

Four-Forest Restoration Initiative

Scenery Specialist Report



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Laws, Regulations, Policy

All alternatives are designed to guide the Coconino and Kaibab NF's management activities in meeting all applicable Federal and State laws, regulations, and policies.

Applicable Laws

The National Environmental Policy Act of 1969 (NEPA) states:

"(a) The Congress, recognizing the profound impact of man's activity on the interrelations of all components of the natural environment, particularly the profound influences of population growth, high-density urbanization, industrial expansion, resource exploitation, and new and expanding technological advances and recognizing further the critical importance of restoring and maintaining environmental quality to the overall welfare and development of man, declares that it is the continuing policy of the Federal Government, in cooperation with State and local governments, and other concerned public and private organizations, to use all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans.

(b) In order to carry out the policy set forth in this Act, it is the continuing responsibility of the Federal Government to use all practicable means, consistent with other essential considerations of national policy, to improve and coordinate Federal plans, functions, programs, and resources to the end that the Nation may --

1. fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;
2. assure for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings;
3. attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences;
4. preserve important historic, cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment which supports diversity, and variety of individual choice;
5. achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities; and
6. enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources."

To accomplish this, numerous federal laws require all Federal land management agencies to consider scenery and aesthetic resources in land management planning, resource planning, project design, implementation, and monitoring. These Federal laws include the following:

The Wilderness Act (1964) – The act dictates that Wilderness is an area of Federal land that will be managed to retain its primeval character and untrammeled setting. It is protected and managed so as to preserve its natural condition and the imprint of man's work must be substantially unnoticeable.

The Wild and Scenic Rivers Act (1968) – The outstandingly remarkable scenic values of rivers eligible or suitable to be included in the system must be carefully managed. Any management activities that could negatively impact the scenic resources, where they are

an identified outstandingly remarkable value, should not be conducted or mitigated according to the river's comprehensive management plan.

The National Trails System Act (1968) – This act states that trails should be established within scenic areas and along historic travel routes of the Nation, which are often more remotely located.

The Environmental Quality Act (1970) – This act sets forth a national policy for the environment which provides for the enhancement of environmental quality.
The Forest and Rangeland Renewable Resources Planning Act (1974) – This act provides direction to conduct aesthetic analysis and assess the impacts on aesthetics for timber harvesting. It also provides the framework for natural resource conservation.

The National Forest Management Act (1976) – This act provides direction that the preservation of aesthetic values is analyzed at all planning levels. Part 219.21 requires that the visual resource shall be inventoried and evaluated as an integrated part of evaluating alternatives in the forest planning process, addressing both the landscape's visual attractiveness and the public's visual expectation.

Resources Planning Act (RPA) includes direction to: "...cut blocks, patches, or strips are shaped to the extent practicable with the natural terrain;...consistent with the protection of...aesthetic resources."

In addition, the Forest Service has routinely included both scenery and recreation as part of the 1960 Multiple Use-Sustained Yield Act.

Policy

FSH 1909.13.13a, Chapter 10: "When pertinent to the issues...the Scenery Management System (SMS) should be used to describe...desired conditions and objectives."

FSH 1909.13.2.3: "...Also, see FSM 2380.61 for landscape aesthetics guidance."

FSM 2380.43.5 "Ensure application of the principles of landscape aesthetics, scenery management, and environmental design in project level planning"

FSM 2380.61 "Refer to the following publications in the Department of Agriculture's National Forest Landscape Management Series for technical guidance in managing landscape aesthetics and scenery." The pertinent publication is USDA Ag Handbook 701, "Landscape Aesthetics: A Handbook for Scenery Management". This Handbook directs identification of Desired Scenic Character (page 1-3 and 5-5), as does its most recent update "Appendix J Recommended SMS Refinements" 2007, and the "Region 5 SMS Implementation Process" 5/2009.

FSM 2020.5 "Sustainability. Meeting needs of the present generation without compromising the ability of future generations to meet their needs. Sustainability is composed of desirable social, economic, and ecological conditions or trends interacting at varying spatial and temporal scales, embodying the principles of multiple-use and sustained-yield (FSM 1905)."

The following USDA handbooks establish a framework for management of scenic resources. These handbooks were written when the visual management system (VMS)

was in place. Although the VMS has now been replaced by the scenery management system, the handbooks still apply to management of scenic resources.

National Forest Landscape Management Volume 1, Agriculture Handbook 434: 1973
 Roads, Chapter 4, Agriculture Handbook 483: 1977
 Timber, Chapter 5, Agriculture Handbook 559: 1980
 Fire, Chapter 6, Agriculture Handbook 608: 1985
 Recreation, Chapter 8, Agriculture Handbook 666: 1987
 Landscape Aesthetics, A Handbook for Scenery Management, Agriculture Handbook 701: 1995

Forest Service manual direction provides further clarification to utilize the Scenery Management System in forest and project planning and implementation, including sections 2380.3, 2382, and 2382.3:

2380.3, Policy: It is Forest Service policy to:
 Inventory, evaluate, manage, and, where necessary, restore scenery as a fully integrated part of the ecosystems of National Forest System lands and of the land and resource management and planning process.

Employ a systematic, interdisciplinary approach to scenery management to ensure the integrated use of the natural and social sciences and environmental design.

Ensure scenery is treated equally with other resources.

Apply scenery management principles routinely in all National Forest System activities. 2382, Scenery Management: Managing scenery on National Forest System lands entails:

1. Completing and maintaining an inventory of landscape aesthetics and scenery resources. Establishing goals and objectives for the management of scenery on all National Forest System lands.

2382.3 - Forest Plan Revisions and Scenery Management System

Update the scenery inventory using the Scenery Management System in Agriculture Handbook 701 (FSM 2380.61, para. 2). The recommended timeframe for updating the scenery inventory is prior to or at initiation of Forest land and resource management plan revisions.

Table 1 summarizes existing Forest Plan direction for the Kaibab NF regarding scenery or visuals, and Table 2 summarizes Forest Plan direction for the Coconino NF.

Table 1 Kaibab National Forest Land Management Plan direction for scenery and accompanying tables 16 and 17 referred to under “exceptions”.

Description	Forest Plan Management Direction	FLMP Page
Goals A goal is "a concise statement that describes a desired condition to be achieved sometime in the	SZ: Protect and enhance the scenic and aesthetic values of the Kaibab National Forest.	p. 17

<p>future . . . it has no specific date by which it is to be completed." [36 CFR 219.3].</p>		
<p>Other Forest-wide Standards</p>	<p>2. Recreation/Wilderness and Scenery Management coordination will be accomplished for all management activities.</p> <p>4. SZ: Where existing conditions do not meet mapped ROS or Scenic Integrity Objectives (SIOs), design and implement projects to move the area toward desired conditions.</p> <p>Exceptions Tables 16 and 17 display exceptions to standard ROS and SMS direction that has been developed in response to the critical need for forest health, grassland restoration, and fuels treatments to move forests toward desired conditions.</p> <p>2. Use the 1986 ROS Book, 1995 Landscape Aesthetics: A Handbook for Scenery Management, Recreation Opportunity Spectrum (ROS) and Scenery Management System (SMS) mapping, and Kaibab National Forest ROS-SMS Guidebook (ROS-SMS Guidebook) for forest management decisions, project analysis, and project implementation.</p> <p>3. SZ: The ROS-SMS Guidebook will be followed unless there is an exception made in a site- or project-specific analysis. Exceptions to Guidebook Guidelines will require documentation in project-level analysis, but will not require a Forest Plan amendment. To use these exceptions, provide written documentation in the project level decision that elaborates on the timeline for completion and final expectation for appearance. Interim mitigations may be developed in response to extended timelines. At the completion of the project, the entire treatment area landscape must meet the mapped ROS class and corresponding SIO. Monitoring of projects will track activities and assure accomplishment and compliance with Forest Plan Standards.</p>	<p>p. 34</p> <p>p.34-1</p>
<p>Specific Recreation Opportunity Setting Standards – SZ</p>	<p>Restrict motorized uses in SPNM designated areas, except for necessary minimal administrative activities, permitted activities, and emergency access needs. Avoid construction of permanent or temporary roads in SPNM areas, unless required by valid permitted activity. Construct and maintain roads with SPNM classes to lowest maintenance level required for the intended use. Roads should be obliterated when no longer needed.</p>	<p>p. 34-2</p>
<p>Guidelines These additional guidelines apply only to resource operations and improvements in GAs 2, 10, and 13.</p>	<p>1. Identify, describe, and geographically locate existing conditions in the implementation land area, regarding: q. NZ: Visual quality objectives; SZ: Scenic Integrity Objectives.</p>	<p>p.39</p>
<p>Geographic Area 8 – Southern Tusayan Woodland</p>	<p>The area contains sensitive travelways such as Highway 64, and the Arizona Trail, important scenic features such as Red Butte, and recreation resources such as the historic Anita Station and Moqui Stage Station. SIO include High (Level 2), Moderate (Level 3), and Low (Level 4).</p> <p>Management Direction for Recreation Resources: Provide extensive management of recreation, visual and heritage resources...Maintain and enhance the scenic quality of the area.</p>	<p>p. 55</p>

FLMP Table 16. Exceptions to standard ROS direction (Kaibab Forest Plan)

Primitive-Wilderness	Semi-Primitive Non-Motorized Wilderness	Semi-Primitive Non-Motorized	Semi-Primitive Motorized	Roaded Natural	Roaded Modified	Rural
No exceptions allowed.	No Exceptions allowed.	Up to 25% of an individual area may be mechanically treated at one time.*	Up to 25% of an individual area may be mechanically treated at one time.*	See SIO exceptions.	See SIO exceptions.	See SIO exceptions.
*Areas larger than 25% may be considered if treatment activities cause minimal visual impacts and/or treated area recovers within SIO 2 standard timeline. Treated areas must achieve the assigned ROS class and corresponding SIO before further large-scale treatments in the area may be initiated. This exception is not intended to limit the size of prescribed fires.						

FLMP Table 17. Exceptions to standard SMS direction (Kaibab Forest Plan)

SIO Level 1	SIO Level 2	SIO Level 3	SIO Level 4	SIO Level 5
Projects usually completed within one year. No exceptions allowed.	Projects usually completed within one year. May temporarily drop one level during critical project or management activities.	Projects usually completed within two years. May temporarily drop one level during critical project or management activities	Projects usually completed within three years. Timeline could be extended, but the SIO will not drop to Level 5.	Used only for inventory and existing condition mapping. Will not be used as a desired SIO.

Table 2 Summary of the scenery Forest Plan management direction from the Coconino National Forest Plan

DESCRIPTION	Forest Plan Management Direction	FLMP page
Goals	Maintain and enhance visual resource values by including visual quality objectives in resource planning and management activities.	Replacement p.22
Forest-wide	Projects are planned to meet or exceed visual quality objectives (VQO). Review the VQO inventory as a part of project planning and make necessary corrections/refinements following field checking. Use VQO inventory to analyze impacts to VQO classes due to management activities such as timber sales, range projects, and firewood sales. Use the current Forest Visual Resource Management Inventory that lists VQO Forest-wide in conjunction with Forest Plan MA Map and descriptions to plan projects. Allow only one classification movement downward unless a larger movement is justified after doing an environmental analysis for emergency situations such as removal of fire damaged timber or I&DC control needs.	Replacement p.60

DESCRIPTION	Forest Plan Management Direction	FLMP page
Forest-wide	...design timber management activities to integrate considerations for economics, water quality, soils, wildlife habitat, recreation opportunities, visual quality, and other values.	Replacement p.23
Ponderosa Pine and Mixed Conifer less than 40% slopes	Stand size, except managed old-growth stands, foreground Retention areas, or stands resulting from catastrophic events, such as wildfires or epidemic insect infestation, is between 10 and 100 acres unless larger or smaller stands are approved by the Forest Supervisor. Exceptions are stands managed for conversion to aspen and those managed as Gambel Oak nonindustrial wood, which can be as small as 5 acres and 1 acre, respectively and have maximum sizes of 10 and 40 acres, respectively. Also stands having a VQO of foreground Retention can be 2.5 acres. Stands are defined in the environmental documentation (ISM Phase IX) and documented in the timber sale project plan (ISM Phase X). Silvicultural treatments are designed to improve age class distribution within a 10K Block. The goal is to attain differences between adjacent timber stands by the time the first regeneration period is completed, which is when the seed trees are removed and the regenerated stand is certified, unless there is a specific management need, approved by the Forest Supervisor that delays achieving the goal. Progress towards the goal is made during each commercial entry. Manage to achieve, where possible, not more than one-quarter of a stand's perimeter in common with an adjacent stand whose characteristics do not meet minimums factors.	Replacement Pg. 129
Ponderosa Pine and Mixed Conifer less than 40% slopes	Timber stands managed to meet visual management objective (VQO) of foreground retention are managed as follows: Maintain or create a mosaic of stands of various sizes and age classes throughout the rotation. Obtain a stand of ponderosa pine and/or mixed conifer at maturity of 30 to 45 trees per acre. The average diameter of mature trees is 20 inches or greater. The large trees are maintained as long as possible. Extended rotations may be necessary. Allow naturally regenerated trees to stay if the overall visual quality objective is met. Obtain diversity of landscape management features. Created slash is promptly treated. Mistletoe treatments are designed to meet as many of these Standards as possible. Precommercial thinning is done as needed to meet the visual quality objectives.	Page 133
Ponderosa Pine and Mixed Conifer less than 40% slopes	Silvicultural Prescription in Foreground Retention Areas: <i>Uneven-Aged Management</i> – ☑ Uneven-aged stands have three or more distinct age classes present. The different aged trees are usually intermixed. Cutting methods are used that develop and maintain uneven-aged stands such as single-tree selection and group selection. Stands are entered on a 20-year cutting cycle and cut to a GSL of 100.	Pg.133

DESCRIPTION	Forest Plan Management Direction	FLMP page
	Stand size is determined by the scale of the landscape, width of the road, and the speed of the viewer (e.g., I-17 vs. 89A). Stand size may be less than 10 acres.	
Ponderosa Pine and Mixed Conifer less than 40% slopes	<p><i>Deferred Management</i></p> <p>☑ Deferred harvest management is used on stands that presently meet foreground Retention stand characteristics. These stands are managed by the uneven-aged management prescription when the stands no longer meet foreground Retention stand characteristics.</p> <p>Roads to be managed for foreground Retention within this MA and in MA 4 (other areas of foreground retention on the timber type are found in MA's 13 and 19):</p> <p>Road Miles (<i>only those in the treatment area are noted here</i>) Arizona Hwy 87 – 29, FH 3 - 46</p> <p>An average 300 feet on each side of the road will be managed as foreground Retention (nearly 20,000 acres) total from all MA's. Determine the exact width of the foreground Retention area after on-the-ground review.</p> <p>Foreground Partial Retention (VQO) Silvicultural Objectives are:</p> <p>☑ To maintain or create a mosaic of stands of various sizes and age classes throughout the rotation with a mature tree component (+18 inches d.b.h.) on at least 10 percent of the area.</p> <p>☑ Created slash will be treated.</p>	Pg.134
Aspen	<p>Emphasize a combination of wildlife habitat, visual quality, firewood production, watershed condition, and dispersed recreation with other resources and uses managed to be compatible...Manage for VQO of Retention and Partial Retention in designated foreground areas, as specified in MA 3, and all VQO's in middleground and background.</p> <p>Standards and Guidelines Visual Quality</p> <p>Review the VQO inventory as a part of project planning and make necessary refinements following the field checking. Clearcutting to enhance or maintain aspen in Retention and Partial Retention areas is permissible with limitations on size and distribution of openings. Clearcuts should be distributed over larger areas rather than confined to small areas. In Retention areas, openings may be up to 2.5 acres in foreground areas, 5 acres in middleground areas, and 20 acres in background areas. In Partial Retention areas, openings may be up to 15 acres in foreground areas, and 40 acres in middleground and background areas.</p>	<p>Replacement Pg.141</p> <p>Replacement Pg.142</p>
Unproductive Timber Land -	Visual Quality Objectives (VQO) are managed in accordance with the Forest-wide Standards and Guidelines	Pg.145
Mountain Grassland	Emphasize livestock grazing, visual quality , and wildlife habitat. Manage Visual Quality Objectives (VQO) in accordance with the Forest-wide Standards and Guidelines. VQO's vary significantly in this MA.	Pg.158
Riparian and Open Water	Scenic values are very high. Emphasize wildlife habitat, visual quality , fish habitat, and	Pg.172

DESCRIPTION	Forest Plan Management Direction	FLMP page
	watershed condition on the wetlands, riparian forest, and riparian scrub. Emphasize dispersed recreation, including wildlife and fish recreation, on the open water portion. Manage for visual quality objectives of Retention, Partial Retention, and Modification.	
Highway Corridor 180	<p>Manage Hwy 180 and its foreground as a sustainable and resilient ecosystem with an emphasis on large trees and stand diversity. There will be sustainable, healthy communities of aspen, ponderosa pine and pinyon juniper with a large percentage of the corridor containing large old trees. Hwy 180 will have a retention visual quality objective. Introduce a level of visual diversity in the driving experience. Viewing the forest is a sequential linear event. Manage for VQO of foreground Retention on Hwy 180.</p> <p>Old-Growth: The Hwy 180 corridor itself will not function as old-growth because it is a linear corridor. However, much of the corridor will have old-growth characteristics in keeping with visual quality guidelines described above.</p>	<p>Replacement Pg.206-1</p> <p>Replacement Pg.206-3 Replacement Pg. 206-4</p>
FLEA Area-Wide Goals and Objectives FLEA Area-Wide Guidelines	<p>There is a range of recreational setting opportunities for people to enjoy the area’s many scenic and aesthetic qualities. Work towards a complete Scenery Management System (SMS) assessment.</p> <p>Provide fast clean-up from management activities and limit short-term visual impacts (1 to 3 years), while meeting fire potential reduction needs, design thinning for long-term scenic quality adjacent to homes and along major highways or near developed recreation sites.</p>	<p>Replacement Pg.206-62</p> <p>Replacement Pg.206-70</p>

Purpose and Need for Action

The purpose and need for proposing an action was determined by comparing the objectives and desired conditions in the Coconino NF and Kaibab NF Land Resource and Management Plans (forest plans) to the existing conditions related to forest resiliency and forest function. Where plan information was dated or not explicit, local research and the best available science were utilized. The results of the comparison are displayed in narrative, tables, and photographs in this specialist report for scenery.

The purpose of the project is to re-establish and restore forest structure and pattern, forest health, and vegetation composition and diversity. There is a need to increase forest resiliency, protect soil productivity, and improve soil and watershed function. Resiliency increases the ability of the ponderosa pine forest to survive natural disturbances such as fire, insect and disease, fire, and climate change (FSM 2020.5). The project is expected to move almost 600, 000 acres towards comprehensive, landscape-scale restoration with benefits that include improved forest function and health, vegetation biodiversity, wildlife habitat, soil productivity, watershed function, and reduced risk of severe fire effects. In summary, there is a need for:

- moving vegetation structure and diversity towards desired conditions by creating a mosaic of interspaces and tree groups of varying sizes and shapes
- moving towards a forest structure with all age and size classes represented as identified in the 1996 forest plan amendment for northern goshawk and Mexican spotted owl habitat
- managing for old age (pre-settlement) trees such that old forest structure is sustained over time across the landscape by moving towards forest plan old growth standards of 20 percent at a forest EMA scale
- improving forest health by reducing the potential for stand density-related mortality and by reducing the level of dwarf mistletoe infection
- moving towards desired conditions for vegetation diversity and composition by maintaining and promoting Gambel oak, aspen, grasslands, and pine-sage
- moving towards the desired condition of having a resilient forest by reducing the potential for undesirable fire behavior and its effects
- moving towards the desired condition of maintaining the mosaic of tree groups and interspaces with frequent, low-severity fire by having a forest structure that does not support wide-spread crown fire
- moving toward desired conditions in riparian ecosystems by having springs and seeps function at, or near, potential
- moving towards desired conditions for degraded ephemeral channels by restoring channel function
- moving towards restoring select closed and unauthorized roads to their natural condition by restoring soil function and understory species

Proposed Action

The Coconino and Kaibab NFs propose to conduct approximately 587,923 acres of restoration activities over approximately 10 years or until objectives are met. Up to 45,000 acres of vegetation would be mechanically treated annually. Up to 40,000 acres of prescribed fire would be implemented annually across the forests. Two prescribed fires would be conducted on all acres proposed for treatment over the 10-year period.

Restoration activities would:

- Mechanically cut trees and apply prescribed fire on approximately 388,489 acres. This includes: (1) mechanically treating up to 16-inch dbh within 18 Mexican spotted owl protected activity centers, (2) cutting 99 acres of trees by hand on slopes greater than 40 percent, and, (3) using low-severity prescribed fire within 72 MSO PACs (excluding core areas)
- Utilize prescribed fire-only on approximately 199,435 acres
- Construct 517 miles of temporary roads for haul access and decommission when treatments are complete (no new permanent roads would be constructed)
- Reconstruct up to 40 miles of existing, open roads for resource and safety concerns (no new permanent roads would be constructed). Of these miles, approximately 30 miles would be improved to allow for haul (primarily widening corners to improve

turn radiuses) and about 10 miles of road would be relocated out of stream bottoms. Relocated roads would include rehabilitation of the moved road segment.

- Decommission 770 miles of existing system and unauthorized roads on the Coconino NF
- Decommission 134 miles of unauthorized roads on the Kaibab NF
- Restore 74 springs and construct up to 4 miles of protective fencing
- Restore 39 miles of ephemeral channels
- Construct up to 82 miles of protective (aspen) fencing
- Allocate as old growth 40 percent of ponderosa pine and 77 percent of pinyon-juniper woodland on the Coconino NF and 35 percent of ponderosa pine and 58 percent of pinyon-juniper on the Kaibab NF

Three non-significant forest plan amendments would be required on the Coconino NF to implement the proposed action:

- Amendment 1 would allow the use of mechanical treatments to improve habitat structure and allow for mechanical treatment up to 16-inch diameter at breast height within 18 MSO PACs to improve nesting and roosting habitat. It would defer Mexican spotted owl monitoring to the project's Biological Opinion issued by the US Fish and Wildlife Service.
- Amendment 2 would : 1) add the desired percentage of interspace within uneven-aged stands to facilitate restoration and defines interspace, (2) add the interspace distance between tree groups, (3) add language clarifying where canopy cover is and is not measured, (4) allows 29,017 acres to be managed for an open reference condition (figure 47), which affects canopy cover guidelines for VSS 4 through VSS 6 groups and reserve trees, and (5) add a definition to the forest plan glossary for the terms interspaces, open reference condition, and stands.
- Amendment 3 would allow a "no adverse effect" determination for heritage resources.

Two non-significant forest plan amendment would be required on the Kaibab NF to implement the proposed action:

- Amendment 1 would 1) add the desired percentage of interspace within uneven-aged stands to facilitate restoration and defines interspace, (2) add the interspace distance between tree groups, (3) add language clarifying where canopy cover is and is not measured, (4) allows 27,637 acres to be managed for an open reference condition (figure 47), which affects canopy cover guidelines for VSS 4 through VSS 6 groups and reserve trees, and (5) add a definition to the forest plan glossary for the terms interspaces, open reference condition, and stands.
- Amendment 2 would defer Mexican spotted owl monitoring to the project's Biological Opinion issued by the US Fish and Wildlife Service.

Refer to the description of alternative B (proposed action alternative) in chapters 1 and 2 of the 4FRI DEIS for details that include tables and maps that display proposed treatments.

Figure 1 shows the extent of the proposed 4FRI project. Figure 2 shows the restoration units within the treatment area.

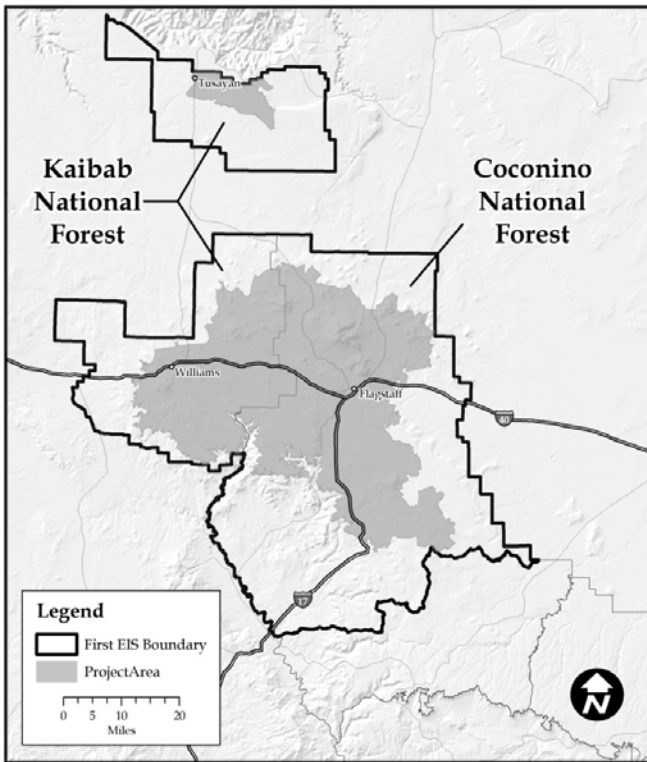


Figure 1 Proposed 4FRI treatment area.

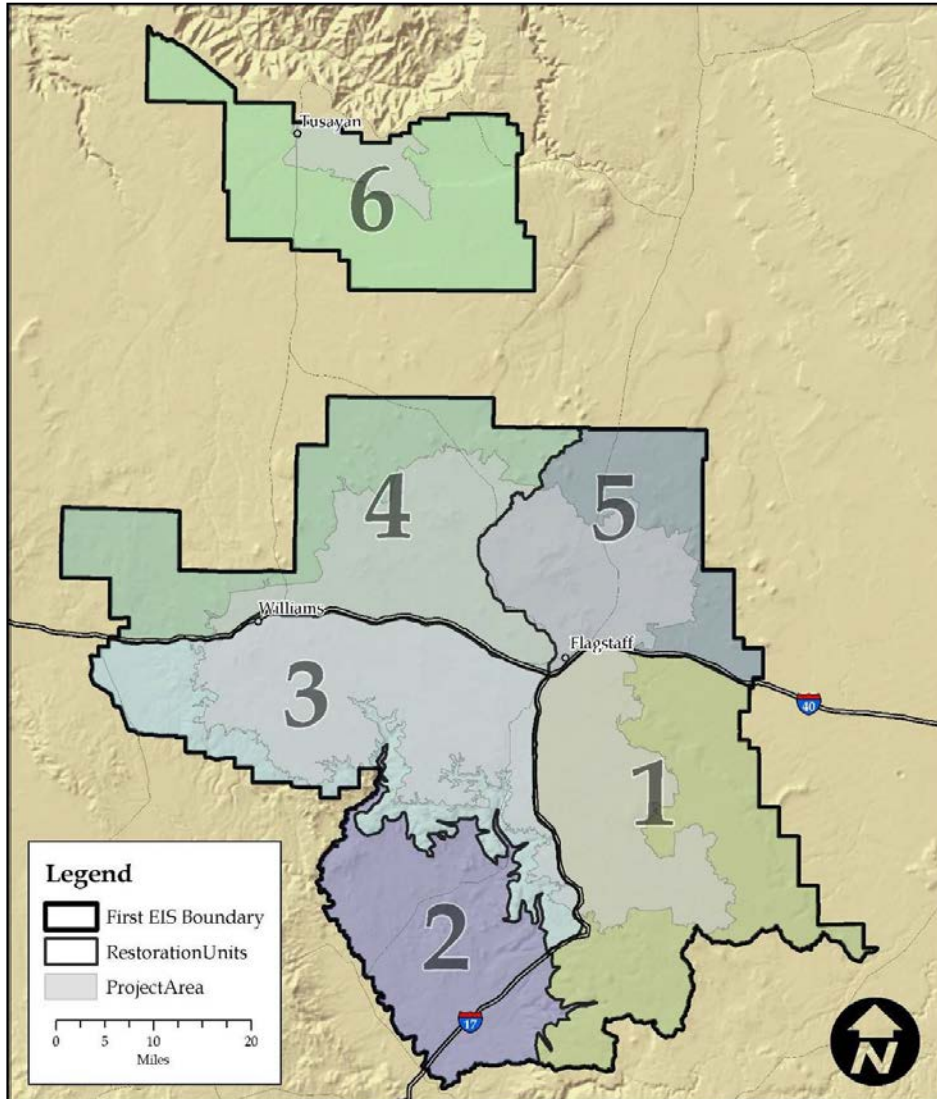


Figure 2 4FRI EIS boundary and restoration units.

Project Description

This report documents the analysis of effects of proposed 4FRI restoration treatments on scenic resources located in the area. The Forest Service developed four alternatives considered in detail, including No Action (alternative A), the proposed action (alternative B) and two additional alternatives (alternative C and D) that respond to recommendations and issues raised by the public. See the Draft Environmental Impact Statement for Four-Forest Restoration Initiative for detailed descriptions of the alternatives. The following descriptions include the proposed restoration activities, these do not include details of forest plan amendments, see the DEIS for these.

Alternative A – No Action

Alternative A is the no action alternative as required by 40 CFR 1502.14(c). There would be no changes in current management and the forest plans would continue to be implemented. Approximately 82,592 acres of vegetation treatments and 96,125 acres of ongoing prescribed fire projects would continue to be implemented adjacent to the treatment area. Approximately 86,771 acres of vegetation treatments and 142,869 acres of prescribed fire and maintenance burning would be implemented adjacent to the treatment area by the forests in the foreseeable future (within 5 years). Alternative A is the point of reference for assessing action alternatives B-D.

Items Common to All Action Alternatives

All action alternatives (B-D) propose additional actions including restoring springs and ephemeral channels, constructing protective fencing in select aspen stands, constructing (and decommissioning) temporary roads, reconstructing and improving roads, relocating a minimal miles of road, and decommissioning existing roads and unauthorized routes.

A complete listing of design features, best management practices (BMPs), and mitigation to be used as part of alternatives B-D are located in appendix D of the 4FRI DEIS. Those related to recreation and scenery management are included in this report.

All action alternatives incorporate key components of the Old Tree Protection Strategy into the alternative's design features (appendix D), implementation plan (appendix E), and monitoring and adaptive management (appendix F) in the 4FRI DEIS. The Forest Service worked collaboratively with stakeholders to develop the monitoring and adaptive management and implementation plan.

All action alternatives include adaptive management actions that would be taken as needed to restore springs, ephemeral channels, and naturalize decommissioned and unauthorized roads.

Alternative B – Proposed Action

The Coconino and Kaibab NFs propose to conduct approximately 587,923 acres of restoration activities over approximately 10 years or until objectives are met. Up to 45,000 acres of vegetation would be mechanically treated annually. Up to 40,000 acres of prescribed fire would be implemented annually across the forests. Two prescribed fires¹ would be conducted on all acres proposed for treatment over the 10-year period. Restoration activities would:

- Mechanically cut trees and apply prescribed fire on approximately 388,489 acres. This includes: (1) mechanically treating up to 16-inch dbh within 18 Mexican spotted owl protected activity centers, (2) cutting 99 acres of trees by hand on slopes greater than 40 percent, and, (3) using low-severity prescribed fire within 72 MSO PACs (excluding core areas)
- Utilize prescribed fire-only on approximately 199,435 acres
- Construct 517 miles of temporary roads for haul access and decommission when treatments are complete (no new permanent roads would be constructed)
- Reconstruct up to 40 miles of existing, open roads for resource and safety concerns (no new permanent roads would be constructed). Of these miles, approximately 30 miles would be improved to allow for haul (primarily widening corners to improve

¹ The first prescribed fire may include pile burning followed by a broadcast burn.

turn radiuses) and about 10 miles of road would be relocated out of stream bottoms. Relocated roads would include rehabilitation of the moved road segment.

- Decommission 770 miles of existing system and unauthorized roads on the Coconino NF
- Decommission 134 miles of unauthorized roads on the Kaibab NF
- Restore 74 springs and construct up to 4 miles of protective fencing
- Restore 39 miles of ephemeral channels
- Construct up to 82 miles of protective (aspen) fencing
- Allocate as old growth 40 percent of ponderosa pine and 77 percent of pinyon-juniper woodland on the Coconino NF and 35 percent of ponderosa pine and 58 percent of pinyon-juniper on the Kaibab NF

Three non-significant forest plan amendments (for more details refer to Appendix C of the 4FRI DEIS) would be required on the Coconino NF to implement the proposed action:

Amendment 1 would allow the use of mechanical treatments to improve habitat structure and allow for mechanical treatment up to 16-inch dbh within 18 MSO PACs to improve nesting and roosting habitat. All Mexican spotted owl monitoring would defer to the project's Biological Opinion issued by US Fish and Wildlife Service.

Amendment 2 would : 1) add the desired percentage of interspace within uneven-aged stands to facilitate restoration and defines interspace, (2) add the interspace distance between tree groups, (3) add language clarifying where canopy cover is and is not measured, (4) allows 29,017 acres to be managed for an open reference condition (figure 47), which affects canopy cover guidelines for VSS 4 through VSS 6 groups and reserve trees, and (5) add a definition to the forest plan glossary for the terms interspaces, open reference condition, and stands.

Amendment 3 would allow for managing to achieve a "No Adverse Effect" determination for significant, or potentially significant, inventoried heritage sites.

Two non-significant forest plan amendment (see appendix C) would be required on the Kaibab NF to implement the proposed action.

Amendment 1 would 1) add the desired percentage of interspace within uneven-aged stands to facilitate restoration and defines interspace, (2) add the interspace distance between tree groups, (3) add language clarifying where canopy cover is and is not measured, (4) allows 27,637 acres to be managed for an open reference condition (figure 47), which affects canopy cover guidelines for VSS 4 through VSS 6 groups and reserve trees, and (5) add a definition to the forest plan glossary for the terms interspaces, open reference condition, and stands.

Amendment 2 would defer all Mexican spotted owl monitoring to the project's Biological Opinion issued by US Fish and Wildlife Service.

Alternative C (Preferred Alternative)

Alternative C responds to issue 2 (conservation of large trees), and issue 4 (increased restoration and research). It adds acres of grassland treatments on the Kaibab NF, incorporates wildlife and watershed research on both forests, and mechanically treats and uses prescribed fire within the proposed Garland Prairie RNA on the Kaibab NF. It proposes mechanically treating up to 18-inch diameter at breast height in 18 MSO PACs and includes low-severity prescribed fire within 72 MSO PACs, including 56 core areas. It includes an implementation plan and a monitoring and adaptive management plan.

The Coconino and Kaibab NFs would conduct restoration activities on approximately 593,211 acres over a period of 10 years or until objectives are met. Up to 45,000 acres of vegetation would be mechanically treated annually. Up to 40,000 acres of prescribed fire would be implemented annually across the forests. Two prescribed fires² would be conducted on all acres proposed for treatment over the 10-year period. Restoration activities would:

- Mechanically cut trees on approximately 434,001 acres. This includes: (1) mechanically treating up to 18-inch diameter at breast height within 18 Mexican spotted owl protected activity centers, (2) cutting trees by hand on 99 acres on slopes greater than 40 percent, and, (3) using low-severity prescribed fire within 72 Mexican spotted owl protected activity areas (including 56 core areas).
- Utilize prescribed fire-only on approximately 159,211 acres
- Construct 517 miles of temporary roads for haul access and decommission when treatments are complete (no new permanent roads would be constructed)
- Reconstruct up to 40 miles of existing, open roads for resource and safety concerns (no new permanent roads would be constructed). Of these miles, approximately 30 miles would be improved to allow for haul (primarily widening corners to improve turn radiuses) and about 10 miles of road would be relocated out of stream bottoms. Relocated roads would include rehabilitation of the moved road segment.
- Decommission 770 miles of existing system and unauthorized roads on the Coconino NF
- Decommission 134 miles of unauthorized roads on the Kaibab NF
- Restore 74 springs and construct up to 4 miles of protective fencing
- Restore 39 miles of ephemeral channels
- Construct up to 82 miles of protective (aspen) fencing
- Construct up to 15 weirs and 20 weather stations (up to 3 total acres of disturbance) to support watershed research
- Allocate as old growth 40 percent of ponderosa pine and 77 percent of pinyon-juniper woodland on the Coconino NF and 35 percent of ponderosa pine and 58 percent of pinyon-juniper woodland on the Kaibab NF

Three non-significant forest plan amendments (for details see appendix C of the 4FRI DEIS) would be required on the Coconino NF to implement alternative C:

Amendment 1 would: (1) allow the use mechanical treatments to improve habitat structure and mechanically treat up to 18-inch diameter at breast height within 18 MSO PACs, (2) allow the use of low-intensity prescribed fire within 56 PAC core areas, and (4) allow for managing 8,410 acres of restricted target and threshold habitat for a minimum range of 110 to 150 basal area, and, (5) would defer all Mexican spotted owl monitoring to the project's Biological Opinion issued by the US Fish and Wildlife Service.

Amendment 2 would: 1) add the desired percentage of interspace within uneven-aged stands to facilitate restoration and defines interspace, (2) add the interspace distance between tree groups, (3) add language clarifying where canopy cover is and is not measured, (4) allows 29,017 acres to be managed for an open reference condition (figure 47), which affects canopy cover guidelines for VSS 4 through VSS 6 groups and reserve trees, and (5) add a definition to the forest plan glossary for the terms interspaces, open reference condition, and stands.

² The first prescribed fire may include pile burning followed by a broadcast burn.

Amendment 3 would allow for managing to achieve a “No Adverse Effect” determination for significant, or potentially significant, inventoried heritage sites.

Three non-significant forest plan amendments (see appendix C) would be required on the Kaibab NF to implement alternative C:

Amendment 1 would: 1) add the desired percentage of interspace within uneven-aged stands to facilitate restoration and defines interspace, (2) add the interspace distance between tree groups, (3) add language clarifying where canopy cover is and is not measured, (4) allows 27,675 acres to be managed for an open reference condition (figure 47), which affects canopy cover guidelines for VSS 4 through VSS 6 groups and reserve trees, and (5) add a definition to the forest plan glossary for the terms interspaces, open reference condition, and stands.

Amendment 2 would allow for mechanically treating and prescribe burning approximately 400 acres in the proposed Garland Prairie RNA.

Amendment 3 would defer all Mexican spotted owl monitoring to the project’s Biological Opinion issued by US Fish and Wildlife Service.

Alternative D

Alternative D responds to issue 2 (prescribed fire emissions) by decreasing the acres that would receive prescribed fire. All other components of the alternative are the same as described in alternative B. The Coconino and Kaibab NFs would conduct restoration activities on approximately 567,279 acres over a period of 10 years or until objectives are met. Up to 45,000 acres of vegetation would be mechanically treated annually.

Restoration activities would:

- Mechanically cut trees on approximately 388,489 acres. This includes: (1) mechanically treating up to 16-inch dbh (diameter at breast height) within 18 Mexican spotted owl protected activity centers, (2) cutting 99 acres of trees by hand on slopes greater than 40 percent, and, (3) disposing of slash through various methods including chipping, shredding, mastication and removal of biomass off-site.
- Utilize prescribed fire-only on approximately 178,790 acres. Up to 40,000 acres of prescribed fire would be implemented annually across the forests. Two prescribed fires would occur over the 10-year treatment period.
- Construct 517 miles of temporary roads for haul access and decommission when treatments are complete (no new permanent roads would be constructed).
- Reconstruct up to 40 miles of existing, open roads for resource and safety concerns (no new permanent roads would be constructed). Of these miles, approximately 30 miles would be improved to allow for haul (primarily widening corners to improve turn radiuses) and about 10 miles of road would be relocated out of stream bottoms. Relocated roads would include rehabilitation of the moved road segment.
- Decommission 770 miles of existing system and unauthorized roads on the Coconino NF.
- Decommission 134 miles of unauthorized roads on the Kaibab NF.
- Restore 74 springs and construct up to 4 miles of protective fencing.

- Restore 39 miles of ephemeral channels.
- Construct up to 82 miles of protective (aspen) fencing.
- Allocate as old growth 40 percent of ponderosa pine and 77 percent of pinyon-juniper woodland on the Coconino NF, and 35 percent of ponderosa pine and 58 percent of pinyon-juniper on the Kaibab NF.

Three non-significant forest plan amendments (see Appendix C of the 4FRI DEIS for details) would be required on the Coconino NF to implement alternative D:

Amendment 1 would: (1) allow the use of mechanical treatments to improve habitat structure, (2) allow for mechanical treatment up to 16-inch diameter at breast height within 18 MSO PACs to improve nesting and roosting habitat, and, (5) would defer all Mexican spotted owl monitoring to the project's Biological Opinion issued by the US Fish and Wildlife Service.

Amendment 2 would: 1) add the desired percentage of interspace within uneven-aged stands to facilitate restoration and defines interspace, (2) add the interspace distance between tree groups, (3) add language clarifying where canopy cover is and is not measured, (4) allows 29,017 acres to be managed for an open reference condition (figure 47), which affects canopy cover guidelines for VSS 4 through VSS 6 groups and reserve trees, and (5) add a definition to the forest plan glossary for the terms interspaces, open reference condition, and stands.

(Amendment 3 would allow for managing to achieve a "No Adverse Effect" determination for significant, or potentially significant, inventoried heritage sites.

Two non-significant forest plan amendments would be required on the Kaibab NF to implement the proposed action:

Amendment 1 would: 1) add the desired percentage of interspace within uneven-aged stands to facilitate restoration and defines interspace, (2) add the interspace distance between tree groups, (3) add language clarifying where canopy cover is and is not measured, (4) allows 27,637 acres to be managed for an open reference condition (figure 47), which affects canopy cover guidelines for VSS 4 through VSS 6 groups and reserve trees, and (5) add a definition to the forest plan glossary for the terms interspaces, open reference condition, and stands.

Amendment 2 would defer all Mexican spotted owl monitoring to the project's Biological Opinion issued by the US Fish and Wildlife Service.

Mitigation Measures/Design Features

Design criteria for each resource were developed to eliminate or reduce adverse effects of the proposed actions on sensitive resources. These design criteria are part of the proposed action alternative and include features required in order to comply with the Coconino and Kaibab forest plans and the MSO Recovery Plan (as appropriate). Site specific conditions

may result in some variation in application of the design criteria. However, the overall effects of all actions must remain within maximum effects predicted in the environmental impact statement (EIS) and must comply with forest plan requirements. In addition to these design criteria, BMPs from the Soil and Water Conservation Handbook (2509.22) apply. Recreation and scenery mitigation measures/design features were jointly developed. These measures apply to all scenery management situations.

Vegetation and Fire Activities:

1. Edges of Individual Units

- a. Edges of treatment units will be shaped and/or feathered to avoid abrupt changes between treated and untreated areas.
- b. Where the treatment unit is adjacent to denser forest (treated or untreated), the percent of thinning within the transition zone (150-250 feet) will be progressively reduced toward the denser edges of the unit.
- c. Similarly, where the treatment unit interfaces with an opening (including savannah and grassland treatments, and natural openings) the transition zone will progressively increase toward the open edges of the unit.
- d. Soften edges by thinning adjacent to the existing unit boundaries. Treat up to the edges; do not leave a screen of trees. Favor groups of trees complying with the prescribed treatment that visually connect with the unit's edge to avoid an abrupt and noticeable change.
- e. Treatment boundaries should extend up and over ridgelines to avoid the "Mohawk" look.
- f. Avoid widely spaced individual trees that are silhouetted along the skylines.

2. Unit Marking

- a. Avoid using trails as boundaries especially for different prescribed treatments.
- b. Avoid abrupt changes between treatment units. Use the techniques suggested for edges of treatment units (above).

3. Road, Skid Trail and Landing Construction

- a. Utilize dust abatement methods during haul of logs on the following roads shown in the table during the season when dust is likely and funding is available. Coordinate with Coconino County on the application and timing of application of dust abatement on road segments that have County Maintenance responsibilities.

Road Number	Beginning Milepost	Ending Milepost	Segment Length
556	0.734	1.245	0.511
418	0.004	1.004	1
418	1.697	2.372	0.675
0716B	0	0.76	0.76

140	5.657	6.158	0.501
141	3.134	3.431	0.297
141	14.303	14.963	0.66
141	31.487	33.968	2.481

- b. Where new temporary roads and skid trails meet a primary travel route, they should intersect at a right angle, then curve after the junction, to minimize the length of route seen from the primary travel route.
 - c. Log landings, temporary roads, and skid trails should be minimized within sensitive viewsheds such as those next to developed recreation sites, private homes or communities, paved and passenger car level roads and trails.
 - d. Highest emphasis for slash treatment, temporary road closures and road decommissioning will be placed on foreground (up to 300 feet) of developed recreation sites, private homes or communities, and concern level 1 roads (paved roads and passenger car level roads) and trails, especially those designated as national scenic, historic or recreation trails.
 - e. Log landings, skid trails and temporary roads will be rehabilitated including restoring proper drainage, and reseeded as needed with native species.
 - f. To hasten recovery and help eliminate unauthorized motorized and non-motorized use of skid trails and temporary roads, use physical measures such as re-contouring, pulling slash and rocks across the line, placing cull logs perpendicular to the route, and disguising entrances.
 - g. Avoid using FS designated trails as skid trails or for temporary roads.
 - h. National Scenic, Historic, and Recreation Trails as well as forest system trails (motorized and non-motorized) will not be used for temporary roads or skid trails. It is acceptable to make perpendicular trail crossings. The locations of crossings will be designated. Trail crossings will be restored to pre-project condition after use.
 - i. Crossing of the Arizona Trail will be done sparingly and only if no other alternative exists. These crossing locations will be coordinated with District Recreation Staff.
 - j. Large, upright trail cairns used on Beale Wagon Road and Overland Trail must be protected. Locate cairns ahead of time. Logging operations will not damage the cairns.
4. Cull Logs, Stump Heights, and Slash Treatments
- a. Cull logs will not be abandoned on landings.
 - b. Use cull logs for decommissioning temporary roads and decommissioning roads.
 - c. Cull logs may also be suitable to use as down woody material, but must be scattered away from the landings.

- d. Stump heights should be cut as low as possible, with a maximum height of 12 inches.
 - i) In the foreground of paved and passenger car level roads, trails, recreation sites, private homes/communities, strive to make stump heights 6" or lower, with 12 inch heights the exception, and rarely occurring.
 - e. Slash must be treated or removed.
 - f. In the seen area immediate foreground of sensitive places (within 300 feet of the centerline of paved or passenger car level roads or trails, or 300' from the boundary of a recreation site or private land/communities):
 - i) Where whole tree logging occurs, machine piling may occur to the back of log landings. Prioritize slash burning in these locations within one year or as soon as possible after treatment.
 - ii) If conventional logging is used and trees are de-limbed and topped in the forest, machine piled slash should be placed at least 300 feet away from the centerline of roads and trails, developed recreation sites or private land/communities. In these instances piles should be burned as soon as possible or within three years.
 - g. Root wads and other debris in sensitive foreground areas will be removed, buried, burned, or chipped. If materials are buried, locate in previously disturbed areas where possible. Beyond sensitive immediate foreground areas, it is acceptable to scatter these or use them to help close temporary roads or skid trails.
 - h. If slash is not removed in grassland treatment areas, it is acceptable to create machine piles 300 feet away from the centerline of sensitive roads and trails, developed recreation sites and private land/communities.
 - i. Place project-generated slash outside of permitted utility line and pipeline rights-of-way; do not interfere with utility corridor management.
5. Fire Control Lines
- a. Generally restore control lines to a near undisturbed condition in the foregrounds (within 300 feet) of sensitive roads, trails, and developed recreation sites.
 - b. To hasten recovery and help eliminate unauthorized motorized and non-motorized use of control lines in these areas, use measures such as re-contouring, pulling slash and rocks across the line, and disguising entrances.
 - c. Do not use motorized equipment on National Scenic, Historic and Recreation Trails, or other forest system trails if these are used for control lines. Coordinate with the District Recreation Staff regarding use of National Trails as control lines.

6. Coordinate with landscape architect prior to implementing jack straw treatments to protect aspen regeneration.
 - a. Do not implement jack straw treatments within 1000 feet of the Arizona Trail.
7. Recreation and Other Trail Mitigation
 - a. Recreation Sites
 - i) Proposed mechanical treatments and prescribed fire adjacent developed recreation sites must be reviewed and approved by the District Ranger. Treatments may occur within Ten-X, Kaibab Lake and White Horse Lake Campgrounds. Work with the District Recreation Staff to determine boundaries or no treatment zones around constructed features that need to be protected in the campgrounds. Treatments around the perimeter of the campgrounds are encouraged. The timing of treatments must be worked out with Districts. Treatment will generally occur in fall, winter or spring. Activity slash must be piled in agreed upon locations, and treated as soon as possible. If campgrounds remain open into fall and winter, provide information about upcoming closures and management activities on site, at FS offices and FS websites.
 - ii) Thinning and burning is appropriate at Garland Prairie Vista and Oakhill Snowplay Area, but constructed features must be protected from damage. Work with the District Recreation Staff to establish boundaries to protect constructed features.
 - b. Provide public notice and information about treatment locations, timing and the type of treatment occurring prior to and during vegetation and fire treatments.
 - i) Consider use of a hotline or link on our web pages that will indicate closures or hazards that may be encountered also use media and make sure front liners are well informed about activities occurring on the Districts and Forests.
 - c. Place warning signs on all trail access points and along trails where treatment activities are occurring. It is also appropriate to place warning signs at developed recreation sites to inform visitors
 - d. When mechanical treatment and burning are occurring along open trails, slash will be pulled back immediately within 100 feet of the centerline of the trail corridor.
 - e. If trails are temporarily closed due to harvesting, the trail tread will be cleared of all slash.
 - f. Character trees that have unique shape or form and trees that define the trail corridor should be retained where feasible and should conform to the applicable prescription. Avoid lines of trees; strive to achieve a groupy appearance to avoid abrupt changes in the landscape character along the trail corridor.

- g. Implement road closures, one-way traffic, and area closure restrictions as deemed necessary by forest officials for health and safety concerns during any operation.
 - h. Prohibit treatment activities in specifically designated units and the Forest system roads associated with these units during times of highest recreation use. The highest recreation use and associated traffic occurs during the weeks of Federal observed Memorial Day, July 4th, and Labor Day.
8. In Semi-primitive Non-Motorized ROS classes specifically:
- a. Temporary roads should not generally be built. If they are used, they will be restored to original conditions when projects are completed.
 - b. Strive to make stump heights 6” or lower, with 12 inch heights the exception, and rarely occurring. Slash must be treated or removed in these areas.
 - c. Use existing barriers (roads) and natural barriers as control lines whenever possible.

Analysis Questions to be Answered

The analysis questions 1-3 are the scenery indicators that identify and measure scenic quality (Scenery Management System, Appendix J, NFMA/Forest Plan)

1. To what degree will the proposed restoration activities affect the scenic integrity of the treatment area? (Measure: acres not meeting SIO)
2. Will visual disturbances detract from the natural appearance or be outside of the natural range of variability? (Measure: qualitative description of anticipated disturbances)
3. Will the proposed restoration activities sustain the valued scenic character and its scenery attributes through time? (Acres meeting scenic character and scenery attributes)

Analysis questions 4 and 5 are related to Key Issues from Scoping/Public Involvement

4. In what ways would prescribed burning smoke affect the scenery? (Measure: qualitative description)
5. Are large, mature trees retained as part of the scenic character? (Measure: Percent of old growth allocation in ponderosa pine and pinyon-juniper)

Methodology

This evaluation applies current National Forest Scenery Management methodology in conjunction with existing Kaibab and Coconino Forest Land and Resource Management Plan (LRMP) direction. This analysis relies on field studies and photography from the treatment area, as well as coordination with project interdisciplinary team members, and consideration of public preferences for scenic quality. Cumulative scenic quality was within the geographic scope of scenic attributes and landscape character in the ponderosa pine type of the Coconino and Kaibab National Forests.

Integration of this scenery analysis assures the 4FRI Project is consistent with scenery-related KNF and CNF LRMP direction, USFS policies, and applicable elements of USFS Visual Management and Scenery Management systems. Refer to Appendix B of the SMS Handbook #701 for a complete list of references requiring Forest Service management of scenery and aesthetics (Forest Service 2000).

The 4FRI project will help achieve the desired conditions for scenery as defined in the Coconino and Kaibab LRMP (Forest Service 1988 and 1987), respectively: “Maintain and enhance visual resource values by including visual quality objectives in resource planning and management activities” and “Protect and enhance the scenic and aesthetic values of the Kaibab National Forest”.

Visual Management System (VMS)

Currently the scenery resources of Coconino National Forest (CNF) are managed through the application of the VMS. The VMS was adopted by the Forest Service in 1974. The culmination of the VMS were Visual Quality Objectives (VQOs) prescribed in the LRMP for all lands within CNF. The VQO classifications range from Preservation, Retention, Partial Retention, Modification, to Maximum Modification. For a full synopsis of each VQO see *National Forest Landscape Management: Volume 2, Chapter 1, The Visual Management System* (USDA-Forest Service 1975).

The CNF LRMP is currently being revised and will be transitioning to Scenery Management System (see next section). For this project, the updated SMS inventory for the CNF will be incorporated and integrated at a project scale until Forest Plan Revision is completed. This action follows existing CNF Forest Plan direction “*Review the VQO inventory as a part of project planning and make necessary corrections/refinements following field checking* (USDA-Forest Service 1988). It also follows Forest Service direction “*begin using the concepts and terms contained in this Handbook (Landscape Aesthetics, A Handbook for Scenery Management) as you work on new projects or initiate forest plan revisions*” (USDA-Forest Service 2000).

Scenery Management System (SMS)

The VMS process has been updated in the Scenery Management System (SMS), which has been incorporated into the Kaibab Forest Management Plan in Amendment 6 for Williams and Tusayan Ranger Districts (USDA-Forest Service 2010). Handbook direction outlining the inventory and transition process from VMS to SMS may be found in *Landscape Aesthetics: A Handbook for Scenery Management* (USDA-Forest Service 2000). Full adoption of the SMS is to occur as each National Forest revises its LRMP. For Forests not currently undergoing the LRMP revision process, or for those requiring extensive time for revision, application of the SMS will occur at the project level. This is the case for the Coconino NF.

The Kaibab Forest Management Plan also refers to the KNF ROS-SMS Guidebook for guidance regarding project implementation, “2. *Use the 1986 ROS Book, 1995 Landscape Aesthetics: A Handbook for Scenery Management, Recreation Opportunity Spectrum (ROS) and Scenery Management System (SMS) mapping, and Kaibab National Forest ROS-SMS Guidebook (ROS-SMS Guidebook) for forest management decisions, project analysis, and project implementation.*” (USDA-Forest Service 2010). Information from the Guidebook supplements the Forest Plan direction.

Scenic Integrity Objectives (SIOs) are used in the SMS in much the same way as VQOs are used in VMS. The Scenic Integrity or "intactness" of national forest lands is the means by which proposed alterations to the land are evaluated. Scenic Integrity is produced from the combined inventory of scenic attractiveness, viewing distance from the observer, and concern level of forest visitors. Scenic Integrity Objectives (SIO) are established for the forest and can be applied at the forest, management area or treatment area (USDA-Forest Service 2000). SIOs range from Very High, meaning the landscape character is unaltered, to Very Low, meaning the landscape character is highly altered. Intermediate levels include High (landscape character appears unaltered), Moderate (landscape character is slightly altered), and Low (landscape character is moderately altered). Another basic premise of the SMS is landscape character, which gives a geographic area its visual and cultural image. It consists of a combination of physical, biological and cultural attributes that make each landscape identifiable and unique. Landscape character embodies distinct landscape attributes that exist throughout an area (USDA-Forest Service 2000). Table 3 compares the Visual Management System rankings and terminology with the Scenery Management System.

Table 3 Scenic integrity, visual quality objective, and perception crosswalk (USDA FS 2000, 2-4)

Scenic Integrity (both Existing and Objective)	Visual Quality Objective	The Forest's Scenic Integrity as people perceive it
Very High	Preservation	Unaltered; landscape character is intact
High	Retention	Appears unaltered; deviations to landscape character are not evident
Moderate	Partial Retention	Slightly altered; deviations are subordinate to landscape character being viewed
Low	Modification	Moderately altered; deviations begin to dominate the valued landscape character being viewed
Very Low	Maximum Modification	Appears heavily altered; deviations may strongly dominate the valued landscape character.
Unacceptably Low	Unacceptable Modification	Appears extremely altered; this level is only used to inventory existing scenic integrity. It is never an objective on National Forest System lands.

Analysis Process

The 4FRI project is being planned as a comprehensive, landscape scale restoration project with activities planned on 587,489 acres on the Williams and Tusayan Ranger Districts of the Kaibab National Forest and portions of Flagstaff, Red Rock and Mogollon Ranger Districts of the Coconino NF. The proposed restoration activities and size of the project make it an appropriate candidate for SMS refinements for managing and sustaining scenic quality within an ecosystem management context.

This purpose and need of this analysis, for restoration of the forest at a landscape scale, is focused on ecosystem sustainability. SMS Appendix J (USDA-Forest Service 2007) recognizes that disturbances across the landscape can be beneficial, and even critically important to forest health and sustainability, but they can also have detrimental impacts to scenery. Appendix J approaches landscape assessments by replacing corresponding

sections within *Chapter 2 – Scenic Integrity*, and refines and supplements parts of *Chapter 1 – Landscape Character*, *Chapter 5 – Scenery Management System Application* and the *Glossary of Landscape Aesthetics, A Handbook for Scenery Management*. The alternative method to Handbook Chapter 2 presented here is based on the use of two indicators for evaluating scenery: Scenic Integrity and Scenic Stability.

SMS Appendix J clarifies of the definition of scenic integrity in which it becomes an indicator of visible disturbance to the valued scenery, rather than ecosystem intactness or an immeasurable blend of the two. It adds a second scenery indicator, Scenic Stability, to identify and measure the sustainability of the valued scenery. Use of this indicator ensures that the sustainability of scenery is addressed as an issue and integrated into the project. Figure 3 illustrates how these changes fit within the SMS process.

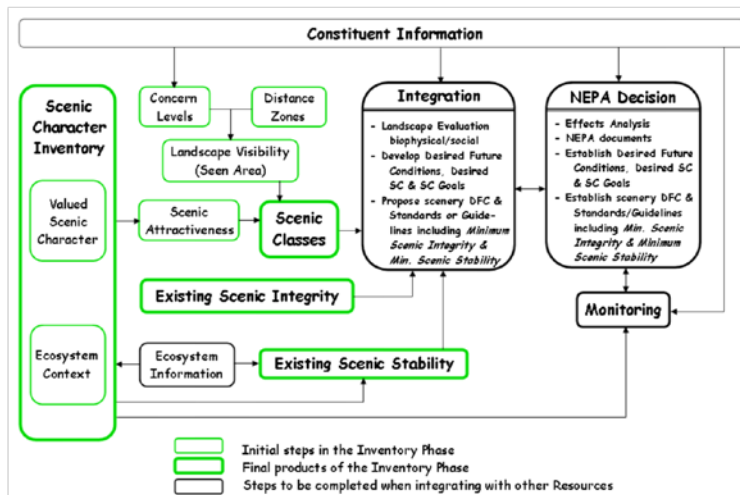


Figure 3 Scenery Management System process using SMS appendix J.

Desired Conditions

The desired scenic character (DSC) identifies the most aesthetically desirable set of valued and sustainable scenic character attributes as possible given the multiple land uses compatible with a particular landscape. Based on the purpose and need and proposed action, Table 4 provides a comparison of existing condition, desired condition, and desired scenic character. The DSC is achievable through the project level activities proposed in this project in the long term. Since the activities required to move the project toward desired conditions are substantial in some areas, short term interim scenic integrity levels will be employed during implementation.

Interim scenic integrity levels acceptable during implementation will follow the forest plan guidance that SIO in the treatment area may drop one level during project implementation in the short term, but must meet or exceed the mapped SIO in the long term. For examples areas mapped with an SIO of high can move down to moderate in the short term, but must meet high SIO in the long term. Similarly if an area is mapped with an SIO of moderate, these areas can move down to low in the short term, but must meet moderate SIO in the long term.

The Kaibab forest plan requires that the short term reduction in scenic integrity and deadline for subsequent attainment of the mapped SIO be noted in the decision document. It is anticipated that implementation activities will be phased across the restoration treatment (treatment) area, and full implementation of each treatment will take at least ten years. The deadline for attainment will be within 15 years of the start of implementation activities in most of the treatment area. This will allow the last area implemented five years to meet the mapped SIO. The one exception is for aspen treatments. The deadline for attainment will with within 20 years of the start of implementation activities since aspen trees must attain sufficient height and stature to withstand browsing by ungulates. It is anticipated that the earliest areas will make progress toward or meet the mapped SIO prior to the deadline.

Table 4 Comparison of existing conditions, project desired conditions and desired scenic character

Existing Condition	Desired Condition	Desired Scenic Character
Lack of recurring fire has resulted in proliferation of smaller trees that have reduced or replaced openings	Mosaic of openings and groups of trees that are maintained by low severity fire (historical condition)	Scattered groups of trees with grassy openings between that provide natural contrast and species diversity. A mosaic of openings and groups of trees allows existing scenic views and attributes to be seen.
Lack of age and size class diversity and trend toward even-aged structure	All size and age classes of trees present and trend toward uneven aged structure (historical condition)	Uneven aged groups of trees – all age and size classes present, but distributed across the landscape in groups and clumps. Different sizes and forms create variety and pattern across the landscape that is characteristic of the ponderosa pine forest and is the dominant visual element. Uneven aged groups of trees are also desirable in the pinyon-juniper woodlands.
Reduced tree vigor and health leading to lack of resilience to drought and other extreme weather events, insect and disease, intense wildfire	Improved tree growth and vigor (forest plans)	Forest health is improved resulting in better resilience and forest structure (Appendix J). Scenic attributes are sustainable into the future.
Under representation of old , mature trees	Retention of existing old mature trees and improved tree growth and vigor to promote growth of future old aged trees (historical conditions and forest plans)	Large old mature trees are a prominent component of the uneven aged forest. The form and shape of large trees and presence of a mature forest structure is critical to the landscape character of the ponderosa pine type.
Small trees reduce or remove openings,	Increased understory grass and forb production (historical	Diversity of species and healthy understory vegetation is critical to the composition and

reduced sunlight to the forest floor, little or no understory vegetation	conditions)	attractiveness of forest settings. Diverse forest communities include trees, shrubs, grasses and forbs native to the area. The aesthetic experience of the ponderosa pine and pinyon-juniper forest increases when the species diversity includes both fine and coarse textures, patterns, scales and colors.
Vegetation diversity has declined	Gambel oak and aspen present, vigorous and sustainable (all conditions and forest plans)	Gambel oak and aspen provide color, pattern and texture contrast to the coniferous forest and are important for fall color viewing. Color viewing pilgrimages are a traditional activity. Aspen and oak are more conspicuous since nearby conifer encroachment is reduced and overtopping trees are thinned.
Trees have encroached on grasslands and savannahs, and species have shifted to woody vegetation	Restore historical patterns of trees within grasslands and savannahs (historical conditions)	Grasslands provide scenic diversity and are important components of Northern AZ forests for recreation and scenic views. They contrast with forested settings and different plant species (especially wildflowers) are present. These places were often homesteaded and have historic significance. They contribute to the sense of place for both the KNF and CNF. Savannahs also provide scenic diversity and a lesser degree of contrast to forested areas.
Fire regimes have shifted to lower frequency high severity surface and crown fires.	Reintroduce fire to the landscape by reducing the potential for crown fire and high severity surface fire and moving toward more frequent lower severity fires (historical conditions)	Fire evidence is reintroduced as a natural element of the scenery in an irregular mosaic of burn patches and as maintenance burning occurs, with low to moderate burn severity. Burning is essential in order to re-establish scenic stability.
Riparian systems have shifted to closed canopies with openings filled with small and medium sized trees. Understory vegetation has been reduced.	Promote riparian vegetation and openings, and maintain or improve their scenic quality (forest plans)	Riparian systems are rare commodities on the forests and often receive heavy recreation use. They are a critical scenic feature since water is a scarce resource and the plant species are often dramatically different than those found in most locations. Riparian systems provide sounds, scenes and tactile experiences found only in these places.
Ephemeral channels have been degraded including heavy erosion with excessive bare ground, denuded vegetation and head cuts.	Restore channels to a functioning condition that promotes establishment of native vegetation and reduces sediment flows. Maintain or improve their scenic quality (forest plans)	Ephemeral channels provide scenic diversity and are important components of the forests. They contrast with forested settings and different plant species are often present. They provide important views and occasional or seasonal sounds and tactile experiences.
Closed roads and unauthorized roads are present that are eroding and contributing to sediment.	Return road prisms to their natural condition. Promote and maintain vegetation re-establishment. Closed roads are reopened rarely to support management activities. (travel	Decommissioning of selected unauthorized routes and re-establishment of native vegetation would move these places toward the characteristic landscape, and would improve the scenic quality of these areas. After implementation, returning closed

	management, FS directives, and forest plans)	roads to an inactive state where drainage and runoff patterns are maintained and the roadbed is allowed to naturalize somewhat improves the contrast between roadbeds and the naturally occurring landscape. Since ML-1 can receive intermittent service, the scenic quality of these roads varies depending upon whether they are reopened occasionally or not. ML-1 roads can vary from mostly naturalized to a defined roadbed.
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Scenic Integrity Objectives

The scenic integrity objectives (SIO) for the treatment area are illustrated in Figure 4. For the 4FRI project, these represent the long term goal for restoration, and are incorporated in the desired conditions for restoration activities proposed above. Approximately half of the area is mapped as SIO high, and the other half is mapped as moderate. Less than one percent of the area is mapped as very high, and occurs in designated Wilderness, not included for treatment in this project (but within the analysis boundary). There is also a small amount of SIO low on the Coconino NF. Per the SMS Handbook (Forest Service 2000): high scenic integrity refers to landscapes where the valued landscape character “appears” intact. Deviations may be present but must repeat the form, line, color, texture and pattern common to the landscape character so completely and at such a scale that they are not evident. Moderate scenic integrity refers to landscapes where the valued landscape character “appears slightly altered”. Noticeable deviations must remain visually subordinate to the landscape character being viewed. SIO low refers to landscapes where the valued landscape character “appears moderately altered”. Deviations begin to dominate the valued landscape character being viewed.

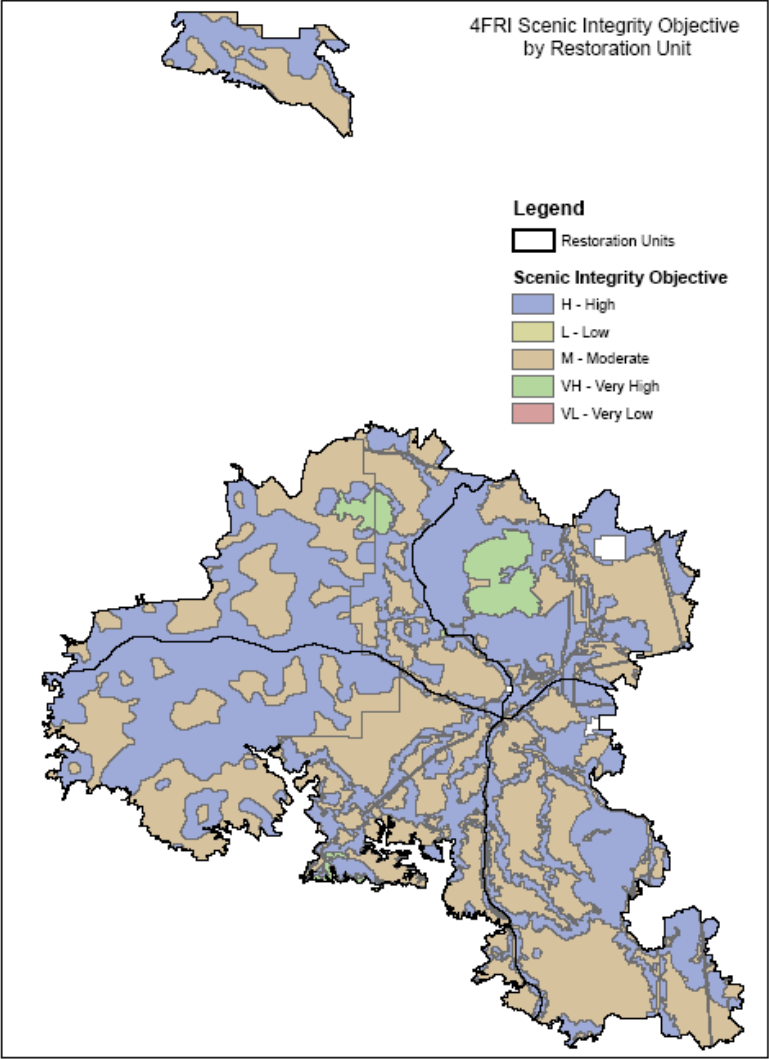


Figure 4 Scenic integrity objectives for the approximately 988,000 acre 4FRI area

As noted, the treatment area is about half high SIO and half moderate SIO as shown in Figure 5. Areas of very high are restricted to designated Wilderness (no treatments would occur in this project) and low is restricted to utility corridors.

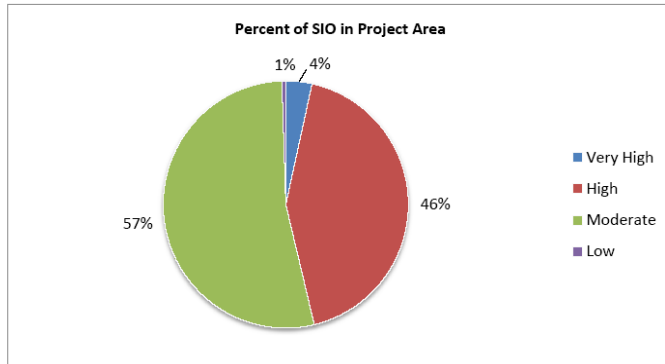


Figure 5 Scenic integrity distributions in the 4FRI treatment area.

Scenic Character Goals

Scenic character goals are defined in the SMS Handbook (USDA-Forest Service 2000) as management prescriptions designed to maintain or modify the existing scenic character to a desired future state, help meet forest plan objectives and desired conditions.

The scenic character goals for this project are:

- Increase scenic variety and ecological resiliency while moving vegetation conditions in the treatment area toward reference conditions.
- Retain and restore the “natural appearing” historical vegetation scenic attributes (structure, pattern, composition) throughout the project recognizing that in some places other values such as endangered or sensitive species requirements may take precedence.
- Restore areas of diminished scenic character.
- Maintain a more open forest canopy, large, mature trees, and greater diversity of species and sizes arranged in a clumpy, irregular distribution to provide better views into the canopy.
- Increase the health, resiliency and prominence of aspens, oaks, and grasslands within the open forest mosaic.
- Restore riparian areas near seeps and springs, and improve watershed function in ephemeral drainages so the scenic quality of these areas is enhanced and sustained.
- Decommission unauthorized routes and closed road to improve the scenic character at these places.
- Reintroduce fire evidence with low to moderate severity burns.
- Retain large snags and downed woody material in a natural appearing condition.

The sum of these activities will move the treatment area toward the long term standard of High and Moderate scenic integrity, and will meet the high scenic stability level within fifteen years or project completion for all areas but aspen, which will meet SIO in 20 years.

Affected Environment

Project Level Scenic Inventory

The affected environment section will first provide a general description of the Coconino and Kaibab NF scenic resources, then discuss scenic integrity and scenic stability in the context of SMS Appendix J (USDA-Forest Service 2007). The scale of analysis for this section is the treatment area.

The Coconino and Kaibab NF's natural, cultural, and historic resources attract visitors, making both forests regional, national, and international year-round recreation destinations. One of the main attractions is the Forest's natural beauty and opportunities to experience nature (USDA-Forest Service 2012). The activities having the greatest numbers of participants on the Coconino National Forest (CNF) are hiking/walking, viewing natural features, relaxing, driving for pleasure, and visiting historic sites. Downhill skiing, bicycling, fishing and viewing wildlife were also very popular primary activities (USDA-Forest Service 2012). Similarly the greatest numbers of participants on the Kaibab National Forest (KNF) are viewing natural features, hiking/walking, driving for pleasure and relaxing. The two forests differ in the quantities of national forest visitors, the CNF received approximately 2,888,000 visits in 2010 and the KNF received approximately 456,000 visits in 2010 (USDA-Forest Service 2012).

The existing condition of scenic resources for both forests is a result of implementing the Land and Resource Management Plans. Management of multiple resources has, to varying degrees, altered the natural landscape character. The most obvious effects on scenic resources within the treatment area are from vegetation and landform alterations. Resource management activities which have altered scenic resources include but are not limited to vegetation management, mineral extraction, utility corridors, roads and trails, development of recreation sites such as campgrounds and picnic grounds, improvements associated with special use permitted sites (ski area, resorts, organizational camps, etc), fire management (suppression and prescribed burning), and livestock grazing.

Sense of Place

Scenery is an important component in the sense of place for an area. Forest niche information recently developed for the two forests provides a general context for the importance of inherent scenic qualities. These qualities include aesthetic, social and biophysical features (see niche descriptions). Valued scenic assets in the treatment area include numerous constructed and natural lakes, including Mormon Lake, Upper and Lower Lake Mary, JD Dam, Perkins Tank, Schulz Lake and others. There are many developed recreation sites throughout the treatment area, including campgrounds, trailheads, trails, snowplay areas, and climbing areas which have constructed facilities that are designed to blend in with the natural environment. In addition, dispersed recreation activities (where there are no constructed support facilities) occur throughout the area. Dispersed recreation includes hunting, fishing, wildlife and bird watching, camping, picnicking and many other activities.

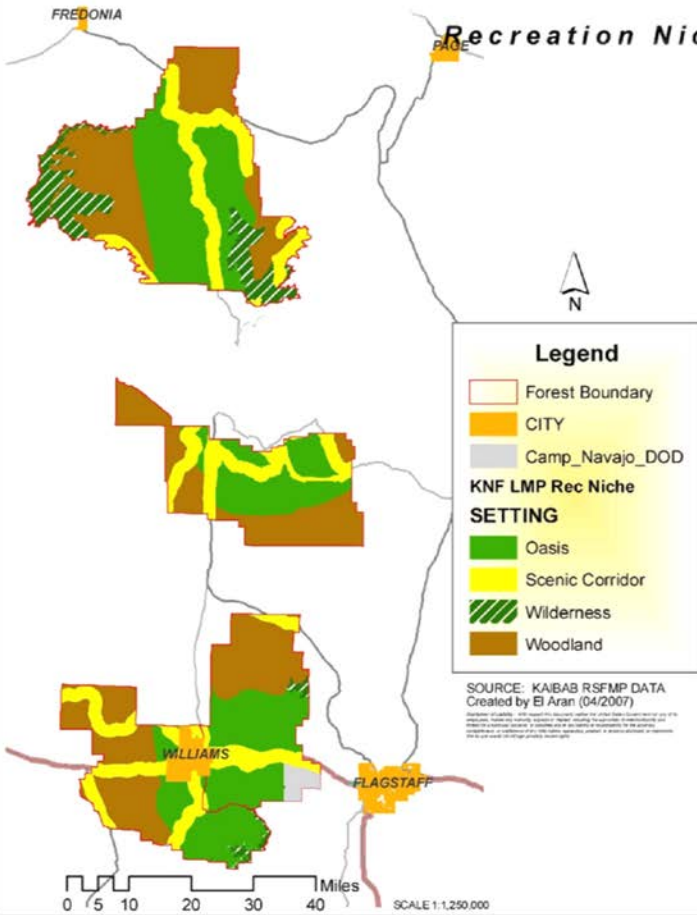
The Kaibab NF niche (USDA-Forest Service 2007a) identifies four settings for the forest, Wilderness Areas, Oasis, Woodlands and Scenic Corridors. The 4FRI restoration treatments will not include Wilderness Areas, but the treatments may increase scenic stability adjacent to Wilderness Areas and reduce the likelihood of wildfire spreading into these areas. Descriptions of the three applicable settings highlights important scenic qualities that forest users seek, and Figure 6 shows their locations.

- Oasis - Provide opportunity to escape the heat in the desert valleys. Higher elevation; Includes the sky islands - Bill Williams Mountain, Sitgreaves Mountain, and the Kaibab Plateau, dominated by ponderosa pine forest and scenic meadows and prairies. Setting Management: maintain scenery and driving opportunities.
- Woodlands - Where the desert meets the plateaus; pinyon-juniper, sage flats and grasslands. Setting Management: Maintain travel routes, and preserve and protect heritage resources.
- Scenic Corridors - Scenic corridors wind through meadows and ponderosa pine forests, up the Kaibab Plateau, and some lead to the Grand Canyon. Setting Management: Developed access (to and through) the Forest and backcountry. Maintain vistas/views.

K A I B A B N A T I O N A L F O R E S T



Recreation Niche Settings



ACTIVITIES*

Oasis

Firewood gathering, gathering forest products, biking, gathering forest products, downhill skiing, cross-country skiing, snowplay, snowshoeing, snowmobiling

Scenic Corridor

Driving for pleasure, viewing scenery, developed camping, cross-country skiing, snowmobiling, visitor centers

Wilderness

Hiking, backpacking, climbing, hunting, horseback riding; pack and saddle

Woodland

Visiting historic sites, scenic byway, viewing natural features, driving for pleasure, OHV Use, mountain biking, hiking, hunting, primitive camping, dispersed camping

SITE TYPES*

Oasis

Developed camping, forest trails, picnic area, trailhead, recreation residence, forest roads, group campground, group picnic ground, OHV area

Scenic Corridor

Interpretive site, trailhead, information site, interpretive display

Wilderness

Campgrounds, trailheads

Woodland

Boating site, fishing site, trailhead, developed campground, developed picnic ground, interpretive facilities, group campgrounds

*Activities & Site Types terminology also derived from National Visitor Use Monitoring (NVUM) Project Primary Activities & Site Types

Figure 6 KNF forest level recreation niche map.

Similarly, niche information was developed for the Coconino NF in 2008 (USDA). Four settings were identified: High Use, Scenic Corridor, Moderate Use/Dispersed, and Secluded/Low Use. Wilderness is excluded from treatment in the 4FRI project and is represented in Low Use (not included in the descriptions) as well as in portions of moderate and high use areas. The importance of scenic assets for recreation is included in the following descriptions and locations in Figure 7:

“The variety of landforms creates a changing viewscape seen from communities, trails and roads. The quality of life for local communities is enhanced by the scenery, clean water, and clean air.”

- High Use - This setting includes Oak Creek Canyon, the highest peak in Arizona, multiple lakes and East Clear Creek which are examples of the high density that visitors can expect. Visitors to the Forest commonly experience a seamless shift from community trails and roads onto the Forest, without recognizing the change.
- Scenic Corridor – Visitors drive through the changing landscapes and view the spectacular scenery, by stopping at observation points they gain an understanding and appreciation for environmental ethics.
- Moderate Use/Dispersed – This less structured setting includes a lot of the vast open space of the Forest. From sparse vegetation to dense timber, canyons to plateaus and mountains this area typifies the Forest contrasting landscapes.
- Secluded/Low Use – Remote areas offer solitude and unconfined recreation. The area’s primeval character dominates and no permanent improvements exist. The Forest has 10 Wilderness areas, not all of which are in this setting.



Figure 7 CNF forest recreation niche map.

(Forest Highway 3). These communities and routes receive high use and users have high concern for scenery.

The treatment area's dominant scenic identity is the continuous ponderosa pine forest, interspersed with grasslands, meadows or sagebrush that overlays the undulating volcanic and sedimentary landforms. The treatment area is viewed at foreground, middleground and background distances from sensitive roadways, trails, and recreation sites located within and around the boundary.

Ponderosa Pine

Vegetation is composed mostly of ponderosa pine forests, with this area being part of the largest contiguous stand of ponderosa pine in the world. Figure 8 illustrates the many faces of the ponderosa pine forest. There is tremendous variability within the ponderosa pine type, with different understory components, soil types, precipitation variation, aspect, and so on. The variability within stands is evaluated in depth in the Silviculture and Fire sections of the DEIS. Scenery in this report looks at the overall condition of the area and its important vegetative components. The project area is valued for its open stands of ponderosa pine. Old-growth "yellow-belly" trees are an important component of the ponderosa pine forest. Forest aesthetic research has found that large mature trees and an open forest are important parts of scenic beauty and should be retained in the forest (Ryan 2005). Patterns of the vegetation are moderate to fine-scaled, with many inter-tree openings, as well as larger openings between groups of trees ranging from less than 1 acre to over a hundred acres in areas locally known as parks or prairies.



Figure 8 Examples of the Ponderosa Pine character zone.

Pinyon-Juniper

The 4FRI project includes about 26,000 acres of pinyon-juniper within the ponderosa pine type. Pinyon-juniper vegetation also has much variability including the juniper grassland, pinyon-juniper grassland, pinyon-juniper sagebrush, and pinyon-juniper persistent woodland communities. Under their natural disturbance regime, these plant communities are dominated by one or more species of pinyon pine and/or juniper with at least 10 percent tree canopy. They can occur with a grass/forb-dominated understory (pinyon-juniper grasslands and juniper grassland forest communities), a shrub-dominated understory (pinyon-juniper sagebrush forest community), or a sparse discontinuous understory of some grasses and/or shrubs (pinyon-juniper persistent woodland forest community) (USDA-Forest Service 2012e). Most of the pinyon-juniper vegetation communities are currently younger and denser than they were historically, because of changes in wildfire occurrence. Greater tree density has increased competition for water and nutrients. This, in turn, has caused a reduction in understory plant cover and diversity, a loss of ground cover, and subsequent increases in soil erosion (USDA-Forest Service 2012e).

Overall patterns of vegetation are moderate scaled, with more space between individual trees. The trees have a less conical, rounder shape and a dense form with more continuous branching from the tree base to the top. In thick stands it is difficult to see through the foliage for any distance. In more sparsely grouped trees, there are views through the trees to topographic changes and understory vegetation. Understory shrubs, grasses and forms are fine scaled and patchy depending upon how dense the canopy cover is.

Understory Vegetation

Other overstory vegetation species include aspen, Gambel oak, and other species of shrubs, grasses and forbs. The range, watershed and wildlife sections of the DEIS provide more detailed descriptions of understory vegetation species.

Aspen is an important scenic species because of the contrast in color, shape, texture and form associated with the species. Aspen groves are enjoyed by the public for their varied sensory experiences including sight of the round green leaves or golden to scarlet foliage in the fall, the sound of tinkling or “quaking” leaves, the distinctive smell of species in the *Populus* genus, and the variety of often abundant and varied understory species that are found in groves. Forest users are also drawn to aspen groves because of the wildlife species that use the habitat. Understory tree species are moderate scaled most have pine trees that have encroached into groves/groups and now overtop many of the deciduous trees. Aspen stands are currently in decline throughout most of the Southwest as a result of fire absence, unmanaged forest succession, drought, and ungulate over browsing (Forest Service 2012).

Gambel Oak is another important scenic species with characteristics of color, shape, texture and form that contrast with the dominant conifer species. The oaks are not as showy as aspen, but sport fall color changes, and large, mature trees can be striking. Gambel oak also attract different wildlife species which contributes to their scenic

attributes. Many oak trees or groves are over topped and encroached upon by conifers that compete for moisture and nutrients. Gambel oak is stressed by absence of fire, unmanaged forest succession, and drought and other extreme weather events.

Grasslands and Savannahs

Open meadows and grasslands (locally known as prairies or parks) occur across the treatment area. These places often have cultural features associated with historic homesteads and present day grazing operations. Areas of grasslands vary from small patches (less than 10 acres) surrounded by conifer forest to large landscape size areas (for example, Newman Park, Munds Park, Garland Prairie, Government Prairie, and Pleasant Valley are several hundred acres each). Most of the grasslands are being encroached upon by conifers. The grasslands create scenic features because they allow open views in all directions and have low, dense and varied vegetation compared to the surrounding coniferous forests. Savannahs are very open areas of mixed grassland and trees. Savannah areas are also being encroached upon by trees which are closing the openings and creating a more continuous coniferous forest. These areas also provide important scenic attributes due to their openness and the “transition” that they provide between closed forest and grassland.

The diversity of vegetation related scenic attributes supports a positive viewing experience for people traveling through or recreating in the treatment area, and supports the quality of life for local residents and visitors (Ryan 2005). The diversity of vegetation also contributes to abundant wildlife also an important part of scenery viewing. Figure 9 illustrates the diversity of vegetative species.



Figure 9 Examples of diverse understory vegetation in the 4FRI treatment area.

Minor scenic attributes of the area include natural and artificial lakes, ephemeral washes, seeps and springs and stock tanks, volcanic and sedimentary rocks and outcrops of all sizes. The landform is fragmented by roads and trails.

Historical Vegetation Conditions

The following historical vegetation conditions from the DEIS are used to describe the natural range of variability so that these can be contrasted with existing conditions.

A century ago the pine forests had widely-spaced large trees with a more open, herbaceous forest floor (Cooper 1960). These conditions were maintained by fairly frequent low-intensity surface fires that did not kill the large trees (Fiedler et al. 1996). These fires occurred every 2 to 21 years and maintained an open canopy structure (Moir et al. 1997). Typical historical tree group/patch size ranged from 0.1 to 0.75 acres in size, 2- 40+ trees (White 1985). The herbaceous understory fueled frequent fires started by lightning, and thinned and/or eliminated thickets of small trees keeping the forest open and park-like (Allen et al. 2002).

Fires burned on a frequency ranging from 2 to 21 years (Weaver 1951; Cooper 1960; Fule 2003; Heinlein et al. 2005; Diggins 2010; Swetnam and Baisan 1996; Fule et al. 1997), with the majority of acres burning with low-to-moderate intensity surface fire. The herbaceous understory fueled frequent fires started by lightning, and thinned and/or eliminated thickets of small trees keeping the forest open and park-like (Allen et al. 2002). This created a mosaic of grass, forbs, shrubs and trees. Under these conditions, the forest maintained its diversity and resiliency to fire and other natural disturbances.

Understory components were part of the historical vegetation pattern. For example, oak ranging from shrubby thickets and pole-sized clumps to large trees occurred across the landscape and provided habitat for a large number and variety of wildlife species (Brown 1958; Kruse 1992; Rosenstock 1998; Abella and Springer 2008; Abella 2008a; Neff and others 1979). Aspen was an early seral component of the ponderosa pine ecosystem and provided habitat diversity. Grasslands provided valuable habitat to many wildlife species. Historically (late 1800's), grassland communities had less than 10 percent tree cover. Savannahs often had less than 30 percent tree cover. Sagebrush was present in the pine-sage and pinyon-juniper vegetation types. Various age classes of sage along with a diversity of other vegetation and an herbaceous layer were present.

The photos in Figure 10 show changes in vegetation conditions near Williams, AZ in 1890 and 2011. Tree density, age class diversity and openness are very different in these examples. The early photos are representative of historical conditions which better match scenic preferences for large, mature trees and forests with a more open structure (Ryan 2005), and current photos are more representative of the higher density, continuous canopies and similar ages classes found today. Additional examples of early photos from the turn of the century and 1930's compared with current conditions can be found in Appendix A of this report.



Photos courtesy of Williams Ranger District, Kaibab National Forest.

Figure 10 Photo reshoot near Williams, AZ showing changed vegetation conditions.

Ecosystem Context

The vegetation is the dominant scenic attribute in the treatment area. There are substantial opportunities for improvement of the ecological function and for scenery attributes. The existing vegetation density and lack of high frequency, low severity fires are inconsistent with the desired scenic character and its sustainability.

- Currently, the dense conifer vegetation often obscures views of existing scenic attributes within the forest canopy and understory, and greatly restricts viewing access to potential scenic attributes. Among the potential attributes are large, mature trees, diverse species including aspen, Gambel oak, grasslands and savannahs as well as other understory shrubs, grasses and forbs.
- Inter-tree spaces and openings have been filled with small and medium sized trees, where if these were opened up, they would allow for sunlight to reach the forest floor adding to the scenic quality as well as helping provide for greater understory vegetation composition and abundance.
- Fire has been suppressed for many years, and this in combination with overly dense forests departs significantly from reference conditions. Currently there is a risk of large scale, high severity fire that could result in elimination of the vegetation scenic attributes that are desired. High frequency, low severity fire helps to recycle nutrients, keep tree densities lower, and keep fuel accumulations lower.
- Seeps, springs and ephemeral drainages have had conifers encroach and overtop other species reducing their function over time. When these features are functioning properly, they provide high scenic quality and auditory, tactile and visual features not found without the presence of water.
- Throughout the forest unauthorized routes and redundant roads have been created. These detract from the scenic quality of the area by forming un-natural linear features that are uncharacteristic of the landscape. Decommissioning the routes and roads will restore characteristic features.

Scenic Stability Assessment

The objective of the 4FRI project is to re-establish forest structure, pattern, and composition, which will lead to increased forest resiliency and function. Resiliency increases the ability of the ponderosa pine forest to survive natural disturbances such as insect and disease, fire, and climate change (FSM 2020.5). This project would put the treatment area on a trajectory towards comprehensive, landscape-scale restoration with benefits that include improved vegetation biodiversity, wildlife habitat, soil productivity, and watershed function.

Scenic stability as described in SMS Appendix J is the degree to which the desired scenic character can be sustained through time and ecological progression (USDA-Forest Service 2007). The scenic stability assessment takes into account the divergences or ecosystem stressors in the treatment area that have led to disruption and instability of the scenic character attributes. Through the scenic stability analysis the condition of the scenic resources is determined, as well as what actions may be appropriate to take in order to move the area toward higher scenic stability in the short term and meet the scenic integrity objectives in the long term.

There are two parts to the assessment, the first identifies the valued scenic character attributes and their condition in a risk determination, and the second combines the risk determinations and determines the relative scenic stability of the landscape. When this is completed, the effects of the restoration activities proposed in four alternatives will be evaluated to determine whether and to what degree they will begin to move the area toward scenic stability.

Scenery Attribute Risk Determination

Scenic Stability uses a descriptive six level rating scale from Very High Stability to No Stability to identify the degree to which the scenic attributes of the valued scenic character are likely to be perpetuated within the ecosystem. The highest scenic stability ratings indicate resilient ecosystems that are functioning within their reference conditions. These would also be places where all scenic character attributes are present and likely to be sustained into the future. The individual scenery attribute risk determination guidelines, noted in Table 5, are used to rate the likelihood that valued scenery attributes will be maintained. Lower scenic stability ratings indicate areas where intensive vegetation management practices to begin to restore ecosystem health and function could also benefit scenery by restoring and/or maintaining valued attributes of scenic character. Areas of higher scenic stability need less intensive management activities to maintain their valued scenic character attributes.

Table 5 Individual scenery attribute risk determination guidelines

Scenery Attribute Condition	Ecosystem Stress On Scenery Attribute and Stability Over Time			
		MINOR	MODERATE	SEVERE
	STRONG	No Risk	Low Risk	Moderate Risk
	FAIR	Low Risk	Moderate Risk	High Risk
	POOR	Moderate Risk	High Risk	High Risk

As noted in the scenic character description above in this report (pages 32-35), vegetation has been identified as the dominant scenic attribute, and the assessment will focus on aspects of it. Water form is a minor scenery attribute, and will be evaluated as it applies to work proposed for springs and ephemeral channels. Road reconstruction and decommissioning activities affect landform. Landform is typically a more stable attribute. Landform is a minor scenery attribute as it relates to temporary road construction and road decommissioning.

Rather than assessing the overall vegetation condition which might give too general a risk determination, the vegetation attributes are discussed as identified from the matrix (Table 4) of existing conditions, desired conditions, and desired scenic character.

The following is a summary of the scenic stability assessment prepared for the 4FRI project; the entire document is available in Appendix B.

Vegetation Scenery Attributes

Scenery Attribute: The ponderosa pine forest has an open appearance with tree groups of varying ages, sizes and shapes and a mosaic of interspaces and openings. Uneven aged groups of trees with all age and size classes present are distributed across the landscape in groups and clumps. Different sizes and forms create variety and pattern across the landscape that is characteristic of the ponderosa pine forest and is the dominant visual element.

Forest resiliency and diversity is dependent on the distribution of age and size classes and the capacity of the site. Currently, over 50 percent of the forested acres in the project area lacks age and size class diversity and is in an even-aged structure. This has resulted in a homogenous landscape with reduced resiliency. Reduced resiliency is expressed as the increased potential for severe effects from wildfire, increased stand density-related mortality, reduced resiliency to bark beetle attack, increased dwarf mistletoe spread, and reduced understory productivity. The desired condition is to have a forest structure that

represents all age classes necessary for a sustainable balance of regeneration, growth, mortality and decomposition (USDA 1987, USDA 1988).

The ponderosa pine forests on the Kaibab are much denser than historical conditions, with 75 percent of the stands in a “closed” state (>39 percent canopy cover). Historically there were spaces between clumps of trees that are now either smaller or nonexistent. Only 22 percent of the ponderosa potential natural vegetation type (PNVT) is currently in the reference condition, which was all a mature to old forest with various-sized patches of young regenerating forest (USDA 1987). Likewise on the Coconino NF, there have been significant shifts to a closed medium aged forest with loss of herbaceous understory and tree age diversity with a trend away from reference conditions. Currently 75 percent of young and young to mid aged forests have cover greater than 39 percent. (USDA 1988).

As noted earlier, a century ago the pine forests had widely-spaced large trees with a more open, herbaceous forest floor (Cooper 1960). Typical reference condition tree group/patch size ranged from 0.5 to 0.75 acres in size, (2- 40+ trees) (Cooper 1961; White 1985; Pearson 1950). In contrast to having a ponderosa pine ecosystem consisting of groups of trees with an open tree canopy density mixed with interspaces (Woolsey 1911), approximately 75 percent of the ponderosa pine forest type within the treatment area has a moderately closed to closed tree canopy density. Table 6 indicates current tree canopy closures across the treatment area as an indicator of continuous tree canopy versus the reference condition tree group and opening patch size of 0.5 to 0.75 acres and 2-40 trees.

Table 6 Tree canopy density across the treatment area

Tree Canopy Density Classification (%)	Percent of Treatment area (%)
Open: 10% to 39%	22
Moderately Closed: 40% to 59%	30
Closed: 60%+	45
Unknown	3

Using 39% tree canopy density as the upper end of the range of reference conditions, about 30% of the treatment area has moderately closed canopy, up to 20% denser than reference conditions and 45% of the treatment area has closed canopy, over 20% denser than reference conditions. Approximately 75% of the treatment area is outside of the range of reference conditions. In addition, the lack of age and size class diversity reduces forest resilience. Using guidance from Table 5, this would put the scenic attribute at poor condition. The stressors including lack of age and size class diversity, overly dense trees and closed canopy cover, lack of frequent low intensity fires, and drought are severe.

This scenery attribute is at high risk.

Scenery Attribute: Old age ponderosa pine trees are well represented across the treatment area. Large old mature trees are a prominent component of the uneven aged forest. The form and shape of large trees and presence of a mature forest structure is

critical to the landscape character of the ponderosa pine type and cannot be duplicated by small or medium sized trees.

A review of stand data and habitat classifications within the treatment area indicates there are approximately 512,178 acres of ponderosa pine in the treatment area. For ponderosa pine in the 4FRI project 36% of the Coconino portion of the project, and 31% of the Kaibab portion of the project would be managed to meet old growth conditions.

There are approximately 23,000 acres of pinyon-juniper within the treatment area. In the small pinyon-juniper portion of the project, 68% of the Coconino and 58% of the Kaibab portion of the project will be managed to meet old growth conditions.

For ponderosa pine, the old growth allocation acreage/percentage includes: 100 percent of MSO protected habitat; 100 percent of MSO target/threshold; 40 percent of MSO restricted habitat that is uneven-aged with low dwarf mistletoe infection; 80 percent of MSO restricted habitat that is even-aged, mid-aged to old with low dwarf mistletoe infection; 100 percent of goshawk nest stands; 40 percent of goshawk PFA and foraging areas that are uneven-aged with low dwarf mistletoe infection; and, 80 percent of goshawk PFA and foraging areas that are even-aged, mid-aged to old with low dwarf mistletoe infection. Most sites currently do not fully meet the minimum criteria for ponderosa pine old growth conditions as listed in the forest plans. However, the habitat types noted above are closest to meeting old growth conditions and thus are allocated and managed to move toward these conditions.

The old growth allocation includes all sites that are classified within the mid-aged to old vegetation structural stages. In ponderosa pine, there is a need to manage sites allocated as old growth towards desired old growth characteristics. Where management occurs within the pinyon-juniper cover type, there is a need to maintain the old growth characteristics within the sites allocated as old growth.

The large tree retention strategy (LTRS) was developed by the four-forest restoration stakeholders through collaboration. Large post-settlement trees, as defined by a socio-political process, are those greater than 16 inches diameter at breast height (dbh). The intention of the exception process within the LTRS was to increase landscape heterogeneity and conserve biodiversity. The LTRS represents social agreement between parties that greatly enhances the chance for success and reduces the risk of conflict. If the LTRS is not incorporated, the current social support for landscape-scale restoration may be withdrawn. In addition, it may result in the removal of key ecosystem components in some areas that include nesting and roosting habitat and large woody debris that is important for wildlife. The key components of the large tree retention strategy are considered in Alternative C of the 4FRI DEIS. It identifies circumstances when large, post-settlement trees may be removed to make progress toward the desired conditions.

The scenery attribute condition is fair because not all old growth is fully developed and doesn't meet all criteria for old growth conditions. Ecosystem stressors include fire, insects and disease, and severe weather conditions including drought. Social concerns have also been identified regarding retention of large trees. The combination of both ecosystem and social concerns results in a moderate level of stress. **This scenic attribute is at moderate risk.**

Scenery Attribute: The ponderosa pine and pinyon-juniper forests in the treatment area have a healthy, diverse understory. Diversity of species and healthy understory vegetation is critical to the composition and attractiveness of forest settings. Diverse

forest communities include trees, shrubs, grasses and forbs native to the area. The aesthetic experience of the ponderosa pine forest increases when the species diversity includes both the fine and coarse textures and colors.

There is a direct relationship between canopy openings and understory vegetation. In the treatment area there is a lack of open tree canopies mixed with interspaces which mimic historical spatial patterns as well as openings for tree regeneration and the development of grass and forbs.

Forest thinning and prescribed burning are often proposed and implemented to reverse the undesirable changes in ponderosa pine forests of Arizona (Abella 2004). About 99 percent of the vegetation diversity in Southwest ponderosa pine forests occurs as understory species (Laughlin and Abella 2007). Abella and Springer (2008) concluded that tree thinning was a viable management technique for increasing the vigor and richness of understory.

Forest thinning and prescribed burning can make resources (e.g., light, nutrients, water) more readily available for understory plant species by reducing overstory competition and enhancing nutrient cycling. Increasing resource availability can provide the herbaceous component of a plant community the opportunity to capitalize, which can result in increased species abundance, vigor, and productivity; and potentially enhance species diversity. Laughlin et al (2006) found that thinning and burning can increase species richness and alter understory composition, but it make take many years for changes to occur, and changes can be affected by severe droughts.

The condition of the scenery attribute will vary depending upon canopy openings. Since 75% of the treatment area has canopy cover greater than 39%, and there is a lack of prescribed burning, it puts the understory in fair condition. Ecological stressors of tree density, closed canopies, extreme weather events including drought, and lack of frequent fire are moderate. **This scenic attribute is at moderate risk.**

Scenery Attribute: The treatment area has a resilient forest where frequent, low intensity fires occur without wide-spread crown fire or high severity surface fires.

Scattered groups of trees will have grassy openings between that provide natural contrast and species diversity. A mosaic of openings and groups of trees allows existing scenic views and attributes to be seen. Fire evidence is reintroduced as a natural element of the scenery in an irregular mosaic of burn patches and as maintenance burning occurs, with low to moderate burn severity. Burning is essential in order to re-establish scenic stability.

Stand replacing fire from an overgrown forest and high-severity surface fires from unnaturally high surface fuel loads is the trajectory most of the treatment area is on. Over 30 percent of the treatment area has the potential to sustain crown fire, about 60 percent has the potential for surface fire, and 1 percent has no fire potential as illustrated in Figure 11. The lack of fire or thinning has produced overly dense stands (Fule et al 2004), which are out of the natural range of variability for the pine systems in the project area. Table 7 compares existing and desired fire potential.

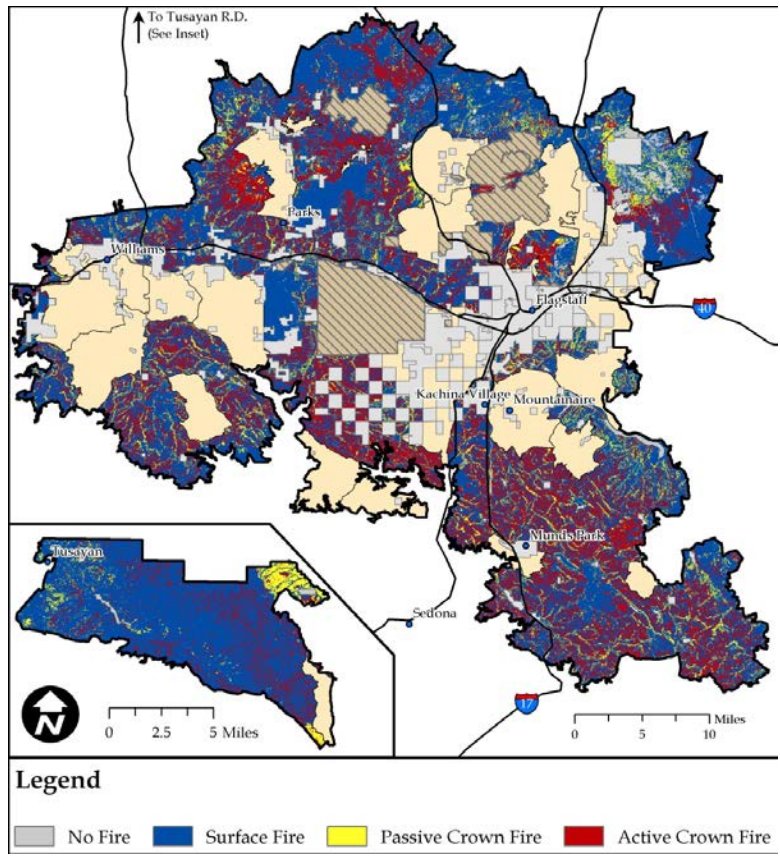


Figure 11 Current crown and surface fire potential

Table 7 Existing and desired fire potential in 4FRI ponderosa pine treatment area

Evaluation Criteria	Existing Condition	Desired Condition
Potential crown fire (%)	34	Up to 10
Canopy Base Height (ft)	15	>18
Canopy Bulk Density (kg/m ³)	0.061	<0.05
Potential surface fire (%)	64	Up to 90

Crown fire generally produces 100 percent mortality in ponderosa pine by consuming the crowns of trees. Crown fire can be active or passive. Active crown fire advances from crown to crown in the tops of trees or shrubs (NWCG 2008). A passive crown fire is a

fire in the crowns of trees, but only individual trees or groups of trees torch. Passive crown fire that is ignited in forests with interlocking crowns and/or low crown base heights may readily become active crown fire in more extreme weather situations. With a delay of more than 20 years between fires or treatments (a delay in the fire-return interval), areas of passive crown fire may transition to having the potential for active crown fire. The current fire-return interval is approximately 43 years, about four times longer than the desired historical fire-return interval which is between 2 and 21 years (Weaver 1951; Cooper 1960; Fule 2004; Heinlein et al. 2005). Even without crown fire, a high severity surface fire burning through this area could scorch the canopy sufficiently to cause widespread mortality (Van Wagner 1993).

Without a frequent fire regime, duff cones (build-up of needles, bark, and other litter) accumulate around the base of a large tree due to a lack of fire. Such cones may smolder for extended periods of time and damage the cambium of the tree. This would make the tree more vulnerable to other stressors (drought, insects, and disease).

No more than 10 percent of the treatment area should be prone to crown fire (Swetnam and Baison 1996; Roccaforte et al. 2008). When crown fire does occur, it should be mostly passive crown fire, occurring in single trees, groups, or clumps, or areas where there had been mortality (wind throw, insects, etc.). Fire would function as a natural disturbance within the ecosystem without causing loss to ecosystem function or to human safety, lives and values.

Since about 34% of the treatment area has the potential for crown fire, and 64% has the potential for surface fire, the scenery attribute condition is poor. Crown fire usually causes 100% mortality and would negatively affect the scenic attributes. The higher than historical fire return level also indicates that high severity surface fires could scorch tree canopies and cause additional mortality in as much as 58% of the area. The ecological stressors of fire, high tree densities, drought and potentially more intensive weather events (wind, lightning, etc) are severe. **This scenery attribute is at high risk.**

Scenery Attribute: Much of the forest has open appearance of tree groups and openings making the forest more resilient to mortality from insects and disease.

Forest health is improved resulting in better resilience and forest structure.

Ponderosa pine is attacked and killed by several different bark beetles in the genera *Dendroctonus* and *Ips*. It can be difficult to discern what species initiated the attack. In the treatment area, bark beetle activity in ponderosa pine currently appears to be at endemic levels.

Dwarf mistletoe infection in ponderosa pine is common throughout the treatment area. Mistletoe infected trees slowly weaken, experience growth loss, and eventually die (Lynch et al. 2008). Inventory data and previous incidence reviews (Hessburg and Beatty 1985) indicates approximately 25 to 35 percent of the treatment area has some level of infection ranging from light to extreme. The desired condition is to move towards forest composition, structure and pattern reference conditions that would allow dwarf mistletoe and beetles to function at endemic or historic levels.

The condition of the scenery attribute of an open forest with tree groups and openings is fair as it relates to insects and disease (insects appear to be at endemic levels, and dwarf mistletoe infects about 20% of the treatment area). The ecosystem stressors relating to insects and disease are high tree densities, and severe weather extremes including drought. These are moderate stressors. **This scenery attribute is at moderate risk.**

Scenery Attribute: Within the ponderosa pine and pinyon-juniper forests, there is a healthy, resilient understory trees and shrubs including Gambel oak, aspen, and sagebrush. Prairies and grasslands provide important contrast to the forested landscape. Gambel oak and aspen provide color and texture contrast to the coniferous forest and are important for fall color viewing. Color viewing pilgrimages are a traditional activity. Aspen and oak are more conspicuous since nearby conifer encroachment is reduced and overtopping trees are thinned. Grasslands provide scenic diversity and are important components of Northern Arizona forests for recreation and views. They contrast with forested settings and different plant species (especially wildflowers) that are present. These places were often homesteaded and have historic significance. They contribute to the sense of place for both the KNF and CNF. Savannahs also provide scenic diversity and a lesser degree of contrast to forested areas.

Vegetation diversity throughout the treatment area has declined (USDA 2009). Gambel oak, a sub-type within ponderosa pine, is important to many wildlife species as it provides important nesting and foraging habitat. A lack of fire, which ultimately caused increased stand densities, has allowed Gambel oak to become overtopped by fast growing ponderosa pine (Abella and Fule 2008). The desired condition is to develop and maintain a variety of oak size classes and forms, where they occur. Oak should range from shrubby thickets and pole-sized clumps to large trees across the landscape in order to provide habitat for a large number and variety of wildlife species (Brown 1958; Kruse 1992; Rosenstock 1998; Abella and Springer 2008; Abella 2008a; Neff and others 1979). There is a need to stimulate new growth and maintain growth in large-diameter trees and use management strategies that provide for a variety of shapes and sizes across the landscape.

Aspen is an early seral component of the ponderosa pine ecosystem and a species that provides for habitat diversity. Aspen is dying or rapidly declining on both forests due to the combined effects of conifer encroachment, browsing, insect, disease, severe weather events, and lack of fire disturbance (Lynch et al 2008; USDA 1988) (USDA 1987; USDA 1988). A study by Fairweather et al. (2007) on the Coconino NF indicates that aspen on low-elevation dry sites (<7500 ft) has sustained 95 percent mortality since 2000. Mortality on these sites is expected to continue as many live trees currently have only 10 to 30 percent of their original crown. The desired condition is to maintain and/or regenerate aspen. Where possible, there is a need to stimulate growth and increase individual recruitment of aspen.

Many grassland acres across the Coconino and Kaibab NF have become encroached with trees and converted to forest (USDA 1987; USDA 1988). An ecological sustainability assessment completed in 2009 found that grasslands on the Coconino have decreased. Historically, only 2 percent of the Great Basin grasslands were comprised of very large shrubs, closed canopy and some very large trees. Since reference conditions, this percentage has increased by 17 percent (USDA 1988). Within montane subalpine grasslands, the percentage has increased from 0 to 33 percent (USDA 1988). On the Kaibab NF, the ecological sustainability assessment found that at least 8 percent of the montane, subalpine, and Great Basin grasslands have been invaded by conifers (USDA 1987).

The desired condition is to move towards the natural range of variability. Tree canopy cover would range from 0 to 9 percent and grasses and forbs would dominate. The fire return interval would be less than 35 years (USDA 1987). Fire would function as a natural disturbance across the landscape without causing loss to ecosystem function or to

human safety, lives, and values. When fire did occur, vegetation would return close to pre-fire conditions within a few years (Johnson 1998) and would typically replace less than 75 percent of the overstory (USDA 1988). There is a need to reduce (and in some cases remove) tree encroachment which has reduced the size and function of landscapes that were historically grasslands.

Pine-sage provides valuable habitat for several species of wildlife including migratory birds. Shrub species that occur with sage and provide further diversity include Fendler's ceanothus, mountain mahogany, snakeweed, bitter brush, Oregon boxleaf, and Gambel oak. Sage cover under ponderosa pine varies from 0 to over 35 percent. In areas where percent cover is about 0, fire had burned with moderate to high severity surface fire or the pine had overtopped and shaded out the sage. In areas where percent cover is over 35, fire had been excluded or the pine density was more open. The desired condition for the sage component of the pine/sage community is to have a shifting mosaic of sagebrush with a mix of age classes. The mosaic pattern would be largely regulated by fire.

The cover of big sage is many times greater than the desired condition. There is a lack of fine, herbaceous fuels that should be found within the sagebrush clumps. These herbaceous fuels help minimize the effects of fire (Tisdale and Hironaka 1981 in McArthur and Taylor 2004). Sagebrush and pine are both present in various age classes, along with a diversity of other vegetation and an herbaceous layer.

The scenery attribute condition is fair for Gambel oak, poor for aspen, fair for grasslands, and fair for pine-sagebrush. Ecosystem stressors include high density ponderosa pine and pinyon-junipers forests, lack of frequent, low severity fire, and extreme weather events including drought. Gambel oak, grasslands and pine-sagebrush have moderate stress, aspen receives severe stress. **The scenery attributes of Gambel oak, grasslands and pine-sagebrush are at moderate risk, and aspen is at high risk.**

Minor Scenery Attribute: Springs, seeps and ephemeral channels because of the diversity they provide, including contrast in color, shape, and texture. In addition, the presence of water, even if seasonal, increases the valued scenery. Riparian systems are rare commodities on the forests and often receive heavy recreation use. They are a critical scenic feature since water is scarce and the plant species associated with riparian areas are often dramatically different than those found on most of the forests. They provide sounds, scenes and tactile experiences found only in these places. Ephemeral channels provide scenic diversity and are important components of the forests. They contrast with forested settings and different plant species are often present. They provide important views and occasional or seasonal sounds and tactile experiences.

Water features are relatively rare across the Kaibab and Coconino NF within the treatment area. While important, these are minor scenery attributes. Springs and seeps play an important role on the landscape for hydrological function of watersheds; and, they are very important for wildlife and plant diversity. On the Coconino NF, although reference conditions are largely unknown, the fact that seeps and springs are well represented, or redundant, throughout all major watersheds assures the opportunity for a high level of sustainability as long as their condition is functional. They are natural water features that existed prior to Euro-American settlement and were probably functional due to lack of human disturbances (USDA 1988). Most springs and seeps in the treatment area have reduced function from drought, lack of fire, and closed forest canopies which increase evapotranspiration. Excessive disturbance can result in these features becoming

non-functional (USDA 1987; USDA 1988). Forty-seven developed springs on the Coconino NF are functioning below potential. On the Kaibab NF, 27 springs on the Kaibab NF have reduced function. Impaired function as described at Babbitt Spring on the Coconino NF includes the headcut in the spring outflow, the encroachment of ponderosa pine into the spring site, and the lack of riparian vegetation that is normally associated with a functioning riparian site.

The desired condition for springs and seeps is to have the necessary soil, water, and vegetation attributes to be healthy and functioning at or near potential. Water flow patterns, recharge rates, and geochemistry are similar to historical levels and persist over time. Water quality and quantity maintain native aquatic and riparian habitat and water for wildlife and designated beneficial uses, consistent with water rights and site capability. Plant distribution and occurrence are resilient to natural disturbances (USDA 1986; USDA 1987; USDA 1987; USDA 1988).

Ephemeral streams are important for hydrological function of watersheds and provide important seasonal habitat for a variety of wildlife, in particular, migratory birds and dispersing amphibians. On the Coconino NF, approximately 32 miles of ephemeral streams are heavily eroded with excessive bare ground, denuded vegetation, and head cuts. Of the total miles, approximately 6 miles are riparian streams and 26 miles are non-riparian streams. The Kaibab NF has approximately 7 miles of degraded non-riparian streams.

The desired condition is to restore the functionality of ephemeral streams (USDA 1986, USDA 1987, USDA 1987, USDA 1988). On some streams, there is a need to maintain and promote existing vegetation. On others, there is a need to reduce tree encroachment, the presence of noxious weeds, and limit the potential for future disturbance. On all ephemeral streams, there is a need to return fire, a natural disturbance process, to the system.

The condition of the scenery attributes is fair. Ecosystem stressors of high tree density, lack of frequent, low severity fire, and extreme weather events including drought are moderate. **The scenery attributes of seeps, springs and ephemeral channels are at moderate risk.**

Minor Scenery Attribute: While roads provide important scenery viewing platforms, as well as access to the forest, scenic quality is improved by decommissioning some closed forest roads and unauthorized routes.

Decommissioning of selected unauthorized routes and re-establishment of native vegetation would move these places toward the characteristic landscape, and would improve the scenic quality of these areas.

Both forests have identified the minimum road system for public and administrative motorized use through the Travel Management Rule (TMR) process. The proposed action would decommission 770 miles of existing system and unauthorized roads on the Coconino NF, and 134 miles of unauthorized roads on the Kaibab NF. It would reconstruct (improve or relocate) about 40 miles of existing roads. It would also construct about 517 miles of temporary roads and decommission these when treatments are finished. The locations of proposed decommissioning, relocations, and temporary roads are shown in Figure 12.

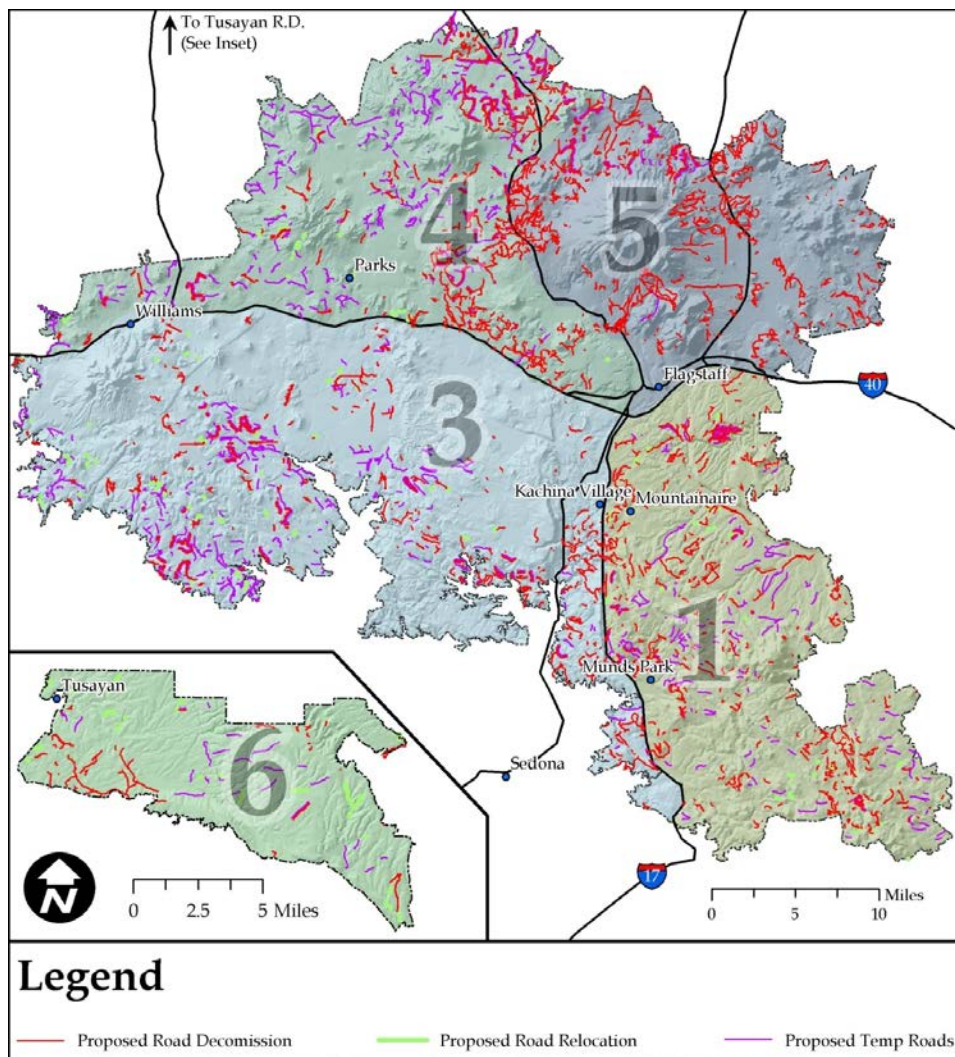


Figure 12 Proposed road decommissioning, temporary roads, and relocations³

Upon project completion the temporary roads, unauthorized routes and about 40 miles of closed roads will be decommissioned. Roads that have been identified for decommissioning will use management strategies and road maintenance techniques (including restoration of drainage features) that moves towards restoring road prisms (as possible and practical) to their natural condition (USDA 1986; USDA 1987). The desired condition for decommissioned roads is to have soils in satisfactory condition so that the soil can resist erosion, recycle nutrients, and absorb water. Understory species (e.g.,

³ Approximate temporary road locations were created in gis to arrive at an approximate mileage of temporary roads needed for the analysis area. The exact location of the temporary roads determined in this exercise will be determined at the time of implementation, but are expected to be similar as the GIS exercise.

grasses, forbs, and shrubs) diversity would be consistent with site potential and provide for infiltration of water and reduction of accelerated erosion.

The scenery attribute condition for decommissioned roads is fair. Ecosystem stressors include fire and intensive weather events, which have moderate stress on these attributes.

The scenery attributes of decommissioned roads are at moderate risk.

The final step in determining scenery stability is to translate the ecosystem risks to a landscape's scenery attributes into a single scenic stability rating. When translating ecosystem risks, a conservative approach is used where the maximum degree of risk to some or all of the dominant scenery attributes is identified. These are contrasted with the stability of the dominant scenery attributes.

Of the seven dominant scenery attributes evaluated above (understory trees and shrubs were subdivided, with most at moderate risk, but aspen at high risk) four are at high risk and three are at moderate risk. Both of the minor scenery attributes are at moderate risk. Using the scenic stability level determination (see Appendix B), this would mean that there is HIGH risk to SOME (40-60% of dominant attributes) and SOME are stable (40-60% of dominant attributes). This fits into the LOW STABILITY level, where most dominant scenery attributes are present and are likely to be sustained; a few may have been lost or are in serious decline.

Much of the vegetation in the treatment area is not sustainable because it has departed too far from reference conditions. Historical fire regimes kept the forest in a more open groupy condition. Large trees were dominant features in the landscape, and there was a healthy diverse understory. Springs, seeps and ephemeral drainages were functional. Through the management activities practiced in the treatment area over the past century, the stable, historical characteristics desired for scenery have all but disappeared. Currently dense stands of small and intermediate sized trees obscure views into the forest and diminish the diversity of openings, reduce contrasts provided by grasses and wildflowers, decrease the scale provided by large mature trees, lessen textures near seeps, springs and ephemeral drainages, and obscure colors provided by aspen, oaks and other shrubs. Dense stands are at much higher risk of high severity wildfire blackening the scenic foreground and beyond. Low scenic stability indicates a need for management activities to restore the scenic attributes to a sustainable condition.

further reduced due to the overstocked condition of the stands, and the grass/forb/shrub understory component would continue to decline in composition and decrease in abundance. Unauthorized routes and closed roads would not be decommissioned, and would continue to be visible linear features uncharacteristic in the landscape. If unauthorized routes and decommissioned roads were unused, they would naturalize in 10 to 20 years.

While not a trend, it does appear that the Southwest is experiencing a repeat of last year's weather pattern where at the end of the winter, persistent dry weather has caused widespread and intense drought across the region. If this is again combined with a windy spring, the conditions would be optimal for another extreme fire season. Last year, the largest fire in recorded history for Arizona occurred, and more than 2.1 million acres burned in Arizona and New Mexico. Potential effects of climate change may influence the duration and severity of disturbance events. Guido (2011) suggests that there may be links between climate change and extreme events for some climate phenomenon. The Southwest Climate Change Network (CLIMAS 2011) has recorded that both temperatures and precipitation patterns and quantities are changing. Drought is natural and common in the region, and less precipitation and warmer conditions worsen drought. Comparison of the 1950's droughts to those between 2000 and 2003 suggest that the major difference is that temperatures in the spring and early summer are warmer in the 2000s, which more rapidly parches the landscape and primes it for fires, among other potential impacts.

At some point, overly dense vegetation conditions may result in large scale, high severity wildfire that is uncharacteristic in this landscape. Because stands would not be thinned, the risk of stand replacement fire would continue to be of concern to the Coconino and Kaibab National Forests and residents of the surrounding communities. This concern would be amplified with the increasing potential for escaped camp fires, ignitions from target shooting, fireworks or cigarettes from dispersed recreation use and private residential developments intermingled with and/or adjacent to National Forest lands.

In the event of an uncharacteristic high severity wildfire such as the Schultz Fire, the existing landscape character would be suddenly altered with little opportunity to slow or control the change. The landscape would be changed to such a degree that very few of the objectives could be met in the short term or long term. The uncharacteristic high severity, large-scale wildfire would redefine and reshape the existing landscape character for decades if not centuries. The appearance and character of the area would shift from densely forested to patchy and open. The overstory component and green canopy would be absent or drastically reduced, depending on the severity of the fire. For a few decades, the landscape would be dominated by blackened, dead standing trees; if allowed to come down on their own, the trees would likely fall in a dense, jack-straw pattern. Although short term, smoke from high severity wildfire would cause scenic quality to be diminished and would obscure views to scenic attributes.

In the short term following high severity fire, emergency fire suppression actions such as fire lines and emergency post-fire rehabilitation treatments could result in unnatural scars on the landscape. With rehabilitation and other mitigation measures, the immediate impacts of the suppression and emergency treatments should not be evident to the casual forest visitor within 2 to 3 years of completion, although effects from the fire itself would

remain visible much longer. For two to three growing seasons, the blackened, exposed ground surfaces would be highly visible due to lack of vegetation. Sedimentation and erosion would increase, raveling soils that would take a long time to revegetate.

Eventually these areas would be covered with spotty vegetation and invasive weeds until native material became established. Within 5 years, the effects of the fire would begin to be viewed in a somewhat more positive light as grasses and forbs become re-established, and the shrubby understory and seedlings became more abundant. There is some risk that a vegetation type change could occur especially if there is wide spread drought, and/or if trends toward higher temperatures, and less annual precipitation continue. These changes would be visible throughout the treatment area in the foreground of Forest roads and trails, and as middle ground and background views from communities within the treatment area, and developed recreation sites. There would be long term (more than 20 years) impacts to major landscape attributes such as ponderosa pine forests with large, mature trees.

Initial public reaction to a large-scale fire tends to be negative, as many people do not consider extensive, blackened landscapes to be natural or beneficial (Ryan 2005). These effects are often perceived by local residents as devastating to their community and way of life; non-local forest visitors may regard the effects of a catastrophic fire as interesting and something “to be seen” but also as a degradation of the scenic quality.

Under this alternative there would be no opportunities to enhance and improve scenic resources or achieve the desired condition described in Section 2 since there would be no thinning, prescribed fire, or other treatments.

This alternative would not meet the project desired conditions or forest plan direction. It would not move the treatment area toward scenic stability. Over time, scenic stability would decrease and move to very low. No action would result in continuation of current risks to scenic attributes and it is reasonable to assume that these risks increase each year and could be exacerbated by climate change.

The No Action alternative would not meet long-term scenic integrity objectives since these are dependent upon improving the condition of scenic attributes so that they are more resilient to ecological stressors. In addition, the No Action would continue the current condition outside of the natural range of variability.

Cumulative Effects

The cumulative effects analysis area is the ponderosa pine forest on the Coconino and Kaibab NF's. The timeline for analysis is 20-30 years because most long-term effects of the alternatives are assessed out to a 20-30 year timeframe (with the exception of large scale high severity wildfire which is more difficult to project). The following is list of actions relating to scenic attributes, landscape character and scenic integrity considered in the cumulative effects analysis for this project:

- Past activities that created the current conditions include grazing, the evolving forest management practices related to timber harvest and fire suppression, drought, disease and insect infestations, developed and dispersed recreational use.

- Present and future activities such as vegetation management, fuels management, utility corridor clearing and new utility corridors, and other management activities (e.g. noxious weeds treatments). These activities could occur on private lands as well.

The cumulative effects of past management activities are visible as the existing conditions. Vegetation management practices, fire suppression, and over grazing have resulted in the current even-aged forest structure, overstocked conditions, and sparse understory trees, shrubs, grasses and forbs.

The short term cumulative effects (1-5 years) of the No Action alternative combined with similar current and future restoration treatments and prescribed burning projects are expected to be negligible, unless additional large scale, high severity wildfires occur in the ponderosa pine type. If wildfires burn large areas, the scenic quality would be decreased, and there would be long term negative changes (10 to 100 years) in scenic character. The scenic attributes that contribute to high scenic integrity, such as an open forest with tree groups of varying ages, sizes and shapes, large, mature trees, and healthy, diverse understory would not be present. The scenic impact of a high-severity wildfire would combine with scenic impacts from adjacent land development, powerline development and maintenance, and impacts from dispersed recreation use to result in a cumulative impact so that scenic integrity is greatly diminished in areas burned for up to a decade or more. In some places there would be a chance that climate change could contribute to type changes in parts of the ponderosa pine forest so that these characteristics would be replaced with difference landscape characteristics, which would also cumulatively impact scenic attributes.

In the absence of large, high severity wildfires, long term cumulative effects of the No Action alternative and present and future vegetation management and prescribed burning projects would be small and localized. In the absence of large scale treatment, the scale of treatments that are currently accomplished would not result in improvement to scenic stability or scenic integrity. The desired landscape character of an open forest with tree groups of varying sizes, shapes and ages, presence of large, mature trees, and healthy, diverse understory would not be met. This could combine with scenic effects such as scenic impacts of bare ground from grazing and recreation use and scenic effects from unhealthy forest conditions resulting from disease and drought to result in a trend toward declining landscape attributes, and less sustainable landscape character.

Effects of Actions in Common for Alternatives B, C, D

Restore 74 springs, and 39 miles of ephemeral channels. Construct 4 miles of fencing to protect springs, and 82 miles of protective aspen fencing. Decommission 770 miles of existing roads and unauthorized routes on the Coconino NF and 134 miles of unauthorized routes on the Kaibab NF. Construct 517 miles of temporary roads for haul access and decommission those following treatments. Reconstruct (relocate and improvement) 40 miles of existing open roads for natural resource health and human safety concerns.

Aspen, Seep/Spring Treatments and Fencing

Aspen treatments are needed throughout the area where these species occur. Aspen is dying or rapidly declining on both forests due to the combined effects of conifer encroachment, browsing, insect, disease, severe weather events, and lack of fire disturbance (Lynch et al 2008; USDA 1988) (USDA 1987; USDA 1988). Aspen are important scenic features and a favorite of the visiting public. Their continued presence in the landscape is a desired condition. The scenic attributes of aspen are at high risk of disappearing throughout the area unless measures are taken to restore them. There will be short term effects to scenery from restoration treatments in aspen stands. There is also a need to protect the aspen sprouts from ungulate browsing following treatments.

Most springs and seeps in the treatment area have reduced function from drought, lack of fire, and closed forest canopies which increase evapotranspiration. Spring and seep rehabilitation is proposed at 74 locations. This includes removal of some vegetation and prescribed burning near the sites to help return the features to proper function. Effects would be similar to those described later under “mechanical treatment and burning”, although at a much smaller scale. There are minimal to low effects to SIO from these treatments.

The objective of ephemeral stream treatments is to re-establish former drainage patterns, stabilize slopes, restore vegetation to site potential, and protect restored areas from ungulate use. These proposed activities would have short term effects (lasting 1 to 5 years) on scenic attributes. Bare soil would be exposed, rocks and logs moved, and some disturbance from vegetation restoration would be visible for a few years until the desired understory vegetation begins to fill in and become established. These activities would have low effects to SIO. Following treatment, these areas will be improved and will make progress toward desired conditions.

Aspen, ephemeral drainage treatments and spring/seep areas require fencing to protect the areas from ungulate browsing. The project includes fencing of 82 miles of aspen fencing and 4 miles of fencing around springs/seeps. Fence materials proposed include wire, wood and jack-strawing of trees. All would introduce unnatural linear features into the landscape that would not be natural appearing. Since these are isolated areas scattered around the over 500,000 acres project area, introduction of linear features would have minor effects.

Wood fencing materials would have the least effect since they would be in scale, and have texture and color that would look most natural in the seep/spring and aspen settings. Many times wooden fencing is viewed as an attractive cultural feature. If the fences are maintained, wood fencing would have very low effects and would meet the SIO. If they fall into disrepair, this would detract from their appearance, but they would still meet the SIO.

Wire fencing materials would be more noticeable than wooden fences. Wire and metal posts can be shiny and their color can contrast with the natural surroundings. Mitigation measures will be used to introduce the fewest contrasting elements where wire fencing is used and effort would be made to locate the fencing where it is least noticeable. Wire fencing would have low effects and would meet the SIO.

Jack-strawing has been used to a limited extent on the Coconino NF in order to protect aspen restoration projects from ungulate browsing. It involves cutting and stacking high numbers of cut trees in an irregular manner to form a wide, tall barrier surrounding the aspen stand. While natural materials would be used to create the jack straw, the shape and

form created at this scale would not normally be found in the characteristic landscape. It would not be completely unnatural however, as it would be similar to large scale blow down events that may be caused by weather related events. Placement of jack-straw treatment would not meet the requirements for foregrounds of high concern level roads or the Arizona National Scenic Trail in high SIO areas. Even if these sites were allowed to drop one SIO level, they would still not meet the basic definition of moderate SIO that “noticeable deviations must remain visually subordinate to the landscape character being viewed” (Forest Service 2000). Beyond the foreground 1000 feet, jack-straw piling may be suitable, and would be mitigated by carefully locating these barriers. These areas would drop to moderate SIO for 10 to 20 years. As jack-straw barrier begins to deteriorate, trees lose their brown needles, branches break off, and logs lose their bark and grey out, the jack-straw piles compress and become less noticeable. It is anticipated that the aspen would also be large enough to withstand ungulate browsing when the jack-straw piles deteriorate or are burned in follow up prescribed burning activities. These areas will improve over time to the mapped SIO.

Road reconstruction and decommissioning

Approximately 40 miles of existing roads will be reconstructed with the action alternatives. There will be little to no effects from road improvements. Improvements may include, but are not limited to, drainage improvements, tree removal, slight realignments and addition of surfacing materials. Potential effects include exposure of bare soil, tree stumps, and contrasting color and texture of surfacing materials. These effects are usually short term (1 – 5 years) and become less noticeable as natural vegetation is re-established and the surfacing material begins to be incorporated into the soil horizon. Road relocation would have more noticeable effects on scenery. Effects of the newly constructed road bed would include newly exposed bare ground, damaged vegetation, tree stumps, root wads, and contrasting color and texture of surfacing. There would also be effects associated with the old road bed. It would appear newly disturbed as well if associated drainage features such as culverts were pulled, new drainage ditches established, the surface roughened to promote vegetation establishment, and slash, brush, boulders or other devices used to close off the entrance. There would be a strong contrast between the existing forest floor and the new and old road beds that would detract from scenic quality. Mitigation measures and best management practices will be used during road reconstruction. The old roads would naturalize over time and become less noticeable to the casual observer.

Approximately 517 miles temporary roads would be constructed for haul access. These would be decommissioned when treatments are finished. The new temporary roads would add new, unnatural linear features into the landscape on a temporary basis. Trees would be removed, soil exposed, and roadbeds constructed including minimal drainage features. This will have moderate effects on the mapped SIO. In high SIO (about 50% of the area), the new temporary road construction would drop these areas one level to Moderate until the roads are decommissioned and begin to naturalize about 5 years later. Mitigation measures and best management practices will be used to rehabilitate decommissioned roads and this will hasten their recovery.

Approximately 904 miles of existing and unauthorized roads would be decommissioned and allowed to naturalize. There would be short term effects (up to 5 years) as the roads have drainage established, the surface area roughened, seeded, and mulched with pine

Deleted: .

needles and slash, boulders and other devices are used to close of entrances to the roads. Mitigation measures and best management practices will be used of rehabilitate these roads. The existing closed roads would naturalize over time and become unnoticeable to the casual observer.

Alternative B Proposed Action

Mechanical treatment and burning

Approximately 388,489 acres would receive mechanical treatments including mechanically thinning up to 16 inch dbh within 18 Mexican spotted owl PAC's outside of nest areas, and cutting 99 acres of trees by hand on slopes greater than 40 percent. Prescribe burning would occur on the same 587,489 acres, including prescribed burning within 72 Mexican spotted owl PACs (excluding nest cores). In addition, 199,435 acres would receive prescribed burning only. Figure 13 provides the approximate locations of these activities for this project.

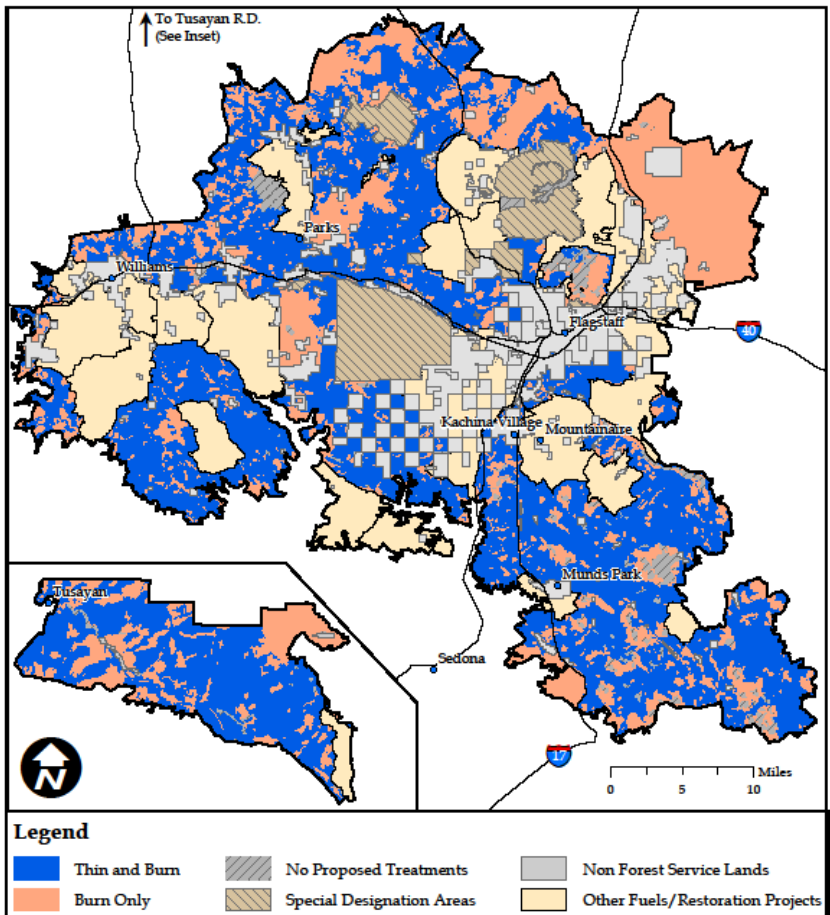


Figure 13 Locations of proposed treatments in the 4FRI area

Mechanical treatments include, but are not limited to use of chainsaws or feller-bunchers to cut trees and lop slash, skidders to move material to landings, bulldozers to pile slash, and specialized equipment such as feller-bunchers or track-type hot saws, and tree shears to cut, chop, break, and lop fuel material. The effects of these activities include:

Hand thinning usually has little or no short term effects on scenery. Trees are cut down, then cut into segments that can be treated. Effects may include slash from limbing and topping trees. Project mitigations require slash to be treated.

Conventional logging typically has moderate short term effects to scenery. During implementation, in most cases whole trees are cut and moved to a “landing” near a haul road. At the landing, the limbs and tops are removed, and the clean logs are decked to be loaded and hauled away. After vegetation has been thinned, the slash is piled using bulldozers. Effects typically include trampling of vegetation where equipment is operating, creation of linear skid trails where vegetation is trampled or completely removed exposing bare soil, creation of linear log landings where vegetation has been removed and bare soil is exposed, and piles of cull logs not suitable for commercial uses. After logs or useable material is removed, slash would be treated as per mitigation measures. This may include bulldozers push slash into large piles (10-20 foot wide piles, often 10 feet tall) which can trample vegetation and cause bare soil to be exposed, and hand piling. Mitigation measures would prioritize treatment of slash along high concern level roads (those in High SIO), require trails to be returned to pre-treatment conditions, and cull logs be removed from landings and used to help close off entrances to decommissioned roads.

There would be a low to moderate effect on scenic quality during and immediately following mechanical treatment methods. Stumps are typically left no more than 6 inches high and are often cut flush unless prevented by rocks or other natural features. The presence of skid trails, landings, and piled or scattered slash would also result in a moderate reduction of the scenic quality until harvesting activities are completed, and mitigation measures are implemented. The effects in these areas would be short-term (lasting 1 to 5 years after treatment) since skid trails would be rehabilitated and activity generated slash would be treated or mostly removed to be utilized. The ground disturbance resulting from using machines to pile slash would be noticeable for one to three years after project completion, depending on how quickly the areas revegetate. Scraped trees would heal or scars would become less noticeable over time.

Where utility corridors cross the restoration area, the proposed mechanical treatments adjacent to the corridors will help to improve the scenic quality. Mitigation measures have been developed to feather treatments or increase their severity close to the corridors. This will have the effect of reducing the contrast between the cleared corridors and dense stands adjacent to them.

Effects from pile burning would be primarily limited to the immediate dead and live fuels of the slash pile, although some scorching and mortality of residual trees would be expected. Smoke from pile burning would be dense when the piles are ignited and as they burn, but would be short term in most cases.

The objective of prescribed burning would be to produce low severity effects over 90% of the treatment area treated with fire, with moderate and high severity effects over no more than 10% of the treated area. Depending on fire severity, effects would include: charred soil and vegetation immediately following burning; charred tree boles; needle and leaf scorch typically less than 20 feet from the ground; and, loss of some smaller understory trees, and mortality in some trees with large accumulations of dead fuels at their base. In areas of moderate to high severity, individual trees or groups of trees may be killed. Openings may be created as a result of more extensive tree mortality.

Prescribed burning would likely result in short-term, moderate reduction in scenic quality. The presence of charred surface vegetation and red or black trees would present a contrast to the otherwise green surroundings. These contrasts would soften and become less noticeable within two or three growing seasons after project completion as the understory component (i.e., grass, aspen and oak seedlings, etc.) moved in, as singed trees either recovered or die, and as dead standing trees fall down. Smoke from prescribed burning would be heaviest during the initial burns, and would reduce visibility of the scenic landscape in the short term. Some residual smoke could be expected to continue in small localized areas where stumps or roots smolder for up to a few weeks. The residual smoke would have little if any effect on visibility of scenic attributes.

Effects may last longer and be more pronounced in areas of moderate to high fire severity. In these locations standing dead trees may be present for a decade or more until they fall down. Understory vegetation would take some time to recover, but is expected to look more natural appearing within five years. Since it is expected that this would be produced over no more than 10% of treatment area, effects would be localized and limited.

Repeat burning would result in fewer effects than described above since fuel loadings will be reduced by initial prescribed burns. Effects are expected to be noticeable for a shorter duration, and within 2-3 years, the areas will be natural appearing. Smoke from repeat burning would not be as heavy as initial burns, and could be expected to be shorter in duration.

The restoration treatment areas should be recovered and moving toward reference conditions after the first thinning and prescribed burning activities. These will be further improved after follow up prescribed fire treatments. The restoration treatments will meet the purpose and need of the project and will help move the forest structure, pattern and composition toward reference conditions.

When the treatments are all completed it is expected that many of the ecological stressors will be lessened, and the scenic stability will move from low to high on 587,923 acres within the restoration area.

The proposed treatments and prescribed burning would make progress toward desired conditions and will improve forest health and resilience.

Large Mature Trees

The proposed action would meet forest plan requirements for large mature trees across the landscape. Some allocated acres will not meet all old growth characteristics, but will move conditions toward requirements for large trees, downed woody debris, and snags. The more open, groupy character of the conifer forest will help make the trees more visible and as a result, more prominent. The treatments will increase scenic stability for large, mature trees. The treated areas will have more of the desired landscape characteristics and will make progress toward meeting SIO.

Proposed Activities for Mexican Spotted Owls

As a result of the treatments proposed under this alternative, stands throughout most of the treatment area would appear more to have the desired conditions of open, groups of

trees of all ages and sizes. In some areas, treatments are modified for Mexican spotted owls. These changes are designed to meet other laws, regulations and policies.

MSO treatments proposed incorporate the need for “Improving habitat structure in addition to managing for fire risk abatement is consistent with the USFWS’s draft MSO recovery plan that focuses on desired conditions and provides for treating PACs to meet restoration and fuels reduction objectives. A key draft recovery objective is to maintain habitat conditions necessary to provide roosting and nesting habitat (pp. 84-85) (USDI 2011)”. This treatment would result in stands appearing slightly more open and more diverse over time when compared to the existing condition, although the difference may not be noticeable to the casual forest visitor, particularly when driving along the roads. The treatments proposed for MSO will move the habitat toward desired conditions, but scenic attributes in these areas will continue to be at risk from ecological stressors.

Scenery Desired Conditions, Compliance with Forest Plans and Scenic Attributes

The 4FRI project will help achieve the desired conditions for scenery as defined in the forest plans: “Protect and enhance the scenic and aesthetic values of the Kaibab National Forest” and “Maintain and enhance visual resource values by including visual quality objectives in resource planning and management activities” for the Coconino (see Tables 1 and 2). Designation of interim SIO and meeting forest plan mapped SIO in the long term would be met under this alternative. Scenic quality would be enhanced to a greater extent and for a longer period than under Alternatives A and D as the diversity of tree species, size, and spatial distribution is improved. Throughout much of the treatment area, stand density would be reduced. The views along primary and secondary travel corridors, from communities, and developed recreation sites and trails would be more open and diverse. Visitors traveling along these corridors would experience a sequence of enclosures and openings that add variety and afford more expansive views into the treatment area. Natural meadows and grasslands would be improved, aspen stands regenerated, and oaks reinvigorated which would increase visual diversity and make these valued scenic features more prominent across the landscape. Conifer stands would feature clumped, uneven-aged groups interspersed with openings. The understory component of shrubs, grasses and forbs would develop and respond to the open canopy conditions, further increasing visual diversity. Frequent low severity prescribed fire would help keep the forest structure open and groupy, recycle nutrients, and improve the understory composition and vigor.

The short term visual disturbances of 1 to 5 years after completion of restoration activities would be within the reference conditions of the area. In the short term the disturbances would be visible and would lower the scenic quality. At the completion of the thinning and prescribed burning, the natural appearance of the area will begin to recover, and will improve over time. Throughout project implementation it is expected that the valued scenic character will begin to improve, and the risks to scenic attributes will decrease.

Slightly fewer acres (about 10% less) will be thinned and burned under this alternative than Alternative C. This alternative may result in slightly less understory vegetation improvement than with Alternative C. Combined thinning and burning is the preferred tool to improve understory composition and abundance (Laughlin et al 2006).

Forest Plan Amendments

Three non-significant forest plan amendments (for more details refer to Appendix C of the 4FRI DEIS) would be required on the Coconino NF to implement the proposed action:

Amendment 1 would allow the use of mechanical treatments to improve habitat structure and allow for mechanical treatment up to 16-inch diameter at breast height within 18 Mexican spotted owl protected activity centers (MSO PAC's) to improve nesting and roosting habitat. All Mexican spotted owl monitoring would defer to the project's Biological Opinion issued by US Fish and Wildlife Service.

The effects of this amendment would be to move vegetation in these areas slightly closer to restored conditions. They would slightly improve scenic stability in MSO PAC's, but these areas would still be at risk for disturbances such as high severity wildfire or large scale insect and disease outbreaks.

Amendment 2 would : 1) add the desired percentage of interspace within uneven-aged stands to facilitate restoration and defines interspace, (2) add the interspace distance between tree groups, (3) add language clarifying where canopy cover is and is not measured, (4) allows 29,017 acres to be managed for an open reference condition, which affects canopy cover guidelines for VSS 4 through VSS 6 groups and reserve trees, and (5) add a definition to the forest plan glossary for the terms interspaces, open reference condition, and stands.

This amendment would move vegetation closer to desired conditions, improve scenic stability and overall scenic integrity. It would result in improved forest structure and pattern, forest health, and vegetation composition and diversity, and overall forest resiliency all of which relate directly to decrease risks to scenery from natural disturbances.

Amendment 3 would allow for managing to achieve a "No Adverse Effect" determination for significant, or potentially significant, inventoried heritage sites.

This amendment would have no effect on scenery.

Two non-significant forest plan amendment (see appendix C) would be required on the Kaibab NF to implement the proposed action.

Amendment 1 would 1) add the desired percentage of interspace within uneven-aged stands to facilitate restoration and defines interspace, (2) add the interspace distance between tree groups, (3) add language clarifying where canopy cover is and is not measured, (4) allows 27,637 acres to be managed for an open reference condition (figure 47), which affects canopy cover guidelines for VSS 4 through VSS 6 groups and reserve trees, and (5) add a definition to the forest plan glossary for the terms interspaces, open reference condition, and stands.

This amendment would move vegetation closer to desired conditions, improve scenic stability and overall scenic integrity. It would result in improved forest structure and pattern, forest health, and vegetation composition and diversity, and overall forest resiliency all of which relate directly to decrease risks to scenery from natural disturbances.

Amendment 2 would defer all Mexican spotted owl monitoring to the project's Biological Opinion issued by US Fish and Wildlife Service.

This amendment would have no effects on scenery.

Cumulative Effects

The cumulative effects analysis area is the ponderosa pine forest on the Coconino and Kaibab NF's. The timeline for analysis is 20-30 years because most long-term effects of the alternatives are assessed out to a 20-30 year timeframe (with the exception of large scale high severity wildfire which is more difficult to project. The following is list of actions relating to scenic attributes, landscape character and scenic integrity considered in the cumulative effects analysis for this project:

- Past activities that created the current conditions include grazing, the evolving forest management practices related to timber harvest and fire suppression, drought, disease and insect infestations, developed and dispersed recreational use.
- Present and future activities such as vegetation management, fuels management, utility corridor clearing and new utility corridors, and other management activities (e.g. noxious weeds treatments). These activities could occur on private lands as well.

The cumulative effects of past management activities are visible as the existing conditions. Vegetation management practices, fire suppression, and over grazing have resulted in the current even-aged forest structure, overstocked conditions, sparse understory trees, shrubs, grasses and forbs, conifer encroached meadows and savannas.

The short term cumulative effects (1-5 years) of Alternative B combined with similar current and future restoration treatments and prescribed burning projects are expected to be widespread. There will be evidence of restoration treatments, and the scenic quality would be decreased in some places in most of the ponderosa pine on the Coconino and Kaibab NF. For example, in areas where restoration treatments result in skid trails or removal of vegetation for staging areas or log decks, there could be a cumulative impact to scenic attributes where activities such as dispersed recreational use, grazing, or adjunct private land or infrastructure development is also occurring. In general these cumulative impacts to scenic attributes will be localized in scale (1-10 acres) and are most likely to be of short-term duration (1-5 years).

In the long term (5 to 20 or 30 years), and there would be large and widespread improvement in the health and sustainability of scenic attributes that make up the landscape character of the ponderosa pine forest. Forest users would experience an open forest with tree groups of varying ages, sizes and shapes, large, mature trees, and healthy, diverse understory. In many places, the scenic integrity objectives would be met.

When natural stressors such as wildfires or insect outbreaks occur, or human activities such as new utility corridors, or development of a new recreation site, or a new private subdivision is developed, the cumulative effects of Alternative B and other projects would result in small and localized changes in the scenic character of the ponderosa pine forest. When drought conditions or unusual weather events as a result of climate change occur, the ponderosa pine forest would be healthier and more resilient to such events, thus counteracting the effects of climate change which are likely to detract from scenic attributes. The overall trend from this alternative would be toward improving landscape attributes, and sustainable landscape character.

Alternative C (Preferred Alternative)

Mechanical thinning and burning

This alternative includes mechanically cutting trees on approximately 434,001 acres, including mechanically thinning up to 18 inch dbh within 18 Mexican spotted owl PACs, and following mechanical treatment, prescribe burning 434,001 acres including burning within 56 Mexican spotted owl PAC's including nest cores. In addition, it would prescribed burn only 159,211 acres. Figure 14 shows the areas proposed for treatment with Alternative C.

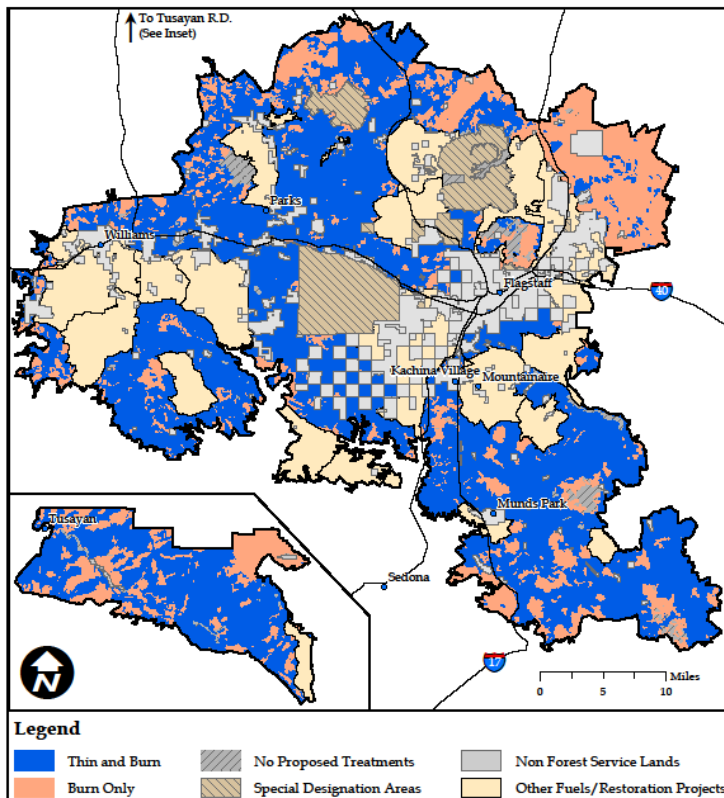


Figure 14 Treatment locations proposed with Alternative C

Effects would be similar to Alternative B. About 10% more acres will be mechanically treated and about 1% more acres burned with this than with Alternative B. Alternative C would improve understory species abundance and composition slightly more than Alternative B since the combined thinning and burning has been found to be a more effective tool (Laughlin et al 2006).

Large Mature Trees

Alternative C would meet forest plan requirements for large mature trees across the landscape. Some allocated acres will not meet all old growth characteristics, but will move conditions toward requirements for large trees, downed woody debris, and snags. This alternative may result in some additional large trees being recruited, which would better meet scenic objectives related to large, mature trees.

Proposed Activities for Mexican Spotted Owls

This alternative would move slightly more toward desired conditions of scenic attributes than Alternative B. The treated areas would be slightly more open but the differences may not be visible to the casual observer.

Scenery Desired Conditions, Compliance with Forest Plans and Scenic Attributes

Effects would be similar to Alternative B. This alternative would result in slightly better understory response and slightly more large trees, which would better meet scenic objectives.

This alternative adds construction of up to 15 weirs and 20 weather stations (3 acres of disturbance) to support watershed research. The construction of these features will create contrast with the characteristic natural landscape. Mitigation measures to assure the weirs are constructed of natural appearing materials, and are of a shape and form that does not create too much contrast will help blend with the surrounding landscape. Weather station located outside of the immediate foreground (300 feet), use of non-reflective surfaces and careful siting will help these features blend with the surrounding landscape.

Forest Plan Amendments

Three non-significant forest plan amendments (see appendix C) would be required on the Coconino NF to implement alternative C:

Amendment 1 would: (1) allow the use mechanical treatments to improve habitat structure and mechanically treat up to 18-inch diameter at breast height within 18 MSO PACs, (2) allow the use of low-intensity prescribed fire within 56 PAC core areas, and (4) allow for managing 8,410 acres of restricted target and threshold habitat for a minimum range of 110 to 150 basal area, and, (5) would defer all Mexican spotted owl monitoring to the project's Biological Opinion issued by the US Fish and Wildlife Service.

This alternative increase the size of trees that could be removed in 18 MSO PAC's and allows use of low intensity prescribed fire within 56 PAC core areas. Old, large diameter trees are an important part of the scenic quality. There may a slight decrease in scenic quality as a result of removing larger diameter trees, but it would also result in slightly greater reduction of tree density in these areas which is important for scenic stability. 56 of these areas would also receive low intensity prescribed burns. While there would be short term effects from tree removal and burning, there would be slight improvement in overall scenic stability than with Alternatives B or D. The amendment would allow for more treatments which would open up these PAC's more creating the potential for views beyond the immediate foreground. This would have a somewhat greater positive effect on scenic quality than action alternatives B or D.

Amendment 2 would: 1) add the desired percentage of interspace within uneven-aged stands to facilitate restoration and defines interspace, (2) add the interspace distance between tree groups, (3) add language clarifying where canopy cover is and is not

measured, (4) allows 29,017 acres to be managed for an open reference condition (figure 47), which affects canopy cover guidelines for VSS 4 through VSS 6 groups and reserve trees, and (5) add a definition to the forest plan glossary for the terms interspaces, open reference condition, and stands.

The effects to scenery would be the same as with Alternative B, Coconino NF forest plan amendment 2.

Amendment 3 would allow for managing to achieve a “No Adverse Effect” determination for significant, or potentially significant, inventoried heritage sites.

There would be no effects to scenery from this amendment.

Three non-significant forest plan amendments (see appendix C in the 4FRI DEIS for details) would be required on the Kaibab NF to implement alternative C:

Amendment 1 would: 1) add the desired percentage of interspace within uneven-aged stands to facilitate restoration and defines interspace, (2) add the interspace distance between tree groups, (3) add language clarifying where canopy cover is and is not measured, (4) allows 27,675 acres to be managed for an open reference condition (figure 47), which affects canopy cover guidelines for VSS 4 through VSS 6 groups and reserve trees, and (5) add a definition to the forest plan glossary for the terms interspaces, open reference condition, and stands.

The effects of this alternative would be the same as for Alternative B, Kaibab NF forest plan amendment 2.

Amendment 2 would allow for mechanically treating and prescribe burning approximately 400 acres in the proposed Garland Prairie RNA.

There would be a short term (1-5 years) decrease in scenic quality from mechanically treating and prescribed burning Garland Prairie RNA. Details of effects from mechanical thinning and prescribed burning are found under alternative B. Those effects would be similar to those described earlier in this chapter. In the long term, these treatments would result in improved plant vigor and species diversity (Noble 2012) that would be positive for scenic drivers, hikers, equestrians and others. There would be an improvement in the scenic stability and scenic integrity for this area with this amendment.

Amendment 3 would defer all Mexican spotted owl monitoring to the project’s Biological Opinion issued by US Fish and Wildlife Service.

This amendment would have no effects on scenery.

Compatibility with the Coconino and Kaibab Revised Forest Plans

Both the Kaibab and Coconino revised forest plans have considered special places. Each has evaluated existing special areas, as well as potential wilderness, and other potential additions as appropriate to the forests. Some existing special areas and potential additions may overlap with proposed treatments in 4FRI alternatives. The analysis below identifies such areas, and addresses each individually.

Area 1: The Coconino NF Revised Forest Plan (2011a) has identified West Fork of Oak Creek (within Redrock-Secret Mountain Wilderness) as an eligible Wild and Scenic River. Figure 15 shows a typical ¼ mile buffer applied to the river corridor.

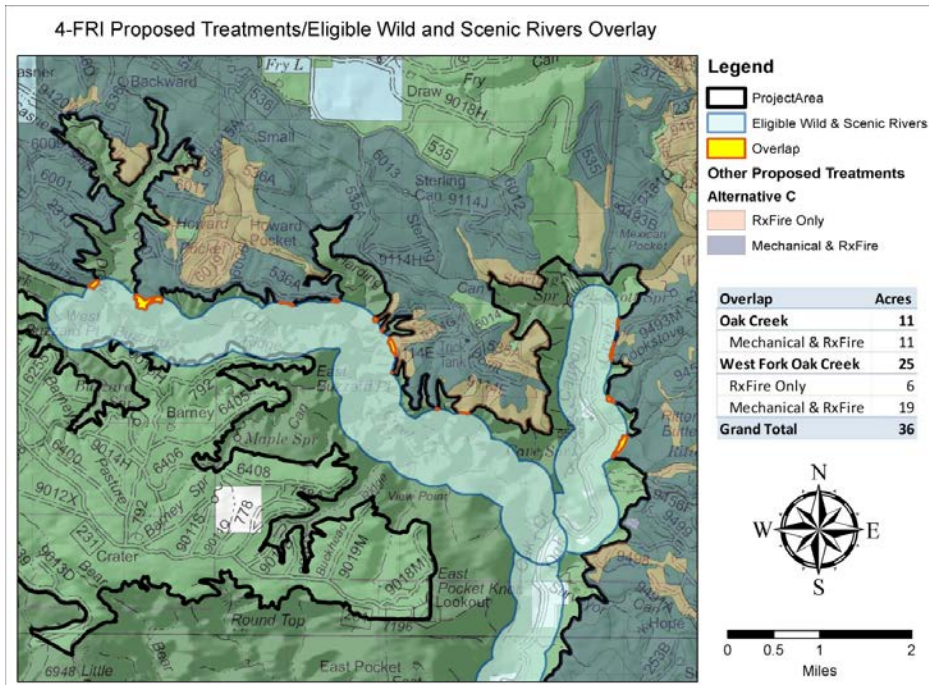


Figure 15. Coconino revised forest plan Eligible River with overlap in 4FRI area.

The ¼ mile buffer would overlap with approximately 36 acres of proposed 4FRI treatments in Alternative C. These locations occur in areas less than 40% slope on top of the rim of the proposed river corridor. The overlaps are outside of the Red Rock-Secret Mountain Wilderness boundary shown in the darker green.

As noted in the Interagency Wild & Scenic Rivers Coordinating Council Technical Paper (IWSR Coordinating Council 2011) “Timber management activities on federal lands within WSR corridors must be designed to help achieve land-management objectives consistent with the protection and enhancement of the values that caused the river to be added to the National System. Management direction needed to protect and enhance the river’s values is developed through the river planning process. WSR designation is not likely to significantly affect timber management activities beyond existing measures to protect riparian zones, wetlands, and other resource values as guided by other federal requirements.” In addition, “Timber management activities on federal lands outside the corridor are managed to protect and enhance the values that caused the river to be designated. Measures needed to protect and enhance the river’s values are developed through the river planning process and include management direction as necessary for lands adjacent to the corridor.”

The areas that overlap the proposed WSR boundary already have mitigation measures for soil and watershed, recreation, and other resources (see 4FRI EIS). The proposed activities would help to protect potential scenic values of the eligible wild and scenic river from the effects of wild fire. In Alternative C, there would be short term effects associated with mechanical treatment and prescribed fire as analyzed in the Scenery sections of the EIS, as well as in this and the Recreation specialist reports. The activities would slightly improve scenic stability and scenic integrity, but at a very small scale.

Area 2: The Coconino NF Revised Forest Plan has identified Elden Environmental Study Area in Alternative C as having an overlap with 4FRI activities, see Figure 16.

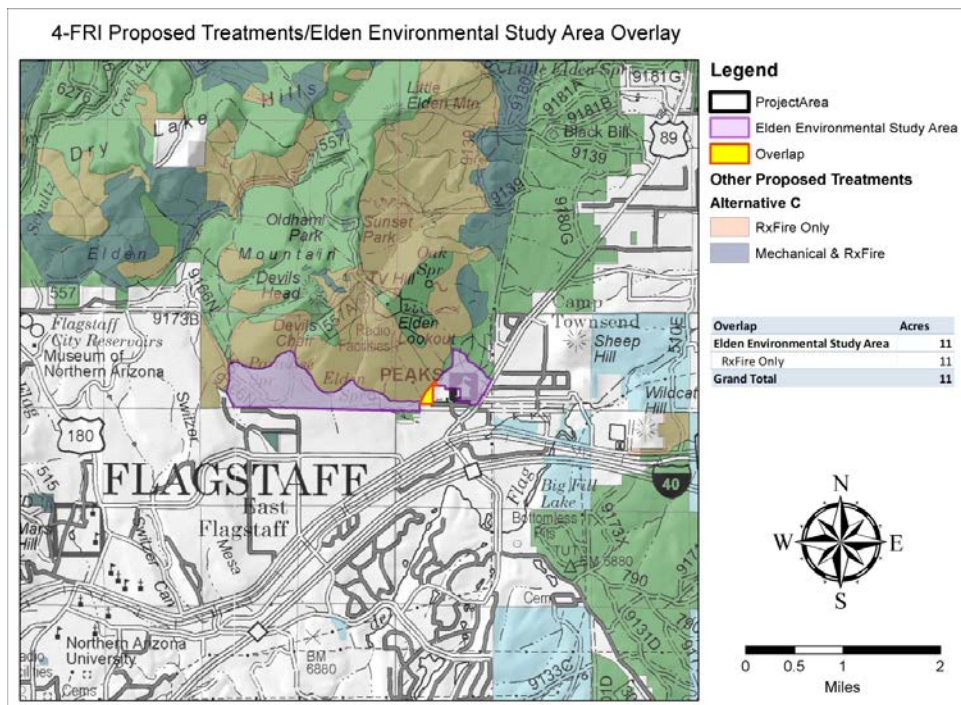


Figure 16 Proposed 4FRI treatments overlap with Elden Environmental Study Area.

The CNF revised forest plan identifies Environmental Study Areas (ESAs) as locations on the forest that are set aside from development for the purpose of environmental education. Mount Elden ESA is located at the base of Mount Elden, adjacent to the subdivisions of Shadow Mountain, Paradise Hills, Skyline Estates, and Swiss Manor and adjacent to Buffalo Park.

Desired conditions for the Mount Elden ESA include providing trails for popular hikes that are convenient and easy to use and environmental education opportunities for the general public as well as school groups. The area is available for study and recreation and is integral part of the Flagstaff Public School curriculum. There are many formal access points developed along the edge of subdivisions providing public access. This ESA strengthens the opportunities for partnerships between the school, the Forest Service, and the Arizona Game and Fish Department. A wintering deer herd provides an opportunity for wildlife viewing by the students (Forest Service 2012).

There are no standards or guidelines that conflict with the 11 acres of prescribed fire proposed in Alternative C. There may be interpretive opportunities in conjunction with the fire treatment that could be incorporated into environmental education. There would be short term negative effects from treating 11 acres in the Mount Elden ESA. These would be similar to those described above under mechanical treatments and prescribed fire. In addition there could be short term negative effects to scenery from prescribed fire. Smoke may temporarily obscure scenic features and cause discomfort for users. Effects

from smoke have been analyzed in the Fire section of the EIS and fire specialist report, as well as under Alternative B of this specialist report.

Area 3: The Kaibab National Forest Revised Plan adds the Bill Williams Mountain Management Area. There are 22 acres of treatment proposed in Alternative C that overlap the management area in scattered locations as shown in Figure 17.

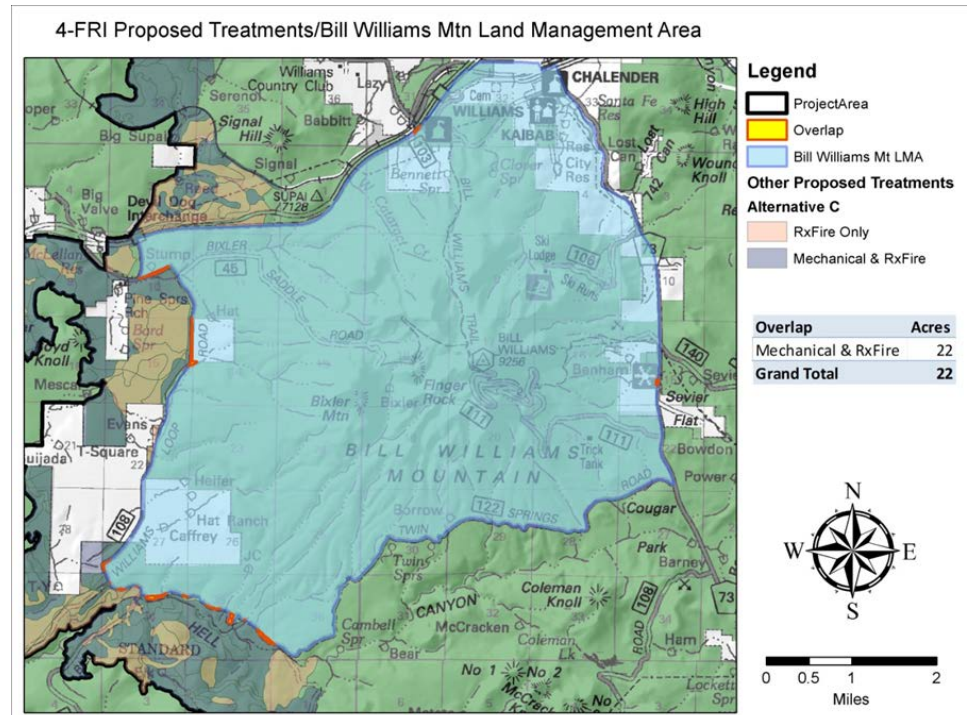


Figure 17 Proposed overlap in treatments at Bill Williams Mountain Management Area.

The proposed mechanical and prescribed fire treatments are compatible with the desired conditions for this Management Area that “risk is low for substantial damage to the municipal water supply, infrastructure, water quality, visual quality, and cultural integrity” (Forest Service 2012). It is in line with standards and guidelines, and the objective to implement a project to improve the health and sustainability of forest conditions on and surrounding Bill Williams Mountain within five years (Forest Service 2012). Potential effects of mechanical and prescribed fire treatments are similar to those described earlier in this report as well in the 4FRI EIS as well as other associated specialist reports.

Area 4: The revised Kaibab NF forest plan shows potential overlap with developed recreation sites as shown in Figure 18.

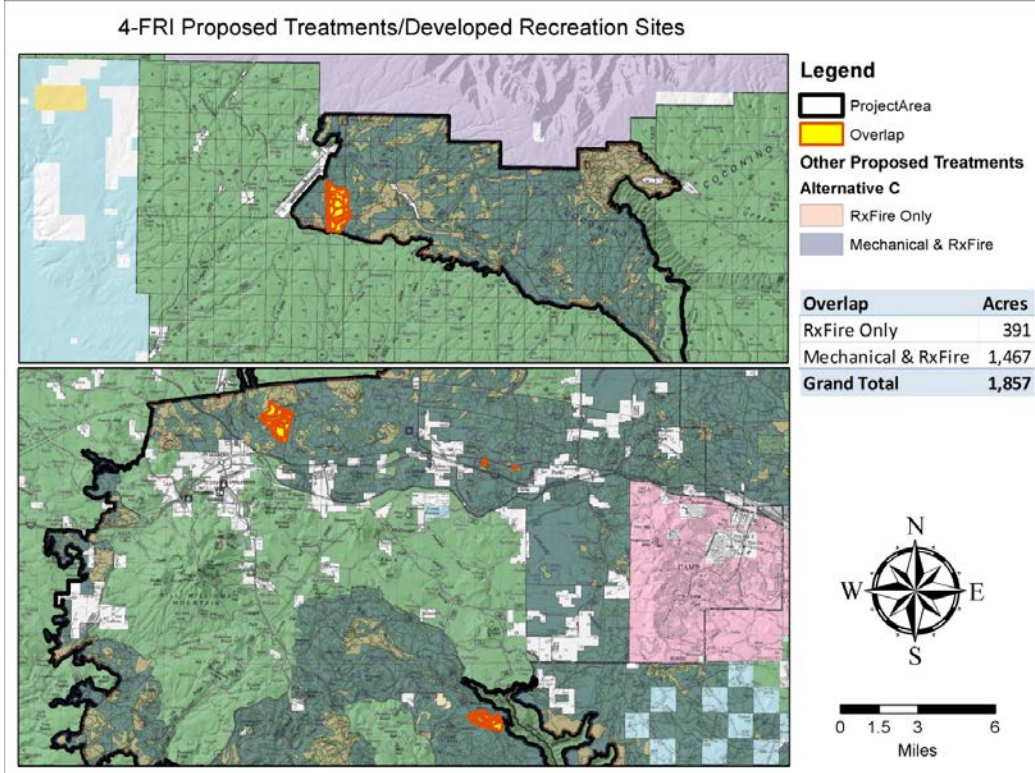


Figure 18 Proposed 4FRI treatments that overlap with developed recreation sites.

Prescribed fire or mechanical treatments and prescribed fire are proposed in Alternative C at Ten-X Campground on Tusayan Ranger District, Kaibab Lake and White Horse Lake Campgrounds, Oakhill Snowplay Area and Garland Prairie Vista on the Williams Ranger District.

Ten-X Campground has had some thinning and prescribed burning treatments in the past. Similarly Kaibab Lake and White Horse Lake Campgrounds have been thinned, but have not received prescribed fire treatment. The guidelines for campgrounds in the KNF revised forest plan (2012) states, “Developed recreation site vegetation management plans should guide tree removal and burning activities in the campgrounds”. Thinning and burning treatments at campgrounds differs from other forest areas. Such treatments may have the overall objective of reducing tree density since a forested setting and healthy forest is desired, but requires more refined treatment. It is desirable to provide and retain privacy and screening among campsites, screen other constructed features such as restrooms, provide shade, retain unique character trees and so on. Per the mitigations for recreation campgrounds, these areas will be treated, but require coordination with the District Recreation Staff in order to determine places where no treatment will occur in

order to protect constructed features. In addition prioritizing treatments, treatment timing and slash pile locations will be agreed upon. Immediate adjacent to the campgrounds (outside of fenced campground boundaries), prescribed burning or mechanical treatments and burning would be appropriate.

At Oakhill Snowplay Area and Garland Prairie Vista, it is appropriate to include burning or mechanical treatments and burning outside of an established boundary that will protect the constructed features at these sites. Per the mitigations for recreation, these boundaries will be established in conjunction with the District Recreation Staff prior to treatment.

Effects of treatments in campgrounds, outside of campgrounds and outside of the identified boundary at Oakhill Snowplay Area and Garland Prairie Vista would be similar to those analyzed for mechanical treatments and prescribed burning earlier in this report. There would be short term reductions in scenic quality as a result of treatments. In the long term, the treatments would help to reduce risks to scenic stability and would improve the overall scenic integrity.

Area 5: 4FRI treatments are proposed on eight acres of potential wilderness identified in the revised KNF forest plan (2012). Figure 19 shows the location of the overlapping areas.

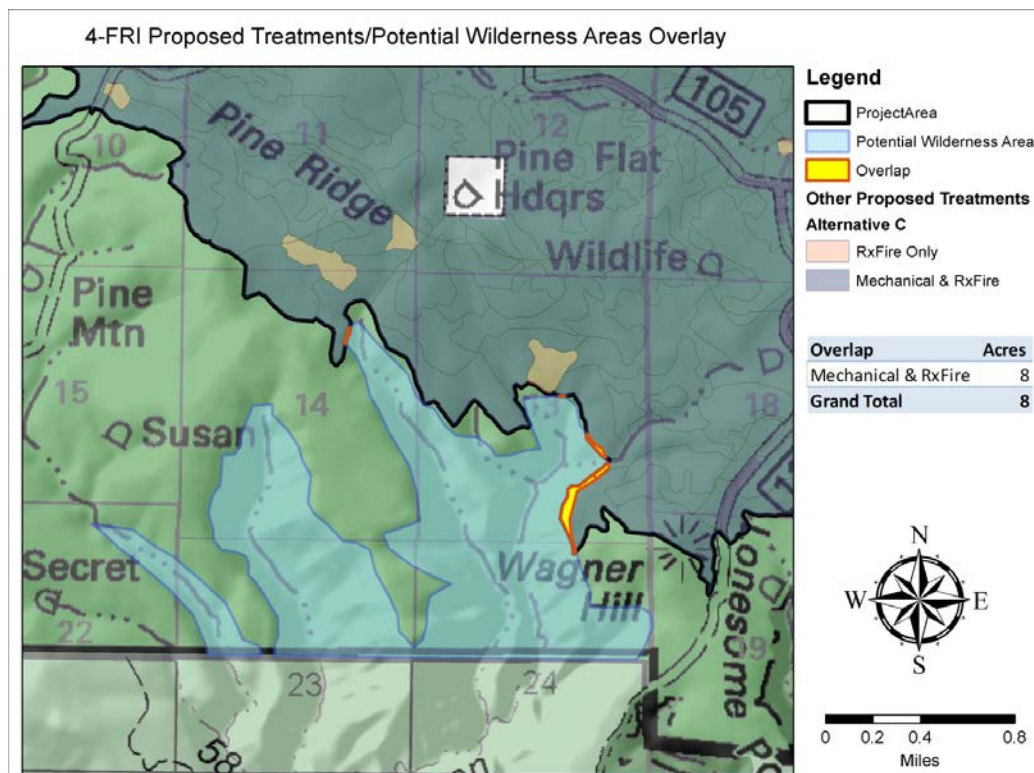


Figure 19 Proposed 4FRI treatments that overlap KNF potential wilderness.

The management approach in the revised KNF forest plan (2012f) states that “Recommended wilderness on the KNF is intended to be managed consistent with the

intent of the 1964 Wilderness Act, specifically with a focus on maintaining or achieving wilderness values.

Although all of these areas have been managed as semi-primitive, non-motorized areas in the past, they have not been managed as wilderness. Some contain evidence of human activities such as old roadbeds, stumps from timber sales, and livestock management structures.

Management may be needed including restoration, trail maintenance, and road obliteration to achieve or retain the desired wilderness values. Because recommended wilderness is not designated wilderness, use of motorized or mechanized equipment may be appropriate when it is used to move the areas toward the desired natural appearing primitive settings.”

The eight acres identified would fit within the management needs identified, specifically restoration. Effects would be similar to those analyzed in the 4FRI EIS for vegetation and fire (as well as associated specialist reports) as well as in this report. Since these areas would be managed for high scenic integrity, it will be important to prioritize these treatments and disposal of slash so that the areas will recover and meet the scenic integrity objectives as soon as possible. These treatments would have short term negative effects, but in the long term, would slightly improve scenic stability and scenic integrity.

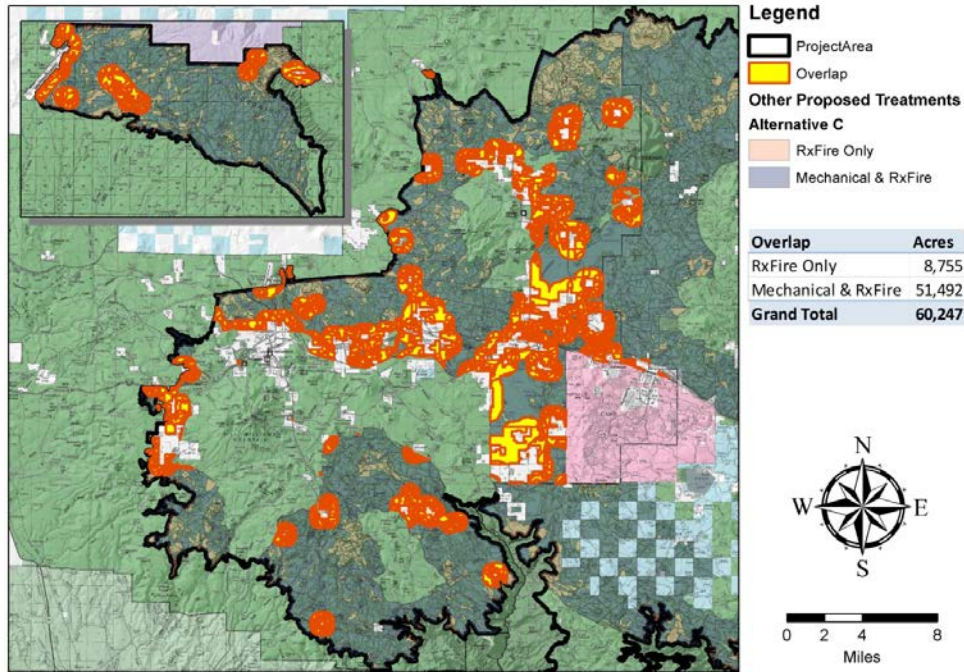
Area 6: There are 60,247 acres of proposed 4FRI treatments that overlap with the Wildland Urban Interface (WUI) Management Area of the Kaibab NF. WUI is generally considered to be the wildland area surrounding resident populations and other human developments having special significance, that are at imminent risk from wildfire. For the Kaibab NF forest plan revision (2012), the forest has refined WUI to a buffer around WUI values to focus more intensive treatments where they will have the most impact for fire protection, and includes the following lands:

- Half-mile buffer around all private lands.
- Half-mile buffer around administrative sites, fee use cabins, fire lookouts, developed campgrounds, day use picnic areas, and facilities managed under special use permits.
- Half-mile buffer around at-risk communication sites.

Figure 20 shows the Kaibab NF Wildland Urban Interface Management Area boundary. Per the revised Kaibab NF forest plan (2012) the management approach is: *“A half-mile buffer around human developments is the starting point for determining where more open, intensive treatments occur. This distance is recommended in the HFRA (2003) and provides a distance conducive for passive crown fire to transition to surface fire. During project-specific planning, the area where more intensive treatments are needed may call for adjustment.”*

The 60,247 acres of proposed 4FRI treatment are compatible with the management approach in the revised Kaibab NF forest plan (2012). The effects of these treatments are found in the 4FRI EIS and specialist reports.

4-FRI Proposed Treatments/Widland Urban Interface



Management Area.

There would be short term (1-3 years) negative effects to scenic quality from implementation of these treatments. Areas of high scenic integrity would drop to moderate until the disturbances from mechanical treatments begin to recover. (Detailed effects of mechanical treatments are found earlier in this report.) Prescribed fire would also have short term effects (1-2 years), but these would begin to blend in and become less visible after new growth emerges in the spring or vegetation response after monsoon rains in the summer. In the long term, these treatments will reduce risks to scenic stability and improve scenic integrity.

Cumulative Effects

The cumulative effects would be similar to Alternative B. There would be slightly more negative short-term cumulative effects in localized areas (areas with skid trails, pile burns, and staging areas) since this alternative would mechanically treat and burn about 10% more acres, and prescribed burn about 1% more acres. However, there would also be slightly more positive long-term cumulative effects from counteracting drought and insect damage likely to occur as a result of climate change since there would be more mechanical treatment and burning to facilitate greater forest resiliency.

Alternative D

This alternative proposes to mechanically cut 388,489 acres including mechanically thinning up to 16 inch dbh within 18 MSO PACs. Slash from these treatments would be

disposed of through various methods including chipping, shredding, mastication, and removal of biomass off-site. Prescribe burning would occur on approximately 178,790 acres. Figure 21 shows the proposed treatment areas for Alternative D.

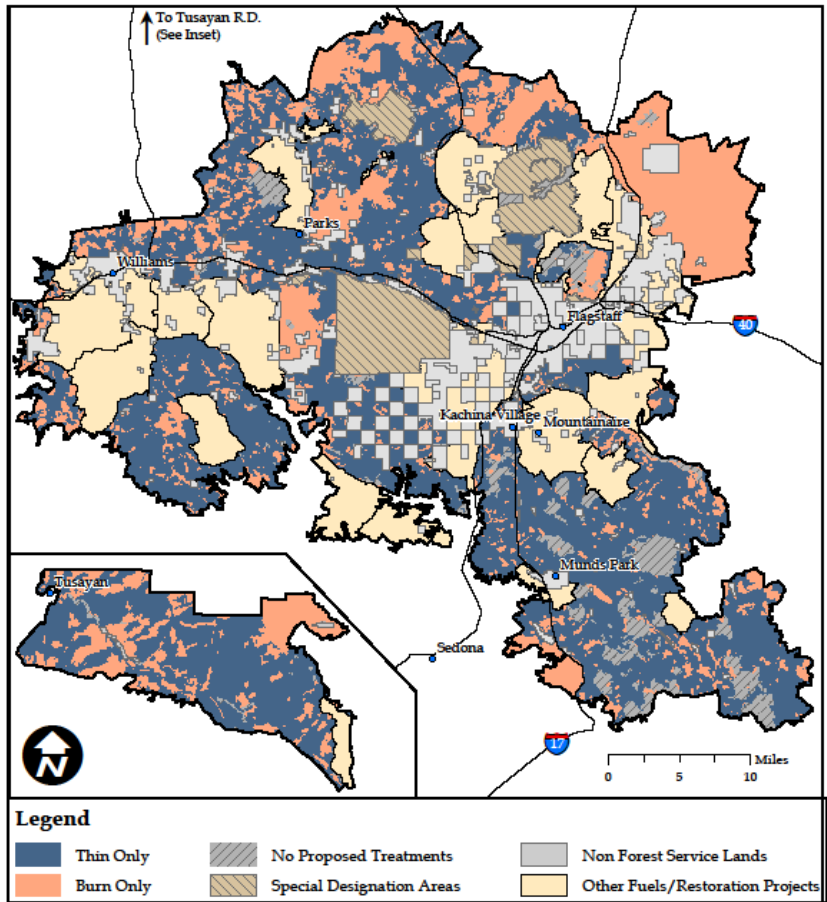


Figure 21 Proposed restoration treatments with Alternative D

Mechanical treatments and prescribed burning

Effects of mechanical thinning would be similar to Alternatives B and C. Instead of piling slash, it would be disposed of instead of being burned. Disposing of slash through chipping, shredding or mastication would have fewer short term effects than Alternatives

B or C. The treated slash would be noticeable for one or two years, until it greys out and has pine needle cover. Treating the slash may take longer than burning and would produce noise and dust. Long term effects of these types of slash treatment would likely result in decline of understory vegetation health and the increased fuels loading would increase the vulnerability of the area to high severity wildfire. In the event of wildfire, there would be negative effects to the project area including to important scenic attributes such as increased large tree mortality. Scenic quality would be immediately reduced, and there would be long term negative changes in scenic integrity objectives.

Disposing of slash through removal would have negligible short term effects to scenery, but the long term effects would include increased vulnerability to high severity wildfire. The effects would be similar to those described above.

Prescribed burning would have effects similar to those described in Alternatives B and C, but would occur on only about a third of the area. There would be a reduction and duration in the amount of smoke produced since less acreage would be burned. This would lessen the short term effects of obscuring scenic attributes. It would improve health of understory vegetation in the 178,790 acres where it would occur.

Large, mature trees

Effects would be similar to Alternative B, but the slash disposal treatments could result in increased large tree mortality in the event of wildfire.

Proposed Activities for Mexican Spotted Owls

Effects would be similar to Alternative B.

Scenery Desired Conditions, Compliance with Forest Plans and Scenic Attributes

Mitigation measures designed for this project and designation of interim SIO (lowering SIO one level) from the start of the project and meeting forest plan mapped SIO in the long term would be met under this alternative.

While there would be short term improvements in scenic quality lasting approximately 1-5 years due to slash disposal, long term scenic quality lasting more than 5 years would not be enhanced to as great an extent or for as long a period as under Alternatives B and C. While the diversity of tree species, size and spatial distribution would be improved with mechanical thinning, the risk from high severity fire would be reduced on less than a third of the project. In addition, the improvements from mechanical treatments would not be sustained in the areas where no prescribed fire would be used. Throughout much of the treatment area, stand density would be reduced.

The views along primary and secondary travel corridors, from communities, and developed recreation sites and trails would be more open and diverse. Visitors traveling along these corridors would experience a sequence of enclosures and openings but these would begin to close in again if not maintained with prescribed fire.

Natural meadows and grasslands would be improved in the short term. Aspen stands would be treated, but may not be sustained into the future since use of prescribed fire is limited to half of the area and conifers would begin to encroach on the groves over time. Oaks would be reinvigorated in the short term (1-5 years), but would also experience conifer encroachment over time. The understory component of shrubs, grasses and forbs

would develop and respond to the open canopy conditions in the areas that receive prescribed burns, but would not be as vigorous as those with repeat burns. The open, groupy forest structure, nutrient recycling and understory response would be limited and without frequent low severity fires would begin to revert toward existing conditions.

The short term (1 to 5 years) visual disturbances from restoration activities would be within the reference conditions of the area. In the short term (1 to 5 years) the disturbances would be visible and would lower the scenic quality. In about one-third of the area where both thinning and prescribed burns occur, the results would be similar to those found with Alternative B. In the remainder of the restoration area only receiving mechanical treatments, the natural appearance of the area would begin to recover, but over time these improvements would become static and begin to deteriorate again. Throughout project implementation it is expected that the valued scenic character will begin to improve, but the risks to scenic attributes would only improve in the short term (1 to 5 years), and the risk of high severity fire would begin to increase in the landscape. In addition, if a wildfire were to start, it is likely that while it would be mostly a surface fire, it might be moderate and high severity, and many trees would be scorched and killed as a result, thus reducing scenic quality.

Slightly fewer acres will be thinned, and about a third of the acres would be burned under Alternative D than with Alternatives C. The same amount of acres would be thinned, and about one-third of the acres would be burned as Alternative B. This alternative would result in about one-third as much understory vegetation improvement than with Alternatives B or C.

Forest Plan Amendments

Three non-significant forest plan amendments (see Appendix C of the 4FRI DEIS for details) would be required on the Coconino NF to implement alternative D:

Amendment 1 would: (1) allow the use of mechanical treatments to improve habitat structure, (2) allow for mechanical treatment up to 16-inch diameter at breast height within 18 MSO PACs to improve nesting and roosting habitat, and, (5) would defer all Mexican spotted owl monitoring to the project's Biological Opinion issued by the US Fish and Wildlife Service.

Effects from this amendment would be similar to Alternative B, Coconino forest plan amendment 1.

Amendment 2 would: 1) add the desired percentage of interspace within uneven-aged stands to facilitate restoration and defines interspace, (2) add the interspace distance between tree groups, (3) add language clarifying where canopy cover is and is not measured, (4) allows 29,017 acres to be managed for an open reference condition (figure 47), which affects canopy cover guidelines for VSS 4 through VSS 6 groups and reserve trees, and (5) add a definition to the forest plan glossary for the terms interspaces, open reference condition, and stands.

Effects from this amendment would be similar to Alternative B, Coconino forest plan amendment 2

Amendment 3 would allow for managing to achieve a “No Adverse Effect” determination for significant, or potentially significant, inventoried heritage sites.

There would be no effects to scenery with this amendment.

Two non-significant forest plan amendments would be required on the Kaibab NF to implement the proposed action:

Amendment 1 would: 1) add the desired percentage of interspace within uneven-aged stands to facilitate restoration and defines interspace, (2) add the interspace distance between tree groups, (3) add language clarifying where canopy cover is and is not measured, (4) allows 27,637 acres to be managed for an open reference condition (figure 47), which affects canopy cover guidelines for VSS 4 through VSS 6 groups and reserve trees, and (5) add a definition to the forest plan glossary for the terms interspaces, open reference condition, and stands.

The effects of this amendment to the Kaibab NF forest plan would be similar to Alternative B, amendment 1.

Amendment 2 would defer all Mexican spotted owl monitoring to the project’s Biological Opinion issued by the US Fish and Wildlife Service.

There would be no effects from this amendment to the Kaibab NF forest plan.

Cumulative Effects

The cumulative effects analysis area is the ponderosa pine forest on the Coconino and Kaibab NF’s. The timeline for analysis is 20-30 years because most long-term effects of the alternatives are assessed out to a 20-30 year timeframe (with the exception of large scale high severity wildfire which is more difficult to project). The following is list of actions relating to scenic attributes, landscape character and scenic integrity considered in the cumulative effects analysis for this project:

- Past activities that created the current conditions include grazing, the evolving forest management practices related to timber harvest and fire suppression, drought, disease and insect infestations, developed and dispersed recreational use.
- Present and future activities such as vegetation management, fuels management, utility corridor clearing and new utility corridors, and other management activities (e.g. noxious weeds treatments). These activities could occur on private lands as well.

The cumulative effects of past management activities are visible as the existing conditions. Vegetation management practices, fire suppression, and over grazing have resulted in the current even-aged forest structure, overstocked conditions, sparse understory trees, shrubs, grasses and forbs, conifer encroached meadows and savannas.

The short term cumulative effects (1-5 years) of Alternative D combined with similar current and future restoration treatments and prescribed burning projects are expected to be widespread, but of small scale (1-10 acres) where they occur. For example, in areas where there will be evidence of mechanical thinning treatments and evidence of grazing and dispersed recreation impacts or infrastructure development (utility lines), and the scenic quality would be cumulatively decreased in these places.

In the long term (5 to 20 or 30 years), initially, there would be widespread improvement in forest structure, but vulnerability to wildfire would remain high thus limiting forest resiliency. While this alternative would counteract impacts to large trees and understory vegetation resulting from climate change and the resulting drought and vulnerability to insect outbreaks and disease, it would be very limited. Specifically, the understory would not be as healthy or diverse and understory vegetation would continue to be cumulatively impacted by grazing, recreational use, and abiotic factors such as drought.

When natural stressors such as wildfires or insect outbreaks occur, or human activities such as new utility corridors, or development of a new recreation site, or a new private subdivision is developed, the effects of Alternative D could serve to slightly counteract the scenic effects of these activities and other projects, but it would be limited compared to other alternatives. When drought conditions or unusual weather events as a result of climate change occur, the ponderosa pine forest would be not be as resilient to such events. The overall trend to scenic quality resulting from this alternative in combination with other activities and projects would be toward level or downward for improving landscape attributes, and sustainable landscape character.

Submitted by: Charlotte T. Minor, Coconino NF Landscape Architect
January 7, 2013

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Appendix A Historic Photo Comparisons on the Kaibab National Forest.
(Provided courtesy of the Williams Ranger District)



Coleman Lake 1909 vs. 2008





Bear Springs Cabin 1900s vs 2003





Santa Fe Dam 1910 vs. 2003



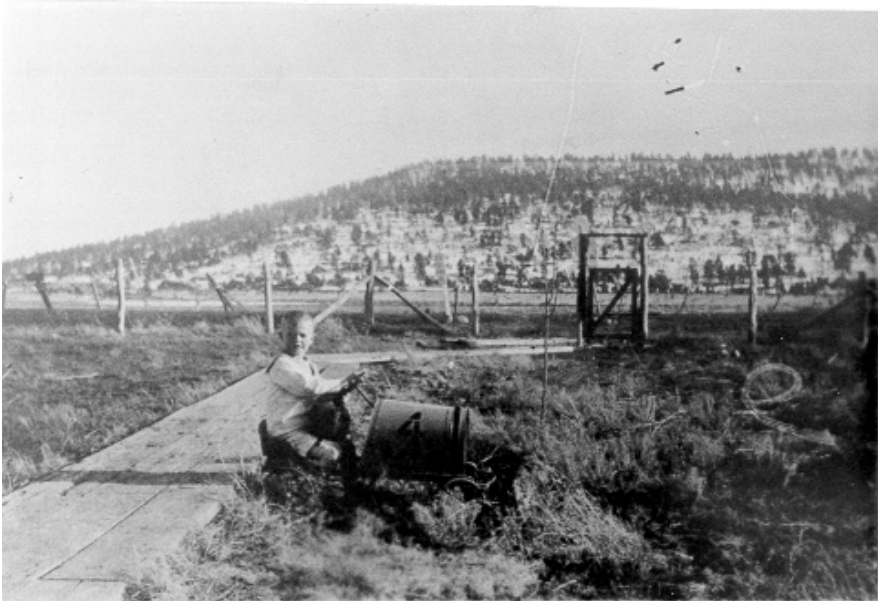


Elephant rocks Golf Course 1930s, 2003



Chalender Early 1900s vs 2003





High School Hill early 1900s vs 2003





Loop Road Coleman Lake 1930s/2003





Kennedy Dam 1930s/2003



Appendix B Scenic Stability Assessment

This assessment follows the guidance from Appendix J (Recommended SMS Refinements, 2007) of the Landscape Aesthetics: A Handbook for Scenery Management.

Introduction

Scenic Stability considers the condition of the valued scenery attributes identified in the scenic character description of the 4FRI project. It evaluates whether their condition is within the natural range of variability, the range of conditions that indicate a properly functioning ecosystem. For example, the forest vegetation related scenic attributes (pattern, stand structure/density, species composition, etc) give an indication of whether the ecosystem is functioning properly and if the scenic attributes can be sustained.

Scenic Stability also considers stressors that can affect scenery such as fire, insects and disease, and infestations of noxious weeds. Stressors may not threaten scenic attributes when the forest is functioning within reference conditions, but may become detrimental when the forest functions outside of these ranges.

Method

Scenic Stability uses a descriptive six level rating scale from Very High Stability to No Stability to identify the degree to which the scenic attributes of the valued scenic character are likely to be perpetuated within the ecosystem. The highest scenic stability ratings indicate resilient ecosystems that are functioning within their reference conditions. These would also be places where all scenic character attributes are present and likely to be sustained into the future. The individual scenery attribute risk determination guidelines, noted in Table 1, are used to rate the likelihood that valued scenery attributes will be maintained. Lower scenic stability ratings indicate areas where intensive vegetation management practices to begin to restore ecosystem health and function could also benefit scenery by restoring and/or maintaining valued attributes of scenic character. Areas of higher scenic stability need less intensive management activities to maintain their valued scenic character attributes.

Table 1 Individual scenery attribute risk determination guidelines.

Scenery Attribute Condition	Ecosystem Stress On Scenery Attribute			
		MINOR	MODERATE	SEVERE
STRONG	No Risk	Low Risk	Moderate Risk	
FAIR	Low Risk	Moderate Risk	High Risk	
POOR	Moderate Risk	High Risk	High Risk	

Assessment of scenic stability involves determining ecological risks and effects on valued scenery attributes based on known conditions and stressors that exist. The assessment will evaluate dominant and minor, as well as stable and vulnerable scenery attributes identified for the project. Evaluation of one or more dominant scenery attributes should be part of every Scenic Stability assessment; minor scenery attributes can be included as applicable.

Determination of the scenic stability level involves combining each of the individual scenery attributes into a single scenic stability level for the analysis area. Table 2 guides the combining and rating process. The most appropriate risk box will describe risks that are equal to or greater than the closest to the combined individual scenery attribute risks.

Table 2 Scenic Stability Level Determination

Ecosystem Risk ⁴ to the Dominant Scenery Attributes	Stability ⁵ of the Dominant Scenery Attributes	Scenic Stability Level
LOW risk to ALL ⁶ (dominant and minor)	ALL are stable	VERY HIGH STABILITY
LOW risk to ALL (dominant)	ALL are stable	HIGH STABILITY
HIGH risk to a FEW	MOST are stable	MODERATE STABILITY
HIGH risk to SOME	SOME are stable	LOW STABILITY
HIGH risk to MOST	FEW are stable	VERY LOW STABILITY
HIGH risk to ALL	NONE are stable	NO STABILITY

Definitions of Scenery Stability Levels are included to help clarify the characteristics of the ratings.

VERY HIGH STABILITY – all dominant and minor scenery attributes of the valued scenic character are present and are likely to be sustained.

HIGH STABILITY – All dominant scenery attributes of the valued scenic character are present and are likely to be sustained. However, there may be scenery attribute conditions and ecosystem stressors that present a low risk to the sustainability of the dominant scenery attributes.

MODERATE STABILITY – Most dominant scenery attributes of the valued scenic character are present and are likely to be sustained; a few may have been lost or are in serious decline.

LOW STABILITY – Some dominant scenery attributes of the valued scenic character are present and are likely to be sustained. Known scenery attribute conditions and ecosystem stressors may seriously threaten or have already eliminated others.

VERY LOW STABILITY – Most dominant scenery attributes of the valued scenic character are seriously threatened or absent due to their conditions and ecosystem stressors, and are not likely to be sustained. The few that remain may be moderately threatened but are likely to be sustained.

⁴ Ecosystem risk identifies the maximum (most severe) degree of risk to some of all of the dominant scenery attributes in the analysis area. For example, HIGH risk to a FEW means that 10-40% of all the dominant attributes are at high risk, while the remaining 60-90% ranges from NO risk to MODERATE risk.

The following ranges will be used:

- ALL = 90-100% of all dominant attributes
- MOST = 60-90% of all dominant attributes
- SOME = 40-60% of all dominant attributes
- FEW = 10-40% of all dominant attributes
- NONE = 0-10% of all dominant attributes

⁵ Stable refers to scenery attributes with MODERATE, LOW, or NO risk (HIGH) risk attributes are not stable.

⁶ This is the only box that considers both the dominant and minor scenery attributes.

NO STABILITY – All dominant scenery attributes of the valued scenic character are absent or seriously threatened by their conditions and ecosystem stressors. None are likely to be sustained, except relatively permanent attributes such as landforms.
Scenery Attribute Risk Determination

Vegetation has been identified as the dominant scenic attribute and the assessment will focus on aspects of it. Water form is a minor scenery attribute, and will be evaluated as it applies to work proposed for springs and ephemeral channels. There are indirect actions that affect landform in the form of roads. Landform is typically a more stable attribute. A minor evaluation will be provided for landform as it relates to road decommissioning.

Vegetation Scenery Attributes

Scenery Attribute: The ponderosa pine forest has an open appearance with tree groups of varying ages, sizes and shapes and a mosaic of interspaces and openings. Forest resiliency and diversity is dependent on the distribution of age and size classes and the capacity of the site. Currently, over 50 percent of the project area lacks age and size class diversity and is in an even-aged structure. This has resulted in a homogenous landscape with reduced resiliency. Reduced resiliency is expressed as the increased potential for severe effects from wildfire, increased stand density-related mortality, reduced resiliency to bark beetle attack, increase dwarf mistletoe spread and reduced understory productivity. The desired condition is to have a forest structure that represents all age classes necessary for a sustainable balance of regeneration, growth, mortality and decomposition (USDA 1987, USDA 1988).

The ponderosa pine forests on the Kaibab are much denser than reference conditions, with 79 percent of the stands in a “closed” state (>32 percent canopy cover). Historically there were spaces between clumps of trees that are now either smaller or nonexistent. Only 19 percent of the ponderosa potential natural vegetation type (PNVT) is currently in the historical condition, which was all a mature to old forest with various-sized patches of young regenerating forest (USDA 1988). Likewise on the Coconino NF, there have been significant shifts to a closed medium aged forest with loss of herbaceous understory and tree age diversity with a trend away from reference conditions. Currently 76 percent of young and young to mid aged forests have cover greater than 30 percent. (USDA 1987) Figure 1 illustrates the canopy cover in the project area.

As noted earlier, a century ago the pine forests had widely-spaced large trees with a more open, herbaceous forest floor (Cooper 1960). Typical historical tree group/patch size ranged from 0.5 to 0.75 acres in size, (2- 40+ trees) (Cooper 1961; White 1985; Pearson 1950). In contrast to having a ponderosa pine ecosystem consisting of groups of trees with an open tree canopy density mixed with interspaces (Woolsey 1911), approximately 75 percent of the ponderosa pine forest type within the project area has a moderately closed to closed tree canopy density. Table 2 indicates current tree canopy closures across the project area as an indicator of continuous tree canopy versus the historical tree group and opening patch size of 0.5 to 0.75 acres and 2-40 trees.

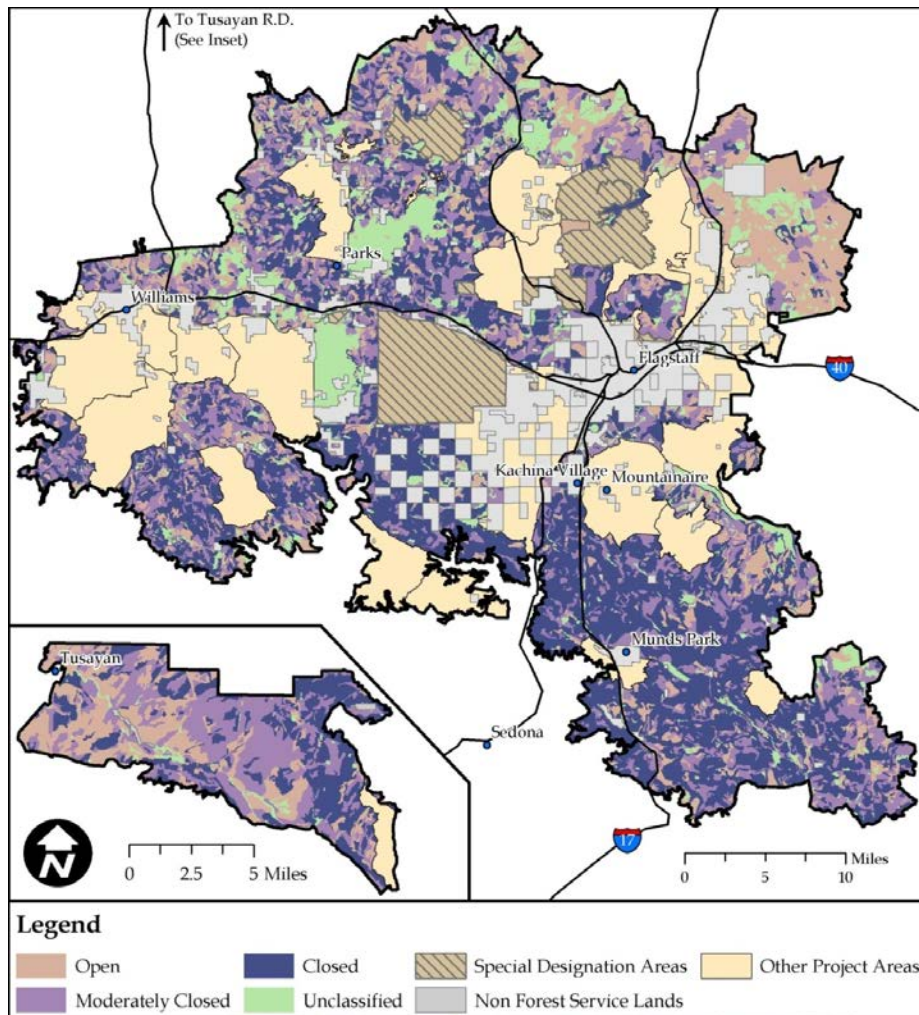


Figure 1 Tree canopy density distribution in the 4FRI project.

Table 2 Tree canopy density across the project area

Tree Canopy Density Classification (%)	Percent of Project Area (%)
Open: 10% to 39%	22
Moderately Closed: 40% to 59%	30
Closed: 60%+	45
Unknown	3

Using 39% tree canopy density as the upper end of the range of reference conditions, about 30% of the project area has moderately closed canopy, up to 20% denser than

reference conditions. In addition, 45% of the project area has closed canopy, over 20% denser than reference conditions. Approximately 75% of the project area is outside of the range of reference conditions. In addition, the lack of age and size class diversity reduces forest resilience. Using guidance from Table 1, this would put the scenic attribute at poor condition. The stressors including lack of age and size class diversity, overly dense trees and closed canopy cover, lack of frequent low severity fires, and drought are severe. **This scenery attribute is at high risk.**

Scenery Attribute: Old age ponderosa pine and pinyon-juniper trees are well represented across the project area. A review of stand data and habitat classifications within the project area indicates there are approximately 412,179 acres of ponderosa pine in the project area. Of this total, about 40% of the area on the Coconino, and 35% of the Kaibab would be allocated to old growth. Old growth allocations are based on current conditions within the project area along with forest plan specific management direction. Not all acres currently meet the definitions, but would be managed to develop the characteristics. There are approximately 23,000 acres of pinyon-juniper within the project area. The old growth allocation includes approximately 77 percent on the Coconino and 58 percent on the Kaibab of the total acres as these sites/acres are closest to the minimum criteria for old growth conditions (per the forest plan). Not all acres currently meet the definitions, but would be allowed to develop the characteristics. Figure 2 shows the distribution of ponderosa pine and pinyon-juniper old growth allocations in the project area.

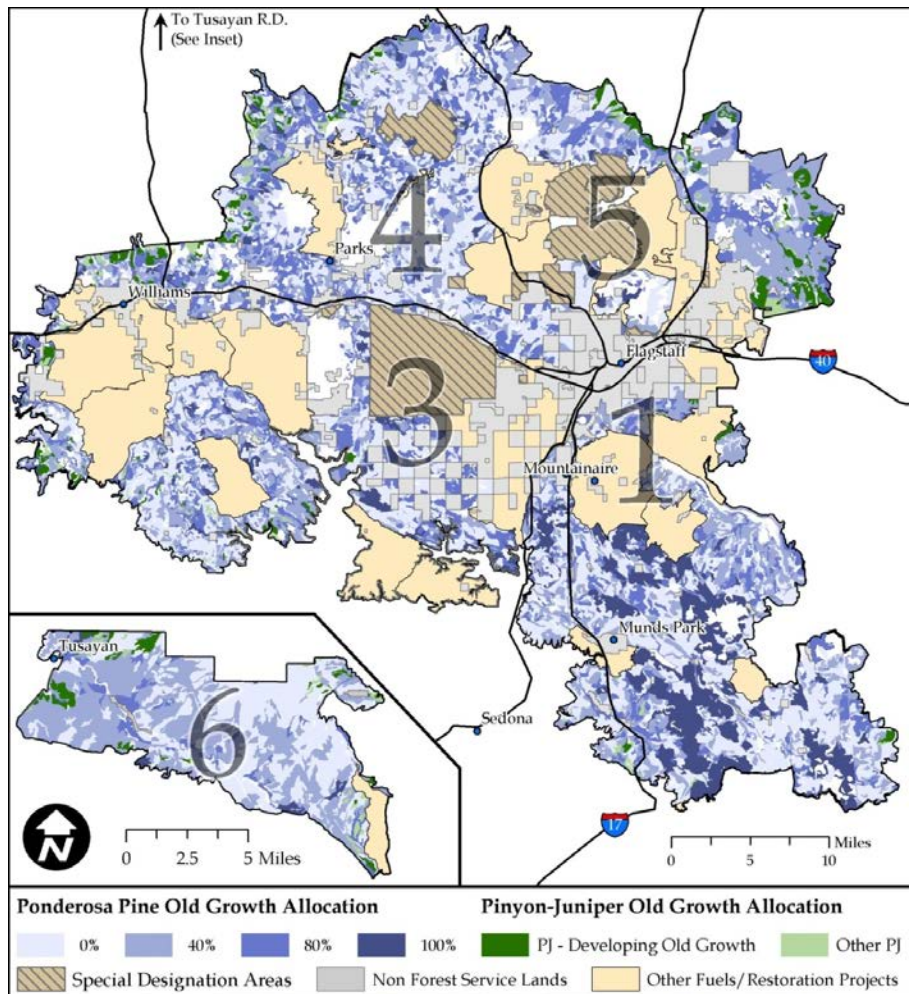


Figure 2 Ponderosa pine and pinyon-juniper old growth allocations.

For ponderosa pine, the old growth allocation acreage/percentage includes: 100 percent of MSO protected habitat; 100 percent of MSO target/threshold; 40 percent of MSO restricted habitat that is uneven-aged with low dwarf mistletoe infection; 80 percent of MSO restricted habitat that is even-aged, mid-aged to old with low dwarf mistletoe infection; 100 percent of goshawk nest stands; 40 percent of goshawk PFA and foraging areas that are uneven-aged with low dwarf mistletoe infection; and, 80 percent of goshawk PFA and foraging areas that are even-aged, mid-aged to old with low dwarf mistletoe infection. Most sites currently do not fully meet the minimum criteria for ponderosa pine old growth conditions as listed in the forest plans. However, the habitat types noted above are closest to meeting old growth conditions.

The old growth allocation includes all sites that are classified within the mid-aged to old vegetation structural stages. In ponderosa pine, there is a need to manage sites allocated as old growth towards desired old growth characteristics. Where management occurs

within the pinyon-juniper cover type, there is a need to maintain the old growth characteristics within the sites allocated as old growth.

The large tree retention strategy (LTRS) was developed by the four-forest restoration stakeholders through collaboration. Large post-settlement trees, as defined by a socio-political process, are those greater than 16 inches diameter-at-breast height [dbh]). The intention of the exception process within the LTRS was to increase landscape heterogeneity and conserve biodiversity. The LTRS represents social agreement between parties that greatly enhances the chance for success and reduces the risk of conflict. If the LTRS is not incorporated, the current social support for landscape-scale restoration may be withdrawn. In addition, it may result in the removal of key ecosystem components that include nesting and roosting habitat and large woody debris that is important for wildlife.

The key components of the large tree retention strategy are considered in Alternative C of the 4FRI DEIS. It links circumstances to when large, post-settlement trees may be removed to make progress toward the desired conditions.

Using Table 1, the scenery attribute condition is fair because not all old growth is fully developed and doesn't meet all criteria for old growth conditions. Ecosystem stressors include fire, insects and disease, and drought. Social concerns have also been identified regarding retention of large trees. The combination of both ecosystem and social concerns results in a moderate level of stress. **This scenic attribute is at moderate risk.**

Scenery Attribute: The ponderosa pine and pinyon-juniper forests in the project area have a healthy, diverse understory. There is a direct relationship between canopy openings and understory vegetation. In the project area there is a lack of open tree canopies mixed with interspaces which mimic historical spatial patterns as well as openings for tree regeneration and the development of grass and forbs. Forest thinning and prescribed burning are often proposed and implemented to reverse the undesirable changes in ponderosa pine forests of Arizona (Abella 2004). About 99 percent of the vegetation diversity in Southwest ponderosa pine forests occurs as understory species (Laughlin and Abella 2007). Abella and Springer (2008) concluded that tree thinning was a viable management technique for increasing the vigor and richness of understory. Forest thinning and prescribed burning can make resources (e.g., light, nutrients, water) more readily available for understory plant species by reducing overstory competition and enhancing nutrient cycling. Increasing resource availability can provide the herbaceous component of a plant community the opportunity to capitalize, which can result in increased species abundance, vigor, and productivity; and potentially enhance species diversity.

The condition of the scenery attribute will vary depending upon canopy openings. Since 75% of the project area has canopy cover greater than 39%, and there is a lack of prescribed burning, it puts the understory in fair condition. Ecological stressors of tree density, closed canopies, lack of frequent fire are moderate. **This scenic attribute is at moderate risk.**

Scenic Attribute: The project area has a resilient forest where frequent, low-severity fires occur without wide-spread crown fire or high severity surface fires. Stand replacing fire from an overgrown forest and high-severity surface fires from unnaturally

high surface fuel loads is the trajectory most of the project area is on. Approximately 41 percent of the project area has the potential to sustain crown fire, about 58 percent has the potential for surface fire, and 1 percent has no fire potential (table 4). Figure 1 shows the existing risk of surface and crown fire. The lack of fire or thinning has produced overly dense stands (Fule et al. 2003), which are out of the natural range of variability for the pine systems in the project area.

Table 4 Existing and desired fire potential in 4FRI ponderosa pine project area

Evaluation Criteria	Existing Condition	Desired Conditions
Potential crown fire (%)	34	Up to 10
Canopy Base Height (ft)	15	>18
Canopy Bulk Density (kg/m ³)	0.028 to 0.35	<0.05
Potential surface fire (%)	62	Up to 90

Crown fire generally produces 100 percent mortality in ponderosa pine by consuming the crowns of trees. Crown fire can be active or passive. Active crown fire advances from crown to crown in the tops of trees or shrubs (NWCG 2008). A passive crown fire is a fire in the crowns of trees, but only individual trees or groups of trees torch. Passive crown fire that is ignited in forests with interlocking crowns and/or low crown base heights may readily become active crown fire in more extreme weather situations. With a delay of more than 20 years between fires or treatments (a delay in the fire-return interval), areas of passive crown fire may transition to having the potential for active crown fire. The current fire-return interval is approximately 43 years, about four times longer than the desired historical fire-return interval which is between 2 and 21 years (Weaver 1951; Cooper 1960; Fule 2004; Heinlein et al. 2005). Even without crown fire, a high severity surface fire burning through this area could scorch the canopy sufficiently to cause widespread mortality (Van Wagner 1993).

Without a frequent fire regime, duff cones (build-up of needles, bark, and other litter) accumulate around the base of a large tree due to a lack of fire. Such cones may smolder for extended periods of time and damage the cambium of the tree. This would make the tree more vulnerable to other stressors (drought, insects, and disease).

No more than 10 percent of the project area should be prone to crown fire (Swetnam and Baison 1996; Roccaforte et al. 2008). When crown fire does occur, it should be mostly passive crown fire, occurring in single trees, groups, or clumps, or areas where there had been mortality (wind throw, insects, etc.) Fire would function as a natural disturbance within the ecosystem without causing loss to ecosystem function or to human safety, lives and values.

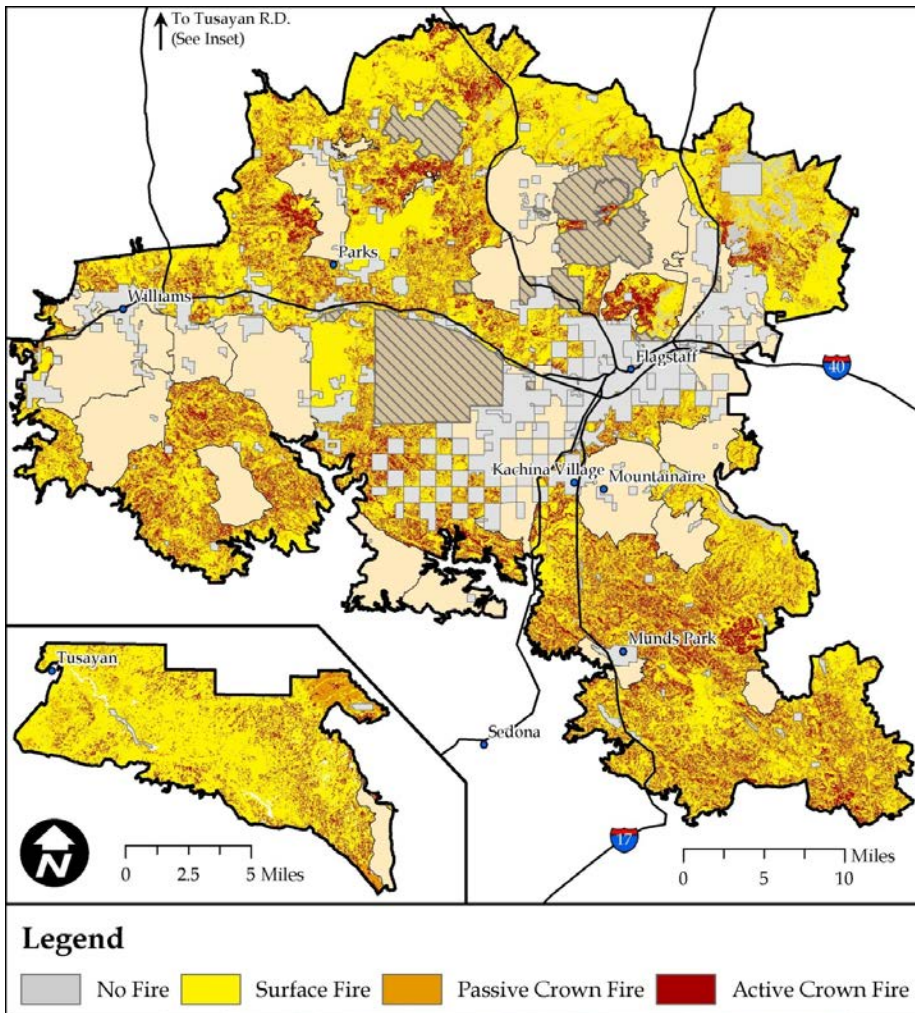


Figure 1 Current surface and crown fire potential in the 4FRI restoration treatment area.

Since about 34% of the project area has the potential for crown fire, and 64% has the potential for surface fire, the scenery attribute condition is poor. Crown fire usually causes 100% mortality and would negatively affect the scenic attributes. The higher than historical fire return level also indicates that high severity surface fires could scorch tree canopies and cause additional mortality in as much as 64% of the area. The ecological stressors of fire, high tree densities, drought and potentially more intensive weather events (wind, lightning, etc) are severe. **This scenery attribute is at high risk.**

Scenery Attribute: Much of the forest has open appearance of tree groups and openings making the forest more resilient to mortality from insects and disease.

Ponderosa pine is attacked and killed by several different bark beetles in the genera *Dendroctonus* and *Ips*. It can be difficult to discern what species initiated the attack. In

the project area, bark beetle activity in ponderosa pine currently appears to be at endemic levels.

Dwarf mistletoe infection in ponderosa pine is common throughout the project area. Mistletoe infected trees slowly weaken, experience growth loss, and eventually die (Lynch et al. 2008). Inventory data and previous incidence reviews (Hessburg and Beatty 1985) indicates approximately 25 to 35 percent of the project area has some level of infection ranging from light to extreme. The desired condition is move towards forest composition, structure and pattern natural reference conditions that would allow dwarf mistletoe and beetles to function at endemic or historical levels. Ponderosa pine is attacked and killed by several different bark beetles in the genera *Dendroctonus* and *Ips*. It can be difficult to discern what species initiated the attack. In the project area, bark beetle activity in ponderosa pine currently appears to be at endemic levels.

The condition of the scenery attribute of an open forest with tree groups and openings is fair as it relates to insects and disease (insects appear to be at endemic levels, and dwarf mistletoe infects 25-35% of the project area). The ecosystem stressors relating to insects and disease are high tree densities, and drought. These are moderate stressors. **This scenery attribute is at moderate risk.**

Scenery Attribute: Within the ponderosa pine and pinyon-juniper forests, there is a healthy, resilient understory trees and shrubs including Gambel oak, aspen, and sagebrush. Prairies and grasslands provide important contrast to the forested landscape. Vegetation diversity throughout the project area has declined (USDA 1988a; USDA 1988b). Gambel oak, a sub-type within ponderosa pine, is important to many wildlife species as it provides important nesting and foraging habitat. A lack of fire, which ultimately caused increased stand densities, has allowed Gambel oak to become overtopped by fast growing ponderosa pine (Abella and Fule 2008). The desired condition is to develop and maintain a variety of oak size classes and forms, where they occur. Oak should range from shrubby thickets and pole-sized clumps to large trees across the landscape in order to provide habitat for a large number and variety of wildlife species (Brown 1958; Kruse 1992; Rosenstock 1998; Abella and Springer 2008; Abella 2008a; Neff and others 1979). There is a need to stimulate new growth and maintain growth in large-diameter trees and use management strategies that provide for a variety of shapes and sizes across the landscape.

Aspen is an early seral component of the ponderosa pine ecosystem and a species that provides for habitat diversity. Aspen is dying or rapidly declining on both forests due to the combined effects of conifer encroachment, browsing, insect, disease, severe weather events, and lack of fire disturbance (Lynch et al 2008; USDA 1988) (USDA 1987; USDA 1988). A study by Fairweather et al. (2007) on the Coconino NF indicates that aspen on low-elevation dry sites (<7500 ft) has sustained 95 percent mortality since 2000. Mortality on these sites is expected to continue as many live trees currently have only 10 to 30 percent of their original crown. The desired condition is to maintain and/or regenerate aspen. Where possible, there is a need to stimulate growth and increase individual recruitment of aspen.

Many grassland acres across the Coconino and Kaibab NF have become encroached with trees and converted to forest (USDA 1987; USDA 1988). An ecological sustainability

assessment completed in 2009 found that grasslands on the Coconino have decreased. Historically, only 2 percent of the Great Basin grasslands were comprised of very large shrubs, closed canopy and some very large trees. Since reference conditions, this percentage has increased by 17 percent (USDA 1988). Within montane subalpine grasslands, the percentage has increased from 0 to 33 percent (USDA 1988). On the Kaibab NF, the ecological sustainability assessment found that at least 8 percent of the montane, subalpine, and Great Basin grasslands have been invaded by conifers (USDA 1987).

The desired condition is to move towards the natural range of variability. Tree canopy cover would range from 0 to 9 percent and grasses and forbs would dominate. The fire return interval would less than 35 years (USDA 1987). Fire would function as a natural disturbance across the landscape without causing loss to ecosystem function or to human safety, lives, and values. When fire did occur, vegetation would return close to pre-fire conditions within a few years (Johnson et al 1998) and would typically replace less than 75 percent of the overstory (USDA 1988). There is a need to reduce (and in some cases remove) tree encroachment which has reduced the size and function of landscapes that were historically grasslands.

Pine-sage provides valuable habitat for several species of wildlife including migratory birds. Shrub species that occur with sage and provide further diversity include Fendler's ceanothus, mountain mahogany, snakeweed, bitter brush, Oregon boxleaf, and Gambel oak. Sage cover under ponderosa pine varies from 0 to over 35 percent. In areas where percent cover is about 0, fire had burned with moderate to high severity surface fire or the pine had overtopped and shaded out the sage. In areas where percent cover is over 35, fire had been excluded or the pine density was more open. The desired condition for the sage component of the pine/sage community is to have a shifting mosaic of sagebrush with a mix of age classes. The mosaic pattern would be largely regulated by fire. The cover of big sage is many times greater than the desired condition. There is a lack of fine, herbaceous fuels that should be found within the sagebrush clumps. These herbaceous fuels help minimize the effects of fire (Tisdale and Hironaka 1981 in McArthur and Taylor 2004). Sagebrush and pine are both present in various age classes, along with a diversity of other vegetation and an herbaceous layer.

The scenery attribute condition is fair for Gambel oak, poor for aspen, fair for grasslands, and fair for pine-sagebrush. Ecosystem stressors include high density ponderosa pine and pinyon-junipers forests, lack of frequent, low severity fire, and drought. Gambel oak, grasslands and pine-sagebrush have moderate stress, aspen receives severe stress. **The scenic attributes of Gambel oak, grasslands and pine-sagebrush are a moderate risk, aspen is at high risk.**

Minor Scenery Attribute: Springs, seeps and ephemeral channels because of the diversity they provide, including contrast in color, shape, and texture. In addition, the presence of water, even if seasonal, increases the valued scenery. Water features are relatively rare across the Kaibab and Coconino NF within the project area. While important, these are minor scenery attributes. Springs and seeps play an important role on the landscape for hydrological function of watersheds; and, they are very important for wildlife and plant diversity. On the Coconino NF, although reference conditions are largely unknown, the fact that seeps and springs are well represented, or redundant,

throughout all major watersheds assures the opportunity for a high level of sustainability as long as their condition is functional. They are natural water features that existed prior to Euro-American settlement and were probably functional due to lack of human disturbances (USDA 1988). Most springs and seeps in the project area have reduced function from drought, lack of fire, and closed forest canopies which increase evapotranspiration. Excessive disturbance can result in these features becoming non-functional (USDA 1987; USDA 1988). Fifty-one developed springs on the Coconino NF are not functioning at or near potential. On the Kaibab NF, 27 springs on the Kaibab NF have reduced function. The impaired function is displayed by the headcut in the spring outflow, the encroachment of ponderosa pine into the spring site, and the lack of riparian vegetation that is normally associated with a functioning riparian site.

The desired condition for springs and seeps is to have the necessary soil, water, and vegetation attributes to be healthy and functioning at or near potential. Water flow patterns, recharge rates, and geochemistry are similar to historical levels and persist over time. Water quality and quantity maintain native aquatic and riparian habitat and water for wildlife and designated beneficial uses, consistent with water rights and site capability. Plant distribution and occurrence are resilient to natural disturbances (USDA 1986; USDA 1987; USDA 1987; USDA 1988).

Ephemeral streams are important for hydrological function of watersheds and provide important seasonal habitat for a variety of wildlife, in particular, migratory birds and dispersing amphibians. On the Coconino NF, approximately 36 miles of channels are heavily eroded with excessive bare ground, denuded vegetation, and head cuts. Of the total miles, approximately 6 miles are riparian streams and 30 miles are non-riparian streams. The Kaibab NF has approximately 7 miles of channels in this condition and all are non-riparian reaches.

The desired condition is to restore the functionality of both springs and ephemeral streams (USDA 1986; USDA 1987; USDA 1987; USDA 1988). On some springs and channels there is a need to maintain and promote existing vegetation. On others there is a need to reduce tree encroachment, the presence of noxious weeds and limit the potential for future disturbance. On all springs and streams and channels, there is a need to return fire, a natural disturbance processes, to the system.

The condition of the scenery attributes is fair. Ecosystem stressors of high tree density, lack of frequent, low severity fire, and drought are moderate. **The scenic attributes of seeps, springs and ephemeral channels are at moderate risk.**

Minor Scenery Attribute: While roads provide important scenery viewing platforms, as well as access to the forest, scenic quality is improved by decommissioning some closed forest roads and unauthorized routes. Both forests have identified the needed road system for public and administrative motorized use through the Travel Management Rule (TMR) process. The proposed action would decommission 770 miles of existing system and unauthorized roads on the Coconino NF, and 134 miles of unauthorized roads on the Kaibab NF. It would construct about 517 miles of temporary roads and decommission these when treatments are finished. 40 miles of roads would be reconstructed (relocated or reconditioned).

The road system used to access the project and for implementation, will include a portion of open, existing roads, as well as closed roads and temporary roads will be used during implementation. Once the project is completed, there is a need to decommission the temporary roads and closed roads. Roads that have been identified for decommissioning will use management strategies and road maintenance techniques (including restoration of drainage features) that moves towards restoring road prisms (as possible and practical) to their natural condition (USDA 1986; USDA 1987). The desired condition for decommissioned roads is to have soils in satisfactory condition so that the soil can resist erosion, recycle nutrients, and absorb water. Understory species (e.g., grasses, forbs, and shrubs) diversity would be consistent with site potential and provide for infiltration of water and reduction of accelerated erosion.

The scenery attribute condition for decommissioned roads is fair. Ecosystem stressors include fire and intensive weather events, these have moderate stress on these attributes. **The scenery attributes of decommissioned roads are at moderate risk.**

Scenic Stability Determination

Of the seven (understory trees and shrubs were split, with most at moderate risk, but aspen at high risk) dominant scenery attributes (four are at high risk and three are at moderate risk). Both of the minor scenery attributes are at moderate risk. Referring to Table 2 footnotes, this would mean that there is HIGH risk to SOME (40-60% of dominant attributes) and SOME are stable. This fits into the LOW STABILITY level; some dominant scenery attributes of the valued scenic character are present and are likely to be sustained. Known scenery attribute conditions and ecosystem stressors may seriously threaten or have already eliminated others.

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2/14/12