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Chapter 1 – Purpose and Need

Document Structure

The Forest Service has prepared this Environmental Assessment in compliance with the National Environmental Policy Act (NEPA) and other relevant federal and state laws and regulations. This Environmental Assessment discloses the direct, indirect, and cumulative environmental impacts that would result from the Proposed Action. The document is organized into five chapters with appendices:

Purpose and Need: The chapter includes information on the history of the project proposal, the purpose of and need for the project, and the agency's proposal for achieving that purpose and need. This chapter also details how the Forest Service informed the public of the proposal and how the public responded.

Alternatives: This chapter provides a more detailed description of the agency's proposed activities. This discussion also includes mitigation and monitoring measures. Finally, this chapter provides a summary table of the environmental consequences associated with the Proposed Action as compared to no treatment.

Affected Environment and Environmental Consequences: This chapter describes the environmental effects of implementing the Proposed Action. This analysis is organized by resource area. Within each section, the affected environment (existing conditions) is described first, followed by the effects (environmental consequences) of no treatment that provides a baseline for evaluation and comparison of the Proposed Action that follows.

Project Coordination: This chapter provides a list of preparers and agencies consulted during the development of the environmental assessment.

References: This chapter provides a scientific bibliography of studies that support the environmental analysis and illustrate use of Best Available Science.

Appendices: The appendices provide more detailed information to support the analyses presented in the Environmental Assessment.

The following documents located in the Project Record (PRD) are incorporated by reference to reduce redundancy in the EA. Key incorporated documents are also available on the Coconino Forest Website at:

http://www.fs.fed.us/r3/coconino/nepa/index.shtml

- Jack Smith/Schultz Needs for Change Analysis, (PRD # 29).
- Jack Smith/Schultz Fuel Reduction and Forest Health Propose Action (PRD # 42)
- Attachment 1 to the Proposed Action – Large Tree Management, (PRD # 42).
- Specialist Reports, including:
  - Botanist Specialist's Report, Amended 1/29/08 (PRD # 79).
  - Archaeology Specialist's Report, (PRD # 59).
  - Wildlife Specialist's Report, Amended 3/5/08 (PRD # 84).
  - Silviculture Specialist's Report, Amended 2/19/08 (PRD # 83).
  - Soil and Watershed Specialist's Report, Amended 1/16/08 (PRD # 77).
  - Fire and Fuels Specialist Report, Amended 2/1/08 (PRD # 82).

- Recreation/Transportation Specialist Report, (PRD # 64).

Background

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 Jack Smith/Schultz Fuel Reduction and Forest Health project is the sixth large-scale project that GFFP has assisted the Coconino National Forest with project planning and design. Upon completion, this project will have completed all of the large-scale planning identified under the cooperative agreement and resulted in over 80,000 acres of area under plans for fire hazard reduction, improved forest health and restoration in the forests surrounding Flagstaff and the adjacent communities.

The Peaks Ranger District has worked collaboratively with GFFP over the past year to jointly develop proposals to treat the Jack Smith/Schultz vicinity. Since October 2006, 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 April 2007, the Peaks 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. See *Appendix B – Healthy Forests Restoration Act Authorities for the Jack Smith/Schultz Fuel Reduction and Forest Health Project* for more information.

Beginning on September 19, 2007 the District provided a 30 day objection period as required by HFRA, (36 CFR 218). A combined objection was received from the Center for Biological Diversity (Mark D. Fink) and Forest Guardians (Bryan Bird) on October 19, 2007. Upon review by Joe Stringer, Deputy Forest Supervisor, a response letter was provided to the objectors on November 16, 2007. In that response letter the Reviewing Official found a number of deficiencies in the environmental analysis and provided the District with instructions to conduct further analysis and changes. The Reviewing Officials letter, including a complete list of instructions is located in the project record, PRD # 74.

One of the larger concerns included in the Reviewing Officials instructions revolved around implementation of Regional Guidelines for management of the Northern Goshawk and whether or not the Proposed Action met Forest Plan Standards and Guidelines for canopy cover and openings. Of particular concern in respect to this issue is the Districts use of the term “interspace” to describe restorative action of re-creating grassy non-forested areas between groups of trees. In the Proposed Action alternative these areas are planned in addition to regeneration openings where Vegetative Structural Stages (VSS) 1 and 2 were included to work toward the desired 20% acreage level called for by the Forest Plan. The District did not include area in “interspace” in the VSS 1 and 2 calculation, and did not apply percentage of area and size criteria limitations to these features. In review of the Forest Plan it was determined that the term

interspace is not addressed by the Forest Plan. It was further determined that the area that the Proposed Action puts into interspace should be included in the VSS 1 and 2 calculation, and that the percent of area and size criteria for VSS 1 openings should be applied.

The term "interspace" used in the Proposed Action alternative was developed in collaboration with the Arizona Game and Fish Department (AZ G&F), and the GFFP as part of the effort to describe a desired condition of a clumpy/groupy stand structure across the landscape while implementing the Northern goshawk management guidelines using elements of restoration based on pre-settlement conditions. During this collaboration concerns were raised by the AZ G&F Department and GFFP about low landscape scale canopy cover levels that could be implemented under the clarified goshawk guidelines and the measurement methods being at the group level versus the stand level. The AZ G&F Department gave examples of how canopy cover could be reduced to as much as 10 percent on the landscape when canopy cover is measured at the group level in combination with canopy cover levels described by the Propose Action for certain VSS classes. Because reducing canopy cover to 10 percent was not a desired condition for either the GFFP or the District, the ID Team built in modifications to the Proposed Action to address these habitat concerns. This was done to demonstrate that this extreme low level of canopy cover was not the intention and to insure that denser areas would exist across the landscape in treated area after implementation of the Proposed Action. Additional modification to the interspace criteria to maintain existing groups of large trees with no pre-settlement evidence was made to retain these structures when they provided needed and desired habitat and did not conflict with fire risk reduction objectives. For a full description of canopy cover modifications, see Table 2.1.

During scoping the District received a letter from AZ G&F Department that continued to express concern over the canopy cover and group versus stand measurement criteria. At that time the ID Team determined the issue to be non-significant due to the modifications that had been made to address the concern. After the issue resurfaced in the objection made by the Center for Biological Diversity and Forest Guardians the District learned through discussion with AZ G&F Department that they continued to have questions about these effects even after the modifications made to the Proposed Action.

This information in combination with the same concern brought forward by the Center for Biological Diversity and Forest Guardians and the questions by the Reviewing Official about the Proposed Action meeting Forest Plan Standards and Guidelines for this criteria caused the ID Team to re-evaluate this issue. The re-evaluation resulted in the District Ranger signing a revised analysis of issues that determines this to be a significant issue, (PRD # 76) and Chapter 1, Issues discussion.

Based on this determination the District Ranger directed the ID Team to develop and consider an additional alternative to address the issue. An additional action alternative has been developed and analyzed and is included in this EA. For comparative reasons, the term "interspace" has been retained in describing the grassy non-forest opening condition described in the Proposed Action. You will note that in the final analysis because this term is not addressed in the Forest Plan and due to the interpretation that this area should be included in the VSS 1 calculation that to go forward with the Proposed Action a Forest Plan Amendment for a one time project deviation from Standard and Guideline would be required. The District Ranger will determine in his Final Decision rather to select the Proposed Action and move forward with a Forest Plan Amendment or to select the additional action alternative. The term or application of interspace is not used in the new alternative, however the ID Team has strived to maintain like conditions within the

context of guidelines required for VSS 1 openings to continue to promote a clumpy/groupy structure across the landscape to the greatest degree possible.

There are other additional analyses included in the EA that have been completed as directed by the Reviewing Official that apply to all alternatives. The District has done the work directed by the Reviewing Official and District Ranger and it is now included in this Environmental Analysis.

Scope of the Project

The Proposed Action and an alternative to the Proposed Action analyzed in this document apply only to Coconino National Forest lands within the project area. While the alternatives will reduce fuel hazard 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, those areas would need to be assessed and treated in tandem with actions proposed in this project. Environmental effects of the alternatives will be analyzed in this Environmental Assessment. These effects will only be analyzed for impacts to National Forest System lands and not to private property.

Project Area

The 11,827 acre Jack Smith/Schultz Project area is located northeast of Flagstaff and is made up of two planning areas on the Peaks Ranger District. While these planning areas are now incorporated into the larger Jack Smith/Schultz project area, they are listed here to provide geographic reference points since the Jack Smith/Schultz project area is relatively large. The Jack Smith/Schultz project differs from Wildland Urban Interface (WUI) projects we have recently completed in the partnership area, such as the Eastside and Mountainaire Fire Risk Reduction and Forest Health Projects. Eastside and Mountainaire projects, for instance, included many miles of boundary adjacent to private land. The Jack Smith/Schultz area has little actual private land interface with only approximately ½ miles of boundary associated with residences. However, the project area includes approximately five miles of natural gas pipeline which traverses through the project area, important watershed to the Doney Park community, domestic water supply developments to both Doney Park and Flagstaff, and much of the project location is situated in area crucial for fire hazard reduction to protect WUI areas down wind of potential large fire events. The entire project is located within the boundary of the CWPP.

- Specifically, those areas of the project located in the Schultz Pass area and adjacent to the Eastside project in the Timberline area are important for the fire hazard reduction objective to reduce risk to private lands in areas of the Timberline/Doney Park communities.

- Other portions of the project area ,while having important fuel hazard reduction needs that are incumbent on the success of fuel hazard reduction in other parts of the project, are also oriented to resource protection needs, both to resources within the project area and adjacent to the project area such as the Kachina Peaks Wilderness, Mt. Elden and the Dry Lake Hills, Threatened and Endangered and Sensitive (TE&S) wildlife species habitats such as Mexican spotted owl protected activity centers (PAC's), northern goshawk post fledgling activity (PFA) centers and scenic view corridors associated with Highway 89 N. Stands outside the 1 ½ mile WUI boundary have been classified as Fire Regime 1, Condition Class 3. Specifically, concerning old-growth dependant wildlife

species, the project intention is to reduce risk of fire damaging, reducing or destroying this important habitat.

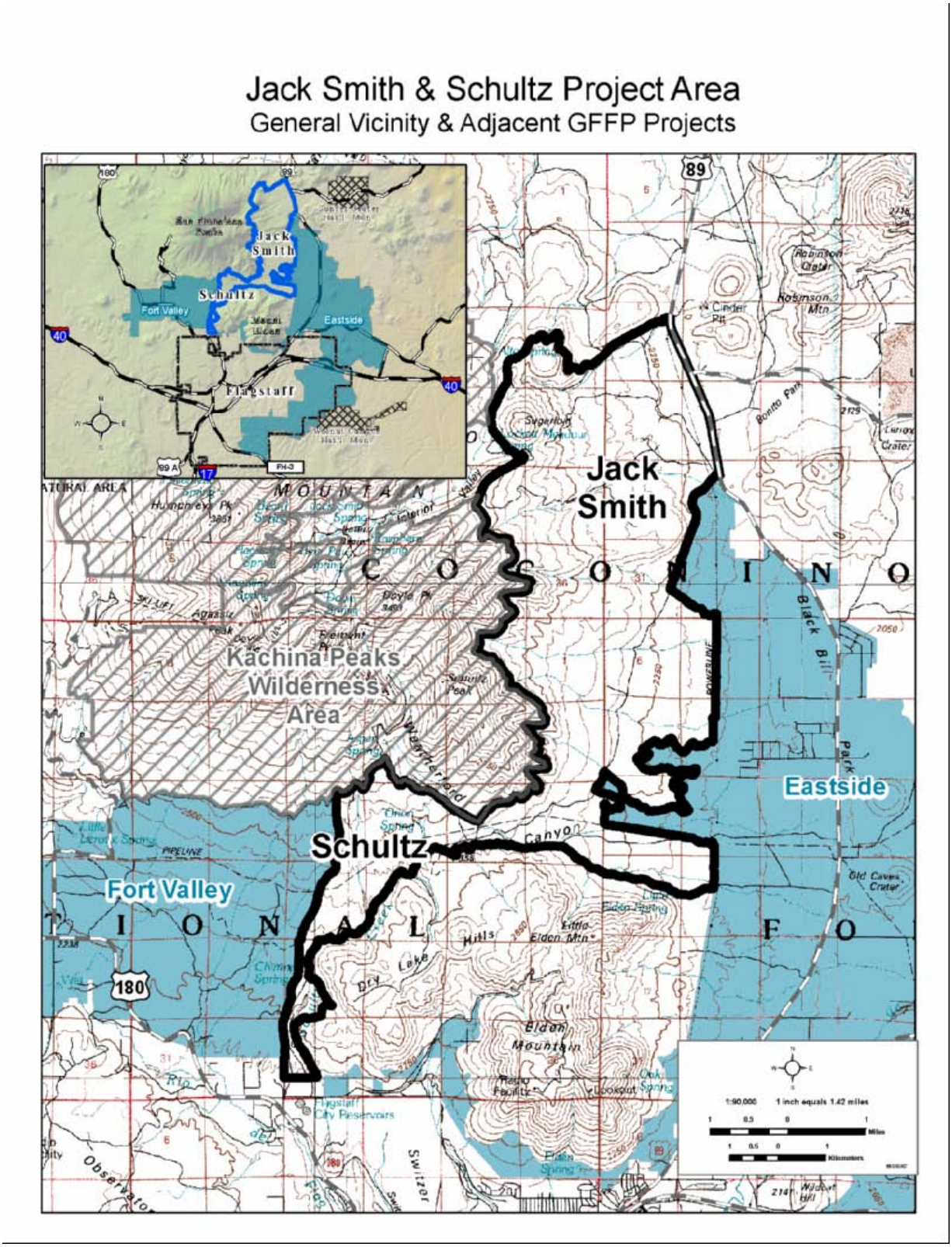
Table 1.1 lists ownership within the project area:

Table 1.1 – Project Area Ownership

Ownership	Acres	Percentage of Total Area
Forest Service	11,727	99%
Private	100	01%
Total	11,827	

The Jack Smith area is located east and west between the Kachina Peaks Wilderness on the San Francisco Peaks and Hwy 89 N, and between Forest Road 556 and Forest Road 418 north and south. The Schultz project joins the Jack Smith project at Forest Road 420 near Schultz Tank and stretches west along Forest Road 420 from Schultz Tank to the City of Flagstaff near Highway 180. (See Figure 1.1, General Location Map, next page).

Figure 1.1 – General Location Map.



Forest Plan Management Areas

The Coconino National Forest Plan (hereafter referred to as the Forest Plan) sets out broad management goals, objectives, standards and guidelines to guide management actions on the Coconino National Forest. The Forest Plan uses Management Areas to guide management of the National Forest System lands within the Coconino National Forest. Each management area provides for a unique combination of activities, practices and uses. The project area includes eight Management Areas. The Forest Plan contains a detailed description of each management area. Table 1-1 lists the acreages under some of the Management Areas within the project area. Additionally, Management Areas under the Flagstaff/Lake Mary Ecosystem Analysis (USDA Forest Service 2002) include the Doney Management Area 1,658 acres) and the Schultz Management Area (10,068 acres).

Table 1.2 - Management Areas located within the project area.

MANAGEMENT AREA	DESCRIPTION	ACRES
003	Ponderosa Pine and Mixed Conifer < 40% Slopes	9,456
004	Ponderosa Pine and Mixed Conifer > 40% Slopes	1,292
005	Aspen	62
006	Unsuitable Timber Land in Ponderosa Pine	592
009	Mountain grassland	27
010	Grassland and Sparse Pinyon/Juniper above the Rim	196
033	Doney	1,658
036	Schultz	10,068

Purpose and Need for Action

The Forest Plan provides a framework that guides development of Desired Future Conditions at the site-specific project level, such as the Jack Smith/Schultz Fuel Reduction and Forest Health Project.

The purpose of this project is to reduce the threat of severe wildfire in and around the Jack Smith/Schultz project area. There is a need to change forest conditions that support desirable fire behavior and create a forest structure that more closely resembles the structure that existed prior to interruption of the historic fire regime.

The Purpose and Need is focused on two main topics:

Wildfire Hazard and Fuel Risk Reduction and

Forest Structure.

For each of these topics, Existing Conditions describe the current ecological and biological conditions. Desired Conditions describes the goals and vision for the area. Need for Change describes the difference between existing and desired conditions that necessitate the need for changed conditions. The following areas need to be addressed to meet need for change to meet this Purpose and Need:

- Stand density values and structural arrangements that meet the desired future conditions for forests and woodlands;

- Progress toward restored historic vegetative structural patterns in forests, meadow, 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;
- Protection and regeneration of Aspen stands, and
- Openings that provide for understory diversity and early VSS class initiation.
- Reduced fire risk while maintaining TE& S habitats and old growth late successional forest wildlife dependant species.
- Low and moderate fire hazard ratings in ponderosa pine forests;
- Conditions where prescribed surface fires can be safely executed in ponderosa pine forests.
- In coordination with TMR identify the desired open road system on the project area.
- Remove or close and restore roads excess to the desired open road system.
- Progress towards or achieve Forest Plan Standard and Guideline road density goals of less than 2 miles per section of road.

The process for developing Desired Future Condition (DFC) and Need for Change statements began with Forest Service IDT members collecting and modeling data to determine the existing conditions in the project area. The team then began reviewing Forest Plan direction related to management of the project area. The team reviewed all Forest Plan standards and guidelines and determined whether they are standard operating procedures for implementing activities or if they are intended to guide management practices towards a desired future condition of the forest. Standards and guidelines in the latter category were used as sideboards when the team developed DFC statements.

Many of these standards and guidelines are quantitative in nature and describe in detail a specific distribution of environmental resources. In contrast, other direction is couched in broad, qualitative terms and allows IDT and GFFP partners to interpret and clarify this direction as it pertains to this project.

As the team started discussing and developing desired future conditions for the project area, it considered goals for the entire project area in addition to discrete areas deemed important for biological or social needs. The DFC statements the team developed generally reflect Forest Plan language, however in many situations where direction was vague or overly broad, the team further defined their vision for the Jack Smith/Schultz landscape in qualitative and quantitative terms. In many circumstances, the team also developed appropriate timeframes to meet these DFCs and considered the difference in conditions over time. Need for Change statements articulate the difference between the existing and desired future conditions.

All of this information was captured in a Final Report of the Need For Change Analysis (March 2007, PRD # 29). While the Need for Change Report is broad in nature and covers many different resource areas within the project area, this Jack Smith/Schultz Fuel Reduction and Forest Health Project Environmental Assessment only includes findings of that report related to forest restoration, fire hazard reduction activities, and the associated transportation system. Other

projects may be developed based on findings of the Need for Change analysis in separate NEPA documents in the future. The following section briefly describes the existing conditions, desired future conditions, and the need for change for Fire-Adapted Forest and Grassland Structure and Wildfire and Fuels Risk planning goals.

An in depth discussion of background and the various settings regarding WUI and Fire Hazard conditions and Fire-Adapted Forest and Grassland Structure associated with the Jack Smith/Schultz project is located in both the Needs for Change (PRD # 29), pages 8 -10 and Proposed Action (PRD # 423) documents, pages 3 - 5. To avoid duplication only key elements of those discussions are repeated here. These documents are also available on the Coconino Forest Website at the previously mentioned address. Summary of background discussion concerning Purpose and Need, collaboration efforts, and Community Wildfire Protection Plan for Flagstaff and Surrounding Communities in the Coconino and Kaibab National Forests of Coconino County, Arizona (CWPP) coordination.

A long time concern of fire managers has been the threat of catastrophic fire starting or entering the Schultz Pass area and spreading into the Timberline/Doney Park communities, as well as into the Kachina Peaks Wilderness area. Schultz Pass is located between the Kachina Peaks Wilderness and the steep slopes of Mt. Elden and the Dry Lake Hills. Due to steep slope topography, fire hazard reduction treatment options are limited on Mt. Elden and the Dry Lake Hills to the south, and unavailable due to policy management constraints in the Wilderness, to the north. This juxtaposition increases the importance of implementing fuels treatments within the remainder of the project area

- Although, the project doesn't meet private land, (except at the far west end of the Schultz area), it is considered integral to providing the hazard reduction began by projects such as the Fort Valley and Eastside Fuel Hazard Reduction and Forest Health Projects.

- The need to complete this piece of the WUI was recognized by the Greater Flagstaff Forest Partnership (GFFP) as they worked with the Forest to design the partnership area, as well as by the crafters of the Community Wildfire Protection Plan (CWPP) for Flagstaff and the surrounding communities, such as Timberline and Doney Park. The Flagstaff Lake Mary Ecosystem Assessment process (FLEA, Forest Plan Amendment 17), also recognized this need when it identified the Urban Rural Influence Zone (URIZ) and incorporated the Fire Management Analysis Zone (FMAZ 01U) from the Forest Plan, into management guidelines for the Schultz and Doney Management Areas. The CWPP describes the WUI as an area where public safety is the overriding goal and is sufficiently large to:

1. Reduce the potential of a high intensity fire from entering the community,
2. Create an area whereby fire suppression efforts will be successful,
3. Limit large amounts of wind-driven embers or "fire brands" from settling on the community, and
4. Protect critical infrastructure.

All four of these descriptors can be directly applied to much of the Jack Smith/Schultz project area, as indicated by the CWPP WUI mapping.

Specific fuels treatment goals will vary throughout the project area based on resource protection goals such as preventing impacts to private lands and developed areas, critical infrastructure such

as the natural gas pipeline and developed domestic water systems, watershed, wildlife habitat, wilderness, viewsheds, cultural resources, or other values at risk. The ID Team has identified three zones within the project area that address these varying conditions.

Zone 1: Schultz Pass WUI West Zone.

Zone 2: Schultz Pass WUI East Zone.

Zone 3: 89 Mesa Zone.

Some important features and considerations pertaining to the zones are as follows:

- Zone 1 in the west portion of the Schultz Pass area will be considered for fuels treatment that will help prevent wildfire from impacting private lands between the Forest Boundary and Hwy 180 and the Mt. Elden/Schultz Pass neighborhoods and will be complementary to work began by the Ft. Valley and Eastside projects. Also important TE&S wildlife habitat both within and adjacent to the project will have reduced fire hazard.

- Zone 2 in the east portion of the Schultz Pass area will be considered for fuels treatment that will help prevent wildfire from impacting the Timberline/Doney Park Area as the primary objective, while blending and incorporating other resource and wildlife habitat needs. Treatment of this zone will be complimentary to treatments in the adjacent Eastside project.

- Zone 3 above 89 Mesa will incorporate fuels treatment designed with a further emphasis to enhance or protect watershed, wildlife habitat values, wilderness, forest health, and viewshed values.

Specific fuels treatments will be designed based on the values at risk and post-treatment spatial arrangement of fuels will vary throughout the project area and to some extent between zones. For example, spatial arrangement and clump, group, and interspace configurations will be different in group and clump size, degrees of openness between and within groups and clumps and their arrangement on the landscape, etc, between the 89 Mesa area and the Schultz Pass area.

These zones will be discussed in greater detail in Chapter 2 – Alternatives and Chapter 3 Affected Environment and Environmental Consequences.

Figure 1.2 identifies various WUI boundaries that will be considered for the project, including the FLEA FMAZ, URIZ, and CWPP/CWPP WUI boundaries.[1] As can be seen from the map portions

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[1] CWPP – Community Wildfire Protection Plan (CWPP) – boundary is from the CWPP for Flagstaff and Surrounding Communities in the Coconino National Forest of Coconino County, Arizona, 2004.

URIZ – the Urban/Rural Influence Zone (URIZ) is defined in the Flagstaff/Lake Mary Ecosystem Analysis (FLEA) as “ National Forest lands highly influenced by adjacent urban or rural residential communities. “This zone is located approximately ½ miles from the urban and rural growth boundaries as drawn in the Flagstaff regional Land Use and Transportation Plan.

FLEA – FMAZ – 1U – the Fire Management Analysis Zone (FMAZ) 1U is an area of National Forest lands with a predominate ponderosa pine cover type “1” and classified as having an Urban component “U”.

of the project area are covered by all of these boundaries. The FLEA FMAZ covers much of the critical Schultz Pass area, URIZ is a minor component, due to its association with private land and the entire project area is included in the CWPP boundary, with a significant portion of the project area included within the CWPP WUI boundary. Table 1.3 describes these various designations by acres and percent of total area.

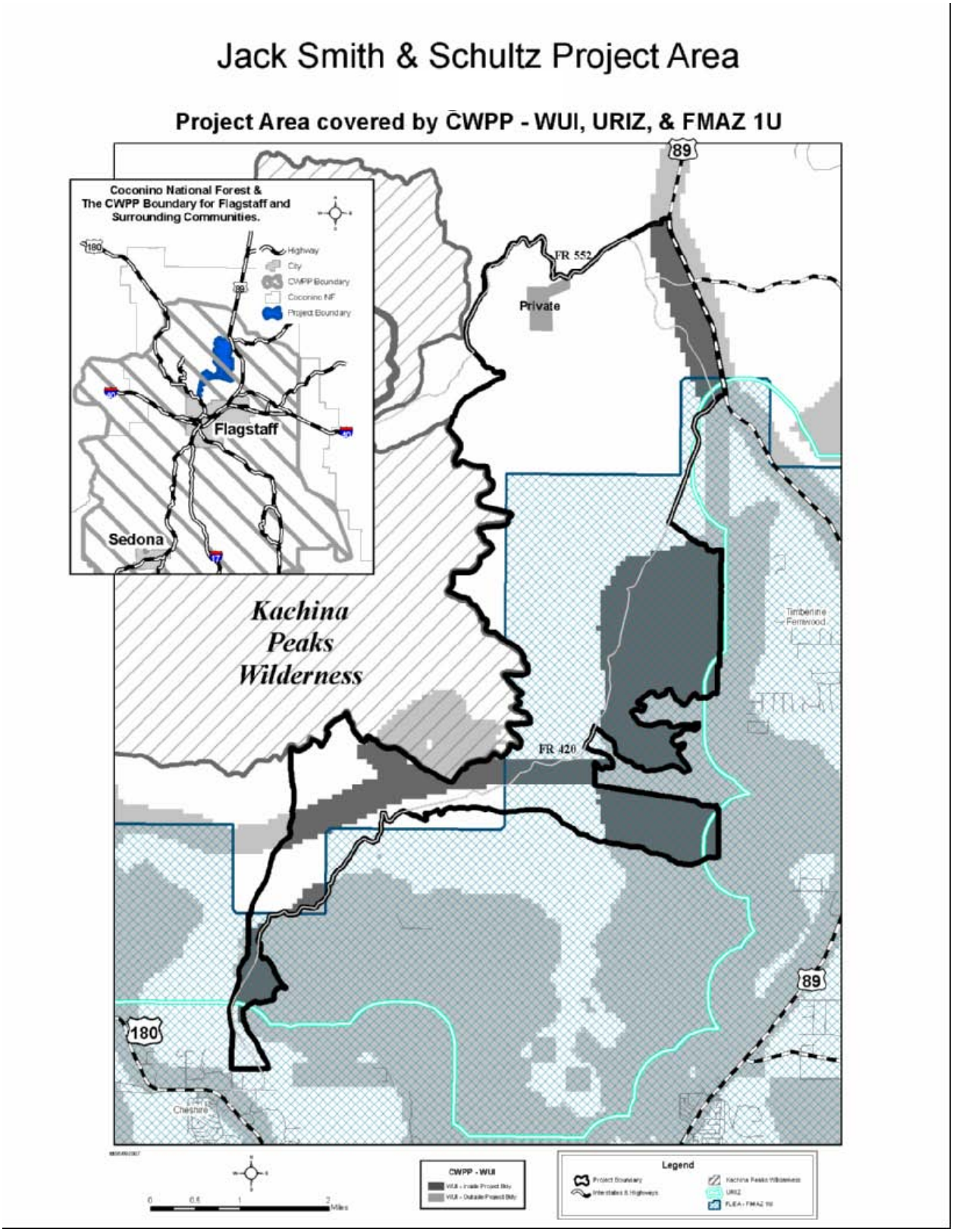
There are various fire management unit designations pertaining to the project area as described in Table 1.3 and displayed on Figure 1.2

Table 1.3 – Project Fire Management Unit Designations

WUI Designation	Acres	Percentage of Total Area
FLEA URIZ	223	02%
FLEA FMAZ 01U (includes FLEA URIZ)	5,930	50%[2]
FMU 01 Non-WUI Ponderosa Pine and Mixed Conifer	5,897	50%
CWPP WUI Area	3628	31%
CWPP	11,827	100%

[2] FMU's – Fire Management Units – are described by the Forest Fire Management Plan (FMP).

Figure 1.2 – Fire Management Unit Designations



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 site structure, changes in successional dynamics, and decreased horizontal heterogeneity. Past logging practices have removed the majority of old forest trees, while fire suppression and climatic events favored denser ponderosa pine and mixed conifer regeneration. The resultant forest structure within the project area is largely even aged and average approximately 80-90 years in age.

Cover Types

Table 1.4 – Cover Types

Cover Type	Acres	Description
Ponderosa Pine	9,747	Predominant cover type/some Gambel oak mixed in in southeast portion of project
Mix Conifer	1,618	Higher elevations and north facing slopes
Pinyon-Juniper	103	South facing slope of 89 Mesa
Meadow	27	Few natural openings/conifer incroachment
Aspen	62	Higher elevations, small groups within conifer stands
Open (right of ways and mines)	175	
Total	11727	

Cover type was calculated using the Fuels data collected for this project.

For a more detailed description of cover types refer to JSS PA, (PRD # 42), and Silviculture Specialist Report, (PRD # 83) and also on the Coconino National Forest Website listed on page 1.

Table 1.5 - Jack Smith Existing Condition Summary – Stand Density, Basal Area, Stand Density Index, Age, Size, and Species Diversity, and Spatial Arrangement

Condition Type	Summary of Existing Condition – Measurements	Existing Condition – Current Function	Desired Conditions
Landscape	Many over dense stands, largely even-aged, deficit mature trees, little interspace	- Landscape condition much denser than historic condition - Natural fire largely eliminated - Susceptible to highly damaging wildfire	A multi-aged, diverse forest structure that supports low intensity fires. Maintained by fire and natural process. Also, see Table 1.6.
Stand Density	Approx. 80% high density (> 40% canopy cover (cc) cc ranges from 15 to 80%	- Decreased growth and tree vigor - Increased susceptibility to insect and disease - Decreased yellow pine and Gambel oak longevity - Decreased natural regeneration - Decreased understory production - Density induced mortality leading to increased fuel hazard	- Density is decreased to reduce tree competition - Increase vigor and diameter growth - Decrease susceptibility to insects and disease - Increase longevity of yellow pine and Gamble Oak - Cc range is 30-50% - Improved understory productivity and species diversity - Northern goshawk and Mexican spotted owl protected habitat cc > 50%

Basal Area (BA)	20 to 296 sqft/ac	Same as above	- BA range is 20 to 100 sq.ft./ac.
Stand Density Index (SDI)	84% > 25% SDI 52% > 35% SDI 10% > 60% SDI	50% of stands with inter-tree competition @ 60% SDI – little to no tree growth	- SDI range is below 25% in treated stands
Age, Size, and Species Diversity	VSS – 75% of ponderosa pine/mixed conifer = VSS 3 & 4 19% = VSS 5 & 6 6% = VSS 1 & 2	Poor VSS distribution with predominance in VSS 3 & 4. Deficit in VSS 1, 2, 5 & 6.	Distribution of tree age and size classes more even among VSS classes as directed by Forest Plan for Northern goshawk habitat Uneven-aged structure/multiple age classes Aspen – remove encroaching conifer. Protection of regeneration (fencing some stands) Gambel oak – Limited conifer competition, increased large oak trees > 10” DRC Also, See Tables 1.6 and 1.7
Spatial Arrangement	84% closed canopy	Little horizontal or vertical diversity. Also, same as above	Tree distribution is variable and patchy Groups and clumps of trees with variable cc Groups and clumps of trees guided by historical evidence Some clumps have interlocking crowns, most do in VSS 5 & 6 Regeneration

Spatial Arrangement continued			openings .5 to 4 acres Grassy interspaces evident Canopy cover managed at the group level Also, see discussion on page 16 on detailed spatial arrangement descriptions.

*VSS – Vegetative Structural Stage

Table 1.6 – Existing and Desired Vegetative Structural Stage (VSS) Values for all Forested Stands.

VSS	Existing Distribution	Desired Distribution
VSS 1 - Grassy Openings	**3%**	**10%**
VSS 2 - Seedlings/saplings	**3%**	**10%**
VSS 3 - 5-11.9 inches	**54%**	**20%**
VSS 4 - 12-17.9 inches	**21%**	**20%**
VSS 5 - 18-23.9 inches	**11%**	**20%**
VSS 6 - 24 inches and greater	**8%**	**20%**

Table 1.7 – Forest Density and Composition Values

Measure	Species/Cover Type	Desired Future Conditions
Canopy Cover	Northern Goshawk (NGO)	Northern Goshawk Habitat Outside PFAs and Within PFA's > 40% (as measured at the group level – Altenative 1 and at the stand level – Alternative 2)
	Mexican Spotted Owl (MSO)	MSO Protected Habitat >50% (as measured at the stand level) MSO Restricted Habitat[3] 40-50% (as measured at the stand level) MSO Target Threshold 50%+ (as measured at the stand level)
Total basal area (ft2/acre) for all tree species	Non-Forest	Meadows and Grasslands 0-40
	NGO	Northern Goshawk Habitat Inside and Outside PFA's 20-100
	MSO	MSO Protected 150 MSO Restricted 80-150 MSO Target Threshold 150 -170[4]
Maximum Stand Density Index	NGO	0-35% in Northern Goshawk Habitat Inside and Outside PFA's and MSO restricted habitat. 0-45% in Northern Goshawk PFAs

[3] Canopy cover derived for meeting minimum requirements under MSO Critical Habitat criteria for primary constituent elements in restricted and protected habitat.

[4] Basal area derived for meeting minimum requirements under MSO Recovery Plan Table 111.B.1 conditions for target threshold habitat.

For a more detailed discussion of Existing and Desired Conditions see Jack Smith Proposed Action, (PRD # 42), and Silviculture Specialist Report, (PRD # 83), also listed on the Coconino Forest Website noted on page 1.

As the ID Team worked through the Needs For Change analysis and in collaboration with the GFFP they developed a description for key terms that further describe what is meant by a groupy/clumpy tree arrangement and intended for desired future condition for this component:

Descriptions of Key Terms for Spatial Arrangement and Heterogeneity

The following descriptions were developed to help describe and develop the Proposed Action. While the desired spatial arrangements described here are desirable for Alternative 2, and efforts will be made to achieve group/clumpy structure, elements such as interspace and canopy cover at the clump and group level are not applied in this alternative, in the case of interspace and to a lesser extent to clumps and groups, as measurement criteria is evaluated at the stand level, because of conflicts with Forest Plan Standard and Guidelines for size and extent of openings.

Groupy/Clumpy Structure: Residual structure and diverse spatial arrangement of trees at both stand and landscape scale, using a combination of groups and clumps of trees, interspersed with openings and interspaces.

Groups: Groups are an aggregation of one or more clumps of trees of varying age and size interspersed with openings. The desired condition is to maintain and retain groups made up of uneven-aged clumps. Where existing structure is even-aged treatments will emphasis development of uneven-aged structure over time. Groups are made distinct by interspace. We have described a DFC to allow for leaving groups for specific habitat needs larger than those described under restoration measurements, which are typically described from .05 to .7 acres maximum and up to 40 trees. To maintain our DFC to distinguish between clumps and groups we will describe a lower tree number of greater than 10 to15 trees for a group. The upper size of a group for our DFC is 5 acres. Subsequently the number of trees and tree clumps increase as acreage increases and as needed for various treatment objectives and habitat requirements and needs. The Proposed Action will describe further the canopy cover ranges for particular treatment objectives and habitat needs. The number of clumps within groups will vary to attain canopy cover ranges defined in the Proposed Action, but in general as group size increases the number of clumps will increase.

Clumps: Clumps are an aggregation of closely spaced trees of varying age and size. Clumps may have closed canopies in the larger diameter classes (VSS 5/6) and closed canopy with interlocking crowns would be the DFC in these size classes. Clumps in smaller VSS classes, 2-4, may be closed, but would often have varying degrees of openness. Clumps are made distinct by interspersed openings within the group and interspaces created along the edges of groups. Clump size varies from two to 10 to 15 trees/per clump. There may be areas where a larger area and number of trees are desirable for a specific habitat need or for diversity purposes. In these instances clump size overlaps group size and they become interchangeable, and are discernable from the typical DFC for groups made of clumps by a lesser occurrence of regeneration openings.

Openings: Openings are areas located within tree groups that are regenerated through the use of group selection harvesting for the sole purpose of natural regeneration. These areas will make up VSS 1 and 2 structures when regenerated. Openings greater than one acre and 200 ft. wide will require 3 to 5 reserve seed bearing trees per acre, preferred to be from mature and older trees or in general yellow pine trees. When mature trees are absent, younger trees that are seed bearing can

be used. Stands or landscapes may require up to 20% openings, depending on the amount of existing condition of VSS 1 and 2 trees. Opening size varies by habitats, such as Goshawk Foraging, MSO PAC, Goshawk PFA, etc. Meadows or other permanent openings are entirely separate stands and do not have a forest structure, but contribute to variability of the landscape.

Interspaces: Interspaces are grassy openings between tree groups. Interspaces are preferably located on areas where historic evidence suggests there were no trees growing prior to fire regime disruption. These non-forested areas are intended to be maintained in grass and forb structure, with no tree regeneration objective, and maintained over time with re-introduction of fire.

Canopy cover/Closure at the group level: Measured at the group level, the amount of crown canopy covering the ground, usually described by a range of percents. The range of canopy cover is determined by various resource objectives and ranges may vary by VSS class. For example, groups of trees with higher canopy cover may be desirable for various wildlife habitat needs and depending on existing crown structure and tree size usually requires increased density of trees, and as described are often desirable in larger VSS classes, where a desired existing structure is present. In smaller VSS classes, structural development and tree growth needs may require lower canopy covers and decreased tree density, such as described for VSS 2, 3, and in some cases 4.

Canopy Cover/Closure at the stand level: Describes the amount of canopy cover at the stand level provided by tree groups. Desired for certain T&E habitats, such as MSO critical habitat, where a shade canopy created by the tree branches covering 40 percent or more of the ground is one of three primary constituent elements related to forest structure for critical habitat. Degree of canopy cover outside of T&E habitat is determined by objective and resource needs. The amount of "openness" or area in interspace may vary by resource goals for such things as reduced fire risk/hazard, wildlife habitat needs, both specific and general, and visual quality. The amount of openness will be described by area and resource objective and specific habitat needs in the Proposed Action.

Managing canopy cover at the group level is a shift in how we have been implementing Northern Goshawk management recommendations on the District. This shift is not only responsive to recent Regional clarifications for implementing the Management Recommendations for the Northern Goshawk in the Southwestern United States (GTR-RM-217), but also allows us to be responsive to our collaborative goals for spatial arrangement and structural heterogeneity. While we make this transition we will insure that stand level requirements and structural habitat attributes for goshawk prey species are also being met. This objective has been clarified in Alternative 2.

Old Growth

Existing Condition

Ponderosa Pine/Mixed Conifer – The Jack Smith/Schultz project is included within portions of two 10K's, the Jack Smith and Elden 10K's. Eight hundred ninety-nine acres of existing old-growth have been identified in the Jack Smith 10K and 213 acres have been identified in the Elden 10K. The Jack Smith 10K has 749 acres identified for developing old-growth and the Elden 10K has 724 acres identified per the adjacent Eastside project.

Allocations made under the Eastside project meet or exceed 100 acre minimum stand size. 10K allocations have been made in the Eastside project and will be considered and additive to

allocations made under the Jack Smith/Schultz project. See Chapter 3, page106 for summary of allocations and Figure 3.3 for a map of existing and developing old-growth allocations.

Desired Conditions

Old growth is located in areas most effective for providing habitat for various wildlife species. For example, areas that may provide bald eagle roosting habitat, MSO and northern goshawk habitats, and areas removed from other disturbances. Road densities are reduced in areas identified for old growth.

Areas identified as having the highest potential to develop into old growth are located along the west and south ends of the project area. ForestERA and Forest Service datasets both indicate quality old growth potential stands in dense areas outside the project area.

West of the project area, near the Jack Smith planning area, ForestERA maps reveal a high number of areas appropriate for northern goshawk and MSO nesting habitat. Canopy cover and basal area are relatively high and provide suitable potential habitat for old growth dependent species. While many of these areas are outside of the project area, connectivity of these areas to adjacent areas within the project area may be beneficial.

Need For Change

There is a need to designate and manage for old growth habitat in the project area to meet or exceed 20% of forested acres by 10K. The minimum acreage required is 958 additional acres in the Jack Smith 10K and 1762 more acres in the Elden 10K.

Timeframes

It would take approximately 90 years for current age structure to reach minimum age requirements for old growth, as defined in the Forest Plan.

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. 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.

Wildfire and Fuels Risk

Existing Conditions

Adjacent to the project area the Side Fire occurred in 1996, the Radio Fire occurred in 1977 and the Leroux Fire occurred in 2001. These three large wildfires demonstrate the probable result of wildfires in the project area if left untreated. The Leroux Fire started above the Ft Valley project in the Kachina Peaks wilderness and grew rapidly to the southeast. For several operational periods the highest concern for the suppression effort was that the fire was progressing uncontrolled toward the Schultz Pass area. Contingency plans were made for establishing a separate Incident Command Post near highway 89 N. and Doney Park at the other end of Schultz Pass as initial analysis projected a high probability that the fire would spread rapidly through

Schultz Pass and gravely threaten the Doney Park/Timberline communities, as well as the Dry Lake Hills/Mt. Elden areas, and the Kachina Peaks Wilderness. The Leroux Fire is actual evidence of the threat from wildfire in this area, and is an example of why fire managers have heightened fire hazard and fuels reduction goals in this zone. Due to aggressive fire suppression efforts and favorable fuel moisture conditions at the higher elevations of the fire the worst case scenario of the Wildland Fire Situation Analysis (WFSA) for the Leroux Fire was avoided. Had this fire started even a few weeks later than it did, the results could have been dramatically different.

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, mixed conifer species have regenerated under some ponderosa pine stands and trees and shrubs have encroached 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 species mix throughout the area.

The existing conditions within the Jack Smith/Schultz project area make it difficult to meet Forest Plan direction to hold fire starts to 10 acres or less within urban interface areas. Over 50% of the Jack Smith/Schultz project is within the urban interface fire management zone established in the Forest's Fire Management Plan, under the FLEA FMAZ, and as identified in the CWPP. Expected fire behavior within portions of the project area rated high, very high, or extreme will make it difficult to hold fire starts to 10 acres or less. During dry conditions that normally occur during fire season, expected flame lengths would exceed four feet in these areas making the occurrence of an uncontrollable crown fire likely. There is a need to alter vegetative structure to reduce the risk of crown fires and increase the probability of stopping fires when they are small.

Values at risk for fire and fuels include Public Safety, Urban Interface areas located primarily at the south portion of the project, and the eastern portion along the East Side Project and Hwy 89, Private in holdings (1/4 section around Dry Lake Hills), a natural gas pipeline infrastructure that traverses the project, watershed, domestic water supply improvements, archeological sites, wildlife habitat for various species, Flagstaff view shed and recreation values.

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[5]. 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, 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 1.8 describes existing values of some of these fire hazard rating criteria.

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[5] 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: 6%

20-Foot Wind Speed: 20mph

Air Temperature: 85 degrees F

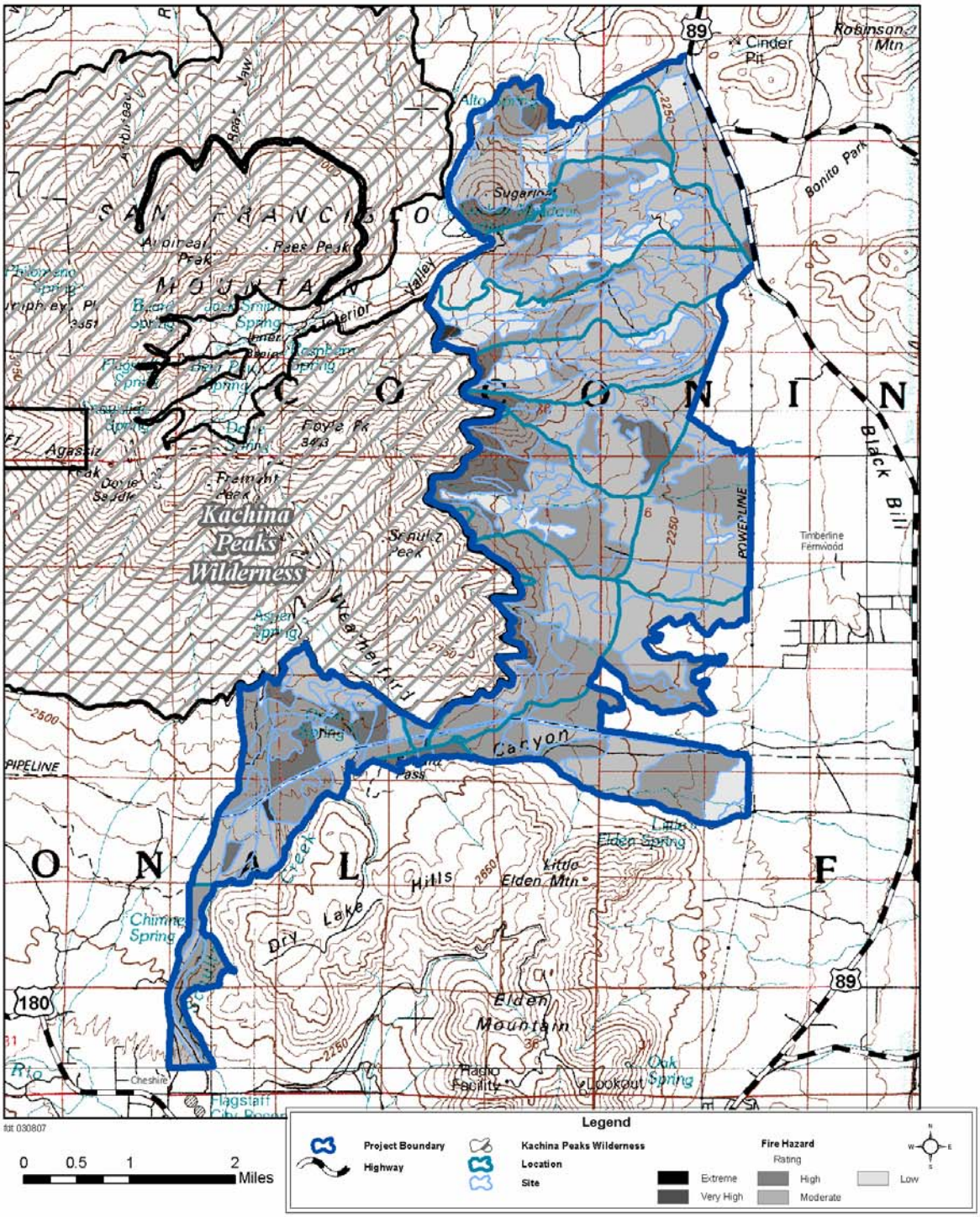
Table 1.8 – Fire Hazard Rating Criteria

Measure	Current Value	Desired Value
Height to Live Crown	1 – 20 feet	12+ 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 100
Fuel type	Ponderosa pine, mixed conifer, grassland.	Same, but with reduced encroachment of invading species such as mixed conifer regeneration in ponderosa pine and ponderosa pine in grassland stands
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	31 acres
Very High	985 acres
High	3,549 acres
Moderate	5,866 acres
Low	1,296 acres

Figure 1.3 – Existing Fire Hazard



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 stands, once a fire is initiated or is carried in from a neighboring area, many stands 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 and remain at that rating for the next 20 to 40 years. 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 that would be a threat to 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.

Roads and Transportation System

Existing Conditions

There are 98.5 miles of inventoried roads in all maintenance levels in the project area resulting in an open road density of 5.4 miles per square mile. Many of these roads began as user created roads. They have inadequate drainage, are most often poorly located and many are causing resource damage.

Desired Future Conditions

In coordination with on-going planning under the Travel Management Rule (TMR), continue to reduce unneeded and damaging roads and restore watershed condition by either removal of these roads through road obliteration or closure of the roads. Identify and implement an open road

system, in coordination with TMR that reduces road density to Forest Plan Standards and Guidelines of 2 miles per section or less and provides an open road system that best meets and balances the access needs of the general public and other Forest users.

Proposed Action – Alternative 1

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.*

For many situations, treatment methods serve multiple resource area needs. We recognize that the Jack Smith/Schultz project is somewhat different than more recent projects due to having little actual private land boundary and that there are different and varying values at risk for this project because of its location. We have addressed this difference by recognizing emphasis areas or zones that help sort the varying values at risk and desired conditions. We have identified three emphasis areas or zones that address different and varying values at risk, project objectives, and desired conditions.

Zone 1: Schultz Pass WUI West Zone: This zone consists of the Schultz project area extending west from Schultz Tank to the Private Land interface near Hwy 180 east and west, by the Dry Lake Hills/Mt. Elden boundary on the south and the Fort Valley project on the north. This zone also abuts the Eastside project at the base of Mt. Elden near Highway 180. Treatments in this zone blend objectives with the Eastside and Ft. Valley projects and have an emphasis on fire hazard reduction. This zone is surrounded by the steep slopes of the San Francisco Peaks, Mt. Elden and the Dry Lake Hills limiting fire/fuel hazard reduction opportunities. The objective in this zone increases the effectiveness of initial attack, and reduces the chance of initiating a crown fire, but is less effective in stopping an approaching crown. Increased initial attack abilities protect both the surrounding terrain and the onsite resources. Visual and wildlife habitat resources will mitigate the proposed treatment design. Several important TE & S species habitat areas are adjacent to this zone. Treatments will reduce threats to these important areas. The treatments should compliment and contribute to fire hazard reduction objectives of the Ft Valley and Eastside projects, while continuing to manage for wildlife habitat and visual considerations.

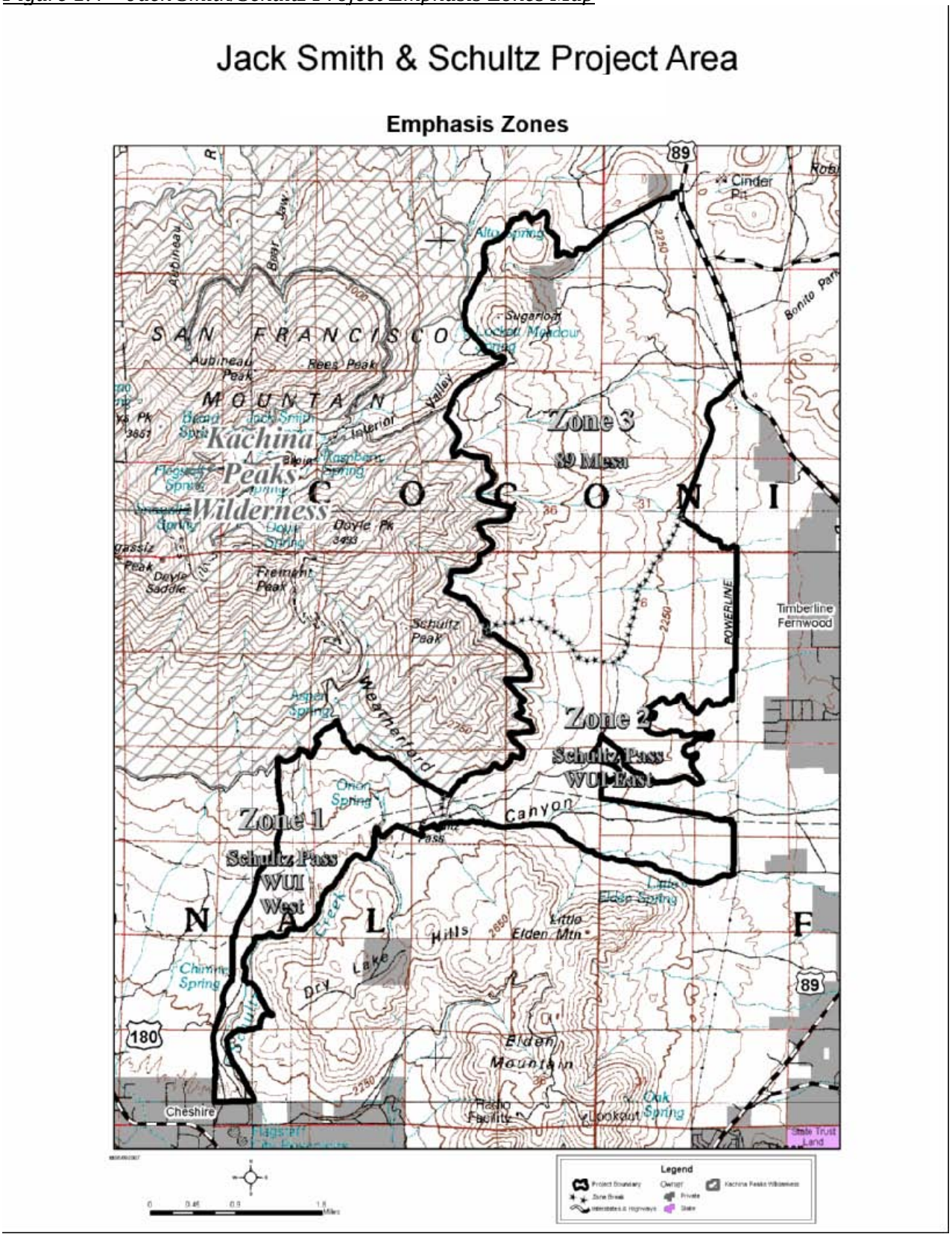
Zone 2: Schultz Pass WUI East Zone: The Schultz Pass WUI East Zone has the greatest emphasis on fuel hazard reduction for WUI, with an objective to reduce wildfire threat to communities at risk, including the Timberline and Doney Park communities. This emphasis zone is described as beginning near Schultz Tank and extending east to the boundary with the Eastside project and north along Forest Road 420 (Schultz Pass Road). The Eastside project includes the private land interface and in general extends one to one and one half miles beyond private land boundaries. Treatments in this zone will compliment and strengthen hazard reduction began by the Eastside project and reduce the threat of uncontrollable wildfire spreading through the pass and entering this interface area as a running crown fire. The proposed treatments respond to this objective, while continuing to manage for wildlife habitat and scenic quality resource needs.

Zone 3: 89 Mesa Zone: Includes the project area north of Forest Road 420, from about the Schultz Tank area, extending to the project boundaries at the Kachina Peaks Wilderness, Hwy 89 N. and Forest Road 418. The emphasis for this area continues to have a fire hazard reduction objective, however the hazard reduction is emphasized for a suite of values at risk, such as the Kachina Peaks Wilderness adjacent to the project area, Hwy 89 N. viewshed, watershed protection, wildlife habitat, and other forest health resource concerns. The Proposed Action provides treatments in this area to reduce fire hazard to resources, but with a greater emphasis on

wildlife habitat needs and other forest health and restoration objectives such as historic tree density and arrangements and restored grasslands, (See Figure 1.4, Jack Smith/Schultz Emphasis Zones on the following page).

A further discussion of the zones and various differences in treatment emphasis and discussion on on-going collaborative efforts can be read in the document Jack Smith/Schultz Fuel Reduction and Forest Health Project Proposed Action, (PRD # 42), pages 25 – 29 and on the Coconino Website.

Figure 1.4 – Jack Smith/Schultz Project Emphasis Zones Map



This action proposes to meet the purpose and need by thinning approximately 8,520 acres of forest and meadow lands mechanically and by hand in the project area. It also proposes prescribed burning on approximately 9,220 acres. The existing road system would be used, with approximately 2 to 5 miles of temporary road constructed for hauling access. These segments would be obliterated after thinning activities are complete. In summary, the Forest Service would:

Uneven-aged management treatments for Fuel Reduction with WUI Emphasis on approximately 3,096 acres.

Uneven-aged management treatments for Fuel Reduction with Resource Emphasis on approximately 3,982 acres.

Thin from below treatments for Developing Old-Growth – Less than 12" diameter breast height on approximately 151 acres in the Jack Smith 10K.There are no treatments proposed for developing old-growth acres in the Elden 10K. (Also, see old-growth allocation discussion – there are additional untreated acres allocated within and outside the project area for old-growth habitat. Old-growth is tracked at the 10K level.

Thin from Below for Fuel Reduction – Less than 12 inches diameter breast height on approximately 1,110 acres. (Acreage includes the 151 acres of developing old-growth).

Thin from Below for Fuel Reduction – Less than 9 inches diameter breast height on approximately 305 acres.

Prescribed Burning – all acres identified in the treatments above would be treated with prescribed burning after thinning and activity slash burning operations have been completed. (In addition – see Burn Only management activity listed below).

- Conduct initial prescribed burns on approximately 8,520 acres after thinning to reduce fuel loads and reintroduce low to moderate intensity surface fire; and
- Conduct prescribed burn only treatments on 700 acres on sites where thinning is not needed or feasible to reduce fuel loads and reintroduce low to moderate intensity fire, and
- Conduct additional maintenance burns on 9,220 acres after initial prescribed burns to maintain fuel loads.

Roads and Transportation System

- Close approximately 27.9 miles and obliterate approximately 38 miles of roads in excess or otherwise undesirable due to resource concerns to achieve the desired open road system of less than 2 miles/section.

Chapter 2 includes a complete description of Proposed Action activities, specific mitigation measures and design features, and monitoring activities.

Decision Framework

Based on the analysis in this Environmental Assessment, the Peaks District Ranger will decide how to best reduce fuel loading and restore fire-adapted lands in the project area in accordance

with Forest Plan direction and the desired future conditions. The responsible official will decide how to implement the Proposed Action or a modified version of it. The decision will include:

- The location, design, and scheduling of the proposed mechanical treatment, burning, and other activities;
- Access management measures; and
- Mitigation measures and monitoring activities.

Relationship to Forest Plan

The Forest Service has two types of decisions: programmatic (e.g., the Forest Plan) and project level which implements the Forest Plan. The Jack Smith/Schultz Fuel Reduction and Forest Health Project EA is a project-level analysis; its scope is confined to addressing the significant issues and possible environmental consequences of the project. It does not attempt to address decisions made at a programmatic level.

The Forest Plan embodies the provisions of the National Forest Management Act of 1976, its implementing regulations, and other guiding documents. The Forest Plan sets forth in detail the direction for managing the land and resources of the Coconino National Forest. Where appropriate, the Jack Smith/Schultz Fuel Reduction and Forest Health Project EA also tiers to the Forest Plan Final Environmental Impact Statement (USDA Forest Service 1987), as encouraged by 40 CFR 1502.20.

Public Involvement

The proposal was listed in the Coconino National Forest's Schedule of Proposed Actions in January of 2007. The proposal was provided to the public and other agencies for comment during scoping in May of 2007. To meet HFRA requirements and better inform the public of project progress and management intent, the District hosted two public meetings during the scoping period, one in the Doney Park community and one near the Schultz Pass neighborhoods. As mentioned previously in the Background section of this Chapter, the District also worked closely with Greater Flagstaff Forests Partnership (GFFP) on all phases of planning and design for this project. See *Appendix B – Healthy Forests Restoration Act Authorities for the Jack Smith/Schultz Fuels Reduction and Forest Health Project* for more information on collaboration with GFFP.

Using the comments from the public, other agencies, and GFFP, the interdisciplinary team developed a list of issues to address.

Scoping

The Council on Environmental Quality (CEQ) defines scoping as "...an early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a Proposed Action" (40 CFR 1501.7). Among other things, the scoping process is used to invite public participation, to help identify public issues, and to obtain public comment at various stages of the environmental analysis process. Although scoping is to begin early, it is really an iterative process that continues until a decision is made.

In May of 2007, a scoping letter notifying the public of a 30-day comment period was released to the public. This letter included the Purpose and Need for the project, the Proposed Action, monitoring measures, and design features that were built into the Proposed Action to reduce or

eliminate any negative environmental effects. This included Federal and State agencies, Native American groups, municipal offices, businesses, interest groups, and interested individuals.

Approximately 6 individuals attended the public meetings on May 24, 2007 and May 31, 2007. A total of five written public comments were received in response to the mailing and public meetings. Copies of these letters and the District's response to these comments are found in *Appendix A - Responses to Scoping Comments.* An updated Comment Analysis document reflecting re-analysis following objection and objection review, PRD # 76 is also included in the project record, which identifies significant and non-significant issues.

Issues

Scoping and public involvement activities are used to identify issues about the effects of the Proposed Action. A list of issues and reasons regarding their categorization is located in the Comment Analysis Report in the Project Record. The following issues are addressed through the Proposed Action, an additional action alternative, project design features, monitoring activities, and effects analysis located in Chapter 3.

As discussed in the Background section on page 2 a re-analysis of issues was conducted in response to objections and findings of the Objection Reviewing Official. As identified below issue 1-1 is determined to be a significant issue in re-analysis. We have also expounded on this issue to further identify the concern. Although other issues were identified in both objection and objection review they were based on process and information clarity and not responsive to alternatives. All other issues remained non-significant.

I-1. Northern Goshawk Habitat and Canopy Cover - Significant Issue

- Measuring canopy cover at the group level versus stand level. Stand level canopy cover could be reduced to as much as 10%, creating a concern for meeting the habitat requirements of the 14 prey species. The following discussion has been included to further describe this issue, after re-analysis of issues from objection and objection review: In addition to concerns regarding measurement levels of canopy cover this issue includes the Districts use of the clarified Regional guidelines for implementation for Northern Goshawk habitat management in the Proposed Action. In applying the clarified guidelines the District described a condition for grassy openings to be maintained in perpetuity as "interspace". This term was developed and described in collaboration as a way to describe the degree of openness on the landscape that would be created by the project. In review it has been determined that the Forest Plan does not address either interspace or grassy openings in the forested environment to be maintained in perpetuity and that these areas must be considered in the VSS 1 calculation to be consistent with the Forest Plan. Because the Proposed Action based the amount and spatial placement of interspace on a restoration basis, using absence of presettlement evidence, the extent and size criteria for VSS 1, not to exceed 20% of forested area at the stand level and not to exceed 4 acres in size as required by the Forest Plan, is exceeded per our estimate of 50% of the project landscape being in interspace. The Reviewing Official found that unless we had another explanation or could demonstrate how this feature could be applied and still meet Forest Plan S&G's for VSS 1 extent and size criteria, a Forest Plan Amendment for the project would be required. Thus, as described elsewhere, the District Ranger requested an additional alternative to address this issue.

I-2. Northern Goshawk Habitat and Even-aged Group Management

- Proposed treatments may trend toward even-aged group selection over time. Managing tree groups by VSS class comes across as even-aged tree group management.
- Even though habitat is to be evaluated at the ecosystem management level, the mid-scale or project area level, and at the stand level, the FS is instead considering only the "group size" for assessing canopy cover and other requirements which… This is not only unsupported by the available science, but is also directly contrary to and in violation of the mandatory goshawk S&G's.

I-3. HFRA and Appropriate NEPA levels

- It is not appropriate to use HFRA authority for this project because the project falls outside the WUI and may result in significant effects to Northern goshawk and MSO. This project proposes to protect the WUI itself, not to protect communities. Figure 2 clearly indicates that many areas that are set for logging in the name of hazard reduction are more than one mile from the CWPP's already extremely cautious WUI, sometimes more than two miles away.
- The Forest Service should conduct an analysis of this project under the regular NEPA process and consider alternatives to what it proposes.
- Significantly, we do not believe that the CNF has authority to use the HFRA to log these non-WUI areas under expedited rules, 16 U.S.C. 6512(a). There are lands that meet none of the other requirements of HFRA that are slated for logging.
- Despite concerns about an overreaching CWPP process we call on the CNF to restrict the project's fuels reduction treatments to areas actually defined as WUI.
- The Forest service is not preparing an EA to determine whether an EIS is required, but rather as the pre-determined final environmental assessment for the project. The pre-determination that there will be no significant impacts and that no EIS will be required violates NEPA. We believe that this project is of a nature that a full EIS should be prepared and a full and open NEPA process be allowed.
- The Forest Service intends to not provide for any public comment on a Draft EA. This position violates both HFRA and NEPA. The "proposed action" description fails to explain why the project will not result in significant environmental impacts, and how the project will comply with applicable forest plan requirements. The FS must therefore allow additional public comment on a Draft EA for this project.

I-4. Meeting Forest Plan Standards and Guidelines for wildlife and TE&S habitats -

- …see no evidence in the document submitted thus far that you are complying with the Forest Plan requirements for old growth, snags, soils, goshawk, and Mexican spotted owl protection.
- The FS has failed to demonstrate that the Jack Smith/Schultz project will comply with the mandatory standards and guidelines for the Northern goshawk.
- There is no way for the public to determine compliance with the numerous, mandatory NGO S&G's, NFMA compliance is not met.

I-5. Fire Regime and Condition Class not displayed clearly

- …Forest is amiss for not providing clear description of Condition Class/Fire Regime on the project.

I-6. Old-Growth Standards and Guidelines are not being met.

- The FS fails to properly disclose whether existing old growth areas actually meet the minimum numeric standards set forth for old-growth in the Forest Plan.
- ... the project only designates 151 acres for future old-growth.
- The FS is far from meeting the mandatory old-growth S&G's for these areas and therefore, cannot log any large, old-growth trees until it comes into compliance.
- …as required by the Plan Amendment and CNF Plan, the FS analysis of old-growth habitat must be at multiple scales… The information provided for the Jack Smith project again fails to meet this requirement. …FS must explain how many acres within the affected 'ecosystem management areas" actually meet the minimum criteria for old-growth habitat. … Must asses the existing and potential impacts to old-growth habitat at multiple scales, must allocate no less than 20%...
- Because the FS is so far out of compliance with the minimum old-growth standards it also cannot demonstrate that it is maintaining the viability of Northern goshawks and other old growth dependant species as required by NFMA.

I-7. MSO Critical Habitat Stocking Levels and Treatments and 24" tree cutting.

- The proposed action is not in compliance with the Forest Plan regarding MSO basal area.
- Many treatments without diameter limits are located in MSO Critical Habitat. The S&G's for MSO require the Forest to, "Save all trees greater than 24" dbh." The PA is not in compliance with the Forest Plan regarding MSO requirements for large tree retention.

I-8. Treatments in Low and Moderate Fire Hazard rated stands.

- In describing the central goal of the project of this fuels reduction project is to achieve a condition currently present without spending a dime of taxpayer dollar. Nonetheless and despite the PA's own internal logic, over 8000 acres of logging is proposed.
- …no logic is provided in the Purpose and Need section of this document that explains the widespread logging in low hazard areas.

I-9. Less than 12" dbh Thinning Treatments cutting large trees.

- It would seem that this project is going to result in current logging practices removing many of the very trees that might have most quickly replaced the missing older trees…
- Stand numbers 000238/0019 and 0009 and 000259/0014 and 0012 are scheduled to receive this <12" logging treatment despite the fact that both have "low' fire hazard ratings. Both are also outside the WUI.

I-10. Thinning in Stands less than 270 SDI.

- …only 10% of the project area is above the 270 value and yet the CNF proposes to log 73.7% of the project area at this time. This means trees in stands even below the 157 value are slated for removal long before they are even close to danger of competition-based mortality.

I-11. Discrepancy in Desired Future Condition for Stems/Acre

- …document shows significant confusion on the issue of stems/acre. Stems/acre DFC is <100 in vegetation section, and then later under fuels is <300.

I-12. Call for 16" Cutting Cap

- We call on the CNF to propose a project that does not log any trees >16" dbh.

I-13. Roads – Locations, Analysis, and Inventory Techniques and Temporary Roads.

- …the PA does not identify the locations of proposed roads and offers no analysis of impacts. We generally oppose the construction of new roads for this project. Roads described as "temporary" often are not.
- …it is unclear what level road density standards are being calculated or reduced:
- The CNF is in non-compliance with its own Forest Plan standards. The construction of new roads makes compliance more difficult. We do not, however, support the logic that the construction of more roads will meet the P&N of the action: "continued road density reduction."
- The road construction proposed in this area will contribute to higher densities and route proliferation.
- …increased access via newly constructed roads increases fire hazard and is counter to the central goal of the project.

I-14. Wildlife – Snags S&G's

- The PA does not clearly state the guidelines for snag retention in the project area, nor does it explain the manner in which these guidelines will be met…PA should include the creation of snags to bring the Forest into compliance.

I-15. Fuels –Machine Piling

- Machine piling should not be allowed in sensitive areas, the effects of any machine piling allowed should be fully analyzed in the EA.

I-16. Wildlife – MIS Analysis

- Forest must conduct MIS analysis.

I-17. Aspen Grazing

- Call for an Alternative to remove all grazing of cattle from aspen regeneration areas.

Applicable Laws and Executive Orders

Shown below is a partial list of federal laws and executive orders pertaining to project-specific planning and environmental analysis on federal lands. Disclosures and findings required by these laws and orders are contained in Chapter 3 and will be addressed in the final decision for this project.

Multiple-Use Sustained-Yield Act of 1960

National Historic Preservation Act of 1966 (as amended)

Wild and Scenic Rivers Act of 1968, amended 1986

National Environmental Policy Act (NEPA) of 1969 (as amended)

Clean Air Act of 1970 (as amended)

Endangered Species Act (ESA) of 1973 (as amended)

Bald and Golden Eagle Protection act of 1940 (as amended)

Forest and Rangeland Renewable Resources Planning Act (RPA) of 1974 (as amended)

National Forest Management Act (NFMA) of 1976 (as amended)

Clean Water Act of 1977 (as amended)

American Indian Religious Freedom Act of 1978

Archeological Resource Protection Act of 1980

Executive Order 11593 (cultural resources)

Executive Order 11988 (floodplains)

Executive Order 11990 (wetlands)

Executive Order 12898 (environmental justice)

Executive Order 12962 (aquatic systems and recreational fisheries)

Executive Order 13186 (Migratory Birds Treaty Act)

Project Record Availability

Additional documentation, including more detailed analyses of project-area resources, may be found in the project record located at the Peaks Ranger District, 5075 N. Hwy 89, Flagstaff, Arizona, 86004. Certain documents are referenced throughout this EA. These records are available for public review pursuant to the Freedom of Information Act (5 U.S.C 552).

Chapter 2 - Alternatives

This chapter describes the Proposed Action - Alternative 1 and alternative management strategies in an additional action alternative, Alternative 2, considered by the Forest Service for the Jack Smith/Schultz Fuel Reduction and Forest Health Project. It includes a discussion of how the Proposed Action was developed, an overview of mitigation and monitoring measures, and a comparison of the Proposed Action – Alternative 1 and Alternative 2. The alternatives are also compared with the effects of not treating the area.

Some of the information used to compare the alternatives with no treatment at the end of Chapter 2 is summarized from Chapter 3. Chapter 3 contains the detailed scientific basis for establishing baselines and measuring the potential environmental consequences of the alternatives.

Alternative Development Process

The Forest Service interdisciplinary team (IDT) used information from scoping, including issues identified for the project (see Chapter 1), in conjunction with the field-related resource information to develop management options. Any alternatives considered in full detail needed to meet the stated purpose and need to be considered in detail and meet HFRA planning requirements. As discussed in the Background Section on page 2, the ID Team identified 1 significant issue in re-analysis following Objection and the Reviewing Officials findings in response to objection. In response to the determination of significant issues the District Ranger asked the ID Team to consider an additional action alternative to address them. Beginning in January 2008 the ID Team developed the additional alternative.

Forest Plan Consistency

The Proposed Action – Alternative 1 has been found to be inconsistent with the Coconino Forest Plan and will require a site specific project level Forest Plan Amendment if selected. The additional action alternative, Alternative 2, provides an option where all applicable forest-wide and management area standards have been incorporated, and/or met, or progress is being made on attaining S&G as soon as possible. A reference guide has been included in **Appendix F** that addresses key S&G's. This guide provides a status of how the project is meeting or working toward meeting S&G's and provides information on specific locations in the document where this is adressed. The Forest Service uses many mitigation and preventive measures in the planning and implementation of land management activities. The application of these measures began during the planning and design phases of the project. Additional direction comes from the Regional Guide, and applicable Forest Service manuals and handbooks.

Alternatives Considered but Eliminated from Detailed Study

1. The Center for Biodiversity and Forest Guardians called on the CNF to propose a project that does not log any trees greater than 16" in diameter in this area. They made this request because they "…categorically oppose logging large trees in the name of hazard reduction or forest health. Also, the feel this is needed in this area where "the vast majority" of large trees and old-growth habitat has already been logged.

The Forest Service has held numerous meetings regarding large tree management with GFFP over several years of collaboration to attempt to resolve some large tree management issues. Much of this history is documented in *Appendix B – Healthy Forests Restoration Act Authorities for the Jack Smith/Schultz Fuel Reduction and Forest Health Project, Attachment 1 to the Proposed Action, (PRD #42).*

These issues associated with a 16 inch diameter limit was not developed into alternatives considered in detail. In making the call for a 16" dbh cutting cap the Center for Biological Diversity/Forest Guardians give no reasons for the cap other than that they "*categorically oppose*" logging large trees in the name of hazard reduction. The only quantification given specific to the Jack Smith/Schultz project is in the description "*…in this area where "the vast majority" of large trees and old-growth habitat has already been logged*". There is insufficient information provided in the request specific to the Jack Smith/Schultz Project to cause us to analyze the alternative in further detail. Because this authorized fuel reduction project proposed is planned in the Wildland/Urban Interface (WUI) including area no farther than 1½ miles from the boundary of an at risk community, other critical urban interface infrastructure with the remaining project area on lands in Fire Regime 1/Condition Class 3, and the Proposed Action implements the recommendations of the Community Wildfire Protection Plan as noted in section 104, subsection d of the Healthy Forests Restoration Act, the Districts are not required to study, develop, or describe any alternative to the Proposed Action in this Environmental Assessment pursuant to Section 102(2) of the National Environmental Policy Act of 1969 (42 U.S.C. 4332(2)).

While recommendations from the Center for Biodiversity and Forest Guardians regarding large tree diameter limits will not be considered in detailed study, Chapter 3 does disclose the environmental effects of thinning some large trees to meet ecological objectives. In addition to the HFRA direction listed in the preceding paragraph, these proposals will not be considered in detail because:

- The district has sufficiently provided large tree management direction in the Proposed Action that limits the amount of large trees to be harvested;
- Comments did not disclose how a large tree diameter limit better meets the intent of the CWPP as required under HFRA; and
- A large tree diameter cap would not meet the Purpose and Need for Action which details a need for a sustainable, uneven-aged forest structure. See the Vegetation Section in Chapter 3 for further information on the effects of a diameter limit on uneven-aged project objectives.

The Districts' response to additional respondent comments regarding large tree concerns is located in *Appendix A – Responses to Scoping Comments.*

2. The Center for Biological Diversity and Forest Guardians call for the CNF to include an alternative to remove livestock from possible aspen regeneration sites. The issue with livestock grazing in aspen regeneration areas was not developed into an alternative considered in detail because there is currently no livestock grazing in aspen regeneration areas within the project area, nor is any anticipated in the foreseeable future. All damaging ungulate grazing on aspen is currently being done by elk. Though there are two grazing permit within the project area, the one that would include aspen regeneration areas has not been used for livestock grazing in the project area since the 1980's. There

is no change anticipated. All pastures on the remaining permit that occur in the project area contain no aspen sites.

The Districts' response to this comment is located in *Appendix A – Responses to Scoping Comments*.

Effect of No Action

Chapter 3 includes an analysis of no treatment or no action to disclose the existing and projected future conditions against which the Proposed Action is compared. No action assumes the landscape would remain subject to natural or ongoing changes only. No thinning or prescribed fire activities would occur in the project area at this time. This analysis and decision does not preclude activities in other areas at this time, or preclude other project activities in the project area some time in the future.

Managing resource areas in their current state does not meet the purpose and need for action, nor would it move the project area towards the desired future conditions.

Proposed Action – Alternative 1

The Proposed Action, as indicated in Chapter 1, was designed to meet the Need for Change for Action of the project while meeting requirements of the Forest Plan and other guiding documents. Alternative 1 used the clarified Regional Guidelines for Northern goshawk management, with modifications that responded to concerns over low landscape scale canopy cover. The alternative also incorporated forest restoration practices based on pre-settlement evidence to help provide a template for on-the-ground implementation. A term, interspace, was developed during collaboration to help describe the restorative grassy areas between tree groups, to be maintained as such, in perpetuity. These areas or as we described, interspaces, are also used to define tree groups to create a groupy/clumpy structure. The alternative measures canopy cover at the group level for Northern goshawk habitat, as described by the clarified guidelines. Determinations made during objection review (previously described on page 2), found that this alternative would not meet Forest Plan Standards and Guidelines for VSS 1 openings in respect to percent of area and acreage size. It was determined that to move forward with the Proposed Action a Forest Plan Amendment would be required.

Alternative 2

As previously described, re-analysis of issues identified a number of comments that were combined into one significant issue. The issue addresses the canopy cover levels and measurement methods being at the group versus stand level and the use and application of "interspace", which under the proposed action are grassy areas to be maintained in perpetuity, and how this application affects the openness of the forest landscape. The District Ranger asked the ID Team to develop Alternative 2 to respond to the significant issue of canopy cover and canopy cover measurement methods and interspace. Alternative 2 is also designed to meet the Need for Change for action of the project, but does so in a manner similar to other recent District projects in regard to meeting the Forest Plan Standards and Guidelines for Northern goshawk management. The use of the term and application of interspace is dropped in this alternative and all openings fall under the criteria for VSS 1. Openings will be limited in size and extent to the Forest Plan Standard and Guideline and canopy cover will be measured at three levels including the Ecosystem Management Area, the Project level and the stand level. (The three levels of analysis will be completed on both alternatives). The District will still strive to create a

clumpy/groupy structure using uneven spacing within groups and VSS 1 openings, but overall the landscape will be much more continuously forested, with less open space.

The following table provides a brief overview of proposed management activities by alternative 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.

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 or that are otherwise a threat to private lands and other critical infrastructure, treatments are designed to best reduce the threat of wildfire. In contrast, treatments in Mexican spotted owl Restricted Habitat—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 - Tables 2.1 – 2.2

Table 2.1 - Proposed Action – Alternative 1 and Alternative 2 Management Activities and Rationale.

Management Activity
Proposed Action – Alternative 1: Uneven-aged management treatments for Fuel Reduction with WUI Emphasis on approximately **3,096** acres. Uneven-aged management treatments for Fuel Reduction with Resource Emphasis on approximately **3,982**acres. **Alternative 2** The number of treated acres for uneven-aged management stays the same in Alternative 2, however because the treatment design is similar across the zones and all of the treatments are at more of the Resource Emphasis treatment described in Alternative 1, these acres are described as outside or inside goshawk protected activity centers (PFA's). Objectives for fuel reduction in the WUI remain the same, but the treatment resolution between the two emphases is minor. Treatment in Alternative 2 for uneven-aged prescriptions are described as follows: Uneven-aged management Outside PFA's: **6,381** acres. Uneven-aged management Inside PFA's: **697** acres **COMMON TO BOTH ALTERNATIVES:** Thin from below treatments for Developing Old-Growth – Less than 12" diameter breast height on approximately **151** acres in the Jack Smith 10K.There are no treatments proposed for developing old-growth acres in the Elden 10K. (Also, see old-growth allocation discussion – there are additional untreated acres allocated within and outside the project area for old-growth habitat. Old-growth is tracked at the 10K level.

Thin from Below for Fuel Reduction – Less than 12 inches diameter breast height on approximately **1,110** acres.
Thin from Below for Fuel Reduction – Less than 9 inches diameter breast height on approximately **305** acres. Prescribed Burning – all acres identified in the treatments above would be treated with prescribed burning after thinning and activity slash burning operations have been completed. (In addition – see Burn Only management activity listed below).
Purpose and Need for Action
Wildfire and Fuels Hazard
COMMON TO BOTH ALTERNATIVES: • 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 12 feet or greater in ponderosa pine forests in VSS classes 3 and above. VSS classes 1 and 2 are protected from prescribed fire where necessary. • Stems/acre less than or equal to 100 in urban interface zones. • A mix of conditions that allow low to moderate intensity fires to be managed or introduced in ponderosa pine forests.
Fire-adapted Forest and Grassland Structure

- **ALTERNATIVE 1**
  - 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
  - Pre-settlement Evidence: An Ecosystem Restoration model modified to meet northern goshawk habitat guidelines will be used to guide management of treatments within the ponderosa pine. Pre-settlement evidences (e.g. stumps, stumpholes, and downed logs) will be used to guide placement or retention of tree clumps and groups, interspaces and openings. Pre-settlement evidences are used to guide residual density and tree retention. Retention tree numbers are adjusted for some areas between zones to meet varying emphasis needs.

SCHULTZ PASS WUI WEST – Zone 1

Emphasis is on fuel and fire hazard reduction to WUI and resource protection for adjacent TE&S wildlife habitats, and additional mitigations for visual quality associated with trails.

UNEVEN-AGED TREATMENTS WITH FUEL REDUCTION EMPHASIS: 1055 ACRES.

Alternative 1:

Modified Group Selection combined with Individual Tree Selection to attain un-even aged groups.

Clumps: Clumps are generally made up of a few trees made distinct by openings and interspaces, and when aggregated together, form groups. The desired condition of clumps is uneven-aged with a variety of tree sizes.

Group size: In general .05 acres or larger, up to .7 acres, composed of 2 or more clumps, 2 to 44 trees. Canopy cover ranges from 30% to 60% measured at the group level.

Forested area consisting of clumps and groups is expected to range between 30 to 50%, increasing over time by as much as 20% as VSS 1 openings regenerate. To insure that there is a diversity of group sizes and that the amount of forested area in canopy cover is well represented within the 30 to 50% range, a minimum of 25% of groups will retain canopy cover greater than 50%, 50% of groups will be retained with canopy cover between 40 and 50% and no more than

25% of groups will retain canopy cover between 30 and 40%. Group size will vary based on the presence of evidence and the number of trees to be retained per evidence, but some groups will reach the 5 acre maximum size or greater over the project area with greater than 50% canopy cover. Efforts will be made to tie larger groups to features such as archaeological sites, drainages, wildlife waters, visually interesting trail niches and wildlife habitat niches. Other larger groups are present in untreated or deferred area, burn only, MSO Restricted treatments, PAC treatments, and the thin to 12" dbh treatments.

Structural arrangement within clumps and groups is described as:

VSS 5 and 6 – Usually closed canopy (interlocking crowns desired condition), usually will retain existing conditions.

VSS 4: Desired condition is closed canopy, but will vary by fuel hazard reduction/resource needs. Canopy cover ranges from 50% to 60%.

VSS 3: Usually open canopy, but may vary from moderately closed to closed for diversity. Canopy cover ranges from 30% to 60%.

VSS 3: Degree of openness: 70 % open – canopy cover range is zero to 40%; 20% moderately closed - canopy cover range is 41 to 59%; 10% closed - canopy cover range is 60%+.

Openings: In general 200 ft. wide or less, 4 acres or less, 3-5 seed bearing leave trees per acre, up to 20% of area, depending on regeneration needs for VSS 1 and 2 to attain 20% in those VSS classes. Measured at the group or stand level. Because the 20% DFC for VSS 1 and 2 is on forested area at the stand level, actual amount of regeneration openings within groups will usually range between 10% and 20% if needed. This accounts for the stand area in interspace where there is no regeneration objective.

Interspace: Created and maintained as grassy non-forested area, usually determined by pre-settlement evidence, but modified as described in bullet 4 above for fire adapted forest and grassland structure to attain grassy open area at 1 ½ times the tree height of adjacent groups, (If group tree height averages 30 feet, distance across grassy interspace will be at least 45 feet). Stands will average 50 to 70% of acreage in grassy interspaces.

Alternative 2:

Group Selection Treatment

Canopy cover in VSS 4, 5, & 6 will average 40% or greater across the stand in areas outside of PFAs. Canopy cover in VSS 4, 5, & 6 will average 50% or greater across the stand within PFAs. In addition in VSS 4, 1/3 will be greater than 60% canopy cover.

VSS 4, 5, &6 groups will typically have closed canopies with interlocking crowns.

VSS 3 areas will average 30 percent canopy cover.

Where VSS 1 and 2 are lacking in stands, openings will be created up to 20% of the stand.

Openings will not exceed 4 acres outside of PFA or 2 acres insided PFA and/or not be wider than 200 ft.

Un-even spacing will be used to create as much of a groupy/clumpy structure as possible while meeting stand level canopy cover requirements.

There will be no thinning in Northern goshawk nest stands.

Proposed Action – Alternative 1:

UNEVEN-AGED TREATMENTS WITH RESOURCE EMPHASIS: None in this Zone, however, larger group sizes, up to 5 acres are included in the uneven-aged treatments for fuel reduction based on specific features such as Schultz Creek drainage, north facing slopes, trails, Schultz Tank and other key waters. This zone also includes other management activity treatments types specific to resource needs such as MSO habitat as follows:

Alternative 2:

Outside PFA: Treatment intensity is similar to Uneven-aged treatments for Resource Emphasis on **752 acres,** however the overriding goal in this Zone is still on WUI emphasis fuel reduction.

Inside PFA: Treatments are designed to meet canopy cover requirements for the Northern goshawk guidelines inside PFA on **303 acres**.

.COMMON TO BOTH ALTERNATIVES

THIN FROM BELOW TREATMENTS WITH RESOURCE EMPHASIS– MSO PROTECTED HABITAT: 88 ACRES. Within PAC's, thinning is 9 inches or below, and canopy cover will be 50% +. Mixed conifer and 40% slopes are deferred from treatment. Openings are ¼ acre or less.

THIN TO 12 INCHES DBH OR LESS DUE TO EXISTING STAND STRUCTURE: 235 ACRES. Thin from Below for Fuel Reduction – Less than 12 inches diameter breast height. Canopy cover is 20%+.

SCHULTZ PASS WUI EAST – Zone 2

Alternative 1:

Where uneven-aged management treatments for fire hazard reduction are applied, reduce average canopy closure to approximately 40%, using a groupy/clumpy spatial arrangement interspersed with interspaces. Group and clump size is generally smaller than those created in the resource emphasis treatments. Clumps of VSS 5-6 are usually closed canopy in both treatments, VSS 3-4 is usually open canopy. Groups are located in a NW-SE fashion (to be laid out cross wind).The distance across the opening between the groups is greater than or equal to the distance of the group. Primarily there is a S/W wind in this area; being laid out in this fashion will help reduce developing fire intensity which would produce spot fire activity down wind. This reduces the ability of a wildfire from transitioning into a crown fire from continuing across these zones, and reduces the distances at which spot fires would be expected to occur. By reducing canopy closure to this degree (40%) FS Vegetation Simulator indicates that the canopy would not close to a dangerous level for the next 20 years. This zone includes un-even-aged treatments with resource emphasis for MSO restricted and protected habitat and cultural resource mitigations.

Alternative 2:

Alternative 2 will strive to attain all conditions described in Alternative 1, however interspaces are not used to create space between groups and canopy cover is averaged at 40% or higher in VSS 4-6 classes. Because forest cover is more continuous the distinction between groups is less evident. The distinction between WUI and Resource Emphasis treatments is less distinctive with treatment emphasis similar to Resource Emphasis, however the overriding goal in this Zone is still on WUI emphasis fuel reduction.

Proposed Action – Alternative 1:

UNEVEN-AGED TREATMENTS WITH FUEL REDUCTION EMPHASIS: 2041 ACRES.

Alternative 1

Clumps: Same as Zone 1.

Group size: Same as Zone 1.

Openings: Same as Zone 1.

Interspace: Same as Zone 1.

Alternative 2: Treatment intensity similar to Resource Emphasis but without interspaces and the overriding goal remains WUI emphasis fuel reduction.

.Outside PFA's: **2,006 acres.**

Inside PFA's: **35 acres.**

COMMON TO BOTH ALTERNATIVES:

UNEVEN-AGED TREATMENTS WITH RESOURCE EMPHASIS-OTHER RESOURCES: 430 ACRES

Stand structure of the selected alternative will be implemented with mitigations for the protection

of cultural resources included, which require thinning with slash removal to be accomplished by hand-only in designated areas.

UNEVEN-AGED TREATMENTS WITH RESOURCE EMPHASIS– MSO RESTRICTED HABITAT: 272 ACRES. There are four stands that have been classified as restricted habitat. Within this habitat 76 acres have been identified as target/threshold habitat. Canopy cover is measured at the stand level and will be 40% or greater in this habitat. Openings are 2 acres or less.

THIN FROM BELOW TREATMENTS WITH RESOURCE EMPHASIS– MSO PROTECTED HABITAT: 217 ACRES. Within PAC's, thinning is 9 inches or below, and canopy cover will be 50% +. Mixed conifer and 40% slopes are deferred from treatment. Openings are ¼ acre or less.

THIN TO 12 INCHES DBH DUE TO EXISTING STAND STRUCTURE: 155 ACRES. Thin from Below for Fuel Hazard Reduction – Less than 12 inches diameter breast height. Canopy cover 20%+.

89 Mesa – Zone 3

Desired results for the fuels treatment in this zone include fire hazard reduction, but with more emphasis on resource protection and less on WUI, however, fire hazard reduction in this Zone makes treatments in Zone 2 more effective. This zone differs from Zones 1 and 2 in that larger group size can often be present and a higher percentage of closed canopy groups are present.

COMMON TO BOTH ALTERNATIVES:

UNEVEN-AGED TREATMENTS WITH FUEL REDUCTION EMPHASIS WUI: None in this zone.

UNEVEN-AGED TREATMENTS WITH RESOURCE EMPHASIS: 3,552 ACRES.

Alternative 1;

Clumps: Same as Zones 1 and 2.

Group size: In general .05 to 5 acres composed of 2 or more clumps, 2 to 44 trees, with regeneration openings and interspace between clumps. Canopy cover ranges from 30% to 60% measured at the group level and stand level. Canopy cover measurement includes openings and interspace. Larger group sizes, up to 5 acres are included often.

Forested area consisting of clumps and groups is expected to range between 35 to 65%, increasing over time by as much as 20% as VSS 1 openings regenerate. To insure that there is a diversity of group sizes and that the amount of forested area in canopy cover is well represented within the 30 to 65% range, a minimum of 35% of groups will retain canopy cover greater than 50%, 50% of groups will be retained with canopy cover between 40 and 50% and no more than 20% of groups will retain canopy cover between 30 and 40%. Group size will vary based on the presence of evidence and the number of trees to be retained per evidence, but some groups will reach the 5 acre maximum size with greater than 50% canopy cover. 5 acre maximum size or greater over the project area with greater than 50% canopy cover. Efforts will be made to tie larger groups to features such as archaeological sites, drainages, wildlife waters, visually interesting trail niches and wildlife habitat niches. Other larger groups are present in untreated or deferred area, burn only, MSO Restricted treatments, PAC treatments, and the thin to 12” dbh treatments. The mid-range canopy cover percents will be adjusted down as the large group percentage goes up.

Structural arrangement within clumps and groups is described as:

VSS 5 and 6 – Usually closed canopy (interlocking crowns desired condition), usually will retain existing conditions.

VSS 4: Desired condition is closed canopy, but will vary by fuel hazard reduction/resource needs. Canopy cover ranges from 50% to 100%.

VSS 3: Usually open canopy, but may vary from moderately closed to closed for diversity. Canopy cover ranges from 40% to 60%.

VSS 3: Degree of openness: 60 % open – canopy cover range is zero to 40%; 20% moderately closed - canopy cover range is 41 to 59%; 20% closed - canopy cover range is 60%+.

Openings: In general 200 ft. wide or less, 4 acres or less, 3-5 seed bearing leave trees per acre,

up to 20% of area, depending on regeneration needs for VSS 1 and 2 to attain 20% in those VSS classes. Measured at the group or stand level. Because the 20% DFC for VSS 1 and 2 is on forested area at the stand level, actual amount of regeneration openings within groups will usually range between 0% (if VSS 1 and 2 is present in existing structure) and 10% if needed. This accounts for the stand area in interspace where there is no regeneration objective. Opening in PFA's will be 2 acres or less.

Interspace: Created and maintained as grassy non-forested area, usually determined by pre-settlement evidence, but modified as described in the 6th and 7th bullets on page 30 above, for fire adapted forest and grassland structure to attain grassy open area at 1 ½ times the tree height of adjacent groups, (if group tree height averages 30 feet, distance across grassy interspace will be at least 45 feet). Stands will average 50 to 65% of acreage in grassy interspaces.

Alternative 2: Same as Alternative 2, zones 1 and 2.

.Outside PFA's: **3,193 acres.**

Inside PFA's: **359 acres.**

COMMON TO BOTH ALTERNATIVES

THIN TO 12 INCHES DBH DUE TO EXISTING STAND STRUCTURE: 720 ACRES. Thin from Below for Fuel Hazard Reduction – Less than 12 inches diameter breast height. Canopy cover 20%+.

COMMON TO ALL ZONES:

Alternative 1

NO TREATMENT: 2,608 ACRES. There are no treatments planned on these acres due to steep slopes, deferred mixed conifer cover type, access, or no treatment need. These acres will contribute to the amount of area in higher canopy closure and contribute to landscape diversity across the project area.

Alternative 2:

NO TREATMENT: 2,464 ACRES. There are no treatments planned on these acres due to steep slopes, deferred mixed conifer cover type, access, or no treatment need. These acres will contribute to the amount of area in higher canopy closure and contribute to landscape diversity across the project area.

Alternative 1:

Managing VSS within groups: The desired structural condition within groups is uneven-aged. Although we describe managing by VSS class, our goal is to maintain and increase uneven-aged structure. Where trees of differing ages or tree size classes exist within a group or clump that is otherwise dominated by a VSS class, these trees will be retained whenever possible. Treatment within groups is not intended to attain a single VSS class for the group. There will be conditions where a single VSS class completely dominates the group. The long term goal for these groups is to attain an uneven-aged structure over time using regeneration management.

Alternative 2:

The same as Alternative 1, however there will be less opportunity to develop uneven-aged

conditions within the groups. Trees will be left in a groupy clumpy pattern as much as possible; using tree rooting zones, regeneration openings and uneven spacing, while maintaining cover across the stand.

Management Activity

PRESCRIBED BURN ONLY TREATMENTS

Alternative 1

Initial prescribed burning on approximately **700** acres. Burn only treatments are intended to reduce ground fuels and reintroduce fire. Thinning with fire is not an objective in these stands, however some tree mortality can be expected due to torching of individual trees even under low and moderate fire intensities.

Alternative 2

Initial prescribed burning is increased by **144** acres by including 3 stands in the 89 Mesa area for a new total of 844 acres. These stands are added under this alternative to improve coverage of area treated for reduced fire hazard and help to mitigate loss of open space from Alternative 1.

Purpose and Need for Action

Wildfire and Fuels Hazard

Areas that do not need treated by mechanical thinning can be avoided and Fuels Management can achieve our objectives by prescribed burning.

- 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 less than 5 tons per acre in ponderosa pine forests

Management Activity

COMMON TO BOTH ALTERNATIVES

RESTORATION OF MOUNTAIN MEADOWS/GRASSLANDS.

Removal of invading ponderosa pine on approximately **27** acres.
Purpose and Need for Action
Restore mountain meadows and grasslands to historic and natural conditions
Management Activity
COMMON TO BOTH ALTERNATIVES **ASPEN RESTORATION.** Removal of invading ponderosa pine and/or fence protection on approximately **35** sites and **150** acres.
Purpose and Need for Action
Restoration and perpetuation of aspen cover type.
Management Activity
COMMON TO BOTH ALTERNATIVES **NOXIOUS OR INVASIVE WEED CONTROL AND PROTECTION.** Treatments and mitigations as identified in Noxious or Invasive Weed section, P. 48, and Attachment 5 on the Coconino Web Site.
Purpose and Need for Action
Reduce existing populations and control spread of noxious or invasive weeds.
Management Activity
COMMON TO BOTH ALTERNATIVES **Transportation System and Planning**: The project will require approximately 2 - 5 miles or less of temporary roads. Open road system and maintenance level of roads have been identified in a Roads Analysis Plan (RAP), has been coordinated with the ongoing Travel Management Rule analysis, and will identify road management needs for open road, closure, and obliteration. Managing for the desired open road system will allow for accomplishing 38 miles of road obliteration and 27.9 miles of closed roads. The resulting road density is approximately 1.5 miles/section.
Purpose and Need for Action
Continued road density reduction to work toward Forest Plan Standard or 2 miles of road/section

or less. Identification of the open road system.

Table 2.2 – Summary of Management Activity Parameters – Alternative 1 has been removed. Feed back was that the table was hard to read and repetitive from Table 2.1.

COMMON TO BOTH ALTERNATIVES

THIN FROM BELOW FOR FUEL REDUCTION – LESS THAN 9 INCHES DIAMETER BREAST HEIGHT.

These treatments have been identified on approximately **305** acres in stands within MSO PAC's where recovery plan requirements limit tree cutting to 9" dbh. These treatments have been identified for stands within PAC's that would benefit from a limited thinning to reduce fuel and fire hazard and improve over all forest health. The emphasis in these stands is to maintain higher canopy cover at the stand level.

UNEVEN-AGED TREATMENTS WITH RESOURCE EMPHASIS– MSO RESTRICTED AND PROTECTED HABITAT

There are eight stands comprising **445** acres that are classified as MSO Restricted Habitat. Emphasis on treatments in these stands is still on reduced fuel and fire hazard, but treatments will be accomplished to maintain or attain canopy cover requirements as defined for MSO Critical Habitat. This classification of habitat is one of the primary constituent elements under Critical Habitat. Canopy cover is maintained or attained at 40% or greater, at the stand level.

UNEVEN-AGED TREATMENTS WITH RESOURCE EMPHASIS– MSO THRESHOLD HABITAT:

There are five stands comprising **158** acres (36% of Restricted Habitat) that are classified as MSO Target/Threshold Habitat.

THIN FROM BELOW LESS THAN 12" DBH TREATMENTS WITH RESOURCE EMPHASIS– DEVELOPING OLD GROWTH

Approximately **151** acres have been identified for treatments for developing or recruitment old-growth. These stands have been selected as those that could reach an existing old-growth condition as soon as possible. Many of these stands are located to tie in with other important wildlife habitats, or haven't been chosen because they were only lacking in a few of the required components of existing old-growth and treatments are designed to promote attainment of those missing or lacking components as soon as possible. Canopy cover in these stands will be achieved at the stand level. (See old-growth discussion about additional lands allocated with no treatment).

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 **27** acres. However, no yellow pine trees would be removed.

ASPEN RESTORATION

To restore, protect, and regenerate aspen clones, invading ponderosa pine will be removed from within the clones and up to 66 ft. surrounding the clone. Treated sites may be fenced to protect

aspen suckers from ungulate browsing. There are approximately **150** acres on **35** sites that will be treated.

The various treatments and their locations are displayed on Figure 2.1 - Jack Smith/Schultz - Proposed Treatment Map

*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.

Figure 2.1 – Proposed Treatment Map – Proposed Action – Alternative 1. See attached map files on web site when viewing electronic version and to see color version.

Figure 2. 2 Proposed Treatment Map – Alternative 2

Figure 2.3 – Location/Stand Map

See following pages.

INSERT FIGURE 2.1

INSERT FIGURE 2.2

INSERT FIGURE 2.3

Forest Structure and Composition

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

In Alternative 1 Canopy cover values will be averaged across groups as achieved by the mix of varied density clumps, the aggregation of clumps in groups, and the amount and size of openings for regeneration, and grassy interspace occurrences. There are a few habitats where canopy cover is measured and described at the stand level only. These include MSO restricted habitat, MSO Target/Threshold, developing old-growth, and treatment constraints due to MSO PAC guidelines restricting thinning to 9” dbh. This situation also applies to areas with operability constraints on steep slopes or other access constraints where hand thinning is required and treatments are limited to 12 inches dbh. In these stands canopy coverage patterns are more continuous and will include less of a groupy/clumpy structure and less openings and interspace, due to the cutting limitations. 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.

In Alternative 2 all stands are measured at the stand level. Canopy coverage patterns are more continuous and will include less of a groupy/clumpy structure. Openings for VSS 1 will not exceed 20% of a stand and will not exceed 4 acres in size or be wider than 200 ft. Reserve trees will be retained in openings of 1 acre or larger. 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. Average stand canopy closure will meet Forest Plan Standards and guidelines for all VSS classes. In stands with a high percentage of VSS 3, VSS 4-6 canopy covers percentage will average 40 percent, but average canopy cover for the stand may fall below 40% to allow for achieving fuel hazard reduction and other forest health objectives.

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 30-60% cc and 40-120 basal area in the project area, depending on wildlife, fuels, and forest structure needs. Percentages of landscapes to be retained at various canopy cover levels have been described for both groups and forested area in Table 2.1 to insure there is a diversity and inclusion of all canopy cover ranges.

Age, Size, and Species Diversity

COMMON TO BOTH ALTERNATIVES

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 within clumps and groups across the landscape and not within individual stands. Treatments are not designed to attain a single VSS class within a clump or group, but will work with existing structure and retain trees of varying age and size classes when available and/or desirable to promote and retain uneven-aged structure when it exists.

Thinning 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. Attachment 1, (PRD # 42), Large Tree Management, on the Coconino Website, describes these situations and the rationale for removal of large diameter trees.

Spatial Arrangement

Alternative 1

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 and grassy interspaces. In Table 2.1 we describe clump and group structures, openings and interspaces by tree size and numbers, juxtaposition on the landscape, and canopy cover percentage and ranges by Zone by the various treatment emphases and how they are varied by the different wildlife habitats that are present on the project.

Alternative 2

Goals for tree arrangement after thinning are the same as Alternative 1, however, interspace is not used and all openings between groups are considered VSS 1 and will adhere to the Forest Plan S&G for size and extent. This creates a more continuous forested landscape and the distinction of a groupy/clumpy appearance is lessened. It is still desirable to mimic historic patterns in Alternative 2, and pre-settlement evidence can be used as an initial guide for tree distribution, however, historic patterns will not be re-created to the same extent as Alternative 1.

COMMON TO BOTH ALTERNATIVES

Old Growth

The 151 acres of proposed thinning treatments will maintain and contribute towards the development of old growth structure and composition in the project area. The remaining allocation of developing old-growth stands are in deferral areas within the project or in areas outside of the project area and will progress toward an existing old-growth condition with no treatment at this time. Old-growth is assessed at three levels, the Ecosystem Management Area, or 10K, the mid-scale or project level and the stand or site level. Table 2.3 describes old growth existing and desired conditions and minimum allocations by 10K area to be made with this 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. Chapter 3, Figure 3.3, page 84 displays current and proposed allocation by 10 K.

Table 2.3 – Old Growth Existing and Desired Conditions

Measure of Change	Existing Conditions	Forest Plan Direction
Old Growth Acres by 10K area There are parts of two 10K's within the project area, the Jack Smith and Elden 10K's.	Ponderosa Pine/Mixed Conifer – Jack Smith has 899 existing acres identified that meet all structural and stand size criteria. The Jack Smith 10K has 749 acres identified for developing old-growth and the Elden 10K has 724 acres identified per Eastside project	Identify no less than 20% of the forested acres to old-growth objective by 10K. Jack Smith 10K has 13,028 forest acres - 20% = 2606 acres. Elden 10k has 13,499 acres – 20% = 2700. Need 958 additional acres Jack Smith 10K and 1762 more acres Elden 10K.
Size	Allocations made under the Eastside project meet or exceed 100 acre minimum	Old Growth stands are 100-300 acres in size
Location	10K allocations have been made in the Eastside project and will be considered and additive to allocations made under the Jack Smith/Schultz project.	Consider relative risks to sustaining old-growth function at the appropriate scales, due to natural and human caused events.. Expect much of the additional allocation to come from Mt. Elden and the Dry Lake Hills in the Elden 10K and from contiguous wilderness area in the Jack Smith 10K

Wildlife Habitat

Alternative 1

Alternative 1 would require a Forest Plan Amendment for Northern goshawk management. Specifically, the amendment would allow canopy cove requirements to be met at the group versus stand level and would treat interspace as being outside the VSS 1 size and extent criteria. 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.

Alternative 2

Alternative 2 maintains a more continuous forested landscape as all created openings are considered VSS 1 and Standard and Guideline extent and size criteria for VSS 1 is applied. 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 MSO Protected habitat, slopes and drainages that have mixed conifer cover type and provide wildlife corridors.

Slash Treatment

COMMON TO BOTH ALTERNATIVES

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

Slash treatment in most areas would consist of whole tree skidding and piling at the landings. Skid trails will be laid out to avoid sensitive plant populations, areas with a high density of noxious and invasive species, 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.

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.

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 vegetation 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.

Alternative 1

In addition to areas mechanically and hand treated, approximately 700 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 9,220 acres would receive prescribed burn treatment.

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.

Alternative 2

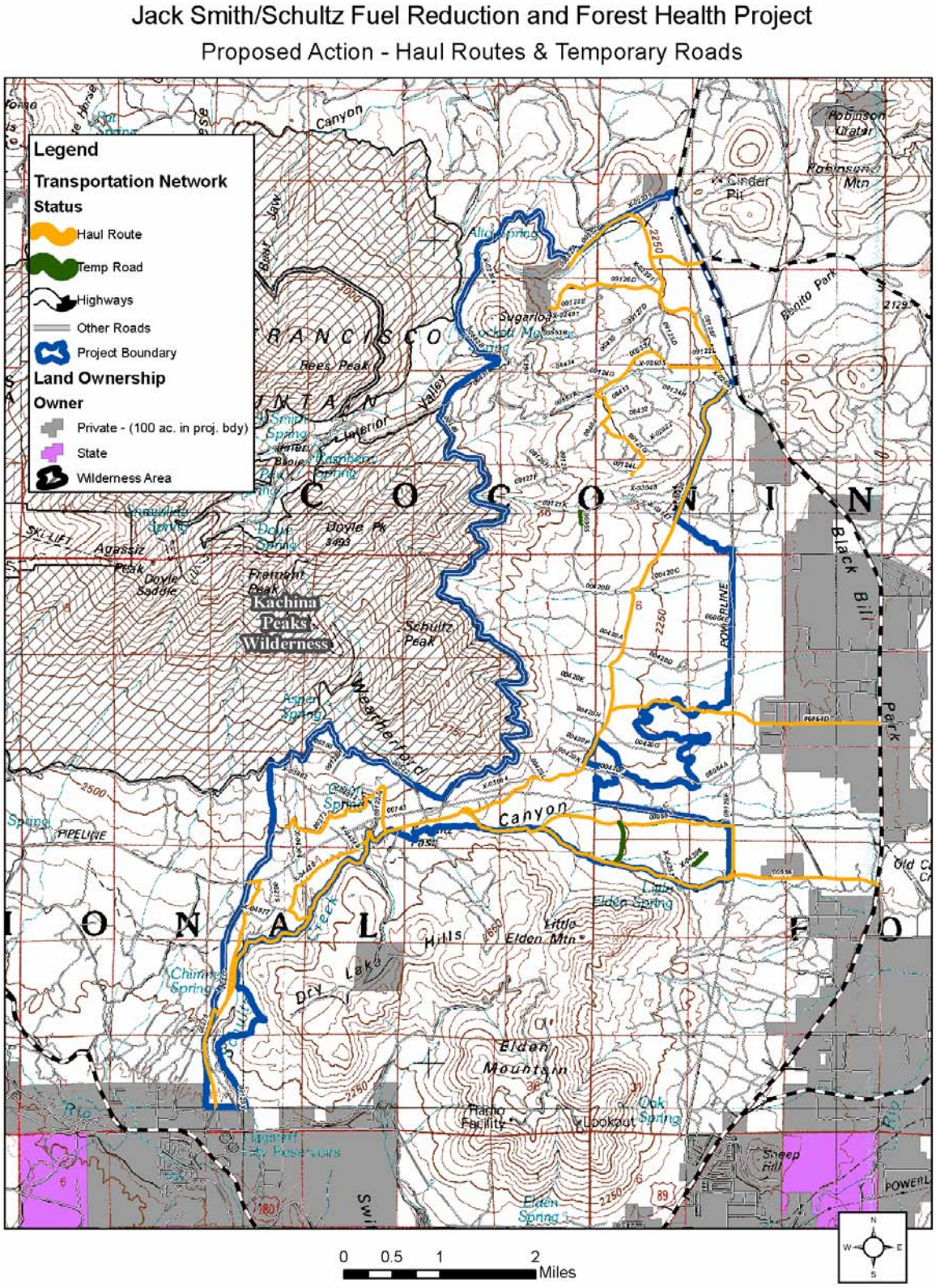
Alternative 2 increases total burn-only treatment acres by 144 acres for a total of 9,364 burn-only treatment acres.

Temporary Road Construction

COMMON TO BOTH ALTERNATIVES

To aid in thinning operations temporary road will be needed to be constructed to remove trees after thinning. We have identified approximately .8 miles on Figure 2.2. These are known locations of temporary road needs and it is anticipated that there may be 2 to 5 miles of additional temporary roads needed as implementation operations are underway. These additional temporary roads can occur in areas where the use of an existing road is less desirable and more impacting than creating access by use of the temporary road.

Figure 2.4 – Haul Routes and Temporary Roads



Project Timeframes and Longevity

COMMON TO BOTH ALTERNATIVES

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.

The processes of fuel hazard 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, tree harvest 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

COMMON TO BOTH ALTERNATIVES

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, on the Coconino Website, lists and describes specific BMP's for the Jack Smith/Schultz 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.

- No prescribed burning or thinning within MSO PACs or within ½ mile of nests or roosts during the breeding season (March 1 - August 31).

Northern Goshawk

- Prescribed burn plans for the nest areas within PFAs will minimize smoke impacts to nesting birds and minimize loss of nest trees. Burn plans for the Jack Smith Schultz Project and adjacent projects will be coordinated with Wildlife Biologist to ensure the entire home range of the northern goshawk pair is not burned in a single year.

- No thinning within northern goshawk PFA's/Nest Stands or unsurveyed habitat (all unsurveyed habitat is in wilderness) during the breeding season (March 1 – September 30).

Wildlife Cover

- Maintain hiding cover at least 200 feet wide around known dependable waters in the area.

- In drainages and wildlife movement areas, thinning treatments will be blended with deferral areas and intensity will emphasize maintaining wildlife habitat attributes such as resident songbirds, raptors, and other wildlife. 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 will be felled (approximately 12 inches DBH in size) to replace logs burned up during the prescribed fire if needed to work toward and/or 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.

- Recruitment snags will be identified and a minimum of two 18" + trees/acre are retained and distributed across the landscape for future snags where available. Recruitment snags are retained from live trees that exhibit defects ideal for wildlife to work toward and/or meet Forest Plan S&G requirements. For example, trees with forked or spiked tops, lightning strikes, mistletoe brooms, or fading crowns are good candidates.

Vegetation Treatment

- Trees greater than 24 inches DBH will not be thinned in MSO restricted habitat. Also, refer to Attachment 1, on the Coconino Website for a detailed discussion on large tree management.

- No 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.

Alternative 1:

- Tree arrangement after uneven-aged treatments 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 and interspaces.

Alternative 2:

- Is the same as Alterntive 1, except the mosaic pattern of individual and clustered trees is interspersed among openings only, and opening are limited in size and extent to Forest Plan Standards and Guidelines for VSS 1.

COMMON TO BOTH ALTERNATIVES

- 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.

- Openings will be irregular in shape and be no greater than 200 feet in width or greater than 4 acres in size.

Alternative 1:

- Interspaces are created based on an absence of pre-settlement evidence and maintained as grassy openings using prescribed and natural fire.

Alternative 2:

- Interspace is not used or created in this alternative.

COMMON TO BOTH ALTERNATIVES

- Implementation of vegetation treatments in stands 277/03, 05, 038 will be done under service contract with a compressed contract time period to reduce impacts to recreationist. Additional adjacent treatment stands may be included in this specified contract area if it is determined that they are more suited to be completed under the service contract due to a lack of commercial sized trees. These stands are generally comprised of trees less than 5 inches dbh in the treatment component.

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 Schultz Creek Road, the Schultz Creek Trail, Schultz Tank, and other system trails and roads. Thinning will be varied using a combination of thinning applications, and may include larger group sizes and 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 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 stand-by-stand basis if absolutely necessary, and requires that the trail would be repaired to its original condition post thinning treatment.

- 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.

Slash Treatment

- Piles shall be so located that burning will minimize damage standing live trees, snags, down logs, TE&S 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.

Road Reconstruction

- To facilitate harvest activities Forest Service system roads should be maintained, constructed or reconstructed to acceptable standards for the equipment to be used. All system roads maintained, constructed or reconstructed to these standards are to remain part of the Forest Service Roads system, and will remain open for multiple use after completion of harvest activities.

TE&S plants

- Prohibit machine piling and burning within any identified population of Rusby milkvetch (*Astragalus rusbyi*). Prohibit construction or reconstruction of roads or log landings in identified populations. Place slash piles 10 to 20 feet away from known populations.

Noxious or invasive weeds

- Best Management Practices (BMP's) adapted from the Three Forest Final Environmental Impact Statement for Integrated Treatment of Noxious or Invasive Weeds (as needed to address management actions and specific project concerns) will be specifically incorporated into the project. An example of a BMP is cleaning of

equipment before entering treatment areas (not roadways) to prevent introduction of invasive noxious or invasive weeds, (See Attachment 5, on the Coconino Website – Noxious and Invasive Weeds Mitigation).

- 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).

- 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.

Cultural Resource Protection

- All ground-disturbing activities including vehicular use are prohibited within sites. The District 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, as identified by the District Archaeologist. Archaeological sites with fire intolerant artifacts or features will be excluded from prescribed burning and protected.

Community Wildfire Protection Plan (CWPP)

The Jack Smith/Schultz 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. Appendix C, page 254, Attachment 2, (PRD # 42), describes the CWWP and the interactions of the Jack Smith/Schultz project with the plan in greater detail. To view a copy of the CWPP go to*: www/gffp.org*.

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 Jack Smith/Schultz Project will include the following implementation monitoring items:

- Archeological monitoring for fire effects to cultural resources, and to ensure that the conditions of the archaeological clearance have been met.
- 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.
- Soil monitoring on pile burn sites will occur to assess any needs for soil amelioration.

Other agreed to monitoring and experimental 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.

Comparison of Management Practices

This section compares outputs, objectives, and effects of the Proposed Action and the effect of no action for the Jack Smith/Schultz Fuel Reduction and Forest Health Project. The discussions of effects are summarized from Chapter 3, which should be consulted for a full understanding of these and other environmental consequences. Tables 2-4 and 2-5 provide an overview comparison of information from the Proposed Action and no treatment.

Table 2.4 - Comparison of management practices

Practice	No Action	Proposed Action Alternative 1	Alternative 2
Mechanical thinning - Uneven-aged Treatments	0	7078 acres	Same as Alt. 1
Hand and/or mechanical Thinning From Below	0	1110 acres	Same as Alt. 1
Mechanical thinning - Uneven-aged Treatments – MSO Restricted and Protected Habitat	0	445 acres	Same as Alt. 1
Mechanical thinning - Uneven-aged Treatments – MSO Threshold Habitat	0	158 acres	Same as Alt. 1
Meadow and Grassland thinning	0	27acres	Same as Alt. 1
Total Acres where trees are thinned	0	8,818 acres	Same as Alt. 1
Initial Prescribed burning	0	9,220 acres	9,364 acres
Maintenance Prescribed Burning	0	9,220 acres	9,364 acres
Temporary road construction	0	2 to 5 miles estimated	Same as Alt. 1
Road Obliteration	0	38 miles	Same as Alt. 1
Road Closure	0	27.9 miles	Same as Alt. 1

Table 2.5 - Comparison of management effects

Environmental Effects	No Action	Proposed Action Alternative 1	Alternative 2
Silvicultural Effects			
Sustaining a mosaic of vegetation densities, age classes and species composition across the landscape	Vegetation density continues to increase, slight age class change over time due to mortality and chance regeneration, understory species composition continues to decline.	A mosaic of vegetation densities is created and maintained across the project, and landscape. Age classes are improved through un-even aged management, with emphasis on within group un-even aged structure. Understory species composition is maximized and nearing presettlement levels over time	Same as Alternative 1, but because the overall landscape is more continuously forested and open space generally only occcurs in regeneration areas, the un-even-aged structure will be maintained at the group level. There is less opportunity for maintaining uneven-aged groups. Understory diversity improves, but much less than in Alternative 1
	Canopy cover	Canopy cover	Canopy cover
Treatments 9” and < = 305 acres	70%	60%	Same as Alt. 1
Treatments 12” and < = 1,110 acres	59%	42%	Same as Alt. 1
Alternative 1:			
Uneven-aged Fuel Red. Emp. = 3,096 acres	67%	39%	
Uneven-aged Resource Prot.: = 3,982 acres	60%	41% (Does not include interspace openess)	
Uneven-aged Fuel Red. Emp. = 3,096 acres		20%	
Uneven-aged Resource Prot.: = 3,982 acres		21% (Interspace openess included)	
Alternative 2: All Uneve-aged treatment intensities similar to Resocurce Protection Emphasis:			
Outside PFA’s: 6,385 acres.	64%		43%
Inside PFA’s: 697 acres.	73%		48%
No Treatment	30 – 70+%	No Change on 2,608 acres	No Change on 2,752 acres

Environmental Effects	No Action	Proposed Action Alternative 1	Alternative 2
Sustaining old age trees and old forest structure as much as possible across the landscape. Also see next row.	Old age tree numbers continue to decline due to mortality and competition from understory trees. Old age trees are replaced over time but trees are smaller due to suppressed growth due to stand densities.	All existing old trees/old forest are retained. No old trees or yellow pine, regardless of sizeare cut in this treatment. Understory thinning, emphasized in the small diameter young and mid-aged trees to promote tree growth will allow for replacement and continuing development of old forest over time .	Same as Alternative 1.
Competition to yellow pines and oaks	Continuing at current levels and increasing over time w/ increased densities	Decreased on over 8,791 acres for approximately 20-40 years	Same as Alt. 1
VSS Class distribution (acres) calculated on treated acres for Alternative 1 – includes 12" thinning, Uneven-aged Fuels Emphasis, and Uneven-age Resource Emphasis.	VSS 1&2 – 24% VSS 3 – 34% VSS 4 – 27% VSS 5 – 09% VSS 6 – 05%	VSS 1&2 – 21% VSS 3 – 17% VSS 4 – 23% VSS 5 – 25% VSS 6 – 13%	
VSS Class distribution (acres) calculated on treated acres Alternative 2 – includes Uneven-age treatments inside PFA's and 12" thinning and Uneven-aged treatments outside of PFA's	VSS 1&2 – 19% VSS 3 – 31% VSS 4 – 34% VSS 5 – 11% VSS 6 – 05%		VSS 1&2 – 21% VSS 3 – 21% VSS 4 – 26% VSS 5 – 20% VSS 6 – 12%

Environmental Effects	No Action	Proposed Action Alternative 1	Alternative 2
Openings – size and acres. Also, additional discussion on the VSS 1.	Few openings greater than ½ acre on over 11,727 acres	Up to 20% openings ½ to 4 acres in size in forested area will be created where VSS 1 and 2's are lacking. Interspace will be created over 50% of 8,188 acres approx. 4,090 acres (associated with thinning treatments) Of the remaining 4090 acres of forest areas, 20% or 818 acres will be in openings. However, when the 50% openess created by inerspace is included as VSS 1, this structural stage is boosted to approx. 4908 acres, or 60%, when added with reneration openings. This exceeds Forest Plan S& G for VSS 1 structural stage, and as has been discussed will require a Forest Plan Amendment to implement.	Same as Alt. 1, except interspace is not applied, all created openings meet VSS 1 size and extent criteria of Forest Plan S&G's. Extent of openings will not exceed 20% of the forested area of the project.
Understory development	Continuing at current levels and decreasing over time w/ increased densities	Increasing on over 9,220+ acres for 20-40 years Grassy interspaces on 50% of project maintained in peretuitiy. Also, additional 700 acres improved due to precribed burn only treatments.	Increasing on over 9,220+ acres for 20-40 years, although less than in Alt. 1 due to continuous canopy cover. Also, additional 144 acres improved due to additional precribed burn only treatments.
Aspen Management	None	Approximately 150 acres on 35 sites	Same as Alt. 1
Acres Old-growth Managed	Jack Smith 10K: 1648 acres Elden 10K: 938 acres	Jack Smith 10K: +1,010 acres, Total = 2,658 acres = 20% of forested areas Elden 10K: +2,543 acres, Total = 3,481 acres = 26% of forested areas.	Same as Alt. 1

Environmental Effects	No Action	Proposed Action Alternative 1	Alternative 2
Trees 16+inches DBH removed for uneven-age management and canopy cover objectives	0	<10% of trees > 16.0" dbh –Emphasis is on small tree removal	Same as Alt 1 except less trees > 16.0" removed (removal of > 16" trees rare, due to no interspaces being created..
Fire and Fuel Effects			
Fire Hazard Rating (number of acres with a Low rating)	1,296	5,510	3,299
Height to Live Crown (VSS 3 – 6)	1' – 20' ft.	12+ ft.	Same as Alt. 1
Tree Mortality from fire	9 – 99%	4 – 31%	Same as Alt. 1
Fuels (tons/acre)	1 – 22 tons/acre	5 – 7 tons/acre	Same as Alt. 1
Critical Flame lengths	2.5' – 8'	<3.5	Same as Alt. 1
Probability of Exceeding Emission Standards (if burned)	Likely	Unlikely	Same as Alt. 1
Visual and Scenic Resource Effects			
Visual Quality Obejective met	Yes	Yes	Same as Alt. 1
Watershed and Soil Effects			
Soil Quality and Productivity	No Impact	Minor Short Term Impacts	Same as Alt. 1
Sedimentation and runoff potential	No Potential	Little Potential	Same as Alt. 1
Wildlife Effects			
Fire Hazard Rating in MSO Restricted and Protected habitat (number of acres with low rating)	235	318	Same as Alt. 1
Acres of Wildlife Cover in Fire Management Analysis Zone	5,540	3,426	Same as Alt. 1
Acres of Wildlife Cover Outside Fire Management Analysis Zone	5,482	4,572	Same as Alt. 1
Estimated Snag Trend	Increasing	20% short term decrease, with mitigation for replacement, Long Term – 18"+ trees designated for snag retention at minimum 2/acre (when available), otherwise, tree growth to attain 18" + trees for available habitat	Same as Alt. 1
Prey base habitat for northern goshawk and Mexican spotted owl linked to understory diversity	Low to Moderate	High	High to Moderate

Environmental Effects	No Action	Proposed Action Alternative 1	Alternative 2
Transportation System			
Effects on Road Density	98.5 miles of existing roads at 5.4 miles/section	Close 27.9 miles and oblit. 38 miles of roads that are excess to open road system needs or otherwise damaging to watershed and other resources. The open road system is 32.6 miles at 1.5 miles/section	Same as Alt. 1
Rare Plants			
Direct effects to *Astragalus rusbyi*	No effects	Project design features mitigate impacts	Same as Alt. 1
Effects on habitat and plants from uncontrolled wildfire	Uncontrolled wildfire could damage habitats and populations.	Reduced risk of uncontrolled wildfire prevents damage to habitat and populations.	Same as Alt. 1
Noxious or Invasive Weeds			
Spread/control of noxious or invasive weeds	Noxious weed populations would continue to expand.	BMPs and other treatment measures will eradicate, maintain, or control populations.	Same as Alt. 1
Effects on noxious or invasive weeds from uncontrolled wildfire	Uncontrolled wildfire would increase the risk of severe ground disturbance and increase noxious or invasive weed invasions.	Reduced risk of uncontrolled wildfire would decreases the risk of noxious or invasive weed invasions in severely disturbed areas.	Same as Alt. 1

Chapter 3 – Affected Environment and Environmental Consequences

This chapter provides information concerning the affected environment of the Jack Smith/Schultz Fuel Reduction and Forest Health Project area, and potential consequences to that environment. It also presents the scientific and analytical basis for the comparison of the Proposed Action – Alternative 1, and Alternative 2 with no treatment. All effects, including direct, indirect and cumulative effects, are disclosed. Effects are quantified where possible, and qualitative discussions are also included. The means by which potential adverse effects will be reduced or mitigated are described (see also Chapter 2 and Appendices D and E).

The discussions of resources and potential effects take advantage of existing information included in the Coconino Forest Plan's FEIS, Jack Smith/Schultz Project Need for Change Report, and project-specific resource reports and related information in the Project Record. Where applicable, such information is briefly summarized and referenced to minimize duplication. The planning record for the Jack Smith/Schultz Fuel Reduction and Forest Health Project includes all project-specific information, including resource reports, watershed analyses, and other results of field investigations.

Vegetation

Affected Environment

The project area consists of a total of 11,827 acres, with 11,727 acres of National Forest System land and 100 acres of private land. Vegetation cover types on National Forest System lands within the project area are displayed in Table 3.1. Predominant cover types include ponderosa pine (9,747 acres), and mixed conifer (1,618).

Historically, ponderosa pine forests of 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 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 smaller diameter trees and a greater number of larger, older trees interspersed with grassy openings. After Euro-American settlement, several conditions, including fire exclusion, livestock grazing, high-grade timber harvesting, and climatic events, favored dense ponderosa pine regeneration (Long and Smith 2000). As a result, the current forest structure is predominately even-aged and consists of dense, overstocked sites of ponderosa pine with a closed canopy. Changes in the historic fire regime have resulted in increased site densities, changes in age and size class diversity, altered site structure, changes in successional dynamics, altered insect and disease dynamics, decreased understory productivity and diversity, decreased tree vigor, increased fuel accumulation and continuity, increased crown fire potential, and increased fire size and intensity (Long 2003).

Table 3.1 - Vegetation cover types located within the project area.

Cover Type	Acres
Grassland/Meadows	27
Right of Ways	175
Pinyon/Juniper	103
Ponderosa Pine	9,747
Mixed Conifer	1,618
Aspen	62
Total	**11,727**

Past and ongoing silvicultural treatments conducted within and adjacent to the Jack Smith/Schultz Project area used in the cumulative effects analysis are displayed in Table 3.12. In the early 19th century, high-grade timber harvesting was conducted within the project area to provide wood for the building of the railroad. Portions of the project area were logged repeatedly through the 20th century. Prior to 1980, much of the project area had been pre-commercially thinned. Illegal wood cutting of Gambel oak continues at present. Fire has been excluded from the project area for over 100 years.

Geographic Areas

Due to the large size of the project there is a wide variety of geographic features and soils which affect the growing conditions and vegetation type. A general overview of the different geographic areas within the project area follows.

Jack Smith Area

This is the area north of Doney Park and the Timberline communities. The northern portion of the area above Forest Road 420 lies on the toe slopes of the San Francisco Peaks. Further to the south below the 420 road soils and topography are derived from Mt. Elden. Site conditions range from open to dense. Growing conditions are high to moderate moving from north to south.

Schultz Pass Area

This area lies between the southern toe slopes of the San Francisco Peaks and the northern slopes of Mt. Elden and includes the Schultz Creek drainage. Site conditions range in density from moderate to very dense. Growing conditions are high to moderate throughout.

Forest Structure

The forest structure of the Jack Smith / Schultz contains a variety of eco-types. With elevations ranging from 7100 to 9200 feet, the project contains, pinyon-juniper, ponderosa pine, mixed conifer, aspen, and meadows. Ponderosa pine cover type is the most common cover type, followed by mixed conifer. Areas of pinyon-juniper occurred on rocky south facing slopes. The list on Table 3.1 shows only 62 acres of aspen, however this is misleading as many groups of

aspen occur within larger stands. Only 27 acres have been identified as meadows. An additional 175 acres of open areas are the result of right of way from utility corridors and mines.

The current ponderosa pine forest structure is dominated by young even-age stands. About 54% of the ponderosa pine acreage is comprised of stands with the majority of the trees in the 5 to 12 inches dbh class. As shown in Figure 3.1 below, the current forest structure is dominated by VSS classes 3 and 4. VSS classes, 1, 2, 5, & 6 are underrepresented under the guidelines set by the Northern Goshawk guidelines.

Figure 3.1 - Vegetation Structural Stage (VSS) Distribution

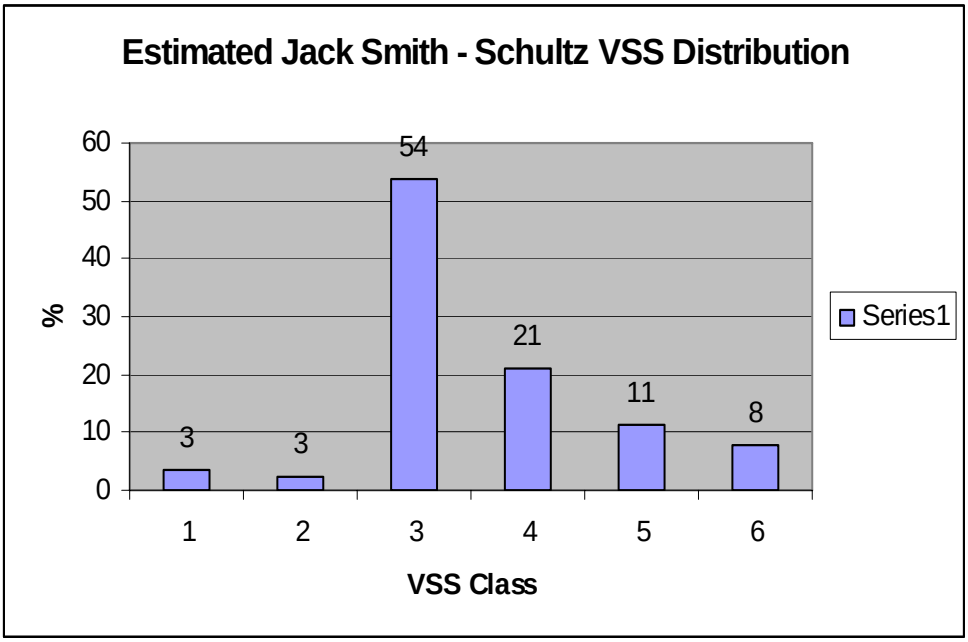


Figure 3.1: VSS distribution was calculated using stand exam data and field observations.

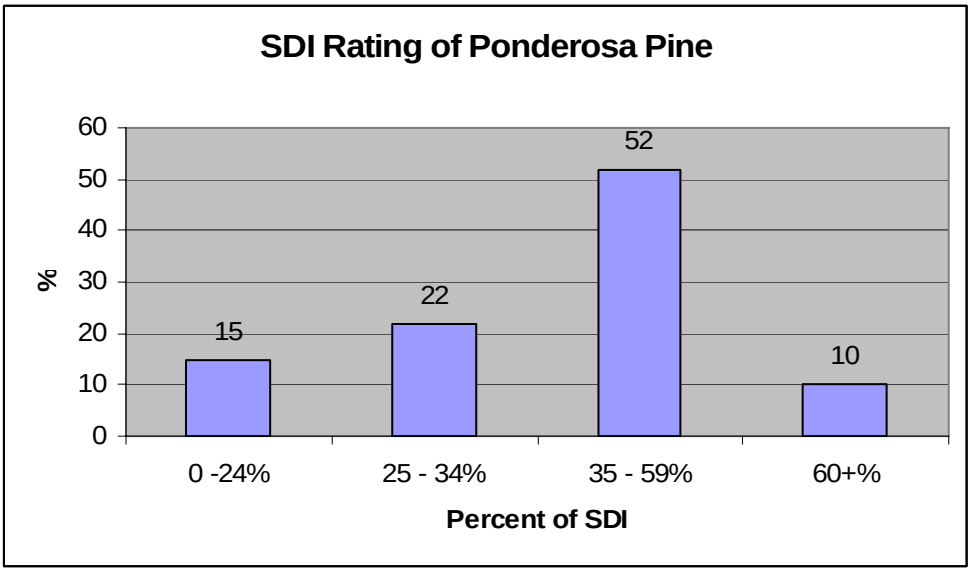
Stand Density

Over 80 % of the project area has fairly high stand densities (SDI greater than 25% of max), 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.

Canopy cover by stand ranges from 15% to 80%. The basal area ranges from 20 to 296 ft^2 per acre. Stand Density Index (SDI) is a relative measure of stand density based on trees per acre and mean diameter. There is a maximum density that can be achieved for each species, which is referred as the maximum SDI. Table 3 in the Silviculture Specialist Report, PRD # 83, p. 8, describes expected growing conditions for the various SDI percentages. 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.

Figure 3.2 below shows the percentage of the ponderosa pine areas within the different SDI categories. Currently, only 15% of forested Forest Service lands within the project area are below 25% max SDI. Approximately 85% of the forested stands have densities above 25% of the maximum SDI, suggesting that over half of the stands within the project area are experiencing varying degrees of inter-tree competition. In stands above 35% max SDI there is a significant increase in individual trees exhibit reduced tree growth and vigor due to competitive stress. Unless the number of trees is reduced by thinning or natural disturbance, individual stand densities will eventually approach the maximum stand density, with imminent, competition-based mortality occurring at approximately 60% of the maximum SDI. These stand densities are not ecologically sustainable and are at high risk for successful bark beetle attack and stand replacement fire. Approximately 10% of forested Forest Service lands within the project area are above 60% of the maximum SDI, with individual trees exhibiting very little or no growth due to a lack of adequate moisture, nutrients, and sunlight.

Figure 3.2 – Stand Density Index of Ponderosa Pine within the Jack Smith Schultz Project Area



Forest Health

Bark beetle activity was observed throughout the project area. Signs of past and present activity are occur throughout the project area. Most of the bark beetle mortality with in the ponderosa pine areas has occurred mostly on rocky south-facing slopes. Douglas-fir beetles and mountain pine beetles have also been causing mortality in Douglas-fir and limber pine in the higher elevation mix conifer types.

Dwarf mistletoe is present in pockets throughout the project area. Infection rates are mostly low, with some moderate levels of infection. Within the project area, infected areas typically occur on stands with higher site quality, usually in areas a little higher in elevation (7500+ feet) and or with more moisture. Douglas-fir dwarf mistletoe was also observed in some mix conifer stands.

Tiger Moth and Needle Miner activity have been observed in the project area.

There has been a systematic decline in the health of the aspen groups throughout the project area, particularly below 8000 feet. Aspen groups are showing signs of reduced vigor. This may be due to on going drought and encroachment from other species. Aspen regeneration has been largely unsuccessful, mainly due to elk browsing and rubbing.

Species Diversity

Ponderosa Pine:

Ponderosa pine is the predominant cover type across the project area and is described in detail in the following sections.

Mix Conifer:

About 1,618 acres with in the project area has been classified as mix conifer. Mix conifer occurs at the higher elevations, typically near the wilderness boundary, on north facing slopes in

drainages coming off the eastern side of the wilderness area, and on north facing slopes in Schultz Pass. Species include Douglas-fir and ponderosa pine as the primary species along with white fir, limber pine, and infrequent occurrences of Engelmann spruce, corkbark fir, and bristlecone pine. Individual instances of Douglas-fir, White fir, and limber pine occur in the ponderosa pine stands. There are some occurrences of mixed conifer regeneration occurring in ponderosa pine habitat types, which is establishing in response to lack of natural fire. These occurrences are not related to mixed conifer habitat types, existing ecotonally or through slope or elevation gradient. Mixed conifer regeneration in ponderosa pine habitat types can create unnatural fire effects and can be a fuels hazard.

Aspen:

Aspen occurs mostly at higher elevations in the project area near the wilderness boundary. Ungulate browsing and rubbing of aspen regeneration is present in all stands. Successful regeneration of aspen is occurring in the higher elevation stands and clumps. Aspen clumps at lower elevations have little regeneration success, and some are becoming old and decadent.

Pinyon / Juniper:

There is about 103 acres classified as pinyon-juniper in the project areas. Most of these acres are on rocky south facing slopes of 89 Mesa. Individual pinyon pine and juniper spp. occur in the lower elevation ponderosa pine stands.

Gambel oak:

Gambel oak occurs mostly in the south-east portion of the project in primarily in stands 278-12, 278-14, and 278-19. The oak in these stands is a mix of thickets and large individuals with some 30”+ oaks occurring. Outside of these stands, Gambel oak only occurs infrequently in small clumps.

Understory Vegetation

Data was not collected on understory biomass within the project area. However, research at the Fort Valley Experimental Forest has shown that massive declines in herbaceous vegetation have occurred over the past century due to increased stand densities, increased canopy covers, and increased forest floor depth (Covington et al 1997). Within the project area, understory productivity is low in areas with “closed” and “moderately closed” canopies.

There are also scattered populations of shrub species throughout the project area. A partial list includes: elderberry *(Sambucus spp*.), currant (*Ribes spp*.), cliffrose (*Purshia stansburiana*), and mountain mahogany (*Cerocarpus spp*.).

Meadows

Approximately three small sites totaling 27 acres within the project area are classified as meadows by Terrestrial Ecosystem units. These meadow areas have been experiencing pine encroachment for over 100 years due to fire suppression.

Environmental Consequences

Proposed Action – Alternative 1, Alternative 2 &- No Action

Direct and Indirect Effects

Forest Structure & Stand Density

Under No Action, there would be no direct effect to forest vegetation because no trees would be harvested. There would be no change in forest structure from the existing forest structure. However, No Action would indirectly affect forest structure over the long-term.

The Proposed Action and Alternative 2 will have a direct effect on the distribution of VSS classes within the project area immediately after treatment. The tables below will display the effects on a per acre basis. The treatments were designed to create an even distribution of VSS classes throughout the stand. Treated stands were then projected out 20 and 40 years to show the long term effects.

Common to both Alternatives

1) Thin from Below to 9 inch DBH

This treatment on 305 acres is located entirely within the Orion and Weatherford PAC's. The stands selected for treatment have a high density of small trees and are rated either high or very high fire danger. Table 3.2, below shows the existing, treated, and no action numbers for trees per acre (TPA), basal area (BA), % of maximum stand density index (SDI), average diameter, and canopy closure.

Table 3.2 - Average Values from Forest Vegetation Simulator (FVS) for thinning of Ponderosa Pine up to 9" dbh only within the Spotted Owl PAC's. Canopy closure values are derived from Shepperd, et all 2006

Year and Action	Trees / Acre	Basal Area	% of max SDI	Average Diameter	Canopy Closure
Year 2007					
Existing Conditions	719	157	75%	7.0	70
Year 2008					
After Treatment	143	106	41%	11.5	60
Year 2028					
No Action	645	191	86%	8.2	76
Treated	137	135	49%	13.4	67
Year 2048					
No Action	588	216	93%	9.1	80

Treated	132	159	55%	14.9	72

No Action

Existing conditions show a high TPA average and a low average diameter. Already the stands are above 60% maximum SDI. Without action TPA will go down due to competition based mortality, the SDI will continue to increase and cause increasing mortality of trees of all sizes, and the average diameter will only increase slowly. Encroachment will continue into the few small openings that occur in these stands. Understory abundance and diversity of grasses, forbs, and shrubs will continue to decrease as the canopy closure increases. Aspen groups will continue to decline due to increasing competition and encroachment of conifers.

Proposed Action – Alternative 1 and Alternative 2

The proposed action will thin trees up to nine inches dbh. Some trees less than nine inches will be left in order to provide for vertical diversity. A 50% canopy cover will be maintained across the stand. After treatment, TPA will be greatly lowered. BA, SDI, and canopy closure will be reduced, while the average diameter will increase significantly. By 2048, the stands will have BA and canopy closure similar to the current conditions, however TPA, and SDI will be much lower than if left untreated., Also, the average diameter is much greater which means the stand will have a higher percentage of larger more fire resistant trees. Understory abundance and diversity will be increased temporarily increased and then maintained over time. Small openings will be maintained within the stands. Competition will be reduced to the aspen stands which will increase vigor and be maintained on site.

Common to Both Alternatives

2) Thin from Below to 12 inch DBH

Under the Proposed Action and Alternative 2; approximately 1,110 acres will be thinned up to 12 inches dbh. Because ponderosa pine forests were historically uneven-aged, the project area will be treated using uneven-aged management. Under uneven-aged management, age and size class diversity will be improved through selection harvesting to create openings up to 10% of the stand for natural regeneration (VSS 1 groups). Thinning will be designed to create a groupy/clumpy arrangement of trees.

The stands selected for the 12 inch thinning treatment are stands with an over abundance of VSS 2 and 3 size trees and lacking in VSS 4, 5, and 6. For many of the stands this was the result of a prior seed tree harvest, where only a few large trees were left per acre as seed trees. Many of these stands are in areas where access may be limited or cost prohibitive. These stands are often in higher elevations. Treatment may by done by hand or mechanical means. All of these stands will be treated with the objective of moving stand conditions towards meeting the Goshawk guidelines. Table 3.3, below shows the existing, treated, and no action numbers for trees per acre (TPA), basal area (BA), % of maximum stand density index (SDI), average diameter, and canopy closure. Table 3.4 below shows a break down of trees per acre and basal area by VSS class for existing conditions and for the no action and treatment alternatives.

Table 3.3 - Average Values from Forest Vegetation Simulator (FVS) for thinning in stands up to 12" Canopy closure values are derived from Shepperd, et all 2006

Year and Action	Trees / Acre	Basal Area	% of Max SDI	Average Diameter	Canopy Closure
Year 2007					
Existing Conditions	536	107	49%	8.1	59
Year 2008					
After Treatment	70	53	21%	12.0	42
Year 2028					
No Action	480	146	63%	9.9	68
Treated	77	72	26%	13.5	50
Year 2048					
No Action	431	170	70%	11.5	73
Treated	85	87	31%	14.3	56

Table 3.4 - A display of values for proposed areas to be treated by thinning up to 12". Averaged FVS output by VSS class for trees and BA per acre.

	2007		**2008**		**2028**		**2028**		**2048**		**2048**	
	Existing Conditions		**After Treatment**		**No Action**		**Treated**		**No Action**		**Treated**	
VSS	#Tr/ ac.	BA	#Tr/ ac.	BA	#Tr/ ac.	BA	#Tr/ ac.	BA	#Tr/ ac.	BA	#Tr/ ac.	BA
1	15	0	7	0	13	0	9	0	15	0	13	0
2	349	8	13	1	274	10	13	0	229	11	19	1
3	137	54	15	6	136	53	18	7	111	40	15	6
4	30	32	31	34	52	61	27	36	65	77	15	20
5	3	6	3	6	6	14	8	19	13	29	18	39
6	1	8	1	8	1	8	2	10	3	14	5	22
Totals*	536	107	70	53	480	146	77	72	431	170	85	87

*Due to rounding, displayed numbers do not always equal up to the total.

No Action

Existing conditions show that on average these stands have over 500 tpa most of which are in the VSS 2 size class, and the SDI is 49% of max SDI. These stands are currently experiencing

decreased growth and vigor and are increasingly susceptible to insect disease and stand replacing fire. Within 20 years SDI is up to 63% of max SDI, which means there is widespread competition based mortality occurring and extreme risk of successful insect attack and mortality.

Current and projected future conditions show these stands have excessive amounts of trees in VSS 2 and 3. The VSS 5 and 6 size classes remain underrepresented, even after 40 years.

Proposed Action and Alternative 2

These treatments have been identified on approximately **1,110** acres in stands where access by mechanical logging equipment or haul trucks may be prohibitive, but the stands could benefit from thinning in the 12" diameter breast height (dbh) and less size classes to reduce fuel and fire hazard to resources and improve forest health. Attaining a clumpy/groupy arrangement is still desirable in these treatments, but may be limited due to the diameter cutting limitations.

The proposed action and Alternative 2 will be removing the majority of trees in the VSS 2 and 3 size classes. By doing this, this reduces the competition of the existing larger trees and allows for a greater response and growth. Trees will be left in a groupy/clumpy arrangement, where feasible. After 40 years there will be an increased TPA and BA in the VSS 5 and 6 classes.

Table 3.5 below shows the distribution of trees as a percentage on a per acre basis across all VSS classes. Under this treatment the distribution of VSS classes on a per acre basis will be moving towards meeting the Goshawk guidelines.

Table 3.5 - The average VSS distribution as a percentage on a per acre basis in the 12" treatment areas using trees per acre.

	VSS					
	1	**2**	**3**	**4**	**5**	**6**
Desired Future Condition	10	10	20	20	20	20
Existing Condition	3	65	26	6	1	0
After Treatment	10	19	21	44	4	1
No Action 2028	3	57	28	11	1	0
Treated 2028	12	17	23	35	10	3
No Action 2048	3	53	25	15	3	1
Treated 2048	15	22	18	18	21	6

3. Target Threshold Stand 278/14A

This stand is a ponderosa pine and Gambel oak stand which was identified to be developing towards target threshold conditions for nesting and roosting for the Mexican spotted owl. Minimum requirements to meet target threshold conditions is: 150 BA, more than 20 trees per

acre greater than 18 inches dbh, and at lest 15% stand density contained in each of VSS 4, 5, and 6.

No Action

This stand is currently at 120 BA with the majority of the trees from 9 to 18 inches dbh. The FVS modeling shows this stand will not be able to meet the target threshold conditions in 100 years.

Proposed Action – Alternative 1 and Alternative 2

A thinning from 5 to 18 inches dbh retaining over 80 BA and maintaining at least 55% canopy cover (as measured across the stand) immediately after treatment would allow for this stand to meet the minimum target threshold within 50 years after treatment. Thinning would emphasize retaining an uneven-age size distribution and the creation of gaps in the canopy to allow for regeneration. Thinning will also target removal of pines encroaching upon established oak. This will help improve the health and vigor of the oaks by reducing competition from the pines.

4) Prescribed Burn Only Treatments

Alternative 1

Approximately 700 acres will be receiving burn only treatments. These treatments are intended to reduce ground fuels and reintroduce fire. Thinning with fire is not an objective in these stands, however some tree mortality can be expected due to torching of individual trees even under low and moderate fire intensities.

Under the Proposed Action, in addition to the 700 acres receiving a burn only treatment, all treated stands will receive a broadcast burn. Again, thinning with fire is not an objective in stands that receive prior thinning. It is expected that some tree mortality can be expected due to torching of individual trees from burning of piles and broadcast burning, even under low and moderate fire intensities.

Broadcast burning, in conjunction with harvesting or existing open canopies, will have beneficial effects on understory productivity and diversity, see Silviculturist Specialist Report, (PRD # 83) for discussion of research findings concerning effects of prescribed fire and ponderosa pine).

Alternative 2

Treatment for burn only is increased by 144 acres for a total of 844 acres on the project. All other discussion under Alternative 1 is the same for Alternative 2.

5) Meadow Restoration

Three historic meadows totaling 27 acres occur on 89 Mesa. These are the only large natural openings of any significance within this project area. There is a need to ensure that this unique feature is retained upon the landscape. All three meadows have ponderosa pine encroachment into the meadow. All pine except historic yellow pine will be removed from the meadows in order to enhance the restore the function of the meadows.

6) Aspen Restoration

As described in the species diversity section later in this report: there is a need restore, protect, and regenerate aspen clones. Invading ponderosa pine will be removed from within the clones

and up to 66 ft. surrounding the clone. Treated sites may be fenced to protect aspen suckers from ungulate browsing. There are approximately 150 acres on 35 sites that may be treated. Where aspen sites occur in spotted owl PAC's only trees up to 9" dbh will be cut. Treating the aspen clones will help ensure the continued survival and regeneration of aspen clones. This will help to maintain species diversity across the landscape.

7) Uneven-aged Treatments with Fuels Reduction Emphasis

Approximately 3,096 acres are treated using this system with a fuel hazard reduction objective and an emphasis on WUI, which includes protection to communities and critical infrastructure. All treatments with fuels reduction emphasis will occur in Zones 1 and 2 only. This is an uneven-age group selection which will provide for meeting fuels reduction, modified restoration objectives, and the goshawk guidelines. Table 3.6, below shows the existing, treated, and no action numbers for trees per acre (TPA), basal area (BA), % of maximum stand density index (SDI), average diameter, and canopy closure. Table 3.7 below shows a break down of trees per acre and basal area by VSS class for existing conditions and for the no action and treatment alternatives.

Table 3.6 Proposed Action only. Average Values from Forest Vegetation Simulator (FVS) for Un-even age fuels emphasis thinning. Canopy closure values are derived from Shepperd, et all 2006

Year and Action	Trees / Acre	Basal Area	SDI	Average Diameter	Canopy Closure
Year 2007					
Existing Conditions	221	132	52%	11.5	67
Year 2008					
After Treatment	41	45	16%	14.2	39
Year 2028					
No Action	206	157	59%	12.9	71
Treated	46	60	21%	15.6	47
Year 2048					

No Action	189	174	63%	13.9	74
Treated	51	73	25%	16.2	52

Table 3.7. Proposed Action only. A display of values for Un-even age fuels emphasis treatment. Averaged FVS output by VSS class for trees and BA per acre.

	2007		**2008**		**2028**		**2028**		**2048**		**2048**	
	Existing Conditions		**After Treatment**		**No Action**		**Treated**		**No Action**		**Treated**	
VSS	#Tr/ ac.	BA	#Tr/ ac.	BA	#Tr/ ac.	BA	#Tr/ ac.	BA	#Tr/ ac.	BA	#Tr/ ac.	BA
1	3	0	0	0	6	0	7	0	11	0	6	0
2	44	2	9	0	32	1	6	0	26	1	14	1
3	111	41	11	5	88	36	9	3	66	28	6	3
4	52	60	9	10	54	66	10	12	56	69	8	10
5	9	20	9	20	19	41	10	26	26	57	9	21
6	3	10	3	10	3	13	5	19	5	19	9	38
Totals*	221	132	41	45	206	157	46	60	189	174	51	73

*Due to rounding, displayed numbers do not always equal up to the total.

No Action

As displayed on Table 3.6, the average SDI is 52% which means that there is significant competition, decreased growth, and increased susceptibility to insects, disease, and fire. After 40 of no treatment SDI increases to 63% which brings it above that critical threshold of density which will cause little to no growth, competition based mortality, and extreme risk of insect, disease, and fire mortality. Canopy closure values are very high and become higher, which means there is not much understory to begin with and will continue to decrease over time.

Table 3.7 shows the number of trees and corresponding basal area for each of the VSS classes. There is currently an excessive amount of trees in the VSS 2, 3, & 4 size classes. In 40 years there will be an excessive amount of trees in VSS 3, 4, & 5 size classes.

Proposed Action

Forested area consisting of clumps and groups is expected to range between 40 to 50%, increasing over time by as much as 20% as VSS 1 openings regenerate. To insure that there is a diversity of group sizes and that the amount of forested area in canopy cover is well represented within the 30 to 50% range, a minimum of 25% of groups will retain canopy cover greater than 50%, 50% of groups will be retained with canopy cover between 40 and 50% and no more than 25% of groups will retain canopy cover between 30 and 40%. Group size will vary based on the presence of evidence and the number of trees to be retained per evidence. Some groups may be up

to 5 acres in size with greater than 50% canopy cover. Efforts will be made to tie larger groups to features such as archaeological sites, drainages, wildlife waters, visually interesting trail niches and wildlife habitat niches.

Structural arrangement within clumps and groups is described as:

VSS 5 and 6 – Usually closed canopy (interlocking crowns desired condition), usually will retain existing conditions.

VSS 4: Desired condition is closed canopy, but will vary by fuel hazard reduction/resource needs. Canopy cover ranges from 40% to existing conditions.

VSS 3: Usually open canopy, but may vary from moderately closed to closed for diversity. Canopy cover ranges from 30% to 60%.

VSS 3, 2, 1: In 70% of the area canopy cover will range from zero to 40%; in 20% of the area canopy cover will range from 41 to 59%; and in 10% of this area canopy cover will be 60%+.

Depending on regeneration needs for VSS 1 and 2, up to 20% openings will be created with the express goal of creating regeneration. All existing VSS 1 and 2 size trees will be retained in openings. Openings will typically be 200 ft. wide or less, and up to 4 acres in size. For openings greater than one acre, 3-5 seed bearing trees will be left per acre.

Interspaces will be created across 50% of the stand area and maintained as grassy non-forested area. Interspaces will be a minimum of 1 ½ times the tree height in order to satisfy fuels reduction objectives. VSS 1 and 2 trees will not be retained in interspaces.

As shown in Table 3.6, after treatment SDI will be reduced to 16%. Over the next 40 years it only increases to 25%, which continues to meet the desired future condition of maintaining the stand at less than 25% of maximum SDI.

Treatments will use pre-settlement evidences to guide retention tree levels when possible. Retention tree levels will vary between zones when needed to meet specific objectives, such as higher retention in some clumps and groups for wildlife habitat desired conditions, visual quality, and diversity. Treatments in VSS 3 and some VSS 4 stands will generally emphasize more open clumps (less trees per evidence) in all zones.

Table 3.8 below shows the distribution of trees as a percentage on a per acre basis across all VSS classes. After 20 and 40 years, tree distribution is fairly even across the VSS classes and moves toward meeting the desired VSS distribution and meeting the Goshawk guidelines. To simplify the display of the table, VSS classes 1 and 2 are combined.

Table 3.8. Proposed Action only. The average VSS distribution as a percentage on a per acre basis in the Uneven-age Fuels Emphasis treatment areas using trees per acre

	VSS				
	1 & 2	**3**	**4**	**5**	**6**
Desired Future Condition	20	20	20	20	20
Existing Condition	10	39	35	11	5

After Treatment	20	12	19	33	15
No Action 2028	7	30	36	22	5
Treated 2028	8	10	21	36	25
No Action 2048	7	22	35	28	8
Treated 2048	11	6	15	29	40

8) Uneven-aged Treatments with Resource Emphasis

Approximately 3,982 acres are treated using this system where due to differing values at risk, fuel hazard reduction is still a primary objective, but resource protection is the emphasis. This is an uneven-age group selection which will provide for meeting fuels reduction, modified restoration objectives, and the goshawk guidelines. Table 3.9, below shows the existing, treated, and no action numbers for trees per acre (TPA), basal area (BA), % of maximum stand density index (SDI), average diameter, and canopy closure. Table 3.10 below shows a break down of trees per acre and basal area by VSS class for existing conditions and for the no action and treatment alternatives.

Table 3.9 Proposed Action only. Average Values from Forest Vegetation Simulator (FVS) for Un-even age resource emphasis thinning. Canopy closure values are derived from Shepperd, et all 2006

Year and Action	Trees / Acre	Basal Area	SDI	Average Diameter	Canopy Closure
Year 2007					
Existing Conditions	216	103	42%	10.5	60
Year 2008					
After Treatment	52	52	18%	13.1	41
Year 2028					
No Action	211	131	51%	11.7	67
Treated	60	67	24%	14.1	48
Year 2048					
No Action	207	155	58%	12.7	72
Treated	67	81	28%	14.8	54

Table 3.10. Proposed Action only. A display of values for Un-even age resource emphasis treatment. Averaged FVS output by VSS class for trees and BA per acre.

	2007		2008		2028		2028		2048		2048	
	Existing Conditions		After Treatment		No Action		Treated		No Action		Treated	
VSS	#Tr/ ac.	BA	#Tr/ ac.	BA	#Tr/ ac.	BA	#Tr/ ac.	BA	#Tr/ ac.	BA	#Tr/ ac.	BA
1	12	0	1	0	10	0	8	0	10	0	6	0
2	84	4	14	1	61	3	7	0	49	2	12	0
3	78	30	18	6	87	34	21	8	80	32	20	8
4	33	38	10	12	37	44	11	13	43	50	10	13
5	7	15	7	15	13	28	10	23	21	48	10	24
6	3	17	3	17	4	21	4	23	5	23	7	32
Totals*	216	103	52	52	211	131	60	67	207	155	67	81

*Due to rounding, displayed numbers do not always equal up to the total.

No Action

As displayed on Table 3.9, the average SDI is 42% which means that there is significant competition, decreased growth, and increased susceptibility to insects, disease, and fire. After 40 of no treatment SDI increases to 58% which brings it close to that critical threshold of density which will cause little to no growth, competition based mortality, and extreme risk of insect, disease, and fire mortality. Canopy closure values are very high and become higher, which means there is not much understory to begin with and will continue to decrease over time.

Table 3.10 shows the number of trees and corresponding basal area for each of the VSS classes. There is currently an excessive amount of trees in the VSS 2, 3, & 4 size classes. The average VSS in this treatment area is VSS 4. If left untreated there will still be an excess of trees in VSS 2, 3, & 4 size classes.

Proposed Action

Forested area consisting of clumps and groups is expected to range between 35 to 65%, increasing over time by as much as 20% as VSS 1 openings regenerate. To insure that there is a diversity of group sizes and that the amount of forested area in canopy cover is well represented within the 30 to 65% range, a minimum of 35% of groups will retain canopy cover greater than 50%, 50% of groups will be retained with canopy cover between 40 and 50% and no more than 20% of groups will retain canopy cover between 30 and 40%. Group size will vary based on the presence of evidence and the number of trees to be retained per evidence. Some groups may be up to 5 acres in size with greater than 50% canopy cover. Efforts will be made to tie larger groups to features such as archaeological sites, drainages, wildlife waters, visually interesting trail niches and wildlife habitat niches.

Structural arrangement within clumps and groups is described as:

VSS 5 and 6 – Usually closed canopy (interlocking crowns desired condition), usually will retain existing conditions.

VSS 4: Desired condition is closed canopy, but will vary by fuel hazard reduction/resource

needs. Canopy cover ranges from 50% to 70%.

VSS 3: Usually open canopy, but may vary from moderately closed to closed for diversity. Canopy cover ranges from 40% to 60%.

VSS 3, 2, 1: In 60% of area, canopy cover will range from zero to 40%; in 20% of the area, canopy cover will range from 41 to 59%; and in 20% of this area, canopy cover will be 60%+.

Depending on regeneration needs for VSS 1 and 2, up to 20% openings will be created with the express goal of creating regeneration. All existing VSS 1 and 2 size trees will be retained in openings. Openings will typically be 200 ft. wide or less, and up to 4 acres in size. For openings greater than one acre, 3-5 seed bearing trees will be left per acre.

Interspaces will be created across 50% of the stand area and maintained as grassy non-forested area. Interspaces will be a minimum of 1 ½ times the tree height in order to satisfy fuels reduction objectives. VSS 1 and 2 trees will not be retained in interspaces.

Treatments will use pre-settlement evidences to guide retention tree levels when possible. Retention tree levels will vary between zones when needed to meet specific objectives, such as higher retention in some clumps and groups for wildlife habitat desired conditions, visual quality, and diversity. Treatments in VSS 3 and some VSS 4 stands will generally emphasize more open clumps (less trees per evidence) in all zones.

Table 3.11 below shows the distribution of trees across all VSS classes as a percentage. After 20 and 40 years, tree distribution under the treated alternative has moved towards meeting the desired VSS distribution and meeting the Goshawk guidelines.

Table 3.11. Proposed Action only. The average VSS distribution as a percentage on a per acre basis in the Uneven-age Resource Emphasis treatment areas using trees per acre

	VSS				
	1 & 2	**3**	**4**	**5**	**6**
Desired Future Condition	20	20	20	20	20
Existing Condition	23	33	27	10	6
After Treatment	20	19	21	25	15
No Action 2028	16	33	27	17	7
Treated 2028	7	21	21	33	18
No Action 2048	12	28	29	24	8
Treated 2048	9	17	17	29	28

Actions common only to Alternative 2

9) Uneven-age Treatments outside of PFAs

Approximately 6,383 acres will be treated using an uneven-age group selection system. This alternative will meet the VSS distribution of forested groups within a stand and minimum canopy cover requirements for the northern goshawk as stated in the Coconino Forest Plan. Openings of

up to 20% of the stand will be created for regeneration in stands lacking VSS 1 & 2. The remainder of the stand will be maintained in forest cover. There will be no interspaces created. Canopy cover of 40% will be maintained in VSS 4, 5, & 6 groups across the stand. Table 3.11A, below shows the existing, treated, and no action numbers for trees per acre (TPA), basal area (BA), % of maximum stand density index (SDI), average diameter, and canopy closure. Table 3.11B, below shows a break down of trees per acre and basal area by VSS class for existing conditions and for the no action and treatment alternatives.

Table 3.11A Alternative 2. Average Values from Forest Vegetation Simulator (FVS) for Uneven-age treatments outside of PFAs. Canopy closure values are derived from Shepperd, et all 2006

Year and Action	Trees / Acre	Basal Area	SDI	Average Diameter	Canopy Closure
Year 2007					
Existing Conditions	171	116	44%	12	64
Year 2008					
After Treatment	67	52	20%	12	48
Year 2028					
No Action	165	142	52%	13	68
Treated	90	72	27%	12	52
Year 2048					
No Action	160	162	58%	14	72
Treated	96	93	34%	13	58

Table 3.11B. Alternative 2. A display of values for Un-even age treatment outside of PFAs. Averaged FVS output by VSS class for trees per acre and BA.

	2007	2008	2028	2028	2048	2048

	Existing Conditions		After Treatment		No Action		Treated		No Action		Treated	
VSS	#Tr/ ac.	BA	#Tr/ ac.	BA	#Tr/ ac.	BA	#Tr/ ac.	BA	#Tr/ ac.	BA	#Tr/ ac.	BA
1	4	0	1	0	6	0	5	0	11	0	7	0
2	41	2	22	1	27	2	30	1	23	1	27	2
3	66	28	22	9	58	26	23	9	46	20	25	9
4	48	55	12	14	48	59	17	20	49	61	18	21
5	9	20	7	16	19	42	9	22	26	59	12	27
6	3	11	3	11	3	14	5	20	5	21	8	34
Totals*	170	116	67	51	162	143	89	72	160	162	96	93

*Due to rounding, displayed numbers do not always equal up to the total.

No Action

As displayed on Table 3.11A, the average SDI is 44% which means that there is significant competition, decreased growth, and increased susceptibility to insects, disease, and fire. After 40 years of no treatment SDI increases to 58% which brings it close to that critical threshold of density which will cause little to no growth, competition based mortality, and extreme risk of insect, disease, and fire mortality. Canopy closure values are very high and become higher, which means there is not much understory to begin with and will continue to decrease over time.

Table 3.11B shows the number of trees and corresponding basal area for each of the VSS classes. There is currently an excessive amount of trees in the VSS 2, 3, & 4 size classes. The average VSS in this treatment area is VSS 4. If left untreated there will still be an excess of trees in VSS 3, 4, & 5 size classes.

Alternative 2

Forested clumps and groups will be maintained across 80% the stand. Where VSS 1 and 2 are lacking, openings will be created in up to 20% of the stand for regeneration. All VSS 4, 5, & 6 groups will have a canopy cover greater than 40%. Archaeological sites will not receive mechanical treatment. Areas in which higher canopy cover and densities may be maintained include drainages, wildlife waters, visually interesting trail niches and wildlife habitat niches.

Structural arrangement within clumps and groups is described as:

VSS 5 and 6 – Usually closed canopy (interlocking crowns desired condition), usually will retain existing conditions. Canopy cover is greater than 40%

VSS 4: Desired condition is moderately open, but may vary from open to closed. Canopy cover is greater than 40%

VSS 3: Desired condition is open canopy, but may vary from moderately closed to closed for diversity. Canopy cover ranges from 30% to 60%.

Depending on regeneration needs for VSS 1 and 2, up to 20% openings will be created with the express goal of creating regeneration. All existing VSS 1 and 2 size trees will be retained in openings. Openings will typically be 200 ft. wide or less, and up to 4 acres in size. For openings greater than one acre, 3-5 seed bearing trees will be left per acre.

Table 3.11C below shows the distribution of trees across all VSS classes as a percentage. After 20 and 40 years, tree distribution under the treated alternative has moved towards meeting the

desired VSS distribution and meeting the Goshawk guidelines.

Table 3.11C. Alternative 2 The average VSS distribution as a percentage on a per acre basis in the Uneven-age treatment outside of PFA's using trees per acre

	VSS				
	1 & 2	**3**	**4**	**5**	**6**
Desired Future Condition	20	20	20	20	20
Existing Condition	11	29	41	13	6
After Treatment	20	21	22	23	14
No Action 2028	8	24	37	26	6
Treated 2028	16	18	25	23	18
No Action 2048	7	17	35	32	9
Treated 2048	12	16	22	26	24

10) Uneven-age Treatments inside of PFAs

Approximately 697 acres will be treated using an uneven-age group selection system. This alternative will meet the VSS distribution of forested groups within a stand and minimum canopy cover requirements for the northern goshawk PFA's as stated in the Coconino Forest Plan. Openings of up to 20% of the stand will be created for regeneration in stands lacking VSS 1 & 2. The remainder of the stand will be maintained in forest cover. There will be no interspaces created. Canopy cover of 50% will be maintained in VSS 4, 5, & 6 groups across the stand, with 1/3 of the VSS 4 groups at 60% canopy cover. Table 3.11D, below shows the existing, treated, and no action numbers for trees per acre (TPA), basal area (BA), % of maximum stand density index (SDI), average diameter, and canopy closure. Table 3.11E below shows a break down of trees per acre and basal area by VSS class for existing conditions and for the no action and treatment alternatives.

Table 3.11D. Alternative 2. Average Values from Forest Vegetation Simulator (FVS) for Uneven-age treatments inside of PFAs. Canopy closure values are derived from Shepperd, et all 2006

Year and Action	Trees / Acre	Basal Area	SDI	Average Diameter	Canopy Closure
Year 2007					
Existing Conditions	402	166	71%	9.4	73
Year 2008					
After	80	63	24%	12.2	48

Treatment					
Year 2028					
No Action	360	194	78%	10.6	77
Treated	101	93	34%	13.1	58
Year 2048					
No Action	312	209	81%	11.7	79
Treated	108	119	42%	14.2	120

Table 3.11E. Alternative 2. A display of values for Un-even age treatment inside of PFAs. Averaged FVS output by VSS class for trees per acre and BA.

	2007		**2008**		**2028**		**2028**		**2048**		**2048**	
	Existing Conditions		**After Treatment**		**No Action**		**Treated**		**No Action**		**Treated**	
VSS	#Tr/ ac.	BA	#Tr/ ac.	BA	#Tr/ ac.	BA	#Tr/ ac.	BA	#Tr/ ac.	BA	#Tr/ ac.	BA
1	5	0	5	0	10	0	6	0	12	0	8	0
2	98	3	13	1	81	3	32	1	61	2	30	2
3	236	76	29	11	188	72	19	7	140	56	19	8
4	53	61	24	28	61	72	27	33	72	85	19	24
5	9	19	8	17	17	37	16	38	23	52	22	50
6	1	8	2	8	3	12	3	13	3	14	9	35
Totals*	402	166	80	65	360	195	102	94	312	209	108	118

*Due to rounding, displayed numbers do not always equal up to the total.

No Action

As displayed on Table 3.11D, the average SDI is 71% which means that there is intense competition which is causing little growth, competition-based mortality, increased risk of insect attack, and increased fire risk. After 40 years of no treatment SDI increases to 81% which means

there is still, little to no growth, competition based mortality, and extreme risk of insect, disease, and fire mortality. Canopy closure values are very high and become higher, which means there is not much understory to begin with and will continue to decrease over time.

Table 3.11E shows the number of trees and corresponding basal area for each of the VSS classes. There is currently an excessive amount of trees in the VSS 2, 3, & 4 size classes. The average VSS in this treatment area is VSS 3. If left untreated there will still be an excess of trees in VSS 2, 3, 4, & 5 size classes.

Alternative 2

Forested clumps and groups will be maintained across 80% the stand. Where VSS 1 and 2 are lacking, openings will be created in up to 20% of the stand for regeneration. All VSS 4, 5, & 6 groups will have a canopy cover greater than 50%. Archaeological sites will not receive mechanical treatment. Areas in which higher canopy cover and densities may be maintained include drainages, wildlife waters, visually interesting trail niches and wildlife habitat niches.

Structural arrangement within clumps and groups is described as:

VSS 5 and 6 – Usually closed canopy (interlocking crowns desired condition), usually will retain existing conditions. Canopy cover is greater than 50%

VSS 4: Desired condition is closed canopy, with 2/3 at greater than 50% and 1/3 greater than 60%.

VSS 3: Desired condition is open canopy, but may vary from moderately closed to closed for diversity. Canopy cover ranges from 30% to 60%.

Depending on regeneration needs for VSS 1 and 2, up to 20% openings will be created with the express goal of creating regeneration. All existing VSS 1 and 2 size trees will be retained in openings. Openings will typically be 200 ft. wide or less, and up to 4 acres in size. For openings greater than one acre, 3-5 seed bearing trees will be left per acre.

Table 3.11F below shows the distribution of trees at the stand level across all VSS classes as a percentage. After 20 and 40 years, tree distribution under the treated alternative has moved towards meeting the desired VSS distribution and meeting the Goshawk guidelines.

Table 3.11F. Alternative 2. The average VSS distribution at the stand level as a percentage on a per acre basis in the Uneven-age treatment inside of PFAs areas using trees per acre.

	VSS				
	1 & 2	**3**	**4**	**5**	**6**
Desired Future Condition	20	20	20	20	20
Existing Condition	16	56	20	7	1
After Treatment	20	22	30	21	7
No Action 2028	14	45	24	14	3
Treated 2028	16	12	28	35	9

No Action 2048	12	35	29	20	4
Treated 2048	13	10	16	39	22

Common to Both Alternatives

Forest Health

No Action

Under No Action there would be no direct effect on dwarf mistletoe infection because no trees would be harvested. There would be no change in the level of dwarf mistletoe infection from existing levels. However, No Action would indirectly affect the level of dwarf mistletoe infection over the long term. Under No Action, dwarf mistletoe infection would continue to spread throughout infected stands, expanding at a rate of 1-2 feet per year. Increased dwarf mistletoe infection would result in reduced tree growth, reduced tree vigor, branch deformations, and shortened life span of the infected host (Conklin 2000). Reduced tree vigor and altered pitch flow associated with dwarf mistletoe infection would result in compromise of a tree's defense mechanisms to combat bark beetle attack, thus increasing the risk of successful bark beetle attack and mortality. Reduced tree growth and shortened life span would result in stagnation of VSS classes. Additionally, the accumulation of resin and branch deformations associated with dwarf mistletoe infection would result in increased fire hazard. (Conklin, 2007 pers. comm.)

Under No Action increasing stand densities will result in increased inter-tree competition and decreased tree vigor. Natural defense mechanisms against insect attack, such as the production of pitch, would be limited, resulting in increased susceptibility to successful bark beetle attack and mortality. As stand densities continue to increase over time, those trees that are out-competed would die, thus attracting bark beetles to the project area and further increasing the risk of bark beetle attack to residual trees.

Proposed Action - Alternative 1 and Alternative 2

The Proposed Action and Alternative 2 will have a direct effect on the level and extent of dwarf mistletoe infection within the project area. Infected acres within the project area will be treated by showing a preference for leave trees that do not exhibit signs of infection or through the placement of openings in infection centers, thus resulting in a decreased level and extent of infection. Both alternatives will also have an indirect effect on dwarf mistletoe infection within the project area. The Proposed Action may result in a greater decrease in the rate of spread between individual trees and throughout the infected stand compared to Alternative 2. Due to the number and size of the interspaces and discontinuous canopy arrangement that will be created in the Proposed Action, dwarf mistletoe will likely not be able to spread as readily than in stands treated under Alternative 2 which will leave much more continuous canopy throughout the stand.

According to Conklin (2000), dwarf mistletoe infection spreads at an average rate of 1-2 feet per decade. Furthermore, dwarf mistletoe populations in the southwest are thought to have increased since Euro-American settlement due to increased forest densities resulting from fire suppression. A more open, patchy forest structure would have limited the spread of dwarf mistletoe infection (Conklin 2000). Additionally, DM infection occurs more abundantly in the lower crown due to its mechanism of spread. The historic fire regime may have decreased the severity of infection through partial crown scorch and a "sanitizing" effect on lightly to moderately infected trees

(Conklin 2000). Under both alternatives, broadcast burning will be conducted across infected areas to emulate the effects of the historic fire regime on dwarf mistletoe infection. Although decreasing canopy covers and broadcast burning will decrease the severity and spread of DM infection, the beneficial effects of either alternative will be short-lived without additional treatments. Without additional treatments within 40 years, canopy covers will begin to close and approach pre-treatment conditions. Additional thinning treatments are recommended to decrease canopy cover, maintain a patchy tree distribution, create openings in the canopy, and treat latent infection. Broadcast burning is also recommended each decade to treat dwarf mistletoe infection. Without treatment, DM infection would continue to spread throughout stands and the project area. Increased DM infection results in reduced tree growth, reduced tree vigor, branch deformations, and shortened life span of the infected host (Conklin 2000). Trees infected with dwarf mistletoe are more susceptible to insect attack, such as bark beetles, and diseases. Reduced tree growth and shortened life span result in stagnation of VSS classes. Additionally, in comparison to uninfected trees, trees infected with dwarf mistletoe are more flammable due to the accumulation of resin and branch deformations (Conklin 2000). Conklin (2000) also states that areas infected with dwarf mistletoe often have higher fuel levels, compared to uninfected areas, resulting in more intense fires. Due to the damaging effects of DM on tree growth, the Coconino National Forest Land and Resource Management Plan states, “Silvicultural prescriptions emphasize treating dwarf mistletoe infections to bring them down to acceptable levels…” (USDA Forest Service 1996, p. 122-1. However, complete elimination of DM from the project area is neither practical nor desirable. Proposed treatments are not designed to completely eliminate dwarf mistletoe from the project area, but rather decrease infection to manageable levels. Although DM increases fire hazard and has many damaging effects on tree growth, it is a natural occurrence in ponderosa pine ecosystems and has many beneficial effects. Increased snag densities and witches’ brooms in large, infected trees improve habitat values for several wildlife species. Additionally, infection areas are associated with increased insect populations and, therefore, present increased foraging opportunities for insect-feeding birds. Although not a primary food source, many wildlife species feed on DM fruits, shoots, and infected bark (Conklin 2000). By decreasing canopy cover and creating a patchy tree distribution, the proposed treatments will decrease the rate at which infection spreads to more closely mimic the natural range of variability.

Current stand densities within the project area provide excellent habitat for increases in bark beetle and other insect populations. Insects are attracted to trees under stress from competition and a lack of resources, such as water, nutrients, and sunlight. The Proposed Action and Alternative 2 will have an indirect effect on susceptibility to insect attack and mortality. Decreasing stand densities will reduce competition between trees, resulting in increased tree vigor. Individual trees will be better able to defend themselves against bark beetle attack. After implementation of the Proposed Action or Alternative 2, the risk of insect attack and mortality for residual trees will be greatly reduced across the project area. However, benefits will not be as great in Alternative 2 where higher density of trees will be left compared to the Proposed Action. After the slash generated from thinning activities has been burned, the majority of the project area will be broadcast burned, further reducing the risk of mortality from bark beetles and other insects.

Species Diversity

No Action

Mixed Conifer

No action will not have any effect on mixed conifer. The majority of the mixed conifer occurs at

the higher elevations adjacent to the Peaks Wilderness area. Mixed conifer also occurs in drainages, north facing slopes, and infrequently in high elevation ponderosa pine stands. Mixed conifer stands will continue to grow and increase in density. Successional pathways will continue uninterrupted with shade tolerant climax species overtaking early/mid succession seral species. Scattered mix conifer regeneration and encroachment which occurs in the ponderosa pine type areas will continue to persist.

Oak

No Action would indirectly affect Gambel oak within the project area. Over a minimum period of 40 years, ponderosa pine would continue to compete with Gambel oak for moisture, nutrients, and sunlight, resulting in reduced oak growth, vigor, and longevity. There would be few replacement oaks of large diameter size for at least 80 to 100 years.

Understory Vegetation

No Action would indirectly effect understory vegetation within the project area. Understory productivity and diversity would continue to decrease over the next 40 years as stand densities continue to increase and crown canopies close. With a lack of broadcast burning across the project area, understory production would be further inhibited by increasing fuel loads and a lack of nutrient recycling from fire.

Meadow

No Action would indirectly affect meadows within the project area. Over a minimum period of 40 years, meadows would continue to experience pine encroachment. As pine increase in density over time, meadows would experience decreased understory productivity and diversity and loss of functionality in terms of hydrology, biodiversity, horizontal heterogeneity, and wildlife habitat diversity.

Aspen

Aspen groups occur on approximately 300 acres within the project area. The majority of the groups are located along the wilderness boundary. There are also a number of groups scattered within the existing stands at lower elevation. In general aspen stands at lower elevation have inadequate regeneration due to elk browsing, are being encroached upon by pine and other species, and smaller aspens are being used as rub trees by deer and elk which often leads to disease problems and mortality. Stands at higher elevation have higher successful regeneration rates but also are experiencing elk browse. Some of these stands are experiencing encroachment by conifers while others are not.

With out action, and no anticipation of a reduction in elk numbers, aspen stands will continue to decline, especially at the lower elevations. At higher elevations, successful regeneration will allow some stands to persist, while the older mature stands with heavy conifer encroachment from underneath will die out and be replaced by mixed conifer.

The cumulative effects of no treatment within the aspen stands would be an eventual type conversion from aspen to ponderosa pine or mixed conifer and a further loss of genetic diversity between aspen clones.

Common to Both Alternatives

Mixed Conifer

Under both alternatives all stands classified with a mix conifer cover type are deferred from treatment. There may be up to 100 acres of mixed conifer in small pockets within ponderosa pine

cover type stands in the 12” treatment areas. This mixed conifer will be treated along with the pine. Species diversity will be preserved. Overall stand densities will be reduced, which will result in greater individual tree vigor, and increased resistance to insect and disease attack. As much as 200 acres of mixed conifer will receive a prescribed burn treatment. Prescribed burning may result in scatted mortality (depending upon conditions) across the stands, particularly in younger smaller trees. The result will be reduced surface fuel loading, higher crown base heights, and decreased fire hazard. Prescribed burning in the Ponderosa pine stands which contain encroachment of mixed conifer regeneration will likely cause high mortality rates of the mixed conifer.

Oak

Both alternatives will have an indirect effect on Gambel oak health, growth, and vigor. Thinning of smaller, black-barked pine trees around oak clumps will increase nitrogen, carbon, and water uptake of oak, thus decreasing inter-tree competition and stress and increasing tree vigor, growth, and longevity (Stone et al. 1999). Gambel oak is a relatively slow-growing hardwood species. Therefore, increased growth rates in response to thinning will be less noticeable in oak, compared to ponderosa pine. Maintenance burning is recommended each decade to prevent regeneration from eventually overtopping oak clumps. Additional thinning is also recommended around oak clumps within 20 to 40 years as the pine canopy grows laterally and begins to overtop oak clumps.

Understory Vegetation

Both alternatives will have an indirect effect on understory productivity and diversity. Under the Proposed Action there will be a greater impact. According to research conducted in ponderosa pine around Flagstaff, restoration treatments result in changes in microclimate on the forest floor, specifically increased sunlight penetration to the forest floor, increased soil temperatures, and increased understory productivity (Meyer et al 2001). The interspaces created under the Proposed Alternative are intended to be permanent and thus the increase in understory productivity related to the creation of interspaces would be permanent. Additional studies have shown that understory response to thinning treatments is directly related to the intensity of the treatment and the use of prescribed fire (Griffis et al 2001). Under Alternative 2, there is expected to be a short term increase, but lesser than the Proposed Action, in understory productivity which will slowly be lost as crown canopy increases.

Aspen

Cutting the pine or mixed conifer out of and fencing the aspen stands will help improve the health and regeneration of the aspen stands. Reduced competition for space, water, sunlight, and nutrients from other trees will improve the health vigor and survival of the existing aspen trees. Cutting a one chain buffer around existing aspen and fencing in the stand along with the buffer will prevent elk and deer from eating and killing aspen shoots. Fencing may need to be left in place for a long as 25 years to ensure the success of the aspen regeneration.

Meadow

There is approximately 28 acres of meadow treatments.

The Proposed Action will remove trees within areas that were historically meadows. Under the Proposed Action, meadows will be restored to presettlement conditions. Indirect effects of removing trees in these areas include increased understory productivity and diversity and restoration of their functionality in terms of wildlife habitat, watershed production, fire hazard, and scenic values.

Mid and Large Scale Analysis for Vegetation Management:

Forest Plan Standards and Guidelines

Treatments within the Northern Goshawk treatment areas must be analyzed at three levels: small, mid, and large scale. The small scale is represented by the stand, treatments 2, and 7 -10 discussed above address effects at the stand level. The mid scale is the project. The large scale is the Ecosystem Management Area (EMA). On the Coconino NF the EMA is based on 10K areas. Because the project boundaries are in two different 10K's (Jack Smith 10K and Elden 10K) the large scale for this analysis encompasses both 10K's.

To perform this analysis canopy cover and VSS were averaged at the stand level. This means that individual stands which may contain multiple VSS groups within the stand will be classified by VSS class which has the highest amount of basal area with in the stand. Average stand canopy cover will not be accurately reflecting the canopy cover within individual tree groups in the stand. Stands with a high percent of openings will have an average canopy cover which is lower than the canopy cover within the forested group in the stand.

During the course of the analysis it was found that both alternatives had the same effect upon overall stand VSS classification therefore post treatment VSS distribution is not broken out by alternative.

Project Level

This section will discuss the effects of the treatments on VSS and canopy cover as it pertains to the goshawk guidelines at the project level.

A stand which has met the VSS distribution at the stand level will be classified as a VSS 6. So if all the stands have met the VSS distribution at the stand level then all stands would be classified at the VSS 6 level when looking at the project level. The higher the percentage of stands classified in greater VSS size classes the closer the project is to meeting the goshawk guidelines. In 3.11G below, comparing pre-treatment VSS distribution to the post treatment distribution shows an increase in the percent of VSS 4, 5, and 6 size classes, which indicates these treatments are moving towards the desired VSS distribution.

Canopy cover for VSS 4, 5, and 6 forested areas will average 40% or greater. In table 3.11G which looks at ponderosa pine stands outside of PFAs, the proposed action alternative post treatment canopy cover for VSS 5 is at 39% which would seem to indicate that the standard is not being met, however this number represents the canopy cover for all forested groups in the VSS 5 stands. In this case it is the lower canopy covers in the VSS 1-3 forested groups that has caused this VSS class to average below 40% even though the minimum 40% canopy cover is being maintained in the VSS 4, 5, and 6 groups within those VSS 5 stands.

The five tables below (tables 3.11.G -3.11K) display the project level information. Tables are broken out by ponderosa pine stands and mix conifer stands, and those stands which are inside or outside of PFAs and nest sites. All tables display the amount of acres and percent in each VSS class, the pre treatment canopy cover, post treatment canopy cover by alternative, and post treatment change in VSS distribution if the stand is treated. In all categories where treatment occurred there was no change in VSS distribution or there was an increase in VSS 4, 5, and 6. This shows that these treatments are helping to move the project level towards meeting the northern goshawk guidelines.

Table 3.11G. In ponderosa pine stands outside of PFAs, within the project area: distribution of VSS pre and post treatment, and canopy cover by VSS

class before treatment, and after treatment.

VSS	Acres	Pre-Treatment % of VSS	Pre-Treatment Canopy Cover	Alternative 1 – Post Treatment Canopy Cover in Forested Areas Only	Alternative 1 – Post Treatment Canopy Cover across the whole stand	Alternative 2 – Post Treatment Canopy Cover across the whole stand	Post Treatment VSS Acres for Alt. 1 & 2	Post Treatment % of VSS
1	231	2	16	16	16	16	231	2
2	554	6	54	43	41	43	52	1
3	3993	41	56	43	29	47	1911	20
4	2887	30	60	42	26	49	3557	36
5	1131	12	51	40	30	46	2774	28
6	984	10	56	49	46	50	1255	13

Table 3.11H. In ponderosa pine stands inside of PFAs, within the project area: distribution of VSS pre and post treatment, and canopy cover by VSS class before treatment, and after treatment.

VSS	Acres	Pre-Treatment % of VSS	Pre-Treatment Canopy Cover	Alternative 1 – Post Treatment Canopy Cover in Forested Areas Only	Alternative 1 – Post Treatment Canopy Cover across the whole stand	Alternative 2 – Post Treatment Canopy Cover across the whole stand	Post Treatment VSS Acres for Alt. 1 & 2	Post Treatment % of VSS
1	0	0	0	0	0	0	0	0
2	51	5	51	43	43	43	13	1
3	369	39	64	43	28	51	191	20
4*	429	46	56	42*	24*	50*	213	23
5	77	8	80	78	78	78	190	20
6	17	2	69	45	63	52	336	36

*Within PFA's, 1/3 of the VSS 4 groups will have a minimum of 60% canopy cover and the remaining 2/3 VSS 4 groups will maintain a minimum 50% canopy cover. The 50% average shown might indicate this standard is not being met, however this average number is due to the high occurrence of VSS 1, 2, and 3 groups, which have open canopies, within the VSS 4 stands and as a result brings the overall canopy

coverage down within these VSS 4 stands.

Table 3.11I. Mixed Conifer – Outside of PFAs Only VSS 4, 5, & 6 mix conifer stands occur within the project area. No treatment of mix conifer stands will occur.

VSS	Acres	% of VSS	Canopy Cover
4	61	8	57
5	594	81	73
6	76	10	73

Table 3.11J. Mixed Conifer – Within PFAs No treatment with in the mixed conifer. This stand is also in the nest site.

VSS	Acres	% of VSS	Canopy Cover
5	64	100	83

Table 3.11K. Ponderosa Pine Nest Stands (burn only treatments. There was no change in VSS distribution after treatment.

VSS	Acres	Pre & Post Treatment % of VSS	Pre-Treatment Canopy Cover	Post Treatment Canopy Cover Alt. 1 & 2
1	0	0	0	0
2	12	13	52	47
3	19	20	70	63
4	35	36	61	55
5	13	14	63	57
6	17	17	69	63

Ecosystem Management Level

This section will discuss the effects of the treatments on VSS and canopy cover as it pertains to the goshawk guidelines at the Ecosystem Management Area (EMA) level. The EMA is comprised

of the Jack Smith 10K and the Elden 10K.

The analysis of this EMA includes the areas to be treated and areas that will not be treated. Treatments from both the Jack Smith / Schultz and Eastside projects occur within the EMA. Pre and post treatment numbers reflect pre and post treatment VSS and canopy cover of those stands within the Eastside project that will be treated.

The five tables below (tables 3.11L -3.11P) display the EMA level information. Tables are broken out by ponderosa pine stands and mix conifer stands, and those stands which are inside or outside of PFAs and nest sites. All tables display the amount of acres and percent in each VSS class, the pre treatment canopy cover, post treatment canopy cover by alternative, and post treatment change in VSS distribution if the stand is treated. In all categories where treatment occurred there was no change in VSS distribution or an increase in VSS 4, 5, and 6. This shows that these treatments are helping to move the project level towards meeting the northern goshawk guidelines.

Table 3.11L. In ponderosa pine stands outside of PFAs, within the EMA: distribution of VSS pre and post treatment, and canopy cover by VSS class before treatment, and after treatment.

VSS	Acres	Pre-Treatment % of VSS	Pre-Treatment Canopy Cover	Alternative 1 – Post Treatment Canopy Cover in Forested Areas Only	Alternative 1 – Post Treatment Canopy Cover across the whole stand	Alternative 2 – Post Treatment Canopy Cover across the whole stand	Post Treatment VSS Acres for Alt. 1 & 2	Post Treatment % of VSS
1	926	4	14	14	14	14	926	4
2	2052	10	40	36	36	36	1542	7
3	5734	27	55	42	32	44	3043	14
4	7516	35	55	41	35	44	7903	37
5	2897	13	45	40	35	41	5095	24
6	2489	12	56	54	52	54	3104	14

Table 3.11M. In ponderosa pine stands inside of PFAs, within the EMA: distribution of VSS pre and post treatment, and canopy cover by VSS class before treatment, and after treatment.

VSS	Acres	Pre-Treatment % of VSS	Pre-Treatment Canopy Cover	Alternative 1 – Post Treatment Canopy Cover in Forested Areas Only	Alternative 1 – Post Treatment Canopy Cover across the whole stand	Alternative 2 – Post Treatment Canopy Cover across the whole stand	Post Treatment VSS Acres for Alt. 1 & 2	Post Treatment % of VSS
1	0	0	0	0	0	0	0	0
2	51	4	51	43	43	43	13	1
3	401	31	64	45	31	52	223	17
4	454	35	58	47	33	53	310	24
5	175	14	70	70	70	70	288	22
6	216	17	62	52	52	55	463	36

Table 3.11N. Mixed Conifer – Outside of PFAs. No treatment of mix conifer stands will occur.

VSS	Acres	% of VSS	Canopy Cover
1	7	0.2	13
2	60	2	46
3	134	4	87
4	1096	32	78
5	1820	53	75
6	294	9	65

Table 3.11O. Mixed Conifer – Within PFAs No treatment with in the mixed conifer. This table includes one stand which occurs in a nest stand (the same stand in table 3.11K).

VSS	Acres	% of VSS	Canopy Cover
5	145	47	75
6	161	53	56

Table 3.11P. Ponderosa Pine Nest Stands (burn only treatments. There was no change in VSS distribution after treatment.

VSS	Acres	Pre & Post Treatment % of VSS	Pre-Treatment Canopy Cover	Post Treatment Canopy Cover Alt. 1 & 2

1	0	0	0	0
2	12	13	52	47
3	19	20	70	63
4	35	36	61	55
5	13	14	63	57
6	17	17	69	63

Common to Both Alternatives

Large Tree Discussion:

According to Abella, et al.: "Based on published research, diameter caps will not improve and will likely negatively impact canopy cover openings, understory productivity, Gambel oak vigor, soil microorganisms, nutrient cycling, streamflow, fire behavior, and the economics of thinning projects."

As stated in the Proposed Action: "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." In order to achieve this condition we have proposed to create the groupy/clumpy structure described in this report and a reduction in trees per acre and basal area working towards pre-settlement conditions. A review of the modeling treatment numbers in the Uneven-aged analysis will show that on an average acre that none of the trees in the VSS 5 (18" – 24") and VSS6 (24"+) size classes will be cut. On an 'average' acre, we believe the model accurately depicts the distribution of tree sizes. Observations of the project area have shown that there are areas that have a high number of 16"+ trees which would necessitate cutting some of them to meet the objective of creating a groupy/clumpy structure and support frequent low intensity fires. It is not possible using the existing stand data and modeling program to tease out the number of trees greater than 16 inch dbh that will be cut.

Other management objectives such as improving forest health and retaining species diversity may necessitate the cutting of trees greater than 16". Large trees which are shading out Gambel oak or are heavily infected with mistletoe and may infect the understory may be cut. A 'one size fits all' diameter cap does not allow for land managers to address the variety of management objectives and differing site conditions.

The only areas in which trees over 16" may be cut will be in the Uneven-age treatments, meadow treatments, and aspen restoration treatments. Under the Proposed Action I estimate that within these areas, less than 10% of the trees over 16" dbh will be cut, and for trees over 24 inches dbh, less than 0.5% will be cut. Under Alternative 2, I estimate around 5% of the trees greater than 16" dbh will be cut and less than 0.5% of trees greater than 24" dbh will be cut. All other treatments and untreated areas will not have trees over 16 inches dbh cut.

As shown in tables 3.4, 3.7, 3.10, 3.11B, and 3.11E there will be a greater number of 24 inch trees in 40 years after treatment than without treatment. The tables show there will be fewer trees in the 18 to 24 inch size class in 40 years after treatment than without treatment. This is due to thinning of small trees in the present in order to meet the desired future condition. To not treat and allow the current smaller trees to continue to grow would only serve to perpetuate the issues identified in the needs for change report and which drive the need for treating this area.

Appendix B, and Attachment 1 of the Proposed Action (PRD # 42) includes a detailed discussion of rationale and criteria for the removal of large trees in the project area. This large tree

management rationale aims to prevent the thinning of any large trees except for ecological needs, some of which are directly linked to the Purposed and Need for Action of this project.

Common to Both Alternatives

Old Growth:

Under forest plan guidelines, a minimum 20% of forested acres by ecosystem units is to be managed for old growth habitat. The Jack Smith / Schultz project is located within two ecosystem units, the Elden 10K, and the Jack Smith 10K. Below is a break down of forested acres in each ecosystem unit and the amounts of existing and designated old growth.

Jack Smith 10k

All of the 10K is located in the Jack Smith/Schultz and Eastside Projects. There is currently 1,648 acres designated in this 10K. An additional 1,010 acres will be designated.

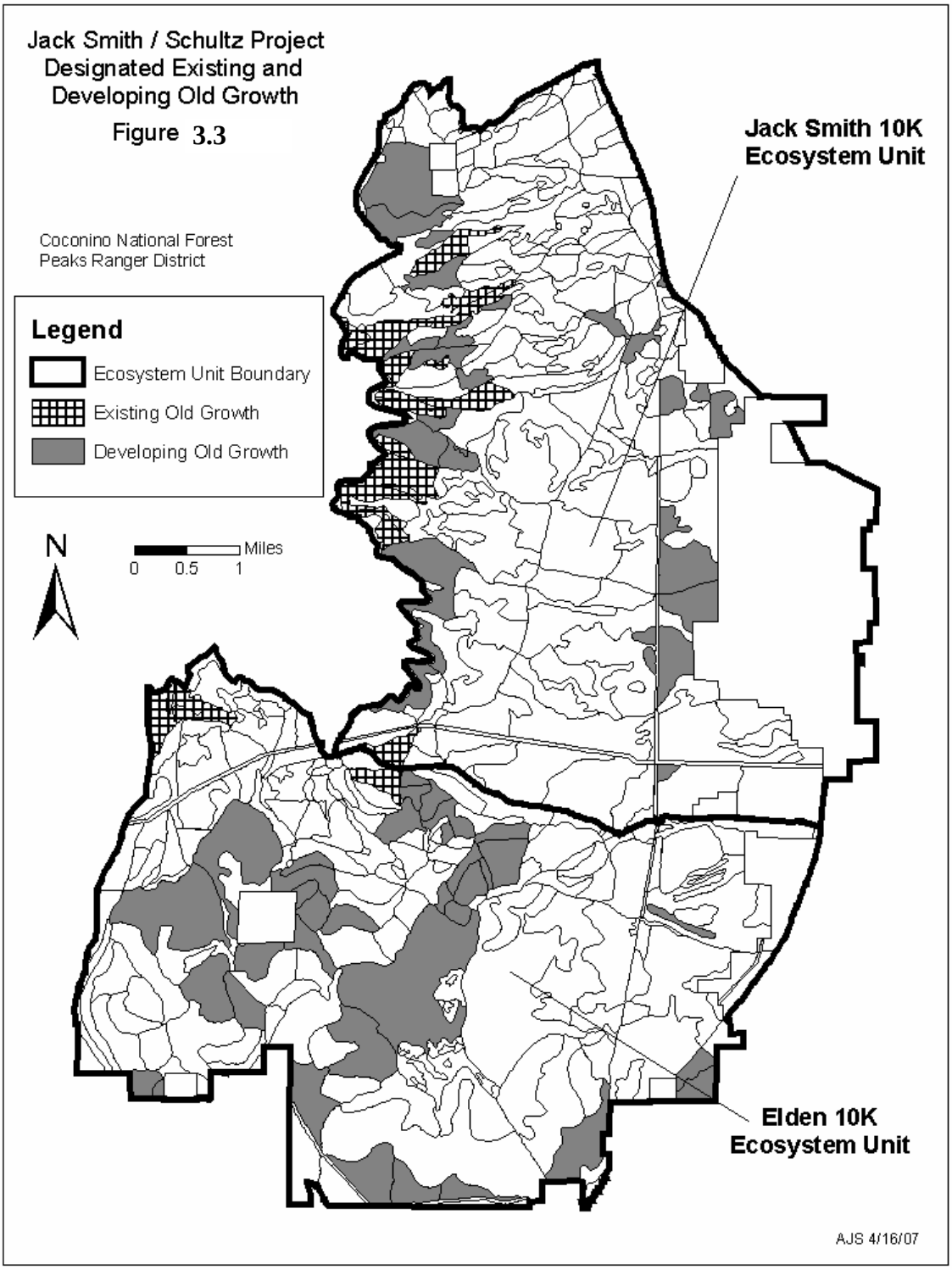
Total acres in 10k = 16123
Forested ac in 10k (MA 3, 4, 5, 6, 7, 8) = 13028
20% of forested ac (old growth required for the whole 10k) = 2606
Current existing or designated old growth in 10K = 1648
Additional acres designated as developing old growth in project area = 1010 ac
Total existing and designated for 10K = 2658 ac

10k #213

Portions of this 10K are in the Eastside Project and the Jack Smith /Schultz Project with the remainder being Mt. Elden and the Dry Lake Hills. There is currently 938 acres designated in this 10K. An additional 2543 acres will be designated with in the Dry Lake Hills and on Mount Elden for a total of 3481 acres of existing and designated old growth within this 10K.

Total acres in 10k = 14350
Forested ac in 10k (MA 3, 4, 5, 6, 7, 8, 18) = 13499
20% of forested ac (old growth required for the whole 10k) = 2700
Current existing or designated old growth in 10K = 938
Additional acres designated as developing old growth in project area = 2543 ac
Total existing and designated for 10K = 3481 ac

Figure 3.3 – Allocated Old-Growth Stands by 10K



Cumulative Effects

In considering the appropriate area to analyze for the cumulative effects analysis the project EMA and recent and on-going adjacent treatment areas have been included. This would include the Jack Smith and Elden 10K's, which include the Eastside Fuel Reduction and Forest Health Project and the adjacent Ft Valley 10K, which included the Ft. Valley Fuel Reduction and Forest Health Project.

No Action

Under No Action, no activities are proposed. If no activities are proposed, then there are no effects from the alternative. Since cumulative effects are about putting in context the effects of the alternative with other projects, there are no cumulative effects (The Shipley Group 2005).

Proposed Action – Alternative 1 and Alternative 2

Past, present (ongoing), and future activities considered in the cumulative effects analysis are listed in Table 3.12. Over the past century, several events, including fire exclusion, livestock grazing, and high-grade timber harvesting, occurred over the majority of the project area and in adjacent stands. These events resulted in disruption of the historic fire regime that consisted of frequent, low-intensity surface fires. In 1919, climatic events favored dense ponderosa pine regeneration. At this time, understory production was greatly decreased by grazing and offered little competition with pine regeneration. As fire suppression and sawlog harvesting continued through the 20th century, regeneration from 1919 continued to grow in density. In the mid- to late 1900s, commercial thinning treatments in and adjacent to the project area removed a large proportion of the mature and old trees, contributing to a more even-aged forest structure. At the same time pre-commercial thinning treatments occurred that reduced the density of younger forest, mainly through even spacing of residual trees. Although these treatments did provide some short-term improvement to forest health, vigor, and growth by reducing stand densities and increasing the growing space of individual trees, they also caused further departure from the variable, patchy tree distribution that typified the historic ponderosa pine forest structure. Additionally, blending treatments were used to produce a single age class deemed "more manageable" in terms of regulated timber harvesting. Past events have resulted in increased stand densities, decreased age and size class diversity, altered stand structure, changes in successional dynamics, altered insect and disease dynamics, decreased understory productivity and diversity, decreased tree vigor, increased fuel accumulation and continuity, increased crown fire potential, increased fire size and intensity, and a more even-aged forest structure (Long 2003). Figure 3.4 depicts changes in trees per acre by size class on non-reserved forest lands in New Mexico and Arizona. The graph depicts changes that are typical of southwest ponderosa pine around Flagstaff due to past events and activities and is intended as a reference only. The density of trees has increased significantly over time, especially in diameter classes less than 13 inches. With this tremendous increase in smaller size classes, size class diversity has decreased, resulting in a more even-aged forest structure. Currently, there are two ongoing projects located adjacent to the project area. The purpose of both the Eastside and Fort Valley projects is to reduce hazardous fuel accumulation, while improving forest health and promoting the development of VSS distributions recommended by management recommendations for the Northern goshawk.

Treatments in this EA and ongoing projects are not based on spacing guidelines, involve the creation of openings and enhancement of groups, and thin to varying densities. The proposed treatments, in combination with ongoing projects adjacent to the project area, will result in a landscape which is more open, variable, and groupy for a minimum of 40 years into the future. The creation of openings and a more open canopy will result in increased natural regeneration

across the landscape and a more uneven-aged forest structure. A mosaic of varying forest structures, patterns, densities, and size classes results in increased horizontal and vertical heterogeneity, increased biological diversity, improved forest health, and a more sustainable forest structure at the landscape-level. A more sustainable forest structure is more resilient and capable of maintaining its health in the face of climate change and other disturbances. Both alternatives and ongoing treatments will result in a decreased risk of insect attack and mortality at both the project and landscape levels.

Also, the risk of a crown fire of sufficient intensity to significantly alter forest structure would be reduced. Additionally, these treatments will also result in faster development of a landscape-level VSS distribution recommended for the Northern goshawk by retaining large trees, creating openings for regeneration, and increasing tree growth and vigor. The creation of grassy interspaces (in the Proposed Action only) and openings (in both alternatives) across the landscape will also result in increased understory abundance, increased diversity at the landscape scale, and increases in insects, such as butterflies, that serve as prey bases for a suite of wildlife species. Lastly, by focusing on the removal of smaller diameter trees, this and other projects will retain and produce larger diameter trees for both ecological and social/aesthetic values.

Road Density

This project will be decommissioning 38 miles of forest roads. The decommissioning of the roads themselves will have little effect on vegetation. Over time understory vegetation will likely increase on decommissioned road beds and ponderosa pine or mixed conifer seedlings may become established. Indirect effects of decommissioning road would be reduced instances of illegal firewood cutting, and possible reduce response time for the suppression of wildland fire. However since much of the decommissioned road are in areas that will receive treatments, reduced response time for suppression is not likely to have an adverse impact as wildfire are less likely to become crown fires.

Figure 3.4 - Changes in stand density in southwestern ponderosa pine, non-reserved forest lands, NM and AZ.

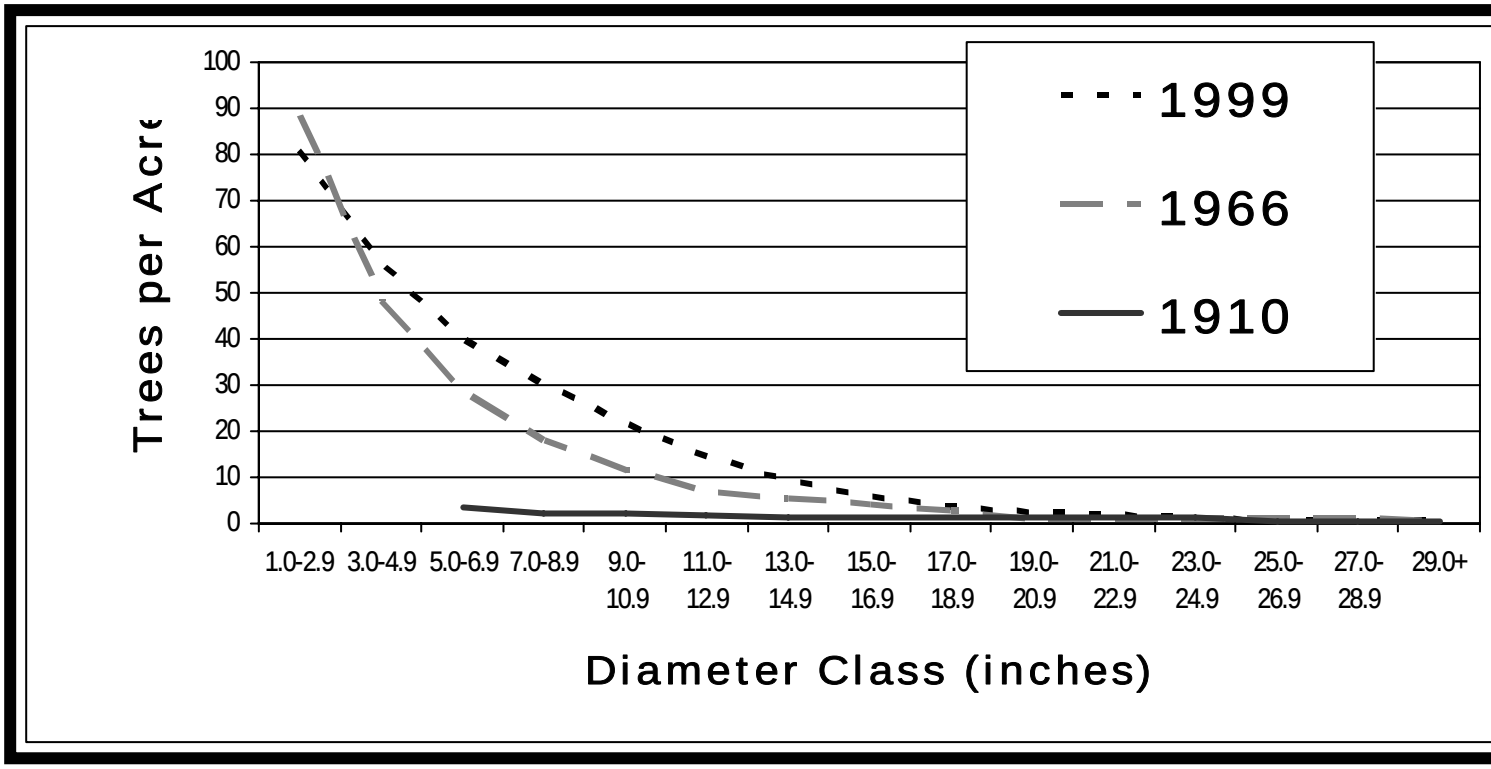


Table 3.12 - Past and ongoing treatment history of the Jack Smith Schultz Fuels Reduction Project, Coconino National Forest, Arizona.

ACTIVITY	WHEN OCCURRED	PERCENT OF PROJECT AREA	EFFECTS
Livestock Grazing	1870s – 1980s: 1980s – Current:	100% and adjacent stands None	Reduced understory abundance and produc Disrupted the natural, surface fire regime. C regeneration.
Commercial Thin	1960s, 1970's, 1980s, early 1990's	50% and adjacent stands	Reduced density of mid-aged and mature sa Decreased crown canopy closure. Contribu even-aged forest structure.
Precommercial Thin	1960s, 1970s, 1980s	50% and adjacent stands	Reduced density of young forest. Decrease improvement to forest health and fire hazard
Reforestation	Late 1970's, Early 1980's	<5%	Area burned in Radio Fire
Burnt and Radio Fires	1970's	20% and adjacent stands	Two large fires created patchy conditions, r
Fort Valley Project	1998 to Present	5000 acres adjacent to the southwestern edge of project.	Reduce density of young and mid-aged fore Improvement to forest health, vigor, structur hazard, and wildlife habit.
Eastside Project	Ongoing	6000 acres adjacent to northeastern edge of project area	Reduce density of young and mid-aged fore settlement like structure. Improvement to fo growth, visual quality, fire hazard, and wildli
Dispersed Recreation	Ongoing	100% and adjacent stands	Affects localized soil conditions (compaction wildlife (user trails).
Illegal Firewood Cutting	Ongoing	100% in past; 25% current	Reduces density of large diameter pine and

Fire and Fuels

Affected Environment

The current fuel conditions would likely generate dangerous fire behavior and undesirable fire effects when a wildfire occurs. The modeling indicated considerable torching and spot-fires as much as a mile a head of an intense crown fire in some sites within the project area. Although it would be difficult to initiate a crown fire within many sites, once initiated or if carried in from a neighboring area, many sites had sufficient crown bulk density coupled with sufficient canopy closure to sustain a crown fire and spread it through other sites. Initial attack forces would have difficulty in controlling a wildfire occurring in this area under severe weather conditions. The forest condition after a high intensity wildfire would not meet management direction in the Forest Plan for a variety of resources.

Fire Hazard Ratings

Fire hazard rating is a relative measure of how virulently a wildfire might burn under the 90 percentile weather conditions that occur from April through July. It is a relative measure from site to site and from pretreatment to post treatment. It is a good indicator of how effectively and safely fire suppression crews can attack a wildfire and bring it under control.

For projects associated with GFFP the fire hazard rating is derived by accumulating hazard points associated with canopy closure, tree stems per acre, height to the bottom of the live crown, dead & down fuel loading, slope steepness, and aspect. While we cannot affect a change in slope steepness or aspect, their effects on fire behavior may influence how much we attempt to reduce other factors.

Another assessment method required of the Forest Service nationally is called the Fire Regime Condition Class rating. The Fire Regime indicates how often wildfires burned across this part of the landscape and with what level of severity. The plants and animals that inhabit this area have come to depend on that fire regime to maintain ecosystem balance. The condition class of an area indicates how far from historical norms the area has departed because the fire regime has been disrupted. In many cases, it is no longer practical to return an area to its naturally occurring fire regime and condition class, but the assessment is still valuable in determining a close-fitting proposed action.

One of the fuel treatment objectives for this project is to reduce the probability of crown fire initiation. This is achieved by reducing the crown bulk density (the volume of fuel available in treetops) throughout the sites, by increasing the effective crown base height (the height at which tree branches can be ignited by ground fire), and by reducing the expected flame length (the heat emitted by a ground fire).

Another fuel treatment objective is to reduce the capability of the sites to sustain a crown fire should one develop. This is achieved by reducing the percent of canopy closure as well as the tactics identified to reduce crown fire initiation.

Another fuel treatment objective is to reduce the number of firebrands that could ignite spot fires. This can also be achieved by reducing the crown bulk density, by increasing the effective crown base height, and by reducing the expected flame length.

Another fuel treatment objective is to reduce the distance at which firebrands would be expected to ignite spot fires. This can be achieved by reducing the number of treetops that would burn simultaneously if ignited by ground fire. In turn one must reduce the crown bulk density and canopy closure.

The treatments proposed would be expected to maintain these objectives for approximately 20 to 40 years by periodic prescribed burning without additional thinning treatments.

Periodic prescribed burning can reduce the expected flame lengths by maintaining a low dead and down fuel loading. To facilitate prescribed burning canopy closures must be reduced. Also to reduce the fire hazard across this project area canopy closure must be reduced and crown base height must be raised. Thinning reduces canopy closure, crown bulk density, and can increase the effective crown base height.

A final fuel treatment objective is to bring the project area closer to the natural historic fire regime of vegetation characteristics, fuel composition, fire frequency, severity and pattern. This can be achieved by thinning followed by prescribed burning at appropriate intervals.

Existing Conditions

The fire hazard of the existing condition across the sites surveyed to date is listed in the table below (totals may include some private and state land);

Table 3.13 – Existing Condition acres by Fire Hazard Rating

Extreme	Very High	High	Moderate	Low
31 acres	985 acres	3703 acres	5815 acres	1126 acres

Within some sites of the project area, the higher fire hazards are driven by all six of the hazard factors listed above in the introduction. While in other sites the higher fire hazard is derived from spikes in 2 or 3 of the above criteria (most often crown closure, stems per acre, and crown base height). Dead and down fuel loads were severe in only a handful of sites. However, in some sites substantial tree mortality, stems per acre, canopy closures, or crown base height alone drove the fire hazard beyond a desirable level for a wildland urban interface.

The existing fire hazard makes it very difficult for initial attack forces to control a wildfire starting in some parts of the project area under severe weather conditions that occur in April, May, June, September, and October.

Table 3.14 - Existing Condition, Expected Flame Length

Expected Flame Length Across project area by Fire Hazard Rating				
Extreme	Very High	High	Moderate	Low
Flame Length 6.0’	Flame Length 5.0’	Flame Length 4.5’ – 5.5’	Flame Length 3.5’ - 5’	Flame Length 2.5’

The modeling indicated a high occurrence of wildfire induced tree mortality (71 to98 percent) among trees 8” to 26” diameter at breast height (dbh). Critical flame lengths are the threshold distances where ground fire can move into the canopy of a stand. Average critical flame length for tree torching and transitioning to a crown fire is relatively low (2.5’ –10’). The expected ground fire flame lengths ranged from 1.2’ to 6’.

The current fuel conditions would likely generate dangerous fire behavior and undesirable fire effects when a wildfire occurs. The modeling indicated considerable torching and spot-fires as much as a one half mile a head of an intense fire in some sites within the project area. Although it would be difficult to initiate a crown fire within many sites, once initiated or if carried in from a neighboring area, many sites had sufficient crown bulk density coupled with sufficient canopy closure to sustain a crown fire and spread it through other sites. Initial attack forces would have difficulty in controlling a wildfire occurring in this area under severe weather conditions. The forest condition after a high intensity wildfire would not meet management direction in the Forest Plan for a variety of resources.

The project area is a critical watershed to the communities of Timberline and Doney Park. The project area also abuts a buried waterline (inner basin to Flagstaff Reservoir) that is critical to the city of Flagstaff. A large wildfire could reduce the hydrological function of the watershed, as well as result in erosion that undermines the critical waterline.

Fire Regime/Condition Class

The majority of the project area, approximately 95%, is Fire Regime I, where a fire recurrence of less than 35 years with a low percentage of over story replacement would be expected under historical conditions. Approximately 2% of the project area is Fire Regime II, where a fire recurrence of less than 35 years with a high percentage of over story replacement would be expected under historical conditions. Areas that were historically Fire Regime II are located in the Northwest portion of the project area where an arid mixed-conifer vegetation type is found. The remaining 3% of the project area is Fire Regime V, where a fire recurrence of around 200 years with a high percentage of over story replacement would be expected even under historical conditions. The portion of the project area that is Fire Regime V was historically Pinyon pine and juniper and is located in the Eastern and Southeastern portions of the project area. Site assessments indicate that the majority of these areas have transitioned to ponderosa pine. The only exception is the southeast slope of the area referred to as 89 Mesa, which has remained pinyon-juniper vegetation type.

95% of the project is in Condition Class 3 due to a lack of fire occurrence (a severe departure from the natural historical regime of vegetation characteristics, fuel composition, fire frequency, severity and pattern). The remaining 5% of the project is in Condition Class 2 (a moderate departure from the natural historic regime of vegetation characteristics, fuel composition, fire frequency, severity and pattern). A wildfire occurring under the existing Condition Classes of 2 and 3 would result in more severe effects than should occur for the natural Fire Regime. However, a significant number of sites would receive an improved condition class rating once prescribed fire was reintroduced, since the vegetation characteristics are within the historical range of variability. Other sites would receive an improved condition class rating after thinning and prescribed burning, since the “late-open” sites have filled-in to become “mid-closed” sites. See Appendix B, Figure B-1 – Fire Regime/Condition Class Map.

Table 3.15 - Existing Condition, Fire Regime and Condition Class

Fire Regime 1: Frequent Fires (0-35 years), surface burn severity		
Condition Class 1	Condition Class 2	Condition Class 3
0	0	11214Acres

Fire Regime II: Frequent Fires (0 – 35 years), high burn severity		
Condition Class 1	Condition Class 2	Condition Class 3
0	282 Acres	0

Fire Regime V: Infrequent Fires (200+ years), high burn severity		
Condition Class 1	Condition Class 2	Condition Class 3
0	331 Acres	0

The Pinion/Juniper vegetation type within the project area (located on the east facing slope of 89 Mesa) contains a high number of dead standing Pinion trees. This area has a heavy dead and down fuel load. 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 Pinion Pinion/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 Pinion/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.

Figures 3.5 - Fire hazard ratings pre-treatment,
Figure 3. 6- Fire hazard rating post-treatment – Proposed Action – Alternative 1
Figure 3.6A – Fire hazard rating post-tretment – Alternative 2.

Pre-Treatment - Fire Hazard

Figure 3.5 Alternative 1

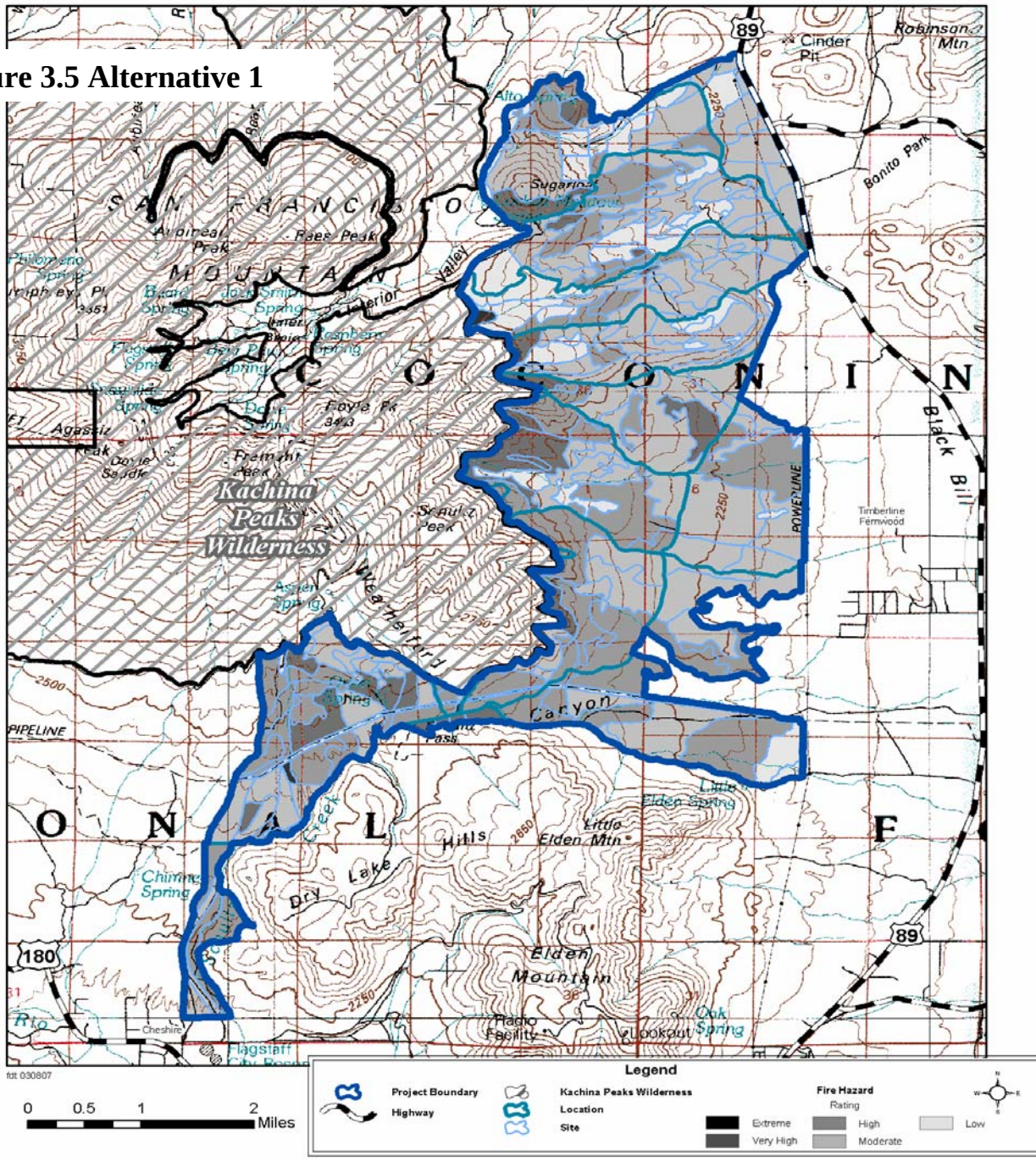


Figure 3.6 Alternative 1

Jack Smith/Schultz Fuel Reduction and Forest Health Project

Post Treatment - Fire Hazard

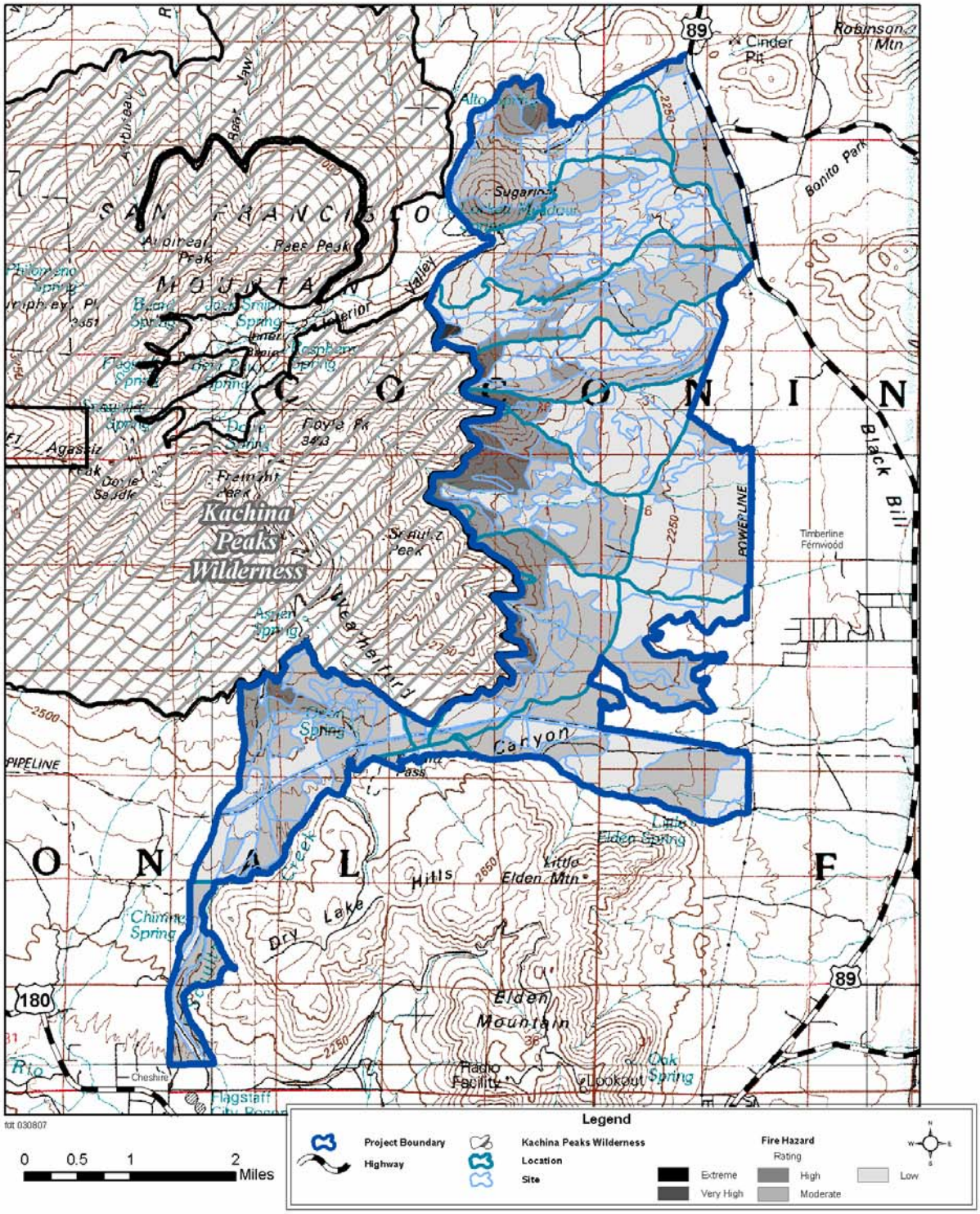
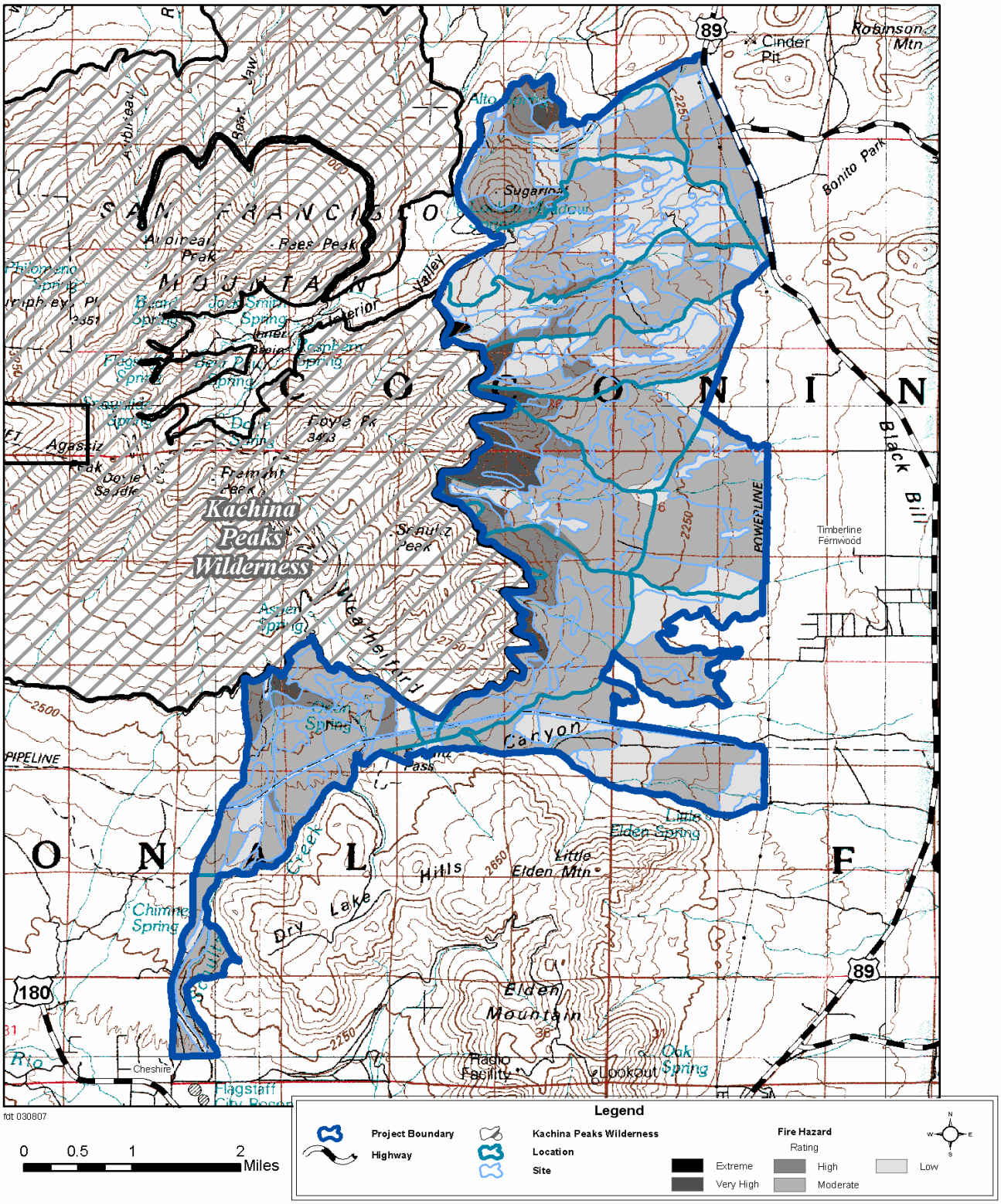


Figure 3.6A

Jack Smith/Schultz Fuel Reduction and Forest Health Project

Post-Treatment Alternative 2 - Fire Hazard



Analysis Methods

A detailed discussion of analysis methods used, including assumptions, models, and methodologies used can be found in the Fuels Specialist Report, (PRD # 82).

Environmental Consequences

Direct and Indirect Effects

No Action

No action does nothing to address the fuel treatment objectives of this project. The existing fire hazard makes it difficult for initial attack forces to control a wildfire starting in many parts of the project area under severe weather conditions that occur in April through July.

When a wildfire occurs expected flame lengths would exceed 4 feet in many sites, making it difficult and unsafe for initial attack crews to control a wildfire occurring under modeled conditions. The critical flame lengths (treetop ignition) commonly range 6’-12’. Many of the sampled sites had two to three times the crown bulk density necessary to sustain a crown fire. Canopy closure exceeded 50% in many sites and closed-in to 65+% canopy cover over the course of 20 years.

Mortality of Ponderosa pine trees 8-14” diameter at breast height (dbh) would range as high as 99%. Ponderosa pine trees 16” dbh and greater could suffer mortality rates as high as 71%. Mortality of oak trees 10” diameter at root crown (drc) and greater would be expected to reach 98% in most sites.

The indirect effects of not taking action would allow the fire hazard to worsen over time as vegetation grows and fuel accumulates. Many of the sites currently rated with a Low or Moderate fire hazard rating would develop conditions that result in a higher hazard rating. Those sites must receive prescribed burning to maintain their acceptably low hazard rating. Some sites require thinning as well as burning to maintain their low rating over the next 20 years.

Competition between trees for moisture, nutrients, and sunlight would continue resulting in decreased tree vigor, increased susceptibility to infestation, disease and then mortality. Those trees that die, further increase the fuel load, the fire hazard, and increase the risk of successive attacks on remaining trees. The indirect effect may be the loss of habitat and wildfire damage to private property in the vicinity of the project.

Proposed Action – Alternative 1 and Alternative 2

The fire hazard ratings after implementation of the Proposed Action – Alternative 1 are listed in Table 3.16 and for Alternative 2 in Table 3.16A. Some acres are still rated with a High, Very High, and Extreme hazard rating. These areas have been reduced from a higher rating only to High because they are in areas that are either inaccessible, which limits thinning opportunities, or they may have been deferred to meet certain wildlife habitat and watershed needs.

Table 3.16 – Proposed Action – Alternative 1 - Post-treatment acres by Fire Hazard Rating

Extreme	Very High	High	Moderate	Low
17 acres	406 acres	916 acres	4978 acres	5510 acres

Table 3.16A – Alternative 2 - Post-treatment acres by Fire Hazard Rating

Extreme	Very High	High	Moderate	Low
17 acres	406 acres	961 acres	7,144 acres	3,299 acres

Comparison of Alternatives 1 & 2 show that the fire hazard ratings increased in Alternative 2 by 45 acres in high, 2,166 acres in moderate and decreased by 2,211 acres in the low category.

Table 3.17 – Proposed Action – Alternative 1 and Alternative 2 - Post-treatment acres by Fire Regime and Condition Class

Fire Regime 1: Frequent Fires (0-35 years), surface burn severity		
Condition Class 1	Condition Class 2	Condition Class 3
0	9081 Acres	2121 Acres

Fire Regime II: Frequent Fires (0 – 35 years), high burn severity		
Condition Class 1	Condition Class 2	Condition Class 3
0		556 Acres

Fire Regime V: Infrequent Fires (200+ years), high burn severity		
Condition Class 1	Condition Class 2	Condition Class 3
0		69 Acres

Both Alternative 1&2 address the purpose and need by reducing the crown bulk density (thinning), reducing the canopy closure (thinning), increasing the effective crown base height in most sites (thinning and prescribed burning), reducing expected flame length (prescribed burning), and reducing the number and shortening the distance at which spot fires would be expected to occur (thinning and prescribed burning). However, Alternative 1 places an additional 2,248 acres in a low fuel hazard classification as compared to Alternative 2. From a fuel hazard

reduction standpoint Alternative 1 does more to achieve the fuel risk reduction objective than Alternative 2. Although, Alternative 1 reduces the fire hazard to lower classes Alternative 2 still meets the project goals and objectives, because the fuel hazard has still been reduced on the project area, and overall goals for community protection and resource protection are still improved over the no action alternative. The Fire regime and condition classes remain common to both alternatives and did not change.

Alternative 1 proposes to thin and prescribe burn 6,815 acres that are currently rated as Moderate fire hazard. 5,510 of these acres would reach a Low fire hazard rating after treatment. The balance of these acres would have the characteristics that generate difficult fire behavior improved, but would not qualify for a lower fire hazard rating after treatment. Alternative 2 proposes to thin and prescribe burn 6,815 acres that are currently rated as Moderate fire hazard. 3,845 of these acres would reach a Low fire hazard rating after treatment

Alternatives 1&2 also propose to lightly thin and prescribe burn 1,126 acres that are currently rated as Low fire hazard. Although these acres already have a Low fire hazard rating, those characteristics that generate difficult fire behavior would be improved still further. Without the proposed thinning, stand characteristics changing over 20 years would cause undesirable fire behavior within the urban interface.

Common to both Alternatives

As displayed by Tables 3.18 and 3.19, modeling did not show significant changes between alternatives based on the sampled sites; however fire behavior and fire effects will have considerable differences in treatment types. Alternative 1 would reduce fire behavior and effects less than Alternative 2 but as stated Alternative 2 still meets project goals of fuels reduction and reestablishing ecosystem balance.

Areas receiving light mechanical and hand thinning, flame lengths after treatment would be expected to range between 1.5 and 4 feet, making initial attack of a wildfire occurring under modeled conditions safe and effective. The critical flame lengths (treetop ignition) would range between 3’-8’. The sampled sites would have a crown bulk density of 0.0031 to 0.0064 lbs/Ft^3. This is still high enough to sustain a crown fire.

In areas receiving mechanical thinning, flame lengths after treatment would be expected to range between 0.5 and 3 feet, making initial attack of a wildfire occurring under modeled conditions safe and effective. The critical flame lengths (treetop ignition) would range between 11’-15’. The sampled sites would have a crown bulk density of 0.0021 to 0.0024 lbs/Ft^3. This in conjunction with the canopy openness is not to sustain a crown fire.

In areas that receive prescribed burning only, flame lengths after treatment would be expected to range between 1 and 4 feet, making initial attack of a wildfire occurring under modeled conditions safer and more effective. The critical flame lengths (treetop ignition) would range between 3 -7’. The sampled sites would have a crown bulk density of 0.0014 to 0.0025 lbs/Ft^3. Characteristics necessary to propagate a crown fire will vary across these stands. Stands with canopy cover less than 40% probably will not, while stands with greater canopy percents and crown bulk densities will sustain crown fire behavior.

Prescribed burning would be relatively easy to execute and maintain. Should a wildfire occur after this treatment it is unlikely to exceed state air quality standards. Wildfire-induced mortality of ponderosa pine trees 8-14” diameter at breast height (dbh) would not be expected to exceed

31%. Wildfire mortality of ponderosa pine trees 16” dbh and greater would not likely exceed 9%. Wildfire mortality of oak trees 10” diameter at root crown (drc) could reach 41%, but would not be expected to exceed 19%.

In areas treated for restoration of mountain meadows and grasslands flame lengths after treatment would be expected to range between 0.5 and 3 feet, making initial attack of a wildfire occurring under modeled conditions safe and effective. The critical flame lengths (treetop ignition) would range between 11’-15’. The sampled sites would have a crown bulk density of 0.0014 to 0.0026 lbs/Ft^3. These areas would not be able to sustain a crown fire. Without periodic prescribed burning, trees would begin to reinvade these areas over the course of 20 years.

Prescribed burning would be easy to execute and maintain. Should a wildfire occur after this treatment it is unlikely to exceed state air quality standards.

Common to both alternatives an indirect effect of the Alternatives 1 and 2 would be to maintain this suite of fuel treatment objectives for approximately 20 years through periodic prescribed burning and without additional thinning. Alternatives 1 and 2 would result in a short-term increase in wildfire hazard potential while treatments are occurring. While the proposed thinning reduces crown fire ladders, canopy closure, and crown loading, the thinning slash will usually be piled on site increasing the dead & down fuel loading until the piles are burned within prescription. Until the material composing these piles dries out they do not pose a significant hazard. These piles will be burned soon after they dry out. By timing thinning activities and piling activities so that the slash piles do not pose a hazard for more than a few months, this short term increase in fuel hazard is offset by a long-term decrease in wildfire hazard.

Table 3.18 - Probability of Wildfire Induced Mortality; Pre and Post Treatment, by Treatment Type. Based on averages of sampled sites – Alternatives 1 and 2

Tree Species and Dbh	Treatment Type	Using BEHAVE3		Using Fuel Mgt Analyst	
		Alternative 1	Alternative 2	Alternative 1	Alternative 2
Ponderosa Pine Up to 8" dbh	Existing Condition	99%	99%	99%	99%
	Resource Emphasis	35%	40%	39%	40%
	Fuel Emphasis	35% - 99%	35% - 99%	64%	67%
	12" Treatment			20%	20%
	Burn Only	35% - 99%	35% - 99%	58%	58%
	MSO PAC	35%	35%	36%	36%
Ponderosa Pine 10" dbh	Existing Condition	99%	99%	99%	99%
	Resource Emphasis	25%	32%	27%	30%
	Fuel Emphasis	25% - 99%	25% - 99%	35%	37%
	12" Treatment				20%
	Burn Only	25% - 99%	25% - 99%	29%	29%
	MSO PAC	25%	25%	28%	28%
Ponderosa Pine 12" dbh	Existing Condition	98%	98%	98%	98%
	Resource Emphasis	19%	22%	20%	27%
	Fuel Emphasis	19% - 98%	19% - 98%	25%	22%

	12" Treatment	19% - 98%	19% - 98%	25%	25%
	Burn Only	19% - 98%	19% - 98%	20%	20%
	MSO PAC	19%	19%	19%	19%
Ponderosa Pine 14" dbh	Existing Condition	97%	97%	77%	77%
	Resource Emphasis	14%	17%	15%	18%
	Fuel Emphasis	14% - 97%	14% - 97%	22%	26%
	12" Treatment				
	Burn Only	14% - 97%	14% - 97%	15%	15%
	MSO PAC	14%	14%	15%	15%
Ponderosa Pine 16+" dbh	Existing Condition	96%	96%	86%	86%
	Resource Emphasis	11%	13%	10%	13%
	Fuel Emphasis	11% - 96 %	11% - 96 %	6%	9%
	12" Treatment				
	Burn Only	11% - 96 %	11% - 96 %	5%	5%
	MSO PAC	11%	11%	12%	12%
Oak 10+" drc	Existing Condition	99%	99%	98%	98%
	Resource Emphasis	27%	31%	31%	37%
	Fuel Emphasis	41%	41%	60%	60%
	12" Treatment				
	Burn Only	41%	41%	40%	40%
	MSO PAC	27%	27%	40%	40%

Table 3.19 - Comparison of Fire Behavior Characteristics; Pre and Post Treatment, by Treatment Type. Based on Average of Sampled Sites. - Alternatives 1 and 2

Fire Behavior Characteristic	Treatment Type	Using BEHAVE3		Using Fuel Mgt Analyst	
		Alternative 1	Alternative 2	Alternative 1	Alternative 2
Crown Bulk Density (lbs/Ft3)	Existing Condition	NA	NA	0.0083 lbs/Ft3	0.0083 lbs/Ft3
	Resource Emphasis	NA	NA	0.0026 lbs/Ft3	0.0029 lbs/Ft3
	Fuel Emphasis	NA	NA	0.0188 lbs/Ft3	0.0113 lbs/Ft3
	12" Treatment	NA	NA	n/a	n/a
	Burn Only	NA	NA	0.0032 lbs/Ft3	0.0032 lbs/Ft3
	MSO PAC	NA	NA	0.0161 lbs/Ft3	0.0161 lbs/Ft3
Expected Flame Length (Feet)	Existing Condition	3' - 18'	3' - 18'	5'	5'
	Resource Emphasis	2' - 4'	2' - 4'	3'	3'
	Fuel Emphasis	2' - 5'	2' - 5'	3'	3'

	12" Treatment	2' - 5'	2' - 5'	3'	3'
	Burn Only	2' - 5'	2' - 5'	3'	3'
	MSO PAC	2' - 4'	2' - 4'	3'	3'
Critical Flame Lentgh (Feet)	Existing Condition	3' - 7'	3' - 7'	6'	6'
	Resource Emphasis	7' - 15'	7' - 15'	8'	10'
	Fuel Emphasis	5' - 7'	5' - 7'	11'	7'
	12" Treatment	5' - 7'	5' - 7'	6'	6'
	Burn Only	4' - 7'	4' - 7'	6'	6'
	MSO PAC	7' - 15'	7' - 15'	8'	8'
Expected Rate of Spread (Chains/Hr)	Existing Condition	3 - 65 ch/hr	3 - 65 ch/hr	33 ch/hr	39 ch/hr
	Resource Emphasis	3 - 5 ch/hr	3 - 5 ch/hr	6 ch/hr	10 ch/hr
	Fuel Emphasis	3 - 18 ch/hr	3 - 18 ch/hr	8 ch/hr	14 ch/hr
	12" Treatment	3 - 18 ch/hr	3 - 18 ch/hr	6 ch/hr	6 ch/hr
	Burn Only	3 - 18 ch/hr	3 - 18 ch/hr	6 ch/hr	6 ch/hr
	MSO PAC	3 - 5 ch/hr	3 - 5 ch/hr	6 ch/hr	6 ch/hr

Cumulative Effects

The analysis area for cumulative effects includes the area covered by the 300,000 acre + GFFP area and other non-GFFP projects within that boundary. Additionally, specific effects are considered when looking at the adjacent Eastside and Ft. Valley projects.

No Action

A cumulative effect of no action is an increase the number of acres of national forest that are vulnerable to severe fire effects. The vegetation type across the project area requires periodic fire to remain balanced. Fuel conditions have reached a point where fire effects are more severe than desired and more severe than would naturally occur. The fire hazard and fuel profile increases with time as the vegetation grows and dies.

Another cumulative effect of no action increases the possibility that a wildfire can get established and burn with sufficient intensity to exceed the capability of emergency response personnel. Wildfires in the wild-land/urban interface place particularly high demands on emergency response personnel. Such a fire threatens multiple structures and multiple groups of people in a very short span of time. Firefighting resources must be deployed to protect the people and properties that lie in the fire’s path, thus leaving fewer personnel to actually bring the fire under control. This generally results in larger wildfires and greater resource damage to the national forest.

A treatment within this project does not eliminate the chance of a crown fire, but greatly reduce the chance of a crown fire initiating. By leaving a large area like Jack Smith Schultz untreated, we increase the risk of a crown fire starting and spreading as a crown fire through an adjacent area that has been treated.

Finally, no action leaves most of the area in Condition Class 3 (a severe departure from the natural historical regime of vegetation characteristics, fuel composition, fire frequency, severity and pattern). As time passes, the entire project area would transition to a Condition Class III and further result in destructive wildfires more severe than the area’s historic fire regime.

Common to both Alternatives

The prevailing winds for this project area are out of the southwest and accelerate through Schultz Pass. The area analyzed for the cumulative fire effects of this project includes those projects that are south, east and west, of the project boundary. It constitutes most of the forested land subject to the prevailing winds driving a wildfire into the communities of Doney Park and Timberline.

The time period analyzed for the cumulative fire effects of this project includes a twenty-five year period from 1996 to 2028. Prior to that time the only activities in the area that affected the fire hazard were aggressive fire suppression and the continuing growth of forest vegetation. After 2028 models indicate that the continuing growth of forest vegetation will cause the fire hazard to approach current conditions in many respects; canopy closures will fill-in, crown bulk densities will increase, and the number of new trees and shrubs will lower the effective crown base height.

Fuel reduction treatments within the Wildland/Urban interface should reduce expected fire behavior to a level at which a small number of personnel can quickly and effectively control a wildfire. This is beneficial, reducing the possibility that wildfires can get established and reducing the intensity with which wildfires can burn. This further reduces the probability that the demand on emergency response personnel will be exceeded and reduces the threat to life and private property. Wildfires can be controlled with fewer acres burned resulting in less damage to National Forest lands. Also, wildfires burn less severely resulting in less resource damage to each acre burned.

The cumulative effect of this project adds such a fuel treatment to those that lie in the path of the prevailing winds around Flagstaff and its suburbs (Eastside, Ft. Valley Restoration, A-1 Multi-Product, Mars Hill, Airport, Woody Ridge, Kachina Village, Lake Mary Fuel Reduction, Mountainaire, and Skunk Fuel Reduction). The treatments within these projects do not eliminate the chance of a crown fire, but greatly reduce the chance of a crown fire initiating within their bounds.

By treating the Jack Smith Schultz project area, we reduce the risk of a crown fire starting in the project area and spreading as a crown fire through adjacent areas. Also with the two adjacent treatments (Ft. Valley and Eastside) this treatment will further reduce the risk of crown fire spreading to nearby communities at risk and improve this fire adapted ecosystem.

These projects accumulate in the neighborhood of 109,200 acres analyzed and 98,175 acres proposed for treatment. As more acres that are treated in this way these benefits accumulate. As these projects are accomplished we expect the fire hazard rating for all acres analyzed to shift as shown in the following table.

Table 3.20 - Cumulative Change in Fire Hazard Rating

Expected Cumulative Change in Fire Hazard Rating Expressed as a Percentage of All Projects Analyzed To Date					
	Extreme	Very High	High	Moderate	Low
Pre-Treatment	10%	13%	30%	43%	19%
Post-Treatment	3%	4%	11%	30%	66%

The Flagstaff Center anticipates three additional project areas south or west of Flagstaff (Elk Park Meadows, Marshall and Hart Prairie). These project areas would have no effect on the fire behavior or fire hazard of the Jack Smith project area.

Since existing conditions and proposed treatments vary widely across these projects and even within individual projects, it is difficult to summarize the fire effects. It is accurate to state that fire-induced tree mortality across all size classes will be dramatically reduced by these treatments. It is also accurate to state that wildfires occurring in these treated areas will be easier to control and burn less severely with less acreage burned than if the areas were left untreated. These projects combine to form a defensible space for Flagstaff and its surrounding communities.

The Fire Regime would of course remain the same (Fire Regime 1 an open forest maintained by frequent mixed intensity fires and Fire Regime III a mosaic of open forest to mid-seral maintained by mixed severity fires recurring generally 35 to 100), but the condition class would move very close to a Condition Class I, where vegetation composition, structure, and fuels are similar to those of the natural regime and do not predispose the system to risk of loss of key ecosystem components. A wildfire occurring under post-treatment conditions would be characteristic of the historic fire regime behavior, severity, and patterns.

Transportation System

A direct effect of road closures on 27.9 miles, and road obliteration on 38 miles would be that the amount of human caused fires would potentially decrease, whereas an indirect effect would be access for fire fighting apparatus will be limited in the project area and could potentially delay the response times and weaken initial attack actions to both human and lightning caused fires.

Air Quality – Common to Both Alternatives

The prevailing winds for this project area are out of the southwest. However, as fronts pass winds can arrive from any compass direction for a period ranging from a few hours to 3 days. Atmospheric inversions can prevent smoke from dispersing. Within the project area inversions occur between October and December more than at other times of the year. Stagnant atmospheric conditions result from low mixing heights and light transport winds. These conditions when they occur, may last from 12 hours to 7 days (Arizona Department of Environmental Quality, Fort Collins Weather Database).

Regulatory Framework

Smoke from prescribed fire must meet federal, state, and local air quality regulations. The basic framework for controlling air pollutants in the United States is mandated by the 1970 Clean Air Act (CAA), as amended in 1999 and 1990. The EPA has established National Ambient Air Quality Standards (NAAQS) for specific pollutants emitted in significant quantities throughout the country that may be a danger to public health and welfare.

All forest burning activities are regulated and administered by Article 15, Forest and Range Management Burn Rules (10/8/96). The Arizona Department of Environmental Quality (ADEQ) models emissions/pollutants from all prescribed burning within the state. Any prescribed burn planned by the Forest Service must be approved by ADEQ on a daily basis. ADEQ will not allow more acres burned per day, per air shed, than is acceptable with current air quality forecasts. The Forest Service burn boss is responsible for monitoring smoke plume trajectories to assure impacts are within predicted values. The Forest Service burn boss will make changes as needed when unpredicted weather threatens stronger impacts.

Analysis Methods

Assumptions

The Jack Smith Schultz project area is in the Little Colorado River air shed. The communities of Doney Park/Timberline are east of the project. The community of Flagstaff is located immediately south of the project. Other suburbs of Flagstaff are within 10 miles of the project. There is a high level of recreation activity, especially in the summer months, within the vicinity of the analysis area.

Models

The Fuel Management Analyst (version 3+) was used to model the amount of slash generated for this analysis. The Simple Approach Smoke Estimation Model (SASEM) version 4.0 was used to model the amount of emissions from prescribed burning as well as from wildfire occurrence. The Arizona department of Environmental Quality directs that the SASEM model be used for this purpose.

Methodologies used

Brown's Transect Dead and Down Fuel Inventories were taken to determine dead fuel loading in most sites. In some cases, the Photo Series for Quantifying Forest Residues in the Southwestern Region was used to estimate dead and down fuel loading. Data was collected in 2005 and 2006 by fuels crews. Fire regimes and condition classes were assessed as well during the field surveys for this project.

Existing Conditions

Air quality surrounding the project area is generally good. However, smoke from wood-burning stoves and haze from automobile traffic can be seen at times during the winter months. Prescribed burning from other fuel treatment projects generates emissions that must be balanced with the air mass' ability to disperse emissions on any given day.

Direct and Indirect Effects

No Action

No direct effects would occur since pile burning or prescribed burning would not occur. However, emissions from a wildfire occurring within the project area have been modeled. The amount of fuel consumed and the smoke generated by a wildfire occurring under no action would be greater than that under the Proposed Action. The resulting smoke would spread wider and farther than under prescribed burning. Nighttime smoke would reach farther and impact the nearby communities more severely. Smoke would exceed air quality standards in both volume and duration.

The current fuel and vegetative conditions would generate severe fire effects on many parts of the project area. Even after a wildfire was extinguished there would be bare soil areas that when exposed to wind would continue to produce air pollutants. A wildfire occurring within the project area under the weather conditions described in the Fire and Fuels section of this chapter would in places require an indirect attack for successful suppression. This would result in a larger burned area with more emissions than one occurring after implementing any of the action alternatives.

Common to both Alternatives

Alternatives 1 and 2 seek to reduce the fire hazard while retaining as many nutrients on site as possible. It proposes burning the piled thinning slash (8,845 acres), as well as, prescribed burning of the forest floor (9,220 acres in Alternative 1 and 9,364 acres in Alternative 2). A direct effect of each alternative is that smoke from prescribed burning will have short-term impacts on local air quality. These effects come from three sources: 1) pile burning of slash generated from thinning trees, 2) initial prescribed-burning the forest floor in small blocks, and 3) maintenance-burning of the forest floor. Emissions generated by these actions have been modeled for the project area.

Pile-burning is relatively efficient combustion producing fewer emissions than both wildfires (pre-treatment) and initial-entry prescribed-burning. Piles can be burned during rain and snowstorms with excellent smoke dispersion and little diurnal smoke flow into the canyons or basins. Proper pile burning consumes a majority of the piled fuel before atmospheric cooling begins. This leaves little fuel to produce smoke for nighttime subsidence flows.

Some smoke from pile burning may still subside into the neighborhoods in and around the project area. Pile burning adjacent to subdivisions may cause short-term (1-day) smoke impacts to a subdivision. This is a direct effect of Alternatives 1 and 2. Public notification of burning will take place prior to ignition of all 3 types of prescribed burning.

The initial prescribed-burning of the forest floor produces considerably more emissions than pile-burning, but less than most wildfires burning in the same (pre-treatment) fuel bed. The initial broadcast burning of each block in the project area will generate smoke for as long as 72 hours after ignition. The emissions from implementing would generally meet National and State Ambient Air Quality Standards because we can select the weather conditions under which we burn and control the size of the area burned on any given day. The following table displays modeled volumes.

Table 3.21 - Comparing Emissions from Burning to Wildfire

Comparison of Burn Emissions	Existing Condition Wildfire	Post Treatment Wildfire	Pile Burn	Initial Prescribed Burn	Maintenance Prescribed Burn
Ground Fuel Consumed Tons per Acre	8	2	Not Applicable	7	2
TSP Total Emissions Tons	30	0.3	6	13	3
Air Quality Standards	Exceeded	Unlikely	Unlikely	Rarely Exceeded	No

Common to both Alternatives

Successive maintenance burns on a given block (initiated to mimic the historic fire regime) will generate far less smoke volume and have virtually no smoke after sunset of ignition day. Hence there would be no nighttime smoke (subsidence flow) impacts from maintenance burning. The emissions from implementing the Alternative 1 or 2 would generally meet National and State Ambient Air Quality Standards because we can select the weather conditions under which we burn and control the size of the area burned on any given day. This is a direct effect of Alternative 1 or 2.

The high level of recreation activity that occurs in the summer months is not likely to be impacted by smoke because very little prescribed-burning is conducted during those times. Hunters and other people recreating in the project area in the fall and spring could be impacted by smoke from prescribed-burning. This could last for as long as 72 hours during the initial prescribed-burning, but only 6 hours during the maintenance prescribed-burning.

Smoke plume trajectories indicate that the communities within and adjacent to the project area, Interstate Hwy 40, AZ State Hwy 89, and the Townsend/Winona Road may be impacted by smoke when burning. Short-term air quality degradation and reduced visibility may be experienced in the smoke plume trajectories. After sunset, cooling atmospheric conditions will carry smoke down drainages like water flows. Under Alternative 1 and 2, these down canyon flows reach the communities around the project area in the early morning hours.

These early morning flows may carry smoke down slope and reduce visibility along, Interstate Hwy 40, AZ State Hwy 89, and the Townsend/Winona Road when blocks adjacent to them are being burned. These portions will be posted with appropriate signs warning motorists of reduced visibility. Ignition of each day’s block would be completed in the afternoon, thus limiting the smoke generated after atmospheric cooling begins. Smoke impacts would be much worse should a wildfire occur under modeled weather conditions without the implementation of the proposed action.

As stated above, under the Proposed Action, broadcast burning could be conducted without violating air quality regulations.

The reduction in the fuel load and the increased openness of the canopy will allow future broadcast burning under a wider range of weather conditions than the existing conditions. The ability of burn managers to limit undesirable smoke impacts is increased by having a wider range of weather parameters within which to burn. The areas thinned mechanically would allow the widest range of prescribed burning weather and lowest risk of smoke impacts because they result in the most open canopy conditions. The areas thinned by hand would allow the next widest range. Areas receiving burn-only treatments may or may not have an open canopy dependant on their existing condition. This is an indirect effect of both alternatives.

Cumulative Effects

In analyzing the cumulative effects for air quality for the project the area contained within the Little Colorado Airshed was considered.

No Action

The natural fire regime for most of the project area is frequent surface fires that generally do not involve much of the tree canopy. These would occur at 3 to 15 year intervals. This is a necessary function of this ecosystem. The natural fire regime for the Pinion/Juniper cover type is a fire recurring generally not more than every 35 years (sometimes more than 100 years) where a mixture of over story replacement and surface fire would be expected under historical conditions.

Most of the project area has not experienced fire in over 70 years. By not burning periodically the fuels have accumulated to an unnatural level contributing to more severe fire effects and smoke impacts when wildfires occur. This is a cumulative effect of vegetative growth, aggressive wildfire suppression, and insufficient prescribed-burning. While these actions minimized suppression costs, resource damage, and protected private property in the short-term, they have contributed to an increasing forest fuel problem.

The Coconino N.F. averages about 400 wildfires a year. Roughly half of these are human-caused with the balance caused by lightning. On average there are 85 days a year in which multiple wildfires start. The vast majority of these fires are stopped at $1/10^{th}$ of an acre. Large destructive fires pull the average-annual-wildfire-acres up to 4,000 acres a year. Smoke from a wildfire occurring under modeled conditions would exceed air quality standards. As more area is left untreated, smoke from a wildfire occurring under no action could accumulate with emissions from other wildfires and further exceed air quality standards.

Common to both Alternatives

Although smoke from a wildfire occurring after treatment under Alternative 1 and 2would be unlikely to exceed air quality standards by itself, it could combine with the emissions of other wildfires and the accumulation might exceed air quality standards. As stated above, the Coconino N.F. averages 400 wildfires a year and 85 days a year having multiple fire-starts. This cumulative effect is not very likely under Alternative 1 and 2 because fuel loading will be reduced by the proposed treatments. This cumulative effect would also be unlikely because after treatment, the wildfires could be controlled at a smaller size, burning fewer acres, and fewer days, thus producing less smoke.

As stated earlier, this project lies within the Little Colorado River air shed. There are many other forest burning projects that may affect this air shed (A-1 Multi-Product, Airport, Apache Maid, Bald Mesa, Blue Ridge, East Clear Creek, Ft. Valley Restoration, Good Enough/Tule, IMAX, Kachina Village, Lake Mary Fuel Reduction, Mars Hill, Mint, Pocket Baker, Ritter, Rocky, Sinks, Skunk Fuel Reduction, Spearmint, Valley, Victorine, and Woody Ridge).

Since ADEQ limits total acres burned per day per air shed, daily emissions from prescribed-burning do not accumulate to exceed air quality standards. The number of days per year in which prescribed burning occurs is likely to increase as projects are implemented, but exceeding air quality standards will not be an effect. Further, these projects combine to reduce future smoke impacts. The following table displays estimates of current forest prescribed-burning with estimated capacity assuming normal weather patterns.

Table 3.22 - Forest's Annual Prescribed Burning and Estimated Capability

Estimation of Current Forest Annual Prescribed Burning with Capability	Initial Prescribed Burning	Est. Burn Days	Maintenance Prescribed Burning	Est. Burn Days	Prescribed Pile Burning	Est. Burn Days
Current Execution	13,000 A.	37 Days	7,000 A.	8 Days	1,700 A.	17 Days
Capability With Typical Weather	17,000 A.	50 Days	11,000 A.	18 Days	8,500 A.	43 Days

Smoke from pile-burning may combine with smoke from wood-burning stoves and automobile smoke on some days when inversions are strongest during the winter.

In sites with more closed canopies, forest floor fuel accumulates more quickly. In sites where canopies are denser, prescribed-burning can only be executed under a narrower window of weather conditions. Denser canopies result in fewer opportunities to burn and this in turn is likely to result in less frequent prescribed-burning of those areas. Fuel accumulates more quickly and is prescribe-burned less often resulting in greater smoke impacts.

Wildlife

The following section summarizes existing conditions and effects to threatened, endangered, and Forest Service sensitive species (TES), management indicator species, and migratory bird priority species that may occur or may have habitat within the project area, wildlife cover and key habitat components such as snags and downed logs.

Threatened and Endangered Species

Mexican Spotted Owl (Strix occidentalis lucida)

Analysis Methods

The following evaluation criteria were used to compare environmental consequences for the alternatives:

- Protected and Restricted Habitat Quality – Measures are primary constituent elements as identified for critical habitat which include; basal area of large diameter trees, canopy closure/cover, tree sizes suggestive of uneven-aged management, multi-layered canopy with large overstory trees.
- Prey Habitat – Measures are primary constituent elements as identified for critical habitat which include; volumes of fallen trees and other woody debris, plant species richness, including hardwoods, residual plant cover to maintain fruits, seeds, and regeneration to provide needs of MSO prey species.
- Disturbance associated with project implementation.
- Fire hazard rating to MSO habitat by acres and fire hazard to PACs from acres outside PACs.

Existing Conditions

- The project area contains four dominant vegetation types – ponderosa pine (9,747 acres 83%) of which a small percentage is ponderosa pine/gambel oak (355 acres, .04%) and mixed-conifer (1,618 acres, 14%). There is a smaller percent of pinyon-juniper (103 acres, <1%), aspen (62 acres, <1%) and grassland/meadows (27 acres, <1%).

Table 3.23 - Existing acres of MSO habitat within the project area

Habitat Type	Acres
Protected Outside of PACs	628
PAC	1727
Restricted Habitat	462
Threshold Habitat	0
Total	2,817
Critical Habitat	2,708*

*Critical Habitat is a subset of the total MSO habitat acres.

Protected Habitat

Protected habitat includes 628 acres of mixed conifer with slopes greater than 40% within the project boundary. Additionally, four Mexican spotted owl (MSO) Protected Activity Centers (PACs) are located partially within the project boundary (Weatherford #040208, Orion Spring #040207, Jack Smith #040209 and Pipeline #040201). There are approximately 1,727 MSO PAC acres within the project boundary. Fire hazard rating for the portion of the PACs within the project area is low to extreme. Fire hazard ratings for protected habitat on slopes greater than 40 percent are high to very high with 44% high and 56% very high. See Fire and Fuels section for ratings and clarification.

The Orion Spring PAC overlaps with the Orion northern goshawk PFA on 106 acres (Location 267, Sites 18, 21) within the project. Protected habitat overlaps with northern goshawk (Pipeline II) nest stands on approximately 60 acres (Location 269/Site14, Location 259/Site10). This overlap of habitat is displayed in Figure 3.7. Within MSO protected or restricted areas, the Mexican spotted owl standards and guidelines will take precedence over the northern goshawk standards and guidelines (USDA 1987a). Beyond the project boundary, there are four PACs within one mile of the project boundary. Two of these are north and west of the project. The remaining two PACs are in the Dry Lake Hills south and southwest of the project area.

The protected habitat is easily accessible from the Forest Service road system and there are a large number of user-created trails developing and present within it. Specifically, a user-created trail (a.k.a. Challenger Trail) which is used by motorized and non-motorized users and transects protected habitat throughout the Jack Smith portion of the project.

Restricted Habitat

Restricted habitat exists in mixed conifer and pine oak habitat with slopes less than 40 percent. Restricted habitat within pine oak is defined as an area that could attain the type of forest structure sought by spotted owls for roosting and nesting habitat and having at least 10% of the site basal area consisting of oak greater than 5” in diameter at root collar (DRC). There are approximately 462 acres of restricted MSO habitat within the project area that are located primarily northeast of Orion PAC (between Orion and Aspen Spring PACs) and north of Little Elden Spring. Of those 355 acres are pine/oak and 107 acres are mixed conifer.

About one-quarter (23%) of the restricted habitat is mixed conifer, multi-storied with a wide range of tree sizes. The remaining 355 acres of the restricted habitat (77%) is pine oak. The restricted habitat has an open (0-39%) to closed (60-100%) canopy with few openings one-quarter acre of larger. Understory production and diversity are limited. Fire hazard ratings are low to very high with most (57%) high/very high, 20% moderate with the remainder (23%) low.

Oak and pine snags have been harvested for fuelwood and are in low numbers. Dead and down logs have also been reduced by past timber sales and fuelwood harvesting and are in low levels. The restricted habitat is easily accessible from the Forest Service road system and there are a large number of user-created trails developing and present within it.

Target and threshold habitats are managed for future nesting and roosting habitat, and are subsets of restricted habitat. The Forest Plan directs that target threshold habitat will be identified in restricted areas outside of the Urban Rural Influence Zone (URIZ). No sites meet threshold habitat values. The proposed action identifies four stands as target/threshold: C267/S12 and 13, C278/S14A, C259/S10, which accounts for 33% of restricted habitat.

Designated Critical Habitat

Critical habitat is designated by U.S. Fish and Wildlife Service (FWS) to provide for the survival and recovery of listed species. For the MSO, critical habitat includes areas within mapped boundaries that are protected or restricted habitat and include one or more of the primary constituent elements as listed in the Federal Register (USDI 2004).

Critical habitat is in Upper Gila Mountains (UGM) Recovery Unit 14. Critical habitat within the project consists of 2,708 acres with 2,355 acres of protected habitat, 353 acres of restricted habitat and the remainder is other forest and woodland.

Sites Proposed for Thinning and/or Burning

Protected Habitat

Approximately 377 acres of protected habitat (16%) is proposed for hand thinning or burning. All stands will maintain canopy closure of 50% or greater with an average canopy closure of 60% after treatment.

Restricted Habitat

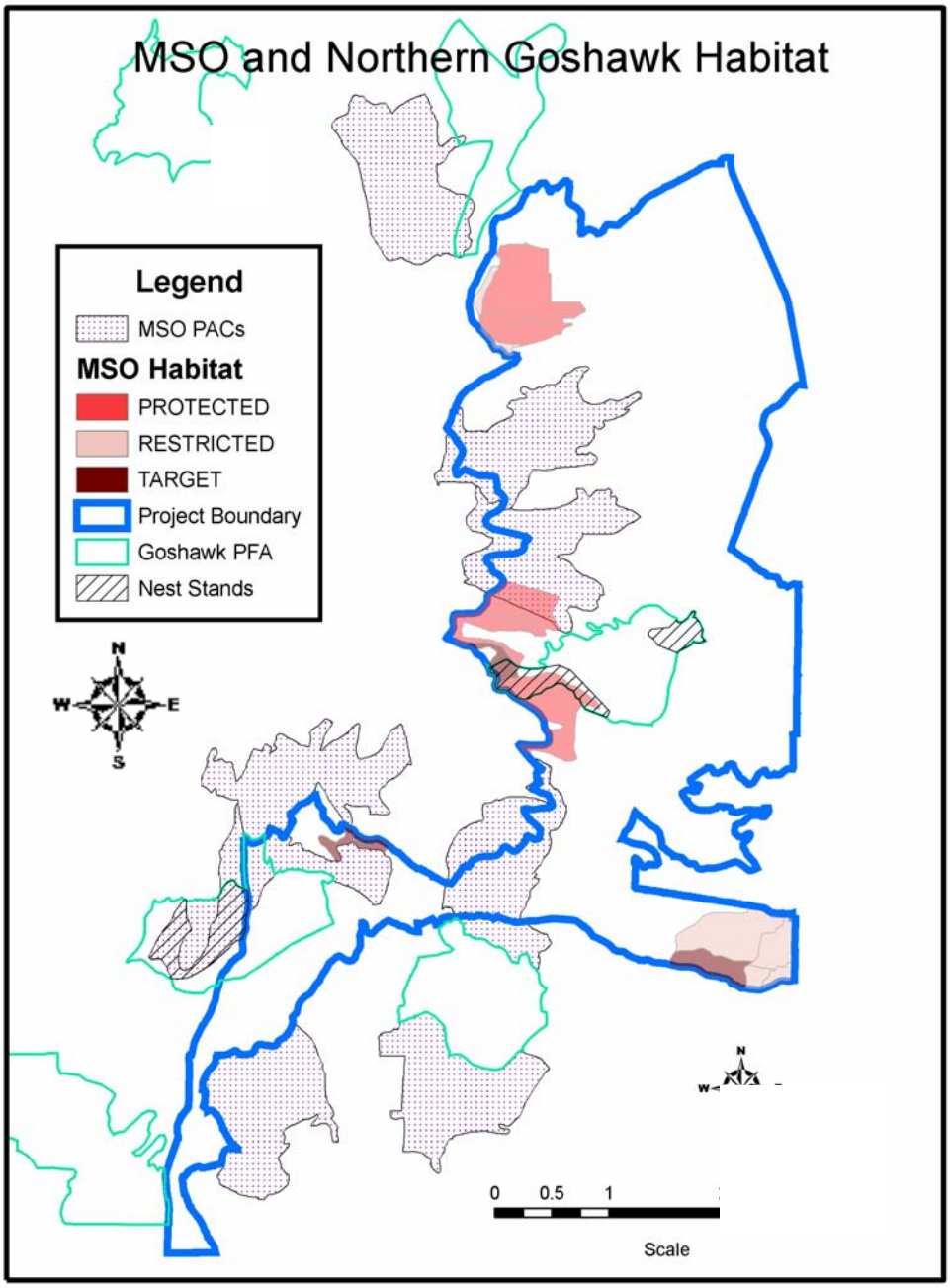
Approximately 303 acres of restricted habitat (66% of MSO habitat, within the project area) will be uneven-aged thin with a resource emphasis to a canopy closure of 40 to 50% and basal area of 70-92 sq. ft./acre and approximately 424 acres of restricted habitat (92% of MSO habitat, within the project area) will be broadcast burned for fire risk reduction.

No temporary roads will be needed within restricted or protected habitat in order to accomplish thinning treatments.

Table 3.24 - Acres of treatments proposed in MSO habitat

	PROTECTED HABITAT	RESTRICTED HABITAT
9” THIN/BURN	308	0
12” THIN/BURN	0	31
UNEVENAGED THIN RESOURCE OBJECTIVE	0	272
UNEVENAGED THIN FIRE REDUCTION OBJECTIVE	0	0
BURN ONLY	70	121
NO TREATMENT	1,978	38
TOTAL	2,355	462

FIGURE 3.7 – MSO AND NORTHERN GOSHAWK HABITAT



Environmental Consequences

Direct and Indirect Effects

No Action

Habitat conditions for wildlife would remain in their current condition, not withstanding natural processes. No action would have no direct effect on MSO. However, dense forest conditions would still occur and the high fire hazard potential would continue to place spotted owl habitat at risk with respect to stand-replacing fire. If a crown fire were to occur in MSO habitat, components for nesting, roosting and foraging would be reduced or eliminated. Wildfire-induced mortality of key habitat components such as large ponderosa pine and oak trees would range from 71 to 98 percent (Fire and Fuels Specials Report). If a ground fire occurred, it is likely that ladder fuels would carry fire into the dense canopies and turn into a passive or active crown fire.

Tree densities would continue to be high slowing their growth into larger diameter classes. Habitat for MSO prey would continue to be limited by high tree densities with closed canopies. Ponderosa pine would continue to compete with oak for moisture, nutrients and sunlight resulting in reduced tree growth, vigor and longevity of oak. This alternative would not move to develop or maintain MSO habitat components.

High road densities would continue to provide access into sensitive MSO habitats increasing the potential for habitat alteration or direct disturbance of owls.

Alternative 1 – Proposed Action and Alternative 2

Direct effects to MSO would be from smoke created from broadcast burning. Smoke tends to settle into low-lying areas during the nighttime, and could potentially affect owls adjacent to the project. Due to prevailing winds from the southwest it is generally PACs to the northeast of burning activities that are impacted by smoke. There are two PACs (Schultz Creek #040206 and Aspen Spring #040235) northeast of portions of the project. PACs are located so smoke may drift into PACs from burning and this could occur in the spring within the breeding seasons, but effects would be short-term (3-5 days) and low intensity (drift smoke). Mexican spotted owls are known to return to PACs after fires and smoke events have ceased. Short-term impacts from smoke would be reduced by coordination and timing and type of burning with wind direction, topography, time of year, and distance to PACs. Initial entry prescribed burning will be restricted during the breeding season in areas that may create smoke impacts to occupied PACs. Under the action alternatives there would be no direct effects from thinning activities as no activities will occur in PACs or within one-half mile of nests or roosts during the breeding season. Activities associated with prescribed burning and thinning treatments conducted outside of the breeding season normally do not result in negative effects to the MSO. The project area has been surveyed according to approved protocols. Effects from proposed treatments to adult and young owls outside of PACs are unlikely.

Prescribed burning or thinning activities may *indirectly affect* MSO by changing the owl's habitat structure including snags, downed logs, woody debris, multi-storied canopies, and dense canopy cover. There is the potential for owls to relocate. Ganey (2003) concludes that in some cases, it may be necessary to manage for lower basal areas and provide openings in the canopy to provide adequate sunlight to maintain oaks in well-developed sites. The proposed thinning and burning may change the structure of MSO prey species' habitat, affecting the abundance and composition of prey species. Although treatments, especially prescribed burning may have adverse effects to

prey species in the short-term (generally one year, depending on climate and moisture) by impacting individuals of prey species due to disturbance of prey species' habitat and harm from fire, the proposed treatments may increase the diversity of vegetative conditions, which in turn would provide for a diverse prey base. Empirical models of factors that influence availability of Mexican spotted owls five common prey species indicate that microhabitat manipulation can influence abundance of the Mexican vole, followed by the long-tailed vole, Mexican woodrat, deer mouse and lastly the brush mouse (Ward 2001). Ward (2001) found that the total available biomass (kg) of mice and voles provided the strongest correlation with reproductive output. Model results indicated that abundance (g/ha) of the two vole species could be influenced by manipulating grass-forb height, whereas abundance of Mexican woodrats, the preferred prey, might be influenced by promoting shrub diversity and increasing large log cover. Block et al. (2005) concluded downed logs were not a strong predictor of habitat use by any of the three prey species studied, including the woodrat, in ponderosa pine/Gambel oak habitat, but found them closely associated with rocks and shrub cover.

All treatments follow Forest Plan standards and guidelines and the Mexican Spotted Owl Recovery Plan (USDI 1995b) in restricted habitat and protected habitat. Approximately 377 acres of protected habitat (16%) is proposed for hand thinning or burning. All stands will maintain canopy closure of 50% or greater with an average canopy closure of 60% after treatment. Average canopy closure in areas proposed for hand thinning will increase to 67% in 20 years and to 72% in 40 years. Currently the average diameter at breast height of trees in stands proposed for hand thinning is 7.0. This average will increase to 11.5 immediately after treatment and will increase to 13.4 in 20 years and 14.9 in 40 years.

Approximately 303 acres of restricted habitat (11% of MSO habitat, within the project area), including 76 acres of target threshold, will be an uneven-aged thin with a resource emphasis to a canopy closure of 40 to 50% and basal area of 80-150 sq. ft./acre and approximately 424 acres of restricted habitat (15% of MSO habitat, within the project area) will be broadcast burned for fire risk reduction. It is anticipated that this thinning treatment will be maintained over time. A change in the number of 18-inch diameter trees would not be detectable from existing conditions. Of the 152 acres of developing target threshold 76 acres of pine oak habitat will be treated to develop into nesting roosting habitat. Modeling shows the stand will meet *target threshold* conditions 50 years after treatment (Silviculture Report). Of the remaining 76 acres, 38 acres will be treated with a burn only treatment and the remaining 38 acres will be deferred from treatment. These stands are primarily mixed conifer and are expected to move toward target conditions without thinning treatments.

Throughout the project, during broadcast burning activities, torching may occur within treatment areas, however a change in the stand structure from this type of event would not be detectable on a stand basis. Torching would mimic gap processes that occur under natural conditions. Broadcast burning would decrease woody debris by approximately 50% of existing volume, and decrease number of snags by 20% across all acres burned (Randall-Parker and Miller 2000). Woody debris and snags are habitat for small mammals. Indirect effects of reducing woody debris due to broadcast burning will decrease prey base abundance on a short-term basis for approximately one year (Jenness 2000). This decrease in small mammal prey base could be compounded during drought years when the prey base is lower due to a lack of food for these animals. However, herbaceous vegetation typically responds favorably to broadcast burning, and an increase in forage for small mammals is expected, outside of drought conditions. This in turn will have a corresponding increase in the small mammal prey base (Jenness 2000). Lining of snags and logs in combination with burning techniques and vegetation treatments designed to

protect snags will reduce the number of snags burned. Recruitment snags will be identified from live trees that exhibit defects ideal for wildlife. For example, trees with forked or spiked tops, lightning strikes, mistletoe brooms, or fading crowns.

By treating restricted habitat with a prescribed burn wildfire-induced mortality of key habitat components in restricted habitat will be reduced. For ponderosa pine 8-14" diameter breast height (dbh) wildfire-induced mortality would not be expected to exceed 31%, ponderosa pine >16"dbh 9% and for oak >10" diameter at root collar (drc) could reach 41% , but would not be expected to exceed 19% (Fire and Fuel Specialist Report).

Under the action alternatives the fire hazard potential within restricted habitat is reduced. Although fire hazard is not reduced in all treated stands there is an increase in crown base height and a reduction in fire intensity. The following table reflects the change in fire hazard rating by acres within restricted and protected habitats:

Table 3.25 - Fire Hazard Change to MSO Protected and Restricted Habitat for Alternatives 1 and 2

Fire Hazard Rating	Existing Protected Acres	Post-treatment Protected Acres	Existing Restricted Acres	Post-treatment Restricted Acres
Extreme	54	50	0	0
Very High	612	516	14	0
High	738	570	249	14
Moderate	820	1,005	93	342
Low	129	212	106	106

Table 3.25A displays the miles of road existing within MSO habitat, the miles of roads proposed for obliteration or closure and the resulting road density within owl habitat. Road densities are reduced within MSO habitat by 7.52 miles. This reduction will limit access into all four PACs within the project boundary potentially reducing habitat alteration and direct disturbance to owls using these habitats.

Table 3.25A. Proposed closed and obliterated roads in MSO protected and restricted habitat for Alternative 1 and 2

Habitat Type	Existing Miles of System and Non-system Roads	Miles System Road Closed or Obliterated	Total Remaining Open
Protected (steep slope)	.20	.20	0.0
Restricted (target threshold)	1.2	.90	.30
Protected (PAC)	9.75	6.42	3.33
Total	11.75	7.52	3.63

Alternative 2

All treatments within MSO habitat are the same as in Alternative 1.

Cumulative Effects

Historical silviculture practices of removing large-sized trees and suppression of fires created the current forest structure. Cumulative effects were analyzed based on the likelihood of disturbances (smoke, visual and auditory) to impact owls within the project area and a one mile buffer from the project boundary. Reviews of all projects (past, present and reasonably foreseeable) that have the potential to impact owls during implementation were analyzed. Review with the fuels management specialist concluded that smoke from broadcast and pile burning in the Fort Valley and Eastside Project areas would have similar short-term direct (3-5 days) and low intensity (drift smoke) effects of smoke to individual MSO.

Burning inside PACs occurs outside the breeding season for all projects. Burning outside of PACs during the breeding season is conducted in a manner that minimizes smoke impacts to MSO. However, it is anticipated that burning activities on portions of the Jack Smith-Schultz Fuels Reduction and Forest Health project could occur simultaneously with burning activities on portions of the Fort Valley and Eastside projects. While there are numerous burning operations planned in areas adjacent to the Jack Smith-Schultz Fuels Reduction and Forest Health project area, ADEQ standards limit the total amount of burning allowed in the airshed at a given time. Thus, smoke impacts to PACs are limited.

There is a slight chance that daytime drift smoke from the proposed Schultz Fuels Reduction and Forest Health project will reach the Orion Spring and Aspen Springs PAC. This would occur over a 1-2 day period of time per year. There is a greater chance that daytime drift smoke from Fort Valley project burning could move into the Orion and Aspen Spring PACs. This would occur over a 3-5 day per of time per year. Nighttime smoke would most likely move away from the slope of the San Francisco Peaks and into low-lying drainages moving away from PACs. Generally, within the urban interface smaller blocks are burned with early (9 am to 11 am) ignition and smoke production lasting until 3 pm. Smoke would not continue into the nighttime. Disturbances are localized and short-term in duration and will not affect the reproduction and overall distribution of the species.

Other cumulative effects come from activities such as recreation. Cumulative effects of vegetation treatments and recreation are not expected, as no new roads or trails will be designated as part of the Jack Smith/Schultz project. All temporary roads will be obliterated after implementation.

Treatments in owl habitat can affect the prey base immediately by impacting individuals of prey species due habitat disturbance of prey species' habitat and harm from mechanical operations or from fire. Conversely, prey species diversity will increase with increased diversity of vegetation structural stages and improvement of understory vegetation. Over time, a more diverse prey base would enable different prey species to prosper during variable climatic conditions, thus improving food availability. In addition, vegetation treatments in adjacent projects will help improve tree vigor and growth, and vegetative structural stage diversity, thus promoting the growth of larger trees and habitat components for MSO. Cumulatively, these adjacent project activities combined with this project's activities will not affect the reproduction or overall range of the MSO.

Black-footed Ferret

Analysis Methods

The following evaluation criteria were used to compare environmental consequences for all alternatives:

Removal or modification of potential habitat

Existing Conditions

There are no records of black-footed ferret in the project area or vicinity. There are no recorded Gunnison's prairie dog towns within the project.

Direct and Indirect Effects

No Action

There are no direct effects to black –footed ferrets as none occur in the project area.

No Action will not treat meadows or meadow edges and will continue to have trees encroach these habitats over time reducing potential habitat in meadow habitats for Gunnison's prairie dog, a primary prey species.

Alternative 1 - Proposed Action and Alternative 2

There are no direct effects to black-footed ferret as none occur in the project area. Indirect effects to the black-footed ferret include effects to ferret habitat, ferret prey species, or prey species habitat. There are no anticipated adverse effects to prey species or prey species habitat.

Meadow restoration treatments would improve and increase available habitat for Gunnison's prairie dog, a primary prey species. The Proposed Action will increase available habitat for prairie dogs with 27 acres of meadow enhancement treatments.

Cumulative Effects

The area for analysis is the project area boundary. For both action alternatives there is no effect to the numbers, distribution or reproduction of the black-footed ferret so there is no added effect from past, present or foreseeable future projects.

SENSITIVE WILDLIFE SPECIES

Table 3.26 - List of sensitive wildlife species that are present or have habitat in the Jack Smith-Schultz action area

SPECIES NAME	SCIENTIFIC NAME
Birds	
Bald eagle	*Haliaeetus leucocephalus*
Northern goshawk	*Accipiter gentilis*
American peregrine falcon	*Falco peregrinis anatum*
Mammals	
Navajo Mogollon vole	*Microtus mogollonensis navaho*
Long-tailed vole	*Microtis longicaudus*
Merriam's shrew	*Sorex merriami leucogenys*
Allen's lappet browed bat	*Idionycteris phyllotis*
Pale Townsend's big-eared bat	*Corynorhinus townsendii pallescens*
Spotted bat	*Euderma maculatum*
Greater western mastiff bat	*Eumops parotis californicus*
Amphibians	
Northern leopard frog	*Rana pipiens*
Invertebrates	
Blue-black silverspot butterfly	*Speyeria nokomis nokomis*
Mountain silverspot butterfly	*Speyeria nokomis nitocris*
Spotted skipperling	*Piruna polingii*

Table 3.26A lists Forest Service sensitive species that were considered but dropped from detailed analysis because habitat does not exist in the analysis area.

Table 3.26A. Sensitive wildlife species that were considered but eliminated from detailed analysis

SPECIES NAME	SCIENTIFIC NAME
Birds	
Clark's grebe	*Aechmophorus clarkii*
Ferruginous hawk	*Buteo regalis*
Western burrowing owl	*Athene cunicularia*
Mammals	
Wupatki Arizona pocket mouse	*Perognathus amplus cineris*
Dwarf Shrew	*Sorex nanus*
Amphibians	
Narrow-headed garter snake	*Thamnophis rufipunctus*

Bald Eagle

Analysis Methods

The following evaluation criteria were used to compare environmental consequences for all alternatives:

- Removal of potential habitat
- Disturbance from project implementation

Existing Conditions

The bald eagle was removed from the list of threatened and endangered species August 8, 2007 (USDI 2007). Eagles are currently protected under the Golden and Bald Eagle Protection Act and are a Forest Service Sensitive species.

Bald eagles are primarily winter visitors to the Coconino National Forest, occupying all habitat types and elevations.

Nesting**:** There are no nesting bald eagles within the Jack Smith-Schultz project. There is no potential nesting habitat within the project area based on the absence of habitat and nesting structures common to nesting bald eagle sites in the southwest, which are major rivers and reservoirs and mature to over-mature cottonwood and ponderosa pine trees. Another important habitat factor is the presence of large trees, snags, or ledges for foraging perches. There are no wetlands in the project area and it is unlikely that this area will provide nest sites for bald eagles in the future.

Roosting: There are no roosts known to occur in the project area. The nearest roost is a winter roost (Cinder Lake) approximately 2.5 miles east of the project boundary. This is a night roost on the northeast side of a small cinder cone approximately one mile north of Old Caves Crater. The project area provides north and northeast facing slopes consisting primarily of mixed conifer with some ponderosa pine drainages and slopes. Highway 89N provides limited daytime foraging.

Foraging: Eagles forage widely and opportunistically on carrion, waterfowl or fish on the Forest. Waterfowl and fish distribution are driven by amount and timing of precipitation and fish stocking by the Arizona Game and Fish Department. Eagles are expected to use any open water that would support waterfowl. There are no significant water bodies in the project vicinity, although eagles may feed on mammalian prey in project area. Schultz Tank provides marginal foraging opportunities for eagles. Bald eagles have been observed perching in snags and dead-topped trees within and at the fringes of the Jack Smith-Schultz project area.

Direct and Indirect Effects

No Action

Habitat conditions would remain in their current condition, not withstanding natural processes. Because there would be no habitat altering activities or disturbance associated with project implementation this alternative would have no effect on the bald eagle. However, dense forest conditions would still occur and the high fire hazard potential would continue to place bald eagle roosting and foraging habitat at risk with respect to stand-replacing fire.

Tree densities would continue to be high slowing their growth into larger diameter classes and thereby limiting the development of larger diameter (> 18-inch) trees important for roosting and perching.

Alternative 1 – Proposed Action and Alternative 2

Direct effects to the bald eagle would be from activities that cause disturbances (smoke, auditory or visual) to eagles within or adjacent to the project. There would be no direct effects to nesting eagles.

Burning activities are not expected to affect breeding or roosting eagles because there would be no activities within 2 miles of a nest or roost site. During the daytime the smoke would travel upward 1000-2000 feet above the ground. Generally, within the urban interface, smaller blocks are burned with early (9 am to 11 am) ignition and smoke production lasting until 3 pm. Smoke would not continue into the nighttime. Disturbances are localized and short-term in duration and will not affect the reproduction and overall distribution of the species.

Mechanical thinning activities are not expected to affect breeding eagles because there will be no activities within 2 miles of a nest site during the breeding season thus there would not be auditory effects to nesting eagles. There will be no direct effects to roosting eagles from thinning activities as there will be no activities within 2 miles of winter roost sites during the wintering season thus there would not be auditory effects to roosting eagles.

Under the Proposed Action, proposed mechanical treatments, broadcast burning and hauling of timber may cause visual or auditory disturbance to foraging bald eagles. This disturbance would be localized, of short duration and low intensity and may affect individual birds but would not affect the overall distribution or reproduction of the species.

Indirect effects to the bald eagle include affects to eagle habitat, eagle prey species, or prey species habitat. There are no anticipated adverse effects to prey species or prey species habitat. The main effects are more likely to occur when project treatments modify the number of trees in a group of suitable roost trees, as eagles prefer to roost in large trees within close proximity to other large trees.

Thinning would improve old tree longevity. Lining of yellow pines and snags will reduce potential mortality to these components from burning activities. The Proposed Action includes recruitment of trees into developing old-growth stands over 20% of the area that may be used as future winter roost sites for bald eagles.

Cumulative Effects

The area for analysis includes the area that is within one mile of eagle nests, roosts, and high use winter foraging areas (Interstate 89N). Reviews of all projects (past, present and reasonably foreseeable) that have the potential to impact bald eagles were analyzed.

Short-term disturbance to foraging or roosting bald eagles during thinning and broadcast burning activities may cause eagles to forage and roost in nearby areas for the duration of the activity. Short-term (the time it takes to complete implementation) impacts can be considered cumulatively with similar impacts in the Fort Valley Forest Restoration, and Eastside projects however, implementation of these burns is not likely to occur simultaneously and do not combine to cause a negative effect. These effects combine with APS hazard tree removal for powerlines and ADOT and County hazard tree removal for highways that have reduced the number of snags and large trees for perching along high use winter foraging areas in the analysis area.

Cumulatively, these activities combined with this project's activities will not affect reproduction or the overall range of the bald eagle.

Northern Goshawk

Analysis Methods

The following evaluation criteria were used to compare environmental consequences for all alternatives:

- Disturbance
- Canopy cover within post-fledgling family area (PFA) and outside PFA's
- VSS distribution within PFA's and outside PFA's
- Road density

The Vegetation section evaluates the distribution of habitat structures at the ecosystem management area level, at the mid-scale level and at the small scale level.

Existing Conditions

Two northern goshawk post-fledgling family areas (PFA) are located within the project boundary, Orion #040205 and Pipeline II #040211. The Orion PFA is 781 acres (472 acres within the project) and within the PFA 185 acres have been designated as nest areas which include known existing and historic nest sites. The Pipeline II PFA is 634 acres and within the PFA 190 acres have been designated as nest areas. The nest stands for Orion PFA were previously designated and are outside of the project area; the nest stands are designated within the project area for the Pipeline II PFA (Figure 3.7A). The PFAs were monitored in 2006 and 2007 with one, the Orion PFA, active and the Pipeline II PFA not occupied. All of the project area and one-half mile beyond the boundary, with the exception of wilderness that was inaccessible, were surveyed for northern goshawks in 2004 and 2005 according to Region 3 protocol. No goshawk sightings were documented during that survey period. Areas that were inaccessible for survey will be managed as occupied.

<u>Canopy Cover</u>
For ponderosa pine the Forest Plan states that outside PFAs canopy cover should average 40+% in VSS 4, 5 and 6. Areas within PFAs average canopy cover in VSS 4 should be 60+% (1/3) and 50+% (2/3), VSS 5 and 6 should average 50+%. Nesting areas should be VSS 5 and 6 and average 50-70% canopy cover. Although canopy cover is met for the existing VSS condition, the desired condition is more clumped and grouped spatial arrangement of trees, uneven-aged forest structure with high canopy cover. Snags and down woody debris are retained within groups. Openings are scattered throughout within PFAs and outside PFAs. Rare VSS classes and ages (VSS 1, 2, 5 and 6) are emphasized within clumps and groups and fuel reduction is focused on the most common VSS class (VSS 3).

<u>Vegetative Structural Stage (VSS)</u>
The Forest Plan states that the desired Vegetative Structural Stage (VSS) for spruce-fir, mixed conifer, and ponderosa pine forests, within and outside PFAs is 10%, 10%, 20%, 20%, 20%, 20% for VSS 1-6, respectively. The existing VSS distributions within the PFA and outside the PFA do not meet recommended Forest Plan guidelines. VSS distribution of sites still lacks optimal nesting stands (VSS 5 and 6) and grass, forb, shrub and seedling/sapling classes (VSS 1 and 2) are also lacking. Currently there is a lack of optimal nest sites across the project area due

primarily to low densities within these VSS classes. Vegetative structural stage distribution in the areas outside the PFAs is lacking in VSS 1, 2 and 5, 6.

Road Density

There are approximately 7.2 miles of system and non-system roads within post-fledgling family areas (3.4 miles in Orion Springs PFA and 3.8 miles within Pipeline II PFA) in the project. Areas outside PFAs have approximately 91.3 miles of existing roads within the project.

Direct and Indirect Effects

No Action

Habitat conditions for wildlife would remain in their current condition, not withstanding natural processes. This alternative would have no direct effect on goshawks. However, dense forest conditions would still occur and the high fire hazard potential would continue to place goshawk habitat at risk with respect to stand replacing fire. High road densities would continue to provide access into sensitive goshawk habitats increasing the potential for habitat alteration or direct disturbance of northern goshawks. Vegetative structural stage distributions as outlined in the Forest Plan and Management Recommendations for the Northern Goshawk in the Southwestern United States would never be attained.

Alternative 1 – Proposed Action

Disturbance

Noise from mechanical treatments are not likely to directly effect nesting goshawks as no thinning will occur within the nest stands, PFAs, or un-surveyed habitat (inaccessible wilderness) during the breeding season. There are potential direct effects from smoke. Smoke could affect nesting and feeding behavior. Goshawk may be flushed from nest sites and/or change their foraging behavior due to smoke accumulation. This could cause goshawks to expend more energy and/or cause them to be detectable to predators during movements. Smoke from broadcast burning may disturb individual birds, although this would be a short-term effect and activities would be temporally and spatially separated, which would reduce overall effect. These smoke disturbances would be short-term and will not affect the overall distribution of northern goshawk.

Project implementation will avoid burning near goshawk nesting areas during critical periods in the goshawks life cycle. Smoke accumulation during times when goshawks are incubating eggs and tending nestlings and fledglings could cause adults to leave the area; this in turn could cause reproductive failure for the year. Smoke effects are short-term (1-3 days) and of low intensity (drift smoke). Impacts from smoke are reduced by the coordination of timing and type of burning with wind direction, topography, time of year and distance to the goshawk nesting area.

Prescribed burning or thinning activities may indirectly affect the goshawk by changing the goshawks habitat structure (snags, downed logs, woody debris, vegetative structural stages, and dense canopy cover). In addition the proposed activities may change the structure of goshawk prey species' habitat, affecting the abundance and composition of prey species. Although treatments, especially prescribed burning, may have adverse effects to prey species and their habitat in the short term, the proposed treatments may increase diversity of vegetative conditions, which would provide for a diverse prey base. Burn plans will avoid burning the entire home range of a northern goshawk pair in a single year.

It is estimated that there may be up to 20% loss of snags and 50% loss of downed logs during broadcast burning (Randall-Parker and Miller 1999) although many will be protected using appropriate ignition and piling techniques, and lining of most snags and large logs. In addition, after burning, trees will be felled to replace logs burned up during prescribed fire to meet forest plan guidelines. Recruitment snags will be identified from live trees that exhibit defects ideal for wildlife. For example, trees with forked or spiked tops, lightning strikes, mistletoe brooms, or fading crowns.

Reduction of snags and logs would have a negative impact on numbers of prey items, thus prey availability, for northern goshawk. The impact of this effect is expected to lessen in the short-term as snags fall and become logs. The number of snags would continue to be in short supply, due to an existing shortage of snags. The number of snags is expected to increase in the future as other trees grow, age, and die. Under the action alternative the resiliency of the area to withstand wildfire will improve due to the increase in crown base height and the reduced ground fuels. Fire hazard potential outside the PFAs is reduced.

Canopy Cover

Table 3.26B through Table 3.26F display how Alternative 1 will meet Forest Plan guidelines for canopy cover. Alternative 1 will maintain canopy cover values as identified in desired conditions in areas outside PFAs (Table 3.26B and 3.26C). Nest stands will be treated with a burn only having a potential reduction in canopy cover of 5-7 percent (Table 3.26F). The existing condition for canopy cover was determined by averaging canopy cover across stands within VSS 4, 5, and 6. Post treatment canopy cover is measured at the group and clump level and is a percentage of the fixed area (group) covered by the crowns of plants delimited by a vertical projection of the outermost perimeter of the spread of foliage. When measured as noted above, Alternative 1 will meet Forest Plan guidelines by maintaining a range of 50% to 60% canopy cover in Zone 1 and 2 and 50% to 100% in Zone 3 within VSS 4 while maintaining a minimum of 1/3 of the VSS 4 at 60% canopy cover. Alternative 1 will maintain 60% or greater canopy cover in 5 and 6 classes where existing. Existing low average canopy cover levels in these VSS classes will continue to be low. Post-treatment canopy cover will maintain groups and clumps of trees with variable canopy cover to allow for wildlife and prey species habitat, tree regeneration, and understory diversity. Groups of trees will be located in areas where historical evidences exist or where best group/clump structure exists at the time of implementation. A diverse age and size class and interlocking crowns will occur in clumps. Openings will be scattered within the PFAs and outside the PFAs. Openings will not be greater that two acres in PFAs and four acres outside PFAs.

Alternative 1 canopy cover calculations do not include between group interspaces. Interspaces will maintain up to 30 to 50 percent of the project area in a forested condition with 50 to 70 percent of the project in openings or interspace. When canopy cover is averaged across the stand and includes openings and interspaces Forest Plan standards and guidelines are not met for canopy cover for any of the VSS classes except for VSS 2 in areas outside PFAs. For areas within PFAs guidelines are met for VSS 2, 5 and 6 as well as within all of the nest stands. Mixed conifer stands will maintain a canopy of 57- 83 percent.

Vegetative Structural Stages (VSS)

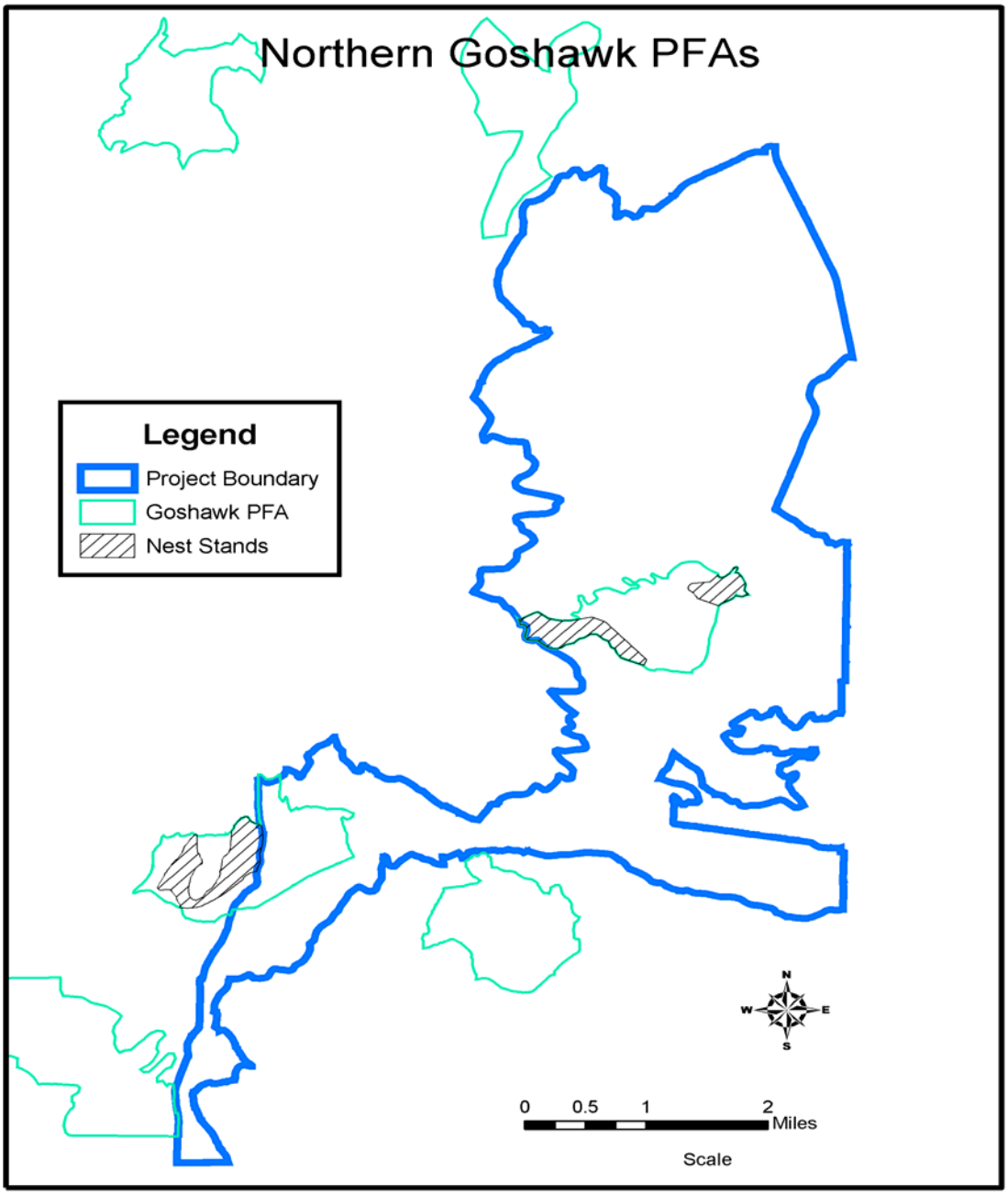
Table 3.26H displays how Alternative 1 proposed treatments will meet Forest Plan guidelines for VSS. Treatments described in the action alternative would alter VSS class distribution, changing the project area from one dominated by VSS 3 more toward the desired future condition, although still not meeting the desired future condition. The no action nor Alternative 1 will result

immediately in the desired VSS class distribution as outlined in the Forest Plan for the northern goshawk. Trees will grow into the larger diameter classes at a faster rate with implementation of Alternative 1. The proposed action would offer higher quality foraging habitat over time due to improved habitat conditions for most prey species. There are no thinning treatments proposed in mixed conifer resulting in a continued lack of smaller VSS classes (VSS 1 and 2).

Road Density

For both alternatives road density within post-fledgling family areas is reduced by 6.7 miles. In the Orion Springs PFA all roads are either closed or obliterated and for the Pipeline II PFA all but .45 miles of road are closed or obliterated. Road density within one of the Pipeline II nest stands will be reduced by 0.5 mile. Road densities in areas outside PFAs will be reduced by fifty-nine miles across the project. This reduction in road density will limit access into goshawk habitat and reduce potential for habitat alteration or direct disturbance to goshawks using these habitats.

FIGURE 3.8 – Northern Goshawk Post-fledgling Family Areas in the Jack Smith Project and Vicinity



Alternative 2

Disturbance

Effects would be the same as Alternative 1.

Canopy Cover

Table 3.26B through Table 3.26G display how Alternative 2 will meet Forest Plan guidelines for canopy cover. Canopy cover is averaged across the stand both within the PFA and outside the PFA. Alternative 2 will meet Forest Plan guidelines by maintaining a range of 50% canopy cover within VSS 4 with 2/3 50+% canopy cover and 1/3 60+% canopy and maintaining a 52 to 78 percent canopy cover in 5 and 6 classes within PFAs. Nest stands will be treated with a burn only treatment. During broadcast burning activities, torching may occur within nest stands. Torching would mimic natural gap processes that occur under natural conditions. Canopy cover could be reduced by approximately 5-7 percent. This will not reduce the canopy cover below 50% in any of the nest stands. Nest stands will meet Forest Plan guidelines for canopy cover. Alternative 2 will maintain a 46 to 50 percent canopy cover in VSS 4, 5, and 6 outside PFAs. Post-treatment canopy cover will maintain groups and clumps of trees with variable canopy cover to allow for wildlife and prey species habitat, tree regeneration, and understory diversity. A diverse age and size class and interlocking crowns will occur in clumps. Openings will be scattered throughout inside the PFAs and outside the PFAs in foraging areas. Openings will not be greater that two acres in PFAs and four acres outside PFAs. Alternative 2 does not incorporate interspaces and will maintain up to 80 percent of the project area in a forested condition with 20 percent in openings. Mixed conifer stands will maintain a canopy of 57- 83 percent.

Vegetative Structural Stages (VSS)

Table 3.26H displays how Alternative 2 proposed treatments will meet Forest Plan guidelines for VSS. Treatments described in Alternative 2 would alter VSS class distribution in ponderosa pine, changing the project area from one dominated by VSS 3 more toward the desired future condition, although still not meeting the desired future condition. Alternative 2 will not result immediately in the desired VSS class distribution as outlined in the Forest Plan for the northern goshawk. Trees will grow into the larger diameter classes at a slower rate than Alternative 1. Both alternatives would offer higher quality foraging habitat over time due to improved habitat conditions for prey species although Alternative 2 will provide 30 to 50 percent less forage than Alternative 1. There will be no thinning treatments in mixed conifer resulting in a continued lack of smaller VSS classes (VSS 1 and 2).

Tables 3.26B – 3.26F best display the effects of treatments on canopy cover as it pertains to the goshawk guidelines. All proposed treatments in the project are uneven-aged. Because vegetative structural stages are best used to display effects for even-aged management in the following tables the larger VSS classes tend to overshadow the smaller VSS classes because they account for more basal area. A stand which has met the VSS distribution at the stand level would be classified as a VSS 6. The higher percentage of stands classified in greater VSS size classes the closer the project is to meeting the goshawk guidelines.

Table 3.26B. Ponderosa canopy cover by VSS, outside PFAs, within the project area. VSS classes 1= grass/forb/shrub, 2=1-4.9 inches DBH, 3= 5-11.9 inches DBH 4= 12-17.9 inches DBH, 5=18-23.9 DBH, 6=24+inches DBH

VSS	Acres	Pre-Treatment % of VSS	Pre-Treatment Canopy Cover	Alternative 1 – Post Treatment Canopy Cover in Forested Areas Only	Alternative 1 – Post Treatment Canopy Cover across the whole stand	Alternative 2 – Post Treatment Canopy Cover across the whole stand	Post Treatment VSS Acres for Alt. 1 & 2	Post Treatment % of VSS
1	231	2	16	16	16	16	231	2
2	554	6	54	43	41	43	52	1
3	3993	41	56	43	29	47	1911	20
4*	2887	30	60	42	26	49	3557	36
5	1131	12	51	40	30	46	2774	28
6	984	10	56	49	46	50	1255	13

Table 3.26C. Mixed conifer canopy cover by VSS outside PFAs, in the project area. VSS classes 1= grass/forb/shrub, 2=1-4.9 inches DBH, 3= 5-11.9 inches DBH 4= 12-17.9 inches DBH, 5=18-23.9 DBH, 6=24+inches DBH

VSS	Acres	Pre-Treatment % of VSS	Pre-Treatment Canopy Cover	Alternative 1 – Post Treatment Canopy Cover in Forested Areas Only	Alternative 1 – Post Treatment Canopy Cover across the whole stand	Alternative 2 – Post Treatment Canopy Cover across the whole stand	Post Treatment VSS Acres for Alt. 1 & 2	Post Treatment % of VSS
1	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0
4	61	8	57	57	57	57	61	8
5	594	81	73	73	73	73	594	81
6	76	10	73	73	73	73	76	10

Table 3.26D. Ponderosa pine canopy cover by VSS within PFAS (includes nest stands) in the project area. VSS classes 1= grass/forb/shrub, 2=1-4.9 inches DBH, 3= 5-11.9 inches DBH 4= 12-17.9 inches DBH, 5=18-23.9 DBH, 6=24+inches DBH

VSS	Acres	Pre-Treatment % of VSS	Pre-Treatment Canopy Cover	Alternative 1 – Post Treatment Canopy Cover in Forested Areas Only	Alternative 1 – Post Treatment Canopy Cover across the whole stand	Alternative 2 – Post Treatment Canopy Cover across the whole stand	Post Treatment VSS Acres for Alt. 1 & 2	Post Treatment % of VSS
1	0	0	0	0	0	0	0	0
2	51	5	51	43	43	43	13	1
3	369	39	64	43	28	51	191	20
4*	429	46	56	42*	24*	50*	213	23
5	77	8	80	78	78	78	190	20
6	17	2	69	45	63	52	336	36

*1/3 of the VSS 4 groups will have a minimum of 60% canopy cover and the remaining 2/3 VSS 4 groups will maintain a minimum 50% canopy cover. The 50% average shown might indicate this standard is not being met, however the average number is due to the high occurrence of VSS 1, 2, and 3 groups, which have open canopies, within the VSS 4 stands and as a result brings the overall canopy cover down within these VSS 4 stands.

Table 3.26E. Mixed conifer canopy cover by VSS, within PFAs, in the project area. VSS classes 1= grass/forb/shrub, 2=1-4.9 inches DBH, 3= 5-11.9 inches DBH 4= 12-17.9 inches DBH, 5=18-23.9 DBH, 6=24+inches DBH

VSS	Acres	Pre-Treatment Percent of VSS	Pre-treatment Canopy Cover	Alternative 1 – Post Treatment Canopy Cover **	Alternative 2 – Post Treatment Canopy Cover	Post Treatment VSS Acres for Alt. 1 and 2	Post Treatment % of VSS
1	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0
5	64*	100	83	83	83	64	100
6	0	0	0	0	0	0	0

*This is also a nest stand

Table 3.26F. Ponderosa pine nest stands (burn only treatment) canopy cover by VSS in the project area. VSS classes 1= grass/forb/shrub, 2=1-4.9 inches DBH, 3= 5-11.9 inches DBH 4= 12-17.9 inches DBH, 5=18-23.9 DBH, 6=24+inches DBH

VSS	Acres	Pre and Post Treatment VSS	Pre Treatment Canopy Cover	Post Treatment Canopy Cover Alternative 1 and 2
1	0	0	0	0
2	12	13	52	47
3	19	20	70	63
4	35	36	61	55
5	13	14	63	57
6	17	17	69	63

Table 3.26G. Alternative 1 - VSS class 12" thinning, un-evenaged fuels emphasis, and en-evenaged resource emphasis. VSS classes 1= grass/forb/shrub, 2=1-4.9 inches DBH, 3= 5-11.9 inches DBH 4= 12-17.9 inches DBH, 5=18-23.9 DBH, 6=24+inches DBH

VSS	Pre-treatment Acres*	Pre-treatment % of VSS Acres	Post Treatment VSS Acres for Alt. 1	Post Treatment % of VSS Acres for Alt. 1
1 and 2	1990	24	1751	21
3	2815	34	1369	17
4	2230	27	1919	23
5	755	9	2069	25
6	398	5	1079	13

- VSS is calcualted on a per acre average and is based on FSVEG model. Pre-treatment acres vary from Alternative 2 and this is a reflection of using sample data over different sized areas.

Table 3.26H. Alternative 2 - VSS class for 12" thinning, unevenage outside PFAs and un-evenaged within PFAs. 1= grass/forb/shrub, 2=1-4.9 inches DBH, 3= 5-11.9 inches DBH 4= 12-17.9 inches DBH, 5=18-23.9 DBH, 6=24+inches DBH

VSS	Pre-treatment Acres*	Pre-treatment % of VSS Acres	Post Treatment VSS Acres for Alt. 1 and 2	Post Treatment VSS Acres for Alt. 1 and 2
1 and 2	1565	19	1741	21
3	2528	31	1728	21
4	2821	34	2103	26
5	888	11	1660	20
6	388	5	956	12

* VSS is calcualted on a per acre average and is based on FSVEG model. Pre-treatment acres vary from Alternative 1 and this is a reflection of using sample data over different sized areas.

Road Density

The effects are the same as Alternative 1.

Cumulative Effects

The area of analysis is the project and a one-half mile area surrounding the project boundary. Reviews of all projects (past, present and reasonably foreseeable) that have the potential to impact northern goshawks were analyzed.

There is an added indirect effect regarding vegetation modification activities. Other projects where modification of goshawk habitat occurs within the Jack Smith-Schultz project area are: ADOT tree removal along North Highway 89 and APS hazard tree removal. Projects adjacent to and within one-half mile of the project are Fort Valley Ecosystem Restoration and Eastside Fuel Reduction and Forest Health. Burn plans for Jack Smith Schultz will be coordinated with burn plans for Fort Valley Ecosystem Restoration and Eastside Fuel Reduction and Forest Health to avoid burning the entire home range of a northern goshawk pair in a single year. Cumulative effects are not expected to affect the reproduction or overall distribution of northern goshawks because generally, projects are designed to move toward the desired conditions for northern goshawks as identified in the Northern Goshawk Management Recommendations (Reynolds et. al., 1992).

American Peregrine Falcon

Analysis Methods

The following evaluation criteria were used to compare environmental consequences for all alternatives:

- Prey species habitat
- Disturbance from project implementation

Existing Conditions

The peregrine falcon was removed from the Federal List of Endangered and Threatened Wildlife in August 1999 (USDI 1999a) and is now a Forest Service Sensitive species. The essential habitat for peregrine falcon includes rock cliffs for nesting and a large foraging area. Suitable nesting sites on rock cliffs have a mean height of 200 to 300 feet. Peregrine occur state wide as a migrant, transient and/or wintering individual. The subspecies anatum breeds here on selected isolated cliff ledges and is a permanent resident on the Coconino National Forest. There are two eyrie locations on Mt. Elden both over 2 miles south of the project area. Peregrines forage throughout the Dry Lake Hills and likely forage in the project area. The peregrine breeding season is from March 1 to August 31.

The main threat to the peregrine falcon is the continued contamination of its environment by synthetic organochlorine contaminants (e.g. DDT). These contaminants result in eggshell thinning and direct mortality to this species. Other threats include disturbance from rock climbing near eyries and mortality from encounters with powerlines.

Direct and Indirect Effects

No Action

There are no direct effects from No Action. There would be no change to the prey species base under No Action, and no change in falcon hunting patterns within associated forest structure. This is not a negative effect.

Alternative 1 – Proposed Action and Alternative 2

No direct effects from thinning are expected since no thinning will take place within two miles of eyrie locations. There are no potential direct effects from smoke as no burning will take place within two miles of eyrie locations and winds are not expected to drift smoke south of the project area over Mt. Elden.

Indirect effects from vegetation modification would occur. Thinning can affect the prey base on a short-term basis by impacting individuals of prey species due to disturbance of prey species' habitat and harm from fire. Conversely, prey species diversity will increase with increased diversity of vegetative structural stages and improved understory vegetation. A more diverse prey base enables different prey species to prosper during variable climatic conditions thus food availability improves. Thinning of the forest would increase sight distance for foraging peregrine falcons which facilitates hunting conditions.

Cumulative Effects

There is an additive indirect effect regarding vegetation modification activities. Other projects where thinning occurs can affect the prey base on a short-term basis by impacting individuals of prey species due to disturbance of prey species' habitat and harm from fire. Projects are implemented at different times and/or different locations, thus disturbances to the prey base are minimized. Activities of these projects do not affect the reproduction or overall distribution of peregrine falcons. Increased rock climbing use is estimated to be twofold in the last ten years, with today's use to be estimated at 7,000 climbers each year using three primary sites (Mt. Elden West, Mt. Elden South and East and Walnut Canyon). Unmanaged climbing in areas where peregrine falcons are known to nest could affect nesting success.

Navajo Mogollon Vole

Analysis Methods

The following evaluation criteria were used to compare environmental consequences for all alternatives:

- Amount and distribution of habitat
- Disturbance from project implementation

Existing Conditions

There are no documented populations of voles in the project area. Suitable habitat exists within the area. Navajo Mogollon voles occupy meadows and riparian areas above the Mogollon Rim associated with ponderosa pine or other coniferous forests. They also occur within forested areas where tree densities are low. They rely on grasses and other herbaceous vegetation for food or cover. Suitable habitat within the project area is currently less than 16% of the project area. [28 acres of grassy opening and meadows, and 1,892 acres of stands of “A” canopy (<40% canopy closure)].

Direct and Indirect Effects

No Action

There would be no disturbance under No Action and no direct effects.

No Action will continue to provide habitat for this species. Currently 84% of the project area is in a moderately closed to closed condition. Dense forest stands provide low quality habitat for the Mogollon vole. Meadows would not be rehabilitated, thus there would not be any benefits to these species. Favorable habitat would decrease over time as conifers encroach into meadows and canopy closure increases.

Under No Action the high fire hazard potential would persist; a large crown wildfire event would have the potential to affect many individuals.

Alternative 1 – Proposed Action and Alternative 2

Disturbance during thinning and broadcast burning activities may occur to individual voles; some individuals may be lost. Such activities would occur across the project area at different times; therefore, activities would be temporally and spatially separated which reduces impacts to this species. Effects would be short-term. There would be no effects to population viability of voles.

Broadcast burning removes cover and food of Navajo Mogollon vole. Meadows and open areas would rebound after broadcast burning; herbaceous vegetation would be more vigorous, and meadow and understory habitats would be healthier.

Benefits to voles would occur due to the reduction of dense forest canopy and increased growth in the herbaceous vegetation on the forest floor in treatment areas for the Proposed Action. The resulting groups of trees interspersed with openings and interspaces will improve habitat across the project.

Benefits to voles would occur due to the closure or obliteration of sixty-six miles of roads within potential habitat. Of the sixty-six miles, thirty-eight miles will be obliterated and twenty-eight will be closed. Over time obliterated roads would heal and herbaceous vegetation would increase improving habitat for the vole.

Alternative 2

Alternative 2 would have less grassy openings and no between group interspaces providing a slightly less benefit overall to vole habitat compared to Alternative 1.

Cumulative Effects

The area for cumulative effects analysis is the project area. Reviews of all projects (past, present and reasonably foreseeable) that have the potential to impact Navajo Mogollon voles *w*ere analyzed.

Recreational activities will occur, such as hiking, biking, and camping, thereby eliminating these areas as habitat for voles. Recreation and road travel at current levels continues to pose an adverse affect to voles due to soil and vegetation disturbance and soil compaction. Forest and range management practices that promote herbaceous growth could lead to increased vole populations. Development of private and state land has the greatest potential impact to vole habitat. Cumulatively, these projects and activities do not affect the overall distribution of Navajo Mogollon vole.

Long-tailed vole

Analysis Methods

The following evaluation criteria were used to compare environmental consequences for all alternatives:

- Amount and distribution of habitat
- Disturbance from project implementation

Existing Conditions

There are no documented populations of voles in the project area. Suitable habitat exists within the area. Long-tailed voles occupy meadows, grassy valleys, grassy clearing in forests, sagebrush flats, and rocky slopes within coniferous forests. They are known to occur at Little Spring at about 8,000 feet in elevation as well as at a few places higher up the San Francisco Peaks (to 11,500 feet). They rely on grasses and other herbaceous vegetation for food or cover. Suitable habitat within the project area is currently less than 16% of the project area. (Twenty - eight acres of grassy opening and meadows, and 1,892 acres of stands of less than 40% canopy closure).

Direct and Indirect Effects

No Action

There would be no disturbance under no action and no direct effects.

No action will continue to provide habitat for this species. Currently eight-four percent of the

project area is in a moderately closed to closed condition. Dense forest stands provide low quality habitat for the long-tailed vole. Meadows would not be rehabilitated, thus there would not be any benefits to these species. Favorable habitat would decrease over time as conifers encroach into meadows and canopy closure increases. High road densities would continue to fragment habitat.

Under no action the high fire hazard potential would persist; a large crown wildfire event would have the potential to affect many individuals.

Alternative 1 – Proposed Action and Alternative 2

Disturbance during thinning and broadcast burning activities may occur to individual voles; some individuals may be lost. Such activities would occur across the project area at different times; therefore, activities would be temporally and spatially separated which reduces impacts to this species. Effects would be short-term. There would be no effects to population viability of voles.

Broadcast burning removes cover and food of long-tailed vole. Meadows and open areas would rebound after broadcast burning; herbaceous vegetation would be more vigorous, and meadow and understory habitats would be healthier.

Benefits to voles would occur due to the closure or obliteration of sixty-six miles of roads within potential habitat. Of the sixty-six miles thirty-eight miles will be obliterated and twenty-eight will be closed. Over time obliterated roads would heal and herbaceous vegetation would increase improving habitat for the vole.

Alternative 2

Alternative 2 would have less grassy openings and no between group interspaces providing a slightly less benefit overall to vole habitat compared to Alternative 1.

Cumulative Effects

The area for cumulative effects analysis is the project area. Reviews of all projects (past, present and reasonably foreseeable) that have the potential to impact long-tailed voles were analyzed.

Recreational activities will occur, such as hiking, biking, and camping, thereby eliminating these areas as habitat for voles. Recreation and road travel at current levels continues to pose an adverse affect to voles due to soil and vegetation disturbance and soil compaction. The Travel Management Rule (TMR) and the associated Coconino National Forest TMR process proposes to close the Forest to cross-country vehicle travel further reducing adverse affects to voles due to soil and vegetation disturbance. Forest and range management practices that promote herbaceous growth could lead to increased vole populations. Cumulatively, these projects and activities do not affect the overall distribution of log-tailed vole.

Merriam's Shrew

Analysis Methods

The following evaluation criteria were used to compare environmental consequences for all alternatives:

- Amount and distribution of habitat
- Disturbance from project implementation

Existing Conditions

There are no documented populations of shrews in the project area. Suitable habitat exists within the project area. Merriam's shrews occupy cool, grassy places. The shrews usually are found in dry places, often not far from water, near coniferous forests (Hoffmeister, 1986). They are insectivorous, feeding on an assortment of invertebrates such as, spiders, beetles, and crickets. Suitable habitat within the project area is currently less than sixteen percent of the project area (twenty-eight acres of grassy opening and meadows, and 1,892 acres of stands less than 40% canopy closure).

Direct and Indirect Effects

No Action

There would be no disturbance under no action and no direct effects.

No action will continue to provide habitat for this species. Currently eight-four percent of the project area is in a moderately closed to closed condition. Dense forest stands provide low quality habitat for the shrews. Meadows would not be rehabilitated, thus there would not be any benefits to these species. Favorable habitat would decrease over time as conifers encroach into meadows and canopy closure increases. High road densities would continue to fragment habitat.

Under no action the high fire hazard potential would persist; a large crown wildfire event would have the potential to affect many individuals.

Alternative 1 – Proposed Action and Alternative 2

Disturbance during thinning and broadcast burning activities may occur to individual shrews; some individuals may be lost. Such activities would occur across the project area at different times; therefore, activities would be temporally and spatially separated which reduces impacts to this species. Effects would be short-term. There would be no effects to population viability of shrews.

Broadcast burning removes cover and food for prey of Merriam's shrew. Meadows and open areas would rebound after broadcast burning; herbaceous vegetation would be more vigorous, and meadow and understory habitats would be healthier.

Benefits to shrews would occur due to the reduction of dense forest canopy and increased growth in the herbaceous vegetation on the forest floor in treatment areas for the action alternative. The resulting groups of trees interspersed with openings and interspaces will improve habitat across the project.

Benefits to shrews would occur due to the closure or obliteration of sixty-six miles of roads within potential habitat. Of the sixty-six miles, thirty-eight miles will be obliterated and twenty-eight will be closed. Over time obliterated roads would heal and herbaceous vegetation would increase improving habitat for the shrew and its prey.

Alternative 2

Alternative 2 would have less grassy openings and no between group interspaces providing a slightly less benefit overall to shrew habitat compared to Alternative 1.

Cumulative Effects

The area for cumulative effects analysis is the project area. Reviews of all projects (past, present and reasonably foreseeable) that have the potential to impact Merriam's shrew were analyzed.

Recreational activities will occur, such as hiking, biking, and camping, thereby eliminating these areas as habitat for voles. Recreation and road travel at current levels continues to pose an adverse affect to shrews due to soil and vegetation disturbance and soil compaction. The Travel Management Rule (TMR) and the associated Coconino National Forest TMR process proposes to close the Forest to cross-country vehicle travel further reducing adverse affects to shrews due to soil and vegetation disturbance. Forest and range management practices that promote herbaceous growth could lead to increased shrew populations. Cumulatively, these projects and activities do not affect the overall distribution of Merriam's shrew.

Allen's Lappet-browed Bat

Analysis Methods

The following evaluation criteria were used to compare environmental consequences for all alternatives:

- Amount and distribution of habitat
- Disturbance from project implementation

Existing Conditions

Allen's lappet-browed bats have been found in a variety of habitats in Arizona, including ponderosa pine, pinyon-juniper, Mexican woodland, white fir forests and Mohave desertscrub. They are often associated with water, whether for feeding or drinking, or both is unclear. There are no documented populations of Allen's lappet-browed bats in the project area. Hoffmeister (1986) documents Allen's lappet-browed bats occupying mine shafts or rocky areas and cliffs for roosts. A study conducted on the Coconino National Forest also documented lappet-browed bats using snags as roost sites. Suitable foraging habitat exists within the project area. The nearest historic locations are about one to two miles south of the project boundary at the base of Mount Elden, Rio de Flag, and at the Museum of Northern Arizona property. A more recent study (1993 to 1995) documented Allen's lappet-browed bats in the Fort Valley area near Big Leroux Spring and Bismarck Lake (both approximately four miles distance from the project boundary). Suitable habitat in the project would be large snags used for roosting and foraging habitat including areas with water and insects.

Direct and Indirect Effects

No Action

There would be no disturbance under no action and no direct effects. No action will continue to provide habitat for this species. Under no action the high fire hazard potential would persist; a large crown wildfire event would have the potential to affect individuals.

Alternative 1 – Proposed Action and Alternative 2

Disturbance could occur during thinning and broadcast burning activities if bats are roosting in snags within the project. There may be some losses of snags with the potential to directly affect roosting bats. All snags 18 inches in diameter and larger will be fire-lined prior to prescribed burning to reduce potential impacts to roosting bats. Both action alternatives are expected to result in a slight decrease in snags followed by an increase over the long term. This short term loss of snags is not expected to affect the overall distribution of Allen's lappet-browed bats on the Forest.

Broadcast burning temporarily removes cover and food of lappet-browed bats. Meadows and open areas would rebound after broadcast burning; herbaceous vegetation would be more vigorous, and meadow and understory habitats would be healthier.

Benefits to lappet-browed bats would occur due to the reduction of dense forest canopy and increased growth in the herbaceous vegetation on the forest floor in treatment areas for the action alternatives. The resulting groups of trees interspersed with openings and interspaces will improve habitat for this bats prey across the project.

Benefits to lappet-browed bats would occur due to the closure or obliteration of sixty-six miles of roads within potential foraging habitat. Of the sixty-six miles thirty-eight miles will be obliterated and twenty-eight will be closed. Over time obliterated roads would heal and herbaceous vegetation would increase improving habitat for insects that provide food for bats.

Alternative 2

Alternative 2 would have less grassy openings and no between group interspaces providing a slightly less benefit overall to bat habitat compared to Alternative 1.

Cumulative Effects

The area considered for cumulative effects is the project area. Reviews of all projects (past, present and reasonably foreseeable) that have the potential to impact Allen's lappet-browed were analyzed.

The reduction of understory vegetation by ungulate grazing within the project adds to the reduction of plant availability to adult insects. All of the area is currently not being grazed by livestock reducing the potential for cumulative impacts. Elk will continue to reduce vegetative understory in meadows and around waters.

Spotted Bat

Analysis Methods

The following evaluation criteria were used to compare environmental consequences for all alternatives:

- Amount and distribution of habitat
- Disturbance from project implementation

Existing Conditions

Spotted bats are found to occur mostly in the dry, desertscrub in Arizona, but range up to ponderosa pine. There are no data that document populations of spotted bats on the Forest or in the project area. Most localities where they are known to occur have nearby cliffs and water sources. They are thought to be dependant on large, isolated cliffs for roosting. Evidence suggests moths are the dominant food item with occasional prey items including June beetles and grasshoppers. There is no roosting habitat for spotted bats as there are no caves or cliffs in the project. Suitable roosting habitat occurs approximately one and one-half miles from the project on Mount Elden. Suitable foraging habitat within the project would be forest openings and meadows.

Direct and Indirect Effects

No Action

There would be no disturbance under no action and no direct effects. Under no action meadows would not be rehabilitated, thus there would not be any beneficial effect to this species prey. Favorable foraging habitat would decrease over time as meadows are encroached by conifers and canopy closure increases and understory productivity and diversity decreases. High fire hazard potential in the project area would persist.

Alternative 1 – Proposed Action and Alternative 2

There would be no direct disturbance to roosting bats as no roosting habitat occurs within the project.

Foraging habitat will be managed to maintain adequate insect populations. Broadcast burning temporarily removes food for insects which spotted bats feed on. Meadows and open areas would rebound after broadcast burning; herbaceous vegetation would be more vigorous, and meadow and understory habitats would be healthier.

Benefits to spotted bats would occur due to the reduction of dense forest canopy and increased growth in the herbaceous vegetation on the forest floor in treatment areas for the action alternatives. The resulting groups of trees interspersed with openings and interspaces will improve habitat for this bats prey habitat across the project.

Benefits to spotted bats would occur due to the closure or obliteration of sixty-six miles of roads within potential habitat. Of the sixty-six miles thirty-eight miles will be obliterated and twenty-eight will be closed. Over time obliterated roads would heal and herbaceous vegetation would increase improving habitat for insects that provide food for bats.

Alternative 2

Alternative 2 would have less grassy openings and no between group interspaces providing a slightly less benefit overall to bat habitat compared to Alternative 1.

Cumulative Effects

The area considered for cumulative effects is the project area. Reviews of all projects (past, present and reasonably foreseeable) that have the potential to impact the spotted bat were

analyzed.

The reduction of understory vegetation by ungulate grazing within the project adds to the reduction of plant availability to adult moths and other insects that spotted bats feed on. All of the area is currently not being grazed by livestock reducing the potential for cumulative impacts. Elk will continue to reduce vegetative understory in meadows and around waters.

Pale Townsend's Big-eared Bat

Analysis Methods

The following evaluation criteria were used to compare environmental consequences for all alternatives:

- Amount and distribution of habitat
- Disturbance from project implementation

Existing Conditions

There are no documented populations of Pale Townsend's big-eared bats in the project area. Pale Townsend's big-eared bats occupy mostly caves or mine tunnels, but at night they often rest in abandon buildings. There is no suitable roosting habitat for this bat as there are no caves or mines in the project. Suitable habitat in the project would be foraging habitat including areas with water and insects.

Direct and Indirect Effects

No Action

There would be no disturbance under no action and no direct effects. No action will continue to provide foraging habitat for this species. Under no action the high fire hazard potential would persist; a large crown wildfire event would have the potential to affect many individuals.

Alternative 1 – Proposed Action and Alternative 2

Disturbance during thinning and broadcast burning activities is highly unlikely to occur. There would be no direct effects to roosting Townsend's big-eared bat from project implementation. Broadcast burning removes cover and food for insects which bats feed on. Meadows and open areas would rebound after broadcast burning; herbaceous vegetation would be more vigorous, and meadow and understory habitats would be healthier. Indirect effects would result from vegetation modification activities such as thinning and broadcast burning. These activities would disturb or remove understory vegetation, in effect reducing availability to insects. These are short-term effects and will be minimized due to activities being temporally and spatially separated. In contrast, reducing the canopy closure, removing trees in and at edges of meadows, restoring meadows and broadcast burning will encourage the development of understory vegetation, increasing availability of food for these species over the long-term.

Benefits to bats would occur due to the closure or obliteration of sixty-six miles of roads within potential foraging habitat. Of the sixty-six miles thirty-eight miles will be obliterated and twenty-eight will be closed. Over time obliterated roads would heal and herbaceous vegetation would increase improving habitat for insects that bats feed on.

Alternative 2

Alternative 2 would have less grassy openings and no between group interspaces providing a slightly less benefit overall to insect habitat compared to Alternative 1.

Cumulative Effects

The area considered for cumulative effects is the project area. Reviews of all projects (past, present and reasonably foreseeable) that have the potential to impact pale Townsend's big-eared bat were analyzed.

The reduction of understory vegetation by ungulate grazing within the project adds to the reduction of plant availability to insects that these bats feed on. All of the area is currently not being grazed by livestock reducing the potential for cumulative impacts. Elk will continue to reduce vegetative understory in meadows and around waters.

Greater Western Mastiff Bat

Analysis Methods

The following evaluation criteria were used to compare environmental consequences for all alternatives:

- Amount and distribution of habitat
- Disturbance from project implementation

Existing Conditions

The only documented location of greater western mastiff bats potentially on the Forest is one specimen collected after death near Flagstaff in December 1992 (Noel 1993 in AZGD 2002). There are no documented populations of greater western mastiff bats in the project area. Based on records in the Heritage Data Management System, elevation ranges from 240 – 8,475 feet. The greater western mastiff bats use cliff habitats for roosting. They regularly use roosts which allow the bats a vertical drop of ten or more feet. They feed on a variety of insects (moths, crickets, grasshoppers, dragonflies, leaf bugs, true, bugs, beetles and especially bees, wasps, ants and sawflies. Greater western mastiff bats are known to forage at least fifteen miles from their roosting site. There is no suitable roosting habitat for this bat as there are no cliffs in the project. Suitable habitat in the project would be foraging habitat including areas with water and a variety of insects.

Direct and Indirect Effects

No Action

There would be no disturbance under no action and no direct effects. No action will continue to provide foraging habitat for this species. Under no action the high fire hazard potential would persist; a large crown wildfire event would have the potential to affect many individuals.

Alternative 1 – Proposed Action and Alternative 2

Disturbance during thinning and broadcast burning activities is highly unlikely to occur. There would be no direct effects to roosting habitat for the greater western mastiff bat from project implementation.

Broadcast burning removes cover and food for insects which bats feed on. Meadows and open areas would rebound after broadcast burning; herbaceous vegetation would be more vigorous, and meadow and understory habitats would be healthier. Indirect effects would result from vegetation modification activities such as thinning and broadcast burning. These activities would disturb or remove understory vegetation, in effect reducing availability to insects. These are short-term effects and will be minimized due to activities being temporally and spatially separated. In contrast, reducing the canopy closure, removing trees in and at edges of meadows, restoring meadows and broadcast burning will encourage the development of understory vegetation, increasing availability of food for these species over the long-term.

Benefits to bats would occur due to the closure or obliteration of sixty-six miles of roads within potential foraging habitat. Of the sixty-six miles thirty-eight miles will be obliterated and twenty-eight will be closed. Over time obliterated roads would heal and herbaceous vegetation would increase improving habitat for insects that bats feed on.

Alternative 2

Alternative 2 would have less grassy openings and no between group interspaces providing a slightly less benefit overall to insect habitat compared to Alternative 1.

Cumulative Effects

The area considered for cumulative effects is the project area. Reviews of all projects (past, present and reasonably foreseeable) that have the potential to impact the greater western mastiff bat were analyzed.

The reduction of understory vegetation by ungulate grazing within the project adds to the reduction of plant availability to insects that these bats feed on. All of the area is currently not being grazed by livestock reducing the potential for cumulative impacts. Elk will continue to reduce vegetative understory in meadows and around waters.

Northern Leopard Frog

Analysis Methods

The following evaluation criteria were used to compare environmental consequences for all alternatives:

- Impacts to potential habitat

Existing Conditions

There are no known existing or historic locations of northern leopard frogs within or adjacent to the project. The nearest historic location is at Veit Spring over three miles northwest of the project boundary. Best potential habitat is tanks and springs within the project boundary.

Potential threats to local populations of northern leopard frogs include changes in wetlands, especially the alteration of marshy ponds to reservoirs and natural local extirpations as ponds dry up during years of low precipitation. Other threats include alteration of riparian vegetation by livestock grazing, and predation and competition by introduced bullfrogs and potential introduction of the pathogen Batrachochytrium dendrobatidus (Bd).

Direct and Indirect Effects

No Action

Habitat conditions for wildlife would remain in their current condition, not withstanding natural processes. This alternative would have no effect on northern leopard frog. However, dense forest conditions would still occur and the high fire hazard potential would persist. Large crown-wildfires could adversely affect potential habitat by destruction of understory and overstory vegetation. As a result overland flow would increase, and soil erosion would increase with potentially high sediment loads. Water quality would be adversely affected on a wide-scale basis.

Alternative 1 – Proposed Action and Alternative 2

All of the springs within the project are developed eliminating the potential for leopard frogs to survive in these areas. Most tanks in the project are not dependable and have the potential to dry up during dry years with low precipitation. There are no direct or indirect effects to northern leopard frog eggs, larvae, or adults from mechanical treatment and/or prescribed burning.

Under the proposed action a 200 feet wide buffer around all dependable waters would be maintained and would greatly reduce the amount of sediment and ash introduced to potential frog habitat.

Cumulative Effects

The area considered for cumulative effects is the project area. No cumulative effects to northern leopard frogs would occur from implementation of any of the alternatives, when added to past, present and reasonably foreseeable future activities. Implementation of Best Management Practices curtails soil erosion and minimizes the potential for inflow into potential northern leopard frog habitat.

Invertebrates

Analysis Methods

The following evaluation criteria were used to compare environmental consequences for alternatives:

- Quality and quantity of meadow habitat
- Disturbance from project implementation

Three sensitive species of invertebrates have potential habitat within the project. They are spotted skipperling, mountain silverspot butterfly and blue-black silverspot butterfly. All three of the butterfly species inhabit moist meadows, seeps, springs, and streams within ponderosa pine and mixed conifer vegetation types, and in some cases other habitat types with riparian areas. The two silverspot butterfly species have life cycles where they utilize Viola species, adults feed

on thistles.

Existing Conditions

There are no documented populations of these butterfly species within the project area; however suitable habitat does exist at several tanks, springs and wet meadows. Best potential habitat is the several tanks within the project boundary as all springs within the project have been developed.

Direct and Indirect Effects

No Action

Under no action meadows would not be rehabilitated, thus there would not be any benefits to these species. Favorable habitat would decrease over time as meadows are encroached by conifers and canopy closure increases and understory productivity and diversity decreases. High fire hazard potential in the project area would persist.

Alternative 1 – Proposed Action and Alternative 2

Under the proposed action no activities would occur within or near wet meadows. Individuals may be impacted by treatment activities, such as contact with machinery and tools. These activities would be minimal and short term.

Indirect effects would result from vegetation modification activities such as thinning and broadcast burning. These activities would disturb or remove understory vegetation, in effect reducing availability to adult butterflies and/or caterpillars. These are short-term effects and will be minimized due to activities being temporally and spatially separated. In contrast, reducing the canopy closure, removing trees in and at edges of meadows, restoring meadows and broadcast burning will encourage the development of understory vegetation, increasing availability of food and reproductive sites for these species over the long-term.

Improvement to meadows in the action alternatives will be beneficial to these butterfly species. Reducing the canopy closure, removing encroaching trees in and at the edges of meadows will be beneficial to these species.

Alternative 2

Alternative 2 would have less grassy openings and no between group interspaces providing a slightly less benefit to overall invertebrate habitat compared to Alternative 1.

Cumulative Effects

The area considered for cumulative effects is the project area. Reviews of all projects (past, present and reasonably foreseeable) that have the potential to impact spotted skipperling, mountain silverspot butterfly and blue-black silverspot butterfly were analyzed.

The reduction of understory vegetation by ungulate grazing within the project adds to the reduction of plant availability to adult butterflies and/or caterpillars. All of the area is currently not being grazed by livestock reducing the potential for cumulative impacts. Elk will continue to reduce vegetative understory in meadows and around waters.

SNAGS AND LOGS

Snags and logs are important elements of the structure and function of ponderosa pine and mixed conifer and are important to bird and small mammal communities. The Forest Plan standards and guidelines for ecosystem management in northern goshawk habitats apply to all of the forest and woodland communities within the project. In ponderosa pine forests, standards and guidelines are to manage for a minimum of 2 snags per acre, 3 downed logs per acre, and 5-7 tons of woody debris per acre. In mixed conifer forests, standards and guidelines are to manage for at least 3 snags per acre, 5 downed logs, and 10-15 tons of woody debris per acre.

Analysis Methods

The following evaluation criteria were used to compare environmental consequences for alternatives:

- Snag and log densities
- Snag and log location

Existing Conditions

Landscape Level

In 2002 the Forest estimated that trends for snags in ponderosa pine habitats were probably declining (USDA Forest Service 2002a). However, a recent study by Ganey and Vojta (2007) conducted on the Coconino and Kaibab National Forests within ponderosa pine and mixed conifer habitats, indicates at least in the short term, snag numbers are increasing and will continue to increase and densities of large snags will increase (Ganey and Vojta 2007). Despite these increases, densities of large snags, > 18” dbh, would remain below Forest Plan guidelines. The models used by Ganey and Vojta provide a useful tool for modeling snag dynamics at a landscape scale but are not suitable for modeling snag dynamics at the stand level (Ganey and Vojta 2007).

Project Level

Snag and log data were collected for the project area. Snags and logs are deficit across the Jack Smith-Schultz project area particularly in the ponderosa pine. The average density of snags greater than 18 inches in diameter per acre is .12 and the average density of logs greater than 12 inches in diameter is .64 per acre.

Site/Stand Level

Of the stands inventoried none met the Forest Plan standard of two snags per acre and 3 logs per acre.

Direct and Indirect Effects

No Action

With no action, there are no treatment effects. Under no action, the high fire hazard potential in

the project area would persist. In the event of a large crown-wildfire, widespread loss of snags and logs would occur. Generally, snags remaining after a crown-wildfire would have decreased longevity and value to wildlife. High tree densities would remain limiting growth of large diameter trees and thereby limiting replacement snags and logs. Within both the ponderosa pine and mixed conifer habitats snag numbers are expected to continue to increase and densities of large snags are expected to increase similar to landscape level trends.

Alternative 1 – Proposed Action and Alternative 2

Losses of snags and logs from prescribed burning will occur and is estimated to be 20% loss of snags and 50% loss of logs (Randall-Parker and Miller 2000). Randall-Parker and Miller (2000) also found that snags continue to fall and provide new logs on the forest floor at a rate of 2 logs/25 acres/year. There will be a direct effect of loss of snags and logs during broadcast burning, however these effects will be minimized since snags necessary to meet wildlife management objectives will be fire-lined. Loss of large logs will be minimized though ignition techniques and possibly fire-lining. Recruitment snags will be identified and retained from live trees that exhibit defects ideal for wildlife. For example, trees with forked or spiked-tops, lightning strikes, mistletoe brooms, or fading crowns. Felling trees between 12 and 16 inches after burning to required levels to meet Forest Plan S&G will provide additional habitat.

Although fire can have a detrimental affect on pre-burn snags, it can cause live trees to die and become snags after fire. With the retention of yellow pine trees, retention of two trees 18 inches in diameter and greater where existing, recruitment snags and old growth recruitment site management, some trees would in time naturally convert to snags. This natural conversion of live trees to snags and snags to logs would contribute to additional numbers of snags and logs. The less competition between trees for moisture, nutrients, and sunlight the larger they will grow prior to becoming snags. Larger diameter snags (>18) are necessary to meet Forest Plan guidelines. Both action alternatives are expected to result in a short term loss of snags and logs followed by an increase over the long term.

The approximately sixty-six miles of road closures proposed for this project will reduce vehicular access in the area reducing access to woodcutters. This reduced access may allow for snags and logs to remain on the landscape and not be removed for fuelwood.

Both alternatives move toward the Forest Plan guidelines by mitigating shortfalls of snags and logs through designation and replacement efforts, treating stands to develop a larger percentage of the project area in VSS 4, 5, and 6 to develop recruitment for larger snags and logs, and both alternatives maintain two trees 18 inches in diameter or greater per acre where existing.

Cumulative Effects

The area considered for cumulative effects is the project area. Reviews of all projects (past, present and reasonably foreseeable) that have the potential to impact snags and logs were analyzed.

Past timber harvest and illegal fuelwood activities have reduced snag densities to below Forest Plan recommendations. Snags were removed during forest harvest because of potential fire and safety hazards, and many thought they had poor aesthetic value and were indicative of an unhealthy forest. Snags are especially vulnerable to bark beetle infestation, illegal fuelwood cutting, and ongoing projects that remove hazard trees such as APS hazard tree removal along powerlines and ADOT tree removal along Interstate 89N.

The past outbreak of bark beetle infestations has killed trees thus creating snags, therefore

increasing snags in pockets across the landscape. However, insect attacks result in rapid deterioration of snags, decreasing their longevity and value to wildlife. Some bug-killed trees will topple over and become downed logs. Bug killed logs will compensate for a portion of the loss of large logs due to burning activities.

The proposed Travel Management Rule will further reduce cross country access to vehicles reducing access to fuelwood cutting in the Jack Smith project area. This would allow snags and logs to remain on the landscape.

WILDLIFE COVER

Hiding and thermal cover are important attributes of the forest for wildlife habitat. Hiding cover is defined as "vegetation capable of hiding 90% of a standing deer or elk from human view at a distance of 200 feet or less". Tree trunks and foliage as well as shrubs and herbaceous vegetation offer hiding cover. Topographic features, such as rock outcroppings and terrain breaks, also serve as hiding cover. Thermal cover is defined as "a stand of coniferous trees tall enough to allow animal movement and bedding with a high degree of crown closure". Thermal cover offers protection from heat and cold. High tree crown closure also provides hiding cover from aerial predators (Forest Plan pg. 124).

The Coconino Forest Plan requires 30% cover within a 10K Block outside the Urban Rural Influence Zone (URIZ) and Wildland Urban Interface 1U (FMAZ 1U) but does not apply the hiding and thermal cover guideline within the URIZ or the FMAZ 1U. Projects will attempt to retain 15% cover within a given section within the URIZ and the FMAZ 1U.

The following evaluation criteria were used to compare environmental consequences for all alternatives:

- Amount of cover
- Type of cover (thermal, hiding, and combination)
- Location of cover

Analysis Methods

Wildlife Cover for the Jack Smith-Schultz Fuels Reduction and Healthy Forest Project was determined with the following information:

- Wildlife cover was documented at points along goshawk survey transects across most of the project area. Points were mapped at most 1000 foot intervals along transect that was at most 850 feet apart. Points were offset along neighboring transects by 500 feet. At each point surveyors determined if there was hiding cover, thermal cover or a combination of both cover types at each point.
- Orthophoto quadrants were overlaid with transect cover data to determine if points provided a good representation of the stand vegetative structure.
- Topographic maps were reviewed to determine if there were cover effects from topographic features and to determine if slopes are inoperable due to steep or rocky terrain.
- Field examinations were conducted to evaluate cover distribution needs and to determine whether other factors contributing to effective cover were present.

Assumptions made to determine cover remaining after treatments:

- Uneven-aged with a fuel reduction emphasis will remove both hiding and thermal cover values.
- Uneven-aged thin treatments with a resource management emphasis will retain both hiding and thermal cover values.
- Thin from below to 9 inch treatments will retain thermal cover values and remove hiding cover values.
- Thin from below to 12 inch treatments will retain thermal cover values and remove hiding cover values.
- Burn only stands will maintain both hiding and thermal cover values.
- Stands will maintain hiding cover values where steep slopes are present and provide cover effects.
- Grassland restoration treatments will remove both hiding and thermal cover values.

Existing Conditions

The project falls within the area analyzed under the Flagstaff/Lake Mary Ecosystem Analysis (FLEA) (USDA FS 2002a). It is under that analysis where two zones were defined around Flagstaff and the Lake Mary areas, the Fire Management Analysis Zone (FMAZ) and the Urban/Rural Influence Zone (URIZ).

For the Jack Smith – Schultz project there are approximately 5797 acres (49%) outside the FMAZ and 5930 acres (51%) of Forest Service lands within the FMAZ project area.

The area outside the FMAZ within the project boundary is within two 10K block's the Jack Smith and Elden 10K's. Wildlife cover was analyzed across the project as well as by the 10K block. Table 3.27 includes current, desired and projected values of thermal and hiding cover on a project level.

Key wildlife cover areas are along steep slopes and drainages across the project. Many of these areas are considered too steep to implement burning or mechanical treatments and will likely continue to provide cover. Movement of wildlife from the San Francisco Peaks area to the east is limited and wildlife corridors are fragmented by development.

Direct and Indirect Effects

No Action

Under no action there would be no change from existing conditions. Current conditions exceed Forest Plan direction. A surplus of thermal and hiding cover for wildlife will be maintained across the project area. However, dense forest conditions would still occur and the high fire hazard would continue to place wildlife cover at risk with respect to stand-replacing fire.

Alternative 1 – Proposed Action and Alternative 2

Horizontal and vertical diversity are both important components of cover. Both alternatives will maintain hiding cover at least 200 feet wide around dependable waters and along the travel corridors identified along the steep slopes and drainages across the project area. These areas

provide cover for big game species as well as attributes for resident songbirds, raptors, turkey and other wildlife. These areas are considered too steep to implement mechanical treatments and will continue to provide cover. Both alternatives will still provide cover and vertical diversity for most species and will meet Forest Plan direction.

Both alternatives will reduce combination thermal and hiding cover across 3024 acres (26%) of the project area. There will be a reduction of approximately 2056 hiding or thermal cover acres within the FMAZ and a reduction of approximately 968 acres outside of the FMAZ. This reduction will still provide adequate cover for most species and meet Forest Plan direction.

Specifically, areas of VSS 4, 5 and 6 thinned to an un-even aged with moderately closed (41-60%) or closed (60%+) canopy cover will retain both hiding and thermal cover values. Areas in VSS 3 thinned to open (0 to 40%) canopy cover will lose thermal and hiding cover qualities. Sites will maintain hiding cover values where steep slopes are present and provide cover effects. Grassland restoration treatments will remove both hiding and thermal cover values. Sites treated with prescribed fire only (no thinning) will maintain both thermal and hiding cover qualities.

The entire Jack Smith 10K block includes two project areas, the Jack Smith - Schultz and the Eastside. Both projects meet or exceed Forest Plan direction for wildlife cover and therefore wildlife cover is met at the 10K block level for this 10K. The Elden 10K includes a portion of Jack Smith – Schultz project. Eighty-eight percent (12,659 acres) of the Elden 10K is within the FMAZ 1U and the Forest Plan does not apply the hiding and thermal cover requirements within the FMAZ 1U. Of the remaining twelve percent (1700 acres) of the Elden 10K the Forest Plan requires 30 percent cover within a 10K block. Using the same criteria as was used at the project level there would be 188 acres of thermal cover (11%), 39 acres of hiding cover (2%) and 305 acres of combination cover (18%) post treatment in areas outside the FMAZ 1U for a total of 31% (532 acres) of wildlife cover. Although there are no specific wildlife cover requirements for a large portion of the Elden 10K there are large tracts of wildlife cover on both Mount Elden and the Dry Lake Hills areas within this 10K block

Table 3.27. Wildlife Cover for the Jack Smith Schultz Project Area.

Measure of Change	Existing Conditions	Forest Plan Direction	Alternative 1 and Alternative 2
% Cover Within FMAZ	Hiding 17% Thermal 2% Combination 76% Total 95%	Hiding 0-15% Thermal 0-15% Combination 0-15% Total 0-15%	Hiding 2% Thermal 7% Combination 19% Total 28%
% Cover Outside FMAZ	Hiding 16% Thermal 6% Combination 71% Total 93%	Hiding 10% Thermal 10% Combination 10% Total 30%	Hiding 1% Thermal 7% Combination 38% Total 38%

Alternative 2

The same stands will maintain cover for both alternatives although with the reduction of between group interspaces in Alternative 2 the quality of wildlife cover and the amount of cover within each stand will be greater in Alternative 2.

Roads and trails within cover sites provide access to recreation activities thereby reducing the effectiveness of that cover for some species due to human disturbance. Benefits to some wildlife would occur due to the closure or obliteration of sixty-six miles of roads within the project.

Cumulative Effects

The area considered for cumulative effects is the project area. Reviews of all projects (past, present and reasonably foreseeable) that have the potential to impact wildlife cover were analyzed. The Travel Management Rule (TMR) analysis has been initiated for the Forest and a proposed action has been identified that prohibits cross-country travel. The Jack Smith-Schultz project area is included in this study, and the elimination of cross-country travel may benefit some wildlife by reducing potential disturbance within areas identified for wildlife cover.

MANAGEMENT INDICATOR SPECIES

A working draft Forest-wide assessment entitled "Management Indicator Species Status Report for the Coconino National Forest" (USDA 2002) summarizes current knowledge of population and habitat trends for species identified as MIS for the Coconino National Forest. Arizona Game and Fish Department provides annual population trend updates by Game Management Unit (GMU) for game species (i.e. elk, turkey, mule deer, and pronghorn). This information when available is used to augment the MIS report. Below are descriptions of each of the management indicator species identified for management areas (MA's) within the analysis area, and a discussion of the relationship of the effects of each project alternative on forest level population and habitat trends for each of these species.

Management indicator species (MIS) for this project are evaluated based on management area types located within the project area. The management areas (MA) listed immediately below, with associated indicator species, indicated to be present within the project boundary. Table 3.29 lists MIS that were considered but dropped from detailed analysis because habitat they are indicators for does not exist in the analysis area. These are a subset of the Forest-wide management areas and management indicator species. Refer to the Forest Plan for a complete list of management areas and associated management indicator species. Table 3.30 describes MIS and the habitat components they are indicators for.

Analysis Methods

The following evaluation criteria were used for MIS to compare environmental consequences for all alternatives:

- Indicator Habitat Quantity
- Indicator Habitat Quality

Table 3.28. Management areas within the Jack Smith-Schultz project with the associated MIS

MANAGEMENT AREA (MA)	MANAGEMENT INDICATOR SPECIES	ACRES WITHIN PROJECT AREA ON FS LANDS
MA 3 (Ponderosa Pine and Mixed Conifer with <40% Slopes)	Abert squirrel, red squirrel, Mexican spotted owl, elk, northern goshawk, pygmy nuthatch, turkey, and hairy woodpecker	9,465
MA 4 (Ponderosa Pine and Mixed Conifer with >40% Slopes)	Abert squirrel, red squirrel, Mexican spotted owl, elk, northern goshawk, pygmy nuthatch, turkey, and hairy woodpecker	1,292
MA 5 (Aspen)	Yellow-bellied sapsucker and mule deer	62
MA 6 (Unsuitable Timber Land in Ponderosa Pine)	Elk, mule deer, Abert squirrel, and hairy woodpecker	592
MA 9 (Mountain grassland)	Antelope, elk	28
MA 10 (Grassland and Sparse P/J above the Rim)	Antelope	196

Forest habitat acreage for MAs provided by FSVeg/RMRIS stand database. These acres may vary slightly from the Vegetation Section which identifies acres of cover types.

Table 3.29. Management indicator species considered but eliminated from detailed analysis

MA	MIS Species	Habitat
MA 12	Lincoln's Sparrow	Late seral, high elevation riparian (≥7000')
MA 12	Lucy's Warbler	Late seral, low elevation riparian (<7000')
MA 12	Yellow-breasted Chat	Late seral, low elevation riparian (<7000')
MA 12	Macroinvertebrates	Late seral, high and low elevation riparian
MA 12	Cinnamon Teal	Wetlands/aquatic

Table 3.30. Summary of MIS habitats on the Jack Smith-Schultz HFRA project with forest trends.

MIS Species	Indicator Habitat	Forest Habitat Trend	Forest Population Trend	Acres Habitat in Project Area
Abert Squirrel	Mid seral PIPO	Stable	Inconclusive	4380
Red Squirrel	Late seral MC, S-F	Declining	Inconclusive	1659
Mexican spotted owl	Late seral MC, S-F	Declining	Inconclusive Declining	1659
Northern goshawk	Late seral PIPO	Declining	Variable	2208
Pygmy Nuthatch	Late seral PIPO	Declining	Stable	2208
Turkey	Late seral PIPO	Declining	Increasing	2208
Elk	Early seral P-J, PIPO, MC, S-F	P-J – Stable PIPO - Stable	Stable	P-J – 201 PIPO – 836 MC – 0
Hairy woodpecker	Snag component of PIPO, MC, S-F	Pipo and MC snags increasing	Stable-to-slightly increasing	PIPO - 2208 MC, S-F - 1659
Mule deer	Early seral aspen and P-J	P-J – Stable	Declining	Early-seral P-J- 0 Early-seral Aspen 0
Yellow-bellied Sapsucker	Late seral and snag component of aspen	Declining	Stable	62
Antelope	Early and late seral grasslands	Stable- to-declining	Declining	224 (Mt. Meadow and Sparse P-J

Table 3.31. Effects to MIS habitat quantity by alternative (Acres*/% of Forest-wide)

MIS Species	Current Forest-wide Habitat	No Action	Alternative 1 Acres Changed/% of Forestwide Acres	Alternative 2 Acres Changed/% of Forestwide Acres
Abert Squirrel	490,000	0	-1,446/-0.3	-800/-0.2
Northern Goshawk	193,812	0	1,995/1.0	1,342/0.7
Pygmy Nuthatch	193,812	0	1,995/1.0	1,342/0.7
Turkey	193,812	0	1,995/1.0	1,342/0.7
Elk	22,188	P-J – 0 PIPO – 0 MC – 0	P-J –0 PIPO – -239/-1.0 MC – 0	P-J –0 PIPO – 127/0.6 MC – 0
Hairy Woodpecker	231,812	PIPO - 0 MC, S-F - 0	PIPO - 1,995/0.9 MC, S-F - 0	PIPO - 1,342//0.7 MC, S-F - 0
Yellow-bellied Sapsucker	Undetermined	0	0	0
Mule Deer	31,500+Aspen	0	0	0
Juniper (plain) Titmouse	598,500	0	0	0
Antelope	161,000	0	27/.02	27/.02
Mexican Spotted Owl	42,000	0	0	0
Red Squirrel	42,000	0	0	0

* Calculated per acre basis vs per stand

Abert Squirrel

The Forest Plan designates the Abert squirrel as a management indicator species for early seral stage ponderosa pine forests. However, Abert squirrels use a variety of age classes and research from several locations has shown strong habitat associations with mature ponderosa pine. Recent research indicates that this species' best habitat is the intermediate to older aged forest (trees 9-22 inches dbh), where groups of trees have crowns that are interlocking or in close proximity (Dodd et al. 1998). Squirrels favor scattered large trees and multi-storied stands mixed with poles. Abert squirrels select and use broomed ponderosa pine trees (Garnett 2004). The project area currently exhibits areas of good quality habitat for Abert Squirrel.

Existing Conditions

Population trend. Forest-wide population trend is inconclusive since there is little Forest-specific data. Statewide information indicates a stable trend for hunter harvest of squirrels. Abert squirrels are currently found throughout the project area. Abert squirrel nesting habitat includes high canopy cover with interlocking canopies, multi-storied stands, and high basal area with 18" diameter trees distributed throughout.

Habitat trend, early seral stage ponderosa pine. Forest-wide trend is stable. The age class distribution of ponderosa pine has remained essentially the same, dominated by mid-seral stage

stands, with some loss of old growth and older trees, and some early seral stage habitat created by wildfire.

Direct and Indirect Effects

No Action

Habitat conditions for wildlife would remain in their current condition, not withstanding natural processes. This alternative would have no effect on Abert squirrel forest-wide habitat or population trends. However, dense forest conditions would still occur and the high fire hazard potential would continue to place squirrel habitat at risk with respect to stand replacing fire. The project area would continue to be lacking in the higher basal areas that provide high quality nesting habitat. Foraging habitat would continue to be limited as tree basal areas will remain lower and densities higher reducing tree growth rates and limiting cone production.

Alternative 1 – Proposed Action

The proposed action will reduce best quality nesting habitat to lower quality nesting habitat. Canopy closures and basal areas will be reduced overall with 41% or greater canopy cover over 30% of the treated acres but will continue to average 50% canopy cover and maintain higher basal areas within MSO habitats, PFAs, steep slopes and most areas with a resource emphasis. There will not be a noticeable difference in the number of 18” trees across the landscape. Low quality nesting habitat (> 90 BA and > 30 CC) will be met at the group level over 30% of the landscape in Zone 1 and 2 and over 85% of Zone 3. Group sizes will vary across the landscape with smaller groups (.05 or larger up to 0.7 acres) in Zone 1 and 2 and larger groups (.05 to 5 acres) in Zone 3 providing nesting and foraging habitat for squirrels. Tree basal area and canopy cover will be reduced although within 40 years after treatment basal areas will range from 87 – 159, canopy cover will range from 52-72% and average diameter will increase 4.3 -7.9 inches providing high quality nesting habitat over time. Habitat quality will be reduced in the proposed action although the project area will continue to provide recruitment, nesting and foraging habitat for Abert squirrels. This reduction in habitat quality is too small to alter the Forest-wide habitat or population trends.

Alternative 2

Alternative 2 will reduce best quality nesting habitat to lower quality nesting habitat. Alternative 2 proposes eighty percent of the area will be in a forested condition with twenty percent in openings. There will be no between group interspaces resulting in larger groups in all zones. Canopy cover will range from 43-73% providing nesting habitat throughout. This alternative will maintain higher basal areas within MSO habitats, PFAs, and steep slopes. There will not be a noticeable difference in the number of 18” trees across the landscape. Habitat quality will be reduced in Alternative 2 although the project area will continue to provide recruitment, nesting and foraging habitat for Abert squirrels. This reduction in habitat quality is too small to alter the Forest-wide habitat or population trends.

Cumulative Effects

There is no effect to Forest-wide habitat or population trends and there is no added effect from past, present or foreseeable projects. Past fuel reduction treatments in the urban - interface has reduced habitat quality due to resulting low tree densities and lack of interlocking crowns (USDA 2002). MSO protected habitat and northern goshawk PFAs have similar habitat qualities as those required for higher quality Abert squirrel habitat and densities. These protected habitats are scattered across the landscape thereby providing habitat for squirrels within these urban - interface projects and across the landscape. Urban – interface treatments have maintained large trees across the landscape and are reducing competition between trees for water and nutrients thereby moving toward the larger VSS size classes important for Abert squirrels.

Elk

The Forest Plan designates elk as an MIS for early seral stages of ponderosa pine, mixed conifer, and spruce-fir habitat types. Grasslands and early-seral stage woodlands are also important to this species. Elk are associated with the deciduous thickets and early-seral stages of forests that contain an interspersion of the grass/forb vegetation type. Forest-wide population trend is essentially stable. There was an increase in elk numbers in the early to mid 1990's with a gradual decline back to late 1980's levels.

Existing Conditions

The analysis area provides summer range for elk and is located within Arizona Game and Fish Department's Game Management Unit (GMU) 7E. Game Management Unit 7 shows a generally increasing trend in elk numbers.

Population trend. The Forest-wide trend is stable. Elk numbers on the Forest increased in the early to mid 1990's, with a gradual decline through 2001 to roughly the 1980's level.

Elk are found throughout the project area. Elk are known to calve north of Sugarloaf Mountain and winter west of 89 Mesa within the project area. Elk were documented to occur on 89 Mesa within the project area.

Habitat Trend; early seral ponderosa pine. The Forest-wide trend is stable. The age class distribution of ponderosa pine has remained essentially the same, dominated by mid-seral stage stands, with some loss of old growth and older trees, and some early seral-stage habitat created by wildfire. Early seral-stage ponderosa pine has not increased to any large degree.

Direct and Indirect Effects

No Action

Habitat conditions for wildlife would remain in their current condition, not withstanding natural processes. This alternative would have no effect on the forest-wide habitat or population trends for elk. However, dense forest conditions would still occur and the high fire hazard potential would persist. Dense forest conditions would do nothing to reduce grazing pressure to aspen, oak meadows and riparian habitats which are documented to be impacted by elk grazing.

Alternative 1 – Proposed Action

The action alternative will decrease the amount of early seral stage ponderosa pine. Open canopy areas in ponderosa pine would increase throughout the project increasing the habitat quality and

distributing elk foraging throughout the project. This will have the added benefit of reduce grazing pressure to aspen and oak. There would be a slight decrease in VSS 1 and 2 although this will be compensated with between group interspaces. This decrease in habitat quality is too small to alter Forest-wide population and habitat trends.

Alternative 2

Open canopy areas in ponderosa pine would increase throughout the project increasing the habitat quality and distributing elk foraging throughout the project. There would be a slight increase in VSS 1 and 2 although Alternative 2 does not incorporate between group interspaces resulting in a less open landscape than Alternative 1. Alternative 2 will maintain up to 80 percent of the project area in a forested condition with 20 percent in openings. This increase in habitat quality is too small to alter Forest-wide population and habitat trends.

Cumulative Effects

The area of analysis is the project area. Roads and trails within elk habitat provide access to recreation activities thereby potentially disturbing elk. The Travel Management Rule (TMR) and associated Coconino National Forest TMR process proposes to close the Forest to cross-country vehicle travel further reducing adverse affects to elk from potential disturbance.

Hairy Woodpecker

The Forest Plan designates the hairy woodpecker a MIS for snags in ponderosa pine, mixed conifer, and spruce-fir forests for suitable nesting and feeding habitat. Hairy woodpeckers are most abundant in mature forests with large old trees suitable for cavity nesting and are also common in medium-aged forests. Hairy woodpeckers prefer forests with dense canopies (Bushman and Therres 1988). They use tree cavities for roosting and winter cover and may excavate new cavities in fall to be used for roosting (Sousa 1987). This species is experiencing loss of suitable breeding habitat in the form of snags, both range-wide and in Arizona. According to Latta et al. (1999), hairy woodpeckers are uncommon throughout their range yet common in their preferred habitat in Arizona.

Existing Conditions

Data from the Coconino National Forest, as well as statewide data, indicate that hairy woodpecker populations are stable, or slightly increasing on the Forest. Hairy woodpeckers are fairly common in conifer forest types within the project area.

Population trend. The Forest-wide trend is stable, or slightly increasing. Minor population decreases occur on a short-term scale of 1-3 years, but are generally followed by a recovery (USDA 2002). Hairy woodpeckers were documented to occur throughout the project area.

Habitat trend; snag component of ponderosa pine, mixed conifer, and spruce fir. In 2002 the Forest estimated that trends for snags in ponderosa pine habitats were probably declining (USDA Forest Service 2002a). However, a recent study by Ganey and Vojta conducted on the Coconino suggest that within ponderosa pine and mixed conifer habitats, model projections suggest that, at least in the short term, snag numbers will continue to increase and densities of large snags will increase (Ganey and Vojta 2007). Despite these increases, densities of large snags, > 18” dbh, would remain below Forest Plan guidelines in the project area.

Direct and Indirect Effects

No Action

Habitat conditions for wildlife would remain in their current condition, not withstanding natural processes. This alternative would have no effect on hairy woodpecker. However, dense forest conditions would still occur and the high fire hazard potential would persist.

Alternative 1 – Proposed Action and Alternative 2

Management of old growth, target/threshold, Mexican spotted owl habitats, northern goshawk PFAs and snags will provide habitat for the hairy woodpecker. The action alternatives progress stands to larger VSS classes providing for more recruitment snags. There may be some losses of snags in areas treated with prescribed fire slightly reducing habitat quality in the short term although snag densities are expected to increase over the long term. This short term loss of snags will not alter the habitat quality enough to render it unusable and will have no effect to the Forest-wide habitat or population trend for the hairy woodpecker.

Cumulative Effects

The area of analysis is the project area. Removal of hazard trees for powerlines and highway safety will reduce snags and reduce habitat for snag dependant species. These projects combined with the either alternative are not expected to reduce habitat quality enough to alter Forest-wide population or habitat trends.

Northern Goshawk

The Forest Plan designates this species a MIS for late seral stages of ponderosa pine forests. Goshawks are relatively abundant and widespread, and although population trends are difficult to determine, there is no hard evidence of a considerable decline overall, but populations could be declining in some areas (NatureServe 2007). On the Coconino National Forest, northern goshawk territories have been monitored every year since 1989, with an average of 43 territories monitored from 1991 to 2001. The occupancy rate of territories has declined over these last 11 years; however, this does not signify a corresponding trend in population numbers. It is likely that nonbreeding goshawks would not be observed. During the later years of this time period, precipitation amounts have been below average. Climate may very well play an important role in whether or not northern goshawks breed in a given year, and would also influence nesting success of northern goshawks. Although the forest has some information on territory occupancy and reproduction, these data are not designed to detect changes in population trend. Total number of territories has increased and the statewide BBS data indicates a significant increase, but some indicators of occupancy and productivity appear to be declining on the forest, although year-to-year variability is high.

Existing Conditions

Population trend. The Forest-wide trend is inconclusive. Although the Forest has some information on territory occupancy and reproduction, these data are not designed to detect changes in population trend. The total number of territories has increased, and statewide BBS data indicate a significant increase, but some indicators of occupancy and productivity appear to be declining on the Forest. Monitoring and surveys are ongoing on the forest. There are two Post-fledgling Family Areas (PFA) delineated within the Jack Smith-Schultz project area.

Habitat trend. Late seral –stage ponderosa pine. The Forest-wide habitat trend for late-seral ponderosa pine has declined. The age class distribution of ponderosa pine has remained essentially the same, dominated by mid-seral stage and, with some loss of old-growth and older trees, and some early-seral stage habitat created by wildfire.

Direct and Indirect Effects

No Action

Indicator habitat conditions for goshawks would remain in their current condition, not withstanding natural processes. This alternative would have no effect to forest-wide habitat or population trends for northern goshawk. However, dense forest conditions would still occur and the high fire potential would continue to place goshawk habitat at risk with respect to stand replacing fire. The desired conditions for sustaining and developing late seral ponderosa pine habitat would never be attained.

Alternative 1 - Proposed Action

This alternative will increase the quantity and quality of late-seral (VSS 5 and 6) goshawk indicator habitat from the existing condition. Alternative 1 progresses potential nesting habitat to larger VSS classes and will provide an increase in goshawk nesting habitat quality and quantity over time (Table 3.29). The increase in the quantity of late-seral VSS 5 immediately after treatment is more a reflection of the younger trees being reduced to a point where the larger trees are dominate. Alternative 1 is expected to have a beneficial effect to the Forest-wide habitat with no effect to the population trends for the northern goshawk.

Alternative 2

This alternative will increase the quantity and quality of late-seral (VSS 5 and 6) goshawk indicator habitat from the existing condition. Alternative 2 progresses potential nesting habitat to larger VSS classes and will provide an increase in goshawk nesting habitat quality and quantity over time (Table 3.29). The increase in the quantity of late-seral VSS 5 immediately after treatment is more a reflection of the younger trees being reduced to a point where the larger trees are dominate. Alternative is expected to have a beneficial effect to the Forest-wide habitat with no effect to population trends for the northern goshawk.

Cumulative Effects

Treatments in the Jack Smith-Schultz Project area will provide protection from stand replacing crown fires to predicted high quality northern goshawk nesting habitat not only within the project boundary but also in areas northwest of the project.

There is a beneficial effect to Forest-wide habitat with no effect to population trends therefore there is no added effect from past, present or foreseeable projects.

Pronghorn Antelope

Pronghorn antelope is designated a management indicator species for early and late seral grassland type, which is represented by Management Areas (MA) 9, 10 and 11 in the Coconino National Forest Plan.

A number of factors have been identified that affect pronghorn including severe weather, amount and timing of precipitation, long-term climatic trends, habitat fragmentation, diet overlap with other grazers, reductions in fawn hiding cover, woody vegetation encroachment, fences, human disturbance and development, water availability, predators, parasites and diseases, and nutritional concerns (Nelson 1925, Neff 1986, Neff and Woolsey 1979, O'Gara 1986, Smith et al. 1986, Le Count 1987, Lee et al. 1998, AGFD 2002, Dubay 2002, Ockenfels 1996 in USDA 2002).

Forest-wide population estimates of pronghorn were made in the 1980's and ranged from around 1005-1700; populations were thought to be increasing (USDA Forest Service and Arizona Game and Fish Department (AGFD) 1981, USDA Forest Service and AGFD 1990, USDA Forest Service 1982; USDA Forest Service 1987b in USDA 2002). The forest-wide pronghorn antelope trend is declining, although not equally on the Forest.

Existing Conditions

Population trend. The Forest-wide population trend is declining. Declining numbers of animals observed and fawn to doe ratios below a breakeven of 20-35 fawns per 100 does is documented for all GMUs on the Forest except GMU 7. The Jack Smith-Schultz project area is in GMU 7. Pronghorn have been reported to travel north of the project area. No fawning areas are documented in the project area.

Habitat trend; early and late seral grasslands. Habitat trend is stable to declining. Although the total amount of grassland habitat has generally remained stable, habitat quality is stable to declining due to tree encroachment, fire suppression, long-term climatic changes, short-term drought, and ungulate grazing. There are 27 acres of grassland habitats within the project area. Meadows and openings have been negatively affected by pine encroachment fragmenting habitat for pronghorn.

Direct and Indirect Effects

No Action

Habitat conditions for wildlife would remain in their current condition, not withstanding natural processes. Meadows would not be rehabilitated, thus there would not be any benefit to this species. Favorable habitat would decrease over time as conifers encroach meadows. This alternative would have no effect on Forest-wide habitat or population trends. However, dense forest conditions would still occur and the high fire hazard potential would persist.

Alternative 1 - Proposed Action and Alternative 2

Restoration of meadows grasslands in the action alternative will be beneficial to this species. Vegetative species composition and diversity are increased and the distribution and diversity of vegetative ground cover is improved. The action alternative would result a small increase (224 acres) of habitat for pronghorn although there would be a small increase in habitat quality (<1% of Forest-wide habitat). This increase in habitat quality is too small to alter Forest-wide habitat and population trends.

Cumulative Effects

There is no effect to Forest-wide habitat or population trends therefore there is no added effect from past, present or foreseeable projects.

Pygmy Nuthatch

Existing Conditions

The Forest Plan designates the Pygmy nuthatch a MIS for late seral stage ponderosa pine forests. The pygmy nuthatch is generally associated with mature ponderosa pine forests, where it prefers open, park-like stands of old, yellow pines. It is also found in dense pine forests, as long as large trees and snags are present. The pygmy nuthatch is also tied to old, large oak trees and cavities. This nuthatch requires dead trees or dead-top trees where it builds nests in cavities. Both in Arizona and North America, moderate threats exist on breeding and wintering grounds. Populations are thought to be stable on the Coconino National Forest and statewide. Ponderosa pine snags, a key component for this species.

Population trend. The Forest-wide trend is stable, although there are dramatic population fluctuations in the short-term, and small, local populations, such as those in snowmelt drainages, may be temporarily extirpated. Pygmy nuthatches are documented to occur throughout the project area.

Habitat trend; late seral stage ponderosa pine. The age class distribution of ponderosa pine has remained essentially the same, dominated by mid-seral stage, with some loss of old-growth and older trees, and some early-seral stage habitat created by wildfire. Overall snags are thought to be increasing in the ponderosa pine and will continue to increase and densities of large snags will increase (Ganey and Vojta 2007).

Direct and Indirect Effects

No Action

Habitat conditions for wildlife would remain in their current condition, not withstanding natural processes. This alternative would have no effect on pygmy nuthatch. However, dense forest conditions would still occur and the high fire hazard potential would persist.

Alternative 1 - Proposed Action and Alternative 2

Trees will grow into the larger diameter classes at a faster rate than the no action alternative. The action alternative would offer higher quality nesting habitat over time due to the increase in the acres of VSS 5 and 6 stands over the forty years following treatment. Management of old growth, target/threshold, Mexican spotted owl habitat, northern goshawk PFAs and snags in the action alternative will provide habitat for the pygmy nuthatch. There will be no effect to the Forest-wide habitat or population trend for the pygmy nuthatch.

Cumulative Effects

No effect to Forest-wide habitat or population trends therefore, there is no added effect from past, present or reasonably foreseeable projects.

Turkey

The Forest Plan designates turkey as a MIS for late seral stage ponderosa pine forests, based on roost habitat requirements. Although the age class distribution of ponderosa pine has remained dominated by mid-seral stage stands, there had been some loss of old growth and older trees, resulting in a decline in forest-wide habitat trend for late seral- ponderosa pine habitat. Turkey roosts and nesting habitat occur in steep drainages and on hills. Turkey populations on the CNF declined in the early 1990s and have increased since the mid 1990s in probable response to favorable overwintering conditions, changes in hunt design in the GMU, and contributions to overall mast production from trees from the 1919 seed year. The age class distribution of ponderosa pine has remained the same during Forest Plan implementation. Late seral stage trees have remained largely unchanged on slopes greater than 40 percent. The loss of large old trees occurred on slopes less than 40 percent during the early stages of Forest Plan implementation. The rate of loss due to timber harvest is now much reduced and harvest of trees over 24 inches dbh rarely occurs. Other factors affecting turkey populations are lack of cover in key areas (including travel corridors), water availability, and forage availability are important factors (USDA 2002).

Existing Conditions

Turkey habitat in the analysis area consists of ponderosa pine forest with openings and small meadows for foraging during the summer months. Ponderosa pine and Gambel oak mast are the key habitat attributes and steep drainages and hillsides provide nesting and roosting habitat. Currently, there are no known turkey roosting areas in the project although hillsides and drainages are potential habitat.

Although late seral ponderosa pine habitat has declines some since the Forest Plan was initiated in 1987, and turkey population trends in the early 1990's probably declined, data from the last five years show that populations are increasing on the Coconino National Forest.

Population trend. The Forest-wide trend is increasing. The trend was variable in the early part of the Plan implementation period (late 80's and early 90's), although AGFD standard survey procedures did not provide good data due to low number of observations along survey routes. AGFD developed a better index of turkey populations in the mid 1990's. Data from 1997-2001 indicate a modestly increasing trend. For the last five years, GMU 7 shows a relatively stable trend, with all other GMUs showing a general increasing trend for both percent of archery elk hunters seeing turkeys and the number of turkeys seen per day (USDA 2002). Game Management Unit 7 showed a general increasing trend in 2006 and 2007 for both percent of archery elk hunters seeing turkeys and for hunt success.

Habitat trend; late seral ponderosa pine. The age class distribution of ponderosa pine has remained essentially the same, dominated by mid-seral stage stands, with some loss of old-growth and older trees, and some early seral stage habitat created by wildfire.

Direct and Indirect Effects

No Action

Habitat conditions for wildlife would remain in their current condition, not withstanding natural

processes. This alternative would have no effect on turkey. However, dense forest conditions would still occur and the high fire hazard potential would persist.

Alternative 1 - Proposed Action and Alternative 2

Turkey nesting and roosting habitat exists within the project. In these habitats, all yellow-barked ponderosa pine trees will be retained while old tree longevity is improved. Furthermore, old growth recruitment areas and target/threshold sites are identified within turkey habitat and will add to the potential of increasing numbers of turkey roost tree groups. Forest Plan standards and guidelines will be met for turkey.

Two turkey roost tree groups per section, in actual or potential turkey habitats will be retained. Trees will grow into the larger diameter classes at a faster rate than the no action. Both alternatives would offer higher quality roosting habitat over time due to the increase in the acres of VSS 5 and 6 sites over the forty years following treatment.

The Jack Smith-Schultz Project will have a beneficial effect to the Forest-wide trend for turkey indicator habitat with no effect for populations.

Cumulative Effects

There is no effect to Forest-wide habitat or population trends and there is no added effect from past, present or foreseeable projects.

Red-naped (Yellow-bellied) Sapsucker

The Forest Plan designates the red-naped sapsucker a MIS for the late seral stage and snag component of aspen. Red-naped sapsuckers nest primarily in aspen, or in deciduous/mixed conifer forest, often near water. Live trees are preferred although dead trees (usually spruce or other conifers) are used at times. This species excavates a new hole each year. They extricate sap and soft cambium layer around willows, cottonwoods, aspen and walnuts. Nest trees are a minimum dbh of 10 inches with a minimum height of 15 feet. They favor groups of large aspens near heads of higher elevation canyons during the summer.

On the Forest, mid- to late-seral stage aspen are declining, due to both natural causes and management actions to regenerate stands. Some early seral stage stands are being created through wildfire and management activities, but recruitment is limited primarily due to grazing by animals. The forest-wide snag distribution of aspen has been declining through out the Forest Plan implementation period. Currently, most aspen on the Forest is in the older age classes, providing habitat for sapsuckers, but future Forest-wide trends are of concern, since aspen regeneration remains an on-going problem.

Available population data on the Forest comes from Christmas bird count, Breeding Bird Surveys, and long-term research conducted along the Mogollon Rim. Collectively, these data indicate that red-naped sapsucker populations fluctuate overtime, but are stable overall on the Coconino National Forest (USDA 2002).

Direct and Indirect Effects

No Action

Habitat conditions for wildlife would remain in their current condition, not withstanding natural processes. This alternative would have no effect on Forest-wide trends population and habitat trends. However, pine encroachment and browsing by ungulates will continue to reduce the ability of sites to develop into mature aspen stands important to sapsuckers.

Alternative 1 - Proposed Action and Alternative 2

There are 150 acres of treatments proposed for aspen. The proposed action would slightly increase late seral stage aspen in the long term but will have no effect on Forest-wide trends population and habitat trends.

Cumulative Effects

No effect to Forest-wide habitat or population trends therefore, there is no added effect from past, present or reasonably foreseeable projects.

Mule Deer

The Forest Plan designates the mule deer as an MIS for early-seral stages of aspen and pinyon-juniper woodlands. Early seral stages of ponderosa pine, mixed conifer, and chaparral habitats are also important for this species. Mule deer are primarily browse on green shoots and fruits of shrubs and trees, but also feed on grasses and forbs. Mule deer populations have not done well on the CNF since Forest Plan implementation, due to many factors, such as disease, poaching, climatic conditions, and habitat changes resulting in a declining Forest-wide trend (USDA 2002). Winter mule deer habitat occurs at 89 Mesa in the north portion of the project.

Although age class distribution has remained relatively stable in pinyon-juniper, the vigor of understory components, such as grasses, forbs and browse species, continues to be affected in areas with numerous young pinyon-juniper trees. Creation of early seral aspen and pinyon-juniper through wildfire or management actions has not occurred at a sufficient enough scale to positively influence browse production that would benefit mule deer (USDA 2002). Consequently the Forest-wide habitat trend for mule deer has declined somewhat overall.

Population trend. The Forest-wide trend is declining. The number of deer seen per hour and the number of fawns per 100 does from 1985 through 2001 varies, but the trend is declining. In good years, fawn production has been at levels minimal to sustaining populations, but in poor precipitation and forage years, fawn production has not kept up with mortality rates.

Habitat Trend; early seral stages of aspen and pinyon-juniper woodlands.

Aspen: Forest-wide trend is declining. Some early seral stage stands are being created through wildfire and management activities, but recruitment is limited primarily due to grazing by animals. Management activities have not en implemented to a level, or over enough area, to prevent loss of aspen patches and provide adequate aspen recruitment. Removal of invading ponderosa pine and/or fence protection is proposed on approximately 35 sites and 150 acres.

Pinyon-juniper: Forest-wide trend is stable. The age class distribution has remained relatively stable. Less than 5% of pinyon-juniper on the forest has been converted to grassland through

wildfire or management actions. All pinyon-juniper within the project is late seral stage. There is no early seral stage pinyon-juniper habitat within the project area and therefore no indicator habitat for mule deer.

Direct and Indirect Effects

No Action

Habitat conditions for wildlife would remain in their current condition, not withstanding natural processes. This alternative would result in no loss of habitat for mule deer. This alternative would have no effect on Forest-wide trends population and habitat trends. However, dense forest conditions would still occur and the high fire hazard potential would persist.

Alternative 1 - Proposed Action and Alternative 2

There are 150 acres of treatments proposed for aspen. Some of these areas would eliminate use by mule deer in the short-term due to fencing but will improve foraging habitat for mule deer in the long-term by improving regeneration. There are no treatments proposed in pinyon-juniper habitat. The action alternative would have no effect on Forest-wide population and habitat trends.

Cumulative Effects

No effect to Forest-wide habitat or population trends therefore, there is no added effect from past, present or reasonably foreseeable projects.

Juniper (Plain) Titmouse

Population trend. The Forest-wide trend is stable to slightly decreasing. BBS trend data for Arizona indicate a slightly decreasing trend between 1996 and 2000. Christmas bird count data indicate a stable to slightly declining trend for wintering juniper titmice on the Forest.

Habitat trend; late seral and snag component of pinyon-juniper. The Forest-wide trend is stable. The age class distribution of pinyon-juniper has remained relatively stable throughout the Forest Plan implementation period. A very small portion of total pinyon-juniper acres has been converted to grasslands or early seral stage pinyon-juniper through wildfire or management actions. Older pinyon pine trees are dying out in many areas due to drought and insect outbreaks, but firewood cutting has probably reduced snag densities especially close to Flagstaff.

Direct and Indirect Effects

No Action

Habitat conditions for wildlife would remain in their current condition, not withstanding natural processes. This alternative would result in no loss of habitat for Juniper titmouse. This alternative would have no effect on Forest-wide population and habitat trends. However, dense forest conditions would still occur and the high fire hazard potential would persist.

Alternative 1 - Proposed Action and Alternative 2

There are no treatments proposed in pinyon-juniper habitat. This alternative would have no effect on Forest-wide population or habitat trends.

Cumulative Effects

No effect to Forest-wide habitat or population trends therefore, there is no added effect from past, present or reasonably foreseeable projects.

Mexican Spotted Owl

Population trend. The Forest-wide trend population trend is inconclusive. The Forest has monitoring data on territory occupancy and reproduction, and a demography study had a study area on the Forest from 1991-1998, but these data do not yield reliable population trend information. The demography study indicated a declining trend, but the study did not span a sufficient time period to make long-term population trend estimates, and climatic factors are thought to play a significant role in influencing survival and reproduction of owls (Seamens et. al. 2002).

Habitat trend; late seral mixed-conifer and spruce fir. The Forest-wide trend is declining. From 1989-2002, stand replacing fires have affected approximately 12% (6,000 acres) of mixed-conifer and spruce-fir on the Forest, resulting in a shift to early seral stage.

Direct and Indirect Effects

No Action

Habitat conditions for wildlife would remain in their current condition, not withstanding natural processes. No action would result in no loss of habitat for Mexican spotted owl. This alternative would have no effect on Forest-wide trends population and habitat trends. However, dense forest conditions would still occur and the high fire hazard potential would persist.

Alternative 1 - Proposed Action and Alternative 2

There are approximately 100 acres or less that are proposed to be thinned up to 12 inches in diameter in mixed-conifer habitat. Thinning trees up to 12 inches in diameter will reduce overall stand densities, which will result in greater individual tree vigor and increased resistance to insect and disease. This will have no impact to the indicator habitat, late seral component of mixed conifer. There would be no effect on Forest-wide population or habitat trends.

Cumulative Effects

There is no effect to Forest-wide habitat or population trends therefore there is no added effect.

Red Squirrel

The Forest Plan designates the red squirrel as an indicator for late-seral mixed-conifer and spruce-fir habitat. Red squirrels are found in Arizona where spruce, spruce with Douglas-fir, or white-fir with Douglas-fir occurs at elevations above 7,500 feet. Red squirrel nests are often in tree cavities. Preferred mean diameters are 14 inches. Red squirrels have also been documented to

use dwarf mistletoe for nests (Hedwall 2006). Red squirrels must store and maintain a winter food supply in centralized caches. Large standing snags and large down logs are important sites for caches. Most cashes are centered within a group of trees containing at least one or more large dominant conifers. Hedwall (2006) documented red squirrel use of dwarf mistletoe for foraging and caching. Red squirrels need adequate food supply, protective cover, and moisture and shade for cone storage (Vahle and Patton 1983).

Population trend. The Forest-wide trend is inconclusive since there is no Forest-specific data. The Heritage rating in Arizona is S5, indicating a secure population in the state. However, AGFD does not quantify squirrel populations, since breeding populations are unaffected by hunting, and because determining the size of game populations is very difficult. AGFD tracks only hunter harvest information, which shows a relatively stable number of squirrels killed per hunter day from 1988-1999. This includes both Abert squirrels and red squirrels, but the vast majority of tree squirrels harvested are tassel-eared squirrels.

Habitat trend; late seral mixed-conifer and spruce fir. The Forest-wide trend is declining. From 1989-2002, stand replacing fires have affected approximately 12% (6,000 acres) of mixed-conifer and spruce-fir on the Forest, resulting in a shift to early seral stage.

Direct and Indirect Effects

No Action

Habitat conditions for wildlife would remain in their current condition, not withstanding natural processes. Lack of action would not result in the loss of habitat for red squirrels. This alternative would have no effect on Forest-wide trends population and habitat trends. However, dense forest conditions would still occur and the high fire hazard potential would persist.

Alternative 1 - Proposed Action and Alternative 2

There are approximately 100 acres that are proposed to be thinned up to 12 inches in diameter in mixed-conifer habitat. Thinning trees up to 12 inches in diameter will reduce overall stand densities, which will result in greater individual tree vigor and increased resistance to insect and disease. This will have no impact to the indicator habitat, late seral component of mixed conifer. This alternative would have no effect on Forest-wide population or habitat trends.

Cumulative Effects

There is no effect to Forest-wide habitat or population trends therefore there is no added effect.

MIGRATORY BIRDS

Within the project area there are mixed conifer, ponderosa pine, ponderosa pine/gambel oak, Douglas fir, spruce-fir, aspen and grasslands habitat types. The nearest Important Bird Area (IBA) is Anderson Mesa located more than six miles distant. The Rio de Flag (approximately 3.5 miles distant) is recognized as an area important to birds and will be nominated in 2007 as an IBA. There are no important over wintering areas within the project.

Species of Concern Listed by Partners in Flight

Arizona State Partners in Flight lists priority species of concern by vegetation type. Ponderosa pine, ponderosa pine/gambel oak and mixed-conifer are the dominant vegetation types in the analysis area, accounting for approximately 97 % of the total project area. Five species have been identified as species of concern in these habitats. They are Mexican spotted owl, northern goshawk, olive-sided flycatcher, Cordilleran flycatcher, and purple martin. Mexican spotted owls and northern goshawks are discussed in detail under the Threatened, Endangered and Sensitive species section of this report and will not be discussed here.

High elevation grassland habitat types occur within the project area as well; this habitat is closely associated with the sub-alpine montane meadows community described in Latta et. al.(1999). Montane meadows make up less than 1% of the project. Four species have been identified as species of concern in this habitat. They are Ferruginous hawk, Swainson's hawk, burrowing owl, and grasshopper sparrow.

Aspen occurs is small patches throughout the project area and accounts for less than 1% of the project. One species, the red-naped sapsucker, has been identified as a species of concern for aspen habitat. Red-naped sapsuckers are discussed in detail under the MIS section of this report and will not be discussed here.

Analysis Methods

The following evaluation criteria were used to compare environmental consequences for all alternatives:

- Habitat Quality

The diversity of available habitats is expected to provide habitat for many species of songbirds. Table 3.32 is a list of species eliminated from detailed analysis because the habitat is not found within the project area. The following tables summarize each migratory bird species of concern by habitat, and special habitat factors for each species. Following the tables are descriptions of these species status within the project area.

Table 3.32. Migratory bird species considered but eliminated from detailed analysis

Bird Species	Habitat
Elegant Trogon	High Elevation Riparian
McGillivray's Warbler	High Elevation Riparian
Red-faced Warbler	High Elevation Riparian
Common Black-hawk	High Elevation Riparian
Water Pipit	Alpine
Swainson's Thrush	Spruce-fir
Pine Grosbeak	Spruce-fir
Golden-crowned Kinglet	Spruce-fir
Three-toed woodpecker	Spruce-fir

Table 3.33. Pine and mixed conifer priority migratory bird species and habitat needs (Latta 1999)

Priority Species	Vegetation Composition/Structure	Abiotic Factors	Special Factors	Status in the Project Area	No Action	Propo
Olive-sided Flycatcher	-Douglas fir, ponderosa pine -Multi-level, mature forests, fairly open canopy, "clumpiness" -Dead branches for foraging -Live mature pines for nesting	-may occur on higher areas of slope -Often occur at edge of early post burned areas for foraging and singing -Most common in patchy areas of closed and open habitats; patch size does not seem to be important -Most common where tall conifers overlook ridges and canyon tops	-Prefers forest edges and openings -Arrival on breeding ground generally late (may be as late as June) -maintain large territories	**Known to be declining throughout its range. BBS data indicates that this species exists in low numbers, but is stable to slightly increasing within the analysis area.**	**No Effect**	**Bene of int fores clum large** **This host, rema assoc** **Burn benef insec**
Cordilleran Flycatcher	-Ponderosa pine, -Douglas fir, maple, oak, aspen -Dense canopy closure -Mid-late successional	-drainages to create a cool microclimate	-Need snags & downed trees for nesting -Rare cowbird host	Considered to be on the increase, but at risk due to concerns about loss of habitat and habitat components such as snags, downed logs, and loss of canopy. Within the analysis area it is expected that this species is static to increasing.	No Effect	Imple will c inters and c forma flycat late s Defer levels
Purple Martin	-Ponderosa pine -Open canopy -Open midstory cover	-Large snags, cavities -open space for	-Often prefers habitat near open water.	Openings created from thinning and burning would have beneficial effects for this species, however, the lack in number of snags would limit the distribution	No Effect	Withi snags speci reduc snags burni

Priority Species	Vegetation Composition/Structure	Abiotic Factors	Special Factors	Status in the Project Area	No Action	Propo
	-Open understory cover -High snag density	flying	-Prefers tall snags adjacent to open areas.	of the species.		snags areas

Table 3.34. – High elevation grassland habitat priority migratory bird species (Latta et al. 1999):

Priority Species	Vegetation Composition Structure	Abiotic/Landscape Factors	Special Factors	Status in the Project Area	No Action	Proposed Action
Ferruginous Hawk	-Grassland -Scattered, isolated junipers for nesting -Sparsely vegetated grassland -Nest on elevated areas	-Elevation 3,500 to 6,000 ft. -Nest sites in isolated junipers, ledges, knolls, rock outcrops or pillars, cliff faces -Nests are placed in open with grand view -Shows no preference for shading	-Occur where larger populations of prairie dogs, ground squirrels, rabbits & pocket gophers exist. High sensitivity to human disturbance around nests.	**-No nesting known in the project-** **-The project area is primarily above 7000 ft** -There are no prairie dog towns in the project area.	**No Effect**	**-There is a small amount of grassland habitat that will be treated.** **-The creation of opening throughout the project area will improve prey availability for ferruginous hawks**
Swainson's Hawk	-Grassland -More grass and less woody shrubs than Ferruginous	-Elevation 4,900 to 7,000 ft, locally to 9,500 ft. in the White Mountains -Prefer large expanses of	-Eat grasshoppers during migration & on wintering grounds.	**No nesting known in the project area.**	**No Effect**	**-There are 27 acres of grassland habitat that will be**

Priority Species	Vegetation Composition Structure	Abiotic/Landscape Factors	Special Factors	Status in the Project Area	No Action	Proposed Action
	hawk habitat -Sparse shrublands, small, open woodlands Nest trees include: cottonwood, catclaw, acacia, tall cholla, juniper -Nests in small trees in smaller clumps, wind breaks, woody washes esp. when adjacent to red-tailed hawks	grasslands with interspersed trees or large shrubs -Primarily a tree nester, but also nest on utility poles, windmills	Foods: lizards, snakes, birds, ground squirrels, voles, pocket gophers. Non-breeders hunt communally & eat primarily insects. Not as sensitive to human disturbance as Ferruginous hawks.	**Due to the amount of potential openings within the project (224 acres), there is potential prey availability for Swainson's hawks.**		**improved.** **-The creation of openings throughout the project area will improve prey availability for Swainson's hawks**
Burrowing owl	-Grassland -Grasses and plant communities in early successional stage -Rock outcrops that attract burrowing mammals to provide burrows	Elevation 650-6,140 ft -Little to no slope -Dry, open, short grass, treeless plains, often associated with burrowing mammals -Need perches: fencepost, mounds, power lines, etc.	-Limited to areas with active small and/or burrowing mammals -Food: insects (grasshoppers, crickets, beetles) and small mammals, herps, birds	-The project area is primarily above 7000 ft -Habitat is limited as there are no known prairie dog colonies in the project.	No Effect	**-There is a small amount of grassland habitat that will be treated.** **-The creation of opening throughout the project area will improve prey availability for burrowing owls**

Priority Species	Vegetation Composition Structure	Abiotic/Landscape Factors	Special Factors	Status in the Project Area	No Action	Proposed Action
Grasshopper sparrow	-Grassland -plains lovegrass, sacaton sp., black grama, vine mesquite, little blue stem, agave, taller 30-50cm mixed tall bunchgrass and turf grass or sodgrass	-Elevation 3,800-5,300 ft - Moderately open grassland with patchy bare ground, flat to rolling hills. Some shrubs. Need low perches and tall grass during breeding.	-Feed on grasshoppers and other insects during breeding season -feed on grass seed in winter	-This species only occurs as an accidental species on the Coconino. -The project area is primarily above 7000 ft	No Effect	**-There are 27 acres of grassland habitat that will be improved.** **-The creation of openings throughout the project area will improve prey availability for grasshopper sparrow**

Habitat Types

Pine and Pine-Gambel Oak

Ponderosa pine habitat type occurs throughout the project area. Gambel oak is most prevalent in the southern portion of the project area. Four species have been identified as species of concern in pine-pine/oak habitats. They are northern goshawks, olive-sided flycatchers, Cordilleran flycatchers, and purple martins.

Aspen

Aspen habitat is limited with few acres occurring in scattered patches. The red-naped sapsucker has been listed as a species of concern in aspen habitat.

High Elevation Grassland

High elevation grassland habitat types include the mountain meadows and savannah grassland areas. Four species have been identified as species of concern in high elevation grasslands. They are ferruginous hawk, Swainson's hawk, grasshopper sparrow and burrowing owl.

Pinyon-Juniper

Transition, grassland and sparse pinyon-juniper are found north of 89 Mesa. Pinyon jay, gray vireo, black-throated gray warbler and juniper titmouse are species of concern in this habitat type. No treatments are proposed for the pinyon juniper.

Mixed Conifer

Mixed conifer habitat occurs along the west slopes of the project area. The Mexican spotted owl, northern goshawk and olive-sided flycatcher have been identified as species of concern in mixed conifer habitat.

Species

Olive-sided Flycatcher

Olive sided flycatchers prefer forest edges and natural or human-made openings in spruce-fir, mixed conifer, and ponderosa pine forest types. They nest high in coniferous trees and forage primarily on flying insects. Management recommendations include maintenance of creation of opening, management for uneven-aged forest structure, and retention of tall snags or dead-topped trees during salvage operations (Latta 1999).

Cordilleran Flycatcher

Cordilleran flycatchers breed predominately in pine, but also spruce, fir and aspen forests. They prefer mist and shaded forest. This species is a facultative secondary cavity-nester that also uses rock crevices, tree roots, and forks in small branches. Numbers of birds have been found to be positively correlated with canopy cover, within stand variability of tree sizes (most abundant in stands with five to twenty percent of pine basal area comprised of one to five inch dbh stems), and snag density. Cordilleran flycatchers need snags and downed logs for nesting. This species is a rare cowbird host. Management recommendations include management for greater than or equal to 2 snags per acre, manage for greater than 383 ponderosa pine/acre with high variability in size classes, and avoid mechanical thinning of canopy and snags (Latta 1999).

Purple Martin

In Arizona pine forests, purple martins prefer areas with high snag density adjacent to or in open areas. They are secondary cavity-nesters and forage primarily on flying insects.

Management recommendations include creation and retention of large snags (Latta 1999).

Red-naped Sapsucker
The red-naped sapsucker is considered a “double keystone” species for its role in excavating cavities and drilling sap wells, which are both used by a variety of other species for nesting and feeding (Natureserve 2007). The red-naped sapsucker is found foraging in coniferous forests that include aspen and other hardwoods, as well as riparian areas. The sapsucker generally nests in aspen trees or snags. This highly migratory species, travels to neotropical areas and also descends to lower elevations in winter.

Ferruginous Hawk
Ferruginous hawks historically nest in open shrublands, woodlands, and grasslands in southeastern and northern Arizona. The current distribution of breeding birds is restricted to Plains and Great Plains Basin grasslands in northern and northeastern Arizona. Ferruginous hawks range more widely in winter and are found throughout the state, often in agricultural areas and other open habitats (Latta 1999). Ferruginous hawks forage in montane grasslands in the Flagstaff vicinity. Management recommendations include the reduction of chemical control of prairie dogs, particularly in suitable nesting habitat and treatment to control exotic species encroachment of grasslands. Elevation range for this hawk is 3,550- 6,000 feet which is lower in elevation than the project.

Swainson’s Hawk
The hawks eat grasshoppers during migration and on wintering grounds. They have a wider variety of food sources than ferruginous hawks: e.g. lizards, snakes, birds, ground squirrels, voles, pocket gophers. Non-breeders hunt communally and eat primarily insects. Not as sensitive to human disturbance as ferruginous hawks.

Burrowing Owl
Burrowing owls take over burrows of prairie dogs and ground squirrels, and dens of coyote, fox and badger. They are also known to use artificial burrows. These owls also need perches, such as mounds and fence posts. They primarily eat insects and small mammals, but are known to take other small-sized species. Elevation range for this owl is 650- 6,140 feet which is lower in elevation than the project.

Grasshopper Sparrow
Grasshopper sparrows are known from southeastern Arizona, extreme southwest New Mexico, and adjacent to Sonora, Mexico. They prefer habitat in open grasslands between 3,800 and 5,300 feet. They are not expected to occur within the project area.

Direct and Indirect Effects

No Action

Under this alternative there would be no changes in the project area. Habitat conditions for birds would generally remain the same, notwithstanding natural processes. Alternative 1 would have no effect on migratory birds. However, dense forest conditions would continue to place forest-dwelling migratory bird habitat at risk with respect to stand-replacing fire.

Alternative 1 - Proposed Action and Alternative 2

Northern goshawk and Mexican spotted owl are discussed in previous pages of this report.

Proposed activities may affect these species directly through habitat modification, or indirectly through changes in prey populations.

Species richness is associated with pine, pine oak and mixed conifer habitats. Most of the high species rich areas are associated with MSO habitat in the project and treatments are designed to maintain habitat components important for these species as well as forest-dwelling passerine birds.

Olive-sided flycatcher is associated with forest openings and edges with numerous dead trees and live, mature pines. Disturbances to individuals from thinning and burning will be short-term. This species has been linked to burned areas of ponderosa pine (Altman 1997, Blake 1982, Lowe et al. 1978 in Latta et al. 1999), and burning will likely have short-term beneficial effects by increasing insect abundance post burn. Effects from vegetation modification and burning treatments will be beneficial due to the creation of openings and more edge effect, the retention of snags and large trees.

Cordilleran flycatcher is associated with mid- to late-successional stages with dense canopy cover and drainages that create a cool microclimate. Disturbances to individuals from thinning and burning will be short-term. Through vegetation modification this project will create some open habitat and reduce tree densities which favor early successional birds, not mid-to late successional ones like the flycatcher. However, the project area will continue to support mostly mid-successional and late-successional stages and will maintain habitat in canyons and drainages, which favor this species.

Purple martin is associated with open-canopy, open mid-story and open understory cover, and high snag density. A lack of snags likely limits the abundance and distribution of this species in the project area. The more open understory created by thinning and burning activities favors this species, and burning will likely have short-term beneficial effects by temporarily increasing insect abundance. Both action alternatives will provide open canopy habitat within the project.

Red-naped sapsucker nests in snags in mature to old aspen stands. It is worthy to note that drought conditions and ungulate grazing over the past several years have affected aspen stands in the project area. The remaining living aspen are severely stressed and are primarily seedlings. Both alternatives will treat 150 acres of aspen within the project area in an effort to and provide young seedlings an opportunity to develop into mature aspen over time.

Swainson's hawk is uncommon during June, July and during migration. The openings within the project provide prey availability for Swainson's hawks. Due to the creation of openings within the project, there will be a slight increase in prey availability within the project. It is expected there will be no detectable effect to Swainson's hawk.

Ferruginous hawk is a migrant or uncommon during the winter. The project elevation is not within the elevation range for the ferruginous hawk. Due to the limited grasslands and the elevation range in the project there will likely be little benefit from the project for ferruginous hawks. It is expected that there will be no detectable effect to ferruginous hawks.

Burrowing owl nests in burrows in dry, open grasslands. They also inhabit grass, forbs, and open shrub stages of pinyon pine and ponderosa pine habitats. There are no prairie dog colonies that provide potential burrows for nest sites and there are no known populations of burrowing owls within the project. The project elevation is not within the elevation range for the burrowing owl. There will be no detectable effect to burrowing owls.

Grasshopper sparrow The project elevation is not within the elevation range for this sparrow. There will be no detectable effect to the grasshopper sparrow.

Cumulative Effects

The area of analysis is the project area. Reviews of all projects (past, present and reasonably foreseeable) that have the potential to impact the above migratory birds were analyzed.

Ongoing recreational activities may result in disturbance of migratory birds. Removal of hazard trees for powerlines and highway safety will reduce snags and reduce habitat for snag dependant species. Present and future activities have common objectives to improve current conditions by improving soil conditions, reducing competition of trees, managing for return of the large tree components and providing snags, logs and coarse woody debris in sufficient quantity to provide for raptor species. No significant cumulative effects to migratory birds would occur from implementation of the proposed action when added to past, present and reasonably foreseeable future actions.

Cultural Resources

Affected Environment

The Jack Smith/Schultz Project area has a high archaeological site density. Within the project's current 11,827 acres there are 240 known archaeological sites. Approximately 9,650 acres of the project area have been surveyed (Lyndon, 2004; Gifford, 2007; Hedquist and Edwards, 2007) for a total survey within the project area of 82%.

The existing conditions and fuel loading of archaeological sites in the project area have been evaluated. Currently, only 16 sites are considered "fire sensitive" and the remaining 224 sites are fire tolerant. The archaeological resources in the project area have high levels of dead fuels growing in and around sites and structures. Dead and dying ponderosa, pinyon pine and other fuels throughout the project area have the potential to contribute to adverse fire effects on cultural resources from prescribed fire and wildfire, as well as potential ground disturbing suppression actions.

Direct and Indirect Effects

No Action

Existing fuels in and around archaeological sites will remain as they are and continue to increase. No action may result in high intensity wildfires that these sites have not been subjected to in the past resulting in possible subsurface artifact damage and potentially ground disturbing fire suppression tactics.

Fire suppression actions, particularly bulldozer operations, may damage or completely destroy surface and subsurface heritage resources resulting in the loss of those resources and their associated data. Intense wildfires may also contribute to increased erosion of sites leading to the loss of their research potential and eligibility for the National Register of Historic Places. Since most of the project area lies within the Wildland Urban Interface (WUI), aggressive suppression actions are likely to occur, and the possibility of damage to a significant number of heritage resources is possible through ground disturbing fire suppression actions.

Proposed Action - Alternative 1 and Alternative 2

Predicated on the fire return interval of ponderosa pine forests (Covington, 1997) and current fire effects research on heritage resources (Deal, 2004 and 1999; Jackson, 1998; Rude, In Press; and Ruscavage-Barz, 1999, et al) prescribed burning will be allowed within fire tolerant archaeological sites. These sites will not be adversely affected per the 2001 Region 3 Wildland Urban Interface Programmatic Agreement (WUI PA). Fire intolerant sites will be excluded from prescribed burning and all National Register eligible sites will be avoided by mechanical or other ground disturbing activities.

Unnatural fuel loading will be reduced in and around National Register eligible archaeological sites. Wildfires and associated suppression actions along with post fire erosion impacts will be reduced through thinning and low to moderate intensity prescribed burning. Initial reduction of heavy fuels may lead to an increase in site visibility, public visitation, and possibly vandalism.

Allowing low intensity prescribed fires to burn through prehistorically/historically burned archaeological sites along with thinning will reduce current fuel loads in and around those sites. This treatment will prevent extensive heat damage during any future wildfire event thus lowering fire damage to heritage resources. Increased visibility/vandalism resulting from loss of ground cover can be mitigated through archaeological monitoring, public education and law enforcement patrols. Additionally, ground cover will recover more quickly after a low intensity prescribed fire than after a high intensity wildfire.

If the Proposed Action or Alternative 2 is implemented, emergency fire suppression activities will be lessened and the potential for ground disturbing activities like bulldozer fire-line construction will be reduced, therefore, protecting National Register eligible heritage resources per the 1966 National Historic Preservation Act as amended, the 2001 Region 3 WUI Programmatic Agreement, and the 1987 Coconino National Forest Plan. Erosion from high intensity fire through soil sterilization and complete loss of ground cover will be reduced through selective thinning and low intensity burning that will not sterilize soil and leave large portions of the existing ground cover. Fire intolerant sites will be excluded from burning and ground disturbing actions unlike in an emergency wildfire situation. Also, closing roads in the project area will limit access to archaeological sites and, therefore, will be considered a beneficial effect.

Cumulative Effects

Fire damage, suppression actions, increased visibility/vandalism, and erosion are the primary issues involving archaeological properties in the 11,827 acre project area. Cumulative effects are minimal and can be reduced and/or mitigated through appropriate actions for this and other WUI Fuel Reduction Projects on the forest.

There will be no cumulative effects resulting from fire damage as current forest fuels projects allow the burning of previously burned or fire tolerant sites and exclude all fire intolerant sites from those actions. There will be no change in the current status or treatment of archaeological sites resulting from the project.

There will be no cumulative effect resulting from suppression any more than without with project. Currently in the WUI, the forest uses aggressive suppression tactics and life and property take precedence over all other values. If the Proposed Action or the Alternative 2 is implemented,

the proposed activities will reduce the need for emergency suppression actions, and in the unlikely even that suppression actions are necessary, they will be minimal after treatment.

There is a possibility of increased cumulative effects with regards to the visibility/vandalism issue for archaeological properties once the project is implemented. The Jack Smith/Schultz project has more archaeological sites of all other WUI Fuels projects on the forest combined. Much of the project area is used by local residents for recreation and the reduction of ground cover through thinning and burning has the potential to increase site visibility and vandalism issues. This situation can be mitigated through the measures previously identified. Cumulative effects of erosion issues resulting from prescribed burning are currently unknown. However, if low to moderate intensity prescribed fires are implemented and some vegetation remains, erosion should be minimized. To reduce any potential threat, post fire archaeological monitoring over the next 10 years, especially on slopes, drainages, and other high probability areas, will be implemented.

Landscape Aesthetics

Affected Environment

Much of the Jack Smith portion of the project area occurs within the urban interface between public and private lands primarily around the Timberline residential area. The Schultz Creek portion of the project is located across the Schultz Pass area to the west Flagstaff area around Cheshire Estates. The project area is generally the forested, natural appearing scenic setting prized by residents and visitors to the greater Flagstaff area, with special concern for the mountainous aspects and backdrops of the area. Like much of the Peaks and Mormon Lake Ranger Districts, the area is commonly and regularly used by the public for many different kinds of recreational purposes.

Historic scenic condition:

Historic descriptions and photos of the forested area near Flagstaff and the slopes of the San Francisco Peaks, which would have represented the project area, describe a relatively open landscape dominated by large “yellow pine” parks typical of the Flagstaff character type (Character Types of Arizona and New Mexico, USDA), with intermingled mixed conifer and aspen stands at higher elevations and on north facing slopes. Research suggests that a more open forest with less ground litter and more big trees, typical of the historic forest, is often more appealing to most people than the typical denser, younger stands that are found on the Colorado plateau today. The scenic attractiveness of the forested areas, with the San Francisco Peaks backdrop, produce the desired satisfaction, stress reduction, and general feeling of well-being the national forests are meant to provide. Historic conditions prior to the intensive management that followed European settlement represent the most scenic condition, and the highest level of scenic integrity that has existed on the Colorado plateau since historic times. What we know and understand about historic scenic conditions gives us a baseline for comparison with modern conditions, and helps us understand the scenic potential of the area.

Existing Scenic Condition:

Overall, existing scenic integrity for the area could be defined as ‘”moderate”, meaning the landscape appears slightly altered but with the natural appearing landscape dominant. Alterations to the natural appearing landscape within the project boundary (including private lands) includes roads and trails, power lines, and residential developments and all of the evidence of human

occupation and activity that are typical for cities of Flagstaff's size.

In recent years there has been a loss of aspen in the area due to drought, weather events, pine encroachment, and ungulate impacts. Aspen is an important part of the scenic integrity of the area, and a large reason this area is so appreciated by the visiting public.

Over the past several years, increased recreational use of areas adjacent to high use access roads and residential developments has resulted in increasing visible evidence of human activity such as fire rings, compacted bare ground, litter, and additional unauthorized roads and ATV tracks. All of these additional elements in the landscape detract from its natural appearance and degrade the areas' scenic integrity resulting in a "low" to "moderate" scenic integrity rating that generally equates to a "modification" Visual Quality Objective (VQO) for the specific areas that are affected.

In contrast, most of the project area located away from the residential areas and high use Forest roads have "high" scenic integrity that equates to the prescribed Retention and Partial Retention VQO's defined in the Coconino NF Land Management Plan for the affected area, particularly those areas on and adjacent to the slopes of the San Francisco Peaks and the Schultz Pass area. Past management has altered the vegetative pattern from the more desirable open pine stands with more big trees to the present generally less desirable condition with more dense stands of smaller trees. Even though the resulting landscape looks unaltered and natural to the casual observer and meets the original scenic objectives (VQO's) set forth in the Forest Plan, the existing scenic condition falls short of the potential scenic quality that was inherent in the historic ponderosa pine forest, with its open meadows strung along the major drainages in the area, and the open "parks" that were (are) dominated by large, yellow barked trees.

Land Uses

A major power line runs north and south through the east portion of the project area, to the west of Timberline. Several smaller lines run from this line to area subdivisions and other sites.

A large gas transmission pipeline owned by Transwestern Pipeline Company runs east and west through the project area, crossing Schultz Pass.

The City of Flagstaff operates a water transmission pipe line leading from the Inner Basin of the San Francisco Peaks along FR 146 (Waterline Road) to Schultz Pass, then west to Flagstaff via FR420.

Doney Park Water Company operates a water transmission pipeline from the Schultz Pass area eastward along FR420, then south through the forest to water storage tanks in the project area southeast of Timberline. This company also has a water storage tank located west of Lenox Park.

The Forest Service does not have a right of way in the area of private land on the west end of FR 420, approaching Hwy 180.

Recreation Opportunity Spectrum

The Forest Land Management Plan uses the Recreation Opportunity Spectrum system (ROS) to provide various kinds of recreation settings desired by the public, and managed to produce as many desired experience opportunities as are appropriate and within the National Forest role. For a complete discussion and description of ROS refer to the Needs for Change Report, (PRD # 29).

ROS classes for the Jack Smith and Schultz Creek as currently inventoried are:

- No Primitive ROS lands are located in the areas.
- The project area abuts Semi-Primitive Non-Motorized area at the Kachina Peaks Wilderness Area boundary, but no SPNM area is found within the project area.
- Approximately the west half of the Jack Smith portion of the project area (about 3,500 acres) is currently inventoried as Semi-Primitive Motorized, due mostly to the low-density, low-standard road system that exists throughout much of that area.
- The balance of acres in the project area are Roaded Natural class, including the FR420 (Schultz Pass/Schultz Creek) and FR556 corridors, the lands west of Timberline, and the lands west of Hwy 89 in the Sunset Crater exit area.
- No Rural or Urban areas of ROS classification are inventoried in the project area.

Environmental Consequences

Direct and Indirect Effects

No Action

No treatment will result in a landscape that will continue to meet visual quality objectives defined in the Forest Plan but will continue to fall short of meeting the long term scenic potential of the area as a whole. Visitors to National Forest System lands within the area will see a mostly natural appearing landscape with minor evidence of human activity, aside from the existing road system. The existing vegetative pattern of variable density ponderosa pine sites with large areas dominated by “over stocked” small diameter pine trees will continue to define the areas’ landscape character.

No treatment will result in a vegetative pattern that tends to decrease the viability of larger, older trees and to favor conditions that result in dense sites of small diameter trees; therefore reducing scenic quality. Crowding by smaller trees for moisture and nutrients will tend to accelerate mortality in the larger trees from insects and disease as well as to put them at risk of mortality by wild fire. The long term result will likely be a decrease in the number and extent of large “yellow pine” across the landscape, a trend already affecting parts of the project area where drought and bark beetles have killed hundreds of the oldest and biggest pine trees over the past few years. The ability of the landscape to reach the maximum inherent scenic potential that existed historically will be compromised with no treatment. Continued management of the present condition of vegetation in the project area could see a loss in considerable scenic value due to an increased risk of wildfire, insect infestation and disease. No treatment would be less disruptive to the scenery in the short term but is likely to result in a much less desirable scenic landscape in the long term compared to the Proposed Action.

No treatment will maintain the existing landscape character that is presently most common through out the Flagstaff character type. In the long term, this area will either be a remnant of what is now the dominant landscape character, or it will appear like other burned or partially burned landscapes. Either appearance will likely be less appealing to most people than the landscapes resulting from other local management actions, which will contrast with this area.

Common to Both Alternatives

The implementation of this project will not substantially alter ROS classifications or conditions. SPM conditions should be somewhat enhanced if some of the non-system social roads in the area

are obliterated. Scenic integrity as related to ROS classes should be enhanced as natural conditions are restored to stands in the area.

Cumulative Effects

Treatment of overstocked, unhealthy stands of all species in the project area, and a return to more natural conditions will, over time, contribute to increased scenic integrity above the current Moderate level in areas where this classification is found. High scenic integrity classification will be maintained in this important area, too, where it is found, including in both ponderosa pine and aspen stands.

Treatment will result in landscape patterns that will blend with other local landscape patterns resulting from recent management initiatives and trends to help create a more scenic landscape character for the Flagstaff character type in the long term. The Proposed Action will generally enhance the scenic quality of the affected landscape significantly more than with no treatment.

Soil and Water Affected Environment and Environmental Consequences

Existing Conditions

The Jack Smith Fuels Reduction Project is located in the Rio de Flag and Cedar-Deadman 5th code watersheds of the of the Little Colorado watershed. The project lies within three 6th code watersheds in the Rio de Flag 5th code watershed and one 6th code in the Cedar-Deadman 5th code watershed. Elevations range from around 9,283 feet on Sugarloaf Mountain. in the northern portion of the project area, to around 7,200 feet at Little Elden Spring. The following table is a summary of number of gross project acres within the 6th code watersheds and the percent of the analysis area within the watersheds.

Table 3.35: – Proposed Action Treatments Acres by 5th and 6th code watersheds

6th Code Watershed	% of watershed in Project Area	Acres
Rio de Flag 5th Code Watershed		
1502001514A-Weatherford Canyon 6th code	21%	9,193
1502001514B-Elden 6th Code	1%	340
1502001514D-Schultz Creek 6th Code	4%	1,578
Cedar-Deadman 5th code watershed		
1502001616C-Inner Basin 6th Code	2%	716
Grand Total		11,827

The majority of runoff occurs during the fall and winter months (October to April). Snowmelt, from late February to mid-May produces most of the runoff. Occasional winter frontal storms also produce runoff from heavy or prolonged rain events. Very little runoff occurs during the months of mid-May to October.

Eleven Terrestrial Ecosystem Survey (TES) Map units exist within the proposed action area. Each unit describes an area with similar slope, vegetation, climate, and physical soil properties (Miller et al, 1995). All soils are currently in satisfactory condition.

Table 3.36: - Terrestrial Ecosystem Survey Map Unit Descriptions of the Project Area from Miller et al, 1995.

Map Unit/ Erosion Hazard	Size (acres) By Treatment Type (Proposed Action)	Landform Description
551 Slight	FR<12" 361 Acres FR< 9" 229 Acres Meadow 26 Acres PB 191 Acres UF 2819 Acres UR 3207 Acres NT 282 Acres	Surface rock fragments may limit most management activities including revegetation and reforestation efforts. Natural regeneration potential is high. Timber production potential is moderate (site class II). Upper landscape positions are very bouldery and further limit management activities.

Map Unit/ Erosion Hazard	Size (acres) By Treatment Type (Proposed Action)	Landform Description
553 Slight	FR<12" 78 Acres PB 7 Acres UF 95 Acres UR 471 Acres NT 30 Acres	This map unit occurs at the low elevational range of Pipos and Fear2. Timber production potential is low (site class III). Natural regeneration, reforestation and revegetation potentials are low due to surface rock fragments. This map unit is found predominantly on the north and east sides of the San Francisco Peaks.
575 Severe	PB 34 Acres UR 44 Acres NT 122 Acres	This component has a severe erosion hazard. Maintenance of vegetative groundcover is essential to prevent sheet and rill erosion. Soils are above the angle of repose. Tree roots play a major role toward stabilizing these slopes. Removal of trees should be selective with minimum exposure of mineral soil. Steep slopes, surface rock fragments and rock outcrop limit most management activities
586 Slight	UF 10 Acres	Elevated plains. These soils are subject to trafficability problems and soil damage (compaction, puddling, and displacement) when wet.
611 Moderate	PB 2 Acres NT 28 Acres	This component represents a fire disclimax dominated by Potr5. The Forest Plan objectives call for management of this disclimax to provide for wildlife habitat, visual quality and opportunity for dispersed recreation. This component has a moderate erosion hazard. Maintenance of vegetative groundcover is essential to prevent sheet and rill erosion. Natural regeneration, reforestation and revegetation potentials are high.
613 Severe	UR 305 Acres NT 913 Acres	This map unit has a severe erosion hazard. Maintenance of vegetative groundcover is essential to prevent sheet and rill erosion. Steep slopes and surface rock fragments limit most management activities.
640 Moderate	FR<12" 3 Acres PB 15 Acres	This map unit is classified as a fire disclimax. Fire created and maintained the open park-like conditions of these grasslands in the past. Some of this map unit lies within the Kachina Peaks Wilderness Area and has slopes ranging from 0 to 40 percent. This unit occurs on warmer, dryer aspects than the adjacent mixed conifer map units. This map unit is dependent on recurrent wildfire to maintain the high canopy coverage of grass and low canopy coverage of mixed conifer. It has a moderate erosion hazard and high revegetation potential. Surface rock is variable and may restrict certain management activities.
653 Moderate	FR<9" 14 Acres PB 140 Acres UR 63 Acres NT 70 Acres	These soils are subject to trafficability problems and soil damage (compaction, puddling and displacement) when wet. These problems can be mitigated or avoided by restricting ground disturbing activities to periods when the soils are dry. This map unit has a moderate erosion hazard. Maintenance of vegetative groundcover is essential to prevent sheet and rill erosion. Surface rock fragments are variable and may restrict certain management activities.

Map Unit/ Erosion Hazard	Size (acres) By Treatment Type (Proposed Action)	Landform Description
654 Moderate	FR<12" 227 Acres FR<9" 23 Acres PB 162 Acres UF 74 Acres UR 181 Acres NT 752 Acres	This map unit occurs on moderately steep to steep slopes which may limit some management activities. Surface rock fragment size classes ranging from cobbly to bouldery, depending on geographic location, may limit some management activities. This map unit has a moderate erosion hazard. Maintenance of vegetative groundcover is essential to prevent sheet and rill erosion. Natural regeneration potential is high.
710 Severe	NT 64 Acres	A portion of this map unit occurs within the Kachina Peaks Wilderness Area. This map unit is currently in mid to late seral stage as indicated by the high canopy cover of Potr5. Reforestation and revegetation potentials are low due to surface rock fragments. Natural regeneration potential is high. This map unit has a severe erosion hazard. Maintenance of vegetative groundcover is essential to prevent sheet and rill erosion.
785 Severe	NT 29 Acres	Most of this map unit is within the Kachina Peaks Wilderness Area. Most areas are currently in mid-seral stage, due to past wildfires, as indicated by a higher than normal canopy cover of Potr5, Fear2 and Mumo. Snow avalanche hazard is moderate in areas with little or no tree canopy cover. This map unit has a severe erosion hazard. Maintenance of vegetative groundcover is essential to prevent sheet and rill erosion. Natural regeneration potential is high. Reforestation and revegetation potentials are low due to oversteepened slopes.

FR<12" = Fuel reduction <12";
FR< 9" = Fuel reduction <9"
PB = Prescribed Burn
UF = Uneven aged Fuel Reduction
UR = Uneven aged Resource Emphasis
NT = No treatment

The survey units contain predictions and limitations of soil and vegetation behavior for selected land uses. The survey also highlights hazards or capabilities inherent in the soil and the impact of selected uses on the environment. Each representative soil unit was visited in the spring of 2007 to assess and verify soil condition. Overall, soil condition for the area is satisfactory.

Organic matter consists of humus, litter, and dead woody material on or in the soil. These materials are important because they increase infiltration, improve aeration and retention of moisture, support microbial activity, and are reservoirs for short and long term nutrient supply. Coarse woody debris (CWD) is material from tree limbs, boles, and roots greater than 3 inches in diameter. Coarse woody debris performs such functions as protection of forest floor, seedlings and wildlife, and acts as a sink for nutrients such as sulfur, phosphorous, and nitrogen (Graham et al, 1994). In the project area, where fire frequencies historically are often less than 10 years,

CWD has probably increased in abundance due to extenuation of fire frequency over the last 100 years.

Water

There are no live streams within/and or adjacent to the project area. Schultz Creek is classified as a riparian stream reach. There are approximately 700 acres of the City of Flagstaff Inner Basin municipal watershed within the project boundary, as well as infrastructure for the City of Flagstaff and Doney Park Water Company water delivery systems within and directly adjacent to the project area (Fleishman, 2008).

Environmental Consequences-Soils and Water

No Action

There will be no change in soil condition from current conditions. No treatment will perpetuate stand conditions that are conducive to the occurrence of intense wildfire. If and when such an event occurs in the area, severe fire effects on hydrologic function could occur. Wildfire can have major effects on vegetation, ground cover, and soil properties, resulting in reduced infiltration and increased overland flow (Neary et al, 2005, Wells et al 1979). Intense wildfire can reduce soil surface resistance to erosion resulting in accelerated soil erosion, particularly because of heavy summer precipitation. Peak discharges are likely to increase because of wildfire, and water quality is likely to decrease due to increased sediment loads.

As forest canopy and protective organic matter is consumed by severe fire, interception would be reduced and soil erosion could increase. Changes in forest canopy cover creating large openings can effect snow accumulation and melt patterns and consequently the timing, quantity, and quality of runoff from severely burned watersheds. Changes in soil and watershed conditions become more significant as fire size and intensity increase.

Burning can effect soil resources through reduction of course woody debris, damage to soil physical structure, and damage to soil biological features (Wells, 1979; Graham et al, 1994; Neary et al, 2005), as well as providing positive effects through nutrient flushes from the burn (Covington and Debano, 1990). This increase is short-lived due to rapid biological and chemical immobilization of released nutrients. The effects from fire are directly related to fire intensity, with the general rule of thumb that the greater the burn intensity, the greater the amount of damage to forest soils (Neary et al, 2005; Wells, 1979). In most cases, soil erosion by wind and water is increased in the short term. The severity and duration of accelerated erosion depend on slope, soil texture, recovery of plant material, severity and extent of burning, and post fire precipitation timing and intensity. Duration of the effects of fire on soil structure range from 1 year to many decades depending on the severity of the fire and rate of recovery (Neary et al, 2005, Wells et al. 1979).

High degrees of soil heating can destroy soil structure, affecting soil pore size distribution and overall porosity. This reduces infiltration rates and increases overland flow. Soil water repellency is increased as organic matter is heated. The more severe the fire, the deeper the water repellant layer unless heating is so intense that surface organic matter is destroyed.

Northern Arizona University's ForestERA project has examined relative risk of wildfire to watershed attributes, namely flooding potential and sedimentation potential[6]. The potential from flooding is all medium high (78%) to high (22%), with the potential for sedimentation rated at low (8%), medium low (77%), and medium high (14%) within the project area. The short-term affects are similar to long-term affects, however, the potential for more damage to the watershed increase over time as fuel loads continue to increase.

The effects of wildland fire on municipal water supplies include: changes in erosion hazard and erosion rates, debris and mudflow hazards, the ability of channels to handle sediment, and the formation of water-repellent soil layers (USDA and USDI,2004). With the assessment of flooding potential at medium high to high across the project area, the probablility of flooding that could damage infrastructure for both municipal water entities is very high. The increased sedimentation potential would increase suspended sediments and decrease water quality in the short-term that would have the greatest affect at the infiltration galleries in the Schultz Tank area. Over time, this effect would be diminished as the site recovers. As stated earlier, the fire intensity and corresponding potential damage to infrastructure is expected to increase in the long-term with ever increasing fuel loadings, therefore, it is expected that the potential damage to infrastructure from flooding will also increase over time.

Proposed Action – Alternative 1

Harvest and Burning Activities

The most important direct effect on soil condition from the action alternatives will be from mechanical activities (machine piling, feller buncher, and skidder). Ground cover will be disturbed through mechanical actions. Skid trails will tend to compact the ground and, in some cases, channel water. Some on-site soil loss would occur on soils with moderate and severe erosion hazards. Under the Proposed Action, 349 mechanical treatment/prescribed burn acres (3.8%) and 34 prescribed burn only acres (0.4%) occur on soils with severe erosion hazard, 585 mechanical treatment/prescribed burn acres (6.5%) and 328 prescribed burn only acres (3.6%) occur on soils with moderate erosion hazard. On soils with Slight erosion hazard, 7,296 acres (81%) will be treated mechanically and burned and 198 acres (2%) will be prescribed burn only. The implementation of Best Management Practices (BMP's) will minimize impacts to on-site soil quality and productivity from the proposed activities.

Best Management Practices including skid trail location prior to felling, attention to wet weather operations, and effective erosion control treatments will minimize adverse soil effects on soils with moderate and severe erosion hazards. To provide for long-term soil productivity, roughly 5 tons per acre of CWD will be retained in the project area, and will be retained through both piling techniques and burning under conditions where organic matter is not totally consumed and will minimize impacts to forest soils from burning and harvest activities. Reductions in soil porosity may occur from loads compacting the soil or from removal of ground cover and organic matter. Compaction will be minimized on all soil units through designating skid trail and landing locations. Past monitoring of timber sales on the Coconino National Forest have displayed the effectiveness of timber sale BMP's to reduce impacts to soil resources (Jagow, 1994; Fleishman 1996, Fleishman 2005).

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[6] For a complete discussion of the data sources and limitations of the data layers, please refer to the following website http://www.forestera.nau.edu/data_derived.htm

The effects from prescribed burning are similar to wildfire effects; however, almost all of the prescribed burning will be of low intensity which will minimally heat the soil. Low severity fires burning only surface fuels do not significantly heat the soil surface. Soil temperatures do not rise substantially where repeated cool-burning fires are used to reduce fuel buildup (Debano et al. 1998). As stated above, it is estimated that about 1% of the proposed prescribed burn acreage will have high intensity fire (piles and logs), totaling about 100 acres of ground disturbance. Ground disturbance and compaction is estimated to occur over < 10% of the areas that are mechanically treated. Assuming all harvest activities will be mechanically harvested, there will be approximately 8,000 acres of harvest activities. Therefore, disturbance where ground cover is removed will occur on approximately 800 acres. The expected duration of effects is less than 10 years. Additional loss of ground cover will occur through the burning phase of the project. Prescribed burning will occur on approximately 9,220 acres. It is estimated that high intensity burns that would burn to mineral soil will occur on < 1% of the area, or just less than 100 acres. Pile burning will occur at landings after trees are whole-tree skidded and will occur on the same acres of disturbance that are included in the harvest acres. Therefore, the project will created short-term ground disturbance on about 900 acres out of about 11,800 acres (about 8% of the project area). The combination of thinning to open the stand and burning will likely result in the promotion of herbaceous vegetation over ground litter as the major component of ground cover. Stand canopy conditions and fuel loading will be reduced so that the potential effects of intense wildfire are reduced. The actions proposed with BMP implemenatation will manage ground surface layer to maintain satisfactory soil conditions i.e. minimize soil compaction and maintain hydrologic and nutrient cycles.

The only notable ephemeral stream course in the area is Shultz Creek. Some potential off-site effects include sedimentation from ground disturbing activities, and potential short term increases in runoff from disturbed surfaces. Adequate buffers have been developed on all major drainages in the area. Only a small portion of anticipated soil loss will travel off site and enter ephemeral stream channels. Most of this sediment will remain in storage rather than move downstream. Other potential effects include long term decreases in accelerated soil erosion from road closures on approximately 38 miles of roads, and reduction in the potential effects of intense wildfire within the treated watersheds. Each of these effects may have a slight influence on water quality within the respective watersheds.
The proposed treatments will help to reduce the probability of intense wildfire within the treatment areas. Prescribed burning will have the effect of reducing litter accumulations and most likely promoting herbaceous vegetation. Short-term reductions in ground cover will result where litter is totally consumed (Previous experience on the Forest, and Sackett et al. 1993) shows that this bare soil is covered by litter or vegetation within one to two years. Total consumption of ground cover will be patchy and will not adversely affect overall ground cover. Pile burning of logging slash is not expected to have any significant effects on soil characteristics, (Seymour and Tecle, 2003).

Transportation System

The proposed action will require up to about 2-5 miles of Temporary Road construction. Temporary roads are defined as roads associated with a timber harvest contract, not intended to be a part of the forest development transportation system, and not necessary for resource management (FSM 77-5.7/27/94). Potential undesirable consequences of forest roads include adverse effects on hydrology, habitat fragmentation, predation, invasion by exotic species, degraded water quality, use conflicts, destructive human actions (for example, trash dumping, illegal camping, fires), and loss of soil productivity (Gucinski et al. 2001). Currently, about 98.5

miles of road exist within the project area. Many of these roads will require some degree of maintenance for project activities. The proposed action intends to decommission 38 miles of existing roadway by closing, scarifying, and re-vegetating. These areas will not likely return to full productivity for many years, but will become stable after only a few years. The area of rehabilitated roadway amounts to roughly 70 acres.

Cumulative Effects

The cumulative effects of land disturbing activities can be seen as on site, or downstream of the activity. On-site effects include changes to soil characteristics, vegetation, and nutrient cycling. Downstream effects may include changes in the amount and timing of overland flow, and sediment transport. An appropriate area to consider cumulative effects area is the Weatherford Canyon 6th code watershed (44,703 acres), the Shultz Creek 6th code watershed (40,063 acres). These watersheds accumulate into Rio de Flag and are sub watersheds of the Rio de Flag 5th code watershed. The project occurs within the remaining two sixth codes in such a small percentage that they will not be considered in the cumulative effects analysis. A ten year time period is reasonable to consider when evaluating cumulative effects for soil and watershed because any on or offsite effects from ground disturbing activities generally become negligible after this period of time. The effects from a major wildfire would be an exception, but none have occurred in either watershed Shultz/Jack Smith. The past, current, and future and foreseeable actions that will be considered in terms of potential on-site cumulative effects are listed in the tables in the Revision to the Soil and water Specialist Report and are summarized in the table below.

Table 3.37: Summary of Ground Distrubing Effects within the Cumulative Effect Analysis Area, by 6th code watershed

	Weatherford Canyon					Schultz Creek				
	Total Ac.	GD Ac.[7]	Project GD Ac.[8]	Total GD	% of 6cd	Total Ac.	GD Ac.	Project GD Ac.	Total GD	% of 6cd
Harvest	2,108	211	675	886	2%	6,156	616	122	737	2%
Burning	4,332	43	72	115	<1%	6,569	66	14	80	<1%
Grazing	21,783	218	0	218	<1%	29,763	298	0	298	1%
Roads	256	256	-44	212	<1%	238	238	-49	189	<1%
Total Acres	28,479	728	703	1,431	3%	42,726	1,217	87	1,304	3%

Overall, treatments are designed to reduce the likelihood of landscape level wildfire and the watershed disturbing effects associated with such a fire. Improvements in road and recreation

[7] GD Acres = Ground Disturbance Acres form Cumulative Effects Activities. Harvest acres are calculated by taking 10% of harvest acres, Burning and grazing acres are calculated at taking 1% of the project activity. Roads acres are calculated by assuming a 20 foot wide road bed.

[8] Project GD Acres =Ground Disturbance from the Proposed action. Harvest and burn acres are calculated the same as GD Acres, no grazing is proposed under this action so no cumulative acreage, and decommission of roads is a subtratction of roads calculated using a 20 foot wide road.

management would improve soil condition in the long term, and consequently have a positive effect on soil condition and perhaps downstream water quality.

Assuming that soil and water mitigation measures are employed, the harvest and burning treatments proposed will add about 900 acres of cumulative effect on soil condition and water quality to about 1,800 acres of current ground disturbance, for a total of about 2,700 acres of ground disturbance within the cumulative effects analysis area (about 3% of the cumulative effects area—see Table 3.37). No threshold for ground disturbance occurs within the Coconino National Forest Plan. However, Forest Service Manual 2509.18 recommends a guideline of a 15 percent reduction in inherent soil productivity potential as a basis for setting threshold values for measurable or observable soil properties or conditions (USDA, 1991). The 15% threshold of ground disturbance where soil productivity crosses a negative threshold has not been exceeded with this project for the cumulative effects boundary. The use of BMP's provides further protection of soil resources is provided by the use of Best Management Practices that minimize the potential for soil disturbance. Because of these facts, this Alternative will not provide a detrimental cumulative effect to soil resources within the cumulative effects boundary watershed.

Alternative 2

Harvest and Burning Activities

The effects from harvest activities will be the same as Alternative 1. The effects of prescribed burning are the same as Alternative 1, however, this alternative will add approximately 150 acres of burning to the project. This will add approximately 2 acres of ground disturbance, and as such, the effects are virtually the same between the two alternatives. The actions proposed with BMP implemenatation will manage ground surface layer to maintain satisfactory soil conditions i.e. minimize soil compaction and maintain hydrologic and nutrient cycles.

Transportation System

The effects from the transportation system are the same as Alternative 1.

Cumulative Effects

The cumulative effects boundary, time of effects, and past, current and future projects are the same as Alternative 1. The only difference in the cumulative effects between Alternative 1 and Alternative 2 is that Alternative 2 has two more acres of ground disturbance from burning—which equates to the same cumulative effects as Alternative 1. No threshold for ground disturbance occurs within the Coconino National Forest Plan. However, Forest Service Manual 2509.18 recommends a guideline of a 15 percent reduction in inherent soil productivity potential as a basis for setting threshold values for measurable or observable soil properties or conditions (USDA, 1991). The 15% threshold of ground disturbance where soil productivity crosses a negative threshold has not been exceeded with this project for the cumulative effects boundary. The use of BMP's provides further protection of soil resources is provided by the use of Best Management Practices that minimize the potential for soil disturbance. Because of these facts, this Alternative will not provide a detrimental cumulative effect to soil resources within the cumulative effects boundary watershed.

Recreation and Transportation System

Affected Environment

Recreational use of the project area includes multiple types of trail uses, such as hiking, biking, and horseback riding on numerous system trails and roads; a significant number of non-system "social" trails exist within the project area, especially near subdivisions and leading up to the Waterline Road.

Other recreational uses of the area include developed camping at the Little Elden Horse Camp, firewood gathering, hunting, exercise walking and running, dispersed camping, especially in the Schultz Pass area, recreational driving for pleasure (viewing scenery), wildlife viewing, environmental education, paintball shooting, outfitter and guide activities, and ATV and motorcycle riding.

In general, the recreation management goal in the project area has been guided by the Coconino National Forest Land Management Plan and environmental analysis documents that have updated the forest plan (e.g. Flagstaff and Lake Mary Ecosystem Analysis – FLEA), with emphasis on natural-appearing, semi-primitive forest settings, especially those areas that are popular and influenced by the urban interface near Flagstaff. This emphasis includes focusing primarily on day use activities, considering the needs and desires of the recreating public who are being served. Recent management of the two planning areas has downplayed emphasis on developed site facilities in the area, choosing mostly to maintain what is currently there, and especially trailheads. Little emphasis has been placed on management of national forest land settings in this area that reflect rural or urban forest settings; instead the focus has been on providing wildland recreation settings, with natural-appearing, semi-primitive conditions. The manifestation of this has been active closure and obliteration of un-needed roads and trails in parts of the area, increased focus on trails management and interpretation of natural resource values, etc.

Sharp increases in demand currently being seen for all types of recreational uses in the areas, and particularly for mountain biking, ATV riding, and horseback riding, are being taken into account in various planning processes that affect the areas, including the on-going Forest Land Management Plan Revision effort, the national Travel Management Rule analysis, and others. The forest is attempting to provide more of these desired recreational opportunities while balancing the protection of natural resources.

Trails

Several system and non-system trails are located in the area, mostly hiking and cycling trails, and especially in the Schultz Pass area.

- The very popular **Weatherford Trail** leads from the trailhead at Schultz Pass north through the project area and on to Fremont Saddle.
- The **Kachina Trail** begins within the project area at its intersection with the Weatherford Trail, about 1.5 miles north of the Schultz Pass Trailhead, and goes on along the Kachina Peaks Wilderness Area boundary to the Arizona Snowbowl, 7 miles to the northwest.
- The **Schultz Creek Trail** begins at the Schultz Pass Trailhead and runs in the drainage along Schultz Creek to the west, down to the Schultz Creek Trailhead just east of Highway 180.
- The **Deer Hill Trail** is in the east side of the project area, and begins at the Elden Springs Horse Camp and runs north about three miles to it's intersection with FR420 (Schultz Pass

Road). This trail is popular with campers at the Horse Camp, and for local residents and others from the Timberline residential area lying to the east.

- A one-mile connector trail runs from the Horse Camp northeast where it intersects with FR556 and the **Little Elden Spring Trail**, thereby connecting trail users into the Schultz Pass, Mount Elden and East Flagstaff areas.
- The **Arizona Trail**, which runs from Mexico to Utah, passes through this area via the Little Elden Spring Trail through Schultz Pass. While this segment has been designated, a new section from Schultz Tank northwest below the Wilderness boundary will be constructed in the near future.

Non-system, improperly located, user-created "social" trails (both motorized and non-motorized) are prevalent throughout the project area, primarily around subdivisions and extending into various areas of Schultz Pass and to a lesser extent the Jack Smith area. The problem is increasing each year as more people move into the area for its recreational attributes, and thereby create the trails as they use the forest adjacent to their properties. There are approximately 50 miles of these un-planned trails, including both motorized and non-motorized trails. Many of these trails are improperly located and maintained, and resource issues result, particularly with erosion problems.

Use of trails, including non-system trails, is moderate to high for the various types of uses. The Weatherford, Kachina, Schultz Creek. Elden Spring, and Deer Hill Trails all receive high use. For example, the Deer Hill Trail receives approximately 5,000 to 8,000 uses per year (depending on weather, fire closures, etc.) for mountain biking, horseback riding, and exercise walking and hiking. The Schultz Creek Trail, with about a 210 day use season for mostly mountain bikes, receives approximately 6,000 to 12,000 uses per year, depending on weather.

Many of the non-system trails, e.g. ones leading from people's back yards, illegal ATV and biking trails, etc. receive moderate to high use, estimated to be approximately 10,000 to 20,000 users per year.

With the Forest Service concentrating on maintaining established system trails in the area, and with limited budget to address other needs, many non-system trails, often poorly located, have associated resource problems such as erosion, wildlife impacts, poor user experience, etc.

Recreational Driving

Many of the roads in the project area are often used for recreational driving, especially FR556 to Schultz Pass, FR420 across Schultz Pass, and FR552 to Lockett Meadow. This type of recreational use is defined as use of both system and non-system (un-planned) roads by full-sized motor vehicles for purposes other than commuter travel. For example, these activities include using roads to enjoy the forest surroundings, seek wildlife, access dispersed camping sites, or for seeking the challenge of driving rough roads in muddy conditions—the latter being the most damaging type of recreational driving use in the project area. Many of the non-system roads in the project area contain multiple track braids, low-spots and washouts which can cause some road users to attempt to avoid these spots further braiding the road, while others will drive into them for the challenge and further damage the road surface; this causes resource impacts such as soil and water degradation, and reduces the quality of other user's experience in the area.

While the district has no road use data for the project area (traffic counts), it is reasonable to assume recreational driving use of the road network in the project area is high, similar to that of other areas of the forest, particularly around urban interfaces. Use is high to very high for the Schultz Pass area during the driving season. Some areas receive very high use during particular seasons, e.g. for viewing fall foliage at Lockett Meadow and Schultz Pass.

Dispersed Camping

The Schultz Pass area, including west along FR420 to the private land boundary in the vicinity of West Flagstaff, receives significant amounts of overnight camping (General Forest Area, or "GFA") use during the approximate 210 day use season, and particularly in the Schultz Tank area. Overnight camping use is highest in the area on weekends and holidays, and total yearly use is estimated to be about 5,000 to 10,000 user days per year, depending on weather. People camping here enjoy the high-altitude, mixed-conifer environment and the many hiking and other recreation opportunities found in the area, including in the adjacent Kachina Peaks Wilderness to the north, and in the Mount Elden/Dry Lake Hills area to the south. Because of the limited numbers of suitable campsites in the area, and considering the access route condition and surrounding terrain, most people using the area are tent or truck campers, with a few people using camp trailers.

Because of it's proximity to Flagstaff, the terrain, and other considerations, the Jack Schultz part of the project area does not receive significant amounts of dispersed overnight camping use. Most overnight camping in this area is incidental, short-stay (e.g. one or two nights), and primarily occurs around the Timberline and northeast part of the project area, and also from incidental use off Highway 89, especially off FR552 (Lockett meadow Road) and FR420 (Schultz Pass Road). Overnight camping use in this part of the project area is estimated to be approximately 4,000 to 6,000 uses per year.

All-Terrain Vehicle and Motorcycle Use

All-Terrain Vehicle (ATV) and motorcycle use is popular across the forest, and especially throughout this project area. This use has been increasing significantly in recent years. Use tends to occur more around subdivisions and developments, with problems springing up with illegal trails along the urban interface and higher upslope near the Waterline Road and Deer Hill trail. In recent years an extensive network of social trails has evolved in the east side of the project area from cross-country travel by ATVs and motorcycles, with approximately 50 miles of illegal ATV and motorcycle social trails currently existing in the total project area. These trails, mostly developed from repetitive use, frequently cause resource damage such as vegetation trampling and erosion, as they are not planned and designed with thoughts of sustainability or using accepted trail design and construction practices. Social trails often develop when users fail to find the recreational opportunity they seek on established Forest System trails. Increasingly, user interface problems are occurring, too, as non-motorized and motorized use of the relatively small area increases, and especially in and around popular areas.

There are no designated motorized system trails in the project area. The Schultz Creek Trail has recently been converted from multiple use (motorized and non-motorized) to non-motorized use, as planned through the Fort Valley project. Current planning processes (e.g. TMR, forest plan revision, etc.) are addressing this matter, attempting to identify a motorized trail system for the area.

Most of the existing social motorized trails in the project area link existing Forest roads to create longer loop riding opportunities. There are also loop single-track social motorcycle trails found in the project area.

Wilderness

The terrain of the east side of the Kachina Peaks Wilderness Area is very steep, and so non-motorized recreational use from the Jack Schultz side of the project area is relatively low, and

motorized intrusions are low in number, too, with a few notable exceptions. With the Waterline Road open only to administrative motorized use, but receiving high non-motorized public recreational use, impacts to the adjacent Wilderness are low. When motorized intrusions into the Wilderness are discovered they are dealt with immediately.

The area of Wilderness that the Schultz Creek side of the project abuts receives significant amounts of recreational use, particularly on the system trails in the area. On some days, particularly on holidays and summer weekends, use within the Wilderness area, and mostly on the trails in the area, is moderate to high, and sometimes Wilderness values and character objectives are not met as a result, e.g. opportunity for solitude. Mountain biking intrusions are fairly common in this part of the Wilderness area, especially on the Kachina Trail. When motorized intrusions into the Wilderness are discovered they are dealt with immediately.

Latent Community Use

As is the case in other urban interface areas on the Forest, there is a high level of recreational use of the Forest around the general Flagstaff urban interface – the forest serves as the community's backyard. Survey of the lands around the Timberline and Lenox Park community boundaries, as well as the developed area to the west of Schultz Creek in Flagstaff, reveals the evidence of fairly intensive public use, with numerous social trails, including some used by ATVs and motorcycles, and the occasional "fort" constructed by children. Much of the use is non-motorized, pedestrian use in the form of people walking, hiking, exercising, and walking pets from their homes. This use is endemic to such areas, and most often is not problematic to other resources such as wildlife, soil and water, etc., with some exceptions where such trails pass through sensitive wildlife habitat or are the cause of erosion problems.

Like on most parts of the Forest, the Jack Smith and Schultz Creek project area includes some unique, non-traditional recreation uses, the most prominent of which is paint ball shooting, and the growing sport of geocaching. There is a popular paint ball area just north of Elden Spring Horsecamp in a large boulder area, which has been problematic in the past with littering and marking of natural features. These problems resulted in the relocation of a toilet at the Little Elden Spring Trailhead a few years ago, as the facility was frequently vandalized. Free-riding, a downhill mountain biking sport, is occurring south of the Schultz Creek part of the project area.

The issue of trespass use of national forest lands exists across the project area, and generally along subdivision lines. In several locations along the property boundaries people have constructed unauthorized fences, smaller out buildings, tree forts, cooking areas, etc. on national forest land.

Roads and Transportation System

The management objective for transportation system planning in the area for the last decade or more has been to scale down the road system in order to provide a balanced system that meets practical transportation needs and management desires for natural, wildland settings near major communities. While seemingly contradictory goals, this has basically worked, as initial road densities (for both system and non-system roads) in much of the area were (or are) higher than forest plan specified densities (aprox 2 miles of road per square mile of national forest land) This, coupled with downward trending in road maintenance funding, and public desires for wildland settings "out their back doors", has resulted in the identification of core arterial roads through much of the area, with fewer collector and local roads leading from these roads

The 2002 Flagstaff and Lake Mary Ecosystem Analysis (FLEA), recognizing resources concerns,

diminishing funding to maintain roads, and the high density of roads, calls for a basic system of roads in the area that is compatible with today's maintenance capabilities (funding) of the agency and other resource objectives. FLEA prescribes the closing or decommissioning (obliterating) of remaining un-needed roads that exist in the area.

There are 98.5 miles of inventoried roads in the project area resulting in an open road density of 5.4 miles per square mile. The miles of inventoried roads include the non-systems roads and all miles of the 5 different maintenance levels from the Transportation Atlas.

System Roads

After the Forest Plan was signed, the Forest Service identified the open road system that met the target densities in the Resource Access Travel Management Plan (RA/TM). The RA/TM plan gave every road in the Forest Service System a category of open (unimpeded travel). Closed (physical barrier at either end with the road in-between intact), or obliterated (ripped by mechanical means and seeded). Public input was included in the RA/TM decisions.

After the RA/TM category was established, the agency engineers assigned each Forest Service road a maintenance level.

Table 3-38 includes miles of road, by operational, or the current, maintenance level, that are in the Forest transportation system for the project area.

Table 3-38 - Current road mileage and maintenance levels.

Sub-Area Name	Non-System Roads	Maintenance level 1	Maintenance level 2	Maintenance level 3	Maintenance level 4 & 5	Totals
Jack Smith		24.2	30.8	11	0	66
Schultz		4	12.3	4.8	0	21.1
Total for Jack Smith/ Schultz	**11.4**	**28.2**	**43.1**	**15.8**	**0**	**98.5**

Many of these system roads begin as user created roads and were incorporated into the roads system in the 1980s, prior to the RA/TM process. They have inadequate drainage, are most often poorly located and many are causing resource damage. Roads and off-road vehicle use affects wetland sites by compacting soils, which in-turn affects nutrient cycling, changing decomposition rates, and soil physical properties. This change in upland soil condition affects the amount of material that enters wetland sites, thus again affecting the nutrient cycling and changing decomposition rates through increased sediments.

Non-System Roads

There are 11.4 miles of non-system roads identified at this time. This represents most of the known miles. Some additional work is still required to complete the inventory. It is not anticipated that this will result in a significant increase in the total miles for the area. These roads currently do not have maintenance levels assigned to them. If any of these roads are incorporated into the road system, road numbers and maintenance levels would be assigned at that time.

Special Areas

Restricted Motor Vehicle Use

Implementation of the project should not adversely affect the Lenox Park area motor vehicle closure.

Camping Closure

Implementation of the project should not adversely affect the Lenox Park area camping closure.

White Vulcan Mine Entry Prohibition

Implementation of the project should not adversely affect the White Vulcan Mine entry prohibition.

Chimney Springs Campfire Closure

Implementation of the proposed action will not affect the camping closure, but should actually enhance the protections that are desired with the closure; e.g. the purpose of the campfire closure is to protect the west flanks of the SF Peaks from wildfire, including communities, and this project will make vegetation conditions better in the project area that is downwind from the Chimney Spring area. In other words, if a wildfire were to start in the Chimney Springs area and sweep east as would normally be expected, treatment in the Schultz and Jack Smith areas would presumably result in less damage from such a fire due to lower burn intensities.

Special Uses

Flying Heart Stables

This permit authorizes seasonal trail rides in the Sandy Seep and Mount Elden area, including from the base area near Highway 89 to Sandy Seep, on the Hart, Sunset and Elden Springs Trails.

Environmental Consequences

Direct and Indirect Effects

No Action

Failure to implement the project would allow existing recreational uses and roads management to continue as they do today. With the threat of catastrophic wildfire increasing due to un-managed vegetation, though, overall recreation values could be severely impacted and diminished if radical, less desirable changes in the forest structure of the area were to occur. Fires of greater intensity or scope, including stand replacing fires, can result in changes to the landscape, its character, and visual quality that reduce or essentially eliminate the quality of recreational settings and experiences that are desirable for recreational driving, outfitting and guiding, day hiking, and mountain biking. Areas currently used for dispersed camping or other recreational uses such as rock climbing would likely be less appealing for these activities after such a fire. The effects of less intensive fires, similar to the effects of initial prescribed and maintenance burning, would result in a similar diminishment of the quality of recreational opportunity, but for a shorter, more temporary, duration.

Predominant semi-primitive motorized and roaded natural recreation settings are maintained in the area, and thus will provide the desired wildland recreation setting in the surrounding landscape.

Although it is difficult to estimate where displaced campers may go, it's predicted that major forest roads outside of the treatment areas may see increased use, although this should not be a significant displacement, since there is not a significant amount of overnight camping in the project area now. As the current and historic camping use in the project area has been dispersed (camping outside of developed campgrounds) in nature, it is reasonable to assume that displaced campers will continue to seek this type of use here and in other areas. With that in mind, displaced campers are unlikely to make use of public and private developed campgrounds in the eastern Flagstaff area and Schultz Pass area, or developed campgrounds south and west of the area. Displaced campers may add to current camping impacts in these areas causing a slight increase in resource impacts.

Ongoing planning for the management of off-road and trail motorized use (the Travel Management Rule) will affect the project area in coming years. Studies are ongoing to establish a policy structure directing National Forests to eliminate cross-country travel in most areas and designate routes open to motorized use. Such an action would likely further limit ATV and motorcycle opportunities in the project area, while at the same time providing for enhanced opportunities on district, forest, and region wide basis as designated system motorized routes become established over time.

If no-action were selected, the continuation of dispersed camping in the project area may lead to similar deleterious trends, including the continued potential of a human-caused wildfire. The cumulative effects of a wildfire would likely be more extensive than those of prescribed or management ignited fire, as wildfires tend to burn with greater intensity. The area affected by a fire would likely be less desirable for recreational activities, affecting the setting and users' experience. The area would likely be closed until it was safe to re-enter and rehabilitation work was completed. Should a high intensity fire occur, many recreation activities might be displaced to the surrounding landscape, adding impacts to surrounding lands and increasing competition and possibly conflict between users.

Proposed Action – Alternative 1 and Alternative 2

Implementation of the proposed action and Alternative 2 would maintain desirable forest characteristics for recreational activities for the future if management prescriptions for vegetation treatment and prescribed fire are designed and implemented to maintain desirable recreation landscape characteristics, e.g. natural appearing forest lands that are in synchronization with Recreation Opportunity Spectrum management guidelines, etc. While there would be temporary impacts during the first few years of the vegetation treatments and burns, these impacts would be considered transitory in nature and necessary in order to maintain desirable characteristics for the future.

Common to Both Alternatives

Trails

Mechanical treatments in stands where system trails exist will have immediate short-term effects on the trails and the quality of recreational experience derived from them. The disturbance from

mechanical thinning (temporary and skid road construction and use, tree removal, ground vegetation disruption, slash piles, etc.), while temporary, can impact sections of trails making them hard to follow and in some cases temporarily unusable. The duration of this effect is likely to last from a few months to a few years, until treatments are completed, repair work is done, and subsequent prescribed burning and natural healing occurs.

Initial prescribed burning and longer-term maintenance burning will have little direct effect on system trails, as the trails are often used as burn block lines by Forest Service staff and are unaffected by heat and flame. Short-term visual effects, e.g. burned ground, will usually be gone within one growing season.

Recreational Driving

Mechanical treatments to stands in the areas open to dispersed camping will likely result in immediate changes to the quality of experience and quantity of camping opportunities for both short-term and mid-term timeframes. The disturbance from mechanical thinning (temporary road and skid road construction and use, tree removal, ground vegetation disruption, slash piles, etc.) can disrupt both the aesthetic and physical qualities that make a campsite desirable, including for persons seeking shade, cover, etc. While sites could be rendered unusable by mechanical treatments, these effects will not be permanent, with use picking up again in the mid to long-term timeframes (e.g. 20 plus years). As initial ground disturbance heals, slash piles are burned and the beneficial effects of treatments become evident, the sites will likely become desirable again for camping. In addition, there are other opportunities for dispersed camping outside the project area within a short distance.

Direct effects of initial burning of piles and maintenance burning of the area on dispersed camping would be minimal and short-term. Generally campers in areas to be burned are asked to leave for the duration of the burn for their safety. Smoke from burning could cause discomfort to campers in the project area during burning, but usually disperses within 24 hours. For the duration of a few months after initial and maintenance burning, ash on the forest floor is likely to make camping less pleasurable as it tends to blow in light breezes and stick to surfaces like shoes, tents and clothing. This effect on the quality of the dispersed camping experience, however, would be short-lived as subsequent moisture and vegetation growth makes the activity less evident.

It is likely that in the short term (up to 1-2 years after mechanical treatment and initial prescribed burning activities) dispersed camping use will be displaced to other sites both inside and outside of the project area by the treatment activities. As a result of this displacement, use of existing sites that are not planned for treatment within the project area and sites outside the project area may see increases in use. This use is likely to lead to some adverse effects to these sites from the increased use. However, as the overall amount of dispersed camping use to be displaced is relatively low, the associated effects of displacement to other sites would likely be insignificant.

Dispersed Camping

Mechanical treatments to stands in the areas open to dispersed camping will likely result in immediate changes to the quality of experience and quantity of camping opportunities for both short-term and mid-term timeframes. The disturbance from mechanical thinning (temporary road and skid road construction and use, tree removal, ground vegetation disruption, slash piles, etc.) can disrupt both the aesthetic and physical qualities that make a campsite desirable, including for

persons seeking shade, cover, etc. While sites could be rendered unusable by mechanical treatments, these effects will not be permanent, with use picking up again in the mid to long-term timeframes (e.g. 20 plus years). As initial ground disturbance heals, slash piles are burned and the beneficial effects of treatments become evident, the sites will likely become desirable again for camping. In addition, there are other opportunities for dispersed camping outside the project area within a short distance.

Direct effects of initial burning of piles and maintenance burning of the area on dispersed camping would be minimal and short-term. Generally campers in areas to be burned are asked to leave for the duration of the burn for their safety. Smoke from burning could cause discomfort to campers in the project area during burning, but usually disperses within 24 hours. For the duration of a few months after initial and maintenance burning, ash on the forest floor is likely to make camping less pleasurable as it tends to blow in light breezes and stick to surfaces like shoes, tents and clothing. This effect on the quality of the dispersed camping experience, however, would be short-lived as subsequent moisture and vegetation growth makes the activity less evident.

It is likely that in the short term (up to 1-2 years after mechanical treatment and initial prescribed burning activities) dispersed camping use will be displaced to other sites both inside and outside of the project area by the treatment activities. As a result of this displacement, use of existing sites that are not planned for treatment within the project area and sites outside the project area may see increases in use. This use is likely to lead to some adverse effects to these sites from the increased use. However, as the overall amount of dispersed camping use to be displaced is relatively low, the associated effects of displacement to other sites would likely be insignificant.

All-Terrain Vehicle and Motorcycle Use

Mechanical treatments in stands where social trails exist will have immediate effects on the trails and the quality of recreational experience derived from them. The disturbance from mechanical thinning (temporary and skid road construction and use, tree removal, ground vegetation disruption, slash piles, etc.), while temporary, can obliterate sections of these non-system trails, making them hard to follow and in some cases unusable. The duration of this effect is likely to last a few years, until treatments are completed and subsequent prescribed burning occurs, or if the trails are opened again.

Initial prescribed burning and maintenance burning will have little direct effect on social trails as the trails are often used as burn block line by Forest Service staff and are unaffected by heat and flame.

While the direct effect of mechanical treatments may be on only a short segment of trail—often less than 10 feet — vegetation treatments in whole can have the indirect effect of making an entire trail system unusable. With many short segments disturbed or disrupted, the system may become discontinuous. More importantly, disruption of a trail system by mechanical treatments can displace use to other areas that are not yet treated or are not planned for treatment. A critical point is that these trails systems are user-created and have evolved through use without being properly planned, developed or authorized by the Forest Service; so their disturbance and even obliteration by mechanical treatment can serve to curb use of eroding and other problematic sections of trail. While the de facto closure can have benefits, the displaced use could move to more sensitive locations like Goshawk PFAs and MSO PACs.

There are no significant indirect effects on ATV and motorcycle use from initial prescribed burning and future maintenance burning.

Wilderness

Mechanical treatments in stands where social trails exist will have immediate effects on the trails and the quality of recreational experience derived from them. The disturbance from mechanical thinning (temporary and skid road construction and use, tree removal, ground vegetation disruption, slash piles, etc.), while temporary, can obliterate sections of these non-system trails, making them hard to follow and in some cases unusable. The duration of this effect is likely to last a few years, until treatments are completed and subsequent prescribed burning occurs, or if the trails are opened again.

Initial prescribed burning and maintenance burning will have little direct effect on social trails as the trails are often used as burn block line by Forest Service staff and are unaffected by heat and flame.

While the direct effect of mechanical treatments may be on only a short segment of trail—often less than 10 feet — vegetation treatments in whole can have the indirect effect of making an entire trail system unusable. With many short segments disturbed or disrupted, the system may become discontinuous. More importantly, disruption of a trail system by mechanical treatments can displace use to other areas that are not yet treated or are not planned for treatment. A critical point is that these trails systems are user-created and have evolved through use without being properly planned, developed or authorized by the Forest Service; so their disturbance and even obliteration by mechanical treatment can serve to curb use of eroding and other problematic sections of trail. While the de facto closure can have benefits, the displaced use could move to more sensitive locations like Goshawk PFAs and MSO PACs.

There are no significant indirect effects on ATV and motorcycle use from initial prescribed burning and future maintenance burning.

Latent Community Use

Treatments proposed around or near the Timberline community will have the immediate effect of noise and public safety hazards during mechanical treatment, and disturbance to social trails and routes from vegetation removal, slash piles and other treatment effects. These effects, while short-lived, will likely seem longer-term to adjacent residents and regular forest users. Initial burning and subsequent maintenance burning will provide a similar, immediate nuisance effect from smoke, and a slightly longer-term post-burn effect from the presence of ash, stump holes and other hazards. The burning will, however, help to alleviate some of the effects.

While some of the social trail network adjacent to communities may be obliterated by treatments and subsequent burning, this effect is not expected to be significant. First, treatments will aid in the closure of nuisance routes – those that are causing resource impacts or social impacts to adjacent homeowners. Secondly, as these trails are not approved, nor properly located and constructed, and have evolved over time from use, the post-treatment, open forest type will allow for new routes to develop over time. In effect there will be no net loss of opportunity.

Treatments and burning will likely have the indirect effect of displacing latent community use short distances spatially as users avoid slash piles, stump holes and other effects of treatment. As a result, new social trail networks will likely evolve in adjacent communities.

Changes in the transportation system will have a similar indirect effect of displacing motorized uses immediately adjacent to communities to other locations. Impacts associated with this, including the development of new motorized social trails, will be monitored and mitigated as necessary. Also, the pending implementation of the Travel Management Rule (TMR) will help with this issue by closing un-needed motorized routes.

Where property owners have trespassed on the national forest with structures or permanent improvements without authorization, implementation of the proposed action will likely cause the Forest Service to deal with these matters in order to conduct project activities such as thinning and prescribed burning.

Roads and Transportation System

Implementation of the proposed action would require the use of existing system roads in the area, the re-opening of some closed and/or obliterated roads, and the establishment of temporary roads in order to accomplish vegetation treatment goals.

In the short term this use could adversely impact the roads system, but with maintenance of main roads done through the project, and re-closing or decommissioning of closed or temporary roads, expected impacts would be minimized, and the desired roads system would be maintained and possibly enhanced in the area after the project is completed.

With the threat of catastrophic wildfire reduced in the area, and thus reduced potential impacts on the existing roads system, the temporary impacts of management activities should prove beneficial in the long-term for the roads in the area.

The Travel Management Rule analysis has begun for the forest and this project area, and is meant over a four year period to identify a desired roads system and get rid of un-needed roads. The existing road system in the area is expected to change as a result of this analysis, with fewer miles of road ultimately existing in order to attain a manageable and sustainable roads system.

The non-system roads in the area would either be closed and/or obliterated during the operations phases of this project, or via the pending TMR effort and implementation. The open road system and roads identified for closure or obliteration through the Jack Smith/Schultz project will be included and aligned with proposals under the TMR process, however some adjustments to the system identified here can be expected as the TMR process continues beyond the Jack Smith/Schultz decision. The following table summarizes the open road system and exhibits progress made by the project toward the Forest Plan Standard and Guideline for less than two miles/section and the miles of roads to be closed and/or decommissioned.

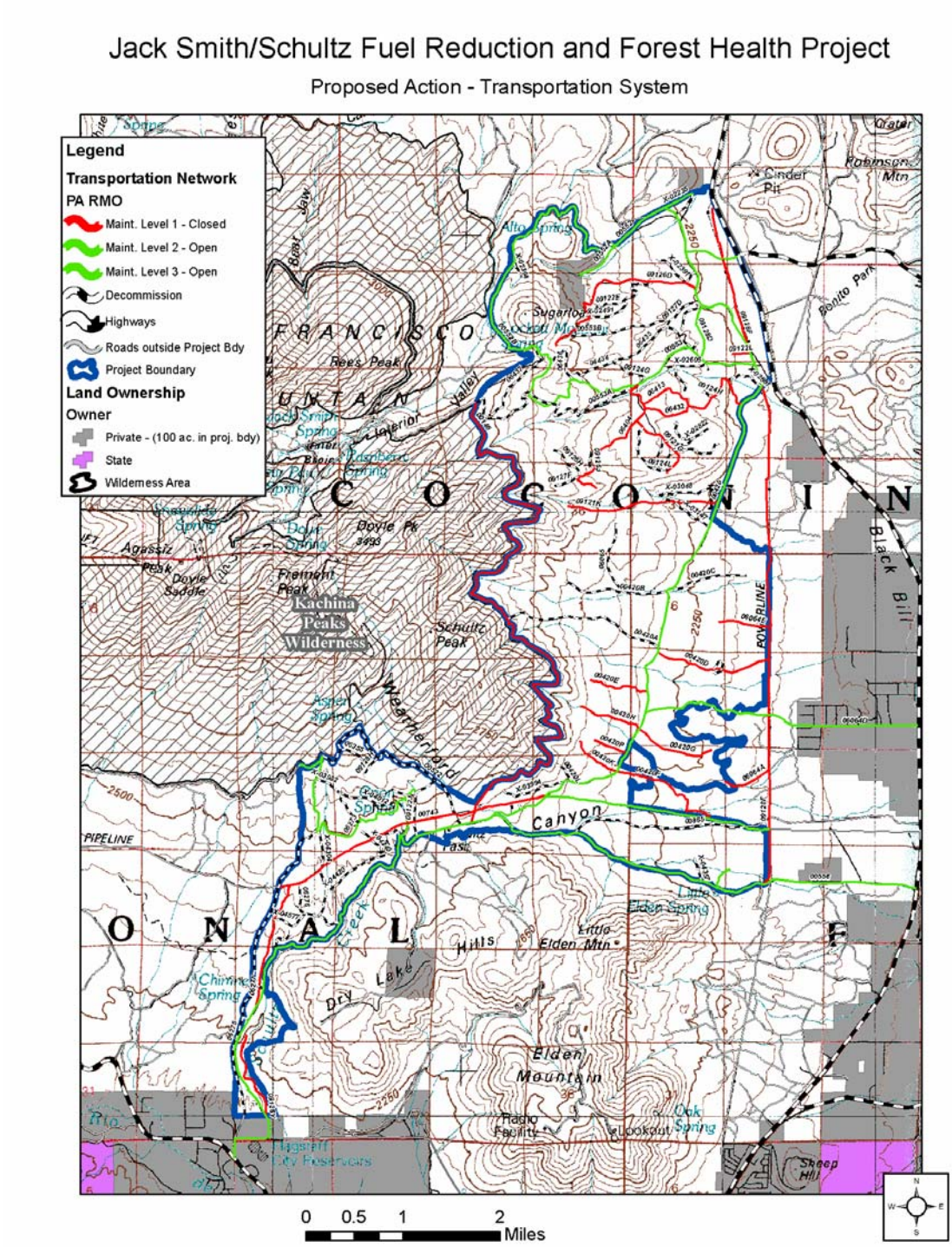
Table 3-39. Open Road System and Summary of Closed and Obliterated Miles.

Sub-Area Name	Miles of Obliterated Roads – Non-System	Miles of Obliterated Roads – System	Maintenance level 1 – Closed Roads	Maintenance level 2 – Open Roads	Maintenance level 3, 4 & 5 – Open Roads
Jack Smith		17.4	23.9	8.9	15.8*
Schultz		9.2	4.0	3.1	4.8
Total for Jack Smith/Schultz	**11.4**	**26.6 Total Oblit 38**	**27.9 Total Closed 27.9**	**12.0**	**20.6 Total Open 32.6**

*4.7 Miles of existing Level 2 road re-classified to Level 3 due to mapping corrections.

The resulting road density for the Jack Smith/Schultz project is approximately **1.8** miles/section.

Figure 3.11 - Proposed Action Transportation System.



Cumulative Effects

The actions considered in this discussion are those that have occurred in the recent past (10 years), as well as those reasonably foreseeable land management actions, and the cumulative effects of those actions and this proposal. Management activities that occurred prior to this time helped create the current condition described under the affected environment section. For this discussion, actions to consider are those that occur in areas immediately within or adjacent to the project area. These include, affect and are affected by:

- Ongoing dispersed camping within the project area, and on lands surrounding the project area.
- Ongoing dispersed recreation (day use) in and around the project area including mountain biking, rock climbing, recreational driving, hiking, horseback riding, etc.
- Ongoing latent community use and social trail use in and around the project area, including for access to general forest areas.
- Upcoming local, regional and national motorized access and Travel Management Rule policy changes for off-road vehicle use.
- Special uses and areas within the project area.
- Areas where special restrictions are in place, such as motorized vehicle restrictions, shooting and camping restrictions, etc.
- Road decommissioning (obliteration) and closing in the project area
- Effects on adjacent Wilderness lands.

Threatened, Endangered and Sensitive Plants

This section details the affected environment and environmental consequences for Threatened, Endangered and Region 3 Sensitive Plants within the project area. The project area does not include any locations or potential habitat for Threatened or Endangered plant species. Additional information may be found in the Botany Specialist's Report, Amended: 1/29/2008 in the project record, PRD# 79 and on the Cconino NEPA website, previously mentioned.

Affected Environment

One Region 3 Sensitive plant species currently known to occur within the project area is Rusbyi milkvetch (*Astragalus rusbyi*). Potential habitat for Sunset Crater beardtongue (*Penstemon clutei*) may exist but no locations for this species have been recorded within the project area.

Rusby milkvetch

The Peaks Wildlife Crew reported over 50 locations of Rusby milkvetch during their surveys in 2004 and 2005. Some of these locations were outside of the project boundary but within the ½ mile buffer around the project area that is surveyed during Northern Goshawk surveys, but others are within the project boundary. The crew documented 22 locations of Rusby milkvetch within the units scheduled for treatment in the proposed action dated February 2007. These populations are subject to damage or destruction if not protected during project implementation (Table 3.40).

Table 3.40 - Locations of Rusby milkvetch in treatment areas on the project.

Date	Number of plants	Compartment	Stand	Prescription	Treatment method
07/29/2004	20+	267	7	Uneven-aged - Fuels Reduction Emphasis	Mechanical restoration
07/29/2004	12+	267	7	Uneven-aged - Fuels Reduction Emphasis	Mechanical restoration
07/29/2004	15+	267	7	Uneven-aged - Fuels Reduction Emphasis	Mechanical restoration
07/29/2004	20+	267	7	Uneven-aged - Fuels Reduction Emphasis	Mechanical restoration
07/29/2004	12+	267	7	Uneven-aged - Fuels Reduction Emphasis	Mechanical restoration
07/29/2004	15+	267	7	Uneven-aged - Fuels Reduction Emphasis	Mechanical restoration
07/29/2004	8+	267	8	Fuel Reduction - < "12	Hand thinning
07/29/2004	8+	267	8	Fuel Reduction - < "12	Hand thinning
07/29/2004	5+	267	23	Uneven-aged - Fuels Reduction Emphasis	Mechanical restoration
07/29/2004	5+	267	23	Uneven-aged - Fuels Reduction Emphasis	Mechanical restoration
07/29/2004	2	267	26	Uneven-aged - Fuels Reduction Emphasis	Mechanical restoration
07/29/2004	2	267	26	Uneven-aged - Fuels Reduction Emphasis	Mechanical restoration
07/29/2004	3+	267	29	Uneven-aged - Fuels Reduction Emphasis	Mechanical restoration
07/29/2004	5+	267	29	Uneven-aged - Fuels Reduction Emphasis	Mechanical restoration
07/29/2004	3+	267	29	Uneven-aged - Fuels Reduction Emphasis	Mechanical restoration
07/29/2004	5+	267	29	Uneven-aged - Fuels Reduction Emphasis	Mechanical restoration
07/29/2004	5+	267	32	Uneven-aged - Fuels Reduction Emphasis	Mechanical restoration
07/29/2004	5+	267	32	Uneven-aged - Fuels Reduction Emphasis	Mechanical restoration
07/29/2004	10+	267	36	Prescribe Burn	Burn only
07/29/2004	10+	267	36	Prescribe Burn	Burn only
08/04/2004	6	286	3	Fuel Reduction - < "12	Hand thinning
08/04/2004	6	286	3	Fuel Reduction - < "12	Hand thinning

Environmental Consequences

Direct and Indirect Effects

Rusby milkvetch

No Action

There will be no direct effects from management actions to existing suitable habitat for Rusby milkvetch, or to populations or individuals of this species since none of the management actions in the proposed action would occur.

Indirect Effects of no action include the persistence and increase of high fire hazard potential. Forest fuels will continue to increase, resulting in increased risk of landscape or crown fire. Crown-base heights will continue to remain low, contributing to the risk of crown fire initiation, which could result in a landscape scale stand replacing wildfire. In this scenario, the risk of death by fire to individuals and groups of Rusby milkvetch will increase. If a large stand replacing wildfire occurred, the plant community would be impacted and sensitive plant populations would be lost due to large expanses of the forest burning at one time. Severe wildfires often result in deaths of all plants including TES plant species, loss of seed banks (Korb et al., 2004) and volatilization or removal of nutrients (Ballard, 2000; Choromanska and DeLuca, 2002). These are generally long term effects on the plant community. Plants eliminated due to large, hot-burning wildfires may take years re-establish and long-term alteration of habitat will occur.

Under no action, no tree removal will occur and tree density and canopy closure will continue to increase, reducing the availability of resources such as light and water to understory plants including Rusby milkvetch, resulting in the reduction or elimination of understory plants including Rusby milkvetch.

Direct and indirect effects common to the Proposed Action - Alternative 1 and Alternative 2

Direct effects of the proposed action and Alternative 2 would include deaths of individual plants or population groups through management actions. Factors contributing to these effects would include disturbance from management activities including mechanical activities such as vegetation management, fuel reduction activities and prescribed burning. Generally, these effects can be mitigated to non significant levels during mechanical activities by avoiding known populations during activities. Some individuals may be destroyed during prescribed burning, especially in areas where only isolated individuals may occur or in areas where plants were not detected during previous surveys. However, prescribed burning may also have beneficial indirect effects. These effects are discussed below.

Prescribed burning may have beneficial direct and indirect effects to on all understory vegetation including Rusby milkvetch depending on fire severity. Burning is a disturbance that can release nutrients, reduce plant competition, and increase the amount of available sunlight light. Observations by Judy Springer (2004), a local botanist from the Ecological Restoration Institute, Northern Arizona University suggest that Rusby milkvetch responds favorable to disturbance. These observations were made on restoration plots at Ft. Valley Experimental Forest. The effects

of burning may initially be negative by reducing the numbers of individuals but will beneficial in the long term by reducing competition, increasing the amount of available sunlight and by increasing available nutrients. It is expected that most broadcast and prescribed burning will be of low severity.

In some cases, fire severity may be higher in limited areas depending on variables such as management goals, weather, fuel conditions and topography. In these cases moderate to high fire severity may occur. In these areas, there could be limited negative direct effects through deaths scattered individuals or groups of Rusby milkvetch if they occur at that particular location. Limited deaths of small groups of plants in these cases would not significantly contribute to the overall populations of these species within the project area or over the range of the species. The indirect effects of higher fire severity in these areas would be similar to those for slash pile burning.

One of the associated activities with several treatments includes piling of slash from management activities. Slash piles may have negative direct and indirect effects on all understory vegetation including Rusby milkvetch. Slash pile construction could be a possible direct negative effect if the pile is placed in or near existing populations of Rusby milkvetch. These effects can be mitigated by avoiding placing slash piles directly on existing plants and by constructing piles at least 10 to 20 feet away from existing populations. Pile burning will create locally severely burned areas at pile sites, which is a negative indirect effect. Consequences include but are not limited to the reduction or loss of the seed bank on these sites (Korb, 2001; Crisp, 2004); death or reduction of soil organisms on the pile sites (Raison, 1979; Ballard, 2000; Korb et al., 2004) and development of hydrophobic soil (Ballard, 2000). Slash pile sites are more prone to invasion from noxious or invasive weeds than surrounding areas and may contribute to the persistence and spread of noxious or invasive weeds in treated areas. Noxious or invasive weeds may have adverse effects on all native plants including Rusby milkvetch by competing with native species for resources and altering habitat. Mitigation for these effects is to use previously disturbed areas including old pile sites or previously used decking areas where available instead of creating new sites within the forest. Additionally, pile sites should be monitored after burning occurs to identify and treat infestations.

An indirect effect of management actions within the potential habitat of Rusby milkvetch includes an increased risk of invasion from noxious or invasive weeds. These effects can be mitigated by incorporating the noxious or invasive weed treatments described in Appendix B and by incorporating the Best Management Practices described in Appendix D. Incorporation of the Best Management Practices will mitigate the effects of increased disturbance from management activities, and help to control the spread and introduction of weeds within the habitat of Rusby milkvetch.

Direct and indirect effects of road closure or obliteration include destruction of individual plants, localized disturbance of suitable habitat and the potential introduction of noxious or invasive weeds. These effects can generally be mitigated by surveying the sections of road where closure or obliteration will occur as well as nearby areas that may be disturbed and avoiding existing plant populations. Additionally, the incorporation of Best Management Practices for noxious or invasive weeds as outlined in the Final Environmental Impact Statement for Integrated Treatment of Noxious or Invasive Weeds (2005).

Cumulative Effects common to the Proposed Action - Alternative 1 and Alternative 2

No specific time limit was established for past actions for this cumulative effects discussion. The boundary for this discussion includes the range of Rusby milkvetch within the Coconino National Forest.

Rusby milkvetch is a native species and has survived in the area as a component of the native vegetation but was not added to the Region 3 Sensitive Species list until 1999. Cumulative effects Rusby milkvetch may include past and ongoing management actions by the U.S. Forest Service such as grazing, timber sales and prescribed burning within the project area and throughout its range but the effects of these actions are unknown. Many were initiated before the species were added to the Sensitive Species list.

Fire suppression and past alteration of the fire regime through suppression have affected all vegetation including Rusby milkvetch through changes in tree density and understory species composition. Elimination of fire in the project area and throughout most of the range of Rusby milkvetch has allowed tree canopy and stand density to increase in some areas, reducing the abundance or eliminating of most understory species including Rusby milkvetch. The elimination of fire has also resulted in the increase in litter in some areas which has negatively affected understory plant species by eliminating plants and by contributing to the increase in fire spread, length of residence time of fire and fire severity.

The project area contains all or portions of several large wildfires. These include the Arnold Cabin Fire (1946), Hostettor Fire (1950), Burnt Fire (1973), Radio Fire (1977), Weatherford Fire (1980), Bear Jaw Fire (1995), Doyle Fire (1996), Smith Fire (1998), Mid Fire (2000) and Wedding Fire (2005). Not all of these are near the known occurrences of Rusby milkvetch and some may not contain suitable habitat. The Peaks Wildlife crew documented at least one occurrence of Rusby milkvetch within the Radio Fire perimeter but outside of the project area. According to Barb Phillips (Zone Botanist, Coconino, Kaibab and Prescott National Forests) the species is adapted to fire. However, severe wildfires often result in deaths of all plants including TES plant species, loss of seed banks (Korb et al., 2004) and volatilization or removal of nutrients (Ballard, 2000; Choromanska and DeLuca, 2002). These effects generally have long term effects on the plant community. Plants eliminated due to large, hot-burning wildfires may take years re-establish and long-term alteration of habitat occurs.

One other fuels reduction project containing Rusby milkvetch, the Fort Valley Ecosystem Restoration Project (2000). Crews found several populations of Rusby milkvetch within the project during implementation and monitoring. The effects of the project were, “may affect individuals but not likely to adversely affect” the species as a whole. The recently analyzed Eastside Fuels Reduction Project is adjacent to this project. However, no locations of Rusbyi milkvetch were detected during project surveys. Therefore, no analysis of the effects to Rusby milkvetch was conducted for that project

Grazing within the project area includes grazing by domestic ungulates and wild grazers. The cumulative effects of grazing include past and present loss of individual plants to grazing animals and alteration of habitat through animal impacts such as trampling and compaction. According to Springer (2004), deer and elk may preferentially select legumes when they find them. Small animals such as rodents may also eat Rusby milkvetch.

Rusby milkvetch has been observed along the Schultz Trail, which is adjacent to the project area. Several of the locations detected by survey crews are along the trail. Trail users may impact individual plants at these locations through trampling and compaction of soil.

In 2000, the Forest withdrew the San Francisco Mountain and Mount Elden areas from mineral exploration. This withdrawal could have indirect long-term beneficial effects on species such as Rusby milkvetch by preserving habitat that might otherwise be altered through mineral exploration.

A mining operation, the White Vulcan Mine is within the project boundary. The permitted mine area contains the same soil series (series 551) as is found in some of the areas where Rusby milkvetch is found within the project. Therefore, past and on-going mine operations could have altered potential habitat for Rusby milkvetch in that localized area.

The Coconino National Forest is in the process of NEPA analysis to implement the Travel Management Rule (2005). The cumulative effects to this and other projects forest wide will be the reduction in the numbers of motorized routes and the elimination of cross country travel. Negative affects from motorized such as crushing of plants; damage to potential habitat such damage to soils, fragmentation of habitat and introduction of noxious or invasive weeds into the habitats and/or populations will be reduced. These reductions will be from the elimination of most cross-country travel and through the reduction of road density. This would aid in reducing pressures from vehicle travel in sensitive areas where plants and potential habitat occur.

The management actions proposed for this project will have no significant negative effects on the overall distribution and abundance within the project area or within the total range of Rusby milkvetch, provided the mitigations recommended in this document are incorporated into the project design and implementation. The management actions will not significantly contribute to the cumulative effects discussed above, provided they are mitigated as recommended. The project will have beneficial direct and indirect effects on Rusby milkvetch by reducing fire risk and therefore the threat of severe wildfire within the potential habitat of Rusby milkvetch within the project area. Additionally, all understory plants including Rusby milkvetch will benefit from the reduction of tree density and canopy in certain areas of the project by reducing competition for nutrients, light and growing space.

No Action

Direct and Indirect Effects

There will be no direct effects from management actions to existing suitable habitat for Rusby milkvetch, or to populations or individuals of this species since none of the management actions in the proposed action would occur.

Indirect Effects of the no action alternative include the persistence and increase of high fire hazard potential. Forest fuels will continue to increase, resulting in increased risk of landscape or crown fire. Crown-base heights will continue to remain low, contributing to the risk of crown fire initiation, which could result in a landscape scale stand replacing wildfire. In this scenario, the risk of death by fire to individuals and groups of Rusby milkvetch will increase. If a large stand replacing wildfire occurred, the plant community would be impacted and sensitive plant populations would be lost due to large expanses of the forest burning at one time. Severe wildfires often result in deaths of all plants including TES plant species, loss of seed banks (Korb et al., 2004) and volatilization or removal of nutrients (Ballard, 2000; Choromanska and DeLuca,

2002). These are generally long term effects on the plant community. Plants eliminated due to large, hot-burning wildfires may take years re-establish and long-term alteration of habitat will occur.

Under the no action alternative, no tree removal will occur and tree density and canopy closure will continue to increase, reducing the availability of resources such as light and water to understory plants including Rusby milkvetch, resulting in the reduction or elimination of understory plants including Rusby milkvetch.

Cumulative Effects - No Action

The cumulative effects of no action are related to the indirect effects discussed above. If none of the management actions proposed for this project is undertaken, high fire risk will exist and continue to increase and forest fuels will continue to increase, resulting in increased risk of landscape or crown fire. Additionally, there will be no reduction of tree density and canopy within the project area. Therefore, there will be increased competition among all plant species, including Rusby milkvetch for resources such as light and water. These indirect effects have minor but notable effects on the potential habitat of Rusby milkvetch range wide by allowing the continuing increases to factors such as fire risk and plant competition within potential habitat.

Sunset Crater beardtongue

Sunset Crater beardtongue is a perennial herb 12 to 30 inches tall with bright pink flowers. The leaves are sharply toothed with lower leaves joining to surround the stem, forming a disk around the stem (amplexicaul). The soil in which Sunset Crater beardtongue grows is typically a layer of cinders 2 to 5 inches deep with a layer of silty soil below, important for water retention at the root level of this species. The range of this species is limited to the Sunset Crater volcanic field near Flagstaff, including the Coconino National Forest and Sunset Crater National Monument. The habitat of Sunset Crater beardtongue is flat or gently sloping sites in open ponderosa pine forest between 6500 to 8500 feet. No locations of this species have been reported in the project area. However, potential habitat may exist within the project area.

Direct and Indirect Effects

No Action

There will be no direct effects from management actions to existing suitable habitat for Sunset Crater beardtongue, or to populations or individuals of this species since none of the management actions in the proposed action would occur.

The indirect effects of no action include persistence and continued increase in fire hazard potential. Forest fuels will continue to increase, resulting in increased risk of landscape or crown fire. Crown-base heights will continue to remain low, contributing to the risk of crown fire initiation, which could result in a landscape scale stand replacing wildfire. If a large stand replacing wildfire occurred, the plant community would be impacted and sensitive plant habitats could be altered due to large expanses of the forest burning at one time. Severe wildfires often result in deaths of all plants including TES plant species, loss of seed banks (Korb et al., 2004) and volatilization or removal of nutrients (Ballard, 2000; Choromanska and DeLuca, 2002). These are generally long term effects on the plant community. Plants eliminated due to large, hot-burning wildfires may take years re-establish and long-term alteration of habitat will occur.

Cumulative Effects

The cumulative effects of no action are related to the indirect effects discussed above. If none of the management actions proposed for this project is undertaken, high fire potential will exist and continue to increase and forest fuels will continue to increase, resulting in increased risk of landscape or crown fire. Additionally, there will be no reduction of tree density and canopy within the project area. These indirect effects have minor but notable effects on the potential habitat of Sunset Crater beardtongue range wide by allowing the continuing increases to factors such as fire risk.

Direct and Indirect Effects Common to the Proposed Action - Alternative 1 and Alternative 2

There are no direct effects to Sunset Crater beardtongue from management actions, since there are no known occurrences within the project area. Indirect effects to the potential habitat of Sunset Crater beardtongue would be similar to those discussed above for Rusby milkvetch. However, there would be no expected loss of individuals to management actions since no locations of Sunset Crater beardtongue occur in the project area.

Cumulative Effects

No specific time limit was established for past actions for this cumulative effects discussion. The boundary for this discussion includes the range of Sunset Crater beardtongue within the Coconino National Forest.

This discussion includes past management activities that have occurred in potential habitat of the Sunset Crater beardtongue, which is an endemic and occurs only in the Sunset Crater volcanic field of the Coconino National Forest and Sunset Crater National Monument. This discussion contains several activities but may not be inclusive of all activities within the potential habitat of Sunset Crater beardtongue.

Fire suppression and alteration of the fire regime has affected all vegetation including Sunset Crater beardtongue. The effects of fire exclusion on Sunset Crater beardtongue are perhaps less severe than for other species since it grows in the relatively open environments that are characteristic of the Sunset Crater volcanic field. However, fire exclusion could have contributed to changes in tree density and understory species composition as it has in other areas of the forest. The elimination of fire has also resulted in the increase in litter in some areas contributing to the increase in fire spread, length of residence time of fire and fire severity.

Historically, there have been several large wildfires in the habitat of Sunset Crater beardtongue including the Burnt Fire in 1973. A portion of this fire is within the project area. After the fire, Goodwin (1979) stated that Sunset Crater beardtongue was a pioneering species in the fire. However, Fule et al. (2000) conducted a burning experiment and found that Sunset Crater beardtongue numbers were lower on experimental plots three years after treatment when compared to pre-treatment numbers. Therefore, burning may initially reduce the numbers of Sunset Crater beardtongue on localized areas.

In 1992, a tornado occurred in the area near Sunset Crater National Monument and O'Leary Peak, within the habitat of the Sunset Crater beardtongue. The storm damaged large numbers of trees on Forest land and within Sunset Crater National Monument. The Forest Service conducted a salvage sale and removed storm damaged trees from its land. Monitoring of the effects of the salvage sale on Sunset Crater beardtongue was mitigation for the project. The monitoring

conducted by the Peaks District (Crisp, 1995) found no adverse effects from the storm or the salvage sale.

The cinder hills area that contains most of the habitat for Sunset Crater beardtongue is heavily used for recreation, especially in the Cinder Hills OHV Area, an area identified for off-highway vehicle use. Impacts from off-highway vehicles, which are legally permitted in the area, may include loss of plants from crushing and compaction and introduction on noxious or invasive weeds into the potential habitat of Sunset Crater beardtongue.

Several utility corridors are present in the potential habitat of Sunset Crater beardtongue. Construction, expansion and maintenance of these corridors could result in loss of individuals along the corridor routes. The presence of these corridors provides corridors for dispersal of noxious or invasive weeds along the utility corridor and in adjacent forested areas.

The presence and expansion of the Flagstaff City Landfill has affected the potential habitat of Sunset Crater beardtongue by altering habitat and possibly by loss of some individuals. Additionally, it is a source for potential noxious or invasive weed invasions.

Other activities that have occurred in the habitat include fuel wood removal and grazing. However, these have limited effects on the overall viability of Sunset Crater beardtongue.

Non-forest actions include a rapidly growing population in the Doney Park, Timberline and similar neighborhoods that are within the range of Sunset Crater beardtongue. Effects of this increasing human population include increases of human impacts to surrounding Forest lands and possibly a decrease in the amount of suitable habitat available on non-forest lands.

Sunset Crater has been collected as an ornamental on a limited basis but this practice is strongly discouraged. This limited collection has not affected the viability of the species.

The Coconino National Forest is in the process of NEPA analysis to implement the Travel Management Rule (2005). The cumulative effects to this and other projects forest wide will be the reduction in the numbers of motorized routes and the elimination of cross country travel. Negative affects from motorized such as crushing of plants; damage to potential habitat such damage to soils, fragmentation of habitat and introduction of noxious or invasive weeds into the habitats and/or populations will be reduced. These reductions will be from the elimination of most cross-country travel and through the reduction of road density. This would aid in reducing pressures from vehicle travel in sensitive areas where plants and potential habitat occur.

Noxious or Invasive Weeds

Noxious weeds or noxious or invasive weeds are receiving increasing emphasis in management decisions. Recently, the Chief of the Forest Service identified invasions by exotic species as one of the four major threats. Noxious weeds and invasive exotics can affect composition, structure and function of native ecosystems and can affect factors such as fire interval, species composition within communities, and successional pathways. Various surveyors have detected several noxious or invasive weed species in the Project area. Infestations range from a few scattered plants to localized but severe infestations. Treatments and best management practices for noxious or invasive weeds for the project area are listed in Appendix E of this document and were adapted for the Jack Smith/Schultz Project from the Final Environmental Impact Statement for Integrated Treatment of Noxious or invasive weeds on the Coconino, Kaibab and Prescott National Forest within Coconino, Gila, Mojave and Yavapai Counties, Arizona. Additional information may be found in the Botany Specialist’s Report, Amended: 1/29/2008 in the project record, PRD# 79 and on the Cconino NEPA website, previously mentioned.

Affected Environment

Table 3.41 - Noxious or invasive weed species and treatment priorities within the project area.

Common Name	Species*	Species Rank	Objective
Camelthorn	*Alhaghi pseudoalhagi*	4	Contain/Control
Diffuse knapweed	*Centaurea diffusa*	9	Contain/Control
Dalmatian toadflax	*Linaria dalmatica*	18	Contain/Control
Bull thistle	*Cirsium vulgare*	20	Contain/control
Cheatgrass	*Bromus tectorum*	22	Contain/Control specific populations
Common mullien	*Verbascum thapsus*	Not ranked	No control objective defined.

Camelthorn

Camelthorn is a native of the Mediterranean area and Asia and was accidentally introduced into the United States around 1915. Camelthorn is a member of the pea family, Fabaceae. It is a perennial shrub with deep roots and extensive rhizomes. The plant is from 1 ½ to 4 feet high and is covered with spines. The spines are yellow tipped. The leaves are small, wedge shaped, and undersides of the leaves are covered with small hairs. Camelthorn has small pea- like pink flowers. The seedpods are maroon to brown in color and are constricted between each seed, forming a distinct outline around each seed. Reproduction can occur from seeds or from the extensive underground rhizomes, making control of infestations difficult.

Diffuse knapweed

Diffuse knapweed is an introduced biennial or short-lived perennial with erect, diffusely branched stems growing from ½ to 3 feet tall. Most plants of this species live to be 2 to 6 years old and are capable of spreading only by seed. In the fall, diffuse knapweed plants break off at ground level and tumble along the ground dispersing seeds. Seeds are also spread as the spiny bracts attach to animal fur, clothing, and vehicles and can be spread in contaminated products such as hay. Diffuse knapweed was first detected in the Flagstaff area in the late 1970's and has spread from a few scattered plants to infestations on thousands of acres in the urban interface around east Flagstaff. These populations continue to expand and new infestations are created after mature plants break at the base and are dispersed by the wind or by being dragged along by vehicles. This species poses serious threat to restoration efforts because of its high rates of expansion and ability to outcompete native vegetation.

Dalmatian toadflax

Dalmatian toadflax is an introduced perennial plant that reproduces both by seed and vegetative root buds. The two methods of reproduction give this plant a competitive advantage under a wide range of environmental conditions. Often stands of Dalmatian toadflax will disappear for several years, only to re-establish through the seed bank or possibly vegetative root buds.

Bull thistle

Bull thistle is a stout biennial thistle with purple flowers. Regeneration is solely from short-lived seed. Bull thistle grows in numerous areas of the Coconino National Forest, mostly in the ponderosa pine forests, where it invades disturbed sites such as slash piles, old log decks, and roadsides.

Cheatgrass

Cheatgrass is an erect winter and spring annual grass from Europe that can grow to a height of two feet. The plant is a prolific seed producer and the density of this species has more to do with available sites (bare soil) for germination than the number of seeds produced. The presence of cheatgrass has increased the fire frequency in grassland and sagebrush ecosystems (Zouhar, 2003). Shorter periods between fires in these ecosystems will eventually cause the loss of native plants not adapted to frequent fire and the replacement of these by non-native annual grasses. Cheatgrass is also common in ponderosa pine forests throughout the western United States. Cheatgrass can provide a flammable link between open areas and forested areas, allowing fires to move from one habitat type into another. Live cheatgrass plants can be killed by fire, but seeds survive relatively severe fires and colonize recently burned areas. Additionally, offsite colonization into recently burned areas often occurs.

Common mullein

Common mullein is native to Europe and Asia, and is found in many areas the United States. First year mullein plants are low-growing rosettes that have bluish, gray-green leaves and a felt-like texture. As the plant ages, the hairs on the leaves are mechanically worn away. Leaves range from 4-12 inches in length and 1-5 inches in width in the rosette stage. Mature flowering plants are produced the second year, and can grow from five to ten feet in height, including the conspicuous flowering stalk. Mullein seeds remain viable for an extremely long time, having a life expectancy that ranges from 35 years to more than 100 years, and will remain dormant when buried in the soil. If a viable seed reaches the surface of the soil, it will be able to germinate and form a new plant, possibly several years after the previous infestation has ended.

Although common mullein is an invasive weed, no treatments are currently proposed for this species on the Forest. Common mullein infestations can cover several acres but tend to be episodic and disappear over time as the source of disturbance passes. Management activities on the project area may lead to temporary increases in common mullein but these infestations will decrease as the disturbance passes and the species is eliminated from the plant community by more competitive species. No further discussion of this species will be included in the effects analysis.

Environmental Consequences

Direct and Indirect Effects

No Action

There would be no direct effects from management actions because none of the management actions identified in the proposed action would occur. No tree thinning would occur and there would be no prescribed burning. Under no action, no noxious or invasive weed treatments would

occur in the project area except those accomplished by other projects such as limited manual control by Forest Service Crews or control efforts by other entities such as treatment of right-of-ways by Arizona Department of Transportation, and release of biological control agents provided by APHIS.

With no treatment, the risk of severe wildfire will continue to increase in many areas of the project area. Those factors that contribute to fire hazard ratings that would be reduced through management actions such as high canopy cover, high numbers of trees per acre and dead and down fuel loading will not be reduced. The risk of wildfire transitioning to crown fires will continue to increase in many areas of the project area. Severe wildfires often result in complete removal of tree canopy, complete loss of ground cover and understory plant community and alteration of soil structure and nutrients. These conditions provide potential sites for noxious or invasive weed invasion through creation of bare soil, increased light and absence of competition from desirable plant species. Therefore, increases in fire hazard and severity that will occur with no action will also increase the risk of or invasive weed invasions in the project area.

Under no action, noxious or invasive weed treatments or mitigations that would help prevent the spread of noxious or invasive weeds will not occur as part of the management actions currently under consideration. Noxious or invasive weed populations will remain untreated and continue to expand. Mitigation measures and Best Management Practices that would help control the spread of noxious or invasive weeds will not be implemented.

Direct and indirect effects common to the Proposed Action - Alternative 1 and Alternative 2

Direct effects of management activities to noxious or invasive weeds include ground disturbing activities that have the potential to increase the acreage and/or density of the existing noxious or invasive weed infestations within the project area. Disturbance is a natural process in our landscape but it can contribute to the spread of noxious or invasive weeds by creating potential sites for invasion. Disturbance may contribute to the spread of weeds by eliminating competition from existing vegetation and creating bare ground that can be more easily invaded than in undisturbed areas. The level of disturbance is important. Severe disturbance removes competitive vegetation, alters nutrient composition, creates bare soil and can severely reduce or eliminate shade, making potential sites for the invasion or spread of noxious or invasive weeds. Examples of management activities that would create localized severe disturbance include burned areas from slash piles, creation of log decks, bare soil created through road construction and decommissioning, road closure/obliteration and use by machinery during mechanical thinning. Other management activities associated with the project will be sources of disturbance but the level of disturbance will not be as severe such as broadcast burning and hand thinning.

A direct effect of management actions includes increased risk of introduction of noxious or invasive weeds to uninfested areas within the project area. This could be expansion of weed species known to exist in the project area or additional species not yet existing in the area. These effects can be mitigated by following the Best Management Practices as identified in Appendix D. An example of a Best Management Practice common to all actions is cleaning equipment before entering the project area.

Tree removal indirectly affects noxious or invasive weeds by reducing tree canopy and stand density. Treatments that reduce the tree canopy and lower the stand density will affect all

understory plants, including noxious or invasive weeds by allowing more sunlight, increasing available nutrients and temporarily decreasing interspecies competition as well as intra species (between tree) competition. The increased availability of resources and decrease in competition can also provide favorable conditions for noxious or invasive weeds and could increase the size and density of existing populations, especially in areas where weed infestations already exist. These effects are reduced to a non-significant level by incorporating the mitigations, best management practices and noxious or invasive weed treatments for the project.

Many stands in the project are scheduled **for mechanical thinning**. Effects associated with this activity include high levels of disturbance, loss or reduction of existing understory vegetation and creation of bare soil. Additionally, machinery can be sources of noxious or invasive weed introductions. These activities can be mitigated by incorporating the Best Management Practices outlined in Appendix D.

Hand thinning is a less severe form of disturbance as compared to mechanical thinning. The effects are similar to prescribed fire and include reduction tree canopy, release of nutrients, reduction plant competition, increase in the amount of available sunlight and creation of bare soil. These factors benefit all understory plants including noxious or invasive weeds. However, these factors are less severe and would be of less concern than pile burning or machine piling on deck sites.

Burning is a disturbance that can release nutrients, reduce plant competition, increase the amount of available sunlight and increase bare soil. Management actions proposed for various areas of the project include broadcast or pile burning. The effects of prescribed burning are similar to those of tree removal and may contribute to expansion of existing noxious weed populations. Prescribed burning may have direct and indirect effects to on all understory vegetation depending on fire severity, including existing noxious or invasive weed populations within the project area. It is expected that most broadcast and prescribed burning will be of low severity. Under these conditions, the effects would be similar to those caused by reducing tree canopy. However, fire severity may be higher in limited areas depending on variables such as management goals, weather, fuel conditions and topography. In these cases moderate to high severity may occur. The effects in these areas would be more severe and would be similar to slash pile burning discussed below.

The implementation of prescribed fire within the project area will benefit the understory vegetation and may eventually lead to a more resilient, weed resistant plant community within the project area and on an area-wide basis, which would be a beneficial indirect effect. However, fire will be a source of disturbance that could contribute to the increase in noxious or invasive weeds. .Prescribed fire will reduce the risk of uncontrolled wildfire, which is a more severe disturbance than prescribed fire especially when wildfires become landscape in scale. Under the conditions of severe landscape scale wildfire, the risk and likelihood of noxious or invasive weed invasions are higher than under the less severe conditions of prescribed fire. Examples of severe, large fires with noxious or invasive weed infestations include the Hochderffer and Horseshoe Fires in 1996 and the Pumpkin Fire in 2000. The prescribed fire treatments that are part of the management actions of this project will help reduce the threat of similar severe wildfire within the project area as well as helping to reduce the risk of uncontrolled wildfire in surrounding areas from a wildfire that might otherwise originate within the project area. This in turn will help to control the potential spread of noxious or invasive weeds that might occur from future wildfires originating within the within the project area and in surrounding areas at risk.

Slash **pile burning** will create localized severely burned areas. Consequences include but are not limited to the reduction or loss of the seed bank on these sites (Korb, 2001); death or reduction of soil organisms on the pile sites (Raison, 1979; Ballard, 2000; Korb et al., 2004) and

development of hydrophobic soil (Ballard, 2000). Slash pile sites are more prone to invasion from noxious or invasive weeds than surrounding areas and may contribute to the persistence and spread of noxious or invasive weeds in treated areas. A possible mitigation for these effects is to use previously disturbed areas including old pile sites or previously used decking areas where available instead of creating new sites within the forest. Additionally, pile sites **should be** monitored after burning occurs to identify and treat infestations. As stated above, management actions can be mitigated by following the Best Management Practices in Appendix D.

Manual removal of noxious or invasive weeds may be used for several species and populations in the project area. Several techniques may be used for this control including hand pulling and removal of weeds with hand tools. District Archeologists should be consulted before using hand tools in areas where conflicts may occur. The effects of manual treatments would be to reduce or eliminate the noxious weed infestations, populations and acreages in the project area.

Biological control agents include approved insects and pathogens that undergo a rigorous testing procedure prior to being available for release. Initial testing occurs in quarantined laboratories abroad and in the United States. The agents are tested for their effectiveness in controlling the target organism and for their host specificity. Testing includes potential effects on economic crops, rare plants, and similar species found in North America. An agent can be released only after is has been determined that it is unlikely that the agent will feed or cause injury to any native or agronomic species. Prior to the release of a new agent an environmental analysis is prepared by APHIS (Agricultural Plant Health Inspection Service). The only action the Forest Service is taking by releasing an agent is changing the location and influencing the rate of spread of the agent. Under the proposed action, there could be releases of biological control insects on diffuse knapweed and Dalmatian toadflax. The indirect effect of these releases is a decrease in the density and area of coverage of targeted weed species. Biological control agents will not completely eliminate noxious or invasive weeds in the project area or elsewhere on the forest.

Herbicide treatment

Under the proposed action, herbicide would be used on a limited basis to control a small infestation of camelthorn in Compartment 231, stand 6. The effect of this treatment would be to eradicate or control Camelthorn from its only known location in the project area. Herbicide treatment has been addressed in the *Final Environmental Impact Statement for Integrated Treatment of Noxious or Invasive Weeds on the Coconino, Kaibab and Prescott National Forest within Coconino, Gila, Mojave and Yavapai Counties, Arizona* (2005) (FEIS). Refer to that document for a complete discussion of the effects of herbicide treatment. Direct and indirect effects of herbicide treatments are discussed comprehensively in the FEIS.

Cumulative Effects Common to the Proposed Action - Alternative 1 and Alternative 2

The Forest began documenting noxious or invasive weed occurrences forest-wide in 1997. Noxious or invasive weeds may have occurred before then but these occurrences are not well documented. Management activities and disturbances prior to 1997 have contributed to the establishment and distribution of noxious or invasive weeds in the project area. Past forest activities, such as grazing, vegetation treatments, recreation uses, road maintenance and travel along roadways, including paved roads and highways probably affected the abundance and

distribution of noxious or invasive weeds in the project area. However, without information on known distribution of noxious or invasive weed species, the past effects of management actions would be unclear. Sources of introduction for noxious or invasive weeds are often unclear and difficult to verify.

Historically, fire suppression and past alteration of the fire regime through fire suppression have affected all understory vegetation through changes in density, abundance and species composition and through changes to hydrologic function. Elimination of fire in the project area and forest-wide has allowed tree canopy and stand density to increase in some areas, severely reducing or eliminating most understory species. As a result, the healthy, resilient plant community that would be present in many areas is absent and there are few desirable understory species present to provide competition that would help reduce the potential of invasion from noxious or invasive weeds. Past fire suppression has increased the risk and severity of wildfires when they occur. The effects of the resulting severe fires include high levels of disturbance, loss of the plant community and possible alteration of habitat.

One of the objectives of the prescribed fire program within the project area and forest-wide is to restore fire to areas where it has been absent for long periods. The beneficial effects of restored fire include reversal of those factors mentioned above, including restoration of understory species, and reduction of fire risk and severity. There have been prescribed burns within the project area before implementation of the noxious or invasive weed FEIS, so noxious or invasive weed control was not considered in the decisions. However, there are no data to suggest that these actions introduced, increased or decreased noxious or invasive weeds in the project area. The effects of these actions were likely similar to the direct and indirect effects discussed above, except no noxious or invasive weed treatments or mitigations were included or required.

Timber sales have occurred in some portions of project area in the past. Examples include the Jack Smith Timber sale harvested in 1990 and 1991. The effects on noxious or invasive weeds from these activities are uncertain because weed data were not recorded until 1997. Therefore, introductions or increases in noxious or invasive weeds for these activities is unknown and the cumulative effects of the reduction in tree canopy and stand density on noxious or invasive weeds within the project area are also unknown. Mitigations such as incorporation of best management practices and noxious or invasive weed control will help reduce the negative effects on noxious or invasive weeds to non-significant levels.

Grazing within the project area includes grazing by domestic ungulates and wild grazers. The cumulative effects of grazing on noxious or invasive weeds include disturbance, trampling, consumption of desirable plants that could provide competition for noxious or invasive weeds, and possible introduction of propagules through feces or contaminated feed. Many of these effects can be mitigated by following the Best Management Practices as identified in Appendix B the *Final Environmental Impact Statement for the Integrated Treatment of Noxious or Invasive Weeds, Coconino, Kaibab and Prescott National Forests* (2005) (FEIS) and through prudent management of grazing allotments.

A mining operation, the White Vulcan Mine is within the project area. The mine site has a high level of disturbance. Additionally, there is heavy vehicle traffic associated with hauling materials from the mine. This location could be a source of infestation. However, portions of the mine have been recently rehabilitated and there is currently no evidence of higher levels of noxious or invasive weed infestations as compared to the surrounding forest. Another mining operation which extracts sand is on the north east corner of the project area. Diffuse knapweed has been observed in that location but is currently untreated. This infestation could potentially spread onto surrounding forest land.

Road re-alignment activities associated with the expansion of Highway 89N may have contributed to noxious or invasive weed infestations in the project area and along roadways. These activities were initiated and completed before completion of the *Final Environmental Impact Statement for the Integrated Treatment of Noxious or Invasive Weeds, Coconino, Kaibab and Prescott National Forests* (2005). No mitigations or Best Management Practices for noxious or invasive weeds were incorporated.

Other cumulative effects include past and on-going efforts to control noxious or invasive weeds. The Forest has been manually controlling weeds on a limited basis since about 1995. The cumulative effects of these treatments include localized decreases or elimination of noxious or invasive weeds in the targeted areas. The success of these treatments has not been assessed. Recently, biological control insects for Dalmatian toadflax (June 2007) and diffuse knapweed (July 2007) were released within or near the boundaries of the project area. These releases were separate actions that were part of the forest-wide noxious weed program. These treatments are intended to reduce the density and acreage of the targeted noxious or invasive weeds but will not completely eliminate them from the targeted areas and project area in general.

Table 3.42 - Releases of biological control insects in the Project area.

Targeted noxious or invasive weed	Date of release	Area of release	Treatment in proposed action
Dalmatian toadflax	June 2007	Compartment 258 stand 1	Uneven-aged – resource emphasis
Dalmatian toadflax	June 2007	Compartment 269 stand 7	Fuel reduction < 9inches DBH
Dalmatian toadflax	June 2007	Near Schultz Tank (Multiple releases)	Adjacent to project boundary
Dalmatian toadflax	June 2007	Near Little Bear Trail	Adjacent to project boundary
Dalmatian toadflax	June 2007	Near Lenoux Tank	Adjacent to project boundary
Diffuse Knapweed	July 2007	Transwestern Pipeline (multiple releases)	Adjacent to project boundary
Diffuse Knapweed	July 2007	Sandpit area near Sugarloaf Peak (multiple releases, insects releases on Forest Service Property)	Adjacent to project boundary

The effects of the management actions proposed in this project and currently under consideration may have synergistic cumulative effects while reversing some of the same effects. For example, disturbance from management actions, especially in areas of existing noxious or invasive weed infestations may contribute to additional growth of the infestations. However, noxious or invasive weed control as part of the management actions will help to control noxious weed invasions within the project as well as within the surrounding area. Neither the disturbance nor noxious or invasive weed control actions associated with the proposed action would occur if the proposed action is not selected by the deciding official.

The Coconino National Forest is in the process of NEPA analysis to implement the Travel Management Rule (2005). The cumulative effects to this and other projects forest wide will be the reduction in the numbers of motorized routes and the elimination of cross country travel. Negative affects from motorized such as crushing of plants; damage to potential habitat such damage to soils, fragmentation of habitat and introduction of noxious or invasive weeds into the habitats and/or populations will be reduced. These reductions will be from the elimination of most cross-country travel and through the reduction of road density. This would aid in reducing pressures from vehicle travel in sensitive areas where plants and potential habitat occur.

Cumulative effects from human activities such as dispersed recreation travel on roadways, hunting and fishing, and fire-wood gathering have occurred in the project area. Effects of these activities include disturbance and possible dispersal of noxious or invasive weeds into or within the project area. The extent and overall past and future effects of these activities are unknown. Many of these activities have occurred in the past and will continue to occur in the future. However, the Forest Service has little or no control over these activities.

Economics

The Recreation and Landscape Aesthetics sections of this chapter describe the social aspects of recreation opportunity and scenery resources. This section report describes social aspects of the Flagstaff area communities and details the effects of the Proposed Action and no treatment on the Flagstaff economy. There were no significant issues identified regarding economic concerns.

Affected Environment

Community Socio-Economic Information

Flagstaff is the largest city and regional hub of Northern Arizona. It also serves as the seat for Coconino County. The local population in Flagstaff is 61,270 while Coconino County holds 129,570 residents (2004 data). Principle economic activities in Coconino country include government jobs; the leisure and hospitality (tourism) sector; and trade, transportation and utilities jobs. While some natural resource-based industries still exist, numbers have been in steady decline over the past few decades. According to 2001 data for the city of Flagstaff, only 4 logging establishments (out of 116 in Arizona) are in operation with few employees. New scientific and high-tech research and development industries have recently located in Flagstaff.
Additional social and economic information can be found in the community profile for Coconino County created by the Arizona Department of Commerce located at http://www.azcommerce.com/doclib/COMMUNE/Coconino%20County.pdf.
Additional Information specific to Flagstaff can be found in the Flagstaff Community Profile at: *http://www.azcommerce.com/doclib/COMMUNE/flagstaff.pdf*
Additional community economic status information is included in the Project Record.

Environmental Consequences

Common to Both Alternatives

Implementation of restoration activities will be a combination of Forest Service “force account” work done by Forest Service employees and contracted work done by private enterprises under the direction of the Forest Service. The following is a cast up of which portions of implementation will likely be contracted and which portions will likely be implemented under force account. This scenario could change depending on Forest Service staffing and budgets, and economic and market trends in timber removal and utilization.

Table 3-43 - Projected responsible parties for implementation of the project.

Activity	Private Contractor	Forest Service Staff
Thinning and removal of trees greater than 5 inches DBH	X	
Thinning and removal of trees less than 5 inches DBH (Pre-Commercial Thinning)	X	X
Treat slash generated from thinning by lopping and/or piling	X	
Road Obliteration	X	X
Road Maintenance	X	
Pile burning		X
Broadcast burning		X
Noxious weed eradication and/or avoidance to control spread in certain areas as related to contract activities		X

Activities to be accomplished through contracts may contribute slightly to jobs in the agriculture sector of the Flagstaff economy but will not cause a significant change. Conversely, no treatment may affect local logging businesses but would not affect the Flagstaff economy, due the industry's small contribution to the diverse Flagstaff economy.

There is an increased potential for stand replacing wildfire without treatment. The Coconino County and Flagstaff community profiles show strong links to tourism, which could be negatively affected by large fires either in the short term during times of heavy smoke, or in the long term with the degradation of outdoor recreation experiences and opportunities. The exact effect of large fires near Flagstaff is unknown and would depend on the location and extent of the fire. Wildlife habitat provides revenues to the State of Arizona through hunting permits. A stand replacing fire could detract from wildlife populations and negatively affect the number of permits issued for the area where the fire occurred. A reduction in outdoor recreation opportunity could affect local community income in the form of gas, hotel, grocery, outdoor equipment and other related receipts.

Local contractors that perform thinning and road maintenance and obliteration work are typically keeping busy with contracts previously available through government agencies or with contracts let in the private sector.

Both alternatives maintain the natural landscape that supports Flagstaff's and Coconino County's tourism industry by providing opportunities for outdoor recreation and scenic backdrops to popular highways, parks, and home sites. Changes in tourism affect hotel, restaurant and outdoor equipment businesses, gas stations, grocery stores, retail stores, and the community tax structure.

Recent large fires within the region, resulting from overly dense forests and drought and climatic stress have raised the awareness of the community concerning healthy forests. Both alternatives would allow for a reduction in tree densities across a large landscape that might improve the public's perception of safety and well being in case of wildfire. No treatment would leave the

forest in its current condition and local residents may have a reduced feeling of safety and well being in relation to wildfire. No activity would eliminate fire risk completely.

Costs of Implementation

The Forest Service will implement activities with allocated project funds. Local communities do not fund costs of implementation. Implementation costs are one factor considered by the deciding official when determining a course of action.

Table 3-44 list the following agency costs of implementation are estimates based on recent, similar project costs. Table 3-44 assumes that all activities would be implemented through service contracts. In likelihood, some areas may sell as timber sale contracts, thus totals shows the estimated maximum amount of agency funds that may need to be spent to implement project activities.

Table 3-44 - Project costs by treatment activity.

Activity	Cost in Dollars per Unit	Total
Thinning and Slash Piling with Road work included	$300 per acre[9]	8,818 x 300 = $2,645,400
Pile Burning in Urban Interface	$50 per acre	8,818 x 50 = $440,900 Estimate 200-500 acres per year
Broadcast burning in the Urban Interface	$200 per acre	9,220 x 200 = $1,844,000 Estimate 100-500 acres per year
Maintenance burning	$40 per acre	9,220 x 40 = $368,800 Estimate 100-500 acres per year to begin after broadcast is complete
Road Obliteration	$400 per mile	38.0 miles x 400 = $25,200

Cumulative Effects

This project considered recent completed and on-going projects over the last decade, all within the boundary of the Greater Flagstaff Forest Partnership for the area of cumulative effects analysis. This project in tandem with other fuel reduction and thinning projects, offers numerous contracts to provide local employment opportunities and revenue in the logging and road construction/maintenance fields. A majority of these projects (Fort Valley, Kachina, Woody Ridge, Mountainaire, and Eastside projects) have been developed collaboratively with Greater Flagstaff Forests Partnership and have been consecutively planned over the last few years. While planning efforts will be completed by 2007 (Jack Smith/Schultz projects) for Forest Service and GFFP projects, implementation will take longer to complete. It is estimated that contracts will be offered for all of these GFFP projects through the next decade.

[9] These values are derived from recent bids on contracts for similar projects such as the Woody Ridge and Kachina Valley projects.

The amount of timber offered through these projects may help stabilize local operators in the short-term (10-15 years) and may also lead to increased investment in utilization opportunities for materials removed from these areas.

Chapter 4 – Project Coordination

This environmental assessment was prepared by the USDA Forest Service, Coconino National Forest, Peaks and Mormon Lake Ranger District.

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Chapter 5 - References

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APPENDIX A

Responses to Scoping Comments

This section displays respondents' original written correspondence and the Peaks Districts' responses to those comments. Where appropriate, the responses direct readers to sections in the Environmental Assessment where comments have been fully addressed in the context of the appropriate resource areas or where text of the original Proposed Action, including mitigation measures, has been modified or amended to address these public concerns. Underlined text has been added to some comments to better direct the reader to those portions addressed by comment response.

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Gene Waldrip
District Ranger, Peaks Ranger District
5075 N. Highway 89
Flagstaff, AZ 86004

RE: Comments on the Jack Smith/Schultz Fuel Reduction and Forest Health Project Proposed Action

5 June 2007

Dear Mr. Waldrip,

The Arizona Game and Fish Department (Department) has reviewed the Jack Smith/Schultz Project: Proposed Action (PA) by the Coconino National Forest Peaks Ranger District (FS). The Department appreciates the extensive opportunities for collaborative participation with the FS Inter-disciplinary Team (IDT) and the Greater Flagstaff Forest Partnership (GFFP) during development of the Proposed Action.

The Department would like to take this opportunity to acknowledge the progress the FS has made over the last several GFFP-collaborative fuels reduction project in their approach toward forest restoration and wildlife habitat. We have seen a positive evolution in FS-GFFP proposed actions that will result in more heterogeneous forest stand structure that provides higher quality wildlife habitat for multiple species. In particular, the Department would like to thank the IDT for their willingness to craft language within the PA that explicitly defines the terms they used to describe spatial heterogeneity (e.g., tree groups and stand openings). Clumpy/groupy stand structure tends to offer better vertical diversity, thermal and hiding cover, as well as better foraging opportunity for wildlife than does a more evenly-aged, evenly-spaced forested stand. The stand structure described in the PA will provide wildlife habitat that more closely resembles the historic range of variability than would a homogeneous stand structure, and the Department acknowledges the IDT's efforts to achieve these conditions within the PA.

Moreover, the Department appreciates the IDT's efforts to ensure that there is a diversity of group sizes within the stands of the project area, and that the amount of forested area in canopy cover is well-represented within the range of canopy covers proposed. For example, in the Schultz Pass WUI West Zone, the FS proposed a minimum of 25% of groups will retain canopy cover greater than 50%, 50% of groups will be retained with canopy cover between 40 and 50%, and no more than 25% of groups will reain canopy cover between 30 and 40%. This type of planning helps to ensure that some groups will be large in size with higher canopy cover, which is an important forest characteristic upon which many wildlife species depend, particularly passerines, turkeys, raptors, mule deer, and black bear.

Comment 1.1

However, the Department reserves some concern about the proposed shift in how the FS plans to reduce overall tree canopy cover within treated areas. The Department has vetted these concerns during several IDT and GFFP meetings and has been unable to resolve these concerns with the FS. All previous FS-GFFP planning projects have planned canopy cover reduction levels at the stand level. In this PA, the FS is proposing target

canopy cover ranges at the group level as opposed to the stand level (where a group is defined as an aggregation of one or more clumps of trees of varying age and size interspersed with openings). The Department finds that this change has the potential to significantly reduce the amount of forest cover within treated areas. For example, the PA proposes to reduce the forested area in certain zones to between 30-50%. Canopy cover within that forested area will be reduced to 30-60%. Under this proposal, overall canopy cover in this management zone could be reduced to as little as 10% canopy cover if measured across the stand. Without considering the average canopy cover across stands, the Department has some concerns that the FS may not meet the canopy cover requirements for wildlife in the project area.

Comment 1.2 It is our understanding that the decision to reduce canopy cover at the group level is based on Region 3 guidance, per a new interpretation of the northern goshawk guidelines within the 1996 Forest Plan Amendment (#11). However, the Department has received no formal documentation of the new interpretation.

Comment 1.3 The Management Recommendations for the Northern Goshawk in the Southwestern United States (GTR-RM-217) defines northern goshawk habitat through the structural habitat attributes of 14 of the hawk's prey species. The canopy cover data described for these prey species, and for the northern goshawk, were measured at the stand level – not the tree group level. By changing the canopy cover targets from the stand level to the group level, the Department is concerned that the FS may not be meeting the habitat requirements for those 14 wildlife species, and also may not be meeting the habitat requirements for the northern goshawk per the 1996 Forest Plan Amendment.

Comment 1.4 Related to the new FS guidance for implementing the northern goshawk guidelines, the Department is also concerned that FS proposed treatment may trend toward even-aged group selection over time. For example, the FS proposed to regenerate groups of VSS1 and 2 while reducing canopy cover for tree groups of other VSS classes. Managing tree groups by VSS class comes across as even-aged tree group management. However, scientific literature describing the historic range of variability in southwestern ponderosa pine does not find that tree groups were even aged. Rather, the literature suggests that tree groups were often comprised of multi-aged trees intermingled intimately in the same area (Long and Smith 2000, Mast et al. 1999, White 1985). Uneven aged tree composition within groups is important for vertical structure and provides forage and breeding habitat for songbirds as well as thermal cover for raptors as well as deer and elk.

Comment 1.5 The Department requests the FS consider our concerns regarding overall canopy cover across stands as well as across the treated areas, and recommend the FS carefully evaluate potential impacts this canopy cover reduction might have on wildlife habitat during the Effects Analysis. The Department also requests any formal

Comment 1.6 documentation that may be available describing the new Region 3 guidance for interpreting the northern goshawk guidelines, as well as an opportunity to formally comment on that new interpretation.

Thank you for the opportunity to comment on the Jack Smith/Schultz PA. We acknowledge the IDT efforts to carefully describe resultant forest structure post-treatment, and we look forward to continued cooperation on implementation of this important forest restoration and community protection project. If you have any questions or require additional information, please contact Sarah Lantz, Urban Wildlife Planner at 928-607-0650, slantz@azgfd.gov.

Sincerely,

Sarah Lantz

S Lantz

Erik Ryberg <ryberg@seanet.com>
06/11/2007 05:06 PM
To: comments-southwestern-coconino-peaks@fs.fed.us
cc:
Subject: Jack Smith Fuels comments

(Also mailed)

June 11, 2007

Gene Waldrip
Peaks Ranger District
5075 N. Hwy. 89
Flagstaff, AZ 86004

Dear Mr. Waldrip:

These are my comments on the Jack Smith Fuels project you are proposing.

Comment 2.1 I do not believe that the Healthy Forests Restoration Act is appropriate for this project, and I do not understand the need to push this project through under that legislation.

Comment 2.2 I also do not see evidence in the document submitted thus far that you are complying with the Forest Plan requirements for old growth, snags, soils, goshawk, and Mexican spotted owl protection; the HFRA also contains requirements for old growth. Nothing in the HFRA permits you to neglect the standards in your Forest Plan.

Comment 2.3 The Forest Service should conduct an analysis of this project under the regular NEPA process and consider various alternatives to what it proposes. Hasty decisionmaking has plagued the Forest Service in the past. It is the cause of too many roads, too many oil and gas projects,
and too many denuded riparian areas. This area can withstand—and deserves—a more careful, thoughtful, and responsible approach.

Sincerely,

Erik Ryberg

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CENTER *for* BIOLOGICAL DIVERSITY
June 12, 2007
Gene Waldrip, District Ranger
Peaks Ranger District
5075 N. Hwy 89
Flagstaff, AZ 86004
Dear Gene Waldrip,
These are the comments of the Center for Biological Diversity and Forest Guardians on the Jack Smith/Schultz Fuel Reduction and Forest Health Project. These comments are submitted on behalf of the staff and more than 35,000 members of the Center for Biological Diversity and Forest Guardians. Our staff and members represent a portion of the public who care about the management of our public lands in general and the management of the Peaks District in particular, and use these lands for scientific, spiritual, and recreational pursuits. Our organizations have a long history of involvement on the Peaks District of the Coconino National Forest (CNF) and we hereby assert standing as members of the interested and affected public.

We appreciate the opportunity to comment on the Jack Smith/Schultz Fuel Reduction and Forest Health Project. In summary this project seeks to log 7078 acres of National Forest with no cap on the diameter of the trees to be logged and to log another 1566 additional acres with a 9-12" diameter cap. This logging occurs in large areas of critical habitat for the threatened Mexican Spotted Owl and in and near stands that are protected as post-fledgling areas for the Northern Goshawk. This logging is proposed in the name of fuels reduction despite the fact that many areas to be logged are outside of the wildland urban interface and rated as low or moderate for fire hazard.

omment 3.52 While this project has many characteristics of a commercial timber sale, that suggestion is not made explicit in the document. No estimate of the volume of timber or chip to be sold is given.

The Wildland-Urban Interface (WUI)

It is understandable that communities want to take the greatest precautions possible to protect themselves against the threat of wildfire. The Community Wildfire Protection Plan (CWPP) for Flagstaff and Surrounding Communities was prepared with a paramount concern for the fire safety of communities. It calls for the maximum conceivable protection from fire and admits to including all but "several small clusters of houses" (p. 18) into the "urban" zone across three quarters of a million acres. In fact, with few exceptions nearly every acre of private land in the 769,476 acre analysis area is considered a "community." This leads to a situation where 82,275 acres of "community" land is home to just 75,000 people with 55,000 of them in Flagstaff alone.

This "community" area is then buffered with a WUI of 280,655 acres, 215,166 on the Coconino National Forest alone. That amounts to 336 square miles of buffer on the National Forest for a nearby population of 75,000 people. This, quite frankly, is an

overreach that must be balanced with other values. The wildlife, rivers and landscape of this area will suffer from a proposal to treat hundreds of thousands of acres of National Forest in an impossible attempt to fireproof the land. It is the job of the deciding official to compromise between the calls of concerned homeowners and the many other values at stake on the CNF.

This overly cautious fire prevention rationale is driving much of the proposed project. The cover memo to the project admits that the 11,827 acres of treatment are "in and *around* the Wildland Urban Interface." (Italics added.) In the Proposed Action, the section on the Scope of the Project notes that the project area "has little actual private land interface with only approximately ½ miles of boundary associated with residences."

Comment 3.1 Hazardous fuels reduction projects implemented under the Healthy Forests Restoration Act (HFRA) are supposed to be designed to protect communities by treating the WUI. This project is instead proposing treating areas, not to protect communities, but to protect the WUI itself: "*much of the project* location is situated in area crucial for fire hazard reduction *to protect WUI areas*."
(Italics added.)

It is as if the CNF has created a new type of treatment area altogether. Not content to protect communities and structures, the CNF apparently has fuels reduction resources available to protect the area that protects the area containing homes and structures. This treatment outside the WUI represents the **majority** of the proposed treatment area and there appears to be no described limit as to how far such treatment could in the future extend.

Comment 3.2 Figure 2 clearly indicates that many areas that are set for logging in the name of hazard reduction are more than one mile from the CWPP's already extremely cautious WUI, sometimes more than two miles away.

Comment 3.3 No legitimate justification has been provided, nor is any conceivable, for fuels reduction treatments in areas where a long and cautious process has determined such areas to be **outside** of the actual areas of concern. It is not credible to claim that backcountry logging more than three miles from the nearest home is about protecting communities from fire. It is difficult to believe that on the 1.8 million acres of the Coconino National Forest, these areas outside the WUI are priorities for treatment.

Comment 3.4 Significantly, we do not believe that the CNF has authority to use the HFRA to log these non-WUI areas under expedited rules. 16 U.S.C. § 6512(a). Attachment 4 says, "The CWPP WUI covers a majority of the project area. See Figure 2, page 6 of the Proposed Action." But a quick look at Figure 2 clearly shows that the majority of lands within the project area are **outside** the WUI as defined by CWPP. Further there are lands that meet none of the other requirements of HFRA that are nonetheless slated for logging.

Comment 3.5 The Forest is further amiss for not providing the public with a clear description of Condition Class, fire regimes or proximity to municipal water systems or watersheds. This makes determination of meeting the HFRA requirements impossible for members of the public and confusing even for the decision-maker. *See* 16 U.S.C. § 6512(a).

Comment 3.6 For these reasons and despite our concerns about an overreaching CWPP process we call on the CNF to restrict the project's fuels reduction treatments to areas actually defined as WUI.

Pre-judging that EIS Will Not be Required

Even if this project does fit within HFRA, proposed fuel reduction projects must still comply with NEPA, and the Forest Service is required to prepare an environmental assessment ("EA") or environmental impact statement ("EIS") for each project. 16 U.S.C. § 6514(a-b). An EA is defined as a public document which serves to provide sufficient evidence and analysis for determining whether to prepare an EIS or a finding of no significant impact. 40 C.F.R. § 1508.9; *see also* 40 C.F.R. § 1501.4(c) (explaining that agency is to make its determination whether an EIS is required based on the EA); *id.* at § 1501.4(e) (explaining that agency may prepare a finding of no significant impact if the agency determines on the basis of the EA not to prepare an EIS).

Comment 3.7 For the Jack Smith/Schultz project, the Forest Service is not preparing an EA to determine whether an EIS is required, but rather as the pre-determined final environmental analysis for the project. *See* May 9, 2007, letter to interested participants ("Upon completion of the EA, I will be selecting a preferred alternative."). This pre-determination that there will be no significant impacts and that no EIS will be required violates NEPA. 42 U.S.C. § 4332(2)(C) (requiring an EIS for every major Federal action significantly affecting the environment); 40 C.F.R. §§ 1501.4(c); 1508.9.

Additional Public Comment Required on Draft EA

Comment 3.8 The Forest Service intends to not provide for any public comment on a Draft EA for the Jack Smith/Schultz project. *See* May 9, 2007, letter to interested participants (stating that "there is no comment period on the EA under HFRA authority."). This position violates both HFRA and NEPA. HFRA requires the Forest Service to comply with NEPA, 16 U.S.C. § 6514(a), and specifically requires the Forest Service to "provide an opportunity for public comment during the preparation of any environmental assessment." 16 U.S.C. § 6514(g). NEPA, in turn, requires the Forest Service to allow public comment on Draft EAs. *Citizens for Better Forestry v. U.S. Dept. of Agriculture*, 341 F.3d 961, 970 (9th Cir. 2003), *citing* 40 C.F.R. §§ 1501.4(b), 1506.6; *Anderson v. Evans*, 314 F.3d 1006, 1016 (9th Cir. 2002).

Comment 3.9 The May, 2007, description of the proposed action for the Jack Smith project that is the basis for this public comment period is not the same as a draft EA prepared under NEPA. Rather than an actual analysis of the potential environmental consequences, as required by NEPA, the "proposed action" simply provides a brief description of the proposal. In addition, the "proposed action" description fails to explain why the project will not result in significant environmental impacts, and how the project will comply with applicable forest plan requirements. The Forest Service must therefore allow additional public comment on the Draft EA for this project. *Citizens for Better Forestry*, 341 F.3d at 970 (9th Cir. 2003); 40 C.F.R. §§ 1501.4(b), 1506.6.

Northern Goshawk

Comment 3.10 Pursuant to the National Forest Management Act ("NFMA"), "the Forest Service must demonstrate that a site-specific project would be consistent with the land and resource management plan of the entire forest." *Neighbors of Cuddy Mountain v. U.S. Forest Service*, 137 F.3d 1372, 1377 (9th Cir. 1998), *citing* 16 U.S.C. § 1604(i); 36 C.F.R. § 219.10(e). In 1996, the Forest Service amended all Forest Plans in the Southwest Region, including the CNF Plan, to provide additional standards and guidelines for Northern goshawks. The Forest Service has failed to demonstrate that the Jack Smith/Schultz project will comply with the mandatory standards and guidelines for the Northern goshawk..

Appendix C to the 1996 Record of Decision for the Northern goshawk plan amendments sets forth the mandatory standards and guidelines for ecosystem management within Northern goshawk habitats, and these standards and guidelines have been incorporated into the CNF Plan. *See* CNF Plan at 65-7 through 65-11. These standards and guidelines apply to all forested lands that are outside the protected areas for the Mexican Spotted Owl. CNF Plan at 65-7. These standards and guidelines include, but are not limited to:

(1) The Forest Service must survey the management analysis area prior to any habitat modifying activities, including a ½ mile beyond the proposed project boundary. The Forest Service must use the R3 survey protocol in order to get complete coverage of the management analysis area, and must complete at least one year of surveys.

(2) The Forest Service must establish and delineate on a map, a post-fledgling family area that includes 6 nesting areas per pair of nesting goshawks for known nest sites, old nest sites, areas where there is historic data of past nest sites, and where there have been repeated sightings. A post-fledgling family area (PFA) must be approximately 600 acres in size, and must include the nest sites and habitat most likely to be used by the fledglings during their early development. The 6 identified nest sites should each be approximately 30 acres in size, requiring a minimum total of 180 acres of nest areas within each PFA.

(3) The Forest Service must manage for uneven-age stand conditions for live trees and retain live reserve trees, snags, downed logs, and woody debris levels;

(4) The Forest Service must manage for old age trees such that as much old forest structure as possible is sustained over time across the landscape;

(5) The Forest Service must sustain a mosaic of vegetation densities, age classes and species composition across the landscape;

(6) The Forest Service must provide foods and cover for goshawk prey;

(7) The Forest Service must limit human activity in nesting areas and near PFAs during the breeding season, which extends from March 1 to September 30;

(8) The Forest Service must manage the ground surface layer to maintain satisfactory soil conditions i.e., minimize soil compaction and maintain hydrologic and nutrient cycles;

(9) The required habitat characteristics, such as tree size, snags, dead and down material, etc., are to be evaluated at the ecosystem management area level, at the mid-scale such as drainage, and at the small scale of site.

(10) For areas outside of PFAs, the required distribution of vegetation structural stages is 10% VSS1, 10% VSS2, 20% VSS3, 20% VSS4, 20% VSS5, and 20% VSS6. Snags are to be 18 inches or larger dbh and 30 feet or larger in height, downed logs are to be 12 inches in diameter and at least 8 feet long, and woody debris must be 3 inches or larger on the forest floor.

(11) For areas outside PFAs, canopy cover for Ponderosa pine forest is to average 40+% for VSS4, 5, and 6.

(12) Within PFAs, the canopy cover for Ponderosa pine forest is to average 50+% for VSS4, 5, and 6.

(13) Within nesting areas, the area must contain only mature to old forest (VSS5 and 6) having a canopy cover between 50-70% with mid-aged VSS6 trees 200-300 years old.

Comment 3.11 The May, 2007, Proposed Action states that Northern goshawk habitat will be managed according to the Forest Plan standards and guidelines, but the EA must actually demonstrate that the proposed project will indeed comply with these numerous mandatory requirements. Moreover, the EA must provide the public with the hard data and objective analysis that is necessary to independently determine and calculate that the project will in fact be consistent with these requirements. *Idaho Sporting Congress v. Thomas*, 137 F.3d 1146, 1150 (9th Cir. 1998) (holding that NEPA requires the public to receive the underlying environmental data from which the Forest Service experts derive their opinions and conclusions). As it stands, there is no way for the public to determine compliance with the numerous, mandatory Northern goshawk standards and guidelines, and therefore the Forest Service has not demonstrated compliance with these standards as required by NFMA.

Comment 3.12 Moreover, what information is provided to the public indicates that the Jack Smith project will not comply with the Northern goshawk standards and guidelines. For instance, even though habitat is to be evaluated at the ecosystem management area level, the mid-scale or project area level, and at the stand level, the Forest Service is instead considering only the "group size" for assessing canopy cover and other requirements, which can apparently be as small as 2 "clumps" of two trees (or .05 acres). This is not only unsupported by the available science, but is also directly contrary to and in violation of the mandatory goshawk standards and guidelines.

Old Growth Habitat Requirements Not Met

In addition to specific requirements for Northern goshawks, the 1996 Forest Plan Amendment for the Southwest Region also included mandatory standards for old growth habitat. Each national forest, including the CNF, must allocate no less than 20 percent of each forested ecosystem management area to old growth habitat. *See* CNF Plan at 70-1. Moreover, to properly determine old growth habitat, the Forest Service must refer to a specific table included in the both the 1996 Plan Amendment and CNF Plan, which sets forth the detailed, minimum numeric criteria for various forest types, including the size, age, and number of live and dead trees, down trees, and canopy cover. CNF Plan at 70-2. Forested sites must meet or exceed these numeric structural attributes in order to be considered old growth habitat.

The Plan Amendment requires the Forest Service to analyze old growth habitat at multiple scales - the ecosystem management area, one scale above the ecosystem management area, and one scale below the ecosystem management area. CNF Plan at 70-1. The amount of old growth that can be provided and maintained must be evaluated at the ecosystem management level and be based on forest type, site capability, and disturbance regimes. *Id*.

Comment 3.13 For the Jack Smith/Schultz project, the Forest Service states that the Jack Smith "10K" consists of 13,028 forested acres, but that there is only 899 acres of existing old growth (6.9%). And for the Elden 10K, there are 13,499 acres, of which only 213 acres is currently old growth (1.6%). Even for this little, existing old growth, the Forest Service fails to properly disclose whether these areas actually meet the minimum numeric standards set forth in the Forest Plan.

Comment 3.14 To make up for the significant deficiency, the Forest Service also admits that it will not be designating enough future old growth to meet the minimum old growth standards. An additional 985 acres are needed in the Jack Smith 10K, and an additional 1762 acres are needed in the Elden 10K, but the project only designates 151 acres for future old growth.

Comment 3.15 The Forest Service is far from meeting the mandatory old growth standards and guidelines for these areas and therefore cannot log any large, old growth trees until it comes into compliance. *See Neighbors of Cuddy Mountain v. U.S. Forest Service*, 137 F.3d 1372, 1377 (9th Cir. 1998) (stating that to prove a timber sale would be consistent with Forest Plan old growth standard, the Forest Service must show that after the sale, the minimum requirements would be met within each affected area); *Lands Council v. Vaught*, 198 F.Supp.2d 1211, 1224 (E.D. Wash. 2002) ("Plaintiffs claim that even if the Project does not log old growth, compliance with the [Forest Plan's] old growth standards must be demonstrated to ensure that the mature trees logged under the Project are not needed to fill any shortfall in the required old growth acreage. . . .. The Court concurs with Plaintiffs' interpretation of the requirement that projects be consistent with land and resource management plans.").

Comment 3.16 Because the Forest Service is so far out of compliance with the minimum old growth standards, it also cannot demonstrate that it is maintaining the viability of Northern

goshawks and other old growth dependent species, as required by NFMA. Additionally, the Forest Service cannot claim, without any supporting scientific analysis or data, that logging additional large trees, as it proposes for this project, will somehow improve the remaining mature habitat for these old growth-dependent species. As in *Ecology Center v. Austin*, 430 F.3d 1057, 1064 (9th Cir. 2005), "the Forest Service's conclusion that treating old growth forest is beneficial to dependent species is predicated on an unverified hypothesis." The Forest Service must also plainly disclose the scientific uncertainty concerning its proposed logging of large trees to somehow improve the remaining old growth habitat and species. *Ecology Center*, 430 F.3d at 1065. The agency cannot simply treat its prediction that logging these large trees will benefit old growth dependent species as a fact instead of an untested and debated hypothesis." *Id*.

Comment 3.17 Additionally, as required by the Plan Amendment and CNF Plan, the Forest Service's analysis of old growth habitat must be at multiple scales, including the ecosystem management area, one scale above the ecosystem management area, and one scale below the ecosystem management area. The information provided for the Jack Smith project again fails to meet this requirement. In sum, the Forest Service must explain how many acres within the affected "ecosystem management areas" actually meet the minimum numeric criteria for old growth habitat that are set forth in the 1996 Plan Amendment and CNF Plan, must assess the existing and potential impacts to old growth habitat at multiple scales, must allocate no less than 20 percent of each forested ecosystem management area to old growth as depicted in the Forest Plan, and must not log any large trees within the project area until it meets these mandatory requirements.

Mexican Spotted Owl (MSO)

Comment 3.18 The project area includes parts of four MSO protected activity centers (PACs) and borders two others. MSO Critical Habitat extends across the majority of the project area. According to the Region 3 Standards and guidelines for MSO, a basal area of at least 150 must be maintained on MSO Critical Habitat. The Proposed Action describes 150 ft^2/acre as the "stocking levels derived for meeting minimum requirements under MSO Critical Habitat." (p. 14) Yet, page 43 of the proposed action states a goal of "40-120 basal area in the project area." The proposed action is not in compliance with the Forest Plan regarding MSO basal area.

We note that the Recovery Plan for MSO makes clear that, "No stand that meets threshold conditions can be treated in such a way as to lower that stand below those conditions until ecosystem assessments can document that a surplus of these stands exist at larger landscape levels (e.g., no less than the size of a FS District.)" Cutting in Critical Habitat cannot reduce stand basal area below the 150 threshold.

To comply with the MSO Recovery Plan, canopy cover values must be evaluated and met on both the stand level and the landscape level. Non-compliance with the Recovery Plan for some stands precludes cutting in other stands where the minimum canopy values may exceed requirements.

Comment 3.19 Many treatment areas without diameter limits are located in MSO Critical Habitat. The Standards and Guidelines for MSO require the Forest to, "Save all trees greater than 24 inches dbh." The Proposed Action is not in compliance with the Forest Plan regarding MSO requirements for large tree retention.
The Recovery Plan for MSO notes, ". . .uneven-aged management results in large acreages of low-density stands, numerous road openings, and the eventual eradication of large diameter stems. . . . this type of application may not be the best option for producing spotted owl habitat."
(p. 71)

Hazard-Treatment Mismatch

Comment 3.20 The majority of treatment areas are labeled as having an emphasis on fuels reduction. Even the areas labeled on the Treatment Map (fig. 5.2) as "Uneven-aged - Resource Emphasis" are referred to in the Summary of Management Actions (p. 40) as "Uneven-aged management treatments for Fuel Reduction with Resource Emphasis." All of the proposed treatments have fuels reductions as a primary goal. According to Attachment 4: "The purpose of the Jack Smith/Schultz Fuels Reduction and Forest Health Project is to reduce wildfire risk to communities, including portions of the Flagstaff, Timberline, and Doney Park Communities." Under the Purpose and Need section there is a subheading for the key priority area: "Wildfire and Fuels Hazard." The "Desired Conditions" under this subsection states the central goal of the project as a whole: "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." (p. 23) "Fire hazard ratings for the project area" are described on page 21. Low or moderate hazard ratings total 7162 acres. High or above rated areas total 4565 acres. The project area **at this time** could best be described as: **A low or moderate fire hazard rating exists across a majority of the project area. Some stands remain with moderate to high rating**. In describing the central goal of the project, the desired condition has been expressed as a condition that already pertains. The central goal of this fuels reduction project is to achieve a condition currently present without spending a dime of taxpayer dollars. Nonetheless and despite the Proposed Action's own internal logic, over 8000 acres of logging is proposed.

But the mismatch between what is needed on the land and what is proposed for treatment is even more glaring when specific areas are examined. We will attempt to point out a couple obvious inconsistencies.

The first involves areas east of Schultz Peak and east of Sugarloaf. In Table 5 (p. 13) the Forest describes a desired distribution of vegetative structural stages. The desired conditions are for 60% of stands to be characterized by trees greater than 12". The proposed action states that, "The desired values stem directly from Forest Plan direction for northern goshawk management." (p. 15) The existing distribution shows a significant shortfall with only 40% of stands reaching this tree size of greater than 12".

Comment 3.21 Trees approaching 12" are those poised to most quickly advance in VSS value to achieve the described desired conditions of greater than 12". This is an important goal given the

Proposed Action's description of the treatment area: "Past logging practices have removed the *vast majority* of old forest trees." (Italics added, p. 9) Still, one of the proposed treatment types is classed in Figure 5.2 as Fuel Reduction - <12". It would seem that this project as proposed is going to result in current logging practices removing many of the very trees that might have most quickly replaced the missing older trees.

Comment 3.22 Fuels reduction, despite the treatment name given, cannot be the rationale for this situation. Two significant areas, one east of Schultz Peak (Stand numbers 000238/0019 and 0009) and the other east of Sugarloaf (000259/0014 and 0012) are scheduled to receive this < 12" logging treatment despite the fact that both have "low" fire hazard ratings. Both are also outside the WUI.

Comment 3.23 While many "low" and "moderate" fire hazard areas are subject to logging, all "extreme" fire hazard areas and about one-half of the "very high" areas are left untreated. In fact, most of the "low" and "moderate" rated fire areas are subject to logging. While topographical and resource restraints can explain the lack of treatment in some areas, no logic provided in the Purpose and Need section of this document can explain widespread logging of low hazard areas.

Comment 3.24 The Forest Plan goal for wildfires is to hold fire starts to ten acres or less. "Expected fire behavior within portions of the project area rated high, very high, or extreme will make it difficult to hold fire starts to 10 acres or less." (Pg. 19) A rating of low or moderate means fire starts in these areas are not difficult to mange per the Forest Plan goals. There is no compelling fire hazard reduction justification for logging. Since treatments do not match hazard ratings, it appears some other logic is driving this process.

Stand Density

The CNF has based much of its argument for cutting these 8000+ acres on problems with stand density. We are told that for Ponderosa Pine stands (presumably regardless of elevation, slope, aspect, microclimate or precipitation differences) a basal area of about 157 ft^2/ac (that is 35% of a maximum basal area of 450 ft^2/ac) leads to reduced tree growth and vigor due to competitiveness. Recall that 150 ft^2/acre is described as the "stocking levels derived for meeting minimum requirements under MSO Critical Habitat." It is interesting to note that a density just above the "minimum requirements" for MSO Critical Habitat, is viewed by the Forest as a problem of overstocking that needs to be addressed by extensive logging. The amount of forest classed in this manner covers well over half the project area.

Comment 3.25 At a value of 270 ft^2/acre (60% of maximum basal area) the Forest believes a stand is in imminent danger of competition-based mortality. This is despite the fact that values up to 450 can be attained. Nonetheless, taking the Forest at its word we are left to speculate how long it will take a stand to move from a value of 157 to a value of 270 while the stand is experiencing "decreased tree growth." This is an important question left unanswered in the Proposed Action. It is relevant in that only 10% of the project area is above the 270 value and yet the CNF proposes to log 73.7% of the project area at this

time. This means trees in stands even below the 157 value are slated for removal long before they are even close to danger of competition-based mortality. Again, page 43 states a goal of "40-120 basal area in the project area."

Comment 3.26 (Regarding the need to log to reduce fire hazards, the document shows additional significant confusion on the issue of stems per acre. Table 7 on p. 21 referencing "Fire Hazard Rating Criteria" calls for a "Desired Value" of "Less than 300" stems per acre. Three pages later the "Need for Change" section calls for far more aggressive logging to reduce stands to "less than or equal to 100" stems per acre. The 100 stems per acre value is repeated again on p. 30.)

Most proposed logging activity based on stand density numbers in this project is unjustified based on the Forest's own presentation of the data. We call on the Forest to restrict logging activity to those areas with a stand density over the 270 ft^2/acre value.

Diameter Limits

The vast majority of logging on this project calls for treatment with no diameter limits. Some treatment areas do however, call for limits of either 9" or 12". The reason for setting diameter limits is given on pages 40 and 41. Diameter limits of 12" are only set where access by "logging equipment or haul trucks is prohibitive." Diameter limits of 9" are set where they are legally required for protecting MSO protected activity centers. So under this Proposed Action, if there are no Mexican spotted owl protected activity centers and you can get a log truck into an area then there is no limit on the size of tree that might be logged and hauled away.

Comment 3.27 The standards and guidelines for MSO state: "Save all trees greater than 24 inches dbh." That is a straightforward and absolute statement. Yet many of the treatment areas without diameter limits are in MSO Critical Habitat.

Comment 3.28 In addition, as set forth above, the Forest Service cannot log any additional large trees in this project area until it can first establish that it is compliance with the mandatory Forest Plan standards for old growth habitat.

It should also be recognized that fire hazard is not increased by large trees or large fallen logs. These structural components are the most resistant to fire. In fact, removing large trees increases fire hazard by opening the canopy and leading to increased evaporation due to less shade and more wind.

Comment 3.29 We categorically oppose logging large trees in the name of hazard reduction or forest health. We call on the CNF to propose a project that does not log any trees greater than 16" in diameter in this area where "the vast majority" of large trees and old growth habitat has already been logged.

Roads

Comment 3.30 It is unfortunate that the Proposed Action does not identify the locations of proposed roads and offers no analysis of impacts. Specific comments are therefore impossible. Nonetheless, we generally oppose the construction of new roads for this project. Roads described as "temporary" often are not. Unless completely obliterated many "temporary" roads continue to be utilized long after the Agency has "closed" them and often times these roads lead to further proliferation of illegal spurs, resulting in a “spaghetti bowl” of routes that cause further damage and can not be maintained or enforced. In addition, the ecological effects of a road present on the landscape, whether technically open or closed, is often the same.

Comment 3.31 At present, Forest Plans makes use of “road” density standards (RDS). We recommend that the Forest Service broaden the reach of its existing road density standards and expressly ensure that all motorized routes – whether classified as a “road” or “trail,” and whether “authorized” or “unauthorized” or “opened or closed” – are factored into route density calculations. This makes sense given that the bureaucratic classification of a route is ecologically irrelevant. What is relevant is the impact of that route – and that route’s use – to the Forest.

We emphasize this point because we frequently hear troubling interpretations by Forest Service staff that RDS are focused solely on “roads” and are calculated by excluding unauthorized and illegal routes, as well as those that are “closed” or “temporary”. This interpretation defies common sense, ignores ecological realities, and constitutes a bureaucratic rationalization of the Forest Service’s failure to curb the proliferation of user-created routes and high density route networks. Therefore, we recommend that the Forest Service for all fuels reduction projects and through the broader Travel Management Planning process, expressly clarify that density standards do in fact include all motorized routes, whether classified as a road or trail, and whether authorized or unauthorized.

Comment 3.32 We further recommend that the Forest Service calculate RDS at clearly-defined, science-based ecological scales (e.g., watershed, or habitat levels) and avoid simplistic Forest-level calculations. This is consistent with the Forest Service’s duty to address impacts, in particular cumulative impacts, in the proper “context” to determine those impacts’ significance. 40 C.F.R. § 1508.27. In so doing, the Forest Service has an informed means of determining whether or not agency actions comport with substantive legal obligations, e.g., to “provide for diversity of plan and animal communities....” 16 U.S.C. § 1604(g)(3)(B). For the Jack Smith project, it is unclear at what level road density standards are being calculated or “reduced.”

Accordingly, Wilderness and other analogous protective designations that prohibit motorized use should be excluded from RDS calculations. Including these designations in RDS calculations too easily leads to the illusion of low route densities when, in reality, the density of route networks outside of these protective designations is quite high and likely causing unacceptable degradation. Excluding these protective designations from RDS also de-politicizes protective designations relative to motorized recreation. In other words, protective designations should not be used as a pretext for condoning high-density

route networks outside of protective areas. Instead, route densities throughout the entire Forest must ensure resource protection.

Once properly established and defined, RDS should be used to identify, prioritize, and plan for the reclamation of closed or unauthorized routes. Reducing route densities on a map is one thing; reducing them on the ground another. Thus, projects like this one in conjunction with the TMP process, instead, should ensure effective travel management in harmony with the broader landscape, resource management objectives, limited agency resources, other recreational uses, and enforcement strategies.

Comment 3.33 The CNF is in non-compliance with its own Forest Plan standards. The construction of new roads makes compliance more difficult. We support the obliteration of existing roads within the project area to bring the CNF into compliance with the Forest Plan. We do not, however, support the logic that the construction of more roads will meet the purpose and need of the action: "continued road density reduction."

Comment 3.34 If the CNF decides to continue to ignore its own road density standards and goes ahead with the construction of roads for this project, we recommend avoiding construction in the following: known or possible habitat for sensitive, threatened or endangered wildlife and plant species; inventoried roadless areas; riparian areas; sensitive soil areas; areas that are adjacent to or contiguous with protected areas that will encourage motorized incursions into Wilderness or other non-motorized/protected areas.

The Forest Service is currently engaged in two very significant decision-making processes across all Region 3 Forests: Travel Management Planning (TMP) and Forest Planning. Many of us are in the process of developing protective management recommendations (e.g., special management area designation for sensitive species habitats) that transcend single resource uses (i.e., motorized recreation) and focus on landscape-scale ecological protection and restoration. We are concerned that the construction of roads on a project-by-project basis, as is proposed for the Jack Smith fuel reduction project will prejudice or compromise these recommendations. If the Forest Service continues to make pre-emptive decisions regarding the use of roads and construction of roads, TMP will be compromised.

Comment 3.35 Thus, we recommend that the Forest Service refrain from designating or constructing more roads until the Travel Management planning process is complete. Otherwise, the Forest Service and associated projects with road building involved will be vulnerable to legal review and the Forest Service will not be able to provide assurances to the public that these projects will not prejudice or compromise conservation-oriented management recommendations.

The TMP process should focus on reducing route densities by designating a limited, baseline travel system principally using existing, authorized routes and refrain from designating new routes, in particular unauthorized, user-created routes. Constructing new routes in the interim will undermine the intent and spirit of the TMP rule.

Comment 3.36 The Travel Management Planning rule's elimination of cross-country travel is a welcome change. However, the intent behind eliminating cross-country travel could easily be compromised if the Forest Service evades the prohibition by designating high-density travel networks and fails to implement measures that prevent the continued proliferation of user-created routes. The road construction proposed in this area will contribute to higher densities and route proliferation. In reviewing and participating in TMR planning processes, the Forest Service must ensure that route densities are consistent with resource protection objectives which, in turn, must be consistent with the underlying need to protect and restore our National Forest's ecological structure, function, and composition.

Declining agency budgets are increasingly a daily part of day-to-day National Forest management. In moving forward with the TMR process, the Forest Service must therefore account for the agency's resources and management priorities. Based on our assessment of Forest Service route and funding data for Southwest National Forests, the Forest Service appears to have less than 10%, and in some instances, less than 5%, of the funds necessary to maintain its existing route system. This, of course, does not account for funds that would be necessary to decommission and restore closed or unauthorized routes. Clearly, more road construction is not necessary or warranted and can not be maintained.

Comment 3.37 Finally, we note that increased access via newly constructed roads increases fire hazard and is counter to the central goal of the project.

Comment 3.38 Construction of roads is one more reason that we are calling for an EIS as the appropriate level of analysis for this project. An EA will not provide the necessary level of analysis of direct, indirect or cumulative impacts, nor will it allow for the full range of necessary public input.

Recreation

Comment 3.39 The NEPA analysis needs to acknowledge the high level of recreation associated with the project area and the Wilderness it borders. All impacts to recreational activities should be analyzed and the project should be modified to accommodate this important value. Recreation includes use of the numerous trailheads and extensive opportunities for dispersed camping. Widespread logging will heavily impact this important Forest value during treatment and for many years thereafter.

Grazing

Comment 3.40 The NEPA analysis should specify post-treatment monitoring and management actions designed to identify and minimize impacts to the landscape from grazing and to ensure that adequate ecological recovery has occurred before livestock grazing resumes on these lands. Such activities should include firm parameters that would trigger re-authorization of livestock following science-based indications of recovery.

Returning fire to a long-fire suppressed ponderosa pine forest has the potential to significantly increase the diversity of annual and biennial forbs. The establishment of adequate ground cover is imperative to reestablishing a natural fire regime in the project area. Livestock grazing must not be permitted to resume until annuals and biennials have adequate time to establish, or the goals and projected outcomes of this project may be significantly nullified. Further, permitting livestock grazing to occur before sufficiently stabilizing vegetation may have long-term consequences, such as damaging soils, soil crusts, and future site productivity.

Snags

Comment 3.41 The proposed action does not clearly state the guidelines for snag retention in the project area, nor does it explain the manner in which these guidelines will be met. Snags play a highly important role for numerous wildlife species. Treatments must be accomplished in a manner that retains sufficient snags for wildlife after both cutting and prescribed fire. Further, analysis must clearly show that sufficient trees of the appropriate size and age classes will remain after treatment to assure adequate snag recruitment. Where the density of snags is not meeting Forest Plan, Critical Habitat and other goals, the proposed action should include the creation of snags to bring the Forest into compliance.

Machine Piling of Slash

Comment 3.42 This method of treating slash is perhaps the most ecologically destructive method available. Vegetation, soils, and future site productivity are all significantly harmed by this method. We call on the CNF to utilize hand piling throughout the project area but especially in areas of steep or moderate slopes, near riparian areas, in the vicinity of sensitive plants or anywhere where future site productivity may be impacted. Further this method cannot be employed on moist soils. The NEPA analysis must clearly identify impacts associated with any machine piling of slash.

Riparian Areas

Comment 3.43 The Proposed Action says little about riparian areas, seeps, springs, draws or washes. These areas play unique and important ecological roles and should be protected from impacts due to treatments. The NEPA analysis should clearly define potential impacts to these areas and identify mitigation measures that will be taken to assure their protection.

Management Indicator Species

Comment 3.44 On pages 14 and 15 of the Proposed Action the CNF seems to indicate that by virtue of managing for MSO and Northern goshawk, the Forest will have automatically provided sufficient habitat for all Management Indicator Species (MIS). This is not necessarily so and in no way absolves the agency from all Forest Plan and NFMA requirements to survey, monitor and manage for each and every specific MIS.

Aspen Regeneration

We do not oppose attempts to regenerate aspen but simply call the Agency's attention to a few relevant facts on the issue. First, climate scientists are widely predicting a migration of species to higher latitudes and higher elevations. Such migrations have already been observed for numerous species. It would come as no surprise then that aspen at lower elevations are no longer regenerating. This trend might be expected to continue and in fact worsen across the entire CNF.

Secondly, we note that the general failure of aspen regeneration may in part be due to fire suppression. As aspen are epicormic sprouters they respond quickly to stand-replacing fires, growing up to several feet in the first year alone after fire. This gives them an advantage over conifers as long as a natural fire regime including a full mosaic of fires continues. In the longterm absence of fire, conifers are able to out-compete them.

Comment 3.45 Third, aspen would likely benefit from removing livestock from possible regeneration sites. We call on the CNF to include such an alternative.

Finally, there is evidence that stand-replacing fire plays a critical role in aspen health. Turner (2003) found that "seedling aspen established successfully throughout the burned pine forests and well beyond the pre-fire range of aspen. We have documented seedling aspen occurring as far as 15 km from the nearest known aspen clone." She further believes that fire stimulates sexual reproduction of aspen (as opposed to the growth of clones from root stock) and without wildfire a link in the ongoing process of species regeneration is severe

Conclusion

In summary we accede to treatments, with diameter caps in truly overstocked stands in the WUI, despite our concerns about overzealously defining large areas of the CNF as WUI. Likewise we are not opposed to prescribed burns, meadow enhancement or to actions taken to regenerate aspen.

Comment 3.46/47 We oppose, however, the proposed commercial logging of trees greater than 16 inches dbh, and are categorically opposed to prescriptions written without diameter limits. Within the WUI we see no need to log areas defined as having a low fire hazard rating. We question the balance between ecological impacts and utilization of scarce financial resources to log areas of "moderate" hazard rating within the WUI in this scarcely populated area.

Comment 3.48/49/50 We believe that most of the proposed treatments outside of the WUI are not allowed under HFRA, and may result in significant impacts to Northern Goshawk and Mexican Spotted Owl. We believe that this project is of a nature that a full Environmental impact Statement should be prepared and a full and open NEPA process be allowed. The nature and significance of this project makes an EIS legally necessary. Only an EIS will provide the public and the decision maker with the information required for adequate involvement

in making a legally sound decision. Finally, the Forest should include a legally-compliant comprehensive analysis of soils, watersheds, wildlife, vegetation, invasive species, cultural resources, climate impacts and socioeconomic impacts of this project.

Comment 3.51 In addition to the comments above, we respectfully remind the agency that it must comply with the National Environmental Policy Act, Endangered Species Act, Clean Water Act, Administrative Procedures Act, National Forest Management Act, Multiple-Use Sustained-Yield Act, National Historic Preservation Act, the CNF Plan standards and guidelines, and all other applicable federal laws governing these public lands. We appreciate the opportunity to help the CNF make a decision that best meets the needs of the land and local community.

We are available for clarification of the above comments if needed and wish to be on the mailing list for this project.

Sincerely,
Tim Ream

Center for Biological Diversity
Bryan Bird
Forest Guardians
312 Montezuma
Santa Fe, NM

Comment analysis has resulted in the identification of 17 issues or issue topic from 51 comments. Nine comments which were statements or opinions were determined to be non-issue comments. The issue areas and their disposition are as follows:

Issue Number	Issue/Issue Topic	Comment Numbers	Disposition	Substantive Comment?
I-1	Northern Goshawk S&G's and Canopy Cover requirements/measurement methods	1-1,1-3,3-12	Addressed in PA/EA Effects Analysis Re-analysis of comment following Objection and Reviewing Officials findings determines this comment to be a Significant Issue as of 1/11/2008.	YES
I-2	Northern Goshawk and even-aged group management	1-4	Addressed in PA/EA Effects Analysis	YES
I-3	HFRA not appropriate or allowed for project, need EA/EIS. EA predetermined over EIS	2-1, 2-3, 3-1, 3-2, 3-3, 3-4, 3-6, 3-7, 3-8, 3-9, 3-48	Addressed in PA/EA Effects Analysis, PA Attachment 4	YES
I-4	PA fails to present evidence Forest Plan S&G's are being met for various wildlife and TE&S species	2-2, 3-10, 3-11	Addressed in EA Effects Analysis	YES
I-5	Forest is amiss for not providing clear description of Condition Class/Fire Regime on the project	3-5	Addressed in PA/EA Effects Analysis	YES
I-6	Old-growth Standards and Guidelines not being met	3-13, 3-14, 3-15, 3-16, 3-17, 3-28	Addressed in PA/EA Effects Analysis	YES

I-7	MSO Critical Habitat Stocking Levels, Treatments, and 24” dbh tree cutting	3-18, 3-19, 3-27	Addressed in PA/EA Effects Analysis	YES
I-8	Treatments in low and moderate fire hazard rated stands not needed, reason for treatments not justified	3-20, 3-23, 3-24, 3-47	Addressed in PA/EA Effects Analysis	YES
I-9	Less than 12 dbh treatments cutting trees that could exceed 12” the soonest, when that size class is deficient	3-21, 3-22	Addressed in PA/EA Effects Analysis	YES
I-10	SDI versus Basal Area – thinning in stands less than 270 SDI.	3-25	Addressed in PA/EA Effects Analysis	YES
I-11	Stems/acre DFC, 100 in vegetation section, 300 in fuels section	3-26	Addressed in PA/EA Effects Analysis	YES
I-12	We call on the CNF to propose a project that does not log any trees >16” dbh	3-29, 3-46	Addressed in PA/EA – Alternatives considered but not analyzed in detail, Effects Analysis, Attachment 1.	NO – Comments do not provide supporting reasons for the Responsible Official to consider
I-13	Roads, locations, analysis and inventory techniques, temporary roads	3-33 – 3-34 and 3-36 – 3-38	Addressed in PA/EA Effects Analysis	YES 3-31, 3-32, 3-35 – Outside of scope of project.
I-14	Wildlife – Snags S&G’s not clearly stated, nor manner in which they will be met on the project	3-41	Addressed in PA/EA Effects Analysis	YES
I-15	Fuels – Machine piling should not be allowed in sensitive areas, fully analyze effects of machine piling in the EA	3-42	Addressed in EA Effects Analysis	YES
I-16	Forest must conduct MIS analysis	3.44	Addressed in EA Effects	YES

			Analysis	
I-17	Call for Alternative to remove all grazing of cattle from aspen regeneration areas	3.45	Addressed in PA/EA – Alternatives considered but not analyzed in detail, Effects Analysis	YES

Responses to Scoping Comments

The District received comments from the Greater Flagstaff Forest Partnership (GFFP) on a draft Proposed Action in a letter, May 03, 2007. The ID Team considered five comment areas received in the letter and was able to make additional clarification in the Final PA in response. These clarifications were presented to the GFFP and the May 12, Partnership Advisory Board (PAB) meeting and are included in the project record, (PRD # 44). Several of the comments received from the Arizona Game and Fish Department (Comments 1-1 through 1-6) and one similar comment from The Center for Biological Diversity/Forest Guardians concerning canopy cover measurements at the group level during the scoping period were similar to those received from the Partnership during collaboration and are farther addressed in this comment response.

The ID Team also received a number of oral comments at two Open House Meetings on May 24 and May 31. These comments were from citizens and were in the form of general questions about the project and were answered by Resource Specialist at the meeting.

Comment 1-1

We received a similar comment from the Greater Flagstaff Forest Partnership (GFFP) in a pre-scoping letter May 03, 2007. In response to this concern we developed criteria for ranges and percentages of various forested area by landscapes. These criteria would prevent the degree of openness expressed as a concern by the Department. Please refer to the Proposed Action, Tables 8 and 9 pages 30 - 39. It is hoped that these added criteria would alleviate this concern by the Department. Also, please note, in your letter you mention appreciation for the criteria developed for the Schultz Pass WUI West Zone to address this concern. For clarification, this criteria is also applied in The Schultz Pass WUI East Zone, and the criteria for retaining denser canopy cover is increased in the 89 Mesa Zone. We mention this because applying the degree of openness to all zones further addresses your concern for canopy cover across the project.

Update 1/11/2008: A similar comment was received in objection from the Center for Biological Diversity and Forest Guardians. In the review of objections the Reviewing Official determined that the District had not adequately explained how Forest Plan Standards and Guidelines (S&G's) were being met for canopy cover requirements and VSS distribution and instructed the District to either clearly display how the S&G's for this criteria were being met, or submit for consideration a one time Project Specific Forest Plan Amendment. The Reviewing Official was particularly interested in how "interspace" would meet S&G's and pointed out that interspace was not addressed in the Forest Plan and went on to point out that under the current Forest Plan, interspace as we have described it would be considered under the VSS 1 structural classification and should come under the S&G guidelines for VSS 1 extent and size criteria. The District originally considered this comment non-significant because of the modifications made during collaboration. We thought these modifications addressed the concerns for landscape openness and therefore, the concern, (see original response above). Because the concern re-surfaced in objection and due to the findings of the Reviewing Official, the District Ranger has reconsidered this concern and determined it to be a **significant issue**. The District Ranger directed the ID Team to consider an additional alternative to address the issue, (see Alternative 2 in the EA). The second alternative removes interspace from the treatment design, and all treatment created openings are included in the VSS 1 calculation and adhere to the extent (20% of forested landscape) and size (4 acres or less, with reserve trees on 1 acre or greater) criteria. The resulting project landscape is of a more continuous tree cover as compared to Alternative 1. In addition, measurements for canopy cover are conducted at 3 scales – Ecosystem Management Area, Project, and Site (or stand), on a stand basis versus group basis.

Comment 1-2

The method to measure canopy cover at the group level is based on Region 3 guidance. It should also be noted that this guidance was presented to us by a panel of scientist, including Dr. Rich Reynolds and Dr. Russell Graham, who were primary scientist in writing GTR-RM-217, and Dr. Wally Covington and staff from ERI. We would differ in your description that the guidance is based on "new interpretation" by describing it as "clarifying interpretation", reference page 87 of RM-217. The Regional effort has been to clarify the intent of the guidelines to attain more consistency among all Forests of the Region in the implementation of the guidelines as there has been considerable variance among Forests in how they have been applied. We have an internal letter, November 20, 2006, that we can share with you from Harv Forsgren, Regional Forester, discussing Attainment of the Central Priority and the Northern Goshawk Guidelines, that includes a Draft Implementation Guide, but have nothing further of a formal nature to share at this time. In Mr. Forsgren's letter he describes that Regional Workshops for our external partners are planned for the spring of 2007. I believe the Region has conducted at least one of those here in Flagstaff at the time of this writing, in June 2007. As we receive further formal information we will gladly share it with you.

Update 1/11/2008: This concern in combination with Comment 1-1 has been determined to be a Significant Issue. See response to comment 1-1 which addresses this concern and describes additional actions taken to address it.

Comment 1-3

We were in hopes that the additions made during collaboration on the Proposed Action mentioned in Comment 1-1 above would alleviate this concern to a great extent. We will be checking back with you to see if this is the case or if we need to discuss additional criteria or description to alleviate the concern. It is important to note that the criteria in the Management Recommendations for the Northern Goshawk in the Southwestern United States (General Technical Report RM-217) nor the Forest Plan standards and guidelines does not make reference of data analysis made at the stand level. The discussion in the scientific documentation and the Forest Plan is based on VSS Classes. In the past we have typically quantified our data at the stand level here on the District, however recent clarification from the Region, ERI, Dr. Reynolds and others have emphasized measurement at the group level. This is one of the areas where we are trying to gain consistency in the application of the standards across the Region.

Update 1/11/2008: See response to Comments 1-1 and 1-2.

Comment 1-4

We have made extensive effort to describe the management techniques we will use for group management as we worked in collaboration with the GFFP. In several meetings we addressed this concern through explanation by the specialist. We further addressed this concern with added descriptions of groups regarding uneven-aged management goals and techniques in the Final Proposed Action. We have no goals for even-aged tree group management and feel that this concern must stem from a deficiency in our descriptions or language. We are on the same page with this not being a desirable future condition.

Update 1/11/2008: This concern is actually more applicable to Alternative 2. Because of the VSS 1 restrictions on openings, and because all created openings will have a regeneration intention, and the loss of the ability to maintain grassy areas in perpetuity, the potential for more

even-aged groups is increased. However, that is the cost of the VSS 1 S&G constraint. Essentially, interspace was the tools to break this up and help to create increased inter-group age class distribution. When it was determined that interspace would be considered VSS 1 this tool became not currently available.

Comment 1-5

We will explore our ability to display canopy cover measurements at both the group and stand level and include this information in the Environmental Assessment, effects analysis, if possible.

Update 1/11/2008: See response to Comment 1-1.

Comment 1-6

See response to Comment 1-2.

Comment 2-1

Please refer to Appendix 2 of the EA, Healthy Forest Restoration Act Authorities (HFRA) for the Jack Smith/Schultz Project, for a discussion/checklist explaining how the project complies with HFRA, also located on the Coconino National Forest Website at:

http://www.fs.fed.us/r3/coconino/nepa/index.shtml.

Update 1/11/2008: The EA has been supplemented with a Fire Regime Condition Class Map, Appendix B, Figure B-1. Also, the project record contains a document that further describes FRCC and Watershed/Water System conditions and improvements in relation to HFRA compliance, PRD # 78. This document is available upon request, however, specific water system location information will be redacted due to Homeland Security Law requirements.

Comment 2-2

This concern has been addressed through detailed effects analysis in the Environmental Assessment, see Chapter 3.

Update 1/11/2008: The District has done further assessment for the snag requirement, as well as down logs. Design criteria for the management of both features have been clarified and/or strengthened in the EA.

Comment 2-3

The final determination of the NEPA authority to proceed under for this project was not made until analysis was completed on significant issues that would merit an additional alternative or alternatives in an EA and a determination was made on significance which would trigger the need to proceed under an EIS. Upon completion of that analysis the District Ranger determined the most suitable authority to proceed under. As required by the HFRA we informed the public during scoping, and two public meetings of our intention to proceed under HFRA if analysis determined it to remain an appropriate avenue.

Comment 3-1

Please see response to comments 2-1 and 2-3. The ID Team has strove to describe in detail, the degrees of WUI included in the project area. This project area was identified as early as 1997 by the GFFP as important to the overall protection of Flagstaff and the surrounding communities. This recognition carried through in the Community Wildfire Protection Plan (CWPP) for the greater Flagstaff area. The project is not designed to only protect the WUI, but to allow WUI treatments at the private land interface to be effective. See the discussion on pages 3-5 of the Proposed Action and in Chapter 1 of the EA regarding setting, and a thorough discussion of the concerns of fire managers about fire risk to the down wind communities regarding this project. Also, note the discussion regarding threats to and from wilderness, to watershed and water supply infrastructure, and to TE&S species that involve this project.

Comment 3-2

See Response to Comment 3-1 and 3-2.

Comment 3-3

See response to Comment 3-1 and 3-2.

Comment 3-4

See response to Comments 2-1, 2-3, 3-1 and 3-2.

Comment 3-5

Fire Regime/Condition Class is described in Chapter 3 of the EA, under the Fuels analysis. Table 3.15 summarizes the acres of condition class on the project. The entire area is important and critical watershed to the Timberline/Doney Park Communities. The project includes important municipal water systems to both of these communities and Flagstaff, as well as other important infrastructures. The ID Team has further described these attributes to help clarify their importance within the project area in the Environmental Assessment.

Update 1/11/2008: See Comment 2-1 update.

Comment 3-6

See response to Comments 2-1 and 3-1.

Comment 3-7

See response to Comments 2-1.

Comment 3-8

This project is subject to the objection process pursuant to 36 CFR Part 218 Subpart A and is not subject to notice, comment, and appeal procedures under 215 (218.3).

Comment 3-9

See, response to Comment 3-8. Explanation and analysis of significance and how the project complies with applicable Forest Plan requirements have been addressed in the EA. The Proposed Action, while much more extensive than typical PA's under traditional NEPA, does not include

determination of significance, the effects analysis, etc, this is done in the Environmental Assessment.

Comment 3-10

How the Jack Smith/Schultz project complies with the Northern Goshawk standards and guidelines is demonstrated and analyzed in the EA.

Update 1/11/2008: Because this comment re-surfaced in objection and because the Reviewing official directed the District to further demonstrate compliance with the Forest Plan S&G's for Northern goshawk management, (also, see Response to Comment 1-1). The ID Team has prepared a Forest Plan Consistency Document, and attached it to the EA as Appendix F to address this issue. This document describes in detail how all pertinent S&G's for the Forest Plan are being addressed.

Comment 3-11

See Response to Comment 3-10.

Comments 3-12

Analysis at all required scales has been completed in the EA.

Update 1/11/2008: Additional work has been completed in the EA to address analysis at the three scales of Ecosystem Management Area, Project and Site for VSS and Canopy Cover, and Snags and Logs.

Comment 3-13

We have identified those stands that are either in an old-growth condition or are the closest to attaining that condition for the old-growth allocation. We don't have intensive measurements on all of the old-growth stands allocated and even those that we have classified "existing" old-growth could be deficient in one or more of the listed criteria. However, as stated these are the best available and closest to meeting all criteria and we are not doing any management practices in those stands classified as existing old-growth that would change or affect the old-growth condition or prevent them from further development of deficient elements. The classification does not affect the acreage we are allocating in total. Rather a stand is classified as existing or developing or recruitment we allocate to meet or exceed the Forest Plan S&G.

Comment 3-14

The 151 acres you refer to was only indicating where treatments are proposed in developing or recruitment old-growth, not the total allocation. Please refer to PA page 44, and PA Table 10, page 45 for the correct allocation levels discussed. Old-growth allocation is also included in the Vegetation section of Chapter 3 or the EA.

Comment 3-15

See response to Comment 3-14. Also, we do not propose any logging of any old-growth trees, large or small. See PA page 49, Vegetation Treatment Design Features, second bullet.

Comment 3-16

See response to Comment 3-13.

Comment 3-17

We have displayed the old-growth allocation at all required scales, see PA, page 44 and PA, Table 10. Also, see response to Comment 3-13.

Comment 3-18

The proposed action is in compliance with the Forest Land Management Plan (FLMP) regarding MSO basal area. The final rule for the designation of critical habitat (USDI 2004) clarified that MSO critical habitat include those areas within the mapped boundaries that are protected or restricted habitat and include one or more of the primary constituent elements. Although much of the project is within the mapped boundaries many of these stands are not restricted and protected habitat and therefore will not be managed as such. For those stands that are restricted or protected the desired future condition for basal area is listed in Table 6 of the Proposed Action. Desired future conditions for both mixed conifer and pine oak target threshold habitat, a subset of restricted habitat, will be added to the table. We will insure all resource descriptions are consistent in applying basal area goals identified.

Comment 3-19

The FLMP standards and guidelines that requires the Forest to "save all trees greater than 24 inches dbh" is only for **restricted** MSO habitat (mixed conifer, pine/oak and riparian forests) (pp. 65-3, 65-4). The JSS project will not cut trees 24 inches or greater in MSO restricted or protected habitat.

Comment 3-20

Inherent in the goal to achieve conditions for low and moderate fuel hazard is to maintain that condition. We must do treatments that will maintain that condition for at least 20 years and preferably longer, up to 40 years. Effects analysis demonstrates that without treatment many stands will move into the higher hazard classifications within 20 years. The Proposed Action proposes to thin and prescribe burn 4,910 acres that are currently rated as Moderate fire hazard. 3,720 of these acres would reach a Low fire hazard rating after treatment. The balance of these acres would have the characteristics that generate difficult fire behavior improved, but would not qualify for a lower fire hazard rating after treatment. The Proposed Action also proposes to lightly thin and prescribe burn 541 acres that are currently rated as Low fire hazard. Although these acres already have a Low fire hazard rating, those characteristics that generate difficult fire behavior would be improved still further. Without the proposed thinning, stand characteristics changing over 20 years would cause undesirable fire behavior within the urban interface. While fuel hazard reduction is still the primary goal, there are other forest health and restoration goals for these stands that drive the need for treatment. We have identified 2,608 acres that due to various reasons, including no need to treat, that will receive no treatment of any kind. We have also identified 700 acres where thinning is not needed and will only receive prescribed burn treatments to meet hazard reduction objectives and begin the return of natural fire to the ecosystem. All stands in the low and moderate hazard classification have treatment needs to enhance or maintain that classification and achieve other forest health and restoration goals.

Comment 3-21

The < 12" dbh treatments are needed to attain fuel hazard reduction goals as well as achieve growth objectives for further stand and tree development into larger trees and tree stands. These

treatments are thin from below which emphasizes thinning of smaller diameter over-crowded trees, excess to historical tree numbers, and that are affecting growth of larger diameter trees that could move into the larger tree and VSS size classes the soonest. Thin from below treatments tend to emphasize retention of the largest trees and these trees are typically the leave trees. Only those trees creating undesirable density and fuel hazard conditions are removed. These thinnings promote advancement of regaining the larger tree component in a much faster timeframe than no thinning.

Comment 3-22

See response to Comments 3-20 and 3-21.

Comment 3-23

See response to Comments 3-20 and 3-21. Also, we discuss this concern further in effects analysis of the EA.

Comment 3-24

See response to Comment 3-20 and 3-23.

Comment 3-25

This comment is confusing Basal Area (BA) with stand density index (SDI). These are two different ways of measuring density in a stand and use different measurements and cannot be used interchangeably as it appears in this comment. This comment appears to be suggesting that thinning should not be undertaken in a stand unless the SDI is 270 or greater. The objectives of proposed action (see Table 8, page 30) could not be met by solely thinning stands with a SDI value of 270 or greater. Also, please see Comment 3-20.

Comment 3-26

The discrepancy regarding desired values for stems per acre has been corrected. The desired value for stems per acre is less than or equal to 100 stems per acre in all treated areas.

Comment 3-27

The standards and guidelines for MSO **restricted habitat** state: “Save all trees greater than 24 inches dbh”. MSO critical habitat designation includes area within the mapped boundaries that are protected or restricted and include one or more of the PCE (USDI 2004). The JSS proposed action does not propose to cut any trees greater than 24 inches in MSO restricted or protected habitat (critical habitat).

Comment 3-28

See response to Comments 3-13 through 3-17.

Comment 3-29

Large tree diameter limits were not selected as part of or an alternative to the Proposed Action for reasons disclosed in the *Alternatives Considered but Eliminated from Detailed Study* section in Chapter 2. There is also a discussion of large tree management in the Vegetation effects section of Chapter 3, and in Appendices B and Proposed Action, Attachment 1, (PRD 3 42).

Comment 3-30

We do not propose construction of any new permanent roads. We have proposed temporary roads where necessary to access treatments. These roads will be obliterated after use. Locations of estimated temp roads will be displayed on the road system map and effects analysis has been conducted in the EA.

Comment 3-31

The recommendation in this comment is outside the scope of the Jack Smith/Schultz project. This recommendation would be more appropriately made to the ongoing Travel Management Rule process and/or Forest Plan Revision process.

Comment 3-32

The recommendation in this comment is outside the scope of the Jack Smith/Schultz project. This recommendation would be more appropriately made to the ongoing Travel Management Rule process and/or Forest Plan Revision process. We have further clarified the density standards being measured in the JSS project in the EA to further reduce any confusion.

Comment 3-33

This comment is based on our differences in considering temporary roads as permanent, making the assertion that we are in “non-compliance” an opinion. We are in compliance with the Forest Plan S&G’s for road density objectives and have demonstrated compliance in the EA.

Comment 3-34

We are in agreement that these areas should be avoided and have done so in project design.

Comment 3-35

We have referred to and coordinated the open road system for the JSS project with the work we have done on TMR and will continue to do so as we move through analysis. Again this comment is based on our differences in opinion on temp roads as we are not proposing any new permanent road construction.

Comment 3-36

All road construction proposed is for temporary roads to be closed and obliterated following use, in addition to those existing roads identified that are in excess to the open road system. The JSS project area will be greatly improved concerning route proliferation and road density as a result of this project and with TMR. Approximately 38 miles of roads are intended for removal or closure under the Jack Smith/Schultz project and this projects specific information will feed into the TMR Proposed Action, and aligns with those goals.

Comment 3-37

There will be no permanent increased access in this area due to road construction and therefore no increased fire hazard due to roads.

Comment 3-38

Construction of temporary roads, when properly located does not trigger significance. The project can proceed under an EA as far as this criteria is concerned.

Comment 3-39

Agree, this has been done in the EA.

Comment 3-40

There is currently no active cattle grazing activity on the project area. Although there are two permits covering the project area, one is with the Navajo Tribe, who has not actively grazed in the project area since the 1980's and we know of no plans for grazing in the near future. Small portions of the project area fall into the Black Bill Allotment (Brandis) which could be grazed sometime in the future, but those dates are unknown at this time. Should grazing become active in the project area at some future date we will assess conditions, especially in relation to any recent prescribed burns through annual grazing permit administration. We have flexibility in implementing prescribed burns and would work with the Range Conservationist to coordinate timing of burning by pastures. Not all pastures in the allotments would be burned at the same time. Assessment will be made on rest periods required following burning when and if that circumstance arises.

Comment 3-41

The Desired Future Condition report clearly states the guidelines for snags retention in the project area and the Proposed Action has integrated design features to retain snags (PA, p.49).

Update 1/11/2008: Also, see Response to Comment 2-2.

Comment 3-42

The comment that "vegetation, soils, and future site productivity are all significantly harmed by this method" (machine piling of slash) is not based in fact. When not properly planned and executed including proper machinery and soil conditions, soil and vegetation can be severely impacted. However, based on soil condition monitoring and observations by experienced soil and watershed specialists, it is evident that technique can be employed with little adverse effect to vegetation and soils. It is not cost effective or necessary to use hand piling everywhere in the project area, however, a soils assessment for the area will evaluate soil erodability based on slope and texture to eliminate any areas deemed to be at risk from machine piling. Presence of springs, seeps, sensitive plants and riparian is also be considered. The amount of machine piling required in the general project area depends on the type of operation used. Much of this work is being done by whole tree skidding operations that limit piles to landings. Slash from the log landing is frequently used to spread on the road surface of those roads scheduled for closure. This technique has been proven to be extremely effective in assuring adequate road closure and obliteration. The effects of slash treatments have been addressed in the EA. It is not feasible to use hand piling everywhere in the project area, however the areas you identify would be hand piled and these criteria will be developed in Design Criteria and through Best Management Practices.

Comment 3-43

Agree, and this has been done through Design Criteria and Best Management Practices.

Comment 3-44

The Wildlife specialist has analyzed effects for all Management Indicator Species (MIS) present in the project area or that may be affected by the project proposal.

Comment 3-45

See response to Comment 3-40. Currently there are no cattle grazing impacts to aspen. Any cattle grazing impacts would have been prior to 1990. All impacts to aspen regeneration are currently from elk grazing.

Comment 3-46

Your opposition is noted, however we have addressed our position to your concern regarding diameter caps and logging of > 16" dbh trees in several recent previous analysis, including the Eastside, Mountainaire, Kachina, and Woody projects. We have strived to fully explain why diameter caps are unnecessary for these projects and how they can compromise fuel hazard reduction and restoration goals. We have explained that the emphasis for density reduction is on the smaller diameter classes and have provided details for when and why we would consider removal of a larger tree, see PA, Attachment 1: Large Tree Management, pages 1-5 – A discussion of the collaboration, history and process used for large tree management and rationale and criteria for when large trees might be removed. Also, see response to comment 3-29.

Comment 3-47

See response to Comment 3-20.

Comment 3-48

All proposed treatments comply with MSO Recovery Plan recommendations and the Management Recommendations for the Northern Goshawk in the Southwestern United States.

Comment 3-49

See response to Comment 3-7.

Comment 3-50

This has been done with the EA.

Comment 3-51

This has been done with the EA.

Comment 3-52

You are correct that we have not addressed the question of rather or not the project will be a commercial timber sale or done under stewardship contracting. Nor have we addressed volume. Concerning the question of timber sale/stewardship contracting; the strategy we have been using on all GFFP projects is to offer them as timber sales if they have a viable commercial product. Because of low market values in the small diameter wood and lack of industries, we have had varying success in timber sale offerings and it often depends on what the few bidders available have going at the time. Also, the cost of road reconstruction greatly affects the desirability of these projects as timber sales. Our strategy continues that if we are unsuccessful at the timber sale offering then we go to stewardship contracting. Lately success for timber sale offerings has

been up, but our latest project (Mormon Lake Basin) had to go stewardship contract. We prefer the timber sale route as it saves the tax payer money. We essentially get the same job done at base rates versus paying $300/acre or more. As far as volume, this is such a non-objective for these projects your question about volume was the first time it has even come up in the entire process. Volume is such a complete by-product of these efforts it is totally a non-issue. We have no volume target and no treatments are driven by volume. We absolutely do not think in terms of volume in designing these projects, the design is completely based on meeting the goals for community protection and forest restoration. As we approach implementation we obviously have to evaluate the suitability of the project for timber sale. Some of the projects just aren't of commercial value as previously described.

Comment 4-1

We will continue to work closely with you and the GFFP and keep you informed as we proceed to implementation. Thank you for your support.

APPENDIX B

Healthy Forests Restoration Act Authorities for the Jack Smith/Schultz Fuels Reduction and Forest Health Project

This analysis provides a description and checklist of how the Jack Smith/Schultz 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.

a. **Does the project meet purposes of Healthy Forest Restoration Act of 2003 (Section 2 (1))?**

- Purposes are "to reduce wildfire risk to communities, municipal water supplies, and other at-risk Federal land through a collaborative process of planning, prioritizing and implementing hazardous fuel reduction projects."

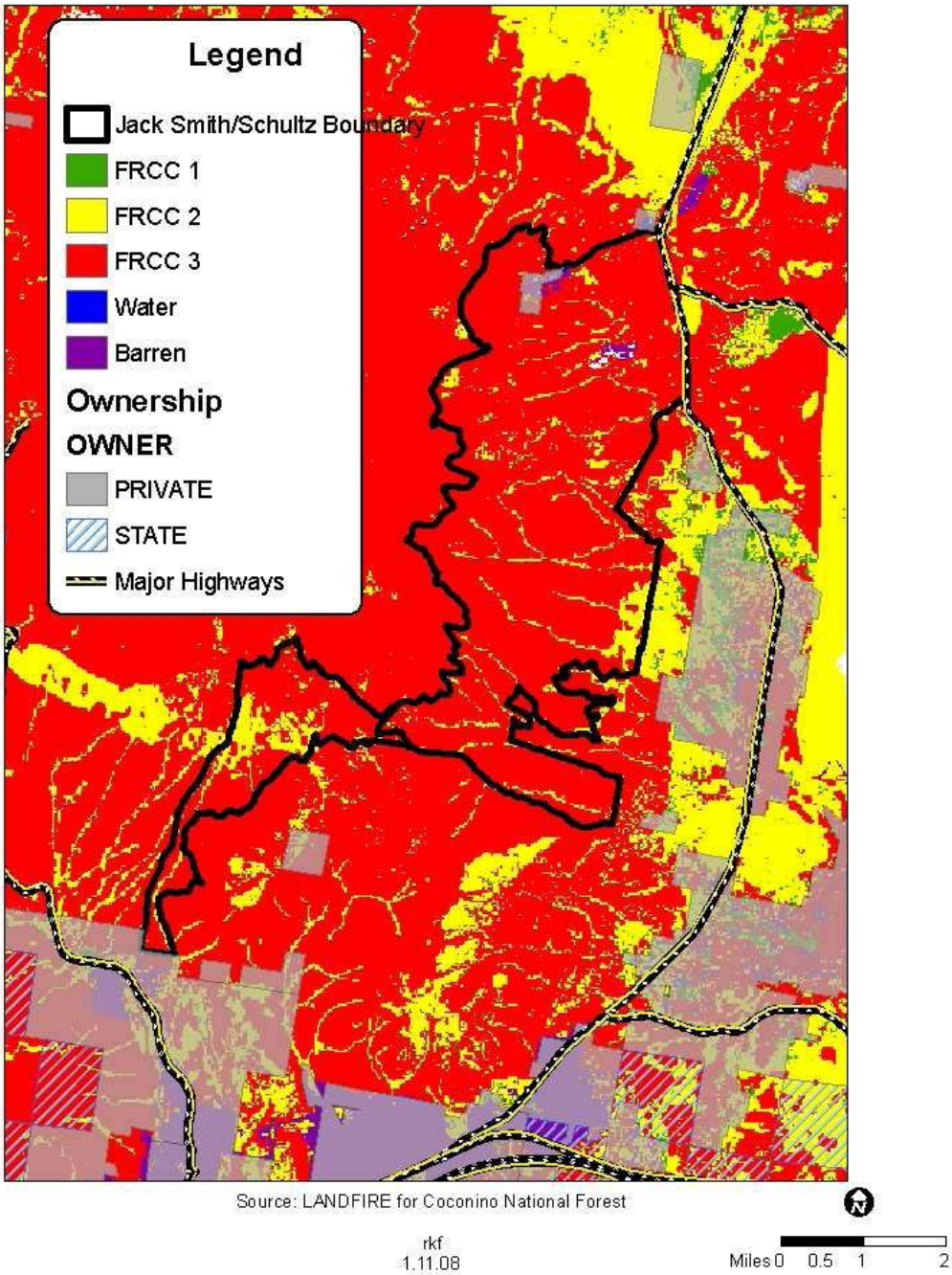
This project fully meets the purposes of the HFRA and is an outstanding example of why the act was developed. The purpose of the Jack Smith/Schultz Fuels Reduction and Forest Health Project is to reduce wildfire risk to communities, including portions of the Flagstaff, Timberline, and Doney Park Communities. The Flagstaff area was listed in the January 4, 2001 Federal Register notice (66 FR 753) describing at-risk communities. The project was identified through a collaborative process with the Greater Flagstaff Forests Partnership (GFFP), which has helped the District and Forest in prioritizing the project for planning and implementation. The project has retained a number one priority on the Forest Program of Work since its inception. The project also reduces risk to important watershed and other water supply infrastructure important to the Doney park/Timberline and Flagstaff communities, reduces risk to important TE&S habitats such as Mexican spotted owls, and makes important progress in restoring fire adapted ecosystem by moving the Fire Regime Condition Class to more natural condition.

A document called Jack Smith/Schultz Project Municpal Water Source Risk Assessment, PRD # 76, that provides additional detail and specifics related to Watershed, Water Developments, and Fire Regime Condition Class and the applicability of these areas to HFRA Authorized projects is available upon request. This document contains some information protected and/or not subject to FOIA as required by Title IV of the Public Health Security and Bioterrorism Preparedness and Response Act of 2002 (P.L. 107 – 188), and so some information concerning specific water development locations will be redacted prior to any public distribution.

Also, see Figure B-1, Jack Smith/Schultz Current-Fire Regime Condition Class, which displays FRCC for the project and adjacent areas. This map displays how FRCC exists in the project and relates to qualification under HFRA, especially in relation to areas outside the WUI.

Figure B-1 – Jack Smith/Schultz Current-Fire Regime Condition Class

Jack Smith/Schultz
Current-Fire Regime Condition Class



b. **Is it on NFS land (Section 102 d. 1, 2, 3)?**

- Projects are to be on federal land but not in Wilderness, Wilderness Study areas, or Congressionally-designated land where vegetation removal is prohibited.

All proposed activities of the project are on federal lands of the Coconino National Forest, outside of Wilderness or Wilderness Study areas, and do not include any Congressionally – designated land where vegetation removal is prohibited.

c. Is it an authorized hazardous fuel reduction project consistent with the Implementation Plan (Section 102), being within

(Section 102 a.1) Wildland-Urban Interface areas.

(a.2) Condition class 3 federal lands in such proximity to a municipal water supply system or a stream feeding such a system within a municipal watershed that a significant risk exists.

(a.3) Condition class 2 federal lands located within fire regime I, II, or III, in such proximity to a municipal water supply system or a stream feeding such a system that a significant risk exists.

(a.4) Federal land on which windthrow or blowdown, ice storm damage, existence of an epidemic of disease or insects poses a significant threat to an ecosystem.

(a.5) Federal lands not in 1-4, that contain T & E species habitat needing natural fire regime, or project will provide enhanced protection to such species.

The Wildland Urban Interface (WUI) for this project is defined though HFRA and the Community Wildfire Protection Plan (CWPP).The project area is located completely within the CWPP analysis area. The CWPP WUI covers a majority of the project area. See Figure 2, page 6 of the Proposed Action. The project includes lands described by (a.2), (a.3), and (a.5) in addition to the WUI area. 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.

d. Is it consistent with NEPA requirements under HFRA (Section 104)?

- (Section 104.c.1) In general, for non-WUI Areas a maximum of 3 alternatives is allowed (proposed action, no action, and 1 action alternative if proposed during scoping or collaboration).
- (c)(2) If more than 1 additional alternative is proposed under (c)(1) above, the Responsible Official shall select which additional alternative to consider and document the rationale in the record.
- (d)(1) For WUI areas you are not required to develop more than the proposed agency action and 1 action alternative.
- (d)(2) For WUI areas within 1 ½ miles of an at-risk community you are not required to develop any alternative to the proposed agency action. And (d)(3) Community Wildfire Plan, if under (d)(2), the at-risk community has adopted a community wildfire protection plan, and the proposed action does not implement the recommendations, the Responsible Official shall evaluate the recommendations as an alternative to the proposed action.

The project includes both WUI within 1 ½ miles and WUI further than 1 ½ miles of a community at risk. The project includes a small area of non-WUI. Non-WUI area meets criteria of (Sections 102 a.2, a.3, and a.5). The District Ranger will determine the number of action alternatives proposed following scoping and analysis of comments and document the action alternative to be used, if applicable. 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.

e. Are requirements for HFRA projects in old growth stands met (Section 102(e))?

- (Section 102 e.2) Treatments must be designed to fully maintain or contribute towards restoration of old-growth stands to pre-fire suppression conditions.
- Newer plans (on or after 12/15/93) are sufficient.
- For older management plans (before 12/15/93), HFRA projects in old growth must be consistent with Section 102 e.2 above.
- Review and amend management direction to be consistent.

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.

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. Old growth stands have been identified on a 10K basis to meet or exceed Forest Plan allocation requirements for the project. A map providing locations of the required acres of land designated for existing old growth and old growth development has been included in the Proposed Action. While 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. Old-growth allocation will continue to be evaluated during Environmental Analysis to ensure that all of the most suitable acres have been identified or are being managed for old growth.

f. Are large tree requirements for HFRA projects met (Section 102 (f))?

- (Section 102 f.1.A): Focus on small diameter trees, thinning, fuel breaks and prescribed fire.
- (f.1.B): Maximize retention of large trees, as appropriate

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. 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 larger immature 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 larger trees may need to occur to meet other forest structure needs and Forest Plan direction. Project goals and objectives are described in Jack Smith/Schultz Project Need for Change Report (March 2007).

This analysis should be reviewed in tandem with the Proposed Action to gain a better understanding of vegetative characteristics in the project area. Attachment 1 of the Proposed Action describes criteria and rationale to be used for any large tree removal.

g. Has the required public involvement for each HFRA Project been done (Section 104 and 218 regulations)?

- Section 104 (e)(1): Public Notice that a HFRA project is being planned.
- Section 104 (e)(2): Public Meeting held in vicinity of project.
- Section 104 (f): Public Collaboration facilitated among State and local governments, tribes, and interested persons.
- Section 104 (g): Opportunity for Public Comment for EAs (scoping) and EISs (minimum 45-day comment period)
- (218.4(a)): the Responsible Official shall promptly mail the FEIS or EA to those who have previously requested to be included.
- (218.4(b)): Upon completion and mailing of the FEIS or EA, a legal notice of the opportunity to object to a proposed action shall be published in the applicable newspaper of record.
- Section 104 (h): Public Notice of Decision. Once the decision document is signed, a notice will be provided of the final agency action.

The intent to analyze the project under HFRA authority has been identified in the Scoping Letter and Proposed Action. Two public meetings in the vicinity of the project area were conducted, and were described in the Scoping Letter.

The Peaks and Mormon Lake Ranger Districts collaborated with Greater Flagstaff Forests Partnership (GFFP) on all phases of planning and project design for this project. The partnership represents a broad spectrum of community interests in the Flagstaff area including federal, state, and local agencies; academic groups; professional societies; conservation organizations; and local fire departments including Flagstaff, Summit, and Highlands Fire. The Forest Service has worked collaboratively with GFFP over the past year to jointly develop desired future conditions, possible management approaches, monitoring and mitigation measures, and the Proposed Action. The Forest Service and GFFP have also conducted numerous field trips and meetings to discuss project goals and objectives for the project area. In May 2007, the GFFP Board of Directors provided their endorsement for the Proposed Action.

The Scoping Letter identified a 30 day period for the opportunity for public comment. The letter specified that those who make comment or otherwise request it, will receive a copy of the EA from the Responsible Official in the mail. The objection process on the EA has been identified in the Scoping Letter and describes that those who have made substantive comment will have standing to object. The Scoping Letter describes that a 30 day objection period will begin with the date of a Legal Notice to be published in the Newspaper of Record upon distribution of the EA. The Responsible Official will provide a Public Notice of Decision when the Decision Notice has been signed, describing the final agency action.

APPENDIX C

Community Wildfire Protection Plan Direction

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

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

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

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

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

Treatment Guidelines

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

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

Implementation and Treatment Types

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

development of the Proposed Action treatments, which may vary from ForestERA models and treatment recommendations found in the Implementation and Monitoring Section of the CWPP.

Proposed Treatments

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

Community Wildfire Protection Plan Treatments

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

Treatment Comparison

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

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

Most acres proposed for thinning (8,000 of 9219 acres or 87%) have a 40% canopy cover or higher objective. A majority of the treatment proposed by the CWPP in Map 11B is a Low intensity thinning and burning treatment that includes a reduction of approximately 20% in canopy cover. Some stands with only a 20% canopy cover reduction do not reduce fire hazard ratings sufficiently, especially over the long term (20-40 year treatment effectiveness). Most of the stands proposed for thinning fall within the Light to Moderate Intensity thinning treatments of the CWPP that result in a 30% decrease in canopy cover, 40% decrease in basal area, and 72% decrease in trees per acre.

Effects of Treatments

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

Monitoring and Assessment Plan

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

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

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

APPENDIX D

Best Management Practices for Soils, Watershed, and Prescribed Fire for the Jack Smith/Schultz Project

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

24.11 - Use of Terrestrial Ecosystem Survey Timber Harvest Limitation Rating

1. Objective. To identify severe and moderate erosion hazard areas and other soil limitations in order to adjust treatment measures to prevent downstream water quality degradation.

24.13 - Limiting the Operating Period of Timber Sale Activities

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

The CT6.3 "Plan of Operation" provision is required in all Timber Sale Contracts. This provision states that the Purchaser must submit a general plan of operation which will set forth planned periods for and methods of road construction, timber harvesting, completion of slash disposal, erosion control work, and other contractual requirements. Forest Service written approval of the Plan of Operation is a prerequisite to the commencement of the Purchaser's operation. Provision BT6.6 can be used to suspend operations because of wet or saturated soils in order to protect soil and water resources.

24.18 - Tractor Skidding Location and Design

1. Objective. To minimize erosion and sedimentation by designing skidding patterns to best fit the terrain. Proper skid pattern management involves such things as locating skid trails to avoid stream courses and restriction of skidders to designated trails. The Sale Administrator locates the skid trails with the timber Purchaser or by agreeing to the Purchaser's proposed locations prior to construction

24.2 - Log Landing Location

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

24.21 - Erosion Prevention and Control Measures During Timber Sale Operations

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

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

24.3 - Slash Treatment in Sensitive Areas

1. Objective. To comply with Federal and state water quality standards by protecting sensitive areas from degradation which would result from using mechanized equipment for slash disposal.

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

41.3 - Obliteration of Roads

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

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

APPENDIX E

Best Management Practices and Recommended Activities – Noxious and Invasive Weeds for the Jack Smith/Schultz Fuels Reduction and Forest Health Project

The Final Environmental Impact Statement (FEIS) for Treatment of Noxious and Invasive Weeds, Coconino, Kaibab and Prescott National Forests, and Coconino, Mohave and Yavapai Counties, Arizona (2005) amended the Coconino National Forest Plan. Appendix B of that document includes specific design features, best management practices, required protection measures and mitigation measures to manage Noxious and Invasive Weeds.

Preventing the introduction and spread of noxious weeds is one objective of integrated weed management programs on the Coconino National Forest. The following list of integrated best management practices for weeds, and recommended management activities was adapted from the FEIS and is designed to mitigate identified risks of weed introduction and spread in the project area. Only those measures applicable to this project are included in this list.

Integrated Weed Management Practices

Objective	Best Known Practice
Incorporate weed prevention and control into project layout, design, alternative evaluation, and project decisions.	Environmental analysis for projects and maintenance programs will need to assess weed risks, analyze potential treatment of high-risk sites for weed establishment and spread, and identify prevention practices This practice was incorporated during NEPA Analysis in Botany Specialists Report and incorporated into Environmental Assessment. Determine prevention and maintenance needs, including the use of herbicides if needed, at the onset of project planning. This practice was incorporated during NEPA Analysis in Botany Specialists Report and incorporated into Environmental Assessment. Include weed surveys at the project planning stage as outlined in “General Weed Management Practices” This practice was incorporated during NEPA Analysis in Botany Specialists Report and incorporated into Environmental Assessment. For timber sale purchaser road maintenance and

Objective	Best Known Practice
	decommissioning, use standard timber sale contract clauses such as WO-C/CT 6.36 to ensure appropriate equipment cleaning. Incorporate during implementation. For new and reconstruction of roads conducted as part of public works (construction) contracts and service contracts include contract language for equipment cleaning such as is in WO-C/CT 6.36. .Incorporate during implementation.
Avoid or remove sources of weed seed and propagules to prevent new weed infestations and the spread of existing weeds.	Before ground-disturbing activities begin, inventory and prioritize treatment of invasive weeds in project operating areas and along access routes, or within reasonably expected potential invasion vicinity. Surveys conducted by field crews prior to NEPA analysis. Do a risk assessment accordingly; control weeds as necessary. This practice was incorporated during NEPA Analysis in Botany Specialists Report and incorporated into Environmental Assessment. After completing the practice above, reduce the risk of spreading and creating weed infestations. Plan operating areas and access routes to avoid heavy infestation areas, plan closure of access routes at finish of project, and/or begin project operations in uninfested areas before operating in weed-infested areas. Locate and use weed-free project staging areas. Incorporate during implementation. Ensure that all outside (rental, other agency or unit) equipment is free of weed seed and propagules before it is accepted by the contracting officers representative. Wash vehicles and equipment before entering project area, focusing especially on areas such as undercarriages,tires and wheel wells that may harbor seeds and fragments of noxious or invasive weeds. Incorporate during implementation.

Objective	Best Known Practice
	Remove mud, dirt, and plant parts from project equipment before moving it into a project area. Determine the need for, and when appropriate, identify sites where equipment can be cleaned. Clean all equipment before entering National Forest System lands. This practice does not apply to service vehicles traveling frequently in and out of the project area that will remain on a clean roadway. Incorporate during implementation. If operating in areas infested with weeds, clean all equipment before leaving the project site. To minimize time spent cleaning equipment, time all work in infested areas last and concurrently. Designate a parking lot where project vehicles working in the infested area may be parked for the duration of the project. This area should be monitored in followup mitigation and should be near a "clean" vehicle/equipment lot. Identify sites where equipment and vehicles can be cleaned before leaving the site at the end of the project. Incorporate during implementation.
Retain native vegetation in and around project activity and minimize soil disturbance.	Minimize soil disturbance to no more than needed to meet vegetation management objectives. Incorporate during implementation. Minimize soil disturbance with appropriate logging techniques. The amount of disturbance from logging techniques varies with equipment and methods. Incorporate during implementation.
Where project disturbance creates bare ground, establish vegetation to minimize favorable conditions for weeds.	Treat disturbed soil (except surfaced projects) in a manner that optimizes native plant establishment for that specific site. Incorporate during implementation. Examples of revegetation techniques include but are not limited to topsoil replacement, native seedbank promotion, planting, seeding, fertilization, and/or weed seed-free mulching as necessary. Use local native material where

Objective	Best Known Practice
	appropriate and feasible (or specifically identify why not used). Use certified weed-free and weed seed-free hay or straw. Incorporate during implementation. Use local seeding guidelines to determine detailed procedures and appropriate mixes. To avoid weed contamination, a certified seed laboratory needs to test each lot against the Forest noxious or invasive weed list, and provide documentation of the seed inspection test. Seed lots labeled as certified weed seed-free at time of sale may still contain some weed seed contamination. Incorporate during implementation.
Manage fire as an aid in control of weeds to prevent new weed infestations and the spread of existing weeds.	Pre-inventory project area and evaluate weeds present with regard to the effects on the weed spread relative to the fire prescription. Surveys conducted by field crews prior to NEPA analysis. Analysis was conducted during NEPA Analysis in Botany Specialists Report and incorporated into Environmental Assessment. Burn noninfested areas first before entering weed infested sections of the burn. Clean all equipment when project is completed. Or treat and burn all infested areas first to remove seed source then clean equipment and proceed to uninfested areas. Incorporate during implementation. Time burns to promote native species and to hinder weed species germination. Incorporate during implementation. Mitigate the effects of pile burning by monitoring pile sites after burning and controlling noxious and invasive weeds on slash pile sites as necessary. These effects were addressed in the Botany Speialists Report.
Avoid or remove sources of weed seed and propagules to prevent new weed	Treat weeds on contracted projects, emphasizing treatment of weed infestations on existing

Objective	Best Known Practice
infestations and the spread of existing weeds.	landings, skid trails before activities commence. Incorporate during implementation. Use standard timber sale contract clauses such as WO-C/CT 6.36 to ensure appropriate equipment cleaning. Incorporate during implementation.
Retain native vegetation in and around project activity and minimize soil disturbance.	Minimize period from end of logging to site preparation, revegetation, and contract closure. Incorporate during implementation. Recognize the need for prompt growth of native vegetation, long-term restoration and weed suppression where forested vegetation management has created openings. Incorporate during implementation. Allow natural seedbank to provide vegetation if possible, next preference is for native seed grown from local collections. All seed must be certified weed seed-free for all species on the forest noxious or invasive weed list. The Forest will provide a current list to potential seed suppliers to facilitate the certification process. Incorporate during implementation.
Minimize roadside sources of weed seed that could be transported to other areas.	Avoid acquiring water for dust abatement from weed-infested areas. Incorporate during implementation. For road maintenance and decommissioning include contract language for equipment cleaning such as in WO-C/CT 6.36. Incorporate during implementation. Schedule and coordinate all earth-moving or soil-disturbing activities (such as pulling of noxious or invasive weed-infested roadsides or ditches) in consultation with the local weed specialist. Do not blade or pull roadsides and ditches that are infested with weeds unless doing so is required for public safety or protection of the roadway. If the ditch must be pulled, ensure the weeds remain onsite. Blade from least infested to most infested areas. When

Objective	Best Known Practice
	it is necessary to blade weed-infested roadsides or ditches, schedule the activity when seeds or propagules are least likely to be viable and spread. Minimize soil surface disturbance and contain bladed material on the infested site. Incorporate during implementation.

Best Management Practices

Herbicide Treatments

These practices only apply to herbicide treatments. If herbicides are selected for use in the project, the following Best Management Practices will be incorporated in project implementation. These Best Management Practices have been developed for this project and are designed to minimize any potential water quality problems with approval of herbicide use in the project area. All Best Management Practices are considered standard procedure and do not constitute deviation from normal planning or implementation processes. These practices are also listed in the Soil and Water Conservation Handbook (2509.22) and comply with the requirements of the Federal Water Pollution Control Act.

21.11: Pesticide Application According to Label Directions and Applicable Legal Requirements — All approved herbicides will be applied according to label instructions to avoid water contamination. Directions found on the label of each herbicide are detailed and specific and include legal requirements for use. These constraints will be incorporated into individual project plans and contracts. Responsibility for in-service projects rests with the Forest Service's project supervisor who shall be a certified applicator. For contracted projects, it is the responsibility of the contracting officer or the contracting officer's representative to ensure that label instructions and other applicable legal requirements are followed.

21.12: Pesticide Application Monitoring and Evaluation — the objective of this BMP is to determine whether pesticides were applied safely, restricted to intended target areas, and deposited at the right rates. It is also designed to evaluate if non-target species were impacted. Another component is also to provide early warning of possible hazardous conditions and determine the extent, severity, and duration of any potential hazard that might exist. Monitoring methods include spray cards, dye tracing, and direct measurements of herbicides on plants or near water. Monitoring of existing herbicide concentrations will be conducted prior to any treatments in riparian corridors where perennial water is found.

22.13: Pesticide Spill Contingency Plan — The objective of this BMP is to eliminate contamination of water or the soil resource that may occur from accidental spills.

24.14: Cleaning and Disposal of Herbicide Containers — This BMP is designed to prevent water contamination from cleaning or disposal of herbicide containers. The cleaning and disposal of these items will be done in accordance with Federal, State, and local laws. The forest or district pesticide use coordinator will approve proper rinsing procedures in accordance with State and local laws and regulations, and arrange disposal of containers when in service personnel apply the product. When a contractor applies the herbicide,

the contractor is responsible for proper container disposal in accordance with label instructions.

21.16: Controlling Pesticide Drift during Spray Application — The objective of this BMP is to minimize risk of pesticides falling directly into water or non-target areas. The spray application of herbicides is accomplished according to a prescription which accounts for terrain and that specifies the following: spray exclusion areas, buffer zones, and factors such as formulation, equipment, droplet size, spray height, application pattern, flow rate, and the limiting factors of wind speed and direction, temperature, and relative humidity. On in service projects, the Forest Service project manager supervisor is responsible for ensuring the prescription is followed, whereas if contracted, the contracting officer is delegated the responsibility.

Additional Best Management Practices established by the FEIS for herbicide use include:

Establish 1-mile limited spray zones adjacent to communities, private lands, recreation sites, trailheads, and scenic overlooks. Non-herbicidal treatment methods will be prioritized in these areas; only if these treatments are not successful will herbicides be used on deep-rooted perennial weeds.

No mixing, loading, and equipment cleaning will be done within the limited spray zones, nor within 300 feet of the limited spray zones or private land.

Application personnel will be trained by, and all application will be under direct supervision of, a Forest Service certified pesticide applicator (Region 3 Supplement 2100-98-1). All applicators must wear protective clothing as described on the label.

All herbicide applications will follow EPA label requirements, USDA policy, and Forest Service direction (e.g., FSM 2150 Pesticide Use Management and Coordination; FSH 2109.11 Pesticide Project Handbook; FSH 2109.12 Pesticide Storage, Transportation, Spills, and Disposal Handbook; and FSH 2109.13 Pesticide Project Personnel Handbook).

Herbicides will be transported daily to the project site under the following conditions: (a) transport only the quantity needed for that day's work, and (b) transport concentrate only in containers in a manner that will prevent tipping or spilling, and in a compartment that is isolated from food, clothing, and safety equipment.

Mixing, loading, and equipment cleaning must be done onsite and at least 300 feet from the edge of a "Limited Spray Zone" or from private land (unless the owner is cooperating in the project), open water, known wellheads, or sensitive areas. Mixing and cleaning water must be transported to the site in labeled containers that are separate from water used for other purposes.

Safety and spill plans will be written for each project.

All herbicide containers will be disposed of in accordance with label, State, and Federal requirements.

Required Protection Measures
Herbicide Treatments in Identified Species Habitats

Appendix B of the Final Environmental Impact Statement (FEIS) for Treatment of Noxious and Invasive Weeds, Coconino, Kaibab and Prescott National Forests, and Coconino, Mohave and Yavapai Counties, Arizona (2005) includes required protection measures for threatened,

endangered and sensitive species (TES) as well as for migratory birds, including management indicator species, partners in flight and Region 3 sensitive species. Only one herbicide treatment, for a population of camelthorn (see table below) is proposed for the project. No TES species, management indicator species or migratory bird species are known to exist on the site of the camelthorn infestation. Therefore, the Required Protection Measures for Herbicide Treatments that were included in the draft EA for this project have been removed. The reader should refer to the noxious and invasive weed FEIS if they wish to review the measures.

APPENDIX F

FOREST PLAN COMPLIANCE

JACK SMITH/SCHULTZ FUEL REDUCTION AND FOREST HEALTH PROJECT

The following table displays those Forest Plan Standard and Guidelines (S&G's) most applicable to the Jack Smith/Schultz Project and includes a summary and comparison of how actions proposed for the project either meet or work toward, or don't meet the guidelines. The summary includes some items that are inclusive of a broader standard and guideline, but respond specifically to issues and concerns that were brought out through scoping, objection, and objection review. The intent of this document is to allow the interested party to determine our findings for the status of meeting the S&G's without searching the complete EA document. The numbers in column 1 are for reference only so that they can be referred to within the table, and do not signify a particular order or Forest Plan designation.

Forest Plan Standard and Guideline (Desired Condition)	**Existing Condition**	**Treatment Effects**	**Post Treatment Condition**	**Summary of Compliance With Standard and Guideline**
<u>Topic</u>: Northern Goshawk Management Standard and Guidelines as required by the Coconino Forest Plan as amended by the Record of Decision for Amendment of Forest Plans (1996 ROD/2006 SEIS) for Mexican spotted owls and northern goshawk.				

Forest Plan Standard and Guideline (Desired Condition)	**Existing Condition**	**Treatment Effects**	**Post Treatment Condition**	**Summary of Compliance With Standard and Guideline**
1. Evaluate habitat structure for NGO, including tree size, snags, and dead and down material at 3 scales – (Ecosystem Management Area (EMA), Project, and Site i.e. stand.	JSS project includes two EMA's, the Jack Smith 10K and the Elden 10K	The project would include portions of the Jack Smith 10K (16,123 acres) Elden 10K (14,350 acres) The total EMA is 30,473 acres. The JSS project includes approx. 39% of the EMA area.	Conditions for VSS, Canopy Cover, Old-Growth, Snags, Wildlife Cover Habitat, and Dead and Down Logs have been evaluated at the 3 scales	**<u>Alternative 1:</u>** Conditions for VSS 1 don't meet S&G because size and extent criteria is exceeded by interspace treatment at the stand and project level**. Forest Plan Amendment Required**. **<u>Alternative 2:</u>** All elements meet or exceed or work toward Forest Plan Standard & Guideline. See Vegetation and Wildlife sections of Chapter 3. Additional information on mitigation for snags and logs are specifically addressed below

Forest Plan Standard and Guideline (Desired Condition)	**Existing Condition**	**Treatment Effects**	**Post Treatment Condition**	**Summary of Compliance With Standard and Guideline**
2.a. Outside Goshawk Post-fledging Family Areas's (PFA's). - Distribution of vegetation structural stages for ponderosa pine and mixed conifer is 10% grass/forb/shrub (VSS 1), 10% seedling-sapling (VSS 2), 20% youn forest (VSS 3), 20% mid-aged forest (VSS 4), 20% mature forest (VSS 5), 20% old forest (VSS 6). The specified percentages are a guide and actual percentages are expected to vary + or – 3%.	Over abundance of VSS 3, VSS 1-2 and 4-6 are under-represented. See EA Table 2.5. Current stand structure does not meet desired condition for goshawk habitat.	Both alternatives use uneven-aged treatments to improve VSS distribution over time on 8,188 acres. Alt. 1: Interspace was not included in the VSS 1 calculation. Alt 2: Interspace is not applied, all created openings are considered VSS 1 and will meet Forest Plan size and extent criteria for this structural stage	Desired conditions for VSS % and distribution is improved and progress is made toward desired condition in both alternatives. Alt. 1: Because interspace has been determined to fall within VSS 1 structural stage, conditions are exceeded in both size and extent for this class. Alt 2: All VSS classes are improved and/or are moving toward desired condition for goshawk habitat as described in the Forest Plan.	**<u>Alternative 1:</u>** **Does not comply with Forest Plan S&G for VSS 1. A site specific plan amendment is required.** **<u>Alternative 2:</u> All VSS structural class management complies with Forest Plan S&G's. See EA Table 3.11C**

Forest Plan Standard and Guideline (Desired Condition)	**Existing Condition**	**Treatment Effects**	**Post Treatment Condition**	**Summary of Compliance With Standard and Guideline**
2.b. Outside Goshawk PFA's. **Cont.** - Canopy cover within ponderosa pine should average 40% in VSS 4, 5, and 6 structural stages.	Canopy cover is > 50% across the VSS 4-6 groups across project area. There are few natural openings. Because of the over abundance of VSS 3 structural stage existing canopy cover is often made up of over dense 5" to 12" dbh trees, affecting tree growth and understory development and increasing fire risk.	**Alternative 1:** : Canopy cover is measured at the group level. Canopy cover requirements are met for VSS 4-6 classes. Because interspace is not included in the canopy cover calculation, degree of openness is 50 to 70% in stands and across the project landscape. **Alternative 2**: Canopy cover is measured at the stand level. Requirements are met for VSS 4-6. Interspace is dropped and degree of openness is 20%	**Alternative 1:** : Post harvest tree arrangement is clumpy/groupy and very evident due to interspace. Conditions in interspace are modified by additional parameters to ensure no existing desirable structures in the VSS 4-6 are removed do to lack of pre-settlement evidence. Further parameters for maintaining some denser structure in the VSS 3 is also included due to concerns over the degree of openness. **Alternative 2**: A more continuously forested landscape, with 20% or less openness. Still strive for clumpy/groupy spatial distribution using uneven spacing, rooting	**Alternative 1:** **Because the Forest Plan does not specify at what scale to measure canopy cover, technically Forest Plan S&G's are met. However, when combined with VSS structural class requirements this condition can not be met without a Forest Plan Amendment. (See 2.a).** **Alternative 2:** **All Forest Plan S&G's are met for canopy cover** **see EA Table**

Forest Plan Standard and Guideline (Desired Condition)	**Existing Condition**	**Treatment Effects**	**Post Treatment Condition**	**Summary of Compliance With Standard and Guideline**
		or less, and temporary due to the regeneration intention applied to VSS 1.	zones and regeneration openings, but less evident due to no interspace. Over time, due to the regeneration intention the landscape will become moreclosed again.	**3.11A.** **At the Project Level outside PFA, see Table 3.11L.**
2.c. Outside Goshawk PFA's. **Cont.** Canopy cover within mixed conifer for VSS 4 should average 1/3 60% and 2/3 40%; VSS 5 should ave. 50% and VSS 6 ave. 60%	Most mixed conifer occurs on steep slopes, is uneven-aged and closed canopy.	**Common to Both Alternatives:** There are no treatments proposed in the mixed conifer.	**Common to Both Alternatives:** Same as existing condition	**Common to Both Alternatives:** **Forest Plan S&G is either met with existing condition or no changes to existing condition are proposed by the project. (See EA Table 3.11N).**
2.d. VSS 1 – Opening size and extent criteria of not greater than 20% at the stand level and greater than 4 acres in size, and not	Few natural openings exist in the forested area of the project.	**Alternative 1:** Uses and applies the term interspace to restore grassy openings based on absence of pre-settlement evidence.. Also	**Alternative 1:** Landscape at project level 50% open, with no regen objective. Interspace to be maintained in perpetuity using Rx fire and natural fire.	**Alternative 1:** Forest Plan is silent or does not support interspace. Interspace is considered part of the VSS 1

Forest Plan Standard and Guideline (Desired Condition)	**Existing Condition**	**Treatment Effects**	**Post Treatment Condition**	**Summary of Compliance With Standard and Guideline**
wider than 200', with one group of reserve trees of 3-5 trees/acre, left on openings > than 1 acre.		calls for up to 20% openings with regeneration intention. **<u>Alternative 2</u>**: Interspace term and application is dropped. All created openings are governed by Forest Plan constraints on VSS 1 extent and size criteria – Landscape is much more closed at 80%..	Groupy/Clumpy structure visually apparent. > 2000 acres more fuel risk classified stands go from moderate to low than Alt. 2. **<u>Alternative 2:</u>** Landscape is more continuously forested at 80%. Groupy/Clumpy structure less apparent. 2000+ acres less fuel risk classified stands in the low category post treatment as compared to Alt. 1, these stands move back into pre-treatment classifications of high and moderate.	structural habitat due to inclusion of grass and forb description. Interspace exceeds size and extent of VSS1 requirements- **Forest Plan Amendment required.** **<u>Alternative 2:</u>** All created openings meet S&G size and extent criteria for VSS 1. Canopy cover requirements at the stand level are met when all forested cover and openings are combined. **Forest Plan S&G met.** See pages 87, 90, 93.
2.e. Measuring Canopy cover at the group versus stand level. Forest Plan does not specify	**<u>Alternative 1</u>**: Canopy cover was analyzed at the group level and applied to VSS 4-6. Interspace was not included in	**<u>Alternative 1:</u>** 50 to 70 % open landscape due to interspace.	**<u>Alternative 1:</u>** Clumpy/Groupy appearance and structure readily apparent. VSS structural requirements met for 4-6. Interspace	**<u>Alternative 1:</u>** S&G for Canopy cover measurement scale not specified by the Forest Plan, so Forest

Forest Plan Standard and Guideline (Desired Condition)	**Existing Condition**	**Treatment Effects**	**Post Treatment Condition**	**Summary of Compliance With Standard and Guideline**
scale. Gives canopy cover requirements for VSS Classes 4-6 inside and outside of PFA's, no requirements for VSS 3 and size and extent requirements for VSS 1 & 2. Canopy cover required inside PFA's: VSS 4-6: 50 %+, (1/3 60% in VSS 4). Canopy cover outside PFA's: VSS 4-6: 40%+	the canopy cover calculation. Canopy cover at 3 scales of analysis not displayed in the initial document **<u>Alternative 2:</u>** Alternative 2 canopy cover is analyzed at the stand level and displayed at 3 analysis scales. Interspace is dropped, VSS 1 included in canopy cover measurements, etc.	**<u>Alternative 2:</u>** 20% open landscape due to VSS 1 and 2 constraint	used to restore historic patterns and densities/landscape openness. 5,510 acres of high and moderate fuel hazard reduced to low hazard. Modifications made within treatment zones to retain density ranges in all VSS classes to lessen affect of interspace openness. No VSS 4-6 cut out of interspace. **<u>Alternative 2:</u>** Much more continuous Forested landscape. Clumpy/Groupy appearance not as evident. 3,299 acres low fuel hazard after treatment – 2211 acres fuel hazard remains in moderate class as compared to Alt. 1.	Plan S&G for VSS 4-6 measurement is met at the group level. However, must be analyzed at 3 levels, (see above). **<u>Alternative 2:</u>** Canopy cover analyzed at three scales, all canopy cover requirements are met. See EA, Tables 3.6, 3.9, 3.11A, 3.11D, 3.11G – 3.11L. Also, see 2.b-d. **Forest Plan S&G met**

Forest Plan Standard and Guideline (Desired Condition)	**Existing Condition**	**Treatment Effects**	**Post Treatment Condition**	**Summary of Compliance With Standard and Guideline**
3.a. Inside goshawk PFA's Distribution of VSS for ponderosa pine and mixed conifer – same as 2.a.	Over abundance of VSS 3 and 4. VSS 1,2 5-6 are underrepresented	**Alternative 1:** See 2.a.	**Alternative 1:** See 2.a.	**Alternative 1:** see 2A **Alternative 2:** see Table 3.11H. **Forest Plan S&G met**
3.b. Inside goshawk PFA's Canopy cover within ponderosa pine for VSS 4 should average 1/3 60% and 2/3 50%; VSS 5 and 6 should ave 50%. Canopy cover within mixed conifer for VSS 4-6 should average 60%.	Canopy cover is > 55% across the VSS 4-6 groups across project area. There are few natural openings. Because of the over abundance of VSS 3 & 4 structural stages existing canopy cover is often made up of over dense 5" to 18" dbh trees, affecting tree growth and understory development and increasing fire risk.	Alt. 1: See 2b Alt 2: Canopy cover is measured at the group level. Requirements are met for VSS 4-6. Interspace is dropped and degree of openness is 20% or less, and temporary due to the regeneration intention applied to VSS 1 and 2.	Alt. 1: See 2b Alt 2: See 2b	**Alternative 1:** See 2b **Alternative 2:** See Table 3.11H. **Forest Plan Standards and Guidelines Met**

Forest Plan Standard and Guideline (Desired Condition)	**Existing Condition**	**Treatment Effects**	**Post Treatment Condition**	**Summary of Compliance With Standard and Guideline**
3.c. Inside goshawk PFA's In both ponderosa pine and mixed conifer opening size up to 2 acres with a maximum width of 200 ft. One group of reserve trees, 3-5 trees, will be left /acre.	See 2.d.	Alt. 1: See 2.d Alt 2: See 2.d	**<u>Alternative 1:</u>** Landscape at project level 50% open, with no regen objective. Interspace to be maintained in perpetuity using Rx fire and natural fire. Groupy/Clumpy structure visually apparent. Alt 2: Landscape is more continuously forested at 80%. Groupy/Clumpy structure less apparent.	**<u>Alternative 1:</u>** See 2.d **<u>Alternative 2</u>**: See Page 96. **Forest Plan Standards and Guidelines Met**
3.d. Within Nesting Areas. Nesting areas should contain only VSS 5 and 6 trees and have a canopy cover between 50-70%	Nesting areas were not clearly identified or mapped in the initial EA. Currently there is	**<u>Common to Both Alternatives:</u>** Nesting areas have been mapped. There are no thinning treatments in nesting areas proposed. Rx burning in some	**<u>Common to Both Alternatives:</u>** Slight reduction in canopy cover due to Rx burn.	**<u>Common to Both Alternatives:</u>** **Forest Plan S&G's met.** See Figure 3.7. Also, see Table s 3.11K, 3.11O, and

Forest Plan Standard and Guideline (Desired Condition)	**Existing Condition**	**Treatment Effects**	**Post Treatment Condition**	**Summary of Compliance With Standard and Guideline**
	a lack of VSS 5-6 in the nest stands.	nest areas.		3.11P**.**
4. Survey prior to activity including ½ mile beyond proposed boundary, using R3 protocol and complete at least 1 year of surveys	EA p. 144 states that all potential area was surveyed in 2004 and 2005. The 2 PFA's were monitored in 2006 and 2007.	N/A	N/A	**Common to Both Alternatives:** **Forest Plan S&G met.**
5. Post-fledgling family area must be established on a map that includes 6 nesting areas per pair of goshawks… Six nest sites should be about 30 acres in size requiring a min. of 180 acres…	Mapping of nest areas was unclear in EA sent out for objection	N/A	N/A	**Common to Both Alternatives:** Maps clearly displaying mapping of nest areas in applicable PFA's included in this document. See Figures 3.7 and 3.8. **Forest Plan S&G met.**
6. Manage for un-even aged stand conditions	Stands are mostly even-aged.	**Common to both Alternatives:** 8,188 acres managed with un-even aged treatments.	**Common to Both Alternatives:** Treated area moving toward an uneven-aged condition	**Common to Both Alternatives:** See Table 2.4**.** **Forest Plan S&G met.**

Forest Plan Standard and Guideline (Desired Condition)	**Existing Condition**	**Treatment Effects**	**Post Treatment Condition**	**Summary of Compliance With Standard and Guideline**
7. Snags: Leave/maintain 2 snags/acre, 18" dbh and 15' tall	Average snags/acre deficit to S&G across the project area, usually at < 1/acre	**Common to Both Alternatives:** Up to 20% loss of snags due to Rx burning.	**Common to Both Alternatives:** Design features included to replace lost snags and work toward S&G snag requirements, either by retention of >18" trees when available (almost always retained anyway as leave trees or always when yellow pine), or where 18" trees are unavailable through tree growth over time. The project will retain and recruit 2 snags/acre where available on all treatment acres.	**Common to Both Alternatives:** **Forest Plan S&G being worked toward.** Existing condition snags/acre will be maintained through mitigation. Recruitment snags are retained where available at S&G level, S&G met for analyzing snags at 3 levels. (Because existing condition is deficit, not possible to meet desired condition in this entry). See Design Features, page 64. Also, see Chapter 3, pages 166 and 167.

Forest Plan Standard and Guideline (Desired Condition)	**Existing Condition**	**Treatment Effects**	**Post Treatment Condition**	**Summary of Compliance With Standard and Guideline**
8. Logs (down woody debri): Leave/maintain 3 logs/acres > 12" and 8' long	Average logs/acre often deficit across the project area, usually at < 1/acre	**Common to Both Alternatives:** Up to 50% loss of logs (including logs gained) due to Rx burning.	**Common to Both Alternatives:** Design features included to replace lost logs and meet S&G log requirements.	**Common to Both Alternatives:** See Design Features page 64**.** Also, see Chapter 3, pages 166 and 167. **Forest Plan S& G met.**
9. Old age trees are to be managed to sustain as much old forest structure as possible over time across the landscape	Currently an avg. of 2.8 yellow pine trees/acre across the project.	**Common to Both Alternatives:** No yellow pine cut, regardless of size. Uneven-aged treatments and other thinnings to promote tree growth and advance tree size and health across the landscape. Emphasis on thinning in the smaller diameter classes, VSS 3 being the predominant density	**Common to Both Alternatives:** Greater than 20% of each 10K has been designated for old-growth management. Existing old tree component same as existing condition	**Common to Both Alternatives:** **Forest Plan S& G met** See Table 2.3, page 58, Table 2.5 page 70.

Forest Plan Standard and Guideline (Desired Condition)	**Existing Condition**	**Treatment Effects**	**Post Treatment Condition**	**Summary of Compliance With Standard and Guideline**
		reduction target.		
10. A mosaic of vegetation densities, age classes and species composition is to be sustained across the landscape.	Stands usually even-aged, few natural openings, tree density impedes grass and forb understory.	Thinning and Uneven-aged treatments to increase age class diversity and Rx burning. Short Term negative effects on the goshawk prey base, but long term positive effects due to treatments.	**Alternative 1**: Treatments improve size and age class diversity over time on 9,220 acres Reduced tree density and more forest openings improves understory species diversity and abundance of food. Grassy openings held in perpetuity at 50% of landscape. **Alternative 2**: Treatments improve size and age class diversity over time on 9,364 acres Open landscape reduced to 20%, less understory diversity and abundance – less food, .	**Common to Both Alternatives:** **Forest Plan S& G met for both Alternatives.** See Table 2.5, page 70.

Forest Plan Standard and Guideline (Desired Condition)	**Existing Condition**	**Treatment Effects**	**Post Treatment Condition**	**Summary of Compliance With Standard and Guideline**
11. Provide food and cover for goshawk prey species	High forest densities and lack of forest openings reduce food for many of the prey species, cover is out of balance with food needs.	**Alternative 1**: Thinning and Uneven-aged treatments and Rx burning on 9,220 acres. Grassy areas restored in perpetuity using interspace concept. **Alternative 2**: Interspace concept not used. Thinning and Uneven-aged treatments and Rx burning on 9,364 acres. More continuous forest landscape at 20% open.	**Alternative 1**: Interspace concept creates open landscape at the project level at 50% openness. Balance of food and cover for goshawk prey species. Better access to prey. **Alternative 2**: Less understory diversity – less food habitat for prey species. Closed forest reduces access prey.	**Alternative 1:** See discussion on VSS 1 and interspace, items 2 & 3. **Forest Plan Amendment Required** **Alternative 2: Forest Plan S&G met.** See Chapter 3, page 145**.**

Forest Plan Standard and Guideline (Desired Condition)	**Existing Condition**	**Treatment Effects**	**Post Treatment Condition**	**Summary of Compliance With Standard and Guideline**
12. Limit human activity in nesting areas and near PFA's during the breeding season from March 1 to Sep. 30.	N/A	**Common to Both Alternatives:** Ea states that no thinning will occur in PFA's during the breeding season. Note: Low intensity ground fires are expressly permitted under the Forest Plan at any time.	**Common to Both Alternatives:** Timing restrictions are specified within the breeding season	**Common to Both Alternatives:** **Forest Plan S&G met.** See Design Features, page 64, and Chapter 3, page 145.
Topic: Old-Growth				

Forest Plan Standard and Guideline (Desired Condition)	**Existing Condition**	**Treatment Effects**	**Post Treatment Condition**	**Summary of Compliance With Standard and Guideline**
13. Allocate a minimum of 20% old-growth in each ecosystem management area.	Jack Smith 10K: There are currently 1,648 acres of existing and designated old-growth allocated at the EMA level. Elden 10K: There are currently 938 acres of existing and recruitment old-growth at the EMA level	**Common to Both Alternatives:** 2,658 acres of recruitment or developing old-growth is allocated on the Jack Smith 10K 3,481 acres of recruitment or developing old-growth is allocated on the Elden 10K	**Common to Both Alternatives:** Jack Smith 10 K has 20% old-growth allocated. Elden 10K has 26% old-growth allocated.	**Common to Both Alternatives:** **Forest Plan S&G met.** See Table 2.5, page 72**.**
Soils				
14. …manage ground surface layer to maintain satisfactory soil conditions i.e. minimize soil compaction and maintain hydrologic and nutrient cycles	Currently, all TES Map Units are in satisfactory soil condition.	**Common to Both Alternatives:** The project will crate short-term ground disturbance on about 900 acres (about 8% of the project area).	**Common to Both Alternatives:** All TES map units are in satisfactory conditions.	**Common to Both Alternatives:** **Forest Plan S&G met. See EA pages 207-210.**

Forest Plan Standard and Guideline (Desired Condition)	Existing Condition	Treatment Effects	Post Treatment Condition	Summary of Compliance With Standard and Guideline
Transportation Management				

Forest Plan Standard and Guideline (Desired Condition)	**Existing Condition**	**Treatment Effects**	**Post Treatment Condition**	**Summary of Compliance With Standard and Guideline**
15. Road densities are to be managed at lowest level possible and at less than 2 miles/sq.mile.	5.4 miles/sq. mile	**Common to Both Alternatives:** 38 mile of road obliterated and 27.9 miles closed	**Common to Both Alternatives:** An open road system of 32.6 miles which is 1.8 miles /sq. mile.	There was some confusion in the initial document that the road. decom. and closure. Was not clearly displayed in the PA or assessed adequately by all resources. This has been corrected in this Document. Also, some mileage corrections have been made in Tables 3.38 and 3.39 to correct errors in the original document. **Common to Both Alternatives:** Reducing road density to 1.8 miles/sq.mi. **meets Forest Plan S&G.**
MEXICAN SPOTTED OWL				

Forest Plan Standard and Guideline (Desired Condition)	**Existing Condition**	**Treatment Effects**	**Post Treatment Condition**	**Summary of Compliance With Standard and Guideline**
16. There are numerous MSO S&G's. The initial review of the project found all MSO S&G's were met by the project. There were no changes to MSO management with Alternative 2	Portions of 4 PACS within the project area.	**Common to Both Alternatives:** Treating in portions of 2 PACS No thinning of trees over 9" dbh. Other protected and restricted (including target/threshold) habitat identified and mapped	**Common to Both Alternatives:** Slightly reduced fuels and fire hazard. 305 acres thinning less than 9" in 2 MSO PAC's. Also, 70 acres of burn only treatment in protected habitat. 424 acres thinned and/or burned in restricted habitat. All treated acres moves fuel hazard ratings from high and moderate to moderate and low.	Individual S&G's not listed for MSO, but see Chapter 3, MSO section. **Forest Plan S&G's met.** **Also, consultation was completed with the USFWS (PRD #73) where they concurred with a finding of may effect not likely to adversely affect.**