment, and that the application of tree cutting, prescribed fire, etc, may differ somewhat from that described herein and must reflect silviculturally-accurate methodology and terminology.

1. Moderate to high intensity treatment for reduction of overall fuel loads in areas adjacent to private land (1/2 mile buffer) with high crown bulk density.

2. Treatment in buffer areas upwind of private land as follows:
   a) Within 1½ miles, low to moderate intensity thinning depending on crown bulk density levels, and high intensity thinning adjacent to steep slopes.
   b) Within 4 miles, low intensity thinning except for areas with extremely high crown bulk density and adjacent to steep slopes, where moderate and high intensity thinning can be used to restore forest health.
3. Outside the *Wildland/Urban Interface* zone, but within the *Analysis Area*, use low intensity thinning and/or light prescribed burn as much as feasible, unless other factors or objectives dictate the need for more intensive thinning.
4. Use of appropriate thinning intensity or prescribed burning for protection of wildlife habitat (such as Mexican Spotted Owl and Northern Goshawk), municipal watersheds (such as C.C. Cragin Reservoir), and watersheds with critical aquatic resources.

Map 9 (page 34) identifies areas where Mexican Spotted Owl (MSO) Protected Activity Centers (PACS) and restricted habitat interface with the WUI. Land management agencies must recognize these areas and adjust treatment activity based on legally mandated requirements. They must also address Northern Goshawk habitat guidelines.

The ***Analysis of Small Diameter Wood Supply in Northern Arizona*** report identified "management zones" for this CWPP area, and proposed treatment characterizations and desired post-treatment conditions (basal area curves) for these zones. Since these treatment guidelines were agreed upon by a diverse group of stakeholders and covered very contentious issues (like large tree - > 16" - cutting), it is recommended that these treatment guidelines and basal area curves are used throughout the remainder of the *Analysis Area*. See Map 10 (page 35) and Appendix D (page 50) for detailed information.

The proposed location of the various potential treatment types may need to be adjusted to take advantage of topographic or access features in order to facilitate effective and safe suppression actions when a major fire threatens the area. Adaptive management requires adjustment and refinement as the effort moves forward, and treatments that have as their goal the reduction of fire risk and the improvement of overall forest ecosystem health are encouraged.

In addition to vegetation treatments, FireWise building techniques and standards are required. The Uniform Fire Code (UFC) and various Wildland Interface Fire Codes (WIFC) all provide the necessary framework, but not all areas can now adopt such codes based upon population, statutory authority, and other factors.

Priority Areas and Treatment Costs: The priority area for implementation of appropriate vegetative treatments is the entire *Wildland/Urban Interface*. Achieving public safety and community protection through treatment of the most significant fuel accumulations nearest developed private land are the over-riding objectives. Therefore, within the WUI priority zone, emphasis should be placed on treating areas of predicted high crown bulk density adjacent to neighborhoods or infrastructure, and adjacent to steep slopes. In addition, anywhere fuel loads are low, these areas can be treated more quickly and at much lower cost with prescribed fire and may also be emphasized. To summarize:

High Priority – 1) Areas of high crown bulk density within the ½ mile buffer around developed private land; 2) Areas of high crown bulk density within the 1½ mile upwind buffer; and 3) Areas with high crown bulk density and areas adjacent to steep slopes within the 4-mile upwind buffer.

Medium Priority – 1) Areas with high crown bulk density or adjacent to steep slopes within the Cragin Reservoir watershed and watersheds with critical aquatic habitat; 2) Areas within ¼ mile of infrastructure (roads or power lines); and 3) Areas within the ½ mile or upwind buffers of undeveloped private land.

Low Priority – 1) Areas with high crown bulk density or adjacent to steep slopes not within the W*ildland/ Urban Interface* or critical habitats.

Over the long term, treatment of the remaining acreage within the *Analysis Area* will need to be implemented based on forest health restoration needs. Further, sites within this area should reflect values other than public safety and treatments must reflect other values and resource management objectives such as wildlife habitat, soils, watersheds, etc. (see discussion of the *Wood Supply Study* above). Opportunities may arise where appropriate treatments within this area are desirable prior to treatments in the *Wildland/Urban Interface* - if this occurs, and the work will not jeopardize priority projects within the WUI, the opportunity should not be missed.

Based on best estimates of typical costs associated with planning and implementation of the treatments, an "average" per/acre cost was determined and applied. This data dramatically illustrates the financial commitment required to treat just the WUI acres. This cost demonstrates that from a strategic perspective, small-diameter wood-based enterprise development (including infrastructure development, wood utilization technology, sustained supply, and sufficient capital for business establishment and operating), geared toward the establishment of a sustainable and effective industry that can offset some of the costs associated with hazardous fuel treatment, is critical to success.

Estimated Treatment Type Costs:

Thinning Intensity:

Low = $650/acre
Intermediate = $800/acre
High = $1,000/acre

Prescribed Burn:

Light = $75/acre
Heavy = $200/acre

Needed capital for treatment can take many different forms: subsidies, low-interest loans, cost-share, profit-sharing ventures, and direct payments. Funding sources may include numerous federal, state, and local governments, as well as private corporate ventures, and should be inclusive of all levels of management: planning, design, implementation, and monitoring.

Based on the acreages in Table 4 (page 23) and rough costs above, the total cost to treat just the WUI in the BRCWPP could exceed $150,000,000.00.

Monitoring and Assessment Plan: It is imperative that a targeted, efficient and effective monitoring program be integrated into all land management actions. To best use the information gathered by such monitoring efforts, it is also imperative that we, as stewards of the land, use a decision making process that is adaptive, or is able to alter the course of actions based on the best available information. This is what is intended through the process of *adaptive management*.

The monitoring program will need to address diverse areas such as fuel reduction and fire behavior, ecosystem restoration, ecological impacts, and social and economic issues, and should be based on existing monitoring protocols (such as for the *White Mountain Stewardship Contract*). Not every CWPP project will have the same degree of uncertainty, and not every project has the same number of factors that are potentially impacted. Someone will need to assess each project and decide the level of monitoring that should be accomplished based on site-specific details, management objectives specific to existing conditions, desired future conditions, management options available to accomplish those objectives, and available resources.

All CWPP projects must allocate funds to accomplish monitoring (approximately 5-10% of project costs is a target), and establish a formal process for integrating the results of that monitoring through time back into the current land management decision-

making process. One of the major benefits of monitoring projects and the cumulative effects of projects at the landscape level is that the process serves as a tremendous tool for public education and involvement, and as we learn from our failures and successes, there is greater agreement about how to proceed into the future.

At a minimum, each of the items in the goal above will be evaluated based upon the criteria described below. Not all may be applicable for each item, and additional criteria may be added. They include:

a. Implementation – A crucial aspect of measuring success will be actual implementation of needed treatments: Did they occur and in what locations? Did the cut follow the prescription?
b. Effectiveness – Of equal importance is the question of how effective are the various treatments: Have they done what was anticipated in terms of fire risk reduction? Where possible, pre-and-post treatment fuel transects will be inventoried to determine actual change in fuel amounts. Fire affects from subsequent wildfires will be evaluated to refine future treatments and the results shared with the community.
c. Ecological Impacts – We continue to need a better understanding of how fuels reduction and forest restoration actions affect the plants, animals, soils, watersheds, and ecosystems within project areas. If we are going to be successful in restoring forests, we must understand the ecological effects of our various restoration strategies and actions, both at the project level and at the landscape scale.
d. Social Monitoring – Assessing public attitudes toward both on-going and proposed treatments, and the agencies/organizations promoting and implementing them, is critical to success. Tracking and assessment of these perceptions will be ongoing.
e. Economic Impacts - To achieve success, a sustainable utilization component is essential. Critical to this will be attracting viable small diameter wood-based businesses into the area and evaluating the resulting economic impact.

Roles and Responsibilities of Stakeholders: As depicted on Table 6 (page 25), implementation of the CWPP cannot be done without major cooperation from all entities. Without continued collaboration, mutual assistance, and action to carry forward these recommendations, this plan will only provide a false sense of security. Wildfire does not recognize property boundaries, and neither can we. Thus, a comprehensive and integrated action plan must be formulated and implemented across the BRCWPP landscape's 555,000 acres.

6.0 ASSISTANCE

Important documents and links regarding CWPP's are as follows.

Documents: (most available on line)

"*Preparing a Community Wildfire Protection Plan: A Handbook for Wildland-Urban Interface Communities*"

"*Federal Agency Implementation Guidance for the Healthy Forest Initiative and the Healthy Forests Restoration Act*"

"*Field Guidance for Identifying and Prioritizing Communities at Risk*"

"Statewide Strategy for Restoring Arizona's Forests"

"Analysis of Small Diameter Wood Supply for Northern Arizona"

Websites:

Arizona Cooperative Extension Service - www.extension.arizona.edu
Arizona State Forestry - www.azsf.gov
Arizona FireWise Communities - www.ag.arizona.edu/firewise
Arizona Forest Health Council - www.azgovernor.gov/fhc
Forest Ecosystem Restoration Analysis Project (ForestERA) - www.forestera.nau.edu
FireWise - National - www.firewise.org/arizona
Grants: Foundation - www.foundationcenter.org
Federal - www.grants.gov
Greater Flagstaff Forests Partnership - www.gffp.org
Northern Arizona University Forest Health - www.forestfire.nau.edu or www.for.nau.edu/forhlth
Southwest Area Fire & Drought - www.gacc.nifc.gov/swcc
The National Fire Plan - www.forestsandrangelands.gov
Western Governors Association - www.westgov.org

For recommendations regarding treatments and/or site-specific FireWise information, contact:
Blue Ridge Community FireWise Partnership - Paula Yeary, Chairperson
Blue Ridge Fire District - Chuck Buddle, Chief, 928/477-2751
Arizona State Forestry Division, Northern Arizona District - 928-774-1425

7.0 TABLES AND FIGURES

Table 1

Land Ownership – *Analysis Area*

Ownership/Jurisdiction	Acres	% of Total
Federal: Coconino National Forest	541,088	97%
Private/Other:	14,092	3%
TOTAL	**555,180**	**100%**

Table 2

Values and Risk Factors

VALUES	1. Communities, Private Land & Infrastructure 2. Municipal Watersheds (C.C. Cragin Reservoir) and aquatic habitat
RISK	3. Crown Bulk Density 4. Steep slopes in proximity to private land 5. Areas upwind (1 ½ and 4 mile distance) of at-risk communities/private land

Table 3

Threat Level Acreage - *Analysis Area*

Threat Level	Acres	% of Total
High	86,474	16%
Low	468,706	84%
TOTAL	**555,180**	**100%**

Table 4

***Wildland/Urban Interface* (WUI) Zone**

Ownership in the WUI	**Acres**	**% of Total**
Federal: Coconino National Forest	216,417	94%
Private/Other	14,092	6%
TOTAL	**230,509**	**100%**
Buffer Areas (Excluding Private Land)	**Acres**	**% of Total**
½ Mile Around Private Land	62,680	25%
1 ½ Mile Upwind Private Land	52,825	21%
4 Miles Upwind Private Land	104,695	41%
1/4 & 1/8 Mile Adjacent to Infrastructure (23,657 acres along roads, 9,109 acres along power line; 1,179 along Cragin power line/pipeline)	33,945	13%
SUBTOTAL	**254,145**	**100%**
Less Overlap of Buffer Areas	18,398	
TOTAL	**235,747**	

Table 5

Structure Protection and FireWise Property Treatments

1. Fuel Modification Plan for Developed Private Parcels less than Two Acres

Treatment		Vegetation	Slash
Zone 1 (0 to 10 feet from structures)		Remove all ladder fuels and reduce flammable vegetation. Remove and destroy all insect infested, diseased, and dead trees.	Remove all dead plant material from ground, prune tree limbs overhanging roof remove branches within 10' of chimney and remove flammable debris from gutters and roof surfaces
Zone 2 (10 to 30 feet from structures)		Remove all ladder fuels, remove and destroy all insect infested, diseased, and dead trees. Create separation between trees, tree crowns and other plants based on fuel type, density, slope and other topographical features. Reduce continuity of fuels by creating clear space around brush or planting groups	Control erosion and sedimentation. Remove all but one inch of pine needle or leaf litter
Zone 3 (30 to 100 feet from structure)		Remove all ladder fuels, remove and destroy all insect infested, diseased, and dead trees. Maximum density of trees(Whichever is greater) Ponderosa pine -60 sq ft Basal Area 100-80 OR Average density 100 trees per acre	Same as Zone 2

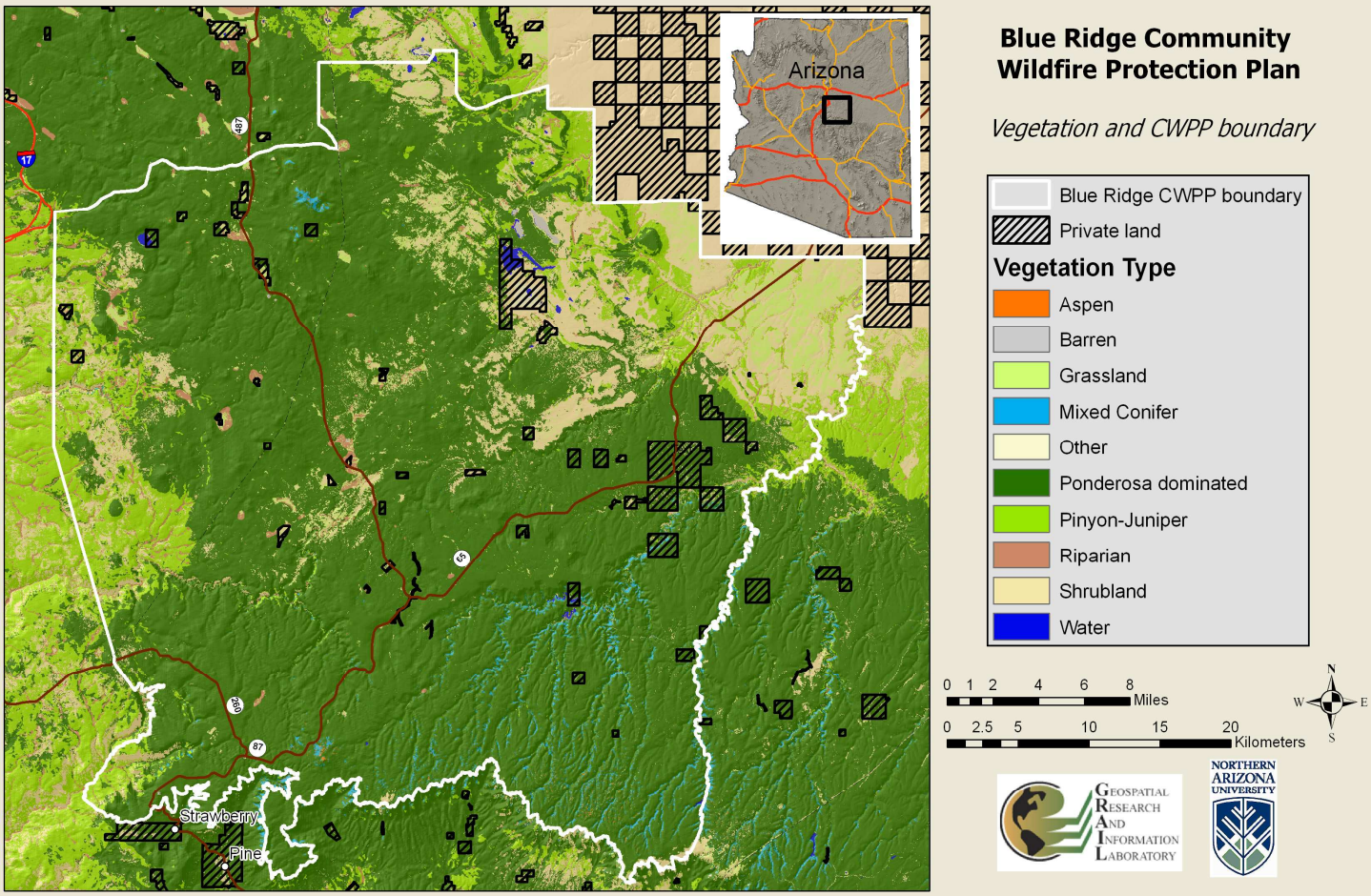
2. Fuel Modification Plan for Undeveloped Private Parcels in Excess of Two Acres

Treatment		Vegetation	Slash
Undeveloped parcels of 2 areas or greater		Remove all ladder fuels, remove and destroy all insect infested, diseased, and dead trees. Fuel modification plan developed to promote forest health, prevent spread of fire to adjacent property and create defensible space with considerations for wildlife and ground water protection.	All slash, snags, 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

Table 6
Roles and Responsibilities of Key Stakeholders

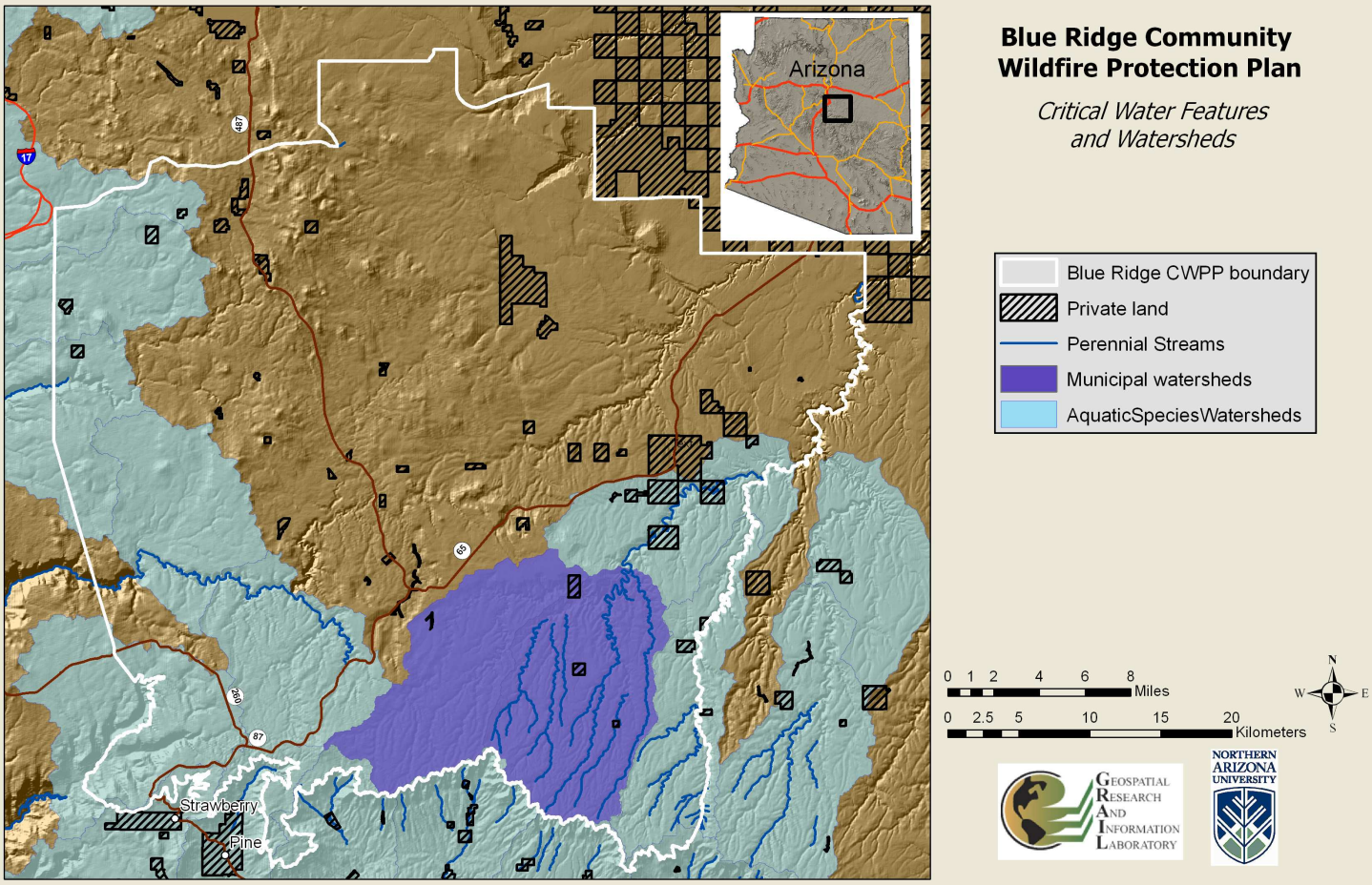
Stakeholder	Planning Design Implementation	Education Information Transfer	Advisory	Regulatory Permitting
Private:				
Citizens	X	X		
Businesses	X	X	X	
Service Clubs	X	X		
Homeowner Groups	X	X	X	X
Blue Ridge Community Firewise Prtnshp	X	X	X	
Discovery Channel Telescope	X	X	X	
County:				
Officials/Departments	X	X	X	X
Fire Districts	X	X	X	X
State:				
State Forestry – Fire Management	X	X	X	
Game & Fish Dept	X	X	X	X
Dept of Environmental Quality	X		X	
Federal:				
Forest Service	X	X	X	
Fish & Wildlife Service	X	X	X	X
Other:				
Utilities – SRP/Cragin Reservoir	X	X	X	
APS	X	X	X	

Map 1. BRCWPP Dominant Vegetation, Private Land Parcels and Analysis Area.

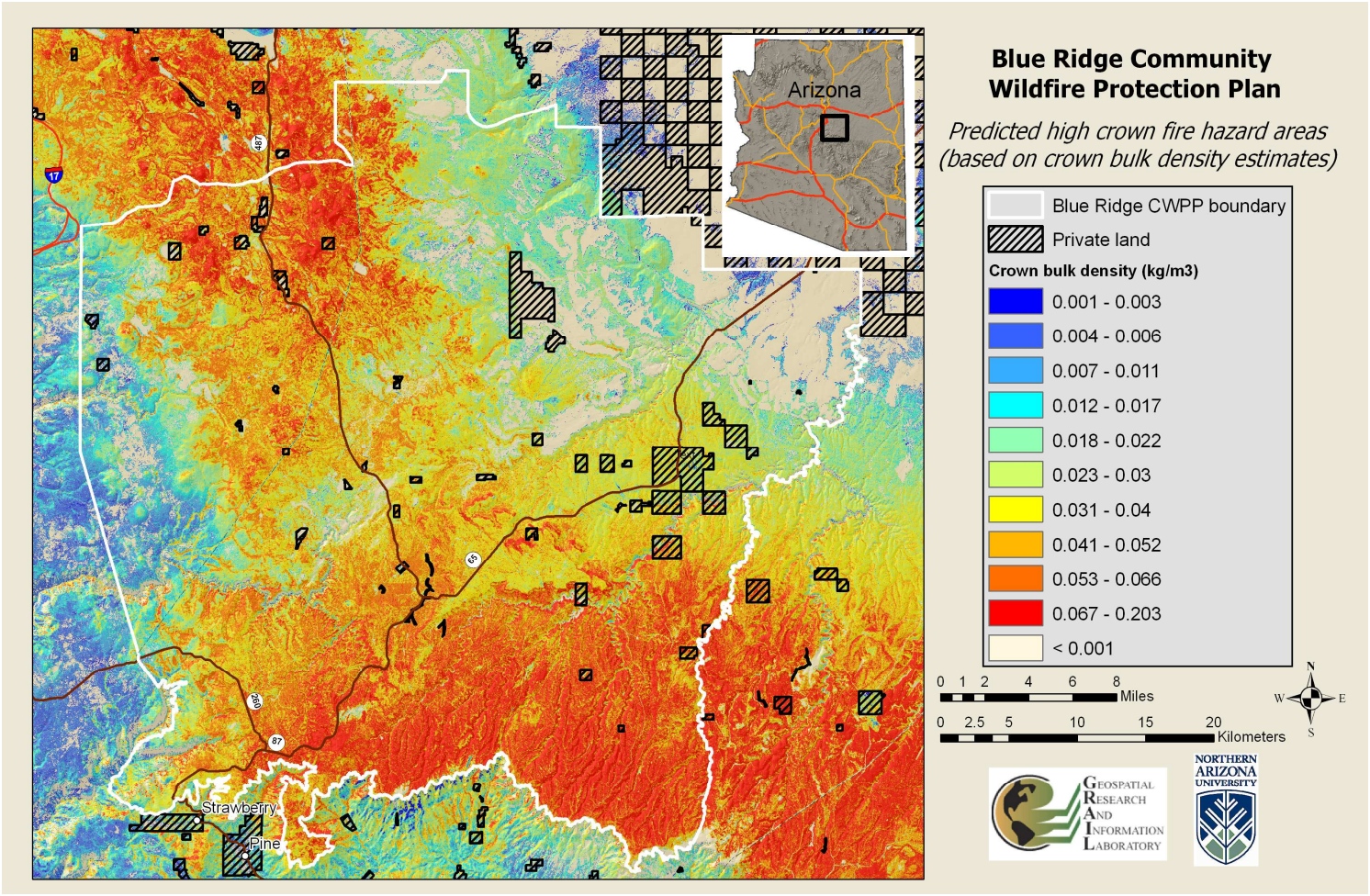


NOTE ON SPATIAL DATA SOURCES:
Spatial data sources used in preparing these CWPP Maps include: USGS National Elevation Dataset; Arizona Land and Resource Information System roads and private lands; The Nature Conservancy Arizona native fish species richness data; National Resources Conservation Service 6th level watershed boundaries; Southwest Regional Gap Analysis Project data on overstory vegetation composition; LANDFIRE fire regime condition class data; Northern Arizona University ForestERA and Wood Supply Analysis data on aquatic species watersheds, municipal watersheds, wood supply analysis landscape management areas, and forest structure; and USDA Forest Service Southwestern Region data on treated areas, treated planning areas, fire perimeters, streams, roads, and Mexican spotted owl protected activity centers (PACS).

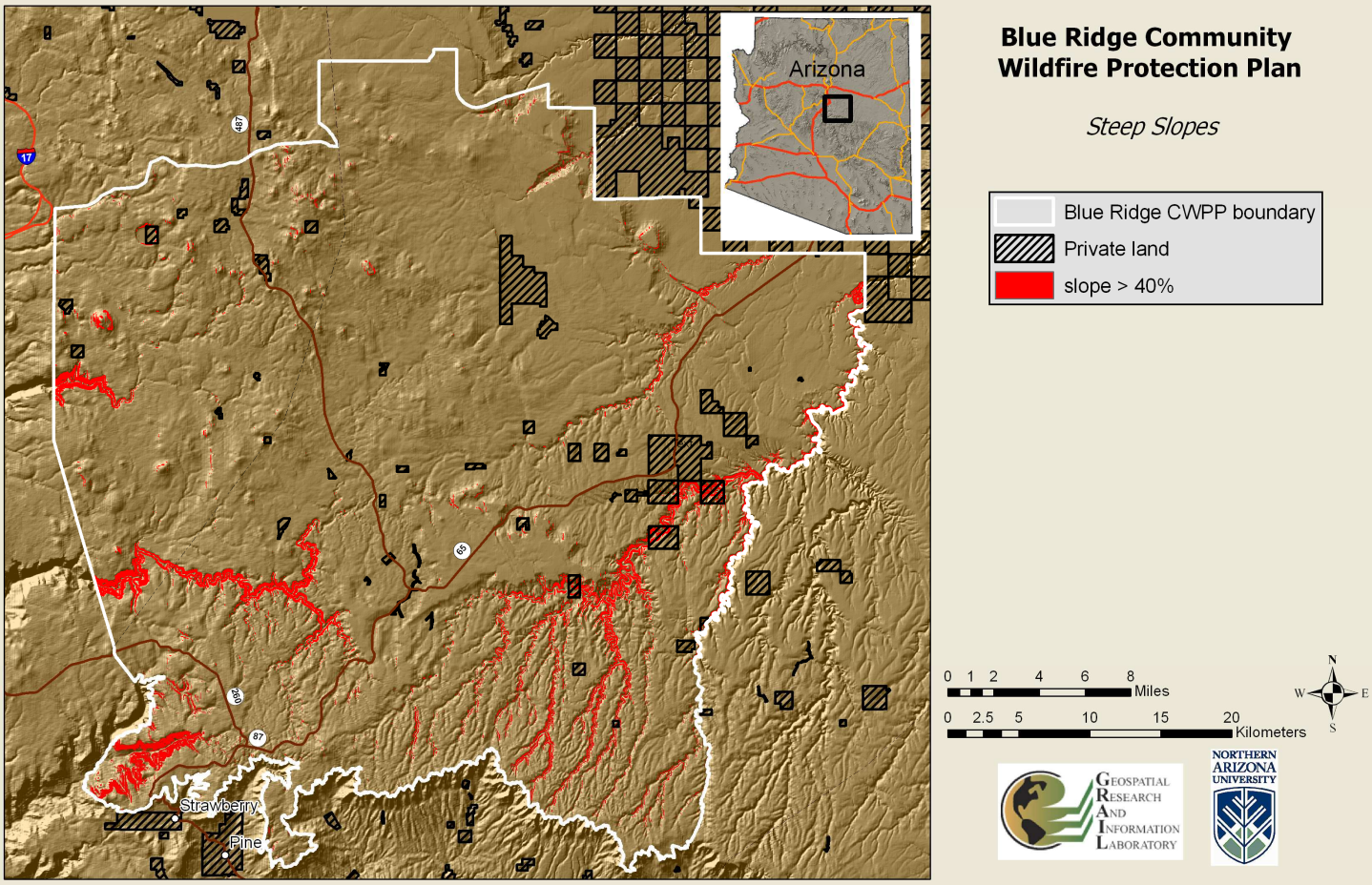
Map 2. BRCWPP Municipal Watershed and Critical Aquatic Habitat.



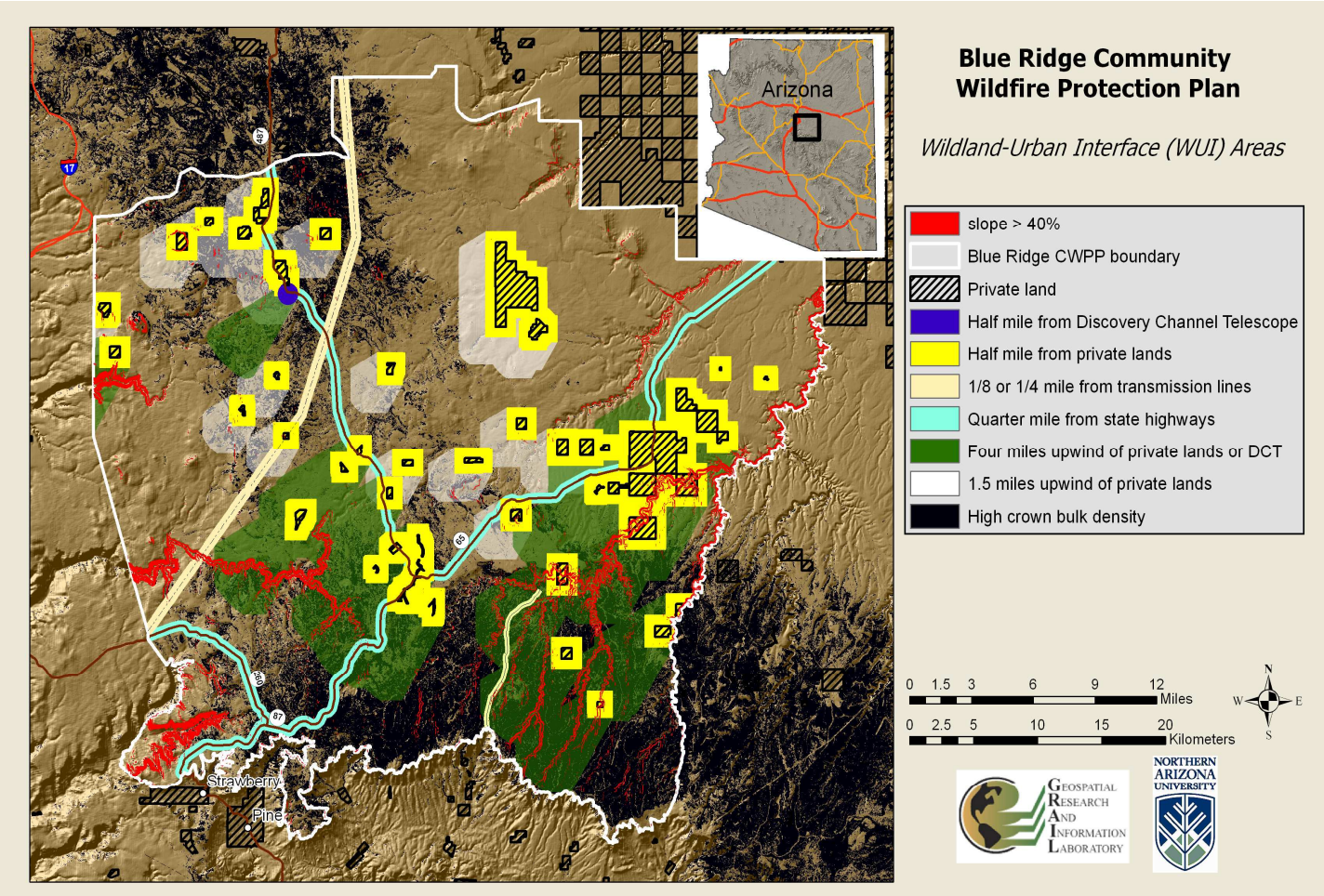
Map 3. BRCWPP Crown Bulk Density as an Indicator of Severe Fire Potential.



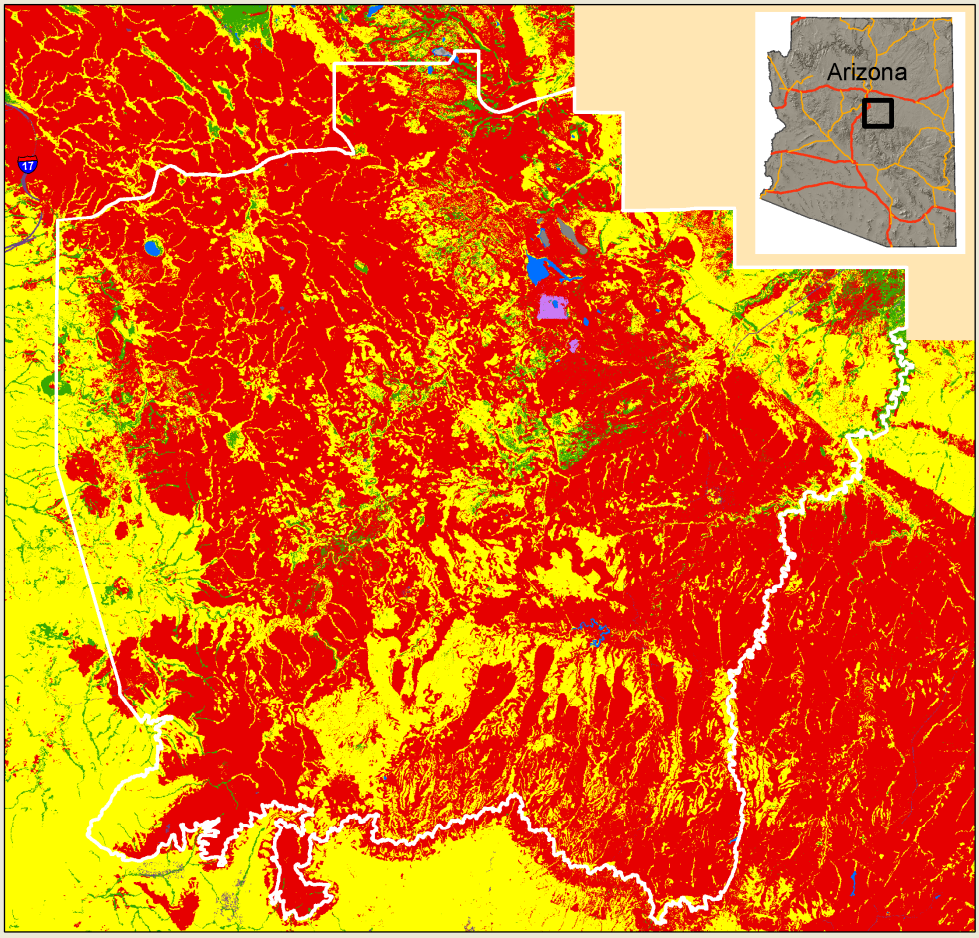
Map 4. BRCWPP Steep Slopes - Greater Than 40%



Map 5. BRCWPP Wildland/Urban Interface.



Map 6. BRCWPP Fire Regime Condition Class.



Blue Ridge Community Wildfire Protection Plan

Fire Regime Condition Class

Blue Ridge CWPP boundary

FRCC

Agriculture

Barren

Fire Regime Condition Class 1

Fire Regime Condition Class 2

Fire Regime Condition Class 3

Sparsely Vegetated

Urban

Water

0 1.5 3 6 9 12 Miles

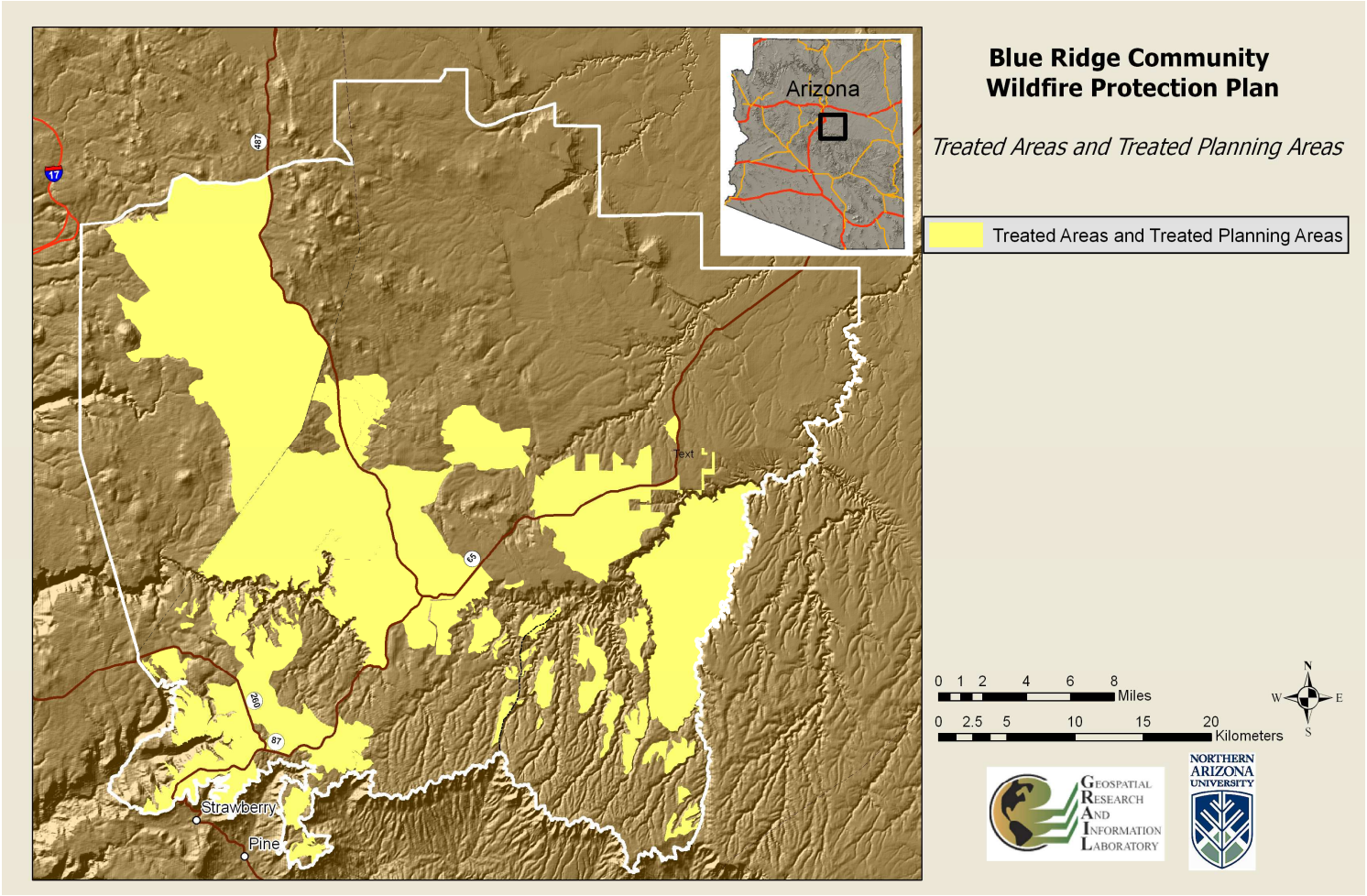
0 2.5 5 10 15 20 Kilometers

N W E S

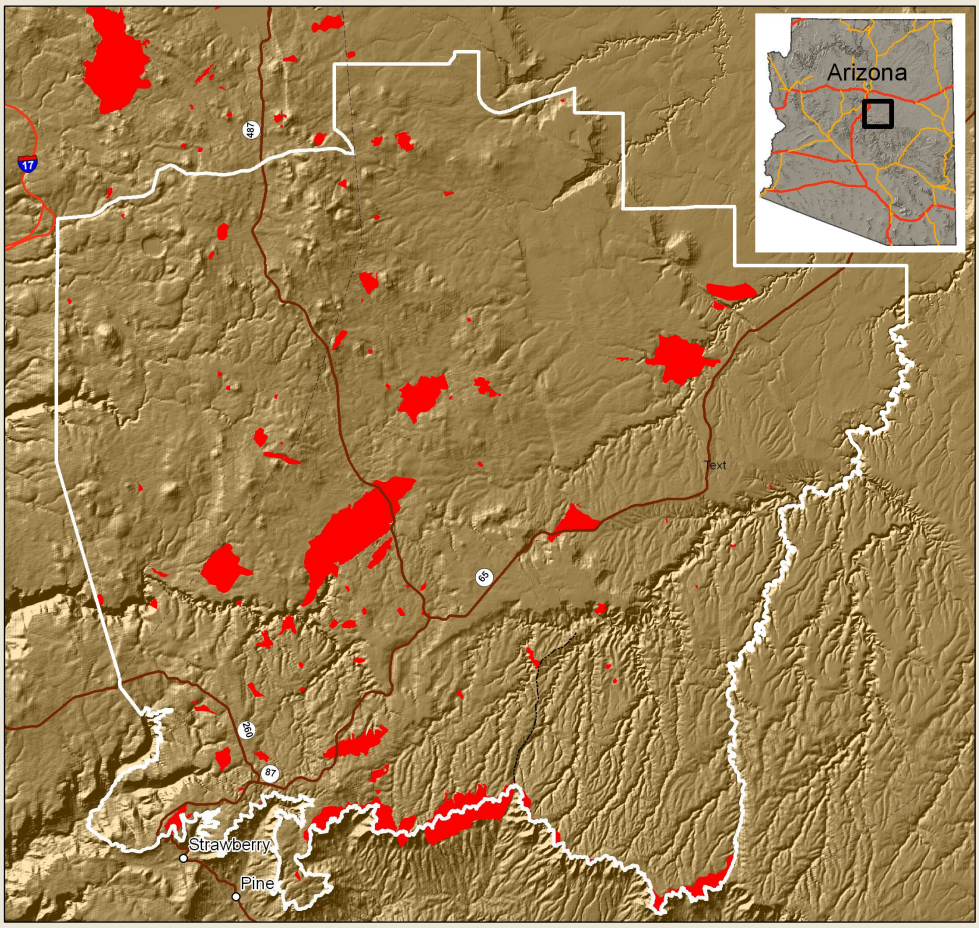
Geospatial Research and Information Laboratory

Northern Arizona University

Map 7. BRCWPP Treated Areas and Treatment Planning Areas (USFS).



Map 8. BRCWPP Fire History.



Blue Ridge Community Wildfire Protection Plan

Fire History

Past fires

0 1 2 4 6 8 Miles

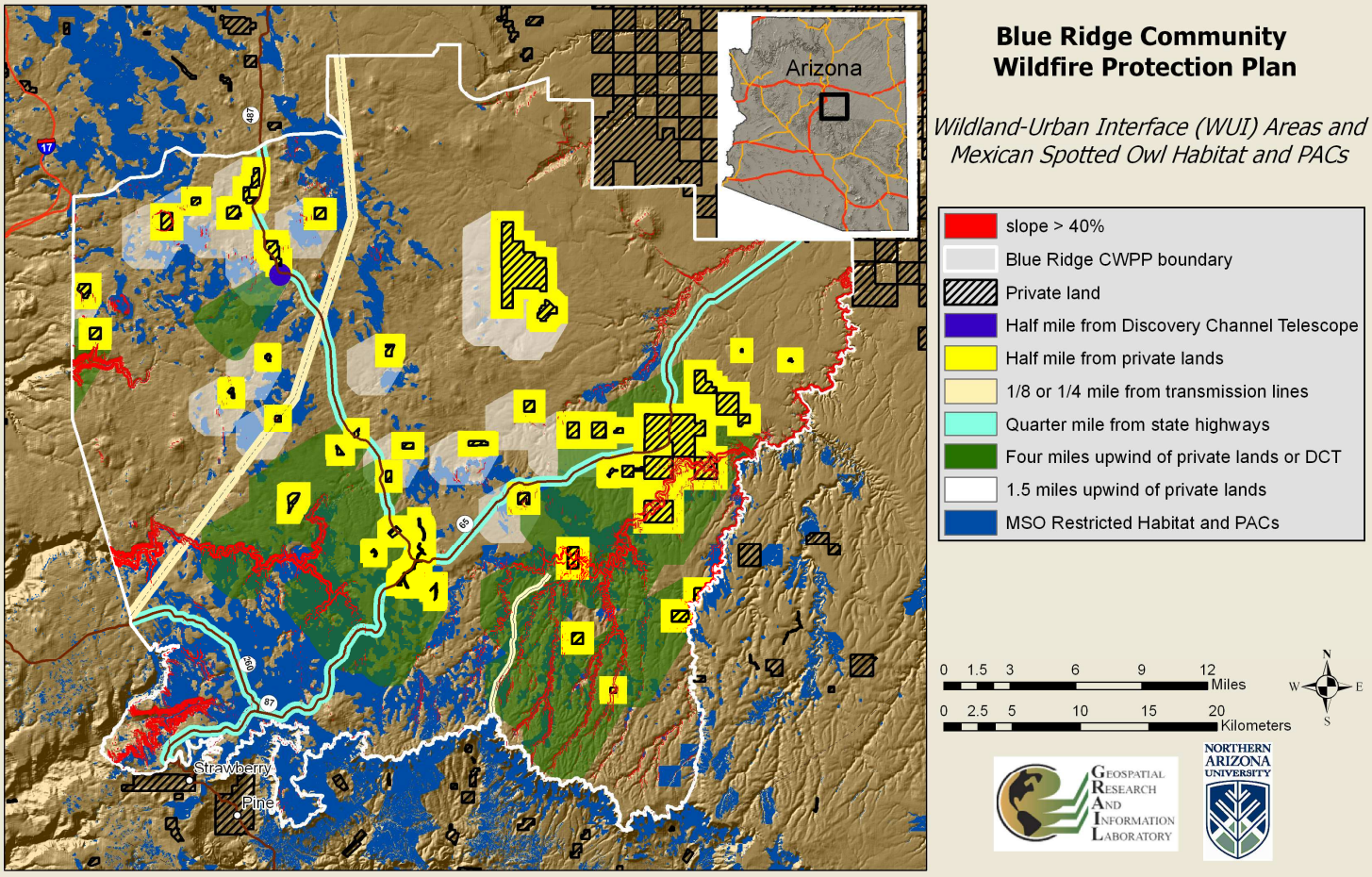
0 2.5 5 10 15 20 Kilometers

N W E S

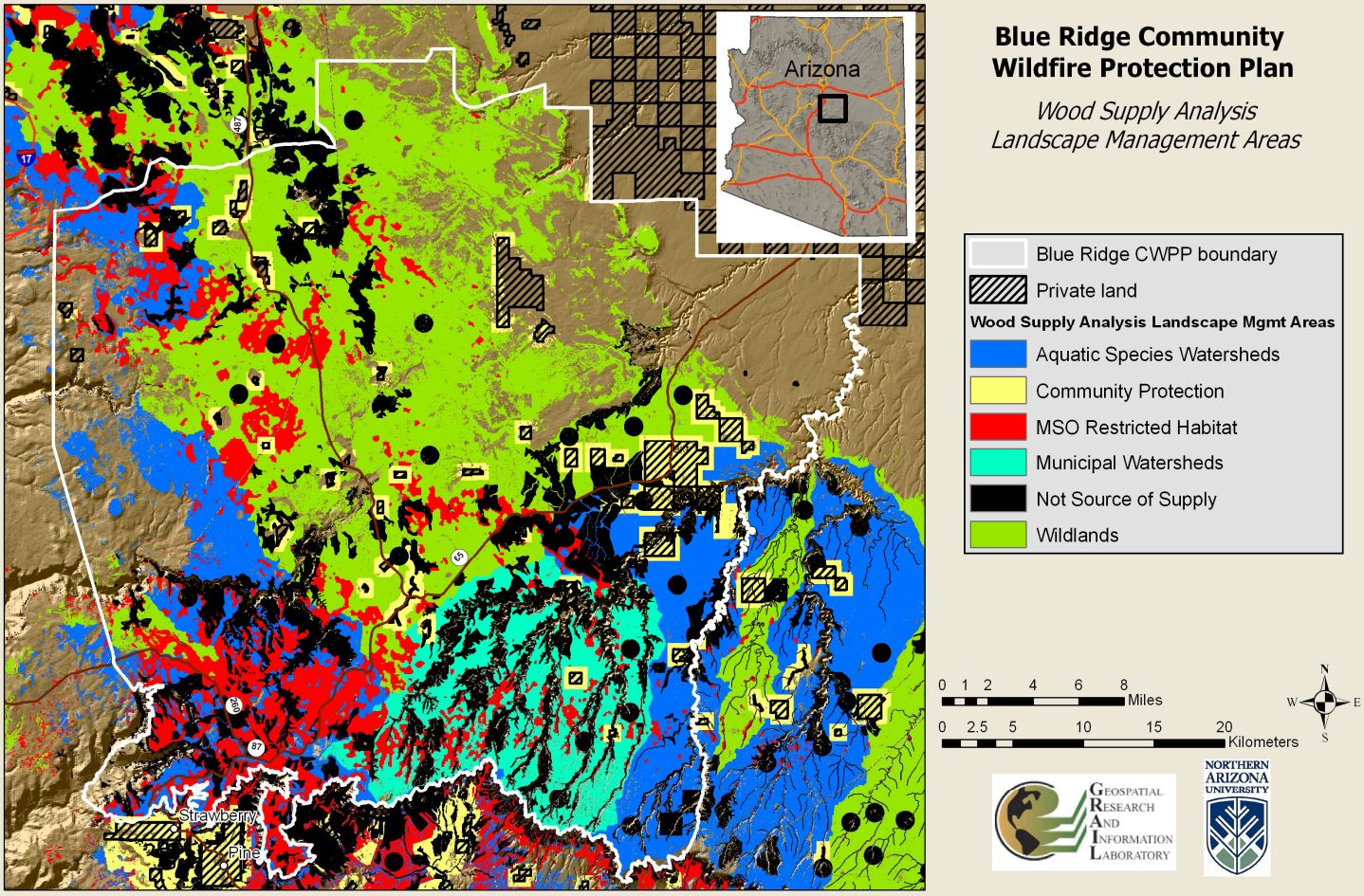
Geospatial Research and Information Laboratory

Northern Arizona University

Map 9. BRCWPP Mexican Spotted Owl Habitat and WUI Overlap.



Map 10. BRCWPP Landscape Management Zones for Guiding Treatments Outside the WUI.



8.0 GLOSSARY

Glossary terms come from several sources including:

> Arizona Forest Health Advisory Council. 2003. *Guiding Principles for Forest Ecosystem Restoration and Community Protection*. September 2003.
>
> Ecological Research Institute. 2004. *Western Mogollon Plateau Adaptive Landscape Assessment Draft Report on Initial Workshop Outcomes*. June 2004

Basal Area (BA): The area of the cross-section of a tree trunk near its base, usually 4½ feet above the ground. Basal area is a way to measure how much of a site is occupied by trees. The term basal area is often used to describe the collective basal area of trees per acre.

Biodiversity (biological diversity): The variety of life and its process, including the variety in genes, species, ecosystems, and the ecological processes that connect everything in the ecosystem.

Coarse-filter analysis: An analysis of aggregates of elements such as cover type or plant community.

Community protection: Actions or programs undertaken for the purpose of protecting human lives, property, and infrastructure.

Conservation: The careful protection, utilization and planned management of living organisms and their vital processes to prevent their depletion, exploitation, destruction, or waste.

Critical habitat: According to Federal Law, the ecosystem upon which endangered and threatened species depend.

Crown fire: This is a fire that travels from one crown (or tree top) to another in dense stands of trees, killing most trees in its path. However, even in intense crown fires, unburned strips may be left due to powerful, downward air currents. A passive (or dependent) crown fire relies upon heat transfer from a surface fire burning below crowns. An active (or independent) crown fire does not require transfer of heat from below the crowns,

Defensible space: This is the area around a structure where fuels and vegetation are treated, cleared or reduced to slow the spread of wildfire towards the structure. It also reduces the chance of a structure fire moving from the building to the surrounding forest. Defensible space provides room for the firefighters to do their jobs. Many communities are taking a more holistic approach of creating defensible neighborhoods rather than jus individual properties.

Disturbance: A discrete event, either natural or human induced, that causes a change in the existing condition of an ecological system.

Ecosystem: Living organisms interacting with each other and with their physical environment, usually described as an area for which it is meaningful to address these interrelationships.

Ecological restoration: The process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed.

Fire Behavior: As utilized throughout this plan -

Active Fire Behavior = Fires readily transition into tree crowns, with large group tree torching common: associated long-range (≥ .5 mile) spotting is common

Passive Fire Behavior = Fires will transition into tree crowns, but only small-group or individual tree torching common: associated long-range spotting (≥ .5 miles) can occur

Surface Fire Behavior = Fires stay on the ground, with little tendency to transition into tree crowns except in isolated cases: short-range spotting (≤ ¼ mile) can occur

Fire Frequency (Fire Return Interval): How often fire burns a given area; often expressed in terms of fire return intervals (e.g., fire returns to a site every 5-15 years). (see also Fire Regime Group).

Forest ecosystem health: A condition where the parts and functions of an ecosystem are sustained over time and where the system's capacity for self-repair is maintained, allowing goals for uses, values, and services of the ecosystem to be met.

Forest ecosystem restoration: Holistic actions taken to modify an ecosystem to achieve desired, healthy, and functioning conditions and processes. Generally refers to the process of enabling the system to resume acting, or continue to act, following the effects of a disturbance. Restoration management activities can be active (such as control of invasive species, thinning of over-dense tree stands, or redistributing roads) or more passive (more restrictive, hands-off management direction that is primarily conservation oriented). Frequently, a combination or number of actions is used sequentially to achieve restoration goals.

Hazard: To place something of value in a risky or dangerous situation

Hazardous fuel: Excessive live and dead trees and other vegetation and organic debris that increase the potential for uncharacteristically intense wildland fire and decrease the capability to protect life, property, and natural resources.

Healthy ecosystem: An ecosystem in which structure and functions allow the maintenance of the desired condition of biological diversity, biotic integrity, and ecological processes over time.

Old growth tree; This is an old tree, one that exhibits the complex structural characteristics associated with the oldest age class of trees in a group, clump or stand. In today's forests, an old growth tree in one that has been present since before the onset of commercial logging and fire exclusion. These trees are sometimes referred to as pre-settlement trees. These trees typically have orange or yellow platy bark.

Prescribed fire: A management fire ignited to meet specific fuel reduction or other resource objectives. All prescribed fires are conducted in accordance with prescribed fire plans.

Risk to communities: The risk associated with adverse impacts to communities resulting from unwanted wildfire.

Reference conditions: Conditions characterizing ecosystems composition, structure, and their variability.

Restoration: Actions taken to modify an ecosystem in whole or in part to achieve a desired condition.

Surface fire: A fire that burns over the forest floor, consuming litter, killing aboveground parts of herbaceous plants and shrubs, and typically scorching the bases and crowns of trees.

Sustainability: The ability of an ecosystem to maintain ecological processes and functions, biological diversity, and productivity over time.

Threat: An indication that an undesirable event or catastrophe may occur. For this plan, a Threat matrix, using three items, was developed to permit focus upon the Interface Zone.

Value – The measure of how strongly something is desired, expressed in terms of effort, money, etc one is willing to expend to attain or preserve it. Two issues (Communities and Infrastructure, and Municipal Watersheds) were identified in this plan.

Risk – The possibility of danger, injury, or loss. Two issues (Predicted Fire Behavior and Post-Fire Flooding) were identified in this plan.

Other – Further or additional issues. One item (Areas upwind from at-risk communities (permitting fire spread into at-risk communities) was identified in this plan.

Treatment Types (potential): These are general descriptor terms only, not silvilcultural terms-

Thinning Intensity:

Low = Simple thinning, w/prescribed fire

Intermediate = Moderate thinning, w/prescribed fire

High = Heavy thinning w/prescribed fire

Prescribed Fire only (Rx):

Light = No mechanical thinning: maintenance burn (one goal is lower tree mortality) or sites w/light fuels (less intense fire)

Heavy = No mechanical thinning (required or practical): thin with fire (one goal is higher tree mortality) or sites w/heavy fuels (more intense fire)

Watershed: An area of land with a characteristic drainage network that contributes surface or ground water to the flow at that point: a basin or a major subdivision of a drainage basin.

Wildland fire: Any non-structure fire that occurs in the wildland. Wildland fires are categorized into two distinct types: 1) Wildfires – Unplanned ignitions and planned ignitions that are declared wildfires. The wildfire term is to be applied to all unplanned ignitions, including events formally termed "wildland fire use". 2) Prescribed fires – Planned ignitions. A wildland fire may be concurrently managed for one or more objectives and those objectives can change as the fire spreads across the landscape, encountering new fuels, weather, social conditions, and governmental jurisdictions.

9.0 APPENDICES

Appendix A

Guiding Principles for Forest Restoration and Community Protection

GUIDING PRINCIPLES FOR FOREST ECOSYSTEM RESTORATION AND COMMUNITY PROTECTION

Arizona Forest Health Advisory Council
September 2003

Steve Campbell ~ Navajo County Cooperative Extension
Dr. Wally Covington ~ Northern Arizona University Ecological Restoration Institute
Dr. Carl Edminster ~ USDA Forest Service Rocky Mountain Research Station
Lori Faeth ~ State of Arizona
Don Falk ~ University of Arizona Laboratory of Tree-Ring Research
Deb Hill ~ Coconino County
John Kennedy ~ Arizona Game and Fish Department
Robert Lacapa ~ Bureau of Indian Affairs
Taylor McKinnon ~ Grand Canyon Trust
Dr. Marty Moore ~ Eastern Arizona Counties Organization
Brian Nowicki ~ Center for Biological Diversity
Kirk Rowdabaugh ~ Arizona State Land Department
Karl Siderits ~ USDA Forest Service Tonto National Forest
Ed Smith ~ The Nature Conservancy
Dr. Tom Swetnam ~ University of Arizona Laboratory of Tree-Ring Research
Richard Van Demark ~ Southwest Forestry
Beth Zimmerman ~ Arizona Division of Emergency Management

Preamble to the Guiding Principles

Arizona's high country is home to magnificent forests harboring a diversity of biological, cultural, and economic values. Yet many of Arizona's forests—especially Arizona's extensive ponderosa forests—have undergone a dramatic transformation during the past century due to land use, climate, and other factors. These changes have increased insect and disease outbreaks, abnormally severe fires, and adversely affected biological, cultural, and economic values. The unacceptable risk posed by these conditions requires immediate and strategic action.

Recognizing these factors, Arizona Governor Janet Napolitano convened a Governor's Conference on Forest Health and Safety in March 2003. Findings from this conference led to the development of an Action Plan for Arizona, and a call for the creation of a broad, science-based Forest Health Advisory Council to provide recommendations on how to improve the health of Arizona's forests.

The Arizona Forest Health Advisory Council has developed these Guiding Principles to provide an overall framework for planning and implementing forest ecosystem restoration and community protection projects statewide. In presenting these Guiding Principles, the Council emphasizes the following:

Different forest types have different natural disturbance regimes. For example, where crown fire is unnatural, thinning and prescribed burning may be needed to safely reestablish more natural surface fire regimes. But in forest types where crown fire is natural, such treatments may not be needed, at least from

an ecological standpoint. Understanding these differences is fundamental to restoring more natural disturbance regimes in our forests.

Community stakeholders must take the lead to implement these principles and make the decisions for their communities at risk. The Council stresses the immediate and urgent need to adequately reduce the risk to communities. This will require a comprehensive effort to reduce hazardous fuels in and around at-risk communities regardless of the adjacent ecosystem type. Fire research and recent fires demonstrate that fuels reduction treatments in and around communities may not prevent the loss of homes. Homeowners must do their part to create defensible space and replace or mitigate flammable building materials.

Although Arizona's forest and woodland ecosystems need restoration, it is important to understand that restoration is a young science whose long-term outcomes are uncertain. The Council urges employing a diversity of restoration strategies that fit local ecological, social, political, and economic circumstances. A "one size fits all" approach is not appropriate.

Learning about restoration should be an active and ongoing process. A serious commitment to monitoring and adaptive management is critical to understanding the ecological, social, and economic dimensions of restoration. The Guiding Principles should be viewed as dynamic and adaptable to evolving conditions and experiences.

The costs of restoration must be weighed against the costs of inaction. Though restoration may seem a weighty investment, it pales in comparison to the immediate and long-term costs and risks of allowing current forest conditions to persist. Restoration is a process of recovery requiring a substantial and sustained investment of funds, and political and public support.

The Guiding Principles urge us to think big. Arizona's forests and the ecological processes that sustain them span landscapes. Assessing needs, identifying priorities, and charting progress toward community protection and forest ecosystem restoration goals must occur within an appropriately large landscape context.

The Council's ultimate hope is that the Guiding Principles will help guide our movement toward sustainable and reciprocal relationships between human communities and forest ecosystems – relationships that sustain the biological, cultural, and economic values that contribute to a healthy democratic society, both now and into the future.

Guiding Principles

Integration

The overall strategy for restoring forest ecosystem health and protecting communities must be dynamic, comprehensive and integrated. A primary component of the overall strategy is to perform a statewide forest health evaluation to identify high-priority communities, critical infrastructure, habitats, and watersheds at risk. This evaluation can also provide the framework for monitoring individual projects and cumulative effects.

Sustainable Communities and Economies

Sustainable economies are linked to sustainable ecosystems. We should be building a sustainable future for Arizona's forests and communities

The immediate focus should be on protecting human communities at risk, critical infrastructure, along with key watersheds and habitats. Distinguishing between forest ecosystem restoration and community protection, and focusing on community protection within the entire community—private, public and tribal lands and the wildland-urban interface—will improve the likelihood of success.

Close collaboration among all stakeholders is essential to a community-based approach to forest ecosystem restoration and community protection. Encourage and empower community-based collaborations to demonstrate and implement effective community protection and forest ecosystem restoration. Be sensitive and responsive to the diversity of individuals and communities who value and/or depend on the forest and its resources.

Decision-making about forest ecosystem restoration and community protection must occur with a serious commitment to rigorous adaptive management. Such an approach should include baseline data, short and long-term monitoring, and a transparent mechanism for tracking results, evaluating and incorporating findings into the decision-making process.

Ecological Integrity

Appropriate restoration methods are based on ecological need. These methods are further defined by the importance of the site in the watershed or landscape, and the timing, techniques and resources needed to restore ecological integrity. Restoration needs to be designed with a clear understanding of desired and ecologically appropriate future conditions.

Effective forest ecosystem restoration should reestablish fully functioning ecosystems. A primary goal of forest restoration is to enhance ecological integrity, natural processes and resiliency to the greatest extent possible. Fire hazard reduction must be linked to the reintroduction of fire as a keystone ecological process. An active program of prescribed and maintenance burns and natural fire use is essential.

Forest ecosystem restoration and community protection treatments should protect and enhance water and soil resources. The development and implementation of forestry best management practices will serve to protect these resources.

Forest ecosystem restoration should protect and promote development of old-growth trees and large trees needed to restore ecosystem structure and function.

Landscape scale forest ecosystem restoration should maintain native plant and wildlife populations and habitat features. A key consideration is the need to maintain and restore movement corridors and refugia to avoid biodiversity bottlenecks.

Project work should be based upon landscape assessments of risks to and status of aquatic and terrestrial resources and of the potential for restoration to be successful. The assessment is used to identify the root causes of ecosystem degradation at the eco-regional, intermediate and site level scales, determine appropriate methods for restoring degraded systems and create a spatially-explicit prioritization of restoration needs.

Land Use and Planning

Forest ecosystem restoration must include evaluating and changing public land use practices that are scientifically demonstrated to contribute to forest health degradation.

Forest ecosystem problems and solutions exist in a context of land use. In fire prone areas community officials must develop, adopt, and enforce comprehensive land use plans, zoning regulations and building codes for community protection, forest restoration, ecosystem health requirements and long-term fire management. Zoning and land use have a major impact on fire management, and can make a significant contribution to restoring forest health and protecting communities.

Forest ecosystem restoration requires effective community protection to establish and maintain a fire-resistive condition for structures, improvements and vegetation. Methods for accomplishing this condition are based on public safety needs, fire hazard, and local capability and creativity. A fire-resistive condition will be accomplished by removing and modifying forest fuels, establishing defensible space, and use of fire-resistant construction materials and architectural design.

Funding and Compliance

Forest ecosystem restoration and community protection requires a sustained investment of federal, tribal, state, local and private resources. Restoration is a long-term process requiring a sustained commitment of funding. Adequate, sustained investment in forest ecosystem restoration and community protection is more cost effective and socially desirable than fire suppression and rehabilitation.

Forest ecosystem restoration and community protection actions should comply with all applicable environmental laws and regulations.

Practices

Forest ecosystem restoration and community protection programs should use the lowest impact techniques that will be effective and efficient. Explore, develop and utilize low impact technologies to sustain and enhance ecosystem integrity and productivity, and minimize negative cumulative effects.
All forest ecosystem restoration and community protection treatments should use locally adapted native plant materials to the greatest extent possible. Non-invasive, non-native species may be considered for emergency rehabilitation.

GLOSSARY

Adaptive Management
A type of natural resource management in which decisions are made as part of an ongoing process. Adaptive management combines planning, implementing, monitoring, research, evaluating, and incorporating new knowledge into management approaches based on scientific findings and the needs of society. Results are used to modify future management methods and policy.

Biodiversity
The variety of life forms and processes including complexity of species, communities, gene pools, and ecological functions.

Biodiversity Bottleneck
A bottleneck in this context is the assemblage of environmental and/or human-caused factors or ecological "threats" that hamper the ability of ecosystems to support biodiversity at its current level through time. The bottleneck analogy is that fewer organisms (and their genes) in the bottle (current conditions) may be able to emerge on the other side (future conditions) due to resource limitations. (Source: this council.)
http://www.usembassy.it/file2001_04/alia/a1041704.htm;
http://www.clat.psu.edu/biodiversity/defined/populations/populations-p04.html

Community Protection
Actions or programs undertaken for the purpose of protecting human lives, property, and infrastructure. (Source: this council)

Crown fire
This is a fire that travels from one crown (or treetop) to another in dense stands of trees, killing most trees in its path. However, even in intense crown fires, unburned strips may be left due to powerful, downward air currents. A passive (or dependent) crown fire relies upon heat transfer from a surface fire burning below the crowns. An active (or independent) crown fire does not require transfer of heat from below the crowns. Source: Barnes, Burton V., Donald R. Zak, Shirley R. Denton, and Stephen H. Spurr. 1997. Forest Ecology (4th Edition). John Wiley and Sons, Inc. New York, NY. p. 282. (See also Surface Fire)

Cumulative Effects
Individual actions when considered alone may not have a significant impact on the quality of the human environment. Groups of actions, when added together may have collective or cumulative impacts that are significant. Cumulative effects that occur must be considered and analyzed without regard to land ownership boundaries. Consideration must be given to the incremental effects of past, present, and reasonably foreseeable related future actions of the Forest Service, as well as those of other agencies and individuals. Source: CEQ Regulations applied to US Forest Service regulations
http://www.fs.fed.us/emc/nepa/includes/epp.htm#c151

Defensible Space
This is an area around a structure where fuels and vegetation are treated, cleared or reduced to slow the spread of wildfire towards the structure. It also reduces the chance of a structure fire moving from the building to the surrounding forest. Defensible space provides room for the firefighters to do their jobs.(New Mexico State Forestry) Many communities are taking a more holistic approach of creating defensible neighborhoods rather than just individual properties.

Ecosystem
A spatially explicit, relatively 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-a log, pond, field, forest, range or grassland, or even the earth' s biosphere. (Society of American Foresters, 1998.)

Ecosystem Function
The process through which the constituent living and nonliving elements of ecosystems change and interact, including biogeochemical processes and succession.

Ecosystem/Ecological Integrity
The completeness of an ecosystem that at multiple geographic and temporal scales maintains its characteristic diversity of biological and physical components, spatial patterns, structure, and functional processes within its approximate range of historic variability. These processes include: disturbance regimes, nutrient cycling, hydrologic functions, vegetation succession, and species adaptation and evolution. Ecosystems with integrity are resilient and sustainable.

Ecosystem Process
The actions or events that link organisms and their environment, such as predation, mutualism, successional development, nutrient cycling, carbon sequestration, primary productivity, and decay. Natural disturbance processes often occur with some periodicity (From Webster's dictionary, adapted to ecology).

Ecosystem Resilience
The ability of a system to respond to disturbances. Resiliency is one of the properties that enable the system to persist in many different states or successional stages.

Fire Frequency (Fire Return Interval)
How often fire burns a given area; often expressed in terms of fire return intervals (e.g., fire returns to a site every 5-15 years). (see also Fire Regime Group).

Fire Regime Group
A generalized description of the role fire plays in an ecosystem. It is characterized by fire frequency, predictability, seasonality, intensity, duration, and scale (patch size), as well as regularity or variability. (See also Fire Frequency)

Forest Ecosystem Health
A condition where the parts and functions of an ecosystem are sustained over time and where the system's capacity for self-repair is maintained, allowing goals for uses, values, and services of the ecosystem to be met.

Forest Ecosystem Restoration
Holistic actions taken to modify an ecosystem to achieve desired, healthy, and functioning conditions and processes. Generally refers to the process of enabling the system to resume acting, or continue to act, following the effects of a disturbance. Restoration management activities can be active (such as control of invasive species, thinning of over-dense tree stands, or redistributing roads) or more passive (more restrictive, hands-off management direction that is primarily conservation oriented). Frequently, a combination or number of actions is used sequentially to achieve restoration goals.

Hazardous Fuel
Excessive live or dead trees and other vegetation and organic debris that increase the potential for uncharacteristically intense wildland fire and decrease the capability to protect life, property, and natural resources.

Invasive or Noxious Weed (also applies to animals and other organisms)

Any species of plant which is, or is liable to be, detrimental or destructive and difficult to control or eradicate and shall include any species that the director, after investigation and hearing, shall determine to be a noxious weed. Arizona Revised Statutes 3-201 http://www.azleg.state.az.us/ars/3/00201.htm

Landscape
An area composed of interacting and inter-connected patterns of habitats (ecosystems) that are repeated because of the geology, landform, soils, climate, biota, and human influences throughout the area. Landscape structure is formed by patches (tree stands or sites), connections (corridors and linkages), and the matrix. Landscape function is based on disturbance events, successional development of landscape structure, and flows of energy and nutrients through the structure of the landscape. A landscape is composed of watersheds and smaller ecosystems. It is the building block of biotic provinces and regions.

Natural Disturbance Regime
A natural disturbance (e.g. fire, insect outbreak, flood) with a characteristic frequency, intensity, size, and type that has influence on an ecosystem over evolutionary time.

Old Growth Tree
This is an old tree, one that exhibits the complex structural attributes associated with the oldest age class of trees in an old growth stand. In today's forests, an old-growth tree is one that has been standing since before the onset of commercial logging and fire exclusion. These trees are sometimes referred to as pre-settlement trees. Old-growth ponderosa pine trees typically have orange, platy bark. Source: Schubert, G.H. 1974. Silviculture of southwestern ponderosa pine: the status of our knowledge. USDA Forest Service General Technical Report RM , http://www.ancienttrees.org/cfogqa.php#1

Prescribed Fire
Any fire ignited by management actions to meet specific objectives. All prescribed fires are conducted in accordance with prescribed fire plans. (See also Wildland Fire Use)

Risk to Communities
The risk associated with adverse impacts to communities resulting from unwanted wildland fire.

Surface fire
A fire that burns over the forest floor, consuming litter, killing aboveground parts of herbaceous plants and shrubs, and typically scorching the bases and crowns of trees. Source: Barnes, Burton V., Donald R. Zak, Shirley R. Denton, and Stephen H. Spurr. 1997. Forest Ecology (4th Edition). John Wiley and Sons, Inc. New York, NY p. 281 (See also Crown Fire)

Sustainable (Sustainability)
Meeting the needs of the current generation without compromising the ability of future generations to meet their needs. Ecological sustainability entails maintaining the composition, structure and processes of a system, as well as species diversity and ecological productivity. The core element of sustainability is that it is future-oriented. (Committee of Scientists Report, 1999.)

Wildland Fire Use (This term is no longer used in fire management – planned & unplanned ignitions)
The management of naturally ignited wildland fires to accomplish specific pre-stated resource management objectives in pre-defined geographic areas outlined in Fire Management Plans. (See also Prescribed Fire)

Wildland-Urban Interface
The area or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuel.

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Unless noted, all definitions come from: “RESTORING FIRE-ADAPTED ECOSYSTEMS ON FEDERAL LANDS - A COHESIVE STRATEGY FOR PROTECTING PEOPLE AND SUSTAINING NATURAL RESOURCES” USDI/USDA Draft unpublished document, pp. 74-78, 12/19/2001.
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Appendix B

BLUE RIDGE AREA VALUES AT RISK

BLUE RIDGE CWPP

February 26 Community Meeting – Stakeholder Identified Issues

COMMUNITY VALUES AT RISK

Communities, Neighborhoods
Private Land
Buffers for PL & Communities
Forests
Riparian Areas, Aquatic Habitat
Archaeological & Historic Sites
Life – human, animal, plant
New Observatory (DC Telescope)
Dopler Tower
Microwave, Cell & Communication Towers (repeater)
Power Lines
Water Company Wells / Infrastructure
Campgrounds & Recreation Sites (OHV)
Grazing & Rangelands
Municipal Watershed – Blue Ridge Reservoir
Air Quality, Visibility
View Sheds
Roads, Evacuation Routes
Commercial Areas
Sense of Community & Place
Investment
Livelihoods
Emergency Access

INFLUENCES ON PLANNING & TREATMENT OPTIONS

Threatened & Endangered Species
Species of Special Concern
Archaeological Sites
Smoke Impacts
Lack of Neighborhood Structure – HOA
Some HOA's Require Treatment – Inconsistency
Apathy
Communication Difficulties
Seasonal Occupancy
Accessibility – Areas Spread Out
Planning Processes – FS, Coconino County
Project Planning – 10K / 10Yr
NEPA
Limited / Restricted Law Enforcement
Fire Departments / Districts – NIMS
Different Views / Perspectives
Slopes / Canyon Resources / $

Appendix C

BLUE RIDGE COMMUNITY FIREWISE PARTNERSHIP MEMBERSHIP

Blue Ridge Estates - Ron Krug
Camp Colley - Darryl Atchison (for City of Phoenix Parks & Recreation)
Clear Creek Pines 1 - no rep at present
CCP 2 - Roy Bell
CCP 3/7 - Larry Sears
CCP 4/5/6 - John Stahl, Darryl Atchison
CCP 8/9 - Don Wilson, Sibyl Dunlap
Mogollon Ranch - Pat Palmer
Moqui Ranchettes - no rep (new subdivision, in hands of developer)
Pine Canyon - Linda McMorine
Ponderosa Pines - no rep at present
Starlight Pines - Paula Yeary, Kevin Hickey, Linda Liesch
Starlight Pines Ranchettes - Bob Reimers
Tamarron Pines - Doug Lendt, Jeff Homan
Timber Ridge - no rep at present

Advisors to BRCFP:

Blue Ridge Fire District: Chief Chuck Buddle; Asst. Chief Charles Jaeger; Duane Swanson
USFS, Coconino NF, Mogollon Rim RD: Jeff Thumm, Andy Pederson, etc.
Coconino County Sheriff's Dept.: Deputy Rick Shouse

Appendix D

PROPOSED THINNING TREATMENT GUIDELINES

See Hampton, H.M., S.E. Sesnie, B.G. Dickson, J.M. Rundall, T.D. Sisk, G.B. Snider and J.D. Bailey. 2008. *Analysis of Small-Diameter Wood Supply in Northern Arizona.* Forest Ecosystem Restoration Analysis Project, Center for Environmental Sciences and Education, Northern Arizona University, for more details.

Table 6. Treatment characterizations which consider a level of forest "fuels reduction" and restoration for the ponderosa pine type in the study area.

Thinning Level	Stem density[1] (% reduction)	Basal area[1] (% reduction)	Canopy closure[1] (% reduction)	Description
1/ Heavy thinning followed by prescribed burning	80 (70-90)	60 (50-70)	40 (25-55)	Representative of a "full" restoration, heavy fuels reduction, multi-age group selection, or WUI-based treatment.
2/ Moderate thinning following by prescribed burning	65 (55-75)	40 (30-50)	30 (15-45)	Representative of a "moderate" or "full" restoration, moderate fuels reduction, or WUI-based treatment.
3/ Light thinning following by prescribed burning	50 (40-60)	20 (10-30)	20 (15-25)	Representative of a "light" restoration or fuels "maintenance" treatment.

[1]Forest structure metrics and mean percent reduction values used to parameterize landscape-scale treatment alternatives. Minimum and maximum values in parentheses are derived from published studies and expert opinion.

Table 7. Percent reduction in basal area following application of desired post-treatment basal area distributions

Landscape Management Areas	Thinning Range (Table 7)	Dominant Thinning Level	Average	Median	StdDev	Min	Max
Community Protection	Light to Heavy	Heavy	60%	64%	14%	3%	79%
MSO Restricted	Light to Moderate	Light	19%	20%	5%	2%	35%
Municipal Watersheds	Light to Heavy	Moderate	41%	45%	11%	2%	53%
Aquatic species watersheds	Light to Heavy	Moderate	41%	43%	11%	2%	58%
Wildlands	Light to Moderate	Light to Moderate	25%	25%	8%	2%	44%

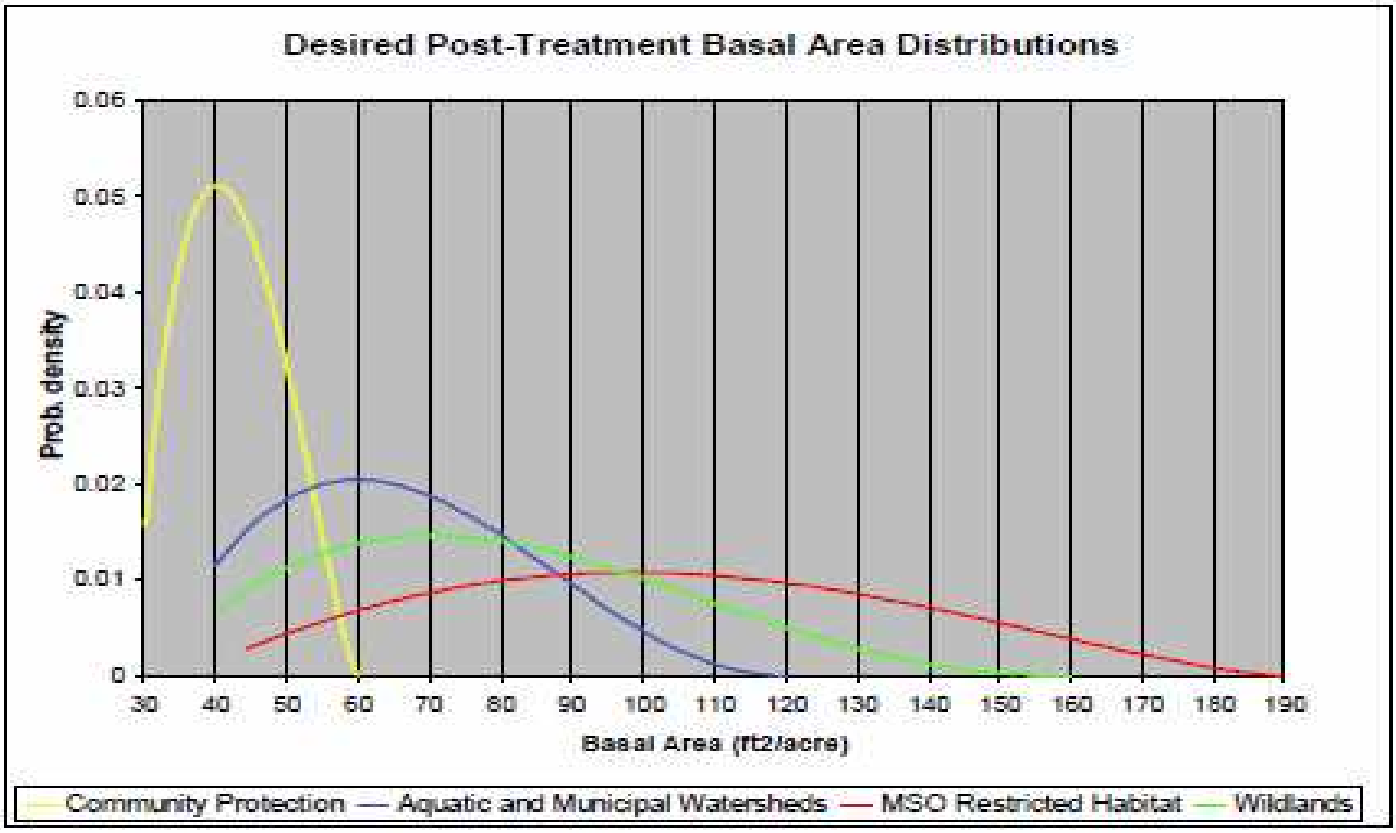

Figure 4. Desired post-treatment ponderosa pine basal area distributions for each landscape management area used in consensus and majority scenarios. Locations with pre-treatment basal areas lower than informed by curves were not decreased following potential treatments.