Attachment 1 – Large Tree Management

Vegetation treatments in the Proposed Action are designed to focus primarily on the thinning of small diameter trees to meet the Purpose and Need for Action. The Proposed Action was designed to best balance the need for reducing fuels and restoring forest health, which includes protecting wildlife and their habitat, meadows and grasslands, and watershed function. A healthy, large tree population is an essential component of a healthy forest. To preserve the existing mature forest component, no yellow-barked pines will be thinned.

While the Forest Service is not purposely targeting the removal of any large trees, it recognizes the need to remove some large trees to manage for overall forest health in a sustained manner, not just the health of the current large tree component. Thinning smaller trees can achieve fuel reduction objectives, yet there are situations where the removal of large trees may need to occur to meet other forest structure needs and Forest Plan direction. Project goals and objectives are described in Eastside Project Need for Change Report (January 2006). This analysis should be reviewed in tandem with the Proposed Action to gain a better understanding of vegetative characteristics in the project area.

While the Proposed Action describes treatment methods and post-treatment forest structure values, it does not detail the management of individual trees. Trees selected for retention and removal—including large trees—will be determined by silviculturists in the field on a site-specific basis. The Proposed Action and this document do not show the actual numbers of large trees retained or removed, but they can provide the context in which large tree removal would occur to meet resource needs. Although the criteria listed in the following sections provide an ecologically justified rationale for why trees may be removed, it is also important to focus on the large tree component that will remain in the project area after treatment.

Process and History

Early in the development of the Mountainaire HFRA project (July 2005), the Forest Service and GFFP met to discuss large tree definitions, site specificity of large tree management, rationale for the retention and removal of large trees, and diameter caps. Subsequent large tree discussions were held within project interdisciplinary (ID) team meetings that were scheduled throughout late summer and fall. In these ID team meetings, Forest Service and GFFP members developed desired future condition statements, treatment timeframes, and possible management practices. Large tree management concerns were discussed at these meetings and during subsequent GFFP Project Team field trips. Forest Service silviculturists provided in depth concerns about large tree management during numerous ID team meetings. Resulting dialog of large tree management concerns for the Mountainaire project was captured in meetings and discussions for the Eastside Project as well.

The Forest Service collaboratively developed the Purpose and Need for Action and Proposed Action with GFFP during the winter of 2005-6. A final Large Tree Management document that will accompany the Environmental Assessment will include preliminary model spreadsheets for some forested stands, sample stand simulations displaying differences in forest structure with and without a diameter limit, and fuel model assumptions used in the analysis.

Large Tree Definition

While the current GFFP policy (December 2004) regarding large tree management does not specify a size threshold in describing large trees, this analysis (based on numerous discussions with GFFP) defines large trees as 16 inches diameter at breast height (DBH) or larger for

ponderosa pine for this project. Although definition by diameter helps provide a visual image of large trees, tree diameter is only one way to measure the ecological value of a given tree.

Forest Stand Data

The project's vegetation and stand data are derived from stand exams performed by the Forest Service prior to project planning. A stand is a delineated area of land that contains a plant community that is generally uniform in cover type, age and size class, and is distinguishable from adjacent plant communities. Field crews collected detailed information at a number of points across stands. The number of points varied according to stand size, structural characteristics, and level of intensity designated for the project. The collected data was then extrapolated to best estimate current vegetative characteristics (trees per acre, tree size, etc.) for entire stands. This modeling of stand characteristics is derived from computer modeling programs. While this information is sufficiently accurate to provide general stand characteristics, it does not detail actual numbers or placement of trees within stands.

Because this data is averaged per stand and stem maps or verified data for individual trees do not exist, actual numbers of trees—including large trees—that would be retained or removed cannot be detailed in an environmental analysis. Rather, estimates would based on modeling and provide a context for the relative numbers of trees to be removed depending on proposed vegetative treatments and desired post-treatment values such as canopy cover percentages. As prescriptions are implemented and trees are marked for removal, actual numbers and sizes of trees targeted for removal can be assessed.

Simulations

The Forest Service will run preliminary estimates of the number of trees removed using stand data and predicted stand conditions after treatment with the Forest Vegetation Simulator (FVS) program. The FVS program can model stand characteristics before and after treatment and into the future. This program, however, cannot model the creation of openings or estimate the numbers of large trees removed to create these openings. While the Forest Service predicts that few large trees would be removed under this project, it is difficult to predict actual numbers due to the inherent variability of stand structure.

Rationale and Criteria for Removal of Large Trees

The following sections describe situations where large trees could be removed to meet project goals and objectives. While the following criteria are listed individually, they are all components of a healthy forest. All of these situations are directly linked to the goal of forest restoration listed in the Purpose and Need for Action, as well as the Need for Change Report. Often, more than one of these conditions exists in a treatment area where removal of a large tree may satisfy a number of these criteria.

The number of large trees that could be removed varies by stand and is highly dependent upon current forest structure. For example, some stands may exhibit a forest structure where large trees are aggregated in clumps or groups. Other areas may have an evenly spaced and distributed population of large trees. The creation of openings would most likely require fewer large trees to be removed in the first scenario compared to the second.

Where possible, criteria were written to further define how forest structure would remain on the ground after treatment.

Creation of Openings and Natural Regeneration Areas

Historically, ponderosa pine forests in northern Arizona were characterized by frequent, low-intensity surface fires occurring every 3 to 15 years. The historic fire regime maintained an open canopy structure and a variable, patchy tree distribution (Moir et al 1997, Covington et al 1997). Desired future conditions for the project area include openings within forested stands that recreate a more open stand structure, increase horizontal heterogeneity and understory productivity, decrease fire hazard, and improve wildlife habitat for northern goshawk, antelope, turkey, and several edge species. Openings also provide areas where natural regeneration can occur. The Proposed Action includes the creation of new or the enhancement of existing openings within at least 20% of the project area to meet Forest Plan direction for Vegetative Structural Stage (VSS) classes. Openings would range in size from ¼ to 4 acres[1].

Criteria for the creation of openings include the following (not in order of priority):

- Create openings in northwest-southeast directional patterns to provide fuelbreaks.
- Avoid rocky soils
- Utilize and enhance existing openings
- Utilize areas with dwarf mistletoe infection
- Utilize areas with bug kill trees
- Utilize areas that lack pre-settlement evidences
- Avoid areas with New Mexico locust populations
- Enhance spaces between oaks and yellow pines
- Avoid uninfected 14-18 inch black jacks where possible
- Emphasize VSS 3 (5-12” DBH) areas

A Sustainable, Uneven-Aged Forest Structure

A forest structure that consists solely of trees greater than 16 inches DBH would not contain sufficient age diversity. Without regeneration, stand structure would not persist over time. Even-aged forest structures are only self-sustaining through stand-replacing events, such as catastrophic crown fire, which is not desirable within the project area, or through management actions that mimic stand replacing events such as clearcutting. Additionally, certain insects favor trees in certain diameter classes (DeMars and Roettgering 2003). As a forest becomes denser, it becomes less resistant to bark beetle infestation. Insects are attracted to trees under stress from lack of resources (water, nutrients, light) due to vegetative competition. An uneven-aged structure with lower tree densities would be less susceptible to landscape-scale insect attack and mortality (USDA Forest Service 2002, Long 2003, Amman et al 2003) and promote understory diversity. Proposed vegetative treatments would create openings and clump or group trees where possible to emphasize this diverse forest structure.

Increased Vigor, Longevity, and Development of Old, Yellow Ponderosa Pine

Ponderosa pine trees begin to turn yellow at approximately 150 years of age. Due to the current dense forest structure, some yellow pines have smaller diameters than normally associated with old, yellow trees due decreased growth rates from competition among trees for light, nutrients, and water. Thinning black-barked pine trees around the drip line of yellow pines will decrease competition among trees, increase yellow pine vigor and longevity, decrease susceptibility to

[1] Seedling and saplings areas (Vegetative Structural Stage 1 and 2 classes) are currently lacking in the project area. Forest Plan direction for the northern goshawk calls for 10% distribution in each of the VSS 1 and VSS 2 classes.

successful bark beetle attack, and decrease the risk of mortality due to crown fire (Stone et al 1999, Kolb et al 2001, Wallin et al 2004).

Decreased Dwarf Mistletoe Infection

Dwarf mistletoe (Arceuthobium vaginatum subsp. cryptopodum) is a parasitic plant that infects ponderosa pine. Infection is spread via pressure-released seeds and expands at a rate of 1-2 feet per year (Conklin 2000). Dwarf mistletoe (DM) is considered a tree pathogen because infection results in reduced tree growth, reduced tree vigor, branch deformations, and shortened life span of the infected host. Additionally, in comparison to uninfected trees, trees infected with DM are more susceptible to bark beetle attack and are also more flammable due to the accumulation of resin and branch deformations (Conklin 2000). Since Euro-American settlement and the advent of fire suppression, DM populations in the southwest are thought to have increased with increased forest densities (Conklin 2000). A more open, park-like forest structure would have limited the spread of DM infection.

Retaining infected trees in the overstory could spread infection to smaller trees in the understory. For example, a stand may contain a 16-inch DBH black-barked pine tree infected with dwarf mistletoe and a 14-inch DBH pine tree free from infection. In this case, the larger tree would be removed and the smaller tree would be retained. If, however, the infected tree is a yellow pine or group of yellow pines, then a 1 chain (66 feet) buffer would be cut around the tree or group to prevent the spread of infection. Infected yellow pines would be retained because of their rarity in the project area and because they provide good habitat as snags or nesting areas for wildlife species.

To decrease (not eliminate) the incidence and spread of dwarf mistletoe infection within the project area, a limited number of infected, overstory large trees may be removed.

Increased Growth, Vigor, and Longevity of Gambel Oak

Due to past harvesting of Gambel oak, both legally and illegally, large oak trees (greater than 10 inches diameter at root collar) are rare within the project area. One objective of the project is to increase the productivity and age class diversity of Gambel oak. A desired future condition is to contain more larger oaks within the project area. Thinning of ponderosa pine around clumps of Gambel oak (oak stems greater than 5 inches DRC) would reduce competition between pine and oaks for moisture, nutrients, and sunlight. Reduced competition for these resources will increase tree vigor, growth, and longevity.

Attachment 2 – Community Wildfire Protection Plan Direction

The development of the Community Wildfire Protection Plan (CWPP) for Flagstaff and Surrounding Communities (January 2005) was coordinated by GFFP and Ponderosa Fire Advisory Council. This plan is a collaborative planning and implementation tool that helps mitigate immediate fire hazards to communities at risk and restore fire-adapted ponderosa pine forests in the area. It provides a broad operating framework for treatment within the area.

According to the CWPP, the immediate, but not exclusive, focus is on protecting communities. Restoration efforts would be directed toward protecting and promoting development of old growth and large trees, but not at the expense of providing adequate fire protection to communities at risk.

Desired future conditions for the area as described in the CWPP includes:

> Actions and treatments will leave both the landscape and at-risk communities resistant to catastrophic fire. Ponderosa pine stands will generally range from 30-100 larger-diameter trees/acre and/or basal area of 40-80/acre, be found in groups in varying degrees of interlocking canopy, and be separated by openings of various sizes. This pattern of tree clumps and openings will be variable and provide for a diverse, rich, robust, and healthy ecosystem that supports a variety of butterflies, songbirds, mycorrhizae, carabib beetles, pollinators, grasses, flowers, shrubs, and herbaceous plants. Further, it will avoid a homogenous, plantation appearance. Thicker groupings of trees, including all sizes, are found scattered throughout the larger area.

Forest structure and composition descriptions are very similar to the desired future conditions for this project.

Treatment Guidelines

The CWPP provides recommendations for successful outcomes instead of prescriptive options for the treatment of ponderosa pine forests. Treatment guidelines are intended to serve as a general guide for management direction and provide a framework within which specific prescriptions can be developed. Modification of the guidelines based upon site-specific conditions and needs is required and encouraged by the plan.

The Proposed Action and associated project design features closely follow CWPP treatment guidelines for tree selection, cutting techniques, slash treatment, pile burning, broadcast burning, and maintenance treatments.

Implementation and Treatment Types

Site specific planning occurred in the development of the Proposed Action with GFFP partners to determine appropriate treatment types and forest structure values. Wildfire hazard ratings for the area are based on tree crown height, fuel levels, canopy cover, fuel type, number of trees per acre, and slope characteristics. This site-specific analysis using current ground data guided the development of the Proposed Action treatments, which may vary from ForestERA models and treatment recommendations found in the Implementation and Monitoring Section of the CWPP.

Proposed Treatments

Treatment actions in the Proposed Action were designed to reduce fire hazard ratings to low or moderate where possible as well as meet other resource area direction. The District used agency

fuel models to determine fire hazard ratings within the project area. The ID Team and GFFP developed a Proposed Action that best met fire hazard reduction needs near communities and wildlife and forest restoration needs in other areas. In some cases, the team attempted to balance these sometimes opposing needs. Canopy cover target values are one element to measure desired conditions and treatment intensity since silviculture, wildlife, and fuel resource areas all use this measure. Proposed treatments range from relatively open park-like conditions (approximately 30% canopy closure) to denser stands (approximately 60% canopy cover), depending on resource needs. Forest structure also varies from area to area depending on resource objectives.

Community Wildfire Protection Plan Treatments

Map 3 in the CWPP depicts ForestERA predicted fire behavior patterns based on current forest conditions. The CWPP presents treatment in a "course-filter" approach that recognizes the necessity of site-specific planning to complement CWPP models. Five treatment types are proposed in the area, ranging from light intensity burning and no thinning to high intensity (heavy) thinning followed by prescribed fire. Treatments are designed to reduce predicted fire behavior from Active Crown Fire behavior to Passive Crown Fire.

Treatment Comparison

Model inputs and assumptions, and desired future conditions are different between the CWPP and the Eastside Project. While low and moderate fire hazard ratings in Forest Service analyses roughly correspond to Surface or Passive fire behavior categories described in the CWPP, there is a difference in the suggested treatments to achieve these lower fire hazard ratings or fire behavior categories. A full comparison between ForestERA models still needs to be conducted. As the CWPP is a "living" document and may change with new information, future versions may better align with Forest Service models for fire hazard and other resource issues.

Forest Service fire hazard ratings serve as the fine-scale analysis tool which the CWPP allows for. The CWPP analysis area also is missing some communities and private property parcels in its maps. The Proposed Action accounts for these deficiencies. In some areas, the Proposed Action includes thinning that is heavier than what the CWPP calls for. In other areas, heavier thinning that the CWPP recommends is not needed.

A majority of the acres proposed for treatment would be burned without thinning or hand thinned (21,294 of 25,299 acres or 84%). Much of the CWPP direction for the area calls for low intensity thinning and burning. Due to layout and layout costs, low intensity thinning would not be employed in many areas. Areas that are proposed for thinning may be treated heavier to accommodate for areas that are not thinned and provide needed fuel breaks and defensible space.

Most acres proposed for thinning (5,029 of 5,718 acres or 88%) have a 40% canopy cover or higher objective. A majority of the treatment proposed by the CWPP in Map 11B is a Low intensity thinning and burning treatment that includes a reduction of approximately 20% in canopy cover. Some stands with only a 20% canopy cover reduction do not reduce fire hazard ratings sufficiently, especially over the long term (20-40 year treatment effectiveness). Most of the stands proposed for thinning fall within the Light to Moderate Intensity thinning treatments of the CWPP that result in a 30% decrease in canopy cover, 40% decrease in basal area, and 72% decrease in trees per acre.

Effects of Treatments

ForestERA modeled effects of treating the project area with the treatment recommendations and are included in the CWPP. Effects of the proposed action will be included in the Environmental Assessment. Full comparisons of ForestERA models with Forest Service programs would need to be made before an adequate comparison of effects can be made.

Monitoring and Assessment Plan

To best manage fuel reduction projects in an adaptable manner, the Forest Service will conduct monitoring of treatment accomplishments. Additional monitoring direction is described in the Monitoring section of the Proposed Action.

Funds will be allocated to accomplish Forest Plan monitoring requirements associated with this project. Monitoring results will be stored in the Project Record and shared with GFFP or other interested parties and will serve as a tool for public education and adaptive management.

A CWPP Review Team has recently been established to coordinate the tracking and monitoring of CWPP implementation. While no specific monitoring measures have been identified yet for this project, the Forest Service will work with the CWPP Review Team to look at possible monitoring activities to determine treatment effectiveness and accomplishments.

Attachment 3 – Best Management Practices for the Eastside Project

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.

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.

The CT6.3 "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. Provision BT6.6 can be used to suspend operations because of wet or saturated soils in order to protect soil and water resources.

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 locating skid trails to avoid stream courses and restriction of skidders to designated trails. The Sale Administrator locates the skid trails with the timber Purchaser or by agreeing to the Purchaser's proposed locations prior to construction

24.2 - Log Landing Location

1. Objective. To locate landings so creation of unsatisfactory watershed conditions which lead to water quality degradation is avoided.

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 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 streamcourses will be designated on the sale area map. Disturbance from mechanical equipment will be minimal within 50' on either side of the protected streamcourse.

41.3 - Obliteration of Roads

1. Objective. To reduce sediment generated from unneeded roads, roads that run in streambeds, and roads that are located in streamside management zones by closing them to vehicle use and restoring them to productivity.

Roads that are no longer necessary for public access or management purposes need to be obliterated. Roads that are allowed to exist without proper maintenance are subject to continued, uncorrected damage and can become chronic sediment sources.

Attachment 4 – Healthy Forests Restoration Act Authorities for the Eastside Fuels Reduction and Forest Health Project

This analysis provides a description of how the Eastside Project Proposed Action meets the requirements set forth under the Healthy Forests Restoration Act of 2003 (HFRA). The HFRA was written to expedite the preparation and implementation of hazardous fuels reduction projects on federal lands. Because HFRA requirements are different than projects authorized under traditional NEPA authority, this document serves as a road map for educating the public on these differences.

Public Collaboration

The Peaks and Mormon Lake Ranger Districts collaborated with Greater Flagstaff Forests Partnership (GFFP) on all phases of planning and project design for this project. The partnership represents a broad spectrum of community interests in the Flagstaff area including federal, state, and local agencies; academic groups; professional societies; conservation organizations; and local fire departments including Flagstaff, Summit, and Highlands Fire. The Forest Service has worked collaboratively with GFFP over the past year to jointly develop desired future conditions, possible management approaches, monitoring and mitigation measures, and the Proposed Action. The Forest Service and GFFP have also conducted numerous field trips and meetings to discuss project goals and objectives for the project area. In March 2006, the GFFP Board of Directors provided their endorsement for the Proposed Action.

Wildland-Urban Interface and At-Risk Communities

Section 102(a) includes direction on types of lands that fit under HFRA authority. These include:

- The wildland-urban interface areas of at risk communities (Section 102(a)(1)); and
- Federal lands not in the WUI that have threatened and endangered species habitat where the natural fire regimes are important for (or where wildfire proposes a threat to) the species or their habitat, and where fuel reduction projects will enhance their protection from catastrophic wildfire (and complies with applicable guidelines in management or recovery plans) (Section 102(a)(5)).

The Flagstaff area was listed in the January 4, 2001 Federal Register notice (66 FR 753) describing at-risk communities. The Wildland Urban Interface (WUI) for this project is defined though HFRA and the Community Wildfire Protection Plan (CWPP). The CWPP defines the interface as an area where public safety is the over-riding goal. The WUI is sufficiently large to:

- Reduce the potential of a high intensity fire from entering the community;
- Create an area whereby fire suppression efforts will be successful;
- Limit large amounts of wind-driven embers from settling on the community; and

- Protect critical infrastructure.

The project area is located completely within the CWPP analysis area. The WUI covers a majority of the project area. See www.gffp.org for a detailed map of the WUI area.

Community Wildfire Protection Plan

The development of the Community Wildfire Protection Plan for Flagstaff and Surrounding Communities (January 2005) was coordinated by GFFP and Ponderosa Fire Advisory Council. This plan is a collaborative planning and implementation tool that helps mitigate immediate fire hazards to communities at risk and restore fire-adapted ponderosa pine forests in the area. It provides a broad operating framework for treatment within the area.

Desired future conditions for the CWPP analysis area consist of landscapes and communities that are resistant to catastrophic fire. Forest structure and composition descriptions are very similar to the desired future conditions for this project.

Treatment Guidelines

The CWPP provides recommendations for successful outcomes instead of prescriptive options for the treatment of ponderosa pine forests. Treatment guidelines are intended to serve as a general guide for management direction and provide a framework within which specific prescriptions can be developed. Modification of the guidelines based upon site-specific conditions and needs is required and encouraged by the plan.

The Proposed Action and associated project design features closely follow CWPP treatment guidelines for tree selection, cutting techniques, slash treatment, pile burning, broadcast burning, and maintenance treatments.

Implementation and Treatment Types

Site specific planning occurred in the development of the Proposed Action with GFFP partners to determine appropriate treatment types and forest structure values. Wildfire hazard ratings for the area are based on tree crown height, fuel levels, canopy cover, fuel type, number of trees per acre, and slope characteristics. Treatments are designed to lower fire hazard ratings across the project area as well as meet other resource area direction. Site-specific analysis using current ground data guided the development of the Proposed Action treatments, which may vary from ForestERA models and treatment recommendations found in the Implementation and Monitoring Section of the CWPP.

Monitoring and Assessment Plan

To best manage fuel reduction projects in an adaptable manner, the Forest Service will conduct monitoring of treatment accomplishments. Additional monitoring direction is described in the Monitoring section of the Proposed Action.

Funds will be allocated to accomplish Forest Plan monitoring requirements associated with this project. Monitoring results will be stored in the Project Record and shared with GFFP or other interested parties and will serve as a tool for public education and adaptive management.

A CWPP Review Team has not yet been established to coordinate the tracking and monitoring of CWPP implementation.

Threatened and Endangered Species

The HFRA authorizes treatments on federal lands outside of the WUI that have threatened and endangered species habitat where the natural fire regimes are important for (or where wildfire proposes a threat to) the species or their habitat, and where fuel reduction projects will enhance their protection from catastrophic wildfire (and complies with applicable guidelines in management or recovery plans) (Section 102(a)(5)).

Natural fire regimes are identified as being important for threatened and endangered species and their habitat in the MSO Recovery Plan (1995). A main threat identified during the listing process for Mexican spotted owls was wildfire risk. The Upper Gila Mountain Recovery Unit, which encompasses the project area, has a high fire threat and has significant owl populations that have the potential of being seriously impacted by fire. Large crown fires can reduce or eliminate nesting, roosting, and foraging habitat. Desirable characteristics of many nest and roost sites place them at high fire risk.

This authorized hazardous fuel reduction project will provide enhanced protection from catastrophic wildland fire for threatened and endangered species and their habitat. The Proposed Action includes management actions within MSO habitat to improve nesting and roosting habitat and reduce fuels in these areas. Many of these areas, including the PAC, are within the WUI area. Prescribed fire and minimal thinning can reduce fuel loadings and create small openings to increase horizontal diversity and promote growth of shrubs, grasses, and forbs.

Coordination among fuel and fire specialists and biologists in the development of prescribed burn plans will occur to minimize impacts to birds and their habitat. See the Project Design Features section of the Proposed Action for project-specific mitigation and management practices.

The potential beneficial and adverse effects to the species in both the short-term and long-term will be described in the Environmental Assessment for the project.

Old Growth

The HFRA requires that the Forest Service fully maintain, or contribute toward, the restoration of the structure and composition of old growth stands according to the pre-fire suppression old growth characteristics of the forest type.

The Coconino Forest Plan (USDA 1986) was amended in 1996 to incorporate management direction for the northern goshawk and Mexican spotted owl. This amendment included new direction regarding the management of old growth ecosystems.

Section 102 (e)(3) provides that old growth direction in resource management plans established (or amended) on or after December 15, 1993, is sufficient to meet the requirements of Section 102 (e)(2) and will be used by agencies carrying out projects under the HFRA.

Old growth stands have been identified through district mapping and planning activities. Map 2 provides locations of the 4,944 acres of land designated for old growth development in the Proposed Action.

The Proposed Action is in compliance with, or is moving in the desired direction to meet all Forest Plan standards and guidelines for old growth management. While these old growth development areas will meet old growth structural values sooner than other areas, other lands will also be managed to increase tree growth rates and ensure the development of additional old growth areas over time.

Large Tree Retention

The HFRA requires the Forest Service to carry out the project that focuses largely on small diameter trees, thinning strategic fuels breaks, and prescribed fire to modify fire behavior. The project should also maximize the retention of large trees, as appropriate for the forest type, to the extent that the trees promote fire-resilient stands (Sec. 102(f)).

Vegetation treatments in the Proposed Action are designed to focus primarily on the thinning of small diameter trees to meet the Purpose and Need for Action. The Proposed Action was designed to best balance the need for reducing fuels and restoring forest health, which includes protecting wildlife and their habitat, meadows and grasslands, and watershed function. A healthy, large tree population is an essential component of a healthy forest. To preserve the existing mature forest component, no yellow-barked pines will be thinned.

While the Forest Service is not purposely targeting the removal of any large trees, it recognizes the need to remove some large trees to manage for overall forest health in a sustained manner, not just the health of the current large tree component. Thinning smaller trees can achieve fuel reduction objectives, yet there are situations where the removal of large trees may need to occur to meet other forest structure needs and Forest Plan direction. Project goals and objectives are described in Eastside Project Need for Change Report (January 2006). This analysis should be reviewed in tandem with the Proposed Action to gain a better understanding of vegetative characteristics in the project area.

While the Proposed Action describes treatment methods and post-treatment forest structure values, it does not detail the management of individual trees. Trees selected for retention and removal—including large trees—will be determined by silviculturists in the field on a site-specific basis. The Proposed Action and this document do not show the actual numbers of large trees retained or removed, but they can provide the context in which large tree removal would occur to meet resource needs. Although the criteria listed in the following sections provide an ecologically justified rationale for why trees may be removed, it is also important to focus on the large tree component that will remain in the project area after treatment.

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interdisciplinary (ID) team meetings that were scheduled throughout late summer and fall of '05. In these ID team meetings, Forest Service and GFFP members developed desired future condition statements, treatment timeframes, and possible management practices. Large tree management concerns were discussed at these meetings and during GFFP Project Team field trips. Forest Service silviculturists provided in depth concerns about large tree management during numerous ID team meetings. Resulting dialog of large tree management was captured in the Need for Change Report that was completed in early November 2004 after review by GFFP.

The Forest Service collaboratively developed the Purpose and Need for Action and Proposed Action with GFFP. The Forest Service also provided GFFP a final Large Tree Management document during the Mountainaire HFRA analysis that included preliminary model spreadsheets for some forested stands, a sample stand simulation displaying differences in forest structure with and without a diameter limit, fuel model assumptions, and a number of detailed maps displaying various aspects of forest structure. The spreadsheets provided much information on current stand characteristics, predicted stand structure after treatment, and the estimated number of large trees removed to meet resource needs. The following sections are adapted from this Large Tree Management document. The work done on the Mountainaire project was reviewed and adopted for the Eastside Project.

Large Tree Definition

While the current GFFP policy (December 2004) regarding large tree management does not specify a size threshold in describing large trees, this analysis (based on numerous discussions with GFFP) defines large trees as 16 inches diameter at breast height (DBH) or larger for ponderosa pine for this project. Although definition by diameter helps provide a visual image of large trees, tree diameter is only one way to measure the ecological value of a given tree.

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Simulations

The Forest Service ran preliminary estimates of the number of trees removed using stand data and predicted stand conditions after treatment with a Forest Vegetation Simulator (FVS) program. The FVS program can model residual stand characteristics after treatment and into the future. This program, however, cannot model the creation of openings or estimate the numbers of large trees removed to create these openings. While the Forest Service predicts that the majority of large trees removed would occur due to the creation of openings and un-even aged forest structures, it is difficult to predict actual numbers due to the inherent variability of stand structure.

While the creation of openings would require the removal of some large trees in many a few stands, other resource needs could also necessitate the removal of large trees in addition to those removed for openings. These resource needs, such as managing for uneven aged forest structure or protecting yellow-barked pines are listed in further detail in the last section of this document. There is a high probability that some large trees in some stands will need to be removed to meet project needs other than the creation of openings. The Forest Service will run preliminary treatment simulations through the FVS program on all treatment stands within the project area to determine if large trees would need to be removed to meet canopy cover and uneven aged management objectives described in the Proposed Action.

Rationale for Removal of Large Trees

The following sections describe situations where large trees would be removed to meet project goals and objectives. While the following criteria are listed individually, they are all components of a healthy forest. All of these situations are directly linked to the goal of forest and grassland restoration listed in the Purpose and Need for Action, as well as the Need for Change Report. Often, more than one of these conditions exists in a treatment area where removal of a large tree may satisfy a number of these criteria.

The number of large trees that could be removed varies by stand and is highly dependent upon current forest structure. For example, some stands may exhibit a forest structure where large trees are aggregated in clumps or groups. Other areas may have an evenly spaced and distributed population of large trees. The creation of openings would most likely require fewer large trees to be removed in the first scenario compared to the second.

Creation of Openings and Natural Regeneration Areas

Historically, ponderosa pine forests in northern Arizona were characterized by frequent, low-intensity surface fires occurring every 3 to 15 years. The historic fire regime maintained an open canopy structure and a variable, patchy tree distribution (Moir et al 1997, Covington et al 1997). Desired future conditions for the project area include openings within forested stands that recreate a more open stand structure, increase horizontal heterogeneity and understory productivity, decrease fire hazard, and improve wildlife habitat for northern goshawk, antelope, turkey, and several edge species. Openings also provide areas where natural regeneration can occur. The Proposed Action

includes the creation of new or the enhancement of existing openings within at least 20% of the project area to meet Forest Plan direction for Vegetative Structural Stage (VSS) classes. Openings would range in size from ¼ to 4 acres[2.]

A Sustainable, Uneven-Aged Forest Structure

A forest structure that consists solely of trees greater than 16 inches DBH would not contain sufficient age diversity. Without regeneration, stand structure would not persist over time. Even-aged forest structures are only self-sustaining through stand-replacing events, such as catastrophic crown fire, which is not desirable within the project area. Additionally, certain insects favor trees in certain diameter classes (DeMars and Roettgering 2003). As a forest becomes denser, it becomes less resistant to bark beetle infestation. Insects are attracted to trees under stress from lack of resources (water, nutrients, light) due to vegetative competition. An uneven-aged structure with lower tree densities would be less susceptible to landscape-scale insect attack and mortality (USDA Forest Service 2002, Long 2003, Amman et al 2003) and promote understory diversity. Proposed vegetative treatments would create openings and clump or group trees where possible to emphasize this diverse forest structure.

Canopy Cover

Canopy cover is an important measure when determining thinning treatments since it is a measure common to numerous resource areas in determining treatment effectiveness. Proposed canopy cover values are important to meet since canopy cover acts as a surrogate measure for other objectives such as reducing fuels, reducing competition to trees, and providing adequate habitat for wildlife species.

Canopy cover values in the Proposed Action were developed to meet fuel reduction objectives and comply with Forest Plan direction for northern goshawk and Mexican spotted owls. Some large trees would be removed to meet target canopy cover values in situations where not removing them would conflict with other objectives listed in this section. For example, if a stand is targeted for an uneven age structure after treatment, removing all trees up to 16 inches DBH may not result in the desired structure, even though the canopy cover value may be met. In this scenario, a few large trees would be thinned and some smaller diameter trees would be retained, providing more structural diversity within the stand.

Increased Vigor, Longevity, and Development of Old, Yellow Ponderosa Pine

Ponderosa pine trees begin to turn yellow at approximately 150 years of age. Due to the current dense forest structure, some yellow pines have smaller diameters than normally associated with old, yellow trees due to competition among trees for light, nutrients, and water. Thinning black-barked pine trees around the drip line of yellow pines will decrease competition among trees, increase yellow pine vigor and longevity, decrease susceptibility to successful bark beetle attack, and decrease the risk of mortality due to crown fire (Stone et al 1999, Kolb et al 2001, Wallin et al 2004).

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[2] Seedling and saplings areas (Vegetative Structural Stage 1 and 2 classes) are currently lacking in the project area. Forest Plan direction for the northern goshawk calls for 10% distribution in each of the VSS 1 and VSS 2 classes.

Decreased Dwarf Mistletoe Infection

Dwarf mistletoe (Arceuthobium vaginatum subsp. cryptopodum) is a parasitic plant that infects ponderosa pine. Infection is spread via pressure-released seeds and expands at a rate of 1-2 feet per year (Conklin 2000). Dwarf mistletoe (DM) is considered a tree pathogen because infection results in reduced tree growth, reduced tree vigor, branch deformations, and shortened life span of the infected host. Additionally, in comparison to uninfected trees, trees infected with DM are more susceptible to bark beetle attack and are also more flammable due to the accumulation of resin and branch deformations (Conklin 2000). Since Euro-American settlement and the advent of fire suppression, DM populations in the southwest are thought to have increased with increased forest densities (Conklin 2000). A more open, park-like forest structure would have limited the spread of DM infection.

Currently, a few stands within the project area contain some level of DM infection. Dwarf mistletoe infection is rated on an individual tree basis on a scale of 0 to 6, with 0 representing no infection and 6 representing a tree that is severely infected. As the number of individual trees severely infected with DM increases, the DMR for the stand increases as well. For this project, DM infection across an entire stand was considered "severe" if the mean dwarf mistletoe rating (DMR) for the stand was 2.0 or greater. Dwarf mistletoe infection was considered "moderate" if the mean DMR for the stand was between 1.0 and 1.9. Dwarf mistletoe infection was considered "light" if the mean DMR for the stand was less than 1.0.

Retaining infected trees in the overstory could spread infection to smaller trees in the understory. For example, a stand may contain a 16-inch DBH black-barked pine tree infected with dwarf mistletoe and a 14-inch DBH pine tree free from infection. In this case, the larger tree would be removed and the smaller tree would be retained. If, however, the infected tree is a yellow pine or group of yellow pines, then a 1 chain (66 feet) buffer would be cut around the tree or group to prevent the spread of infection. Infected yellow pines would be retained because of their rarity in the project area and because they provide good habitat as snags or nesting areas for wildlife species.

To decrease (not eliminate) the incidence and spread of dwarf mistletoe infection within the Eastside Project area, a limited number of infected, overstory large trees would be removed where DM exists. Large trees would most likely be removed in those areas where dwarf mistletoe ratings are severe. Large trees would be removed to a much lesser degree in areas of light to moderate dwarf mistletoe ratings.

Grassland and Savannah Restoration

Many grassland and ponderosa pine savannah areas are relatively open and have fewer larger trees than heavily forested stands. Most of these areas were logged previously during railroad construction and development. Many of the larger, straighter "yellow" pines in the area were cut. This left a forest structure with larger pines that were less desirable from a timber production viewpoint. These trees often exhibit twisted or bent stems, multiple tops, or low heights. In addition, due to fire exclusion, some grasslands have experienced encroachment of ponderosa pine for approximately 125 years. Some of these encroaching trees have reached larger diameters due to open growing conditions.

Many of these trees are “wolfy” black-barked pine trees that are characterized by below average heights (less than 40-50 feet), wide spread crowns, excessive taper, and excessive limbs that extend to the ground (Smith 1986). This low canopy base and high canopy bulk density makes them prone to torching during fire events.

Grasslands identified for restoration were selected based on Terrestrial Ecosystem Survey (TES) units 53 and 55, Forest Plan Management Area 9 (Meadows) units, and orthophoto quadrant maps. TES units 53 and 55 are considered valley plains and swales that are unsuitable for timber production. These areas receive added moisture from surrounding areas and hold water seasonally.

Areas with low historic stand densities and areas that transition from grasslands to forested stands are referred to as ponderosa pine savannahs. Selection of savannah restoration areas was based on TES units 53 and 55, Forest Plan Management Area 9 (Meadows) units, orthophoto quadrant maps, stand data, and field trip visits.

While stand boundaries are fairly accurate in delineating forest structure or topographical differences between stands, actual management boundaries that divide forested areas from savannah or grassland areas would be identified in the field and guide management direction. For example, TES unit boundaries do not follow stand boundaries and some stands may contain only a portion of a TES unit. Because of this, stands identified for grassland and savannah restoration would not receive uniform treatment. The number of remaining trees in grassland areas and savannah areas after treatment would be based on the number of evidences of pre-settlement trees. Remaining portions of stands that have similar vegetative characteristics and forest structure values to adjacent forested stands would receive thinning treatments similar to those proposed for the adjacent stands.

When selecting trees for retention in these areas, tree markers will retain genetically desirable trees over “wolf” trees, where possible, although some “wolf” trees would be retained due to the excess number of them. Retained trees will be selected from the healthiest trees in a stand, not necessarily the closest in distance to historic evidences. Genetically desirable, large trees would most likely not be thinned in these areas.

Increased Growth, Vigor, and Longevity of Gambel Oak

Due to past harvesting of Gambel oak, both legally and illegally, large oak trees (greater than 10 inches diameter at root collar) are very rare within the project area. One objective of the project is to increase the productivity and age class diversity of Gambel oak. A desired future condition is to contain more larger oaks within the project area. Thinning of ponderosa pine around clumps of Gambel oak (oak stems greater than 5 inches DRC) would reduce competition among oaks for moisture, nutrients, and sunlight. Reduced competition for these resources will increase tree vigor, growth, and longevity.