

# **UPPER BEAVER CREEK WATERSHED FUEL REDUCTION PROJECT**

## **PROPOSED ACTION**

### **Mogollon Rim and Red Rock Ranger Districts Coconino National Forest**

#### **Introduction**

The Upper Beaver Creek Watershed Fuel Reduction Project is located about 12 miles northwest of Clints Well, and about 30 miles south of Flagstaff. The project area encompasses about 49,123 acres on the Mogollon Rim and Red Rock Ranger Districts (Figure 1, Vicinity Map). The Proposed Action consists of a variety of vegetation management, fuel reduction, and prescribed burning actions over the next 20 years. Vegetation treatments are proposed over about 18,000 acres and prescribed burning actions are proposed over about 46,000 acres within the project area. The project would treat forest lands both inside and outside of the Wildland Urban Interface (WUI). The project area includes several developed and undeveloped private lands, and special use areas within the WUI<sup>1</sup> including: Stoneman Lake, K-T Ranch, Pratt Park, Double Cabin Park, Mule Park, Lowell Observatory-Discovery Channel Telescope, Casner Park, Goswick, the Western Area Power Administration 345 KV transmission line, Buck Mountain fire lookout, and the Long Valley Ranger Station office at Happy Jack (Figure 2). The designated WUI area encompasses about 17,057 acres (Figure 2, WUI Sites).

The project legal location is: T14N, R8E, Sections 1, 2, 11, 12; T14N, R9E, Section 6; T15N, R8E, Sections 1-7, 9-16, 22-26, 35-36; T15 N, R 9 E, Sections 3-10, 12-14, 19-21, 28-30,31-32; T15N, R7E, Sections 1, 12-13, 25; T16 N, R 8E, Sections 1-36; T16N, R9E, Sections 6-7, 28, 19-20, 28-34; T17N, R8E, Sections 28-29, 34-36; T17N, R9E, Sections 27-34, Gila and Salt River Meridian.

#### **Purpose and Need for Action**

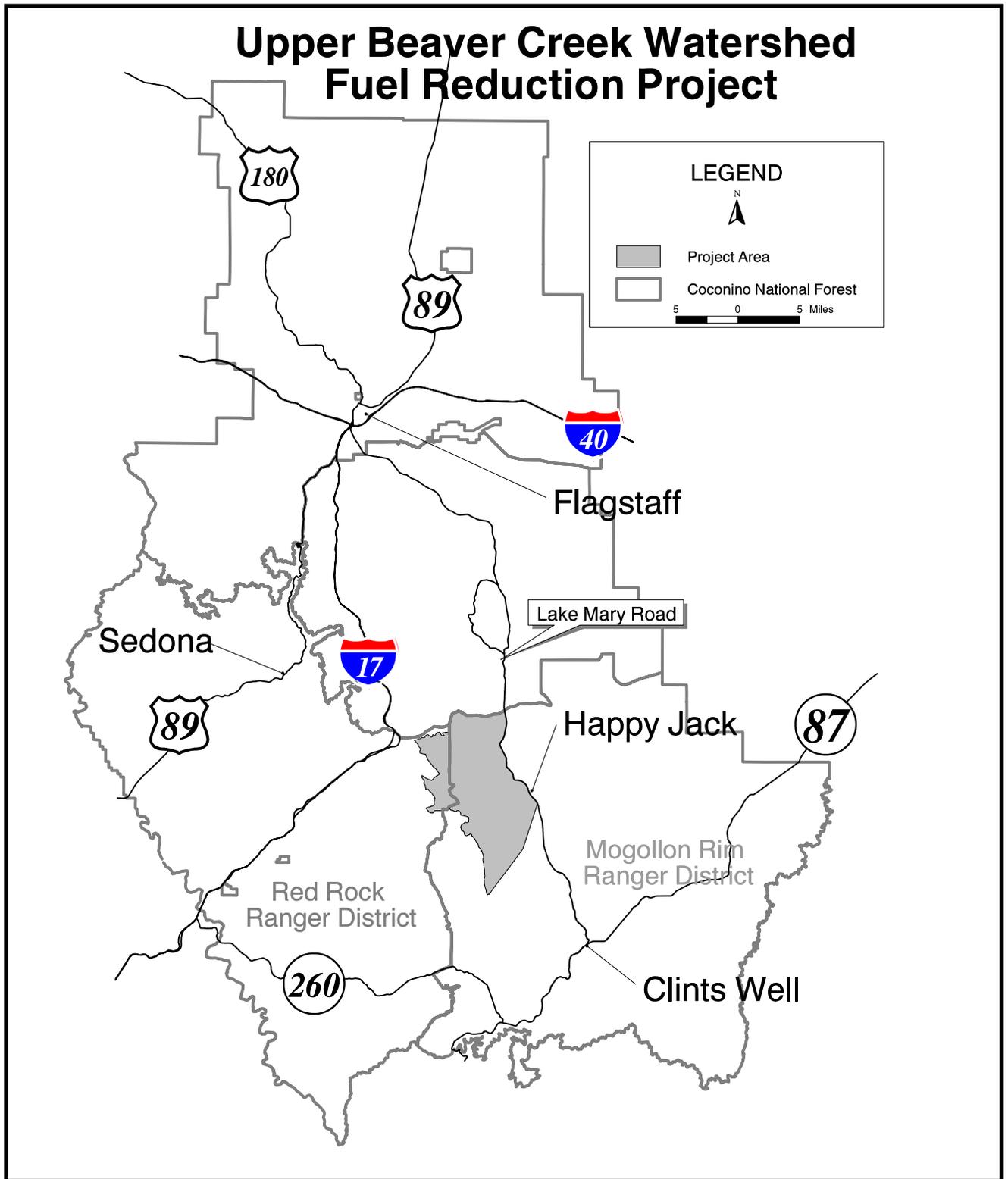
The purpose of the Upper Beaver Creek Watershed Fuel Reduction Project is twofold: to reduce the potential of stand-replacement wildfire that threatens people, private property and natural resource values; and to begin restoring fire-adapted ecosystems.

The need for action results from a departure from the natural fire regime which has been altered due to past fire suppression and past management activities over the last 75 - 120

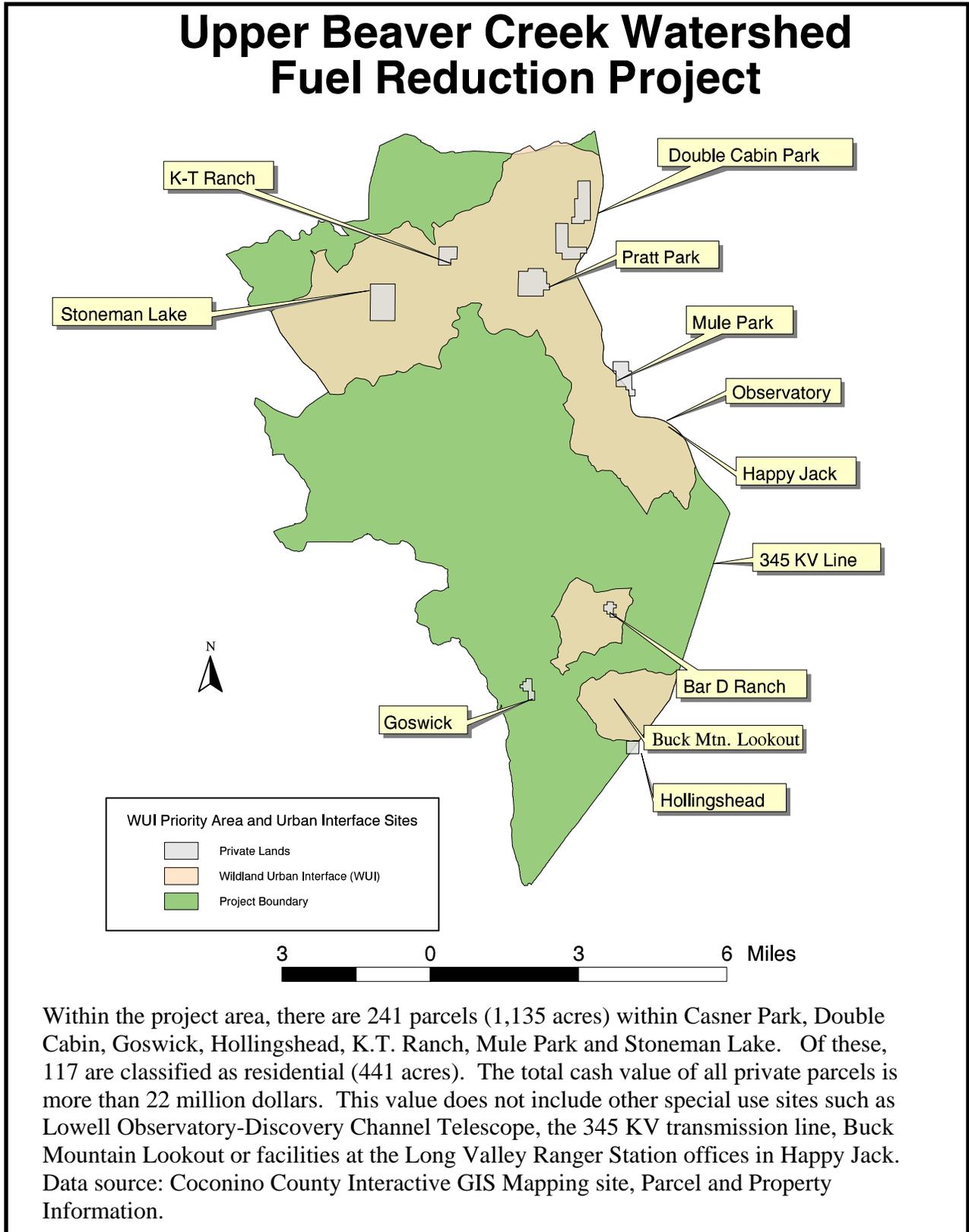
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<sup>1</sup> WUI includes those areas of resident human populations at imminent risk from wildfire, and human developments having special significance. These areas may include critical communications sites, municipal watersheds, high voltage transmission lines, observatories, church camps, scout camps, research facilities, and other structures that if destroyed by fire would result in hardship to communities. These areas encompass not only the sites themselves, but also the continuous slopes and fuels that lead directly to the sites, regardless of the distance involved.

**Figure 1. Vicinity Map**



**Figure 2. WUI Sites**



years. This has resulted in higher fuel loadings of both live and dead fuels (up to 30 tons per acre) and an increase in the number of trees per acre, especially in trees that are of small to intermediate size. About 80% of the project area is dominated by young trees, 30-80 years old, that are in the 5 – 16 inch diameter at breast height (DBH) size class. The project area is predominately in Fire Regime Condition Class 3<sup>2</sup> (45,522 acres) and about 3,422 acres are in Condition Class 2. Fire behavior and effects are highly to moderately departed from the natural (historical) regime, and the risk of loss of key ecosystem components ranges from high to moderate in the project area.

Other indicators of a need for action are low crown base heights<sup>3</sup> and high canopy closure<sup>4</sup>. Within the project area, there are 9,430 acres that have crown base heights of five feet and less, about 11,150 acres that have crown base heights of 6-10 feet and about 28,450 acres that have crown base heights of 11 feet or greater. Thus, about 42% of the project area has from high to very high potential for crown fire initiation. Relating to canopy closure, there are about 41,400 acres (84% of the area) that have a *high* potential to sustain active crown fire of which about 33,540 acres (68% of the area) have 50% or greater canopy closure. Forests in these conditions of high fuel loads, low crown base heights and high canopy closure are prone to rapid crown fire spread and moderate to high burn severity due to dense vegetation and high levels of flammable standing live and dead and down fuel. Forests in these conditions are also more susceptible to disturbances such as those brought on from drought conditions, insects and diseases. Stands that have a combination of low crown base heights (less than 5') and high canopy

<sup>2</sup> Characteristic vegetation and fuel conditions are considered to be those that occurred within the natural (historical) fire regime. Uncharacteristic conditions are considered to be those that did not occur within the natural (historical) fire regime, such as invasive species (e.g. weeds, insects, and diseases), "high graded" forest composition and structure (e.g. large trees removed in a frequent surface fire regime), or repeated annual grazing that maintains grassy fuels across relatively large areas at levels that will not carry a surface fire. Determination of the amount of departure is based on comparison of a composite measure of fire regime attributes (vegetation characteristics; fuel composition; fire frequency, severity and pattern) to the central tendency of the natural (historical) fire regime. The amount of departure is then classified to determine the fire regime condition class. A simplified description of the fire regime condition classes and associated potential risks are shown in the table below (Hann, Wendel, Havlina, Doug, Shlisky, Ayn, et al. 2003. Interagency and The Nature Conservancy fire regime condition class website, USDA Forest Service, US Department of the Interior, The Nature Conservancy, and Systems for Environmental Management ) [frcc.gov].

Fire Regime Condition Class	Description	Potential Risks
Condition Class 1	Within the natural (historical) range of variability of vegetation characteristics, fuel composition, fire frequency, severity and pattern, and other associated disturbances.	Fire behavior, effects, and other associated disturbances are similar to those that occurred prior to fire exclusion (suppression) and other types of management that do not mimic the natural fire regime and associated vegetation and fuel characteristics. Composition and structure of vegetation and fuels are similar to the natural (historical) regime. Risk of loss of key ecosystem components (e.g. native species, large trees, and soil) are low.
Condition Class 2	Moderate departure from the natural historical regime of vegetation characteristics, fuel composition, fire frequency, severity and pattern, and other associated disturbances.	Fire behavior, effects and other associated disturbances are moderately departed (more or less severe). Composition and structure of vegetation and fuel are moderately altered. Uncharacteristic conditions range from low to moderate.
Condition Class 3	High departure from the natural (historical) regime of vegetation characteristics, fuel composition, fire frequency, severity and pattern, and other associated disturbances	Fire behavior, effects and other associated are highly departed (more or less severe). Composition and structure of vegetation and fuel are highly altered. Uncharacteristic conditions range from moderate to high. Risk of loss of key ecosystem components are high.

<sup>3</sup> Crown base height, (cbh) is the distance from the ground to the lowest green limb. The general rule of thumb is, the lower the crown base height, the easier it is for a crown fire to be initiated.

<sup>4</sup> Canopy closure is the degree to which the forest canopy blocks sunlight or obscures the sky. It is related to the number and size of trees. High degrees of canopy closure result in a higher potential to sustain active crown fire. Canopy closures of 50% and greater have a *very high* potential for sustaining active crown fire while canopy closures of 40-50% have a *high* potential for sustaining active crown fire.

closures (greater than 50%) have the highest potential for crown fire initiation and spread. This situation is present on about 5,000 acres. The K-T, Happy Jack, Mule Park and Buck Mountain Lookout are adjacent to these areas and have the highest wildfire threat.

## **Desired Conditions**

There are four distinct vegetation types (also known as biophysical settings) within the project area: Colorado Plateau Ponderosa pine type (PPIN5); Southwest Ponderosa pine type (PPIN7; Pinyon-Juniper Type, (JUPI1), and Mountain Grassland type (MGRA2). The desired condition for the Upper Beaver Creek Watershed Fuel Reduction project area is to have a landscape where the fire condition class is moving toward or achieving the desired condition class and fire regime that is appropriate for each vegetation type within the analysis area. The desired condition of average trees per acre, crown base heights, and canopy closures would vary for each vegetation type. Generally, there would be lower average trees per acre, higher crown base heights and lower average canopy cover within the WUI, than outside of the WUI for each of the vegetation type.

The desired condition for the Colorado Plateau Ponderosa pine type (about 34,900 acres), is: retaining or maintaining 5-10 tons of down woody material per acre; retaining or maintaining an average of about 100 trees per acre within the WUI, and about an average of 155 trees per acre outside of the WUI; having an average crown base height of 13 to 15 feet across the landscape; and having average canopy closures of 35% within the WUI and 40% outside of the WUI. Within Mexican spotted owl (MSO) Protected Activity Centers (PACs) and Northern goshawk post fledging areas (PFAs), average canopy closure would be greater than 50% where there are large trees (trees greater than 16 inches DBH). A fire regime of 1, with frequent low severity fires and a condition class of 1 are desired.

The desired condition for the Southwest Ponderosa pine type (about 9,000 acres) is: retaining or maintaining 5-10 tons of down woody material per acre; retaining or maintaining an average of about 70 trees per acre within the WUI and outside the WUI; having an average crown base height of 13 to 14 feet across the landscape; and having an average canopy closure of 35% within the WUI and 40% outside of the WUI. Within MSO PACs and Northern goshawk PFAs, the average canopy closure would be greater than 50% where there are large trees (trees greater than 16 inches DBH). A fire regime of 1, with frequent low severity fires and a condition class of 1 are desired.

The desired condition for the Pinyon-Juniper type (about 3,400 acres), is: retaining or maintaining 0-5 tons of down woody material per acre; retaining or maintaining an average of about 10-60 trees per acre within the WUI, and about an average of 20-75 trees per acre outside of the WUI; having an average crown base height of 4 feet across the landscape; and having an average canopy closures of 20% within the WUI and 30% outside of the WUI. A fire regime of 3, with mixed burn severity fires and a condition class of 1 are desired.

The desired condition for the Mountain Grassland Type (about 1,700 acres) is: retaining or maintaining 0-5 tons of down woody material per acre; retaining or maintaining an average of about 0-5 trees per acre within the WUI, and about an average 0-10 trees per acre outside of the WUI; having an average crown base height of 10 feet; and an average canopy closure of 0-5% both within WUI and outside of the WUI. A fire regime of 2, with stand replacement burn severity and a condition class of 1 are desired.

The desired conditions may not be fully achieved immediately following completion of initial treatments due to limitations of the existing vegetative conditions and other constraints. The intent of the project is to show positive changes from the undesirable existing conditions toward the desired future conditions and show improvement in overall forest fire regime and condition class.

## **Proposed Action**

To address the needs identified above, the Mogollon Rim and Red Rock Ranger Districts of the Coconino National Forest propose the following actions over the next 20 years to reduce the potential of stand-replacement wildfire and to begin restoring fire-adapted ecosystems. The proposed actions are described below and the acres of vegetation, prescribed burning and fuel treatments are shown in Table 1. Figure 3 is a map showing the proposed locations of vegetation treatments and Figure 4 shows the locations of proposed prescribed burning and fuel reduction treatments.

<b>Table 1. Upper Beaver Creek Watershed Fuel Reduction Project Treatments</b>					
<b>Vegetation Treatment</b>	<b>Prescribed Burning – Fuel Treatment</b>	<b>Subtotal Acres</b>	<b>Total Acres</b>	<b>WUI Treatment Acres*</b>	<b>WUI Total Acres*</b>
Meadow Maintenance	BB/Thin, LopScat/MB	535	913	278	278
	MB/Thin, LopScat/MB	325		0	
	Thin, LopScat	53		0	
MSO PAC <9 inch DBH	Thin, HPB/MB	91	187	91	164
	Thin, RPB, LopScat/MB	96		73	
MSO PAC < 16 inch DBH	Thin,MPB/MB	50	50	50	50
Savannah Maintenance	BB/Thin, RPB,LopScat/MB	2,270	2,813	1,028	1,225
	BB/Thin,MPB, LopScat/MB	67		67	
	MB/Thin, MPB/MB	78		78	
	MB/Thin, RPB,LopScat/MB	398		52	
Thin From Below	BB/Thin, RPB,LopScat/MB	3,819	5,145	1,237	1,951
	BB/Thin, MPB, LopScat/MB	45		45	
	MB/Thin, RPB,LopScat/MB	925		322	
	MB/Thin,MPB/MB	356		347	
Transition Maintenance	BB/Thin, RPB,LopScat/MB	2,439	3,265	128	708
	MB/Thin, RPB,LopScat/MB	826		580	
Timber Stand Improvement	BB/Thin, HPB/MB	490	515	6	24
	BB/MB	18		18	
	MB/MB	7		0	
Uneven Aged Management	BB/Thin, RPB,LopScat/MB	900	1,039	297	297
	MB/Thin, RPB,LopScat/MB	139		0	
Uneven Aged – Goshawk	BB/Thin,RPB,LopScat/MB	2,489	3,695	1,676	2,045
	BB/Thin, MPB, LopScat/MB	22		22	
	MB/Thin, MPB/MB	173		173	
	MB/Thin, RPB,LopScat/MB	1,011		174	
	<i>Subtotal</i>		<i>17,622</i>	<i>Subtotal</i>	<i>6,742</i>
No Treatment	BB/MB	19,456	27,985	5,914	8,343
	MB/MB	8,529		2,429	
<b>Total Treatment Acres</b>			<b>45,607</b>	<b>Total WUI Treatment Acres</b>	<b>15,085</b>
No Treatment	No treatment	2,601	3,516	1,126	1,972
No Treatment, (Private Lands)		915		846	
<b>Total Project Acres</b>			<b>49,123</b>	<b>Total WUI Acres</b>	<b>17,057</b>

\*WUI Treatment Acres are a subset of the Total Treatment Acres.

Fuel Treatment Codes:

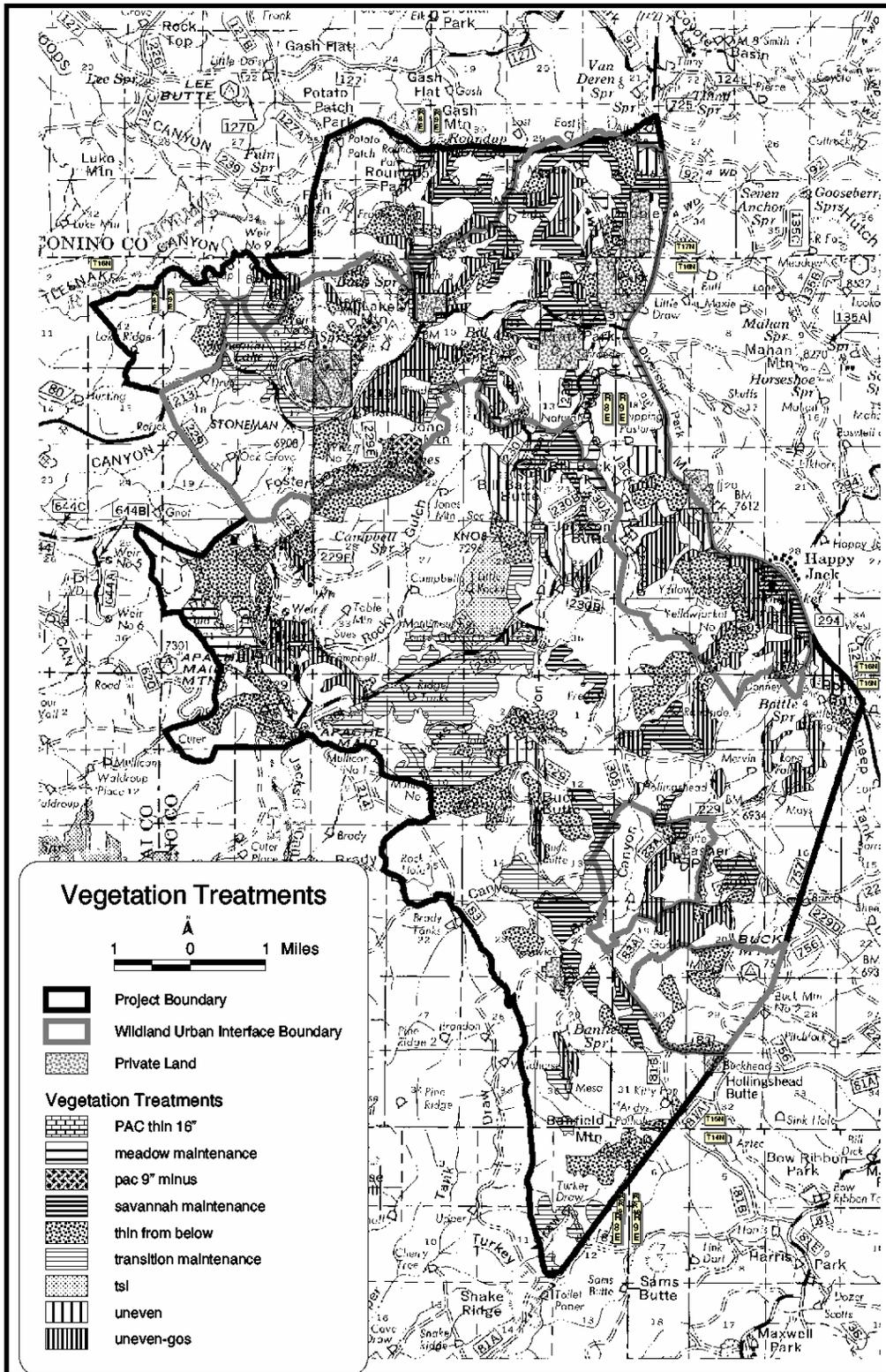
BB = Broadcast Burn; MB = Maintenance Burn

RPB = Rough pile and burn; HPB = Hand pile and burn;

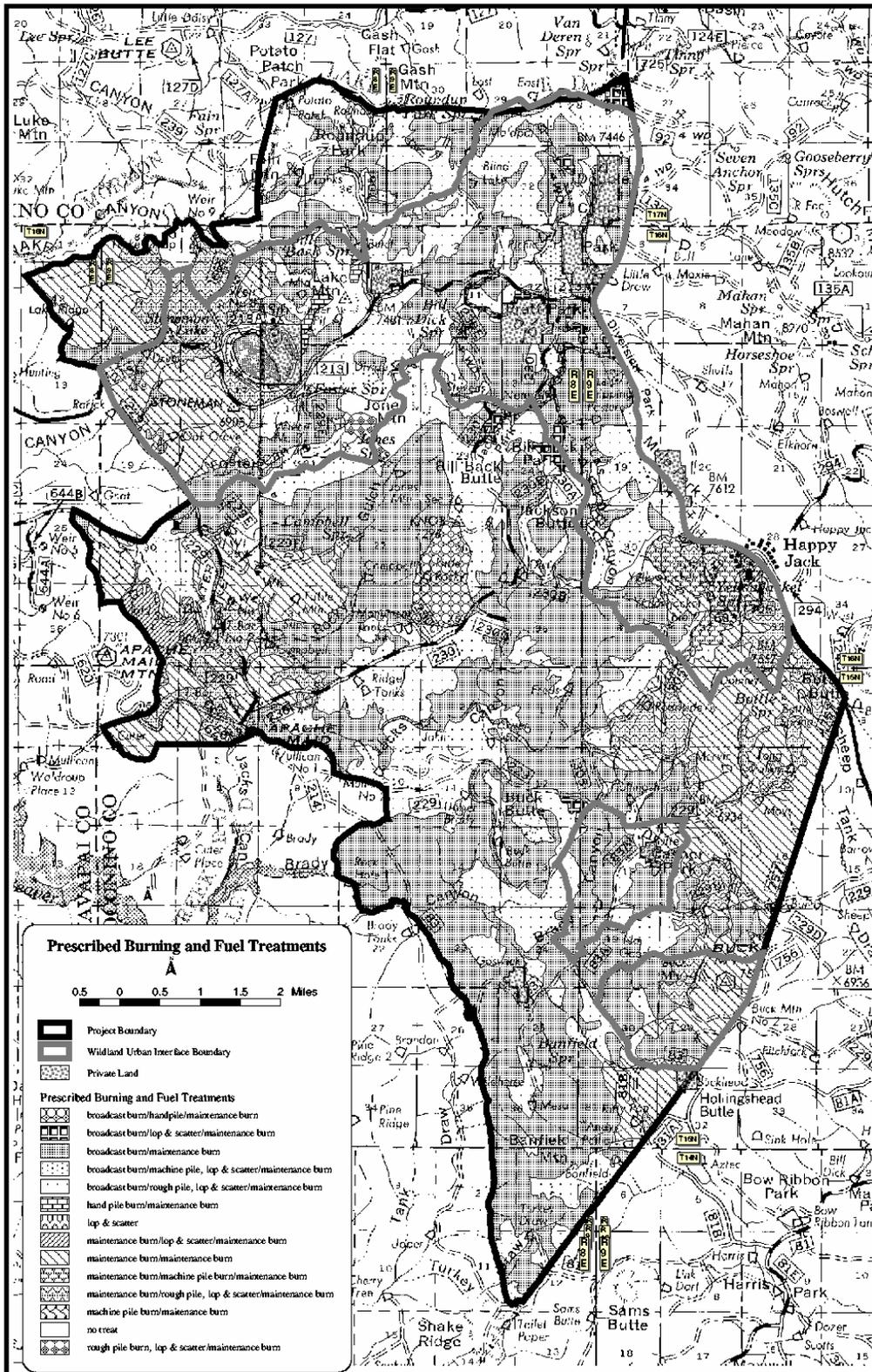
MPB = Machine Pile and Burn; LopScat = lop and scatter limbs and tree boles

Thinning treatments may include group selection, and individual tree selection harvest as well as thinning from below – see vegetation treatment descriptions for information.

**Figure 3. Upper Beaver Creek Watershed Fuel Reduction Project Vegetation Treatments** (Larger sized maps are available on request from the Mogollon Rim Ranger District)



**Figure 4. Upper Beaver Creek Watershed Fuel Reduction Project Prescribed Burning and Fuel Treatments** (Larger sized maps are available on request from the Mogollon Rim Ranger District )



## Treatment Descriptions

Treatment locations, objectives, general prescription, fuel treatment, and the desired conditions post treatment are described below. The interdisciplinary team distinguished nine categories of vegetation treatments and a range of prescribed burning and fuel treatments based on forest biophysical setting, vegetation characteristics, past vegetation and prescribed fire management history, location within the WUI, and wildlife habitat components.

Although burning is described and listed in most cases as the first treatment, commercial thinning rather than burning may be the initial treatment if it achieves the implementation objectives. Fuel treatments of rough piling<sup>5</sup> or machine piling assume conventional harvest methods. This means that trees would be felled by hand, limbed in the woods, and skidded to a landing. If trees are cut by mechanized equipment, the whole tree would be skidded to a landing, and then the tree would be limbed at the landing. In this case, the fuel treatment would consist of machine piling at landings. It would not be necessary to rough pile or machine pile in the cutting unit itself.

### **Meadow Maintenance (913 acres)**

**Location:** The vegetation type ranges from mountain grassland without trees or shrubs to mountain grassland with trees (MGRA1 & MGRA2). The soil order is a mollisol<sup>6</sup> which formed under grassland vegetation and exhibits dark brown to black organic rich surface layers. About 278 acres of meadows are within the WUI area and have been treated previously with prescribed fire. About 325 of the total acres proposed for treatment have had some thinning or prescribed burning treatments in the past.

**Objective:** The objective of the treatment is to restore meadows as a fire adapted ecosystem.

**Prescription:** All ponderosa pine trees, (small saplings to young trees up to 9 inches in DBH), would be removed that have encroached into meadows.

**Fuel Treatment:** Lop and scatter created slash to a height of no greater than 2 feet. After lopping and scattering, the meadows would be maintenance prescribed burned on a short return interval (<20 years).

**Desired Condition Post Treatment:** A meadow system dominated by grass and forbs without tree encroachment and beginning restoration of a fire adapted ecosystem is desired on these sites.

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<sup>5</sup> Rough piling by mechanized equipment would occur where there are large concentrations of created slash. Not all slash would be machine piled; some would be left where concentrations are lower depending on fuels and other resource objectives for the site.

<sup>6</sup> Mollisols are one of the 12 soil orders in the U.S. Soil Taxonomy. Mollisols are characterized by a significant accumulation of humus in the surface horizon, or uppermost layer, which is almost always formed under native grass vegetation.

### **PAC 9 inch Minus** (*187 acres*)

**Location/Description:** This thinning and prescribed burning treatment is located within two MSO PACs, Lake Mountain (PAC# 040411) and Jones Mountain (PAC# 040429). The vegetation type is ponderosa pine and oak (PPIN5). About 164 acres are within the WUI area. All treatments would occur outside the nest buffer zone.

**Objective:** The objectives of the treatment are to raise the crown base heights within selected stands within the PAC to reduce the potential for crown fire initiation, and to begin restoring a fire adapted ecosystem on these sites.

**Prescription:** Saplings and young ponderosa pine trees up to 9 inches DBH would be thinned.

**Fuel Treatment:** The initial treatment would consist of thinning. The slash from the thinning would be piled by hand, rough piled by machine and burned or lopped and scattered. The treated stands in the Lake Mountain and Jones Mountain PACs, would be evaluated after the hand piling and burning slash treatment to see if Forest Plan Standards and Guidelines for down woody material could be attained with future prescribed burning. If so, maintenance prescribed burning would be conducted at intervals of 3-15 years to maintain the desired dead and down material, litter, and fine fuel profile.

**Desired Condition Post Treatment:** The desired stand conditions after treatment would aim for an elevated crown base height, a relatively high basal area (up to 150 square feet per acre), retention of woody debris larger than 12 inches in diameter, snags, clumps of broad-leafed woody vegetation, and hardwood trees larger than 10 inches in diameter at the root collar. This would meet Forest Plan guidance for MSO PACs.

### **PAC Thin 16 inch** (*50 acres*)

**Location/Description:** This thinning and prescribed burning treatment is located within a MSO PAC of Lake Mountain (PAC# 040411) directly adjacent to the K-T private land parcel within the WUI. The vegetation type is ponderosa pine and oak (PPIN5). The stand consists of very homogeneous, mid-aged ponderosa pine trees that are generally greater than 9 inches DBH. All treatments would occur outside the nest buffer zone.

**Objective:** The objectives of the treatment are to break horizontal fuel continuity in the overstory directly adjacent to the K-T private lands and to begin restoring a fire adapted ecosystem. A secondary objective is removal of slash directly adjacent to FR 765 and FR 213 near the K-T private land to protect the PAC from a fire that could come from the private land and so that burnout operations could safely take place if a wildfire threatened the private land.

**Prescription:** Group and individual tree selection would be implemented to create small openings (1/4 acre) in the overstory. Small pine trees would also be preferentially thinned to improve the condition of oak trees. Mid-aged trees up to 16 inches DBH would be thinned and selected for cutting. The current stand structure of most all trees greater than 9 inches DBH would require a Forest Plan amendment to cut trees up to 16 inch within the PAC to break up the horizontal fuel continuity of the overstory.

**Fuel Treatment:** The initial treatment would be thinning followed by machine piling of slash and burning. After initial treatments, the stand would be evaluated to see if Forest Plan Standards and Guidelines for down woody material could be attained with future prescribed burning. If so, maintenance prescribed burning would be conducted at intervals of 3-15 years to maintain the desired dead and down material, litter, and fine fuel profile.

**Desired Condition Post Treatment:** The desired stand condition after treatment would aim for a relatively high basal area (up to 150 square feet per acre), retention of woody debris larger than 12 inches in diameter, snags, clumps of broad-leaved woody vegetation, and hardwood tress larger than 10 inches in diameter at the root collar to meet Forest Plan guidance for MSO PACs. Crown base heights would average over 10 feet. An exception to this is the area directly adjacent to FR 765 and FR 213 near the K-T ranch within 100 feet of the roads where slash would be machine piled and burned. The acres proposed for treatment within the PAC are in the WUI and are adjacent to developed private land. In the past the area has not been managed using prescribed fire.

### **Savannah Maintenance** (2,813 acres)

**Location/Description:** The areas designated for treatment are in transitional zones between the open meadows and forested sites. Savannahs are characterized by grassland soils with a ponderosa pine overstory and contain mollisol soils. The vegetation type consists of ponderosa pine with oak (PPIN5). About 1,225 acres proposed for treatment are within the WUI.

**Objective:** The objectives are to maintain the sites in an open status as defined by soil taxonomy and to maintain and restore the natural fire regime.

**Prescription:** The initial treatments consist of broadcast burning or maintenance burning followed by group selection cuts in combination with prescribed fire that would be used to create new openings or enlarge existing openings in the stand. Trees that would be thinned range up to 24 inches DBH, with most of the trees removed less than 12 inches DBH. Target basal areas are 20 to 60 square feet per acre of ponderosa pine, with all oaks retained.

**Fuel Treatment:** Thinning slash would be either rough piled and burned in slash concentrations, lopped and scattered where created slash is less than 10 tons per acre,

or machine piled and burned where slash is concentrated over areas too large to rough pile. Maintenance burning would occur at intervals of 3-15 years to maintain the desired fuels profile.

**Desired Stand Condition Post Treatment** The desired stand condition is 20 to 60 square feet per acre basal area of ponderosa pine with no treatment in the oak component. Older pine trees and all oak trees would be retained.

### **Thin from Below** (5,145 acres)

**Location/Description:** This treatment consists of thinning ponderosa pine and oak stands (PPIN5) from below. About 1,951 acres are proposed for treatments in the WUI.

**Objective:** The objectives are to raise the crown base height of the trees in the sites proposed for treatment to reduce crown fire initiation potential and to begin to restore the fire adapted ecosystem.

**Prescription:** The initial treatments consist of broadcast burning or maintenance burning followed by thinning. Trees having a DBH of 1 inch to 24 inches would be thinned with most of the trees removed less than 12 inches DBH. Old trees would be retained. Thinning would occur over a range of size classes, leaving a variety of size classes leading to an uneven age condition. Target basal areas would vary by aspect, with north slopes ranging from 60-120 square feet per acre, and south and southwest aspects ranging from 40 to 80 square feet per acre.

**Fuel Treatment:** Slash treatments would include machine and rough piling slash concentrations and burning, or lopping and scattering of less concentrated slash. Maintenance burning would occur at intervals of 3-15 years to maintain the desired fuels profile.

**Desired Condition Post Treatment:** The desired stand condition after treatment would aim for a stand basal area of 40-120 square feet per acre, 5-10 tons per acre of dead fuels, and an average crown base height of 10 feet. Lower basal areas would occur within the WUI and on south and west aspects, greater basal areas would occur on north and east aspects.

### **Transition Maintenance** (3,265 acres):

**Location/Description:** The treatment would occur in ponderosa pine, oak, alligator juniper, mountain mahogany and cliffrose stands that are transitional between the ponderosa pine and pinyon-juniper vegetation types (PPIN7). These sites are generally low productivity sites for ponderosa pine, but are highly diverse with respect to vegetation. About 708 acres proposed for treatment are in the WUI.

**Objective:** The objectives of the treatments are to maintain the transition type and restore the fire adapted ecosystem at these sites.

**Prescription:** Thin from below, group selection and individual tree selection would target pine trees up to 24 inches DBH, with most of the trees removed less than 12 inches DBH. The basal area of ponderosa pine would range from to 20-40 square feet per acre. Older pine trees would be retained, along with juniper and oak trees. No gambel oak or alligator juniper would be cut or removed.

**Fuel Treatment:** Initial treatment would consist of broadcast or maintenance burning followed by thinning. After thinning, concentrated slash would be rough piled and burned and less dense concentrations of slash (less than 10 tons/acre) would be lopped and scattered. Maintenance burns would occur at intervals of 3 to 15 years as needed to maintain the desired fuel profile.

**Desired Condition Post Treatment:** The desired stand condition after treatment is to reduce the basal area of pine and to improve the overall condition for oak and juniper. The target basal area after treatment is 20-100 square feet per acre for all species. The desired stand condition would also aim to increase the average crown base height to 10 feet or greater.

### **Timber Stand Improvement** (*515 acres*)

**Location/Description:** This treatment consists of broadcast burning or maintenance burning followed by thinning young ponderosa pine trees from stands that have had previous timber management and timber harvest. The vegetation type where treatments would occur consists of ponderosa pine and oak and ponderosa pine with oak and juniper (PPIN5 and PPIN7). Only 24 acres are within the WUI.

**Objective:** The objective of the treatment is to raise the crown base height, reduce horizontal fuel continuity, restore the fire adapted ecosystem at these sites, and to improve tree health by reducing competition between trees.

**Prescription:** The thinning treatment consists of cutting pine trees predominantly less than 9 inches DBH. The current stocking of pine trees would be thinned at a varied spacing to provide species diversity and to help promote the growth of oak and juniper.

**Fuel Treatment:** Slash created from thinning would be hand piled and burned over most of the acres treated. Maintenance prescribed burning would occur at intervals of less than 20 years to control fuel loads and stand density.

**Desired Condition Post Treatment:** Stands have a reduced crown fire initiation potential and the current stocking of pine trees have been thinned at a varied spacing to provide species diversity and to help promote the growth of oak and juniper.

### **Uneven-Aged Management** (1,039 acres)

**Location/Description:** These stands already have characteristics of multi-storied stands and multi-aged trees with existing openings where young trees are growing. The stands selected for treatments are ponderosa pine and oak (PPIN5). About 297 acres proposed for treatment are in the WUI, and some of the stands are tied to retention visual quality objectives along Forest Highway 3, and Forest Road 213.

**Objective:** The objective of the treatment is to reduce crown fire initiation potential by removing a portion of the ladder fuels, as well as beginning the restoration of a fire adapted ecosystem in these sites.

**Prescription:** Initial treatment consists of broadcast burning or maintenance burning followed by thinning. Prescriptions would utilize an individual tree selection prescription to extenuate the uneven aged conditions by creating more openings for regeneration of pine as well as thinning to improve tree health and promote large-tree components. Trees would be thinned up to 24 inches DBH, but most of the trees removed would be in the 5-12 inch diameter range.

**Fuel Treatment:** Activity slash from thinning, where concentrated and heavy, would be gathered into piles; and where less concentrated, the slash would be lopped and scattered. Treated areas would then be placed into a maintenance burning program where prescribed burning would occur in 3-15 year intervals depending on fuel loads.

**Desired Condition Post Treatment:** The desired stand condition after treatment would aim for a stand basal area of 40-120 square feet per acre based on aspect (80-120 BA on north and east aspects and 40-80 BA on south and west aspects and within the WUI), 5-10 tons per acre of dead fuels, and an average crown base height of 10 feet or greater.

### **Uneven-Aged Goshawk** (3,695 acres)

**Location/Description:** This treatment is similar to the Uneven-Aged except that the stands selected for treatment are not presently exhibiting multi-canopied and multi-aged characteristics. The stands selected for treatments are ponderosa pine and oak (PPIN5). Approximately 2,045 acres proposed for treatment are in the WUI.

**Objective:** The objective of the treatment is reducing horizontal fuel continuity in the overstory and initiating the restoration of the fire adapted ecosystem through the reintroduction of fire.

**Prescription:** The treatment consists of initial prescribed broadcast or maintenance burning. This would be followed by tree thinning and group selection cuts to create small openings, 1/4 to 4 acres in size, as recommended in the Forest Plan goshawk guidelines. Trees would be thinned up to 24 inches DBH, but most of the trees removed would be in the 5-12 inch diameter range.

**Fuel Treatment:** Slash would be treated by rough piling, lopping and scattering, and machine piling. Treated areas would be placed into a maintenance burning program with prescribed fire intervals of 3-15 years.

**Desired Condition Post Treatment:** The desired stand condition after treatment aims toward the objective of having a stand basal area of 40-120 square feet per acre based on aspect (80-120 BA on north and east aspects and 40-80 BA on south and west aspects and within the WUI), 5-10 tons per acre of dead fuels, and an average crown base height of 10 feet. The openings created in the existing stands provide opportunities for tree regeneration in addition to providing improved tree health and large-tree components.

**Broadcast Burning** (*19,456 acres over the project area with no thinning; 5,914 acres in the WUI*)

**Location/Description:** This treatment would be conducted generally in areas that have not been previously treated with prescribed or wildland fire within the past 20 years or more. This is an initial entry prescribed burn. Vegetation types include ponderosa pine and oak, transition ponderosa pine with oak and juniper, mountain grassland, and juniper pinyon pine (PPIN5, PPIN7, MGRA1, JUPI1).

**Objective:** The objectives are to maintain low surface fuel loads of litter and dead and down wood, low crown fire potential, and high crown base heights. This treatment is intended to mimic the historic fire regime in both fire occurrence and fire severity and intensity, and to reintroduce fire into the ecosystem.

**Prescription:** Low to moderate intensity prescribed burning resulting in the consumption of surface litter and logs. Course woody debris of 5 tons per acre would be retained in the WUI and 5-10 tons per acre would be retained outside the WUI. There may be up to 10% mortality of live trees from crown scorch.

**Follow-up Fuel Treatment:** Maintenance burning would be implemented to maintain fuel loadings and the desired fire return interval.

**Desired Condition Post Treatment:** Course woody debris ranging from 5-10 tons per acre, elevated crown base heights to about 10 feet or greater, and no greater than 10% mortality of remaining live trees are desired conditions.

**Maintenance Burning** (*8,529 acres outside of the WUI and 2,429 acres inside the WUI*). *Maintenance burning would also occur as a follow-up fuel treatment over about 45,000 acres of the project area.*

**Location/Description:** This treatment consists of low to moderate intensity prescribed burning of previously prescribed burned areas. Vegetation types include

ponderosa pine and oak, transition ponderosa pine with oak and juniper, mountain grassland, and juniper pinyon pine (PPIN5, PPIN7, MGRA1, JUPI1).

**Objective:** The objectives are to maintain low surface fuel loads of litter and dead and down wood, low crown fire potential, and high crown base heights. This treatment is intended to mimic the historic fire regime in both fire occurrence and fire severity and intensity, and to reintroduce fire into the ecosystem.

**Prescription:** Low to moderate intensity prescribed burning resulting in the consumption of surface litter and small logs. Course woody debris of 5 tons per acre would be retained in the WUI and 5-10 tons per acre would be retained outside the WUI.

**Follow-up Fuel Treatment:** Maintenance burning would be used to maintain fuel loadings and the desired fire return interval.

**Desired Condition Post Treatment:** Course woody debris 5-10 tons per acre, elevated crown base heights to about 10 feet, and no greater than 10% mortality of remaining live trees.

### Wildland Fire Use

Currently no Wildland Fire Use<sup>7</sup> (WFU) Plan has been approved for the Coconino National Forest. It is a reasonably foreseeable future action. If a plan is approved for the forest, we would have the opportunity to use WFU along with maintenance burning to continue to make progress towards a fire-adapted ecosystem.

### Roadside Fuel Reduction and Hazard Tree Removal Maintenance

This treatment would occur along identified major travel routes in the analysis area (FH-3, Forest roads 83,83A, 213, 229, 229B, 230, and 305). Vegetation and prescribed burning, and fuel reduction treatments would be the same as described above. Where treatments are adjacent to the travel routes listed above, part of the prescription would be to evaluate hazard trees and site distance along the roads. Hazard trees and vegetation would be cut to maintain a safe travel way on these roads. Table 2 displays the roads that are adjacent to the vegetation treatments.

Vegetation Treatment	Roads	Vegetation Treatment	Roads
meadow maintenance	FH-3, 230	thin from below	FH-3,83A,213,229,229B,230,305
PAC 9 inch minus	None	transition maintenance	230
PAC thin 16 inch	213	tsi	230
savannah maintenance	FH-3,83,213,229,230,305	uneven	FH-3,229,230
		uneven-gos	83A,213,229,229B,230,305

<sup>7</sup> Wildland fire use (WFU) is the management of naturally ignited wildland fires to accomplish specific prestated resource management objectives in predefined geographic areas outlined in Wildland Fire Use Plans.

Fuel cleanup and hazard tree removal along roads are needed because roads are a common initial fire start location, and roads are critical for fire protection, public and fire fighter access/egress, and they can function as a control point for prescribed fire or fire suppression.

### **Road Use and Maintenance**

All roads used for project implementation would receive routine maintenance. No additional permanent roads would be constructed. No new temporary roads would be constructed. Existing temporary roads would be reopened and then decommissioned after use.

### **Research and Monitoring by Partners**

The Upper Beaver Creek Watershed Fuel Reduction Project would incorporate new and ongoing research and monitoring projects with three partners, the Arizona Game and Fish Department, (AZGFD) the Ecological Restoration Institute (ERI) of Northern Arizona University, and the Rocky Mountain Research Station (RMRS). The AZGFD/ERI study proposes to use an experimental, wildlife-based fuel reduction prescription in selected stands proposed for treatment. They would use pre- and post-treatment monitoring surveys to evaluate wildlife responses to the vegetation, prescribed burning and fuel reduction treatments. Their study would test the effectiveness of management guidelines for the Abert squirrel, a Forest Service Management Indicator Species. RMRS has ongoing research studies within the Beaver Creek Experimental Watershed. They will be re-instrumenting four stream gauging stations in 2006. The proposed actions of this project would allow RMRS to monitor the watershed responses to the vegetation, fuel treatment, and prescribed burning actions over the long term within the gauged watersheds.

### **Resource Protection Measures**

The proposed actions would be designed to comply with Forest Plan standards and guidelines, as amended. Design features would be incorporated into the project to protect forest resources of soil, water, air, scenery values, wildlife and aquatic habitat, and rare plants. Mitigation measures would be implemented to prevent the introduction and spread of invasive plants, to protect heritage resources, and to protect public health and safety during project implementation.