Mountainaire HFRA Project

Project Area

The Mountainaire HFRA Project area is located southeast of Flagstaff in between Lake Mary Road and Interstate 17 on the Mormon Lake Ranger District. Land ownership of the area includes 15,237 acres of Coconino National Forest land and 1,332 acres of private land. In total, there are approximately 16,569 acres within the project area boundary.

Scope of the Project

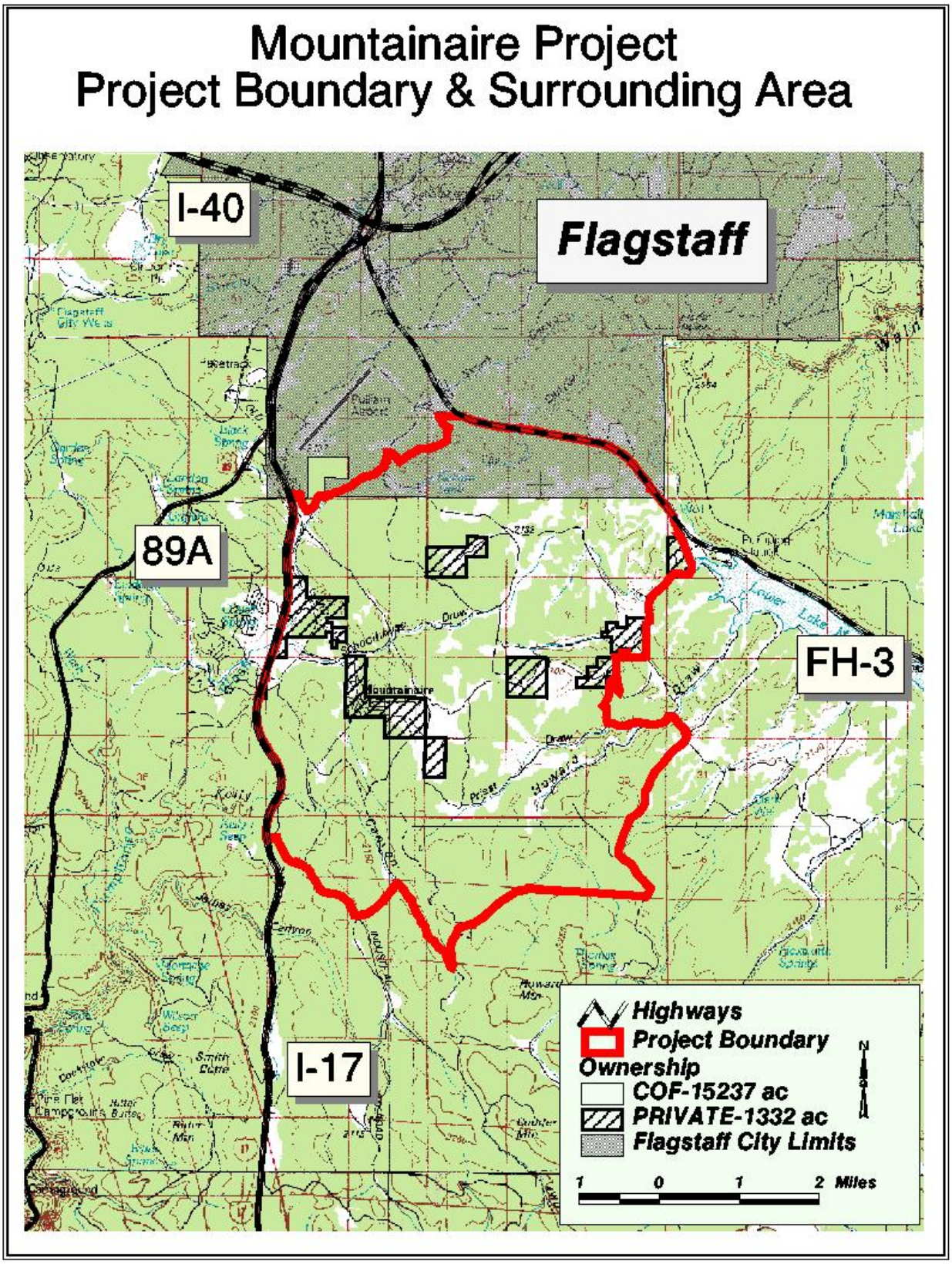
The Proposed Action applies only to Coconino National Forest lands within the project area. While the Proposed Action will reduce fuel loading in most areas, the risk of fire will only be reduced up to private land boundaries and cannot reduce the threat to structures within private lands. To reduce fire threat within private lands, these areas would need to be assessed and treated in tandem with actions proposed in this project. Environmental effects of the Proposed Action will be analyzed in an Environmental Assessment. These effects will only be analyzed for impacts to national forest lands and not to private property.

Background Information

The Greater Flagstaff Forests Partnership (GFFP), a nonprofit organization based in Flagstaff, and the Coconino National Forest have established a cooperative agreement to work collaboratively to demonstrate new forest management approaches in improving and restoring ecosystem health of the ponderosa pine forests surrounding the greater Flagstaff area. This collaborative effort aims to involve the greater Flagstaff community to develop community-based solutions to local forest health and fuel reduction concerns. The Mountainaire HFRA Project is the fourth large-scale project that GFFP has assisted the Coconino National Forest with project planning and design.

The Mormon Lake Ranger District has worked collaboratively with GFFP over the past year to jointly develop proposals to treat the Mountainaire area. Since May 2004, the Forest Service and GFFP have conducted numerous field trips and meetings to discuss project goals, existing and desired future conditions for the project area, and the Proposed Action.

The Purpose and Need for Action in this document is derived from the Project Initiation Letter, Need for Change Report, and comments from the GFFP Board of Directors on a Draft Proposed Action developed by GFFP and the Forest Service Interdisciplinary Team (IDT). During development of the Proposed Action, the Forest Service looked at environmental analysis options for the project. In February 2005, the Mormon Lake Ranger District decided that the project was an ideal candidate for analysis under the Healthy Forests Restoration Act (HFRA). The Purpose and Need for Action and the Proposed Action for this project have been prepared in accordance with HFRA requirements. Proposed activities in the project area such as aspen fencing and trail construction that are not suitable for analysis under HFRA will be developed under separate NEPA analysis.


Mountainaire Project
Project Boundary & Surrounding Area
I-40
Flagstaff
89A
FH-3
I-17
Highways
Project Boundary
Ownership
COF-15237 ac
PRIVATE-1332 ac
Flagstaff City Limits
1 0 1 2 Miles

Purpose and Need for Action

The purpose of this project is to implement management direction of the Coconino Forest Plan and address resource needs identified in the Need for Change Report (located in the Project Record).

The Purpose and Need for Action is divided into three planning topics: Wildfire and Fuels Risk, Fire-Adapted Forest and Grassland Structure, and the Transportation System. Within each topic, the *Existing Conditions* sections describe the current ecological, biological, and social conditions. The *Desired Future Conditions* sections describe the goals and vision for the area. The *Need for Change* sections describe the need to alter conditions from the current state to the desired future condition, and form the foundation for this Purpose and Need for Action.

Wildfire and Fuels Risk

Existing Conditions

The project area has not directly experienced a large wildfire for many years. The lack of fire has allowed dense vegetation and surface fuels to accumulate. Species composition and stand structure and densities have changed. The area was historically dependent on frequent low-intensity fires. Fire suppression has successfully excluded these historic fire intervals.

Fire Hazard Ratings

One method to evaluate the risk of wildfire to an area is to assign a fire hazard rating. Fire hazard rating is a relative measure of how virulently a wildfire could burn under the 90th percentile weather conditions that occur from April through July[1]. It is a relative measure to demonstrate fire resilience between stands and the difference in forest structure before and after treatment. It is a good indicator of how effectively and safely fire suppression crews can attack a wildfire and bring it under control.

Criteria for evaluating fire hazard rating includes canopy cover, tree stems per acre, height to the bottom of the live crown, dead and down fuel loading, slope steepness, and aspect. Because slope steepness and aspect will not change with treatment, their effects on fire behavior influence how much other criteria are altered in project design.

Canopy cover (percent of potential open space occupied by the collective tree crowns in an area) directly effects how easily a fire is able to transition into a crown fire by containing and accumulating heat below the crown layer. High canopy cover can prevent necessary heat dispersal. Canopy cover also affects how easily a crown fire can sustain itself and spread as a crown fire. The number of tree stems per acre also affects how

[1] Fuel moisture and weather characteristics used to model fire effects include:
1-Hour fuel Moisture: 2%
10-Hour fuel Moisture: 3%
100-Hour fuel Moisture: 4%
20-Foot Wind Speed: 20mph
Air Temperature: 85 degrees F

easily a fire is able to transition into a crown fire. The height to the bottom of a live crown directly effects how easily a ground fire "torches" trees, produces firebrands, and transitions into a crown fire.

While neither dead and down fuels nor trees per acre are excessively high across much of the project area, high canopy closure values and low crown heights elevate the fire hazard beyond desirable levels for many areas. The existing fire hazard makes it very difficult for initial attack operations to control a wildfire starting under severe weather conditions that occur in April, May, June, September, and October. Table 1 describes existing values of some of these fire hazard rating criteria.

Table 1 - Fire Hazard Rating Criteria

Measure	Current Value	Desired Value
Height to Live Crown	1 – 25 feet	20+ feet
Dead and down fuel	3 – 12 Tons per Acre	3 – 7 Tons per Acre
Canopy Cover	16 – 89 %	40 – 50%
Stems per Acre Ponderosa Pine	10 – 500	Less than 300

Current fire hazard ratings of the project area:

Extreme	259 acres
Very High	1,064 acres
High	5,658 acres
Moderate	6,997 acres
Low	1,259 acres

Flame Lengths

Flame length is another measure of fire intensity and anticipated tree mortality from wildfire. Expected flame lengths within the area range from 3-5 feet. Critical flame lengths are the threshold distances where ground fire can move into the canopy of a stand. Critical flame lengths in the area range from 7-9 feet. The current range between expected flame lengths and critical flame lengths is small. A smaller range allows a ground fire to transform into a crown fire easily since there is little distance to buffer the canopy from high ground flames. Dead and down fuel loading directly effects flame length and duration. The longer the flame length and duration, the more difficult it is to bring a fire under control. In addition, the longer the flame length and duration, the more likely a fire is able to transition into a crown fire.

Even though the expected flame lengths decrease as a fire hazard rating decreases, the probability of wildfire-induced mortality remains high among mature trees due to a low crown base height common throughout the project area. Fire modeling indicates an extremely high occurrence of wildfire-induced tree mortality (28 to 54 percent) among trees 8 inches to 26 inches DBH.

The current fuel conditions would likely generate dangerous fire behavior and undesirable fire effects if and when a wildfire occurs. Although it would be difficult to initiate a crown fire within most sites, once a fire is initiated or is carried in from a neighboring area, many sites have sufficient crown bulk density coupled with sufficient

canopy cover to sustain a crown fire and spread it to other stands. Initial attack forces would have great difficulty in controlling a wildfire occurring in the area under severe weather conditions.

Human use (presence of roads, trails, and dispersed camping) of the area has also increased the risk of a human-caused fire ignition. There are numerous dispersed camping sites in the areas, none of which are designated.

Desired Future Conditions

A low or moderate fire hazard rating exists across a majority of the project area. Some stands may remain with moderate to high rating after treatment to accommodate other resource needs such as providing adequate habitat for wildlife species. However, most areas within a mile of private property will have a low or moderate rating, especially those areas in the direction of the prevailing wind.

Dead and down fuel loading is low. Low to moderate intensity burns on a regular basis to maintain these low fuel levels. Expected flame lengths are below 3 feet. Crown base heights are high and critical flame lengths are above 15 feet.

Designated dispersed camping areas exist to reduce the risk of human-caused fire starts. Dispersed sites are signed and located in areas that have low to moderate fire hazards, are away from communities, and are away from wildlife habitat areas such as Mexican spotted owl (MSO) protected habitat or northern goshawk Post-Fledging Family Areas (PFAs).

Need For Change

Comparison of the existing condition of the project area and the desired condition indicates a need to:

- Reduce fire hazard ratings to low and moderate levels;
- Reduce flame lengths to 2-3 feet and increase critical flame lengths to 10-15 feet;
- Reduce fuel loads to 3-7 tons per acre;
- Increase crown base heights to 20 feet or greater;
- Reintroduce and maintain low to moderate intensity surface fire; and
- Designate dispersed camping sites to reduce human caused ignitions.

Fire-Adapted Forest and Grassland Structure

The existing and desired future conditions describe forest and grassland structure through three components: density of trees within the area; age, size, and species diversity; and the spatial arrangement of trees on the landscape.

Existing Conditions

Most of the lands in the project area are no longer functioning fire-adapted ecosystems. As described in the previous section, wildfire has been suppressed from this area for many years. The area is characterized by having a high number of trees per acre,

moderately closed (40-60% canopy cover) to closed (60% and greater canopy cover) canopies, and little understory vegetative production and diversity.

Stand Density

Some measures to determine stand densities include canopy cover, basal area (area of the cross section of a tree that measures how much of a site is occupied by tree trunks), and the number of trees per acre in a given area.

In addition to contributing to crown fire hazard, thick canopies also shade out many understory plant species, including smaller trees. All three of these measures are integral components of the overall tree density within the area. Existing and desired values for these measures are listed in Table 3.

Due to this high density of trees, there is competition among trees for resources such as soil nutrients, water, and sunlight. Stand Density Index (SDI) is a relative measure of stand density based on the number of trees per acre and their mean diameter. It expresses the actual density in a stand as a percent of the theoretical maximum density possible for trees of that diameter and species. This measure can help determine competition thresholds, which are very important in a moisture-limiting system.

Currently, the majority of forested Forest Service lands within the project area are above 35% SDI. Above this number, there is a significant increase in inter-tree competition, decrease in tree growth and vigor due to competitive stress, and an increase in susceptibility to insects, disease, and stand-replacing fire. The high density of trees in many areas is limiting the growth rates of larger trees, which are important components of wildlife habitat for Mexican spotter owl and northern goshawks as well as other species.

Meadow areas and ponderosa pine savannahs (areas that transition from forested stands to meadow areas) are less dense than forested areas. They historically held moderately low numbers of ponderosa pines but have been logged in the past century. Remaining trees are mostly smaller trees or genetically undesirable. Many of these areas were planted with seedlings a few decades ago for future harvest. The resulting “plantations” are now dense areas of small diameter trees.

Age, Size, and Species Diversity

Vegetative Structural Stage (VSS) is a measure to determine the dominant tree size in a given stand and is a useful indicator of tree age and size distribution across a landscape. Most of the trees in the area are 5 to 18 inches or greater in diameter at breast height (DBH). Older, mature, yellow-barked ponderosa pines are rare due to past commercial logging activities. There are only 10 acres in the area that exhibit old growth ecosystem characteristics (components include large trees, down logs, snags, high canopy cover, etc.). Conversely, there are also relatively few forested areas with smaller diameter trees. Little natural regeneration is occurring for future tree recruitment. There is a shortage of large mature oak and pine trees as well as snags and down logs, which are important habitat components of wildlife habitat.

The majority of Gambel oak trees are under 10 inches diameter at the root collar (DRC). For example, there is an average of only 6 oaks per acre that are greater than 10 inches

DRC within MSO restricted habitat. The majority of stands containing Gambel oak are located in the southern portion of the project area within the ponderosa pine cover type. Due to a history of illegal wood cutting and proximity of the project area to Flagstaff, Mountainaire, and numerous parcels of private property, the majority of existing Gambel oak consist of small, young thickets with numerous stems. Due to high stand densities, thickets are typically overtopped by pine, resulting in decreased oak growth and vigor.

Spatial Arrangement

The arrangement and patterns of old stumps in the area suggest that trees were often clumped in areas with openings in between clumps. Currently, trees cover much of the landscape, including areas that do not contain historic stumps. There are very few remaining natural openings within forested stands. The absence of fire has allowed areas to grow numerous trees. Openings typically have individual or small clumps of trees within them and typically have more understory plant species and plant productivity.

Table 2 – Existing and Desired Vegetative Structural Stage (VSS) Values.

VSS	Existing Distribution	Desired Distribution
VSS 1 - Grassy Openings	**9%**	**10%**
VSS 2 - Seedlings/saplings	**2%**	**10%**
VSS 3 - 5-11.9 inches	**27%**	**20%**
VSS 4 - 12-17.9 inches	**48%**	**20%**
VSS 5 - 18-23.9 inches	**14%**	**20%**
VSS 6 - 24 inches and greater	**1%**	**20%**

Desired Future Conditions

The desired future condition includes a multi-aged and diverse forest structure that supports frequent low intensity fires. The area is maintained by fire and natural processes.

Many of the forest and grassland structure values are guided by Forest Plan direction for wildlife species. Management direction for the Mexican spotted owl and northern goshawk guides vegetation treatment to maximize habitat components for these species. By managing for nesting, roosting, and foraging habitat characteristics desired by these two species, forest structure components will provide sufficient habitat for many other species including Management Indicator Species (MIS). Table 3 describes desired future conditions for forest structure and is organized by habitat designations. Those areas outside of MSO habitat and northern goshawk PFAs are termed northern goshawk foraging areas. These wildlife habitat areas are displayed in Map 2 – Wildlife Habitat Areas.

Stand Density

Canopy cover ranges from 30-50% and improves understory productivity and diversity of species while still providing sufficient canopy densities to meet wildlife habitat needs in most areas. Stand Competition among trees is limited and growth rates for trees are improved, especially around larger trees.

Grassland and savannah areas hold historic numbers of trees and "plantation" areas have reverted back to historic conditions.

Age, Size, and Species Diversity

Tree age and size are more evenly distributed among VSS classes. Stands have an uneven aged stand structure with multiple age classes. This allows for the continuous replacement of trees in an area over time. The resulting uneven age structures are more resilient to fire or insect and disease attacks.

There is limited competition to Gambel oak, and an increasing amount of large oak trees greater than 10 inches DRC. The oak component exists at levels needed for wildlife habitat.

Spatial Arrangement

Groups or clumps of trees exist in many areas with variable canopy cover to allow for wildlife and prey species habitat, tree regeneration, and reduced fire hazard. Groups of trees are located in areas where historic evidences of trees exist or where best stand-structure exists at the time of implementation.

Openings in forested lands occur in the area, are typically ½ to 4 acres in size, and support greater productivity of plants and an increase of plant species. Opening size depends on wildlife habitat requirements.

Table 3 – Forest and Grassland Density and Composition Values

Measure	Existing Conditions	Desired Future Conditions
Canopy Cover	Meadow and Savannah Areas No data Northern Goshawk Foraging Areas 32-71% Northern Goshawk PFAs 42-68% MSO Protected Habitat 42-68% MSO Restricted Habitat 34-81% MSO Target/Threshold 60-71%	Meadow and Savannah Areas 20-40% Northern Goshawk Foraging Areas 30-50% Northern Goshawk PFAs 40-50% MSO Protected Habitat 50% + MSO Restricted Habitat 40-50% MSO Target/Threshold 50% +
Total basal area (ft2/acre) for all tree species	Meadow and Savannah Areas No data Northern Goshawk Foraging Areas 23-287 MSO Protected 88-142 MSO Restricted 51-208 MSO Target/Threshold 132-157	Meadow and Savannah Areas 20-60 Northern Goshawk Foraging Areas 20-100 MSO Protected 150 MSO Restricted 80-150 MSO Target/Threshold 150
Stand Density Index	0-24% = 36% of the area 25-34% = 32% of the area 35-59% = 30% of the area 60%+ = 2% of the area	0-35% in Northern Goshawk Foraging areas, MSO restricted habitat. 0-45% in MSO Protected and

Measure	Existing Conditions	Desired Future Conditions
		Target/Threshold Habitat, and Northern Goshawk PFAs
Opening Size	Variable patterns and sizes	Northern Goshawk Foraging Habitat – ¼ to 4 acres Northern Goshawk PFAs – ¼ to 2 acres Protected – ¼ to ¾ acre Restricted and Target/Threshold – ¼ to 2 acres

Need for Change

Comparison of the existing condition of the project area and the desired condition indicates a need for:

- Reduce canopy cover, basal area, and Stand Density Index values towards the desired future conditions represented in Table 3 for forest and grassland structure needs;
- Restore historic vegetative structure in meadows and savannah areas;
- Move VSS distribution towards values listed in Table 2 to create an unven-age structure in forested stands; and
- Create or retain openings to promote understory diversity, and initiate VSS 1 and 2 classes.

Transportation System

Existing Conditions

The current inventoried forest road system within the Mountainaire Project area contains 107 miles of road with a road density of 3.88 miles per square mile.

Approximately 75.5 miles of designated open road system exist. The open road system is an inventoried road system with road numbers that the Forest Service maintains at a target maintenance levels. Maintenance levels include Level 4 (suitable for passenger car travel and provide comfort at moderate speeds), Level 3 (suitable for passenger car travel), Level 2 (high clearance 4-wheel drive vehicles). The majority of the Level 3 roads are near the perimeter of the project area. The roads within the interior are mostly Level 2 roads. Many of these roads are in meadows and most are in poor condition due to lack of maintenance. To avoid the muddy areas during the seasons of moisture, drivers are creating multiple routes called “braiding.”

Approximately .4 miles of road is closed except for occasional administrative use such as fire suppression or search and rescue operations. The road is gated to prevent access.

Approximately 12.5 miles of roads were authorized for decommissioning in previous decisions but are still being used by the public currently due to ineffective closures.

Approximately 18.6 miles of user-created social roads exist. These are unauthorized non-system roads that have typically branched out from forest system roads.

The road system is too large to be adequately maintained by personnel and funding currently available. Many roads are a source of noise disturbance and resource damage. Table 4 describes the existing and desired transportation system values.

Table 4. Existing and Desired Transportation System Values

Road Type	Existing Conditions	Desired Future Conditions
Open System Roads	75.5 miles	40-50 miles
Closed System Roads (still being used by the public)	12.2 miles	0 miles
User Created/Social Non-System Roads	18.6 miles	0 miles
Administratively Closed Roads	.4 miles	No specific value
Road Total	106.7 miles	40-50 miles
Road Density	3.88 miles/square mile	2 miles/square mile

Desired Future Conditions

The open road system for the Mountainaire Project area would consist of the minimum network necessary to satisfy both the current and foreseeable future needs. The minimum network is a road system that balances motorized access for resource management activities, fire suppression, and recreational opportunities with resident evacuation and resource protection concerns. User-created social roads are decommissioned. Decommissioning roads includes obliterating roads and rehabilitating road prisms back to natural conditions and contours.

Road densities approximate Forest Plan direction values of 2 miles per square mile of land. Roads accessing the east side of Lake Mary provide an emergency response route.

Need for Change

Comparison of the existing condition of the project area and the desired condition indicates a need to:

- Designate an open road system;
- Close roads for administrative access where roads cause resource impacts but are needed for emergency access; and
- Decommission user-created social roads and system roads that are causing resource impacts.

Map 3 provides a display of the current transportation system. A table is also attached to this document to provide specific road information to complement this map.

Proposed Action

The Proposed Action is designed to best meet the Need for Change for Action of the project while meeting requirements of the Forest Plan and other guiding documents such as the *Integrated Treatment of Noxious or Invasive Weeds EIS.*

The following table provides a brief overview of proposed management activities and how they meet the need for change statements discussed in the previous Purpose and Need for Action section. A more detailed description of management activities is described in the remaining sections of this document.

Section headings in this Proposed Action section are different from those in the Purpose and Need for Action section because management activities are designed to meet multiple project needs. However, similar measures, such as fire hazard ratings and canopy cover, will be described to link management actions to the Purpose and Need for Action.

While some vegetation treatments can maximize effectiveness of both fuel and fire risk needs as well as forest structure needs, other treatments emphasize one resource area over another. For example, in areas within close proximity to private lands, treatments are designed to best reduce the threat of wildfire. In contrast, treatments in MSO Protected Activity Centers or northern goshawk Post Fledgling Family Areas—while still reducing fuels and fire hazards—will emphasize the maintenance of important wildlife habitat and forest structure attributes. For many situations, treatment methods serve multiple resource area needs.

Summary of Management Actions

Table 5 – Management Activities and Rationale

Management Activity	Purpose and Need for Action
Mechanical thinning on approximately 13,780 acres	**Wildfire and Fuels Risk** - Reduce fire hazard ratings to low and moderate levels; - Increase crown base heights to 20 feet or greater; - Increase critical flame lengths to 10-15 feet; and - Create conditions where reintroduction of low to moderate intensity surface fire can occur; **Fire-adapted Forest and Grassland Structure** - Reduce canopy cover, basal area, and Stand Density Index values towards the desired future conditions represented in Table 3 for forest and grassland structure needs; - Restore historic vegetative structure in meadows and savannah areas; - Move VSS distribution towards values listed in Table 2 to create an unven-age

	structure in forested stands; and - Create or retain openings to promote understory diversity, and initiate VSS 1 and 2 classes.
Initial prescribed burning on approximately 15,256 acres	**Wildfire and Fuels Risk** - Reduce flame lengths to 2-3 feet; - Reduce fuel loads to 3-7 tons per acre; and - Reintroduce low to moderate intensity surface fire
Maintenance burning on approximately 15,256 acres	**Wildfire and Fuels Risk** - Maintain fuel loads to 3-7 tons per acre; - Maintain expected flame lengths to 2-3 feet - Maintain low to moderate intensity surface fires periodically
Designating an open road system of 47.7 miles **Decommissioning 55.7 miles of user-created social road and system roads** **Closing 3.3 miles of road except for administrative access and emergency use** **Constructing and decommissioning (after use) 1.3 miles (3 segments) of temporary roads.**	**Transportation System** - Designate open road system; - Close roads for administrative access where roads cause resource impacts but are needed for emergency access; - Decommission user-created social roads that are causing resource damage. - Provide access for thinning operations and skid trails
Designating dispersed camping areas	**Wildfire and Fuels Risk** - Designate dispersed camping sites to reduce human caused ignitions

Mechanical Thinning

Approximately 13,780[2] acres will be mechanically thinned within the area. Three types of thinning are proposed to meet different resource needs. The following treatments are displayed in Map 1 – Thinning Treatments. These areas will be thinned to density levels and structural arrangements that are derived from the Forest Plan, scientific literature, and the Need for Change Report. The following sections further describe the three mechanical treatment types in more detail.

Thin-from-Below Treatments

Approximately 3,448 acres will receive a thin-from-below treatment in areas south and west of private property. These areas are important to protect from wildfire due to common wind and fire movement patterns. In most areas, thin-from-below treatments will remove most small diameter trees and retain larger trees, leaving a more even-aged stand structure.

[2] These acreages do not account for any deferrals due to layout, inoperability, financial efficiency, wildlife cover, etc. Actual number of acres would be lower after review from implementation staff and layout.

Thinning from below increases crown base height, decreases the height to which firebrands are lofted and the distance at which spot fires would be expected to occur, and reduces the ease with which a fire can "torch" trees and produce firebrands. It also reduces canopy closure, and therefore reduces heat accumulation below the crown. These results, collectively, will reduce fire hazard ratings.

Uneven Age Treatments

Approximately 7,527 acres will receive an uneven-age treatment. Treatments will reduce expected flame lengths, lower fire hazard ratings, and increase crown base heights by removing some ladder fuels, although not to the same extent as thin-from-below treatments. The resulting uneven-age stands provide a heterogeneous forest structure; more age and size class diversity; wildlife habitat and hiding and thermal cover for wildlife species; and resiliency to environmental stress factors such as insect and disease outbreaks.

Most of these treatments are proposed to occur in areas that are important for wildlife habitat or where an increased growth rates of trees is important (such as old growth development).

Grassland and Savannah Restoration Treatments

Approximately 2,805 acres of grasslands and ponderosa pine savannah areas will be mechanically thinned to remove stocked "plantations" and restore meadow and savannah structure. Restoration in these areas would include thinning trees to densities based on historic numbers.

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. 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 forest structure values to adjacent forested stands would receive thinning treatments similar to those proposed for the adjacent stands.

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 be prioritized for retention.

Table 6 - Forest Densities by Thinning Type

Treatment Type	Acres	Existing Conditions*			Timeframe	After Thinning*		
		Trees per Acre	Basal Area	Canopy Cover		Trees per Acre	Basal Area	Canopy Cover
Thin-from-Below 40% Canopy Cover	2,919	56 - 499 (196)	51 - 160 (103)	46 - 72 (57)	Immediately after thinning	32 - 120 (63)	61 - 78 (71)	39 - 42 (40)
					20 years after thinning	30 - 115 (60)	86 - 97 (92)	44 - 51 (47)

Treatment Type	Acres	Existing Conditions*			Timeframe	After Thinning*		
		Trees per Acre	Basal Area	Canopy Cover		Trees per Acre	Basal Area	Canopy Cover
					40 years after thinning	29 - 111 (58)	96 - 119 (107)	47 - 58 (52)
Thin-from-Below 50% Canopy Cover	529	54 - 389 (217)	93 - 208 (135)	55 - 78 (65)	Immediately after thinning	31 - 113 (77)	85 - 105 (92)	47 - 50 (49)
					20 years after thinning	30 - 109 (74)	108 - 160 (120)	51 - 69 (57)
					40 years after thinning	29 - 105 (71)	114 - 155 (139)	52 - 75 (61)
Uneven Age Thin 30% Canopy Cover	515	89 - 303 (210)	55 - 122 (102)	36 - 64 (55)	Immediately after thinning	31 - 90 (51)	40 - 55 (48)	28 - 31 (30)
					20 years after thinning	29 - 240 (54)	65 - 77 (70)	36 - 43 (39)
					40 years after thinning	28 - 232 (52)	75 - 102 (88)	39 - 52 (46)
Uneven Age Thin 40% Canopy Cover	5,003	58 - 867 (280)	61 - 287 (121)	45 - 89 (60)	Immediately after thinning	36 - 788 (128)	59 - 79 (69)	38 - 43 (40)
					20 years after thinning	35 - 767 (147)	80 - 130 (93)	43 - 57 (49)
					40 years after thinning	35 - 737 (143)	96 - 147 (113)	48 - 68 (55)
Uneven Age Thin 50% Canopy Cover	2,009	64 - 467 (208)	53 - 170 (111)	44 - 73 (60)	Immediately after thinning	58 - 398 (96)	82 - 97 (92)	48 - 51 (49)
					20 years after thinning	56 - 387 (92)	109 - 136 (118)	53 - 61 (57)
					40 years after thinning	53 - 375 (89)	111 - 157 (136)	54 - 68 (61)

*Values for canopy cover, basal area, and trees per acre are ranges derived from Forest Service stand exam data and Forest Vegetation Simulator models. The mean values in parenthesis are values averaging across all stands with similar canopy cover objectives.

Forest Structure and Composition

This section describes forest and grassland structure needs for specific wildlife habitat areas. While all three mechanical thinning types remove trees to achieve wildfire and fuel risk needs to some extent, specific habitat and forest structure needs will influence thinning treatments.

Table 6 describes forest densities before and after the proposed thinning treatments. Canopy cover values will be averaged across an entire stand (e.g. 40%), but the number of trees remaining and basal area will be influenced by existing age and size class distribution and the size and locations of openings in the area.

Not all values listed in Table 6 may meet the Desired Future Condition values as listed in Table 3 after treatment. For example, a basal area of 150 is desired for a Target/Threshold stand after treatment. While canopy cover may be met, the basal area

value will not be achieved. In other words, while the canopy cover is met, the size of the trees in the area will not be met because of existing stand structure. It is important to note that while the proposed treatment in this stand may not meet the desired basal area value immediately after treatment, the stand will meet the 150 basal area goal much faster than if no treatment occurred at all. Lower stand densities will allow remaining trees to grow quicker than if no trees are thinned. Collectively, desired future conditions for forest structure and composition can be met even if one measure (e.g basal area) is not.

Forest Structure Common to all Treatment Areas

Stand Density

Canopy cover was identified as the primary measure to display differences in thinning treatments since it is a measure common to numerous resource areas in determining treatment effectiveness. After thinning, canopy cover will range between 30-50% in the project area, depending on wildlife, fuels, and forest structure needs.

Age, Size, and Species Diversity

Treatments will be implemented to achieve desired VSS distribution across the landscape. [VSS distribution is currently determined on a stand-level basis. While this provides a good indicator of tree size and distribution within a stand, it is not a good indicator of how tree size and age class are distributed across a project area. For example, a VSS 4 stand has 12-18 inch trees contributing the most basal area in the stand than any other size class. It is likely that numerous clumps of smaller diameter trees and openings in this stand exist as well. To achieve a more accurate distribution of VSS classes, treatments are designed to meet VSS distribution across the landscape and not within individual stands.

Mechanical treatments will primarily focus on removing small diameter trees to meet wildfire and fuels risk and forest structure needs. The three treatment types maximize the retention of large, mature trees to increase fire-resilience, develop old growth, and promote a more sustainable forest structure. Where possible (away from private property), treatment will create or lead to the development of an uneven aged forest structures. In certain situations, trees between 16-24 inches DBH will be removed to meet ecological objectives. The attached HFRA compliance paper describes these situations and the rationale for removal of large diameter trees.

Spatial Arrangement

Tree arrangement after thinning will mimic historic patterns of tree distribution across the landscape. Variation in tree spacing, clump or group sizes, and canopy gaps will provide a mosaic pattern of individual and clustered trees interspersed among openings or meadow areas. Openings will be created or enhanced in forested stands and will range in size and shape, depending on wildlife habitat locations and Forest Plan requirements.

This mixture of openings and tree patterns will achieve numerous fuel reduction and spatial distribution needs in the area. Openings will promote understory vegetation productivity and diversity, increase tree regeneration, and break up fuel loads, while clumps of trees can help maintain important wildlife habitat features such as interlocking

canopies, prey species habitat, and thermal and hiding cover. Opening sizes for different wildlife habitat areas are listed in Table 7.

Table 7 - Opening sizes by Wildlife Habitat Areas

Wildlife Habitat Area	Opening Size
Northern Goshawk Foraging Areas	¼ to 4 acres
MSO Restricted and Target/Threshold Habitat	¼ to 2 acres
MSO Protected Habitat	¼ to ¾ acre
Northern goshawk PFAs	¼ to 2 acres

Northern Goshawk Foraging Areas

Those areas outside of MSO habitat and northern goshawk PFAs are termed northern goshawk foraging areas. Thinning in these areas includes thin-from-below treatment on 2,836 acres and uneven-aged treatment on 5,438 acres. Treatments in these areas are designed to maximize fuels reduction while still meeting Forest Plan direction for goshawk foraging areas. Canopy cover in these areas will range from 30-50% after treatment.

Approximately 514 acres of these areas will be thinned to historic stand densities. The number of trees left per historic evidence (tree stumps, old logs) will be determined on the ground but treatment will meet a minimum 30% canopy cover objective. Trees selected for retention will be based on existing forest structure.

Treatments will reduce canopy cover, basal area, trees per acre, and SDI. An uneven age structure will remain after treatment.

Northern Goshawk Post Fledging Family Areas

Three northern goshawk Post Fledging Family Areas (PFAs) exist in the project area. PFAs will receive an uneven aged thin on approximately 857 acres. Thin-from-below treatment will occur on approximately 145 acres. Canopy cover and tree densities will be higher in the 180-acre nest areas and lower in other areas of the stand but will average 50% canopy cover across the stand. Thinning activities will emphasize improving nesting and roosting habitat, maintaining the yellow-barked pine component, and reducing fire risk to the nest stands as well as private property.

Mexican Spotted Owl Restricted Habitat

Thinning treatments in restricted habitat include both thin-from-below on 382 acres and uneven age management on 1,616 acres. Thinning will be designed to improve foraging habitat, maintain the large oak and yellow-barked pine component, and reduce the threat of fire to these areas and adjacent MSO Protected and Target/Threshold habitat. Canopy cover values after thinning will range from 40-50%.

Mexican Spotted Owl Target/Threshold Habitat

Two stands are designated as target/threshold habitat in the project area. Uneven age thinning will occur on 147 acres to maintain nesting and roosting habitat and reduce fuels. Canopy cover values after thinning will average 50%.

Mexican Spotted Owl Protected Habitat

Approximately 180 acres within the Mexican spotted owl Protected Activity Center (PAC) will receive an uneven age treatment up to 12 inches in diameter at breast height (DBH) to improve nesting and roosting habitat, maintain the large oak and yellow-barked pine component, increase growth rates of remaining trees, create small openings, and reduce fuels and fire hazard ratings. Treatment will prioritize the removal of small diameter trees near mature yellow-barked ponderosa pines and large oaks to reduce ladder fuels and competition to these trees.

Forest Plan direction offers guidance to meet the intent of the 1995 Recovery Plan for the MSO. Thinning up to 9 inches DBH is suggested as a guideline to achieve habitat improvement and fire risk abatement goals. After modeling treatments in the PAC, visiting this area during field trips, and discussing numerous treatment options, it was determined by the district, GFFP Board of Directors, and US Fish and Wildlife Service staff that uneven age thinning up to 12 inches would better meet the intent of the Recovery Plan than a 9-inch limit. Thinning up to 12 inches would enhance habitat components such as understory grasses, forbs and shrubs; reduce competition to large oak and mature yellow-barked pine trees; increase the growth rate of residual trees; and significantly reduce the fire hazard rating of the area, while still maintaining ecosystem structure and function. Some trees under 12 inches DBH would remain to provide for an uneven-age structure. No thinning will occur within the 100-acre nest buffer. Existing canopy cover values after thinning will average 50% and greater.

Old Growth

The proposed thinning treatments will maintain and contribute towards the development of old growth structure and composition in the project area. Approximately 24% (3,574 acres) of the forested lands have been designated as old growth development areas to meet Forest Plan guidance for Vegetation Structural Stage (VSS) distribution and old growth management. Areas were selected based on existing forest structure, age class, and habitat features. While these areas will meet old growth structural objectives sooner than other areas, other areas will also be managed to increase tree growth and ensure the development of old growth areas over time.

Stands designated as old growth development areas will reach old growth structural conditions in different time intervals and will exhibit carrying forest structures over time. Some old growth areas may be more even-aged, with numerous large ponderosa pines and fewer VSS classes. Other areas may have a multi-storied tree component. All old growth development areas will contain openings of various size to increase regeneration and understory productivity and diversity. Many of the old growth development areas designated within the project area also serve as key habitat areas for the northern goshawk, Mexican spotted owl, and Management Indicator Species. See Map 4 – Old Growth Development Areas for a display of stands identified for old growth development.

Slash Treatment

Slash treatment in most areas would consist of either whole tree skidding or machine piling and burning, depending on soil, vegetation, and smoke impacts. Whole trees that are skidded would be de-limbed at landings. Whole tree skidding would not be appropriate in areas that have sensitive plants populations and high densities of residual trees. Slash that remains where trees are cut would be machine piled and burned after the slash cures.

In stands where the initial fuel loading combined with thinning slash does not create broadcast burning problems, or in areas with sensitive soils or plant species, slash may be lopped and scattered to a 1-foot height. This slash would be consumed by prescribed fire after thinning is completed.

Slash would be left in some areas to provide hiding cover to wildlife species. See the Project Design Features section for more detail.

Prescribed Burning

All areas proposed for mechanical treatment would be burned after thinning to remove activity-created slash, duff, and needle cast. After this initial burn, maintenance burning would be conducted periodically (every 4-15 years) to mimic the historic fire interval patterns in southwestern ponderosa pine forests. Maintenance burns aid in reducing fuels loads, raising crown base heights of live trees, and promoting understory growth. Burning would occur when weather and environmental factors such as wind, fuel moistures, and humidity are suitable for burning.

In addition to areas mechanically treated, approximately 1,476 acres would receive a burn-only treatment. These areas that are deferred from mechanical entry include inoperable slopes and forested lands that already meet desired future conditions for forest structure.

Transportation System

The transportation system in the project area will include approximately 47.7 miles of designated open forest roads after thinning and initial prescribed burning activities are complete.

Approximately 3.3 miles of roads will be closed except for occasional administrative use such as fire suppression or search and rescue operations. These administratively closed roads will be gated to prevent access.

This transportation system would provides administrative access for firefighting and provides an arrangement and network of roads that balances the needs of reducing wildfire risk with public access and recreation experience, while meeting forest plan requirements. Approximately 2 miles of open road per square mile section will be maintained to move toward Forest Plan direction.

Agency staff conducted a comprehensive evaluation of the roads system in the project area. Roads not shown on the open road system will be decommissioned. Approximately 55.7 miles of road will be decommissioned to reduce road redundancy, maintenance costs, and impacts to resources such as wildlife habitat and watersheds. Of these 55.7

miles, 9.5 miles have already been authorized for decommissioning through other decisions but due to ineffective prior closure, are still being used currently. This decision will validate decommissioning on these roads.

Various techniques will be used to decommission roads, depending on the requirements necessary to ensure long-term success of the closure and rehabilitation. These techniques include scarifying roads with heavy equipment, reseeding, installing drainage structures, and barricading with rocks or activity generated slash.

See Map 3 – Transportation System for details and locations of the designated open road system.

Temporary Road Construction

To aid in thinning operations, approximately 3 segments of temporary road totaling 1.3 miles would need to be constructed to remove fuels after thinning. These segments would be decommissioned after treatment and reseeded.

Dispersed Camping Designation

Areas in the south end of the project area will be designated for dispersed camping opportunities. These areas are located in areas already used frequently by campers. While these areas would be located in areas with a low to moderate fire hazard and away from communities and important wildlife habitat areas, they would still provide access to popular recreational areas and travel routes. See Map 5 – Proposed Camping Prohibition for areas proposed for closure (dark gray shading).

Treatment Timeframe

The processes of fuel reduction and forest restoration are ongoing events. Restoration of a fire-adapted ecosystem will not be conducted in one treatment; rather numerous treatments would be required over time to restore lands in an adaptive and gradual manner. Mechanical treatment would occur first, followed by prescribed fire and subsequent maintenance burns. Thinning treatments in most areas will be effective for 20-25 years before additional mechanical thinning may be required.

Project Design Features

Applicable Forest Plan standards and guidelines, Best Management Practices, and Forest Service Manual and Handbook direction will be incorporated in project design and implementation. The following features are design elements that further detail management actions, mitigate environmental consequences, and establish priorities for implementation.

Soils and Watershed

- Best Management Practices (BMPs) will be incorporated into activities as a means to prevent or reduce the amount of pollution generated by non-point sources to a level compatible with water quality goals. Best Management Practices will be incorporated into applicable thinning, burning, and road management activities and are located in the Project Record.

Wildlife Protection

Mexican Spotted Owl

- Pre- and post-treatment occupancy monitoring will be conducted in the Protected Activity Center (PAC).
- MSO restricted habitat will be surveyed in the project the year of implementation or one year prior to implementation.
- In protected and restricted habitat where treatments are planned, pre- and post-treatment monitoring will be conducted to determine changes and trajectories in fuel levels; snag basal areas; live tree basal areas; volume of down logs over 12 inches in diameter; and basal area of hardwood trees over 10 inches in diameter at root collar.
- Mechanical thinning and broadcast burning will not occur within the PAC during the breeding season (March 1 to August 31).

Northern Goshawk

- Thinning and hauling within occupied northern goshawk PFAs will not occur during the breeding season (March 1 – September 30).
- Prescribed burn plans for the nest areas will minimize smoke impacts to nesting birds and minimize loss of nest trees.

Coopers's Hawk

- No thinning will occur within 15-acre buffers around Cooper's hawk nest sites located in sites 348/01 and 14, and 357/05.

Turkey

- There are 10 turkey roosts identified within the project area. An additional 6 potential roost trees will be identified prior to thinning treatments. These roost trees will not be thinned and duff and debris will be raked away from the base of roost trees prior to broadcast burning where litter depth layers are greater than 4 inches.

Wildlife Cover

- Maintain hiding cover at least 200 feet wide around known dependable waters in the area.
- No thinning will occur in the two known elk calving areas in units 358/08 and 358/06 between May 15 and June 30.

Snags and Logs

- After burning each designated block, trees may be felled (approximately 12 inches DBH in size), to replace logs burned up during the prescribed fire to meet forest plan guidelines.
- Snags 18 inches in diameter and larger and 3 logs 12 inches midpoint diameter per acre will be fire lined before broadcast burning.

Vegetation Treatment

- Trees greater than 24 inches DBH will not be thinned.
- No mature yellow pines will be thinned. Old 'yellow barked' pine trees will have duff raked away from the bases where high litter depth (greater than 12 inches) may result in girdling and mortality.
- One group of reserve trees, with 3-5 trees per group, will be left per acre in openings greater than an acre in size.

- No oaks will be thinned. Oak mortality will be mitigated for in burn plans by raking duff from the base of large oaks (greater than 10 inches DRC) and not placing slash piles near oaks.
- Best locations for openings include but are not limited to: soils identified with TES that would promote the best revegetation/regeneration; areas with dwarf mistletoe infection; areas with genetically undesirable "apple" trees; clusters of low-vigor trees likely to die or deteriorate; areas with excess numbers of trees with similar diameters; and places where cutting would enhance wildlife habitat values.
- Openings will be irregular in shape and be no greater than 200 feet in width.

Aspen

- No prescribed burning will occur in aspen stands in Priest Draw.

Slash Treatment

- Piles shall be so located that burning will minimize damage standing live trees, snags, down logs, sensitive plants or physical improvements such as fences, poles, signs, and cattleguards.
- Large logs (greater than 12 inches) that exist on the landscape prior to treatment will not be piled during slash treatment.

Sensitive Plants

- Slash piles, fire lines, and temporary road construction activities, and landing sites will not occur within identified populations of *Hedeoma diffusum*.

Non-Native and Invasive Weeds

- Best Management Practices as outlined in the Three Forest Final Environmental Impact Statement for Integrated Treatment of Noxious or Invasive Weeds will be followed to incorporate weed prevention and control into the project. Considering the invasiveness, the extent of these populations, and the potential impacts of these species, the following features will be incorporated into project implementation and monitoring:
- Treatment equipment will be cleaned before entering treatment areas (not roadways) to prevent introduction of invasive weeds.
- To promote native species and hinder weed species germination, early spring burning is preferred (before May 31) to minimize Dalmatian toadflax reproduction and enhance *Hedeoma diffusum* habitat. Late fall burning is the second most preferable treatment window using a low intensity burn.
- After initial burning, monitoring will occur to assess needs for release of biological control targeting Dalmatian toadflax. If needed, this follow-up treatment activity has been cleared through the Final Environmental Impact Statement for Integrated Treatment of Noxious or Invasive Weeds (Feb 2005). Monitoring and release of biological control will follow basic procedures established by APHIS following release.

Recreation

- For public safety, camping will be prohibited within active thinning and burning areas. Thinning activities should be avoided (cutting and hauling) on the following holiday weekends: Memorial Day, Fourth of July, and Labor Day.

Cultural Resource Protection

- Historic and pre-historic cultural resources will be protected during project implementation. All ground-disturbing activities including vehicular use are prohibited within sites. The team archaeologist will flag sites prior to implementation and monitor the sites during burning activities. All sites may be hand thinned to blend in surrounding area treatments.
- Areas where temporary roads will be constructed and where road decommissioning will occur will be inventoried prior to implementation.

Monitoring

Implementation monitoring will assess if the project was implemented as designed and if it complies with Forest Plan direction. Routine implementation monitoring is a part of the administration of all project contracts and involves input from Forest Service specialists.

The Mountainaire Project will include the following implementation monitoring items:

- Fire-sensitive archeological monitoring for site damage from implementation.
- Habitat monitoring of MSO Protected, Restricted, and Target/Threshold Habitat to determine effectiveness of treatments in meeting habitat objectives.
- Fuels monitoring will occur after burning operations to determine if expected fire effects and fuel levels are achieved.
- Noxious weeds monitoring will occur to assess needs for biological control of dalmation toadflax.

Other monitoring activities that the GFFP Monitoring and Research Team develop may be conducted as part of this project if funding and/or volunteer assistance is provided by GFFP or other interested parties.

Decision Framework

Based on the analysis in the Environmental Assessment, the Mormon Lake District Ranger will decide how to best reduce fuel loading and restore fire-adapted lands in the Mountainaire Project area in accordance with Forest Plan direction and desired future conditions. The responsible official will decide whether to implement an action alternative, a modified action alternative (if needed), or the no-action alternative. If an action alternative is selected, it will include:

- The location, design, and scheduling of the proposed mechanical treatment, burning, road management, other activities, or connected actions;
- The estimated timber volume, if any, to make available from the project area at this time;
- Access management measures and;
- Mitigation measures and monitoring requirements.

Attachment 1 - Proposed Transportation System

Road designations in the Proposed Action column include open roads, administratively closed roads, and decommissioned roads.

Forest Road Number	Beginning Point	End Point	Length (miles)	Current Status	Existing Condition	Proposed Action	Surface Type
235B	Barrier	235J	2.7	EXISTING	2	ADMIN	NAT
716	Barrier	132	0.2	EXISTING	2	ADMIN	IMP
716B	716	132	0.4	EXISTING	2	ADMIN	NAT
235	TH	Barrier	1.5	DECOM	1	DECOM	NAT
235B	TH	Barrier	1.5	DECOM	1	DECOM	NAT
700J	700	DE	0.3	DECOM	1	DECOM	IMP
700K	700	DE	0.3	DECOM	1	DECOM	IMP
867C	867A	DE	0.5	EXISTING	1	DECOM	IMP
9456X	3T	867	0.9	EXISTING	1	DECOM	NAT
9423U	237A	DE	0.18	IN USE	1	DECOM	IMP
3G	3E	DE	0.7	IN USE	1	DECOM	IMP
3H	3J	DE	0.7	IN USE	1	DECOM	IMP
3J	3E	DE	0.8	IN USE	1	DECOM	IMP
3L	3E	707D	0.3	IN USE	1	DECOM	IMP
3M	3E	DE	0.3	IN USE	1	DECOM	IMP
3R	3N	DE	0.2	IN USE	1	DECOM	IMP
700M	700	PVT	0.3	DECOM	2	DECOM	NAT
714E	714	DE	0.5	DECOM	2	DECOM	NAT
762M	762	PVT	0.5	DECOM	2	DECOM	NAT
9420N	867A	PVT	0.3	EXISTING	2	DECOM	NAT
9420N	PVT	PVT	0.75	EXISTING	2	DECOM	NAT
9420N	3E	PVT	0.1	EXISTING	2	DECOM	NAT
3K	3E	DE	0.3	EXISTING	2	DECOM	IMP
235	Corner	235A	0.8	EXISTING	2	DECOM	NAT
235C	235	235A	1.3	EXISTING	2	DECOM	NAT
700A	700	DE	0.4	EXISTING	2	DECOM	IMP
700B	700	DE	0.5	EXISTING	2	DECOM	IMP
700C	700	DE	0.3	EXISTING	2	DECOM	IMP
700G	235K	7OOL	0.8	EXISTING	2	DECOM	IMP
700L	700G	PVT	0.6	EXISTING	2	DECOM	IMP
703	700H	700	1.3	EXISTING	2	DECOM	AGG
707A	707	707	1.1	EXISTING	2	DECOM	IMP
707B	707A	707	0.5	EXISTING	2	DECOM	IMP
707C	707A	762	0.5	EXISTING	2	DECOM	IMP
707D	3N	DE	0.8	EXISTING	2	DECOM	IMP
714A	714	DE	0.6	EXISTING	2	DECOM	IMP
714C	714	DE	1.1	EXISTING	2	DECOM	IMP
714D	714	DE	1	EXISTING	2	DECOM	IMP
716	714	Barrier	1.2	EXISTING	2	DECOM	IMP

Forest Road Number	Beginning Point	End Point	Length (miles)	Current Status	Existing Condition	Proposed Action	Surface Type
716A	716B	132	1.2	EXISTING	2	DECOM	NAT
762E	762	762D	0.6	EXISTING	2	DECOM	IMP
866	Tank	867	1.8	EXISTING	2	DECOM	IMP
866A	866	DE	1.1	EXISTING	2	DECOM	IMP
867A	9420N	867D	0.4	EXISTING	2	DECOM	IMP
9419R	9486X	DE	0.6	EXISTING	2	DECOM	NAT
9419S	716	DE	0.7	EXISTING	2	DECOM	NAT
9419T	714D	DE	0.7	EXISTING	2	DECOM	NAT
9419V	9483W	DE	0.8	EXISTING	2	DECOM	NAT
9420M	762	PVT	0.2	EXISTING	2	DECOM	NAT
9420R	235C	PVT	0.2	EXISTING	2	DECOM	NAT
9456P	867	DE	0.7	EXISTING	2	DECOM	NAT
9456Q	9456P	DE	0.3	EXISTING	2	DECOM	NAT
9456Y	866	DE	0.3	EXISTING	2	DECOM	NAT
9478B	FH3	DE	0.6	EXISTING	2	DECOM	NAT
9483W	132	DE	1.3	EXISTING	2	DECOM	NAT
9484T	762D	PVT	0.1	EXISTING	2	DECOM	NAT
235F	235A	DE	0.8	EXISTING	OPEN	DECOM	IMP
235G	235A	DE	0.6	EXISTING	OPEN	DECOM	IMP
9419U	762	235	1.6	EXISTING	1	OPEN	NAT
867D	867	867A	1.1	DECOM	2	OPEN	IMP
867A	866	867D	1.6	EXISTING	2	OPEN	IMP
867A	9420A	867	0.2	EXISTING	2	OPEN	IMP
3E	Boundary	762	2.7	EXISTING	2	OPEN	AGG
3N	3E	DE	1.1	EXISTING	2	OPEN	IMP
235	132	TH	0.4	EXISTING	2	OPEN	AGG
235	Barrier	PVT	1.7	EXISTING	2	OPEN	NAT
235	PVT	Corner	0.4	EXISTING	2	OPEN	IMP
235	235A	235K	0.4	EXISTING	2	OPEN	NAT
235	235K	Boundary	2.3	EXISTING	2	OPEN	NAT
235A	235	Corner	2.3	EXISTING	2	OPEN	NAT
235H	235A	235	0.8	EXISTING	2	OPEN	IMP
235J	235	235	2.7	EXISTING	2	OPEN	NAT
235K	700	235	1	EXISTING	2	OPEN	IMP
707	762	237A	1.8	EXISTING	2	OPEN	IMP
714	867	PVT	2.1	EXISTING	2	OPEN	IMP
762	Boundary	PVT	0.4	EXISTING	2	OPEN	NAT
762	PVT	762D	1.5	EXISTING	2	OPEN	NAT
762	762D	867	0.4	EXISTING	2	OPEN	AGG
762	867	707	1.5	EXISTING	2	OPEN	NAT
762	707	236C	0.8	EXISTING	2	OPEN	NAT
762B	235	PVT	0.6	EXISTING	2	OPEN	AGG
762D	762	762B	0.6	EXISTING	2	OPEN	IMP
762L	762	235	1	EXISTING	2	OPEN	NAT
866	3E	Tank	0.4	EXISTING	2	OPEN	IMP

Forest Road Number	Beginning Point	End Point	Length (miles)	Current Status	Existing Condition	Proposed Action	Surface Type
867	FH3	762	3.1	EXISTING	2	OPEN	AGG
132	FH3	Boundary	5.7	EXISTING	3	OPEN	AGG
237A	236C	Boundary	1.9	EXISTING	3	OPEN	AGG
700	236C	Boundary	3.4	EXISTING	3	OPEN	AGG
700H	I-17	700	0.7	EXISTING	3	OPEN	AGG
236C	I-17	PVT	1.5	EXISTING	4	OPEN	BST

Attachment 2 – Healthy Forests Restoration Act Authorities for the Mountainaire HFRA Project

This analysis provides a description of how the Mountainaire HFRA 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 Mormon Lake Ranger District 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 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 February 2005, 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 (October 2004) 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 3,574 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 Mountainaire Project Need for Change Report (November 2004). 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 silviculturalists 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 project, 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 GFFP Project Team field trips. Forest Service silviculturalists 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 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.

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. There are 255 stands within the project area and they range in size from a few to a few hundred acres. 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 this analysis. Rather, estimates are 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 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 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 approximately 1,939 acres of forested land within the project area that contain 30 or more large trees per acre. There is a high probability that some large trees in these stands will need to be removed to meet project needs other than the creation of openings.

The Forest Service ran preliminary treatment simulations through the FVS program on all 255 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. Of those stands, only 9 had stand structures that warranted removal of some 16 to 18-inch DBH trees to meet canopy cover values and un-even aged management objectives. One additional stand required removal of some trees 16 to 19 inches DBH to meet these objectives. These stands could also require removal of large trees to meet other objectives such as creating openings or reducing competition to mature oaks and ponderosa pines.

For example, Stand 358:009 is proposed for a thin-from-below treatment with a 50% canopy cover target to meet wildlife, forest health, and fuels reduction objectives. Using FVS simulations, the stand would retain 45 trees per acre, a basal area of 99 ft2 per acre, and a canopy cover of approximately 50% after treatment. The program predicts that the removal of 15 trees per acre between 16-18 inches DBH and 7 trees per acre between 18-20 inches DBH is required to meet canopy cover objectives. After treatment, the stand would contain 10 trees per acre 12-18 inches DBH, 27 trees per acre 18-24 inches DBH, and 8 trees per acre greater than 24 inches DBH. If no large trees are removed and all trees up to 16 inches DBH are removed, values after treatment would still include 67 trees per acre, a basal area of 136 ft^2 per acre, and a canopy cover of approximately 60 percent. In this scenario, the resulting structure would not meet canopy cover objectives.

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 2 to 12 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[3.]

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

[3] 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.

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).

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, twenty-three stands within the project area contain some level of DM infection. The severity of dwarf mistletoe infection for the Mountainaire Project area is displayed in Table 2. 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. Within the project area, two stands are severely infected, two stands are moderately infected, and nineteen stands are lightly infected with DM. Dwarf mistletoe infection ranges from 35 to 177 trees per acre in moderately to severely infected stands. Mortality ranges from 7 to 19 trees per acre in moderately to severely infected stands.

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 Mountainaire Project area, a limited number of infected, overstory large trees would be removed over an estimated 2,876 acres where DM exists. Large trees would most likely be removed in those areas where dwarf mistletoe ratings are severe (352 acres). Large trees would be removed to a much lesser degree in areas of light to moderate dwarf mistletoe ratings.

Table 1 – Existing severity of dwarf mistletoe infection within the project area.

EXISTING CONDITIONS				
Dwarf Mistletoe Severity	**Acres**	**Mean Dwarf Mistletoe Rating (DMR)**	**Trees per Acre Infected**	**Trees per Acre Mortality**
Light 0-0.9	2311	0.3	4 - 65	0 - 4
Moderate 1.0-1.9	213	1.1	35 - 132	7
Severe 2.0+	352	2.3	111 - 177	17 - 19

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. Forest Service staff in the 1970s and 1980s planted many of these previously logged areas with seedlings to grow more trees for future harvest. The resulting landscape includes larger trees interspersed among overstocked “plantation” areas that hold numerous small trees.

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.