Eastside Fuels Reduction and Forest Health Project

Purpose and Need for Action and Proposed Action 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 Eastside Project is the fifth large-scale project that GFFP has assisted the Coconino National Forest with project planning and design.

The Peaks and Mormon Lake Ranger Districts have worked collaboratively with GFFP over the past year to jointly develop proposals to treat the southern and eastern areas around the Flagstaff area. The project also includes treatment proposals in the wildland urban interface (WUI) around the communities of Doney Park, Cosnino, Timberline and the base of Mt. Elden. We are also including a detached project at the Elden Electronics site on the top of Mt. Elden to add a measure of fire protection to this important communication site. 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 2006, the Ranger Districts 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 (See Attachment 4 for a discussion about the HFRA process).

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 Eastside Project Need for Change Report (located in the Project Record). Specifically, this project is aimed at restoring fire-

adapted ecosystems and reducing the threat of severe wildfires in and around the project area.

The Purpose and Need for Action for this project is focused on two planning topic areas: Fire-Adapted Forest, Woodland and Grassland Structure; and Wildfire and Fuels Risk. Within each of these topic areas, 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 difference between these two conditions and lists the needs for changed conditions.

Fire-Adapted Forest, Woodland and Grassland Structure

Existing Conditions

Disruption of the historic fire regime has resulted in changes in age and size class diversity, altered stand structure, changes in successional dynamics, and decreased horizontal heterogeneity. Past logging practices have removed the vast majority of old forest trees, while fire suppression and climatic events favored denser ponderosa pine, pinyon pine and juniper regeneration. The resultant forest structure within the project area is even aged and approximately 80-90 years old, on average.

Stand Density

Only 10% of the project area has fairly high stand densities, resulting in increased competition between trees for moisture, nutrients, and sunlight; decreased tree vigor; increased susceptibility to successful bark beetle attack and mortality; decreased diameter growth; decreased “yellow” ponderosa pine and Gambel oak longevity; decreased natural regeneration; and decreased understory productivity and diversity. Eventually, those trees that are out-competed will die, resulting in increased fuel loading, increased fire hazard, and increased risk of bark beetle attack to residual trees.

Average canopy cover by stand ranges from 10% to 80%. The average basal area ranges from 52 to 198 ft^2 per acre. Stand Density Index (SDI) is a relative measure of stand density based on trees per acre and mean diameter. SDI is useful in maintaining sustainable forest conditions because it can be used to measure competition thresholds, which are very important in a moisture-limiting system. Currently, 43 % of the forested Forest Service lands within the project area are above 25% max SDI.

Grasslands in the project area consist of meadows that vary in size from just a few acres too much larger areas. Natural meadows are located in frost pockets or have soil or moisture conditions that are not conducive to conifer growth. A wide variety of species of grasses and forbs characterize the vegetation, which varies according to soil moisture and temperature. In some areas, the meadows are dwindling through channel erosion and subsequent dropping of the water table. This results in encroachment by conifers and other species.

Age, Size, and Species Diversity

Vegetative Structural Stage (VSS)[1] is one way to measure size and age class distribution within a stand. Percentages of VSS are calculated for ponderosa pine across all management areas as well as individual management areas. VSS is not calculated for pinyon-juniper, grassland or oak vegetation types. Currently, 62% of ponderosa pine forested Forest Service land within the project area is young to mid-aged forest (VSS 3 and 4) and 34% is in the mature/old forest structural stage classes (VSS 5 and 6). Grass, forb and shrub and seedling/sapling classes (VSS 1 and 2) represent less than 5% of the project area. While VSS 6 stands represent the old forest structural stage and include a large trees component, VSS 6 stands are not necessarily considered old growth areas. Old growth areas have specific habitat component requirements that VSS 6 stands may not offer.

Spatial Arrangement

Historically, ponderosa pine forests of northern Arizona were characterized by frequent, low-intensity surface fires occurring every 3 to15 years. Historic fires maintained an open canopy structure and a variable, patchy tree distribution across much of the forest by thinning smaller trees (Moir et al. 1997, Covington et al. 1997). Ponderosa pine forests were uneven-aged and consisted of fewer, larger, and older trees interspersed with grassy openings. In spite of the disruption to the historic fire regime, an open, park-like forest structure and variable, patchy tree distribution still exists in some areas due primarily to lower moisture and poorer soil conditions. Closed canopy stand structure, occurring on 10% of the forested acres, has resulted in decreased understory productivity and diversity, increased inter-tree competition, decreased tree growth and vigor, increased susceptibility to insects and disease, increased fuel continuity, increased crown fire potential, and increased fire size and intensity (Long 2003).

Table 1 – Existing and Desired Vegetative Structural Stage (VSS) Values for all Forested Stands.

VSS	Existing Distribution	Desired Distribution
VSS 1 - Grassy Openings	**2%**	**10%**
VSS 2 - Seedlings/saplings	**2%**	**10%**
VSS 3 - 5-11.9 inches	**28%**	**20%**
VSS 4 - 12-17.9 inches	**34%**	**20%**
VSS 5 - 18-23.9 inches	**24%**	**20%**
VSS 6 - 24 inches and greater	**10%**	**20%**

[1] Vegetative Structural Stage (VSS) classifications include:

VSS 1 = Openings **VSS 4 = 12-17.9" DBH**
VSS 2 = Seedlings/saplings **VSS 5 = 18-23.9" DBH**
VSS 3 = 5-11.9" DBH **VSS 6 = 24" and greater DBH**

Table 2 – Forest Density and Composition Values

Measure	Desired Future Conditions
Canopy Cover	Northern Goshawk Foraging Areas > 40% (as measured at the clump and group level) Northern Goshawk PFAs > 50% (as measured at the clump and group level) MSO Protected Habitat (There are no treatments proposed in the 11 acres of MSO Protected Habitat in the Project Area) MSO Restricted Habitat 40-50%
Total basal area (ft2/acre) for all tree species	Meadows and Grasslands 0-40 Northern Goshawk Foraging Areas 20-100 MSO Protected 150 MSO Restricted 80-150
Maximum Stand Density Index	0-35% in Northern Goshawk Foraging areas and MSO restricted habitat. 0-45% in Northern Goshawk PFAs
Opening Size	Northern Goshawk Foraging Habitat – ¼ to 4 acres Northern Goshawk PFAs – ¼ to 2 acres Restricted – ¼ to 2 acres

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 2 describes desired future conditions for forest density and is organized by habitat designations. Those areas outside of MSO habitat and northern goshawk PFAs are termed northern goshawk foraging areas.

Stand Density

Stand densities are at levels where there is decreased competition between trees for moisture, nutrients, and sunlight; increased tree vigor and diameter growth; decreased susceptibility to successful bark beetle attack and mortality; and increased “yellow” ponderosa pine and Gambel oak longevity.

Target values to achieve these desired goals include a basal range of 20-100 ft^2 per acre, and a max Stand Density Index (SDI) below 35% on a majority of the area. Areas infected with dwarf mistletoe should range from 15-25% SDI.

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.

Age, Size, and Species Diversity

The desired future conditions for the Eastside Project area includes a forest structure that distributes tree age and size classes more evenly among VSS classes as listed in the Forest Plan. The desired values stem directly from Forest Plan direction for northern goshawk management. Forested stands will exhibit uneven-aged structure to provide improved stand successional dynamics in the ponderosa pine vegetation type.

This VSS distribution may not be achievable in Management Area 6 areas since low soil productivity or other factors may prevent larger size classes and canopies from forming. Treatment in Management Area 3 lands may have to compensate for vegetative growth patterns in these MA6 areas.

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.

There are a number of Quaking Aspen stands throughout the project area that need protection and regeneration. Conifer species are often encroaching the aspen stands. The desired condition would remove most encroaching conifer species. Aspen stands would be fenced for protection of regeneration.

Spatial Arrangement

Tree distribution is variable and patchy. Groups or clumps of trees exist in many areas with variable canopy cover to allow for wildlife and prey species habitat, tree regeneration, and understory diversity. Groups of trees are located in areas where historic evidences of trees exist or where best stand structure exists at the time of implementation. A diverse age and size class occurs in some clumps. Interlocking crowns occur in some clumps to provide habitat for wildlife species.

In some places, forested lands exist as grassy openings that range from 0.5 - 4 acres in size to provide regeneration areas for trees as well as provide understory diversity.

Need for Change

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

- Stand density values and structural arrangements that meet the desired future conditions for forests and woodlands;
- Restored historic vegetative structural patterns in forests and grassland areas;
- Clumped and grouped spatial arrangement of trees;
- Reduced threat from bark beetle attack through improved tree vigor and resistance by reducing tree densities to improve individual tree and stand health;
- An uneven-aged forest structure; and
- Openings that provide for understory diversity and early VSS class initiation.
- Protection and regeneration of Aspen stands.

Wildfire and Fuels Risk

Existing Conditions

Within the project area the Side fire occurred in 1996 and the Radio fire occurred in 1977. These two large wildfires demonstrate the probable result of wildfires in the project area if left untreated. The area's natural fire regime is frequent (every 3-15 years) surface fires. The lack of fire has allowed dense vegetation and surface fuels to accumulate. It has also allowed species composition and stand structure to change (i.e. Ponderosa pine has shaded out oak trees). It has allowed trees and shrubs to encroach on meadows and drainage bottoms.

The natural fire regime allowed the area to maintain a balance of species well suited to the soils and climate of the area. Urban development has required the Coconino N.F. to aggressively suppress all wildfires in the area disrupting the natural fire regime. That urban development has also made it difficult to execute sufficient prescribed burning to maintain a desirable low fuel load and balanced specie mix throughout the area.

Fire Hazard Ratings

One method to evaluate the risk of wildfire to an area is to determine 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[2]. It is a relative measure to demonstrate fire resilience between stands. It is a good indicator of how effectively and safely fire suppression crews can attack a wildfire and bring it under control.

The same criteria used to determine the fire hazard ratings of previous Greater Flagstaff Forests Partnership (GFFP) projects will be used for this project to maintain consistency and allow direct comparison between project areas. These criteria include canopy cover,

[2] 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

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 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.

High canopy closure values and low crown heights, combined with an increasing number of stems per acre elevate the fire hazard beyond desirable levels for many portions of the project areas. The existing fire hazard makes it difficult for initial attack operations to control a wildfire starting under severe weather conditions that occur in April, May, June, September, and October. Table 3 describes existing values of some of these fire hazard rating criteria.

Table 3 - Fire Hazard Rating Criteria

Measure	Current Value	Desired Value
Height to Live Crown	1 – 20 feet	20+ feet
Dead and down fuel	1 – 22 Tons per Acre	5 – 7 Tons per Acre
Canopy Cover	10 – 80 %	40 – 50%
Stems per Acre Ponderosa Pine	10 – 500	Less than 300
Fuel type	Ponderosa pine, pinyon-juniper, grassland.	Same, but with reduced encroachment
Flame lengths	2.5 – 8	Less than 3.5
Fire Regime Condition Class	1 – 3	1 - 2

Current fire hazard ratings of the project area:

Extreme	472 acres
Very High	989 acres
High	3,220 acres
Moderate	9,824 acres
Low	6,543 acres

The Pinyon/Juniper vegetation type within the project area (located just east of the Cosnino road) contains a high number of dead standing Pinyon trees. This area has a heavier dead and down fuel load than much of the rest of the project area. Due to the recent "bug-kill" it also has a heavier load of dead standing fuel. It has a moderate canopy closure, low crown base-height, and a lower average tree height. These factors result in fire hazard ratings of moderate to high.

However, the fine fuel component (grasses and long-needles) which allows a wildfire to ignite easily and spread rapidly is generally absent from this area of Pinyon Pinyon/Juniper. Needles are short and the litter layer is compact and discontinuous. Where the standing and down fuel load is greatest grasses are generally absent, even after the prolific grass production of 2005.

Wildfires occurring in this area of Pinyon/Juniper can be expected to spread slowly in all but the most severe fire weather. They would be expected to burn intensely with short-range spotting and a slower spread rate than the Ponderosa Pine and even the pine/oak woodlands.

Flame Lengths

Flame length is a measure of fire intensity and anticipated tree mortality from wildfire. Expected flame lengths within the area range from 3 to 8 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 2 to 9 feet. The current difference between expected flame lengths and critical flame lengths is small. A smaller difference 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.

Across much of the project area 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 many 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 difficulty in controlling a wildfire occurring in much of the area under severe weather condition.

Human use (presence of roads, trails, and dispersed camping) of the area has also increased the risk of a human-caused fire ignition.

Desired Future Conditions

A low or moderate fire hazard rating would exist across a majority of the project area. Some stands might 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 would support habitat needs but remain low enough to support low to moderate intensity burns on a regular basis. Expected flame lengths would be less than 3 feet. Crown base heights would be high and flame lengths required to initiate a crown fire would be above 15 feet in most areas.

Need for Change

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

- Low and moderate fire hazard ratings in ponderosa pine forests;
- Conditions in ponderosa pine forests resulting in ground fire flame lengths of 2-3 foot and low probability of transforming to a crown fire;
- Fuel loads 5-7 tons per acre in ponderosa pine forests;
- Conditions leading to crown base heights 20 feet or greater in ponderosa pine forests;
- Conditions where prescribed surface fires can be safely executed in ponderosa pine forests; and
- Conditions in pinyon juniper woodlands that reduce the risk of fire spreading to other areas

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 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

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Table 4 – Management Activities and Rationale

Management Activity	Purpose and Need for Action
Mechanical thinning on approximately 3,679 acres **Hand thinning on approximately 3,327 acres** **Thinning treatments will be followed by pile and Prescribed burning.**	**Wildfire and Fuels Risk** - Low and moderate fire hazard ratings in ponderosa pine forests. - Conditions leading to 2-3 foot flame lengths and low probability of fires transitioning to a crown fire in ponderosa pine forests - Conditions leading to crown base heights 20 feet or greater in ponderosa pine forests. - Conditions where low to moderate intensity surface fires can be maintained or introduced in ponderosa pine forests. **Fire-adapted Forest and Grassland Structure** - Canopy cover, basal area, trees per acre, and Stand Density Index values that meet the desired future conditions for forests and woodlands. - Restored historic vegetative structural patterns in forests and grassland areas. - Clumped and grouped spatial arrangement of trees. - Reduced risk and improved resistance to bark beetle attack - An uneven-aged forest structure. - Openings that provide for understory diversity and early VSS classes initiation.
Fuel Break Construction based on a fuel zone of treatment on approximately 377 acres (6.9 miles), to be followed by pile and prescribed burning.	**Wildfire and Fuels Risk** - Conditions in pinyon juniper woodlands that reduce the risk of fire spreading to other areas.

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Management Activity	Purpose and Need for Action
Prescribed Burn Only treatments w/ selected group and clump thinning in the WUI **Initial prescribed burning on approximately 12,872 acres. Clump thinning occurs in selected dense clumps and groups of trees adjacent to private land on approximately 165 acres.**	**Wildfire and Fuels Risk** - Low and moderate fire hazard ratings in ponderosa pine forests. - Conditions leading to 2-3 foot flame lengths in ponderosa pine forests. - Conditions where low to moderate intensity surface fires can be maintained or reintroduced in ponderosa pine forests. - Fuel loads 5-7 tons per acre in ponderosa pine forests.
Maintenance burning on approximately 20,506 acres **Maintenance burn acreage is a combination of prescribed burn only and mechanical, hand thinning, fuel break, and meadow restoration treatments.**	**Wildfire and Fuels Risk** - - Conditions leading to 2-3 foot flame lengths in ponderosa pine forests. - Conditions where low to moderate intensity surface fires can be maintained or reintroduced in ponderosa pine forests. - Fuel loads less than 7 tons per acre in ponderosa pine forests.
Hand and mechanical thinning and prescribed burning at the Elden Electronics Site on approximately 21 acres	**Wildfire and Fuels Risk** - Reduce threat from wildfire to electronics site improvements. - Conditions leading to 2-3 foot flame lengths from a surface fire. - Conditions where low to moderate intensity surface fires can be maintained or reintroduced.
Restoration of mountain meadows/grasslands by removal of invading ponderosa pine on approximately 230 acres.	- Restored historic vegetative structural patterns in forests and grassland areas
Noxious or invasive weed control and protection.	- Mitigation measures to prevent and control the spread of plants from management actions. - Control certain populations within the project area. - Identification of control projects on selected existing populations not related to Eastside management actions. - Monitoring and control follow-up following Eastside management actions.

Mechanical and Hand Thinning

Approximately 3,679[3] acres will be mechanically thinned and approximately 3,327 acres will be hand thinned within the area. These treatments are displayed in the Proposed Action map. 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.

All thinning treatments are designed to enhance or lead towards an uneven-age stand structure. Treatments will reduce expected flame lengths, lower fire hazard ratings, and increase crown base heights by removing most ladder fuels. 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. Table 5 displays forest density objectives and acreages by thinning type.

Heavy Mechanical Thinning

These treatments will occur in stands that have a majority of trees in the 5-12 inch diameter at breast height (DBH) size class (VSS 3). Treatments will be uneven-aged and focus on smaller diameter tree thinning. Treatments will occur in areas that are in close proximity to communities or biologically important areas. Treatments will create larger openings (up to 4 acres) to provide for future tree regeneration and understory development, and maximize the reduction in fuels and fire hazards ratings over a longer period of time than other thinning treatments.

Moderate Mechanical Thinning

These treatments will occur primarily in stands that have a majority of trees in the 12-18 inches DBH size class (VSS 4) but also occur in a few VSS 5 stands. Treatments will be uneven-aged and focus on smaller diameter tree thinning. This treatment type includes the majority of lands targeted for mechanical thinning. Stand density values will meet Forest Plan habitat requirements for Mexican spotted owl (restricted habitat within the Urban-Rural Influence Zone) and northern goshawk (foraging areas) and other wildlife species while still reducing fuels and fire hazard ratings in these and adjacent areas.

Light Mechanical Thinning

These treatments will occur in stands that have a majority of trees greater than 18 inches DBH (VSS 5 and 6). Treatments will be uneven-aged and focus on smaller diameter tree thinning. This treatment type will primarily occur in areas that hold important wildlife habitat for Mexican spotted owl restricted habitat. These areas will be the densest of all thinned areas after treatment to provide adequate cover and habitat needs for wildlife species and meet Forest Plan direction.

[3] 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.

Hand Thinning

Generally within areas of this designation, trees up to 12 inches DBH would be thinned by hand because mechanical access is limited or mechanical thinning cannot be sufficiently mitigated to achieve resource objectives. For example, many areas are proposed for hand thinning where mechanical thinning may affect archaeological sites and rare and sensitive plant species or exacerbate noxious and invasive weed problems. Some of these areas may be treated by mechanical means if impacts can be mitigated.

Restoration of Mountain Meadows and Grasslands

To restore meadows and grasslands back to historic vegetation and function mechanical and hand thinning treatments will be used to remove most ponderosa pine trees that have invaded mountain meadows/grasslands on 230 acres however, no yellow pine trees would be removed.

Table 5 - Forest Densities by Thinning Type

Treatment Type	Acres	After Treatment			
		Stand Density Index	Trees per Acre	Basal Area	Canopy Cover
Heavy Mechanical Thin	1,134	60 – 100 (80)	20 - 60 (40)	40 - 60 (50)	25 – 35 (30)
Moderate Mechanical Thin	2,511	90 – 140 (90)	30 – 70 (50)	60 - 80 (70)	35 – 45 (40)
Light Mechanical Thin	34	130 – 180 (150)	40 - 80 (60)	80 - 100 (90)	45 - 55 (50)
Hand Thin	3,327	30 – 200 (120)	20 - 100 (60)	20 - 120 (70)	10 - 60 (45)

*Values for canopy cover, basal area, SDI 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. Does not include acreage for Elden Electronics Site, fuel break, and mountain meadow/grassland treatments.

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 5 describes forest density values after the proposed thinning treatments. Canopy cover values will be measured at the clump or group level within goshawk treatment areas and averaged across an entire stand (e.g. 40%) in MSO treatment areas, 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.

Forest Structure Common to all Areas Proposed for Thinning

Stand Density

Canopy cover, basal area, trees per acre, SDI, and age class are identified as primary measures to display differences in thinning treatments since they are common to numerous resource areas in determining treatment effectiveness. After thinning, canopy cover and basal area values will range between 25-60% cc and 40-120 basal area 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 the dominant tree size within a stand, it is not a good indicator of how other tree size classes are distributed within a stand or 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 the desired VSS classes, treatments are designed to meet VSS distribution across the landscape and not within individual stands.

Mechanical treatments will focus on removing smaller diameter trees to meet wildfire and fuels risk and forest structure needs. These treatments maximize the retention of large, mature trees to increase fire-resilience, develop old growth, and promote a more sustainable forest structure. Treatments will create or lead to the development of an uneven aged forest structure. In rare situations, trees larger than 16 inches DBH may be removed to meet ecological objectives. The attached Large Tree Management document (Attachment 1) describes these situations and the rationale for removal of large diameter trees.

Spatial Arrangement

Tree arrangement after thinning will mimic historic patterns (not necessarily densities) 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. To better define clumps and group structure, the following parameters provide some guidance on clump and group management.

Clumps

Clumps are aggregates of 3-20 trees (but often contain 3-8 trees) with unequal distances between trees. Trees are typically within 20 feet of one another and arranged in a clustered pattern, crowns usually interlocked. Most trees (or stumps from an historical perspective) within a clump would be of similar size (diameter) and age. The distance from the drip line of one clump to the next is often greater than the distance between trees within the clump. Clumps are typically even aged.

Groups

Groups are aggregates of trees that are larger in area than clumps and may even contain numerous clumps. Groups can range in density from 10 trees up to a few acres of trees. A group may contain numerous clumps and other individual trees that forms over a cluster or pattern of trees over the landscape that is distinguishable from other groups or clumps. Group boundaries, while not clearly delineated on the ground, are defined by openings that surround them. Similar to clumps, the distance from the drip line of groups is often greater than the distance between trees within the group. Age and size classes may be diverse within a group.

Individual trees and clumps by themselves do not always provide a structure that is desirable from a wildlife perspective. Groups often contain more value and functionality due to the collective worth of individual trees or clumps within them.

Openings

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.

Northern goshawk foraging areas may include the largest openings (up to 4 acres). MSO restricted habitat may include openings up to 2 acres. No new openings will be created in Northern goshawk PFAs and MSO protected habitat with thinning treatments.

Old Growth

The proposed thinning treatments will maintain and contribute towards the development of old growth structure and composition in the project area. Approximately 20 percent of the forested lands within each 10K block will be designated as old growth and/or old growth development areas to meet Forest Plan guidance for Vegetation Structural Stage (VSS) distribution and old growth management. The Eastside project includes portions of seven 10K blocks. Table 6 describes proposed old growth allocations for each 10K block. Additional allocations may be made as we conduct further analysis on the project. 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 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.

Table 6 – Old Growth Allocation by 10K

10K Block	Total 10K Acreage	10K Block Forested Acres	Forested Acres and % of 10K Block in Project Area	10 K Block 20% Acreage	10K Old Growth Allocation needed in Project Area	Proposed Acreage Allocation in the Project Area
10K # 209	16,123	13,028	3,160 (24%)	2,606	625	723
10K # 212	12,208	12,176	1,584 (13%)	2,435	317	711
10K # 213	14,350	13,499	3,358 (25%)	2,700	675	691
10K # 221	16,059	6,053	3,849 (64%)	1,210	775	812
10K # 217	8,629	6,790	6521 (96%)	1,358	1,304	1,379
10K # 316	37,605	4,440	1,206 (27%)	888	240	338
10K # 505	11,173	9,399	1,427	1,880	282	290

Wildlife Habitat

Hand thinning and prescribed burning treatment along the south and southeastern base of Mt. Elden will be conducted to reduce fuels while maintaining or enhancing and rejuvenating the cliffrose *(Purshia mexicana var. stansburiana)* populations in the area.

Activities will be closely planned and coordinated with Arizona Game and Fish Department to manage for these species. Activities beyond thinning and burning (such as raking, seeding, herbivory exclusions, and monitoring) may require additional funds to ensure implementation. Additional mapping and site-specific proposals will be developed as we conduct the NEPA analysis. Site-specific proposals will identify locations where cliffrose populations will be deferred from burning and protected from browsing and from fire by doing prep work such as raking duff around cliffrose plants for research purposes. Other research locations will be identified and protected from browsing that evaluate and monitor burn effects on Cliffrose survivability and regeneration.

Northern goshawk, Mexican spotted owl, and other species' habitat will be managed according to Forest Plan standards and guidelines, and specifically, guidance by the Flagstaff Lake Mary Ecosystem Amendment.

Deferral areas in the project area that will maintain or improve habitat include wildlife corridors, steep canyons, Arizona Trail and a buffer area adjacent to the north rim of Walnut Canyon.

Fuel Break Construction

Approximately 377 acres (6.9 miles) will be thinned mechanically or by hand if necessary to remove fuels in the pinyon-juniper woodlands near the Turkey Hills vicinity near the eastern edge of the project area. The fuel break is designed as a fuel zone of treatment and will vary in width according to vegetation patterns and the fuel reduction needs to reduce the risk of a fire that starts in the woodlands from spreading to other areas. Fuel breaks would generally be 300 feet wide and extend inwards towards the woodlands away from communities in the Cosnino area.

Treatment would involve thinning and pile burning most trees in the area except all yellow pines, pines greater than 16 inches DBH, and 5-10 large junipers per acre.

Slash Treatment

A variety of slash treatment techniques will be employed that best meet fuel reduction objectives while addressing soils, noxious or invasive weeds and rare plants, and vegetation needs.

Slash treatment in most areas would consist of machine piling and burning, depending on soil, vegetation, and smoke impacts. Whole trees may also be skidded and 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 then burned after the slash cures.

Slash in areas with hand thinning treatments would be hand-piled and burned.

Chipping and removal may be used as an alternative to piling and burning slash in stands with viable access. We would like to identify chipping as an alternative slash treatment due to the potential that there will be a need and demand for biomass products for biomass co-generation plants within the next two to three years. The option to treat using chipping and provide biomass material would substantially reduce slash treatment costs, eliminate the need to burn piles over significant acres and reduce mitigation needs for soil and vegetation impacts from pile burning operations.

In areas where the initial fuel loading combined with thinning slash does not create broadcast burning problems (less than 5 tons per acre), 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. This treatment would be focused specifically near the southwest portion of the project area where pile burning could negatively impact *Hedeoma diffusum* populations.

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 3-15 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 and hand thinned, approximately 12,872 acres would receive a burn-only treatment. These areas that are deferred from mechanical entry include inoperable slopes and forested lands that already meet or are close to meeting objectives for forest structure. When thinning acreage is included a total of approximately 20,506 acres would receive prescribed burn treatment.

Prescribed Burning Emphasis with Clump Thinning in the Immediate WUI

Selected clumps and groups of trees on approximately 165 acres within burn only treatment areas will be thinned in areas adjacent to private land boundaries. The overall emphasis remains on prescribed burn only treatments due to existing stand conditions, however these stands often have some dense clumps and groups of trees that present a threat to adjacent private lands and become lower risk when the thinning treatment is included. These treatments will be coordinated with local fire departments such as Flagstaff Fire and Summit Fire. In some cases these cooperating agencies may help with implementation of these treatments.

Some areas would be burned under conditions (cooler or moister weather patterns) that would result in lowest fire hazard reduction while maximizing survival of yellow pines. Fuel consumption in these areas may not be as high as other areas. This technique would often be employed where hazard to pre-settlement trees is high while fire hazard to the urban interface and communities is low or moderate.

Elden Electronics Site Protection

We have included a detached project area at the Elden Electronics Site. In early discussions we had considered this area for separate analysis. Because we feel that we can include this area in the Eastside analysis and meet a similar timeframe that a separate analysis would afford we have included treatment proposals at the electronics site in this proposed action. Thinning treatments to reduce fuel hazard would be conducted on approximately 21 acres within and surrounding the electronics site. A combination of hand tinning, piling and burning on steep slopes, and mechanical thinning on lesser slopes within and surrounding the site itself will be used to reduce risks at this important communication site. Visual considerations will be incorporated into all treatments to maintain screening of the towers to the greatest extent possible.

Project Timeframes and Longevity

Because of major differences in land capability in the Eastside Project area, vegetative responses to various management practices will vary as well. Major differences exist between lands classified as unproductive timber land and those classified as commercial timber land. The differences are based on potential natural vegetation, soil type, and biological growth potential. Unproductive timber lands are within the ponderosa pine vegetative types and are unsuitable because they do not meet minimum standards for productivity or there is not a reasonable assurance that such lands can be adequately

restocked. These lands are not environmentally or economically feasible for regeneration and are currently unstocked or understocked with the likelihood to remaining in this condition indefinitely. Timeframes for achieving VSS distribution in MA6 areas will be much longer than other areas.

On lands classified as commercial timberland (MA3) the desired VSS distribution would not be achieved immediately after treatment, but could be achieved within 50 years with additional treatments and burning on a regular basis. Regeneration will likely occur in openings within 10-20 years and initiate VSS 1 and 2 classes. It would take approximately 90 years for current age structure to reach minimum age requirements for old growth, as defined in the Forest Plan. It is important to make a distinction between "commercial timber lands" and "timber sales". Commercial timber land is a classification the Forest Service uses to identify lands that could be suitable for commercial purposes. The classification by itself does not mean that there will be timber sales in the area. Due to the types of treatment needs and size of trees in the Eastside project we anticipate very little if any treatment will be accomplished through timber sales. Exceptions could be some small units in the southwestern portion of the project area near Skunk and Faye Canyons, the Timberline unit and a small area of the Elden base unit near Mt. Elden road. Most hand or mechanical treatments will be accomplished through Stewardship Contracting or done by Forest Service personnel.

The processes of fuel reduction and forest restoration are ongoing events. Restoration of fire-adapted ecosystems will not be conducted in a single treatment; rather numerous treatments would be required over time to restore lands in an adaptive and gradual manner. Under this proposal, where thinning is needed, mechanical treatment would occur first, followed by prescribed fire and subsequent maintenance burns. Thinning treatments in most areas will be effective for 20-30 years before additional thinning may be required. Prescribed burn only treatments can occur at anytime as weather conditions and budget allow.

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. Attachment 3 lists and describes specific BMP's for the Eastside Project.

Wildlife Protection

Mexican Spotted Owl

- MSO restricted habitat will be surveyed in the project the year of implementation or one year prior to implementation.
- In restricted habitat where treatments are planned, pre- and post-treatment monitoring will be conducted to determine effectiveness of treatments in meeting habitat objectives for; 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.

Northern Goshawk

- Prescribed burn plans for the nest areas within PFAs will minimize smoke impacts to nesting birds and minimize loss of nest trees.

Turkey

- There are 2 turkey roosts identified within the project area that will not be thinned.

Wildlife Cover

- Maintain hiding cover at least 200 feet wide around known dependable waters in the area.
- Maintain existing cover along a 200 foot buffer around the Walnut Canyon rim.
- In the wildlife emphasis corridor, thinning treatments will be blended with deferral areas and intensity will emphasize maintaining wildlife habitat attributes such as resident songbirds, raptors, and other wildlife, while doing as much fuel reduction for fire risk reduction as possible. As with all other thinning treatments in the project area, oaks, large yellow pines, and clumps and groups of pines will be maintained throughout any thinning and burning treatments in these stands.

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. Also, refer to Attachment 1 for a detailed discussion on large tree management.
- 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 6 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.
- Tree arrangement after thinning will mimic historic patterns (not necessarily densities) 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.

- No oaks will be thinned. Oak mortality will be mitigated 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.

Scenery Management Considerations along Roads, Trails and in Special Areas

- Openings will be irregular in shape to mimic natural conditions, and will be no greater than 200 feet in width. Consideration will be given to scenery management when thinning is done along the Arizona Trail and other system trails and roads, including in areas where recreation outfitter and guides are permitted. Thinning will be varied using a combination of moderate and light thinning applications, and may include small clump and group deferrals. Slash and treatment areas will be treated or rehabilitated promptly for the protection of scenic values.
- Mitigation measures will be included in mechanical thinning operations to minimize impacts on any Forest Service system trail. If necessary to skid across existing Forest Service system trails or planned trails, the contractor would be required to cross the trail at a 90 degree angle at strategic locations, and would need to repair the trail (government facility) to its original condition when finished in that cutting unit. Skidding along Forest Service system trails would be highly discouraged, but would be accommodated on a site-by-site basis if absolutely necessary, and requires that the trail would be repaired to its original condition post thinning treatment. Thinning will be varied using a combination of moderate and light thinning applications and may include small clump and group deferrals.

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.
- Chipping and removal of biomass will be used as an alternative in preference to pile burning, where access allows, if biomass material is desired at the time of implementation.
- 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 (BMP's) as outlined in the Three Forest Final Environmental Impact Statement for Integrated Treatment of Noxious or Invasive Weeds (Appendix B) will be incorporated into the project. An example of a BMP is cleaning of equipment before entering treatment areas (not roadways) to prevent introduction of invasive weeds.
- A variety of treatment methods may be incorporated into the project as needed. These include manual, mechanical, cultural, biological and herbicide treatments. Appropriate mitigation such as limiting the amount of soil disturbance in archaeological sites during manual/mechanical control and establishment of limited no-spray zones will be incorporated into treatments.
- Limited spray zones for herbicide treatment as addressed in the Three Forest Final Environmental Impact Statement for Integrated Treatment of Noxious or Invasive Weeds will be incorporated into weed treatments in areas near communities. Limited spray zones would be established adjacent and within 1 mile of communities, recreation sites, trailheads, and scenic overlooks. Sites where other treatment methods will be effective due to species, population size or site factors will be targeted for all integrated weed management methods except herbicides. Exceptions to the limited spray zones are authorized for certain deep-rooted perennial species that cannot reach treatment objectives using manual techniques (such as camelthorn, Russian knapweed, leafy spurge, tamarisk and Tree of Heaven).
- 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 insects targeting such species as Dalmatian toadflax and diffuse knapweed. 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.
- Prescribed fire will be allowed to burn through fire tolerant archaeological sites. Archaeological sites with fire intolerant artifacts or features will be excluded from prescribed burning and protected.

Coordination with the National Park Service

- Walnut Canyon National Monument lies adjacent to the southeast corner of the Eastside project boundary. The Forest Service and National Park Service will closely coordinate treatments types and treatment implementation along the Monument boundary and entrance road corridor. Our goal is to have a seamless boundary that avoids abrupt stand differentiations between the land units. Coordination may include joint implementation and efforts to time treatments on both units of land to occur simultaneously.

Community Wildfire Protection Plan (CWPP)

The Eastside project area falls within the boundary of the CWPP. The development of the 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. The Proposed Action and associated project design features will closely follow CWPP treatment guidelines for tree selection, cutting techniques, slash treatment, pile burning, broadcast burning, and maintenance treatments. Treatments may vary from CWPP recommendations when site-specific information has provided finer scale data that indicates a difference in treatment needs from the larger scale data used in the CWPP. Attachment 2 describes the CWWP and the interactions of the Eastside project with the plan in greater detail.

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 Eastside Project will include the following implementation monitoring items:

- Archeological monitoring for site damage will be conducted after implementation.
- Habitat monitoring of MSO Restricted 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 or invasive weed monitoring will occur to assess needs for biological control of species.

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 Peaks District Ranger will decide how to best reduce fuel loading and restore fire-adapted lands in the Eastside 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, 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.

/S/Gene Waldrip May 25,2006

GENE WALDRIP

Peaks and Mormon Lake Districts Ranger