

# McCracken Project Proposed Action

USDA Forest Service  
Williams Ranger District, Kaibab National Forest  
Coconino County, Arizona  
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## Introduction

The Williams Ranger District of the Kaibab National Forest proposes to conduct vegetation treatments (either commercial or non-commercial tree thinnings, or both), prescribed burning, and associated activity slash treatments, to reduce forest tree densities and hazardous fuel conditions throughout most of the McCracken project area. This action is intended to improve forest health and sustainability, and to protect public and private resources within the area by reducing the probability of wildland fire ignitions becoming intense stand-replacing fires. The McCracken Project encompasses approximately 17,337 acres of national forest system lands (See attached Vicinity Map).

The project area lies 3 to 12 miles to the south of the city of Williams, Arizona. The project is located in T19N, R2E, Sections 5 and 6; T20N, R1E, Sections 1, 12, and 13; T20N, R2E, Sections 2-11, 16-21, and 29-32; T21N, R1E, Section 36; T21N, R2E, Sections 13-15 and 22-36, of the Gila and Salt River Meridian (G&SRM). The project is primarily in Kaibab Forest Plan Geographic Area (GA) 2 with 17,059 acres being within this GA. 278 acres within the far southern tip of the project area is within GA 1. 1,172 acres of the project is within Kaibab Forest Plan Land Use Zone (LUZ) 22. This Land Use Zone is entirely within GA 2. The project is within Arizona Game and Fish Department Game Management Unit 8. The project area is mostly within the Hat grazing allotment with small portions within the Big Springs (238 acres) and Chalender (1 acre) grazing allotments.

## Purpose and Need for Action

There is a need to improve forest health and sustainability, to reduce the risk for uncharacteristically intense stand-replacement wildland fires, to prevent the spread of wildland fire onto private property and into the city of Williams watershed, and to provide for firefighter and public safety in wildland fire situations. This action is needed because the potential for high-intensity wildland fire within the McCracken project area is high. Accumulations of dead and down woody debris, "ladder fuels", and unnaturally high tree densities have contributed to increased wildland fire potential. The proximity of these fuels to private land, Bill Williams Mountain, and the City of Williams and its watershed, make the McCracken Project a high priority for vegetation and prescribed fire treatments. The purpose of this proposed action is to improve forest health and sustainability, and to reduce the risk of catastrophic wildfires.

This action responds to the goals and objectives outlined in the Kaibab Forest Plan (as amended in 2008), the Williams District Fire Risk Assessment (1997), and the National Fire Plan's 10-Year Strategy (2001). This proposal would help move the project area toward desired conditions described in these documents. Most of the project area meets the Forest Service's Southwestern Region definition for the wildland-urban interface (WUI) which includes "those areas of resident populations at imminent risk from wildfire, and human developments having special significance. These areas include critical communication sites, municipal watersheds, high

voltage transmission lines ... 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.” (FSM 5100, Chapter 5140, R3 Supplement No. 5100-2000-2, 12/22/2000). The McCracken area meets this definition because it lies south of the city of Williams and the city’s watershed on Bill Williams Mountain. The fuels between the McCracken area and the city and its watershed are fairly continuous and a large wildland fire could quickly move from the McCracken area to Bill Williams Mountain and into the City of Williams. There are also developed privately owned inholdings and high voltage power lines within the McCracken area that could be threatened by wildfires.

### **Kaibab Forest Plan Management Direction**

The Kaibab Forest Plan (KFP) contains the following direction relating to the purpose and need for the proposed project:

- Improve wildlife habitats through ... development of habitat quality and diversity, and the identification and protection of key habitats (KFP, page 18).
- Apply integrated resource management to improve age-class distribution (KFP, page 19).
- Select tree-groups for regeneration cutting to achieve and maintain, over time, a diverse geographic distribution of tree-groups recognizing forest type, tree size, and tree-group density (KFP, GA 2, page 43).
- In forested areas (within GA 2), tree-groups may be thinned from below to achieve the desired tree-group conditions; removing in order: (1) mistletoe infected, (2) suppressed, (3) intermediate, (4) codominant, and (5) dominant trees. Promote varied irregular spacing between trees within tree-groups; promote interlocking crowns (KFP, page 43).
- Concentrate fuelwood programs in the pinyon-juniper woodland to accomplish wildlife habitat, soil and watershed, and range improvement objectives (KFP, page 19).
- Provide the maximum amount of forage, consistent with other resource values, for use by wildlife and livestock on a sustained yield basis (KFP, page 18).
- In seral grasslands, maintain existing openings and create additional openings with high forb composition (KFP, GA 2, page 42).
- Use prescribed fire as a resource management tool where it can effectively accomplish resource objectives. Fire management, prevention, and control are used to protect life, property, and resources (KFP, page 20).
- Do not allow fires to spread to lands of other ownership (KFP, GA 2, page 47).
- Protect human life and improvements (KFP, GA 2, page 47).
- Minimize acreage burned by high intensity fires (KFP, GA 2, page 47).
- Maintain soil productivity and watershed (i.e. soil) condition. Rehabilitate non-productive lands on a planned basis to eliminate unsatisfactory watershed condition by 2020. Maintain a high quality sustained water yield for Forest users and others. Identify and protect wetlands and floodplains (KFP, page 19).

### **National Fire Plan Direction**

The National Forest Plan contains the following direction relating to the purpose and need for the proposed project:

- Reduce the total number of acres at risk to severe wildland fire.

- Ensure communities at risk in the wildland-urban interface receive priority for hazardous fuels treatment.
- Expand and improve integration of hazardous fuels management program to reduce severe wildland fires to protect communities and the environment.

## Current Condition

The McCracken project area is predominantly a ponderosa pine cover-type (12,559 acres) that includes a mix of ponderosa pine, Gambel oak, and alligator juniper. There are 3,586 acres of woodland sites that are scattered throughout the McCracken management area. There is a high concentration of woodland sites in the far southern portion of the management area. These sites include juniper woodlands, pinyon-juniper woodlands, and oak woodlands. Juniper and pinyon-juniper sites are primarily stocked with alligator juniper but often have scattered ponderosa pine, gambel oak, Utah juniper, and pinyon pine mixed with the alligator juniper. Oak woodlands are predominantly composed of gambel oak but there are often scattered ponderosa pine and alligator juniper mixed with the oak. Other cover type components of the McCracken management area include grasslands (962 acres), aspen (88 acres), and wetlands (142 acres, this is entirely within the Coleman Lake area).

Most of the forested sites within the McCracken area have high densities of trees. Tree densities are much higher than naturally occurred prior to Euro-American settlement of the area. Much of the McCracken landscape is dominated by trees of approximately the same age class, 60 to 100 years old. This high density of fairly even-aged trees leads to several resource concerns in the project area as well as in the adjacent national forest and private properties. These include:

High risk for severe wildfire. The high density of trees combined with high fuel loadings below the forest canopy are conducive to intense stand-replacing fires that run through the forest canopy. As stands become denser, a combination of increased woody debris on the forest floor, increased mid-level forest canopies from younger trees filling in openings in the canopy, and a closed overstory canopy create a “fuel ladder” that allows low-intensity ground fires to move up into the forest canopy, or treetops, and become crown fires. Crown fires are very destructive and also very difficult, if not impossible, to control. The ponderosa pine type is generally at high risk for stand replacing wildfires while the risk for the woodland types ranges from low to high.

Fire is a very natural component of the forested ecosystem. In the past, lightning caused fires burned across the forested landscape every few years. This was the process that thinned the forest and kept it open. These were natural surface fires that burned primarily through grasses in the understory of a very open forest. These fires were much less destructive than the crown fires that we see today.

High intensity stand-replacement wildfires threaten many forest resources. This includes the watershed for the City of Williams that lies to the north of the McCracken management area. After the Pumpkin Fire (2000) on Kendrick Mountain, unprecedented levels of erosion were seen on the mountain. High severity wildfires threaten wildlife habitat for many species including the threatened, endangered, and sensitive species that inhabit the McCracken area. These fires can denude large areas of all sizes of trees, making forest recovery difficult. Recreational opportunities can be diminished for years in the areas where these fires burn, and forest visual quality can be severely impaired.

As defined by the Williams District Fire Risk Assessment, there are within the McCracken ecosystem management area, 1,772 acres of intensive wildland/urban interface zones (within 1/8 mile of private lands and privately owned improvements) and 8,369 acres of extensive wildland/urban interface zones (within 1 mile to the south and west and within 1/2 mile to the north and east of private land and privately owned improvements and outside of the intensive zone). The McCracken area has 14,190 acres that fall within the Wildland Urban Interface boundary as defined by the Greater Williams Area Community Wildfire Protection Plan (2005). The McCracken area contains 326 acres of developed private inholdings. Much of this privately held land has homes and other structures. Crown fires threaten not only the homes and property in these areas but also the safety of the residents. Firefighter safety is also of great concern in urban interface areas when wildfires are burning. Firefighters cannot be safely placed in dense stands of trees to suppress wildfires.

Poor forest health. The high density of trees in the McCracken project area leads to intense competition between trees for limited moisture and soil nutrients. This competition slows individual tree growth and the development of large trees. This competition also places additional stress on all trees and predisposes them to attack and mortality from bark beetles. During the drought years from 2001 to 2003, many ponderosa pine and pinyon pine were killed throughout the Southwestern region. The McCracken area experienced a fair amount of this mortality in ponderosa pine. Competition from smaller trees surrounding larger older trees has also contributed to the loss through mortality of many large trees.

Dwarf mistletoe infection levels in the McCracken area are very high. This tree parasite slows the growth of trees and can eventually lead to tree mortality. Young ponderosa pine infected from the overstory will often succumb to mortality long before they mature. Mistletoe-created witches' brooms also add to the forest fuel ladder that aids ground fires in moving into the overstory canopy. Over 40% of the McCracken area has fairly high to severe infection levels (an average dwarf mistletoe rating of 0.5 or greater). Left unmanaged, these sites can't be maintained in a sustainable uneven-aged condition.

Limited diversity and low forest sustainability. The high density of similarly aged trees in the McCracken project area impedes the development of grasses, forbs, and shrubs in the forest understory. These understory plant species are often important wildlife habitat components for those wildlife species that feed on them or utilize them for other purposes. The large number of fairly even-aged trees also hinders the regeneration and development of younger trees in the understory that would replace the overstory trees in the future. Because of these factors, the forest becomes less diverse and more uniform in age and structure over time.

Aspen is found in a number of small stands (1/4 to 3 acres) and three larger stands (12 to 47 acres) scattered across the northern portion of the McCracken area. Ponderosa pine have encroached into some of these aspen sites and in some cases are overtopping and suppressing aspen development and vigor. Over the past 10 years there has been a significant decline in aspen vigor in most of these sites. Aspen mortality in these sites has ranged from 40% to almost 100% in a couple of the sites. This mortality is related to a number of factors including drought, past late freezes, insect attacks, and disease. New

aspen development is being seriously impacted by elk browse so once the older trees are lost the aspen sites are not able to develop new aspen regeneration. This is leading to the potential for the complete loss of many of these aspen sites.

Many natural meadows, open savannahs, and forest openings within the McCracken area are being reduced in size and number over time by the encroachment of ponderosa pine, juniper, and oak. These meadows and open areas provide routes through the forest for antelope as well as areas of high grass/understory plant productivity which benefit wildlife species that utilize grass, forbs, and shrubs for feed and low hiding cover. The Arizona Game and Fish Department has identified an antelope travel corridor in the northern portion of the McCracken Project area. Tree encroachment within this travel corridor over the past 100 years has created additional hiding cover that predators can utilize to prey on antelope.

There is Mexican spotted owl restricted habitat and target/threshold habitat within the project area. There are Northern goshawk nest areas and post-fledging family areas within the project area.

The following objectives were identified for the McCracken Project:

Improve ecosystem health and sustainability.

Improve the diversity of vegetative age classes, vegetative species, and vegetative structure across the McCracken area. Facilitate uneven-aged forest management by promoting the development of multiple age classes of trees regulated over time.

Reduce mistletoe infections to a more manageable level. Move heavily mistletoe–infected areas towards a condition where they can eventually be managed as regulated uneven-aged sites.

Move stand conditions toward forest structures considered to be more typical of forest structure under pre-settlement fire regimes in a portion of the analysis area in order to improve habitat quality for various wildlife species associated with open forest and savannah conditions.

Reduce the risk for uncharacteristically intense stand-replacement wildland fires by creating openings in the forest canopy, reducing forest fuel loads, reducing ladder fuels, and lowering tree densities.

Protect wildland watershed condition and soil productivity.

Reduce the potential of wildland fire to enter private property from the forest.

Provide for firefighter and public safety in wildland fire situations.

Reintroduce fire as a natural part of the ecosystem.

## **The Vegetative Reference Condition**

For the McCracken analysis, current forest conditions will be compared to vegetative reference conditions for the forest. Reference conditions are those conditions that existed on this forest at a point of time prior to euro-American settlement of the area. This analysis uses the year 1870 as a reference point because it is just prior to euro-American settlement of the area and it is a point in time where we can fairly easily estimate past tree stocking by looking at presettlement evidence that still exists on the site (old trees, stumps, fallen trees, stump holes). Pre-settlement conditions more closely represent the conditions that probably existed on the forest for a long period of time because the reference point is chosen at a point of time prior to heavy vegetative manipulation of the area from grazing, fire exclusion, and logging. Many studies confirm that there has been a drastic change in the forest state, particularly in respect to increased tree density, over the past 130 years. Reference conditions aren't chosen to dictate what conditions the area is being managed towards but rather as a baseline for what conditions forest processes and species adapted to over time.

### **Desired Condition**

The IDT (Interdisciplinary Team) developed a specific desired condition for the McCracken project area based on "Management Direction" in the Kaibab Forest Plan. The desired condition consists of long term goals for the project area. In many cases it may take many years for the project area to reach some of these goals. The desired condition for the McCracken project area includes the following:

Within the Ponderosa Pine cover type:

- Approximately 70% of the ponderosa pine cover type will be composed of a regulated distribution of multiple age classes as specified in the forest plan. This distribution will be composed of approximately 20% of old growth forest (vegetative structural stage 6), 20% of mature forest (vegetative structural stage 5), 20% of mid-aged forest (vegetative structural stage 4), 20% of young forest (vegetative structural stage 3), and 20% of very young forest (vegetative structural stages 1 and 2). Densities of vegetative structural stage (VSS) 4, 5, and 6 groups of trees will be maintained at levels above those specified in the forest plan. Approximately 15% of the ponderosa pine cover type will be maintained in a denser condition with a greater number of large trees in order to meet Mexican spotted owl threshold conditions and goshawk nest conditions described in the forest plan. Approximately 15% of the ponderosa pine cover type will be maintained in a state that is close to vegetative reference conditions in order to promote desirable conditions for antelope and other species that favor open savannah conditions.
- Grasses, forbs, and shrubs will be a significant component of the forested area throughout the ponderosa pine cover type.
- Dwarf mistletoe will be present, but infection levels will be maintained at a manageable level that allows for sustainable uneven-aged management.
- A variety of oak and juniper size and age classes will be maintained in areas where these species were part of the vegetative reference condition. Age class distribution of oak and juniper will be such that some large oak and juniper are always maintained in these areas.

- Large trees of all species will be developed throughout the cover type and many are allowed to attain a very old age. Risk of mortality of these large trees from wildfires or prescribed burning will be low.
- Risk of catastrophic stand replacing wildfires or destructive insect epidemics within the ponderosa pine forest will be low.
- Fuel loading will average 5 to 7 tons per acre in most of the ponderosa pine type. Fuel loadings will be maintained at lower levels in urban interface areas and in areas along major roads that can be used as fire control lines.

#### Woodlands:

- Woodlands will be maintained at stocking levels that are much closer to reference conditions. The exception to this would be areas within oak woodlands that are identified as Mexican spotted owl target/threshold habitat. These areas will have higher densities as specified in the forest plan. Grass and forb production will be high, relative to site productivity, in juniper and pinyon-juniper woodlands and moderate to high in oak woodlands. Woodlands will be in an uneven aged condition that sustains a mosaic of vegetation densities, age classes, and species composition.

#### Grasslands:

- Grasslands will be maintained as open meadows or very open savannahs. Tree stocking will be maintained close to vegetative reference conditions. Grass and forb production will be at or close to the full potential for the site.

#### Aspen:

- Aspen sites will be vigorous and free to grow without excess competition from conifers. As older aspen are lost to mortality, new aspen can sprout and freely grow into replacement trees. At a minimum, the current distribution of aspen will be maintained across the landscape.

#### Wetlands:

- The area will remain mostly free of tree encroachment other than a few scattered trees around the edge that are at or close to reference conditions.

#### The Entire Project Area:

- The watershed will be in good condition with little unsustainable erosion/sedimentation.
- Periodic understory fires will be reintroduced into the area.
- Area aesthetics will be pleasing to the general public.
- A spectrum of high quality outdoor recreation settings and opportunities will be available in the McCracken project area.
- Noxious weeds will be maintained at a very low to nonexistent level.
- Rangeland will be in satisfactory condition.
- Threatened, endangered, and sensitive plant species will be maintained over time.
- There will be a diversity of cool and warm season plants.
- Fuel loadings and fire ladders will be maintained at low levels in urban interface areas and in areas along major roads that can be used as fire control lines. Overall area fuel loading will be low to moderate.

- There will be a low probability for stand replacing wildfires.
- Key habitat components (logs, snags, large trees, etc.) for threatened, sensitive, and management indicator species (MIS) will be maintained over time throughout these species' habitat.

## The Proposed Action

The proposed action was designed to respond to the purpose and need described earlier, the National Fire Plan, and the regional priority of treating the Wildland Urban Interface priority areas. The actions described below will move the project area towards the desired condition by implementing 15,262 acres of vegetative treatments (treatments that involve felling, killing, or removal of trees) and performing prescribed burning on 17,337 acres. There is a low probability of a catastrophic wildfire under this alternative. All mitigation measures described in the Mitigation section will be followed.

The project proposes to reduce forest tree densities and fuel loadings throughout most of the project area through a combination of vegetative treatments, associated activity slash treatments, and prescribed burning.

### Vegetative Treatments

Vegetative treatments include those treatments that reduce tree density by felling trees and leaving the remainder of trees at some specified density. See the McCracken Proposed Action Vegetation Treatments map for the location of these proposed treatments. The project proposes the following vegetative treatments:

<b>Vegetative Treatments</b>	<b>Acres</b>
Group Selection	2,855
Group Selection (with VSS distribution)	742
Irregular Shelterwood	2,049
Irregular Thinning	17
Sanitation	5
Sanitation with Irregular Thinning	38
Aspen Release	87
Full Restoration to Meadow	806
Full Restoration to Woodland Savannah	845
Partial Restoration to Woodland Savannah	820
Full Restoration to Pine Savannah	1,311
Partial Restoration to Pine Savannah	575
Woodland Thinning	1,053
Pre-commercial Thinning	4,059
<b>Total Acres</b>	<b>15,262</b>

Of the above treatments, approximately 8,272 acres will be accomplished with a commercial timber sale. Sale of commercial trees to be thinned is desirable, where feasible, because sales receipts are generated for the government that can be used to implement some of the non-commercial thinning and fuels reduction portions of the project. The main boles of trees that are sold commercially are also hauled away from the area, reducing the amount of activity slash that



must be treated. In the remaining vegetative treatment acres, the trees will generally be treated non-commercially. Activity slash generated by these non-commercial treatments will generally remain on site after the vegetative treatment. Further slash treatments may be required in these areas to reduce fire risk. These treatments may include piling, prescribed burning, crushing, or mulching of slash. In some cases within these non-commercial treatment areas, green fuelwood sales may be used to accomplish at least a portion of the vegetative treatment. Felled trees may also be offered for sale as fuelwood or other forest products in order to decrease activity slash fuel loadings.

Following is a description of the proposed vegetative treatments:

### **Group Selection**

This treatment attempts to regenerate ponderosa pine on 10 to 20% of each site by creating ¼ to 2 acre openings across each site. Opening size may be up to 4 acres in size where there are large pockets of dwarf mistletoe-infected pine. These openings are referred to as “regeneration areas”. 0 to 20 square feet basal area per acre of the largest non-mistletoe-infected pine available can be retained in regeneration areas. When regeneration areas are over 1 acre in size, a minimum of one group of 3 to 5 non-mistletoe infected ponderosa pines will be retained per acre. Regeneration areas will generally be chosen in areas where tree groups are vegetative structural stages (VSS) 1 through 4, except in pockets of heavy mistletoe infection where some larger VSS tree groups may be regenerated. Outside of these regeneration areas, the rest of the site will be irregularly thinned to 40 to 100 square feet basal area per acre.

### **Group Selection with Vegetative Structural Stage (VSS) Distribution**

This group selection treatment is done in sites that are already uneven aged and have a fairly good distribution of vigorous pine groups in all vegetative structural stages. This treatment attempts to leave ¼ to 2 acre sized groups of ponderosa pine in a group distribution as close as possible to the desired VSS distribution expressed in the forest plan (VSS 1, 2 – 20%; VSS 3 – 20%; VSS 4 – 20%, VSS 5 – 20%, VSS 6 – 20%). VSS 1 – 4 groups will be thinned to increase growth and vigor. Some thinning may be done in VSS 5 and 6 groups in trees less than 18” in diameter in the group’s understory but trees greater than 18” in diameter will be left intact in these groups unless there are mistletoe-infected trees in this size class. Mistletoe-infected trees, greater than 18” in diameter, may be removed from these groups in order to protect younger trees from infection and to maintain a sustainable uneven aged site over time. Spacing within groups will generally be irregular. Regeneration areas will be created in groups that are surplus to the desired VSS distribution or in pockets with heavy mistletoe infection levels. VSS 5 and 6 groups will be retained at or above minimum canopy cover percentages specified in the forest plan goshawk guidelines except in some situations where the group has trees with mistletoe infections. VSS 4 groups of trees will be maintained at or above minimum canopy closures specified in the forest plan unless they are surplus to specified forest plan distribution of VSS classes (greater than 60% of area is in VSS 4 through VSS 6 groups) or trees in these groups are infected with mistletoe. Canopy openings will be created around groups and subgroups of trees in order to release the group/subgroup and to increase the growth and crown development of the group/subgroup. These openings will

be included with the entire group when determining the percent canopy cover of VSS 4 through 6 groups.

### **Irregular Thinning**

This is a low intermediate thin that uses very irregular spacing of leave trees. Generally the smaller trees are thinned first to get to the desired leave tree density. Leave trees will be left both individually and in small to medium sized groups of two to twelve trees per group. There will be openings around these tree groups and the openings around groups will generally become larger as group size becomes larger. Although the actual leave tree density will be fairly variable across the site depending on group size and spacing, the overall average density will meet the specified leave tree density of each prescription. Irregular thinning is also generally done in areas outside of regeneration areas in group selection and irregular shelterwood treatments. Another strategy for irregular thinning that is done in a few units is to divide the area to be irregularly thinned into ¼ to 2 acre sized groups and to irregularly thin each of these groups to a variety of densities ranging from 20 to 100 square feet of basal area per acre. Spacing within the groups themselves will also be irregular. This treatment will lead to a mosaic of different tree densities across the site.

### **Sanitation**

This treatment removes only dwarf mistletoe infected ponderosa pine without any thinning of mistletoe free pine.

### **Sanitation with Irregular Thinning**

The thinning treatment focuses on the removal of dwarf mistletoe infected trees and irregularly thins the rest of the site.

### **Irregular Shelterwood**

This treatment is proposed in sites with moderate to heavy mistletoe infection levels. It attempts to regenerate ponderosa pine on greater than 20% of the site by removing most or all of the mistletoe infected ponderosa pine in heavily infected areas. In these regeneration areas the objective is to develop new ponderosa pine that is free of mistletoe infections. Most vigorous noninfected pine will be retained as either a seed source or as a younger age class in these regeneration areas. In areas of the site that have no to lighter mistletoe infections, ponderosa pine will be irregularly thinned to a specified leave density. Most mistletoe infected pine will be removed from these areas also in order to protect surrounding regeneration areas from future mistletoe infection. Sites selected for this treatment generally have mistletoe infection levels that are too high to successfully manage as an uneven-aged site with the group selection treatments. The intent of this prescription is to retain some of the available uneven aged structure while developing a new age class of ponderosa pine over 25 to 70% of the site that is mostly mistletoe free. Over time and with future treatments these sites can be managed closer to the regulated uneven aged conditions specified in the forest plan.

### **Pre-commercial Thinning**

This is a non-commercial low thinning of ponderosa pine and sometimes juniper and oak in ponderosa pine cover types. Trees are generally thinned up to 9 to 12" in diameter, often with spacing of 20 to 30' between leave trees (even higher spacing may be specified on very poor nonproductive sites). Ponderosa pine that are mistletoe infected may be removed to a higher diameter than the specified maximum diameter for thinning for each site. Sites are non-commercial for timber harvest due to a variety of factors including low volume, steepness, poor access, isolation, and rockiness. This treatment is to increase stand vigor, increase stand growth, and to reduce risk of catastrophic wildfire. In the future as larger trees develop on these sites and value increases, commercial treatments may become feasible on many of these sites. At this time, group selection may be implemented to start moving these sites towards uneven aged management as specified in the forest plan.

### **Woodland Thinning**

This treatment accomplishes a low thinning in woodland areas (juniper woodlands, pinyon-juniper woodlands, oak woodlands, and hardwood sites). Juniper and/or ponderosa pine are thinned to a specified average spacing. Specified spacing may range from 25 to 50' between leave trees. Occasionally some oak may be thinned. Trees are thinned up to a specified diameter (generally from 9 to 14" diameter) above which all larger trees are retained. Dwarf mistletoe infected ponderosa pine may be removed to a larger diameter than the specified diameter for thinning.

### **Aspen Release**

This treatment will remove most conifers within aspen stands in order to release aspen from competition with conifers. Where aspen have severe damage and/or disease some aspen may be felled in order to stimulate new sprouting of aspen. Where aspen stands have good access, the entire aspen stand or a portion of the stand may be fenced in order to promote new aspen sprouts from elk browse and to protect larger aspen from damage from elk rubbing and scraping. Dead aspen and other species of snags that could fall on the fence will be removed in order to protect the fence. In aspen sites where all (or almost all) of the aspen have died, some planting of aspen may be done in combination with aspen fencing. Aspen planting stock will be selected from nearby sites of the same elevation. In more inaccessible aspen sites, conifers and dead aspen less than 10" in diameter will be felled and left in place in order to impede some elk access to the aspen and to give aspen sprouts some protection from elk browse. These felled trees will generally not be lopped in order to create as much of an obstruction to elk access as possible. Most of the aspen sites to be treated are shown on the proposed action map. There are a few scattered aspen sites that are very small (less than ¼ acre in size) and that were missed in the aspen site inventory that may also be treated with the treatments listed above.

### **Restoration Treatments**

These treatments attempt to move tree density and spatial orientation closer towards what was present prior to euro-American settlement of the area. Evidence of trees that existed around 1870 (fallen trees, stumps, yellow pine, stump holes) is used as a baseline for tree density and grouping. These treatments retain all living older trees that existed on the site prior to 1870. Generally pine and/or juniper are thinned back towards presettlement stocking levels. Oak is occasionally proposed for mechanical thinning but oak density control will usually be accomplished with repeat broadcast burning. Mistletoe infection is not as important a selection factor for tree removal for restoration treatments as it is for other vegetative treatments. This is because in restoration treatments the groups of pine are separated by larger open interspaces that are maintained over time. These open spaces isolate the mistletoe infections within individual groups of trees. This allows a greater number of large pine with mistletoe infections to be retained in restoration treatments than in other treatments.

#### Full Restoration to Pine Savannah

This treatment attempts to move ponderosa pine cover type sites very close to pre-settlement tree density and distribution. One to two post settlement trees will be retained per each evidence of a presettlement tree having existed on the site. All other post settlement trees will be removed. Generally, the largest, most fully crowned trees will be retained as leave trees but some vigorous younger trees will be retained in order to develop an open uneven-aged site. These treatments will reduce density of VSS 4 through 6 groups below minimum canopy cover specified in the forest plan for ponderosa pine cover types. These treatments will require a site-specific non-significant forest plan amendment.

#### Full Restoration to Woodland Savannah

This treatment is similar to the full restoration to pine savannah treatment except that it occurs in woodland sites (juniper woodlands, pinyon-juniper woodlands, oak woodlands, and hardwood sites). Juniper, ponderosa pine, and very occasionally some oak or pinyon pine will be thinned.

#### Partial Restoration to Pine Savannah

This treatment moves ponderosa pine cover type sites closer to pre-settlement tree density and distribution but it retains a higher density of post-settlement leave trees than pre-settlement evidence indicates would have existed in 1870. Leave tree stocking may be roughly based on pre-settlement evidence but tree group size will generally be greater than pre-settlement group size. A greater number of larger trees may also be retained than pre-settlement evidence would indicate having existed on the site. These treatments will sometimes reduce density of VSS 4 through 6 groups below minimum canopy cover specified in the forest plan for ponderosa pine cover types. These treatments will require a site-specific non-significant forest plan amendment.

#### Partial Restoration to Woodland Savannah

This treatment is similar to the partial restoration to pine savannah treatment except that it occurs in woodland sites (juniper woodlands, pinyon-juniper woodlands, oak woodlands, and hardwood sites).

#### Full Restoration to Meadow

This treatment is proposed in grassland sites that have been encroached upon by ponderosa pine and juniper over the last 130 years. One to two post settlement trees per presettlement evidence will be retained while all other post settlement trees are removed. The treatment objective is to return the site to a grassland or very open savannah.

### **Treatment Strategies Performed in Conjunction with Vegetative Treatments**

#### Cover Areas

These are areas within thinning units that are left unthinned in order to retain some important vegetative feature that is beneficial to various species of wildlife. These unthinned cover areas range from 1/20 to 1 acre in size and may be either scattered across sites or focused in certain portions of sites where their need is judged to be critical. Cover areas may be retained for various reasons. These reasons include: maintaining groups of trees with interlocking crowns for nesting and high canopy hiding cover; providing visual screening for concealment of different species of wildlife and low hiding cover; and providing shading and thermal cover. The Arizona Game and Fish Department identified many areas where hiding cover characteristics were desirable. When cover areas are located within areas identified for fireline preparation (see section on "Fireline Preparation"), additional clearing of trees will take place around the cover areas in order to create openings in the canopy. Cover areas in fireline preparation areas will be placed as far back from the control line as possible. Under the proposed action there will be 1,062 acres within the McCracken project area that will have scattered cover areas within areas proposed for vegetative treatments. In addition to this, under the proposed action there will be 1,735 acres within the McCracken area where large areas (2 to 250+ acres) with good wildlife cover characteristics will receive no vegetative treatment.

#### Wildlife Travel Corridors

Wildlife travel corridors were identified along major roads within the McCracken area by a unit manager for the Arizona Game and Fish Department. These corridors extend for several hundred to several thousand feet along the roadways in identified areas. The intent is to maintain higher densities of trees in these areas along the road and to provide some hiding cover for wildlife crossing the roads in these areas. Site prescriptions will generally maintain higher tree densities in these areas along the roads than that specified for the entire unit. Cover areas will also be utilized in some travel corridors to provide additional hiding cover.

#### Yellow Pine/Oak/Juniper Release

These treatments are done in conjunction with many of the thinning treatments. These treatments involve heavier thinning around yellow pine, large oak, and/or large juniper.

The objectives of this treatment are to increase large tree vigor and longevity. These treatments are meant to reduce the competition from surrounding younger trees with these large trees and also to reduce the fire ladder around these large trees in order to decrease the risk of mortality from crowning during wildfires/prescribed burning.

--- Yellow Pine release: Blackjack ponderosa pine up to a specified diameter are thinned heavily, down to 0 to 30 square feet basal area/acre, within 50 to 70' of individual yellow pine or yellow pine groups. Larger blackjacks and a few smaller blackjacks are retained in order to maintain an uneven-aged group of yellow pine over time.

--- Oak and/or Juniper Release: Ponderosa pine up to a specified diameter are cleared within 25 to 40' of large oak and/or juniper. Either individual trees or groups of trees may be released in this manner. Some vigorous younger oak and juniper may also be released in this manner in order to develop younger age classes of these trees. The number of oak, oak groups or juniper per acre to be released is often specified in the prescription.

#### Isolation of Mistletoe Infected Pine

This treatment is proposed in conjunction with many vegetative treatments where certain dwarf mistletoe infected ponderosa pine are retained (usually yellow pine or large blackjack ponderosa pine). All blackjack ponderosa pine up to a specified diameter are removed within 40 to 45' of the infected pine that is retained. This treatment is to isolate the infection and to slow its spread into the surrounding stand over time.

#### Daylighting

Lower tree densities will be retained in vegetative treatments within 100' of Forest Road (FR) 108, FR 122, and County Road 73. There are two objectives tied to this treatment. One is to create a firebreak along these roads. The second objective is to promote vehicle safety by reducing road shading and ice. This treatment may be modified to leave higher tree densities within identified wildlife travel corridors.

#### Fireline Preparation

Tree densities will be reduced to lower levels within 130' of the west side of County Road 73, the south side of FR 122, the south side of FR 140, along the eastern project boundary, and private property lines. The purpose of this treatment is to provide a fuel break to reduce the risk of escape during prescribed burning activities and to provide greater protection of private property. Most conifers less than 9" in diameter and up to 66% of conifers up to 14" in diameter would be removed in these areas. Where necessary, pruning of leave trees up to 15' in height may take place. All snags that could threaten the control line will be felled. This treatment will generally be accomplished either along with other specified vegetative treatments or by itself in areas adjacent to these roads, property lines, or project boundaries.

#### Oak Thinning

There are a very few sites where some thinning of oak is proposed. Objectives of thinning of oak on these sites include reducing fire risk from oak ladder fuels in the understory and increasing oak diameter development of residual oak stems. No oak

greater than 8” in diameter will be felled. In areas chosen for oak thinning, 50% of existing oak clumps will not be thinned. Vegetative data will be collected within sites with oak thinning prior to treatments. Monumented plots with photo points will be used. Monitoring will occur after treatments to assess the success in meeting treatment objectives. Generally oak density control of smaller oak will be accomplished by repeated prescribed burns. Larger oak will be protected from mortality during these burns using various burning and physical protection techniques.

#### Pre-commercial Thinning (Post Timber Sale)

Many commercial vegetative treatments will either be followed by, or done in conjunction with thinning and/or sanitation of smaller non-commercial trees. Approximately 8,223 acres that is proposed for commercial timber sale treatments will have pre-commercial thinning implemented either following or in conjunction with these commercial treatments.

#### Thinning Strategies in Woodland Sites and Sites with Woodland Species

In sites where juniper and/or other woodland species are proposed for removal, several strategies may be used for thinning these species:

- 1) Contract or force account felling of trees with chainsaws or shearing machines.
  - Treatment slash could be offered as personal use or commercial fuelwood. Treatment slash may be lopped and scattered, piled and burned, and/or broadcast burned.
- 2) Felling of trees with a commercial fuelwood sale or as personal use fuelwood.
  - A follow-up contract or force account tree felling would often be necessary in order to remove smaller trees not utilized for fuelwood.
  - Remaining treatment slash after fuelwood removal may be lopped and scattered, piled and burned, and/or broadcast burned.
- 3) Mulching or grinding of trees with mechanical tree mulcher.
  - Resulting mulch would be scattered to reduce excess accumulations. It would later be broadcast burned.
- 4) Treatment of trees with herbicides. Herbicides would be applied to specific trees and not broadcast sprayed.
  - Resulting dead trees would be left standing or felled at a later time.

Alligator juniper will send up new sprouts from buds around its base after cutting. This makes it difficult to maintain the desired lower densities of this species over time after cutting. Several strategies will be employed to reduce new sprouting. These include:

- 1) Piling thinning slash on stumps and burning. This strategy relies on a hotter burn to kill root collar buds.
- 2) Repeat broadcast burning.
- 3) Herbicide treatments applied directly to the stump after cutting.
- 4) Low grinding or pulling of stumps when machines are employed to mulch or fell alligator juniper.
- 5) Timing cutting of trees to times of the year when root reserves are low and the tree is most stressed.

#### Commercial versus Non-commercial Vegetative Treatments of Ponderosa Pine

During intensive reconnaissance of the McCracken area, an initial determination was made as to whether ponderosa pine can be treated commercially, i.e. with a timber sale, or if it must be treated non-commercially. This determination was based on site accessibility, logging operability, and economics. Upon further review during project implementation a few sites or portions of sites that were initially determined to be commercial may be found to be non-commercial. If this is the case, the treatment may be changed from a commercial treatment to a pre-commercial thinning.

#### Follow-up Mistletoe Treatments

Six to twenty years after initial vegetative treatments are completed in sites with mistletoe infections, further treatments may be required to insure that mistletoe treatment objectives are still being met. These treatments will fell or girdle mistletoe-infected trees that had latent mistletoe infections at the time of initial treatment or were missed during the initial treatment. All mistletoe-infected pine that were intentionally retained during the initial treatment, such as yellow pine, will still be retained during these follow-up treatments. It may also be necessary to maintain isolation of these infected trees by removing new ponderosa pine regeneration around them that has developed since the initial treatment. These follow-up treatments will be non-commercial.

#### General Vegetative Treatment Considerations

Vegetative treatments will retain all yellow pine\* as living trees. No yellow pine will be felled or have mortality induced with vegetative treatments. Some yellow pine may be lost during prescribed burning activities.

*\*Yellow pine are older ponderosa pine. They are older than 140 years old, plating of bark at their base is evident, and at least 40% of the bark on their bole has started to yellow.*

No trees, greater than 24" in diameter will be felled or have mortality induced with vegetative treatments within Mexican Spotted owl restricted habitat. Some trees, greater than 24" in diameter may be lost during prescribed burning activities.

No oak greater than 5" in diameter will be felled in Mexican Spotted owl target/threshold sites. Oak in target/threshold sites will be maintained at a minimum of 20 square feet of basal area per acre. No oak greater than 8" in diameter will be thinned anywhere.

No stand that simultaneously meets all Mexican spotted owl threshold conditions will be treated in such a way as to lower that stand below those conditions.

Thinnings proposed within Mexican spotted owl target/threshold sites or goshawk nest areas will be light and will retain higher densities of leave trees. No trees greater than 18" in diameter will be felled on these sites and generally most trees greater than 12" in diameter will be retained. No regeneration treatments are proposed for these sites.

All thinnings that are proposed within Mexican spotted owl target/threshold sites or goshawk nest areas will be light and will retain higher densities of leave trees. All thinnings within these sites will be non-commercial. Generally no trees greater than 12"



in diameter will be thinned. A few trees up to 16" in diameter may be removed around large oak within these sites in order to retain larger oak over time (see section on yellow pine/oak/juniper release). No more than 1 oak or oak group per acre will be released in this manner within these sites. Pine up to 18" in diameter will be removed within a 2 acre aspen site within a larger Goshawk nest area in order to release the aspen. No regeneration treatments are proposed for these sites.

In vegetative treatment prescriptions in ponderosa pine cover types (this excludes restoration treatments), VSS 5 and 6 groups will always be maintained at or above minimum canopy percentages specified in forest plan goshawk guidelines unless there are dwarf mistletoe-infected trees within the group. Very little thinning will occur in trees greater than 18" DBH within VSS 5 and 6 groups unless these trees have mistletoe infections. VSS 4 groups of trees will be maintained at or above minimum canopy closures specified in the forest plan unless they are surplus to specified forest plan distribution of VSS classes (greater than 60% of area is in VSS 4 through VSS 6 groups) or trees in these groups are infected with mistletoe. Surplus VSS 4 groups may be chosen as regeneration areas or they could be thinned to lower densities to more quickly develop into VSS 5 and 6 groups. When VSS 4 through 6 groups are infected with mistletoe it is often necessary to temporarily reduce group density below forest plan canopy percent minimums in order to develop the sites into sustainable, regulated uneven aged sites that meet the VSS distribution specified by the forest plan. Removal of mistletoe infected pine in the overstory is often needed to protect younger pine from getting infected from the overstory. When younger pine are infected from above, the infection will often overwhelm them and they will never develop into larger trees.

In areas that have had post-settlement fires (wildfires, prescribed burning) some of the presettlement evidence may have been lost. In restoration treatments where this has occurred and the leave stocking is based on presettlement evidence this must be taken into consideration. In these areas, depressions that could have been stump holes will be considered to be presettlement evidence. Also up to 50% additional trees will be retained to account for presettlement evidence that could have been lost.

After prescribed burning, the district wildlife biologist may determine that some areas have critical needs for additional downed logs for wildlife habitat. A few green trees may be felled in these areas and left lying on the ground in order to meet these needs. Trees selected for felling will be greater than 12" and less than 16" in diameter. No more than 3 trees per acre would be selected for felling.

### **Activity Slash Treatments**

Activity slash treatments would follow vegetative treatments and are intended to reduce the amount of woody debris created by the felling of trees, as well as treating pre-existing fuels. These treatments would reduce the immediate fire risk and prepare these areas for future prescribed burning in order to meet specified objectives.

Several types of treatments would be used to accomplish fuels reduction objectives and may include the following:

#### Whole Tree Yarding

This commercial harvest method leaves very little activity slash on site as the whole tree is taken to the landing where limbs and unmerchantable boles are piled for later burning.

#### Machine Piling

This method involves a bulldozer or grapple piling machine that moves ground fuels into large piles that would be burned in 18 to 24 months when the slash has dried. Most of the fuels to be piled would be generated by the proposed thinning or commercial harvest treatments. Some areas of existing natural fuels may also require piling.

#### Hand Piling

Slash that is created would be piled by hand. This type of treatment may be used in areas more sensitive to disturbance or areas with visual concerns. Piles would be burned in 18 to 24 months when the slash has dried.

#### Lopping

This type of treatment involves cutting and scattering slash, so that slash height is not more than two foot above the ground. Low slash heights lessen fire behavior and intensity, and make future prescribed burning more effective. The slash also dries out faster, decreasing the availability of bark beetle brooding sites.

#### Crushing

Heavy equipment is run over activity slash in order to reduce its total height and to partially mix it in with the upper layers of the soil. The slash mixed with the soil will be less flammable and will break down more quickly back into the soil.

Where it is feasible, there will be piling or removal of most activity slash in the following areas:

- 1 mile south and west of private property boundaries.
- ¼ mile north and east of private property boundaries.
- ½ mile from the northern and eastern McCracken project boundaries.
- ½ mile from forest roads 73 (in the ponderosa pine type only), 122, and 140.

Commercial vegetative treatments using timber sales will accomplish these slash treatments in the above areas by using whole tree skidding, machine piling, or hand piling during timber sale implementation. There may be some areas within the above areas that are too steep or rocky for whole tree skidding or machine piling. Here lopping or hand piling may be the only options available for activity slash treatment.

Non-commercial vegetative treatments accomplished by contract or with Forest Service crews in the above areas will require 50' activity slash pullback along the specified property boundaries, project boundaries, and roads during treatment implementation. Slash will be hand piled or removed from 50 to 200' from the above specified features. Further piling will be accomplished in the above areas as the budget allows with the highest priorities given to the areas closest to the specified features.

## **Prescribed Burning**

Prescribed underburning is proposed for the entire McCracken project area. Approximately 2,075 acres are proposed underburning only, without vegetative treatments. Both prescribed burning and vegetative treatments are proposed for the remainder of the project area.

The initial prescribed burn for areas proposed for both vegetative treatments and prescribed burning may be implemented either prior to or following vegetative treatments. The sequence of treatments is left open due to unknown future timber markets and unknown levels of future funding. This flexibility in the timing of treatments would allow the district to more easily adapt to changing markets and funding levels. This strategy, refined over time, will best utilize available funding and respond to changing situations while the project is being implemented.

Maintenance or re-entry burns would occur on a 3 to 7 year schedule following initial burning, and within a 20-year timeframe, in order to maintain an effective fuelbreak and further reduce the risk of stand-replacement wildfires. The original planning, or NEPA analysis (environmental assessment), would be re-evaluated to determine if there are any significant issues or changes to the project area for any re-entry or maintenance burning that is scheduled later than seven years after the initial project implementation date. If there are no significant issues and conditions are not markedly different, this re-evaluation would be documented and filed in the original project record and the maintenance burning could occur.

Prescribed burning would:

- Reduce fuel loadings on the forest floor and reduce fuel ladders by thinning smaller trees
- Stimulate the production and improve the distribution of grasses and forbs
- Aid in restoring the grass/forb nutrient recycling processes
- Reduce the risk of uncontrolled wildfires by effectively treating activity created slash and previously existing woody debris.
- Allow fire to move across the landscape for resource benefits.

## **Road System**

The existing forest road system within McCracken project area provides adequate access for proposed project activities. Where commercial sawtimber and roundwood are sold and hauled from the area on log trucks, roads being used to access commercial sites will be maintained and/or improved to reduce erosion problems. The value of trees that are sold would be applied toward road maintenance and improvements. Any temporary roads used to access timber would be obliterated after use. Also, any currently closed roads that may need to be re-opened would be closed after implementation. There would be increased log truck traffic on local area roads used to access timber.

## **Mitigation Measures**

Mitigation measures are measures that are taken to minimize potential negative impacts that may occur due to implementation of the proposed action. Mitigation measures are also developed to address concerns that might be raised about the proposed action. Further mitigation measures may be developed as more project input is received. Following are the mitigation measures developed for the proposed action, to date:

## **Range**

1. Coordinate with District range personnel well in advance of any treatments/activities.
2. Regardless of when treatments occur, operators will ensure that any range improvements (e.g., fences, cattle guards, waters) that get damaged are repaired in a timely manner.
3. Maintain the integrity of the three to four Parker 3-Step transects and certain pace transects that Range Staff identify as being critical. Protect whatever witness trees or posts may be on site at each transect and replace them if damaged or destroyed. Avoid (if possible) disturbing the angle iron marking transect routes. Notify the District Range Staff of any impacts to these sites.

### **Scenery Management and Recreation Resources**

The following mitigation measures will apply in foregrounds seen from sensitive roads (County Road 73, Forest Service Road (FSR) 108, FSR 122, and FSR 140), Forest Service system trails (Overland Trail), and wildlife viewing sites (Coleman Lake). These measures will also apply within additional areas of special visual concern that include concentrated use dispersed camping sites near Cougar Park, Barney Flat, Jackass Flat, the far east edge of Coleman Lake, and along portions of FSR 108, FSR 122, FSR 140, and County Road 73:

4. With the exception of heritage site marking, mark trees so that paint is not visible from the above listed sensitive roads, trails, and developed recreation sites or in view of private residences. Where possible, cover visible paint when no longer needed or after project is completed.
5. Flush-cut or low-cut stumps to less than 6 inches and at a low angle away from view up to 200 feet from sensitive roads, system trails, developed recreation sites, and private property boundaries. Cut stumps low (8 inches or less) 200 feet to 440 feet from sensitive roads, trails, and wildlife viewing locations.
6. Landings will not be located along County Road 73. Avoid locating landings on sensitive roads (FSR 108 and east end of FSR 122), near private property, or adjacent to Forest Service system trails (Overland Trail). Project managers will coordinate with District Recreation Specialist to locate landings required in sensitive foregrounds to avoid impacts to scenic and recreation resources on the aforementioned roads. Special consideration of landing areas will be evaluated around listed and mapped concentrated-use dispersed camping areas of special visual concern. Wherever possible, landings will be located on spur roads off of visually sensitive corridors and outside concentrated use dispersed camping areas, especially if whole tree skidding operations are used. Landings will be cleaned up and rehabilitated in the foregrounds of County Road 73, FSR122, and FSR108. Cull logs will not be left in the landing areas. To rehabilitate the landings, the area will be ripped, scarified, and/or mulched. Chips from cull logs are an acceptable mulching material.
7. In sensitive foregrounds, skid trails will be designated. Skid trails, fire control lines, and re-opened closed roads will be rehabilitated by backblading and scarifying. The creation of linear features that visitors will be tempted to drive on, and fire control lines that will be used repeatedly, will be ripped for 200 feet and closed with signs at the entrance from system roads to discourage traffic between burnings. Avoid ripping in rocky areas in sensitive foregrounds; if ripping is necessary in these rocky areas, follow up with raking smooth and seeding.

8. Operating machinery on and across the Overland Road Historic Trail will occur at designated crossings. Project related damage to trail tread, signs, or cairns will be repaired and the trail restored to original condition immediately after machine operations are completed to protect the trail investment and keep the trail open for public use. Trail markers and cairns will be marked for avoidance for mechanized operations.
9. In foreground areas seen from sensitive viewing locations described above, complete intermediate slash treatments (piling, lop and scatter) within one year, and complete slash burning as soon as operationally feasible. Attempt to complete burning within two years.

The preferred method of slash treatment immediately adjacent to sensitive roads, Forest Service system trails, and recreation sites, is to handpile the first 100 feet in seen areas. Whole tree skidding operations will remove the slash.

Mitigations for machine piling in areas seen from any of the above mentioned sensitive viewing locations will include:

- a. If whole tree skidding is not used, slash will be pushed back for the first 200 feet; piles can be placed starting at 200 feet. Landings for whole tree skidding operations will be at least 200 feet from sensitive viewing locations mentioned above. Pushing back slash piles, but not less than 300 feet from sensitive locations mentioned on the map of concentrated-use dispersed camping sites of special visual concern.
- b. Restore soil disturbance created by machines in the first 100 feet after piling operations are completed.
- c. After machine pile burning, rehabilitate highly visible negative elements (piled rocks/dirt, remaining burned/unburned wood chunks) at pile locations within 300 feet of sensitive road corridors, such as breaking up piles of pushed rocks and dirt, and scattering remaining concentrations of partially burned wood.

Mitigations for lopping and scattering in above mentioned sensitive areas include:

- a. Scatter lopped material back to a 50 feet minimum from sensitive roads and Forest Service system trails.
- b. Lop slash to a 12 inch height between 50 and 200 feet from sensitive areas. Between 200 and 440 feet lop to 18" and beyond 440 feet lop to 24" inches.

For areas that fall into ROS classification of Semi-Primitive Motorized (SPM), only pre-commercial thinning/commercial fuelwood/logging units will be located along major roadways (County Road 73, FSR 108). If lopping of activity slash is done within this area, activity slash will be pulled back for at least the first 50 feet from the road. Slash from 50 feet to 300 feet will be lopped and scattered down to 12-18 inches. Beyond 300 feet, slash will be lopped and scattered to 24 inches. Piling of activity slash is also acceptable within this area but machine piles must be placed a minimum of 200' from the specified roads and hand piles must be a minimum of 100' from these roads. Personal use fuelwood units will not be located along visually sensitive corridors, but may be located 300 feet from the corridors.

Temporary roads created for achieving resource objectives inside of the SPM classification will be decommissioned when work is completed. Roads will be effectively closed at entrance/exit points, and surface will be scarified, seeded with native species, and mulched (slash material is an acceptable mulch) to promote re-vegetation.

10. Daylight/Fuelbreak areas located along sensitive corridors will have an irregular shape. Small clumps of trees that are completely isolated from the crowns of other stands of trees will be left inside of the daylight/fuelbreak areas in order to break up the pattern. The daylight/fuelbreak areas will be shaped to an irregular pattern, will be blended into the landscape, and will not be of uniform width down the length of sensitive travel corridors.

### **Sensitive Plants**

11. Known populations of sensitive species will be flagged and withdrawn from treatment if analysis shows that the species will be negatively impacted by the treatment.
12. If populations of any sensitive species are found before or during project implementation, the project manager will coordinate with the district sensitive plant coordinator in order to restrict negative impacts.
13. Proposed locations of landings, skid trails, temporary roads, and slash piles will be surveyed for sensitive plants before construction begins, if there are known populations of sensitive plants in the area.
14. If piling is proposed, all slash will be hand piled, instead of machine piled, when located in areas with known populations of sensitive plants that have highly erodible soils.
15. No use of bulldozers off roads to clear trees and slash in areas with populations of sensitive plants.
16. Do not seed near populations of sensitive plants after thinning or burning, in order to prevent the introduction of invasive species and to prevent attracting wild ungulates and livestock to the area.

### **Wildlife**

17. Slash piles will not be created along a 200 foot-wide area centered along the documented pronghorn antelope migration route.
18. Allow no tree cutting activities or heavy equipment use (e.g., tractor piling) within established goshawk nest areas and Post-Fledging Family Areas (PFAs) between March 1 and September 30 unless the South Zone wildlife biologist determines that such activity is unlikely to impact goshawk reproductive success.
19. If an active goshawk nest is found outside of a previously established goshawk nest area after the Decision Notice has been signed, silviculture, timber, and wildlife staff will coordinate to ensure that the proposed action and silvicultural prescriptions, as well as any existing thinning or timber sale contracts, are consistent with Forest Plan goshawk standards and guidelines.
20. Incorporate measures into the project burn plan to minimize prescribed fire loss of the following key wildlife habitat features:
  - yellow pines
  - other large-diameter ponderosa pines (>24" dbh),
  - large-diameter snags (>18" dbh),
  - live or dead trees with cavities,

- cover areas (cover areas are described in the Vegetative Treatments section),
- large oaks (>10" diameter at root collar),
- large logs (>12" diameter at midpoint and >8' long).

Potential measures to minimize loss of these key habitat features include 1) specification of burning prescription parameters designed to achieve low to moderate burn intensities, 2) avoidance of direct ignition within 10' of key habitat features, 3) reducing accumulations of fine fuels around key habitat features where practical, and 4) adjusting ignition techniques and patterns to minimize fire impacts in areas where key habitat features occur or are concentrated.

### Heritage

21. Because the fuels treatments will take place over a 10 year period, prior to any project implementation, managers must consult with heritage staff to determine sites that need to be flagged for avoidance.
22. If project managers propose ground disturbing activities in unsurveyed areas, archaeologists will need funding to conduct additional survey and consultations with the State Historic Preservation Office (SHPO).
23. An archaeologist must be present at fuels reduction projects pre-implementation tailgate safety meetings to discuss site avoidance measures.
24. During all phases of project implementation, heavy equipment must avoid all known eligible or unevaluated heritage resource sites.
25. If any previously unrecorded heritage resources are discovered during project implementation, all project related activities will cease immediately and the consultation process as outlined in Section 800.13 of the Advisory Council on Historic Preservation's regulations 36 CFR Part 800 must be initiated.

The recommended site protection measures for specific types of proposed methods of fuels reduction are as follows:

26. ***Pre-commercial Thinning, Roundwood, and Sawtimber Thinning:*** These activities are limited to non-mechanized vegetation treatments, with timber crews only hand-felling trees. According to the recently signed programmatic agreement between the Advisory Council, the Forest Service Region 3 and the New Mexico, Arizona, Texas, and Oklahoma SHPOs (USDA 2004), these activities "have predictable effects and a very low likelihood of affecting historic properties." If known historic properties are within these types of project areas, the sites should be flagged, and then the fuels can be treated by hand within the site boundaries, but should be hand carried and piled outside of site boundaries.
27. ***Mechanical Timber Harvesting:*** Mechanical harvesting may only occur in previously surveyed areas. These treatments are conducted with a variety of heavy machinery including feller bunchers, wood processors, forwarders, loaders, and skidders. Landings are also created for short term storage of harvested timber. Bulldozers and graders are also used for road work.

Prior to any proposed commercial or non-commercial harvesting project, managers must consult with heritage specialists to ensure that these projects take place in previously surveyed areas. In addition, the harvest of pulpwood or other merchantable wood

products with the use of mechanical equipment **must not occur** on any known eligible or unevaluated sites. Therefore, all known sites will be flagged for avoidance.

To insure sites are avoided, the project manager should arrange for an archaeologist to flag all known eligible or unevaluated sites within the project boundaries. Also for an archaeologist to meet with the project managers and operators know how to distinguish the areas to be avoided, and who to contact in the event of a last minute project design change or if a previously unrecorded site is uncovered due to the project activities.

28. ***Underburning:*** These treatments consist of fuels specialists carrying drip torches to conduct underburns. Project and fire managers will need to arrange to have all fire sensitive sites flagged for avoidance, and **consult with the archaeologists prior to implementing burn activities to ensure that on-site fuels are such that they will not burn with prolonged or extreme heat.** If necessary, excess fuels will need to be removed from sites by hand prior to burning. The prehistoric sites with no combustible materials existing on the surface will suffer no adverse effects from fire.
29. ***Mechanical and Hand Piling:*** After timber treatments, fuels specialists will pile timber either by hand or with bulldozers. Project manager should arrange to have all eligible or unevaluated heritage resource sites flagged for avoidance, and all wood piling and heavy machinery activities are to be conducted outside of site boundaries, except for sites that are bisected by Forest Service roads. In those cases, all activities will be confined to the road prisms.
30. ***Fireline Construction:*** All planned firelines must avoid known heritage resource sites. Planned firelines constructed with bulldozers can occur within previously surveyed areas where known sites have been flagged for avoidance by the archaeologist. If lines are proposed to be constructed in areas that have not been evaluated by archaeologists, these areas will require additional survey prior to fireline construction. In the event that emergency dozer firelines are warranted, fire managers must contact the Forest Archaeologist immediately so that site avoidance and mitigation measures can be devised and employed as needed.
31. ***Road Maintenance / Construction:*** Engineers use road graders to conduct routine road maintenance activities within existing road prisms and features. No protective or mitigation measures are required in areas that have undergone previous surveys and *where no heritage resource sites are known to exist.* New road construction may occur only in previously surveyed areas that contain no eligible or unevaluated sites. If new roads are proposed in unsurveyed areas, the project area must first be surveyed for heritage resources and an amendment to the project clearance drafted. Project managers will need to consult archaeologists while developing their proposal to determine which of the above recommendations will be needed to implement their road projects.
32. In the event that a method of fuels reduction is proposed that is not covered in the above mitigations, or a proposed project is altered or changed after archaeologists have conducted the evaluations, additional review by the Forest Archaeologist will be required and additional consultation may be needed with SHPO and the tribes depending on the proposed changes.

### **Vegetative**

33. During the implementation of non-commercial thinning treatments, activity slash will be kept to a minimum around the base of yellow pine, large oak, and large juniper to reduce



the risk of tree mortality during prescribed burning, wildland fire use or wildfires. This will be accomplished by felling trees away from these trees to be protected. Additional pullback of activity slash around these large trees will be required where it is determined necessary to protect these trees from significant loss during burning. This could include canyons with significant numbers of yellow pine stringers and areas where thinning will create a large amount of activity slash around larger trees.

### **Soil and Watershed Best Management Practices**

Best Management Practices (BMP's) are "a practice or a combination of practices, that is determined by a State (or designated area-wide planning agency) after problem assessment, examination of alternative practices and appropriate public participation to be the most effective, practicable (including technological, economic, and institutional considerations) means of preventing or reducing the amount of pollution generated by nonpoint sources to a level compatible with water quality goals" (Guidelines for using Best Management Practices, FSH 2509.22). Authority and guidance to prescribe and implement BMP's is defined in FSM 2501, 2530, FSH 2509.22 and the Forest Plan.

#### **24.11 - Use of Terrestrial Ecosystem Survey Timber Harvest Limitation Rating**

1. Objective. To identify severe and moderate erosion hazard areas and other soil limitations in order to adjust treatment measures to prevent downstream water quality degradation. About 30% of the McCracken project area consists of soils rated moderate or severe for erosion hazard. This rating is primarily a function of slope. The Kaibab National Forest Terrestrial Ecosystem Survey (TES) handbook suggests guidelines for maintaining soil surface cover:

- For slopes 0-15%, retain at least 20% vegetative cover
- For slopes 15-40%, retain at least 50% vegetative cover
- For slopes greater than 40%, retain at least 55% cover.

Tractor logging will not be permitted on slopes that exceed 40 percent. Field layout of commercial harvest units will consider the sensitivity of soils with a severe erosion hazard (e.g. Map Units 407 and 525). Slope and the capability of contemporary harvest equipment to operate without damaging soil productivity or creating accelerated soil erosion will be emphasized in these areas.

#### **24.13 - Limiting the Operating Period of Timber Sale Activities**

1. Objective. To ensure that the Purchaser conducts operations, including but not limited to erosion control work, road maintenance, and log landing drainage in a timely manner, within the time period specified in the Timber Sale Contract.

A Plan of Operation provision is required in all Timber Sale Contracts. This provision states that the Purchaser must submit a general plan of operation which will set forth planned periods for and methods of road construction, timber harvesting, completion of slash disposal, erosion control work, and other contractual requirements. Forest Service written approval of the Plan of Operation is a prerequisite to the commencement of the Purchaser's

operation. Contract provisions can be used to suspend operations because of wet or saturated soils in order to protect soil and water resources.

#### 24.16 - Protection of stream courses and other sensitive areas.

1. Objective. Protect ephemeral and intermittent streams, wet areas, meadows, riparian areas, or any area that has the hydrological characteristics of carrying water on or near the surface and that the delivery of sediments to this area can affect water quality.
  - 1) All significant springs, wetlands and wet meadows will be designated on the sale area map and protected from mechanized equipment (all of Map Unit 20, Coleman Lake, and wet meadows along drainages in Map Unit 6). In those areas where meadow restoration is prescribed, merchantable trees may be retrieved on designated skid trails.
  - 2) Appropriate ephemeral and intermittent streams will be designated on the sale area map for protection under the timber sale contract. Machine piling, roads and landings will be restricted, skidding will occur at designate stream crossings.
  - 3) In meadow restoration treatments, tree thinning or removal of trees will be allowed by hand or by use of whole tree removal equipment on designated skid trails.

#### 24.18 - Tractor Skidding Location and Design

1. Objective. To minimize erosion and sedimentation by designing skidding patterns to best fit the terrain. Proper skid pattern management involves such things as falling to a lead, locating skid trails to avoid stream courses and generally confining skidders to designated trails. Currently, most harvest operations employ feller/buncher equipment to cut and stack trees for forwarding to the log landing. In most cases, this is sufficient to define the skid pattern and meet the intent of 24.18. The Sale Administrator retains discretion in approving skid trail location if necessary.

#### 24.21 - Erosion Prevention and Control Measures During Timber Sale Operations

1. Objective. To ensure that the Purchaser's operations shall be conducted reasonably to minimize soil erosion.

Equipment shall not be operated when soil conditions are such that excessive compaction, rutting or accelerated soil erosion will result. The kinds and intensity of control work required of the Purchaser shall be adjusted to soil and weather conditions and the need for controlling runoff. Erosion control work shall be kept current immediately preceding expected seasonal periods of precipitation or runoff.

#### 24.3 - Slash Treatment in Sensitive Areas

1. Objective. To comply with Federal and state water quality standards by protecting sensitive areas from degradation which would result from using mechanized equipment for slash disposal. Protected stream courses will be designated on the sale area map. Disturbance from mechanical equipment will be minimal within 100' on either side of the protected stream course.

### 31.11 - Prescribed Fire and pile burn areas

1. Objective. Provide for water and soil resource protection while achieving management objectives through the use of prescribed fire.

- 1) Manage for low to moderate fire intensity in order to preserve some vegetation and litter cover and prevent the development of a water repellent soil layer.
- 2) Develop and implement burn plan that will protect soil cover on Map Unit 407 (e.g. McCracken Knolls, Kunde Knoll, Coleman Knoll, and Barney Knoll). The objective of the plan is to create a low intensity, mosaic pattern burn that will preserve adequate ground cover,
- 3) If funding is available, rip and rake significant burn pile areas and seed with native plants. It may be necessary to spread mulch and to inoculate the soil with arbuscular mycorrhizae in order to promote germination and survival of native plants. Mycorrhizae and native seed may be obtained from a supplier, by collecting seed, or by spreading a layer of topsoil scooped from a nearby area with good grass cover. These measures are necessary to prevent soil erosion and colonization by noxious weeds such as Dalmatian toadflax. (Reference: "Managing Coarse Woody Debris in Fire-adapted Southwestern Forests", Working Paper 21, Northern Arizona University Ecological Restoration Institute, January 2008)

### **Noxious Weeds Best Management Practices**

#### **All Site-Disturbing Projects**

2.1 -- Before ground disturbing activities begin, inventory and prioritize treatment of invasive weeds in project operating areas and along access routes. Control weeds as necessary.

2.2 -- Plan operating areas and access routes to avoid heavy infestation areas, plan closure of access routes at finish of project, and/or begin project operations in uninfested areas before operating in weed infested areas. Locate and use weed free project staging areas. Avoid or minimize all types of travel through weed infested areas, or restrict to those periods when spread of seed or propagules are least likely.

2.3 -- Remove mud, dirt, and plant parts from project equipment before moving it into a project area. This practice does not apply to service vehicles traveling frequently in and out of the project area that will remain on a clean roadway. Seeds and plant parts need to be collected when practical and incinerated.

2.4 -- If operating in areas infested with weeds, clean all equipment before leaving the project site. Seeds and plant parts need to be collected when practical and incinerated.

2.5 -- Workers need to inspect, remove, and properly dispose of weed seed and plant parts found on their clothing and equipment after being trained to recognize the priority species in the area. Proper disposal means bagging the seeds and plant parts and incinerating them.

3.1 -- Inspect material sources (e.g. sand, gravel, fill dirt) on site annually, and ensure that they are weed free before use and transport.

4.1 -- Minimize soil disturbance to the extent practical, consistent with project objectives.

4.2 -- In those vegetation types that have relatively closed canopies as a natural condition, retain shade to the maximum extent possible to suppress weeds and prevent their establishment and growth in and around project activity.

5.1 -- Treat disturbed soil in a manner that optimizes native plant establishment for that specific site.

5.2 -- Revegetation may include topsoil replacement, native seedbank promotion, planting, seeding, fertilization, and/or weed seed free mulching as necessary. Use local native material where appropriate and feasible (or specifically identify why not used). Always use certified weed free and weed seed free hay or straw. Where practical, stockpile weed seed free topsoil from the project area and replace it on disturbed areas (e.g. road embankments, staging areas, wash stations, or landings.)

5.3 -- Use local seeding guidelines to determine detailed procedures and appropriate mixes. To avoid weed contamination, a certified seed laboratory needs to test each lot against the all-State noxious weed list to Association of Seed Technologists and Analysts (AOSTA) standards, and provide documentation of the seed inspection test. Seed lots labeled as certified weed seed free at time of sale may still contain some weed seed contamination.

5.4 -- Monitor and document all limited term ground disturbing operations near weed infested areas for at least five growing seasons, or the documented seed viability for the species of concern following completion of the project.

5.5 -- Evaluate options, including closure, to minimize future infestations on sites where desired vegetation needs to be established.

### **Fire Management Projects: Prescribed Fire**

4.1 -- Pre-inventory project area and evaluate weeds present with regard to the effects on the weed spread relative to the fire prescription. Remove weeds (live plants and seed sources) before project initiation.

4.2 -- Plan to avoid or remove existing sources of weed seed and propagules. Avoid ignition and burning in areas at high risk for weed establishment or spread due to burn aftereffects. Treat weeds that establish or spread because of unplanned burning of weed infestations.

4.3 -- Burn non-infested areas first before entering weed infested sections of the burn. Clean all equipment when project is completed.

5.1 -- Time burns to promote native species and to hinder weed species germination.

### **Lands Stewardship Projects: Vegetation Management**

1.1 -- Treat weeds on contracted projects, emphasizing treatment of weed infestations on existing landings and skid trails before activities commence.

1.2 -- Train contract administrators to identify weeds and select lower risk sites for landings and skid trails.

1.4 -- Use standard timber sale contract clauses such as WO-CCT 6.36 to ensure appropriate equipment cleaning.

2.1 -- Minimize soil disturbance to no more than needed to meet project objectives. Logging practices to reduce soil disturbance include, but are not limited to: over-snow logging, reuse landings and skid trails when they are weed free.

3.1 -- Minimize soil disturbance to no more than needed to meet vegetation management objectives. Prevention practices to reduce soil disturbance include, but are not limited to: Minimizing heat transfer to soil in burning by:

- Treating fuels in place (broadcast burning) instead of piling
- Using small, tall steep piles
- Minimizing fireline construction

Minimizing soil disturbance by logging techniques:

- Preference for forwarders that carry logs, rather than skidders that drag logs
- Using hand fellers instead of machines
- Using hand piling rather than machine piling
- Using low PSI (impact) equipment (big tires)

4.1 -- Recognize the need for prompt growth of native vegetation, long term restoration and weed suppression where forested vegetation management has created openings.

-- After burning slash piles, if funding is available, rip and rake the soil and seed with native plants. It may be necessary to spread mulch and to inoculate the soil with arbuscular mycorrhizae in order to promote germination and survival of native plants. Mycorrhizae and native seed may be obtained from a supplier, by collecting seed, or by spreading a layer of topsoil scooped from a nearby area with good grass cover. These measures are necessary to prevent soil erosion and colonization by noxious weeds such as Dalmatian toadflax. (Reference: "Managing Coarse Woody Debris in Fire-adapted Southwestern Forests", Working Paper 21, Northern Arizona University Ecological Restoration Institute, January 2008)

4.2 -- Allow natural seedbank to provide vegetation if possible, next preference is for native seed grown from local collections. All seed must be certified weed seed free for all species on the forest noxious or invasive weed list.

### **Land Stewardship Projects: Range Management**

3.2 -- Manage livestock grazing on restoration areas to ensure that vegetation is well established. This may involve exclusion for a period of time consistent with site objectives and conditions. Consider practices to minimize wildlife grazing on the areas if needed.

### **Engineering/Roads/Minerals Projects**

2.2 -- Schedule and coordinate all earth moving or soil disturbing activities (such as pulling of invasive weed infested roadsides or ditches) in consultation with the local weed specialist. Do not blade or pull roadsides and ditches that are infested with weeds unless doing so is required for public safety or protection of the roadway. If the ditch must be pulled, ensure the weeds remain onsite. Blade from least infested to most infested areas. When it is necessary to blade weed infested roadsides or ditches, schedule the activity when seeds or propagules are least likely to be viable and spread. Minimize soil surface disturbance and contain bladed material on the infested site.

3.3 -- Avoid acquiring water for dust abatement from weed infested areas.

3.6 -- Treat weeds in road decommissioning and reclamation projects before roads are made impassable.