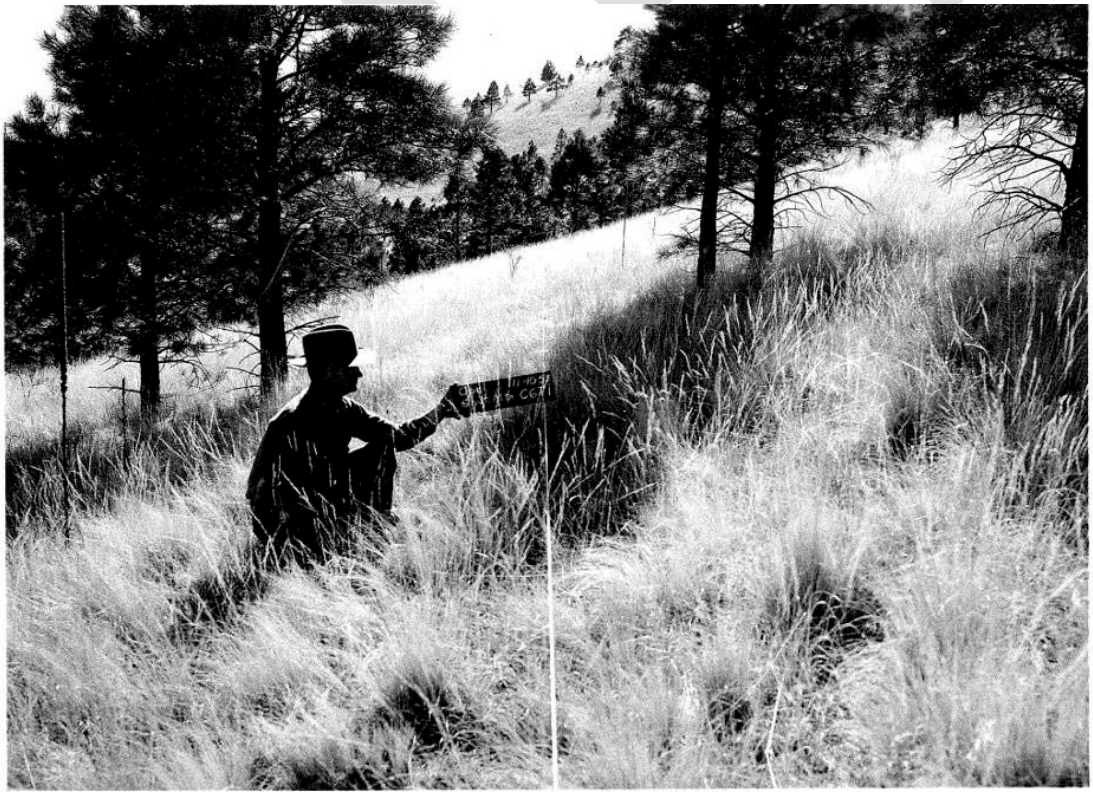
Four-Forest Restoration Initiative
Coconino and Kaibab National Forest
Environmental Impact Statement
Analysis Update

March, 2012



Four-Forest Restoration Coconino and Kaibab National Forest Environmental Impact Statement

Summary of Working Issues and Alternatives

March 19, 2012

Purpose: The purpose of this working summary is to provide information to interested parties on the progress and status of the Coconino and Kaibab National Forest restoration analysis. This document includes key issues that will be used to focus the analysis and draft alternatives. As analysis progesses, the numbers may change and maps will be updated to make them user-friendly.

Public Involvement

Collaboration

Collaboration has been integral to moving forward with a landscape restoration proposal. In 2010, stakeholders and the Forest Service began refining the vision for ponderosa pine forest restoration across 2.4 million acres on four National Forests in northern Arizona: the Apache-Sitgreaves, Coconino, Kaibab, and Tonto National Forests. A sub-group of the 4FRI stakeholder group worked developed a comprehensive restoration strategy for the Coconino and Kaibab forests. A landscape strategy was created documenting existing conditions, identifying potential treatment areas and desired post-treatment conditions. The Forest Service used the landscape strategy to inform the purpose and need and proposed action.

Scoping

The first Notice of Intent (NOI) to prepare an environmental impact statement (EIS) was published in the Federal Register on January 25, 2011 [FR Doc.2011-1444]. The NOI, which formally initiated the scoping process, referenced the 45-day public comment period as being January 25 to March 11, 2011. The NOI was published days earlier than expected (expected date was January 28, 2011); therefore, the official public comment was extended through March 14, 2011. In addition to the referring the comment period, the NOI included dates for a series of public scoping meetings/workshops hosted by the forests.

A draft proposed action was sent to a mailing list (hard copy and electronic mail) of 1,331 individuals, local and state governments, federal and state agencies and organizations (see Tribal Consultation below). Fifty-four (54) responses were received through May 5, 2011. Responses include letters, electronic mail and comments received at public meetings. A scoping report that included a summary of the scoping process was posted on the 4FRI website on June 29, 2011.

Prior to the publication of the NOI in the Federal Register, a pre-scoping public meeting/workshop was held on January 20, 2011. While the scoping comment period was underway, meetings/workshops were held on the Coconino National Forest on February 2, 2011, February 16, 2011 and February 24, 2011. A

meeting/workshop was held on Kaibab National Forest on February 9, 2011. The purpose of these meetings was to receive comments that would be used to develop the proposed action. The sixth public meeting was held at the Coconino National Forest Supervisor's Office on April 27, 2011 for the purposes of providing a project progress and status update. A public meeting was held on June 7, 2011 for the purposes of receiving comments on the draft proposed action. On average, meeting/open house attendance ranged from ten to twenty participants.

A revised proposed action was developed to respond to comments and recommendations and sent to a mailing list of 213parties (169 electronic mail and 44 hard copy recipients). A second fourteen-day public comment period began with the publication of a 2nd revised NOI in the Federal Register on August 19, 2011 [FR. Doc. 2011-20496]. While the comment period was underway, an open house was held at the Williams Ranger District on August 25, 2011 and at the Coconino National Forest Supervisor's Office on August 17, 2011. No general public attended the Williams meeting (eleven Forest Service personnel from the Kaibab NF attended) and six people attended the Coconino open house. Forty-two comments were received in response to the revised proposed action. This total includes e-mail and database inquiries that were received from May 5, 2011 to August 18, 2011(in between comment periods) and includes one comment received as late as October 20, 2011. In an effort to further clarify scoping responses on large trees, a meeting was held with commentors at the Coconino NF Supervisor's Office on October 14, 2011 (see project record for details).

As part of coordination with local governments and residents, project updates were provided to the Coconino City Council and City of Flagstaff on September 12, 201l and again on December 5, 2011. Project updates were provided to the to the Tusayan and Camp Verde City Council on October 5, 2011 and to the Sedona and Williams City Council on October 25, 2011.Updates to local residents and communities was provided at the Mountainaire Community Picnic (at the invitation of the Coconino County Supervisor) on September 17, 2011 and via an educational booth at the Flagstaff Festival of Science on September 24, 2011.

Throughout the scoping period, the 4FRI interdisciplinary team met with interested parties and agencies including the 4FRI stakeholders (, Arizona Department of Game and Fish, Arizona Department of Air Quality and the United States Fish and Wildlife Service to discuss the proposed action. On March 11, 2011, the Arizona Department of Game and Fish was designated as a cooperating agency and routinely participated in interdisciplinary meetings. Meeting documentation is located in the project record. The project has been posted on the Coconino and Kaibab's Schedule of Proposed Actions (SOPA) since January of 2011.

Tribal Consultation

On January 28, 2011 the forests sent a separate consultation letter providing information and seeking involvement and comments to 20 Tribes and Tribe Chapters including the Navajo Nation, Navajo Nation To'Naness' Chapter, Navajo Nation Tuba City Chapter, Navajo Nation Dilkon Chapter Tolani Lake Chapter, Navajo Nation Cameron Chapter, Kaibab Band of Paiute Indians, San Juan Southern Paiute, White Mountain Apache, Yavapai-Apache Nation, San Carlos Apache, Hualapai, Yavapai-Prescott Indian Tribe, Havasupai, Tonto Apache, Pueblo of Zuni, Pueblo of Acoma, Hopi Tribe, and Fort McDowell Yavapai Nation who all have historic ties and an interest in the Coconino and Kaibab National Forests. Two written responses were received. The White Mountain Apache responded on February 17, 2011 and

indicated no concern. A response from the Havasupai Tribe on March 7, 2011 asked for additional information on what the expected outcome of the proposals would be. As a follow-up, a meeting was held with the Havasupai Tribal Council and Tribal Elders on March 7, 2011 to discuss the analysis proposal. On June 6, 2011, a meeting was held with the Hopi to discuss heritage surveys.

On August 22, 2011 the second scoping letter was sent to 20 Tribal leaders including the Navajo Nation, Navajo Coalmine Canyon Chapter, Navajo Bodaway/Gap Chapter, Navajo To'Naness' Chapter, Navajo Leupp Chapter, Navajo Lechee Chapter, Coppermine Chapter, Navajo Nation Cameron Chapter, Kaibab Band of Paiute Indians, White Mountain Apache, Yavapai-Apache Nation, San Carlos Apache, Hualapai Tribe, Yavapai-Prescott Indian Tribe, Havasupai, Tonto Apache, Pueblo of Zuni, Pueblo of Acoma, Hopi Tribe, and Fort McDowell Yavapai Nation . No additional comments were received. In summary, no Tribes identified specific concerns with the project or specific traditional cultural properties that would be affected by the proposed activities.

Issues

Issues serve to highlight effects or unintended consequences that may occur from the proposed action, giving opportunities during the analysis to reduce adverse effects and compare trade-offs for the decision-maker and public to understand. The interdisciplinary team reviewed and considered all comments during the eighth-month public involvement period. How comments were addressed and were used to inform the analysis can be viewed in the final scoping report that is posted on the 4FRI website with paper or CD copies available upon request. The following are the significant issues that focus the analysis and/or drove alternative development:

Issue 1. **Prescribed Burning Smoke**: Smoke from the project's prescribed burning would occur continuously over a ten-year period. Project smoke would degrade air quality and the health of northern Arizona residents, particularly residents of the Verde Valley and Snowflake, Arizona. This project, when combined with prescribed burning that other forests conduct, would negatively impact northern Arizona residents as they would experience constant smoke over a long period of time. Smoke would result in reduced visibility and air quality. Reduced visibility and reduced air quality would reduce the quality of life for residents and would reduce tourism. The reduction of tourism would result in long term impacts to the local and regional economy of northern Arizona. The volume of smoke and the emissions that are part of smoke could affect public health. An alternative that: (1) eliminates all burning, (2) eliminates most burning and uses other methods to dispose of biomass, and, (3) improves coordination amongst all forests that conduct prescribed burning in the vicinity of the Verde Valley and Snowflake is needed. There needs to be smoke-free periods for residents downwind of the project.

Response: An alternative that would eliminate all burning was considered but eliminated from detailed study as it did not meet the purpose and need for restoring the fire-adapted Southwestern ponderosa pine ecosystem. Alternative B and C propose prescribed burning across the entire project area. The alternatives include design criteria aimed at reducing the potential for smoke as practicable and increase coordination on burning amongst neighboring forests. However, alternative C adds acres that would be prescribed burned to address the need for restoring additional acres of grasslands. Alternative D was developed to respond to comments recommending a significant decrease in acres to be prescribed burned. The fire ecology, air quality, recreation, and social-economics environmental consequences for all alternatives

disclose the potential impacts to air quality, quality of life, local and regional economy, and public health and safety.

The indicators used to evaluate this issue are: (1) Quantitative smoke emission modeling and qualitative interpretation to evaluate the potential for smoke within communities that are within or in near proximity to the project, and, (2) Modeling of principal pollutants including carbon monoxide (CO), nitrogen dioxide (NO2), particulate matter less than 10 microns in size (PM 10), particulate matter less than 2.5 microns in size (PM 2.5), ozone (O2), and sulfur dioxide (SO2) pollutants that pose potential health hazards to evaluate compliance with the Clean Air Act as regulated by Arizona Department of Environmental Quality (ADEQ), and, (3) social and economic evaluation of impacts to quality of life and tourism.

Issue 2: Conservation of Large Trees: The large tree retention strategy (LTRS) which was developed by the four-forest restoration stakeholders through collaboration was not included in the proposed action. 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 LRTS 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.

Response: Alternative B, the proposed action alternative, evaluates the potential impacts of treatments to all vegetation structural stages (VSS), including those trees that would be 16" dbh or larger and the resulting impacts to wildlife. In this alternative, the large tree retention strategy is not specifically addressed. Alternative C incorporates the key components of the large tree retention strategy while focusing on ecological desired conditions. It links circumstances to when large, post-settlement trees may be removed to the desired conditions. These features have been incorporated into the alternative's design criteria, adaptive management and monitoring plan, and the implementation plan.

The indicators used to evaluate this issue are: (1) Quantitative pre and post treatment three-level analysis for Mexican spotted owl, northern goshawk, old growth, and vegetation structural stage (VSS) for northern goshawk and at the landscape scale (ponderosa pine vegetation type) to qualitatively gauge movement towards restoration desired conditions, and, (2) Qualitative analysis of pre and post-treatment non-market social values that include large trees, public safety, and other biodiversity objectives that may conflict with protection of large trees.

Issue 3: **Canopy Cover and post-treatment landscape openness**: Measuring canopy cover in northern goshawk habitat at the group level will not meet forest plan stand-scale canopy requirements. A reduction in canopy and large tree densities have never been analyzed under NEPA and NFMA and could have deleterious effects to northern goshawk, its prey species, and those wildlife species that are dependent on that cover. Because natural openings would no longer be included within the VSS classification, it would result in significantly more lands being in an open condition or outside of the VSS 4 to 6 classification. This could substantially increase the logging of mature and old trees and negatively affect wildlife, including goshawk and its prey species.

Response: The forest plans direct projects to manage for uneven-aged stand conditions within goshawk habitat. Forested groups consist of an interspersion of six vegetation structural stages (VSS 1 to VSS 6).

The canopy cover guideline within northern goshawk habitat applies to mid-aged, mature, and old forest structural stages (VSS 4 to VSS 6).

The only reference the forest plans have in terms of measuring canopy cover is in directing projects to apply "vertical crown projection canopy cover". Application of this metric is defined in a Forest Service (Reynolds et. al) general technical report as. "the percentage of a fixed area covered by crowns of plants delimited by a vertical projection of the outermost perimeter of the spread of the foliage" (USDA 1992). Whereas the forest plans clearly provide direction for meeting minimum canopy cover percentages in VSS 4 to 6, the plans lack explicit language for measuring canopy cover.

Although the forest plans provide direction and desired conditions for the vegetation structural stages, the forest plans do not provide a clear definition of interspaces or the relationship between interspaces and openings across the landscape. The plans are also silent on what percent of the landscape would be managed for interspaces and openings that occur between individual trees, tree clumps, and tree groups. These interspaces and openings are not equivalent to VSS 1. Whereas VSS 1 may provide openings in the short term, this structural stage is expected to regenerate tree cover in the long-term.

All action alternatives (B-D) are designed to measure canopy cover in compliance with the forest plans. The alternatives disclose how canopy cover would be measured for this project. Distribution of habitat structure within goshawk habitat would be evaluated at four scales (i.e. ponderosa pine extent, restoration unit, restoration subunit, strata (groups of like stands with like treatments). Overall habitat structure (VSS) and forest density metrics (basal area, stand density index, and trees per acre) would be averaged to a per-acre basis. These averages include interspaces, canopy gaps, and all forest structural stages. These structure and density metrics would be disclosed throughout the analysis for the existing condition, the post treatment condition, 10 years post-treatment, and 30 years post-treatment to evaluate how the alternative moves towards meeting the desired conditions. In the definition of the density metrics, the vegetation analysis would discuss the relationship between basal area and vertical crown projection canopy cover for ponderosa pine. This relationship would be used to disclose an approximation of canopy cover at the scales listed above. In addition, the inter-relationship between the canopy cover analysis to old and large trees would be disclosed.

To address the need to add forest plan clarity for interspaces and the relationship between interspaces and openness (in landscapes dominated by ponderosa pine), a non-significant plan amendment would apply to alternative B, C, and D. The plan amendment would include a definition of interspace and clarify the relationship between interspaces and openings to the vegetation structural stage (VSS) classes. To address savanna post-treatment openness and canopy cover in ponderosa pine with an open reference condition, alternative b and c include a non-significant plan amendment to allow for managing for less than 40 percent canopy cover in VSS 4 to VSS 6 and with less than 3 to 5 reserve trees.

The indicators used to evaluate this issue are: (1) pre and post-treatment distribution of habitat structure within northern goshawk habitat evaluated at four scales: ponderosa pine extent, restoration unit, restoration subunit, and strata (groups of like stands with like treatments). Overall habitat structure (VSS class) and forest density metrics (basal area, stand density index and trees per acre) averaged to a per-acre basis with averages including interspaces, canopy gaps, and all forest structural stages, (2) percent post-treatment change in forest structure (VSS 1 to 6) including changes in acres of open (non-forest) and forest habitat and degree of canopy closure (VSS canopy closure categories) in relation to individual species or species assemblage habitat requirements (e.g., nesting, roosting, calving and fawning habitat,

and thermal and hiding cover) at multiple scales including treatment unit, sub-unit, and restoration unit, and, (3) percent change in herbaceous understory expressed as pounds of biomass and qualitative analysis of impacts to individuals and groups of species.

Proposed Action Development

With the January 25, 2011 publication of the Notice of Intent (NOI) in the Federal Register, meetings and workshops were held over a period of six months (January 2011 to June 2011) for the purpose of refining the draft proposed action. We recorded many comments requesting additional detail on vegetation and prescribed fire treatments. Many people asked for detailed narratives and visual examples of what the post-treatment landscape could look like. In response, a summary of design criteria complete with visuals was developed and included in the revised proposed action. Many commenters provided input and recommendations on evaluating the potential for losing resources and public infrastructure from fire. This input was used to develop a prioritization and treatment location assessment matrix to address fire and forest health risk (August 2011 proposed action, appendix D).

Another topic that emerged during the development of the proposed action was the conservation of old trees. The conservation of old trees was incorporated in the purpose and need (desired condition), treatment summaries were prepared to display design criteria for each treatment, and old tree conservation language was added. An old tree retention strategy, developed in collaboration with 4FRI stakeholders, was made integral to the proposed action (August 2011 proposed action appendix B).

To respond to public comments regarding the conservation of large trees, a large tree implementation strategy that was developed by 4FRI stakeholders was included for comment in the proposed action document (August 2011 proposed action appendix C). This issue drove alternative development (see chapter 2, Alternative Development).

As the proposed action was refined, adaptive management was incorporated. Adaptive management provides an implementation tool that goes beyond the “predict-mitigate-implement” model and incorporates an “implement-monitor-adapt” strategy. Given the scale of this restoration effort, adaptive management was incorporated to provide flexibility to account for inaccurate initial assumptions, to adapt to changes in environmental conditions or to respond to subsequent monitoring information that indicates that desired conditions are not being met (USDA Forest Service 2010). With this objective, most proposed activities were designed to include a suite of possible management actions. Options were developed to specifically implement a treatment that best responds to the site-specific resource condition. For example, a roadbed proposed for decommission may be revegetating naturally. In this case, removing all the emerging ground cover as a part of decommissioning may not be desirable. A sign, gate or earthen berm that would preclude future disturbance from motorized use may be the best option.

By having a variety of management actions that have been analyzed, the forests would be able to select the best method for moving that road segment towards desired conditions. The adaptive management and monitoring plan was developed in collaboration with stakeholders and the public. To ensure that adaptive actions are within the scope of predicted effects and would be consistent with the decision, an implementation plan was developed.

After receiving and considering 8 months of public input and collaboration, the proposed action was published in the Federal Register on August 17, 2011 and sent to interested parties for comment [FR Doc. 2011-20496]. In response to comments received on the August 17, 2011 proposed action, design criteria

and best management practices (BMPs) (appendix C), an implementation plan (appendix D), and an adaptive management and monitoring plan (appendix E) was developed and made part of the proposed action alternative.

Changes to the proposed action after the August 17, 2011 scoping period

After public scoping comments were reviewed and more intensive analysis was performed by resource specialists, the Coconino and Kaibab Forest Supervisor approved modifications to the proposed action, as allowed by 36 CFR 220.7(b)(2)(iii), which resulted in the changes displayed below (Bail 2011;Williams 2011):

- To demonstrate the use of best available science, additional citations and clarification statements were added to existing and desired conditions for forest structure, canopy cover, age and size class diversity, forest structure in goshawk and MSO habitat, insect and disease, vegetation diversity and composition, grassland, pine-sage, fire ecology, and, springs and seeps.

- Correcting the cover type coding from grassland to ponderosa pine resulted in: (1) an increase in project acres to be treated by 346 acres (595,370 to 587,923 acres), (2) a decrease of 9,829 acres of treatment on the Coconino NF (from 361, 379 to 356,115 acres) and a decrease of 2,182 acres of treatment on the Kaibab NF (from 233,991 to 231,809 acres), (3) a decrease of 1,302 total acres of ponderosa pine to be treated (from 508,510 to 507,208 acres),(4) an decrease of 1,467 acres to be mechanically cut and prescribed burned (from 389,993 to 388,526 acres), and, (5) a decrease of 4,880 acres of prescribe-burn only treatment (from 204, 278 to 199,398 acres).

- The total acres expected to be burned annually was reduced from 60,000 per year to 40,000 acres to reflect that 20,000 acres of burning over the two forests would typically be attributed to managed fire or wildfire events.

- Data corrections in goshawk and MSO habitat resulted in: (1) an increase of goshawk habitat acres from 395,547 to 399,512 acres, (2) a decrease of 5,268 acres of MSO habitat from 112,964 to 107,696 acres, (3) a decrease in goshawk habitat VSS 4+ from 57 to 56 percent and VSS 3 and 4 from 84 to 76 percent, (4) an updated percentage of even-aged stands in VSS 1 and 4, (5) an updated percentage of uneven-aged stands in VSS 3 and VSS 5, (6) an updated existing SDI percent in MSO habitat, and, (7) updating the data within PACs to remove 3,322 acres of prescribed burning and 1,564 acres of mechanical treatment within PAC core areas.

- Acres that meet old growth conditions was updated and decreased by 5,384 acres from 195,338 to 189,954 acres. This changed old growth allocation acres and percentages by restoration unit (see table X). The (corrected) percentage of old growth allocation by forest was added to the proposed action.

- In response to comments and collaboration efforts, the old tree retention strategy was incorporated into the final proposed action in appendix C - design criteria and best management practices (BMPs), appendix D- implementation plan, and appendix E -monitoring and adaptive management plan.

- Design criteria and best management practices (BMPs) that were partially included as treatment summaries in the proposed action were further developed and included as appendix C.

- Clarification language was added to include our intent of mechanically treating within 18 MSO PACs. A non-significant forest plan amendment allowing for improvement of habitat structure

within 18 MSO PACs. It included a table displaying mechanical treatment by inches of dbh as a result of having additional data. Additional information and details were added to address how canopy cover would be measured in response to public comments.

- A non-significant forest plan amendment that includes a definition of interspaces and provides clarification language for interspaces and open-ness as it relates to vegetation structural stages (VSS) was added in response to public comments.

- Miles of ephemeral streams needing restoration (reduced from 36 to 32 miles) and miles of non-riparian streams was updated (reduced from 30 to 26 miles) as a result of having more detailed data; and, the miles of temporary roads was corrected (increased from 27 to 118 miles) and miles of existing closed roads needed (175 miles) to implement the project was added.

- Forest Plan amendment language and acres were further refined.

Final Proposed Action

The final proposed action includes a suite of restoration activities. It incorporates collaboration and public comments received over an 8-month period, including the incorporation of an old tree retention strategy, and mechanically treating and prescribed burning within 18 Mexican spotted owl PACs to improve nesting and roosting habitat.

The Coconino and Kaibab National Forest propose to conduct approximately 587,923 acres of restoration activities (within the 988, 764 acre project area) over approximately 10 years or until objectives are met. Approximately 20,000 to 30,000 acres of vegetation would be treated annually and up to 40,000 acres would be prescribed burned annually across the two forests (figure 1). Restoration activities would:

- Mechanically cut trees on approximatley 388,526 acres, this includes mechanically thinning up to 16 inch dbh within 18 Mexican spotted owl PACs and cutting 99 acres of trees by hand on slopes greater than 40 percent
- Following mechanical treatment, prescribe burn approximately 388,526 acres, this includes prescribed burning within 18 Mexican spotted owl PACs (excluding nest cores) and on 99 acres of slopes greater than 40 percent
- Prescribe burn-only on approximately 199,398 acres
- Decommission 941 miles of existing system and unauthorized roads on the Coconino NF
- Decommission 170 miles of unauthorized roads on the Kaibab NF
- Construct 118 miles of temporary roads for haul access and decommission when treatments are finished
- Open approximately 175 miles of existing, closed roads (maintenance level 1) and return to closed status when treatments are finished
- Reconstruct 27 miles of existing open roads for natural resource, health and human safety concerns
- Open 183 miles of existing closed roads in order to conduct treatments and decommission (close and rehabilitate) as needed when treatments are finished
- Restore 78 springs
- Restore 43 miles of ephemeral channels
- Construct 82 miles of protective (aspen and springs) fencing

- Allocate 124,156 acres (38 percent) of ponderosa pine and 8,311 acres (70 percent) of pinyon-juniper woodland on the Coconino NF and 65,798 acres (33 percent) of ponderosa pine and 7,315 acres (59 percent) of pinyon-juniper on the Kaibab NF as old growth

Four non-significant forest plan amendments would be required on the Coconino NF to implement the proposed action. A variance would be provided: (1) to allow vegetation treatments within 18 Mexican spotted owl (MSO) PACs to improve habitat structure, (2) to allow for mechanically treating up to 16 inch dbh within 18 MSO PACs to improve the structure of nesting and roosting habitat and reduce fire risk, (3) to allow for managing for less than 40 percent canopy cover and less than 3 to 5 reserve trees per acre in 27,455 acres of goshawk non-PFA habitat, and, (4) to add a definition of interspaces and clarification language for interspaces and open-ness as it relates to vegetation structural stages (VSS).

Two non-significant forest plan amendments would be required on the Kaibab NF to provide a variance for: (1) managing for less than 40 percent canopy cover in VSS 4-6 and less than 3 to 5 reserve trees per acre in 18,025acres of goshawk non-PFA habitat to facilitate savanna treatment, and, (2) to add a definition of interspaces and clarification language for interspaces and open-ness as it relates to vegetation structural stages (VSS).

Figure 1 (next page) displays general locations for the vegetation thinning and prescribed fire. Table 1 displays acres to be thinned and burned by restoration unit (RU).Table 2 displays the acres proposed for all other restoration activities by RU. Alternative B details that include: (1) tables and maps that display proposed treatments, (2) an old growth allocation table and map, and, (3) treatment descriptions with post-treatment representative photos are under development.

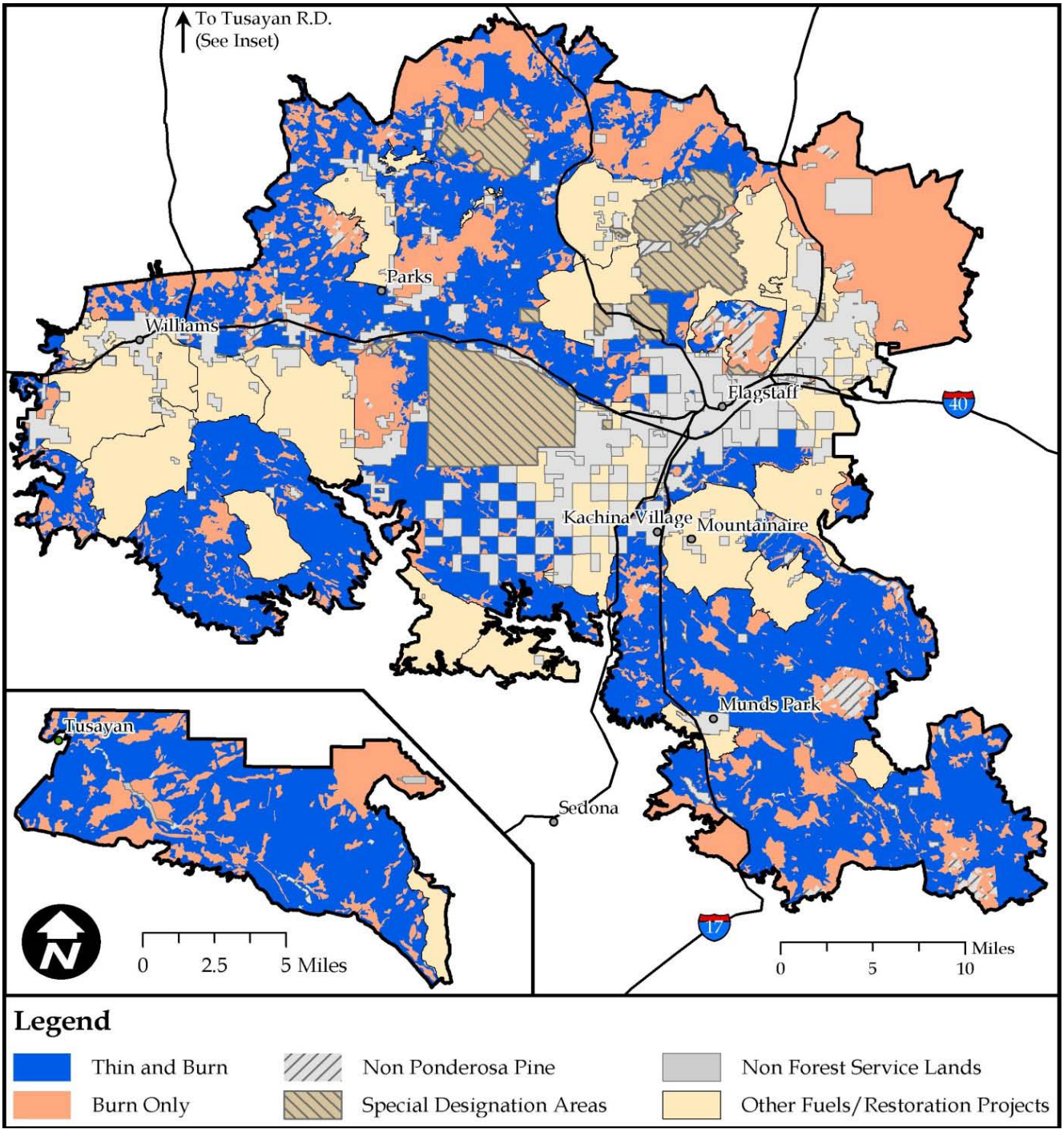


Figure 1. Final proposed action vegetation and prescribed fire treatments

Table1. Proposed mechanical treatment and prescribed fire acres by restoration unit (RU)

Restoration Unit (RU) No.	Proposed Mechanical and Prescribed Fire Treatments (acres)			Total acres of treatment by RU
	Mechanical treatment and prescribed fire (acres)	Thin by Hand on slopes > 40% and prescribe burn (acres)	Prescribed fire only (acres)	
1	121,859	0	30,274	152,133
3	113,546	0	35,371	148,917
4	109,848	0	55,843	165,690
5	12,666	99	64,841	77,606
6	30,509	0	13,069	43,578
Totals	388,427	99	199,398	
Mechanical Treatment and Prescribe Fire Project Total (Acres)				587,923
Note: RU 2 is not included as its predominantly below the Mogollon Rim and does not include contiguous ponderosa pine				

Table 2. Final proposed action road, aspen, riparian, ephemeral channel, and springs treatment acres by RU

Restoration Unit No.	Proposed Road Activities (Miles)					Construct aspen fencing **(miles)	Riparian habitat and ephemeral streams (miles)	Springs (No.)
	Decommission closed roads	Decommission unauthorized roads	Construct temporary roads*	Open closed roads*	Reconstruct open roads			
1	206	0	16	48	7	11	24	32
2	0	0	0	0	0	0	0	0
3	152	109	15	68	9	17	8	28
4	210	36	9	35	5	41	5	14
5	373	0	1	7	2	14	5	4
6	0	25	5	25	5	0	1	0
Totals	**941**	**170**	**46**	**183**	**27**	**82**	**43**	**78**

Alternative Development Process

As a result of public comment over an eight-month timeframe and additional analysis, the proposed action was modified as allowed by 36 CFR 220.7(b)(2)(iii)), which states that "the description of the proposal and alternative(s) may include a brief description of modifications and incremental design criteria developed through the analysis process to develop the range of alternatives considered." See chapter page 7 for details on the development of the final proposed action (alternative B).

The interdisciplinary team (IDT) used information from scoping, including theissues identified for the project (pp. 4-7), in conjunction with database modeling and field-related resource information, to formulate alternatives to the proposed action. Alternative C responds to Issue 2, Conservation of Large Trees, (p.5) and responds to comments and recommendations received during scoping. Key components from the stakeholder-created large tree retention strategy was incorporated into the project's purpose and need and to the alternative's design features, additional acres of grassland treatment on the Kaibab NF was added to address the need to reduce tree encroachment. A research opportunity to evaluate the effect of residual tree groups and tree-less opening size on small mammals and bird species was incorporated, and research that would evaluate water yield from landscape-scale restoration was incorporated. After further review of the current condition of the proposed Garland Prairie Research Natural Area (RNA) on the Kaibab NF, mechanical treament and prescribed burning was included in the alternative.

Alternative D responds to issue 2 in chapter 1by decreasing the acres to be prescribed burned. It also responds to comments from USFWS in terms of the need to further improve Mexican spotted owl (MSO) habitat by increasing the acres of mehcanical treatment and prescribed burning within Protected Activity Areas (PACs) habitat.

Alternatives Considered but Eliminated from Detailed Study

The range of alternatives considered by the responsible officials includes alternatives to the proposed action that are analyzed in the document, as well as other alternatives considered but eliminated from detailed study. Public comments received in response to the proposed action suggested alternative methods for achieving the purpose and need. They include the following three alternatives:

Alternative that would utilize mechanical treatments limited to 8inches dbh to reduce the potential for crown fire

This alternative was based on the assertion that crown fire can be effectively addressed with mechanical treatments that do not exceed 8 inches dbh. How this alternative would meet the purpose and need (which focuses on putting the project area on a trajectory towards increased forest resiliency and function from natural disturbances) was evaluated

Alternative that would utilize prescribed fire as the sole treatment method to move towards restoration objectives

We considered an alternative which uses prescribed burning (versus mechanical treatment and prescribed fire) to move towards restoration objectives. Much of this recommendation is based on the assertion that the current high intensity fire rotation in southwestern forests is 625 years and that the forests should be

predominantly managed as self-regulating through the use of natural processes such as fire. How the alternative would result in movement towards restoration desired conditions was evaluated.

Alternative that would eliminate the use of prescribed fire

The purpose of this alternative is to eliminate smoke impacts from prescribed fire. It responds to scoping comments recommending no prescribed burning be used or to use other methods to meet or move towards restoration objectives. Alternatives to using prescribed burning were considered and include using a variety of mechanical treatment methods (thinning, chipping and shredding, raking, mastication) and grazing:

Alternatives Considered in Detail

The Forest Service developed four alternatives, 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.

Alternative A – No Action

As required by 40 CFR 1502.14(c)) the no action alternative (alternative A) has been analyzed to contrast the impacts of the action alternatives with the current condition and expected future condition if the proposed action were not implemented. This alternative proposes no restoration treatments including vegetation, prescribed fire, springs, seeps, ephemeral channels, and road decommission in the project area. Alternative A would not increase forest resiliency to natural disturbances and would not improve function. It does not meet the purpose and need for the project, as it would not move the project area towards forest plan vegetation (forest structure, forest health, composition and diversity), fire behavior (percent of the landscape with the potential for uncharacteristic fire behavior and effects), soils (soil function/productivity and understory species), and watershed (riparian ecosystem and channel function) desired conditions.

Alternative B – Proposed Action

This alternative a suite of restoration activities and incorporates collaboration and public comments over an 8-month period including the incorporation of an old tree retention strategy, and mechanically treating and prescribed burning within 18 Mexican spotted owl PACs to improve nesting and roosting habitat.

The Coconino and Kaibab National Forest propose to conduct approximately 587,923 acres of restoration activities (within the 988, 764 acre project area) over approximately 10 years or until objectives are met. Approximately 20,000 to 30,000 acres of vegetation would be treated annually and up to 40,000 acres would be prescribed burned annually across the two forests. Restoration activities would:

- Mechanically cut trees on approximatley 388,526 acres, this includes mechanically thinning up to 16 inch dbh within 18 Mexican spotted owl PACs and cutting 99 acres of trees by hand on slopes greater than 40 percent
- Following mechanical treatment, prescribe burn approximately 388,526 acres, this includes prescribed burning within 18 Mexican spotted owl PACs (excluding nest cores) and on 99 acres of slopes greater than 40 percent

- Prescribe burn-only on approximately 199,398 acres
- Decommission 941 miles of existing system and unauthorized roads on the Coconino NF
- Decommission 170 miles of unauthorized roads on the Kaibab NF
- Construct 118 miles of temporary roads for haul access and decommission when treatments are finished
- Open approximately 175 miles of existing, closed roads (maintenance level 1) and return to closed status when treatments are finished
- Reconstruct 27 miles of existing open roads for natural resource, health and human safety concerns
- Restore 78 springs
- Restore 43 miles of ephemeral channels
- Construct 82 miles of protective (aspen and springs) fencing\
- Allocate as old growth 38 percent of ponderosa pine and 70 percent of pinyon-juniper woodland on the Coconino NF and 33 percent of ponderosa pine and 59 percent of pinyon-juniper on the Kaibab NF

Four non-significant forest plan amendments would be required on the Coconino NF to implement the proposed action. A variance would be provided: (1) to allow vegetation treatments within 18 Mexican spotted owl (MSO) PACs to improve habitat structure, (2) to allow for mechanically treating up to 16 inch dbh within 18 MSO PACs to improve the structure of nesting and roosting habitat and reduce fire risk, (3) to allow for managing for less than 40 percent canopy cover and less than 3 to 5 reserve trees per acre in 27,455 acres of goshawk non-PFA habitat, and, (4) to add a definition of interspaces and clarification language for interspaces and open-ness as it relates to vegetation structural stages (VSS).

Two non-significant forest plan amendments would be required on the Kaibab NF to provide a variance for: (1) managing for less than 40 percent canopy cover in VSS 4-6 and less than 3 to 5 reserve trees per acre in 18,025acres of goshawk non-PFA habitat to facilitate savanna treatment, and, (2) to add a definition of interspaces and clarification language for interspaces and open-ness as it relates to vegetation structural stages (VSS).

Alternative B Design Criteria, BMPs, Forest Plan Requirements and Monitoring

Design features, best management practices (BMPs), forest plan requirements, and mitigation measures that are part of alternative B will be located in appendix D. The implementation plan and monitoring and adaptive management plan, also part of this alternative, will be located in appendix E and F.

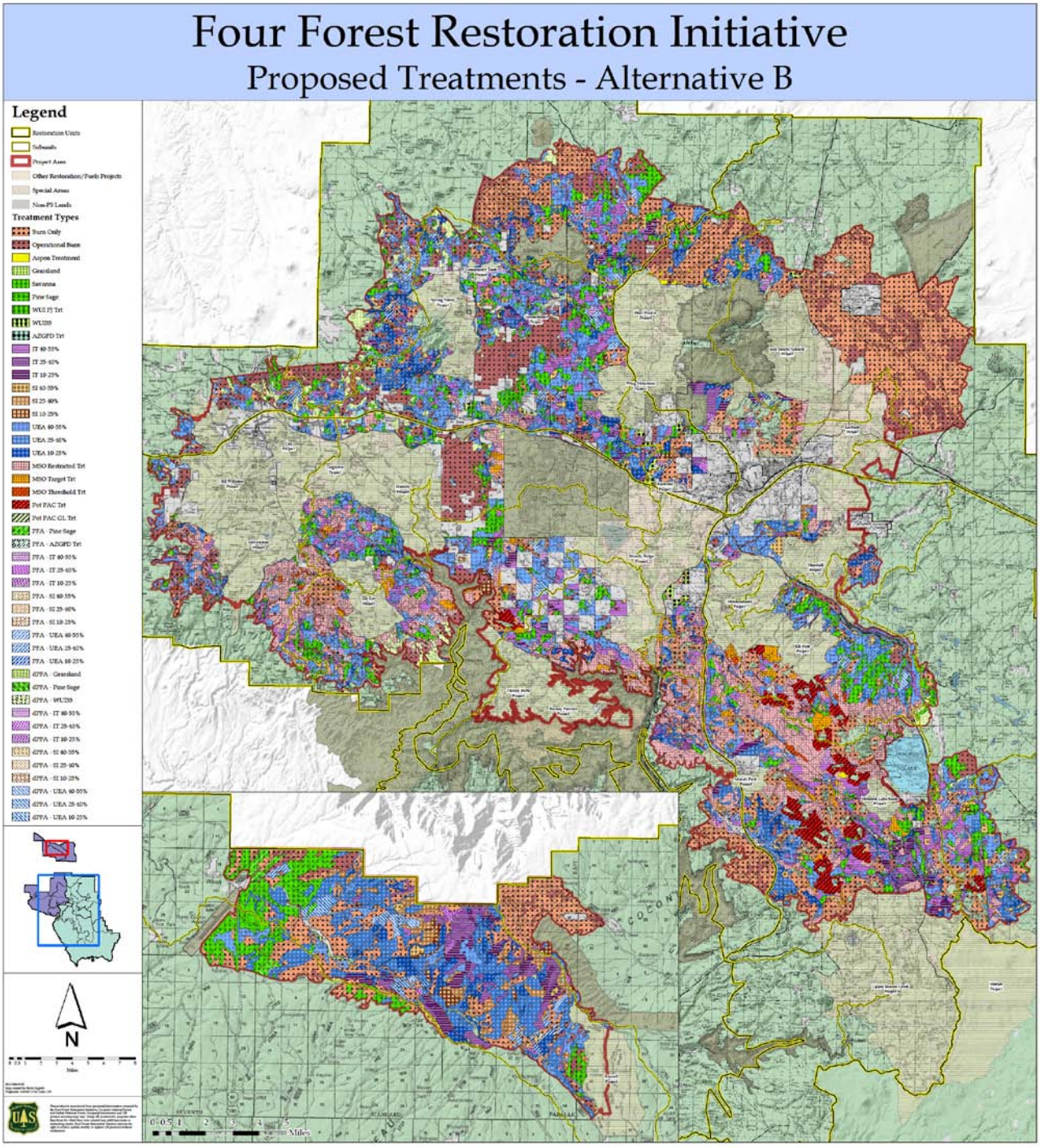


Figure 2. Alternative B vegetation and prescribed fire treatments

Alternative C

Alternative C responds to issue 2 (conservation of large trees) described on page 5 and responds to comments and recommendations received during scoping. Actions include adding key components from the large tree retention strategy to the project purpose and need and design features, adding acres of grassland treatments on the Kaibab NF, incorporating wildlife and watershed research on both forests, and adding both mechanical treatment and prescribed burning to the proposed Garland Prairie Research Natural Area (RNA) on the Kaibab NF. This alternative also responds to having additional data on habitat conditions within Mexican spotted owl PACs. It proposes thinning up to 18 inches dbh in 18 Mexican spotted owl PACs and includes prescribed burning with 56 Mexican spotted owl PACs, including nest cores.

The Coconino and Kaibab National Forest would conduct restoration activities on approximately 593,211 acres over a period of 10 years or until objectives are met. Approximately 20,000 to 30,000 acres of vegetation would be treated annually and up to 40,000 acres would be prescribed burned annually across the two forests. Treatment objectives and the methods used for mechanical treatment and prescribed burning are the same as described in alternative B. Figures that display treatment by location, amount, and habitat type (where appropriate) and display the old growth allocation are under development. Restoration activities would:

- Mechanically cut trees on approximatley 434,038 acres, this includes mechanically thinning up to 18 inch dbh within 18 Mexican spotted owl PACs and cutting trees by hand on 99 acres on slopes greater than 40 percent
- Following mechanical treatment, prescribe burn approximately 434,038 acres, this includes prescribed burning within 56 Mexican spotted owl PACs, including nest cores
- Prescribe burn-only on approximately 159,174 acres
- Decommission 941 miles of existing system and unauthorized roads on the Coconino NF
- Decommission 170 miles of unauthorized roads on the Kaibab NF
- Construct 118 miles of temporary roads for haul access and decommission when treatments are finished
- Open 175 miles of existing, closed roads (maintenance level 1) and return to closed status when treatments are finished
- Reconstruct 27 miles of existing open roads for natural resource, health and human safety concerns
- Restore 78 springs
- Restore 43 miles of ephemeral channels
- Construct 82 miles of protective (aspen and springs) fencing
- Construct up to 15 weirs and 20 weather stations (3 total acres of disturbance) support watershed research
- Allocate as old growth 38 percent ponderosa pine and 70 percent pinyon-juniper woodland on the Coconino NF and 33 percent ponderosa pine and 59 percent pinyon-juniper on the Kaibab NF

Five non-significant forest plan amendments would be required on the Coconino NF to implement the alternative C. A variance would be provided: (1) to allow vegetation treatments within 18 Mexican spotted owl (MSO) PACs to improve habitat structure, (2) mechanically treat up to 18 inch dbh in 18 PACs to improve habitat structure, (3) to allow for managing for less than 40 percent canopy cover and 3 to 5 reserve trees per acre in 27,455 acres of goshawk non-PFA habitat, (4) to add a definition of interspaces, and clarification language for interspaces and open-ness as it relates to vegetation structural stages (VSS), and, to clarify how canopy cover would be measured and evaluated for this project, and, (5) to allow for using prescribed fire within the 100-acre no treatment area within 56 PACs to minimize impacts to protected habitat.

On the Kaibab NF, three non-significant forest plan amendments would be required to provide a variance for: (1) managing for less than 40 percent canopy cover in VSS 4-6 and less than 3 to 5 reserve trees per acre in 18,025 acres of goshawk non-PFA habitat to facilitate savanna treatment, (2) to add a definition of interspaces and clarification language for interspaces and open-ness (as it relates to vegetation structural stages (VSS)) , and, to clarify how canopy cover would be measured and evaluated for this project, and, (3) to add forest plan language to allow for mechanically treating and prescribed burning up to 400 acres in the proposed Garland Prairie Research Natural Area (RNA).

Design Criteria, BMPs, Forest Plan Requirements and Monitoring

Best management practices (BMPs), forest plan requirements, and mitigation measures are the same as presented for alternative B (appendix D – under development). Design features are simliar to alternative B but incorporate the intent of the large tree retention strategy (appendix D-under development). The implementation plan and monitoring and adaptive management plan will be located in appendix E and appendix F.

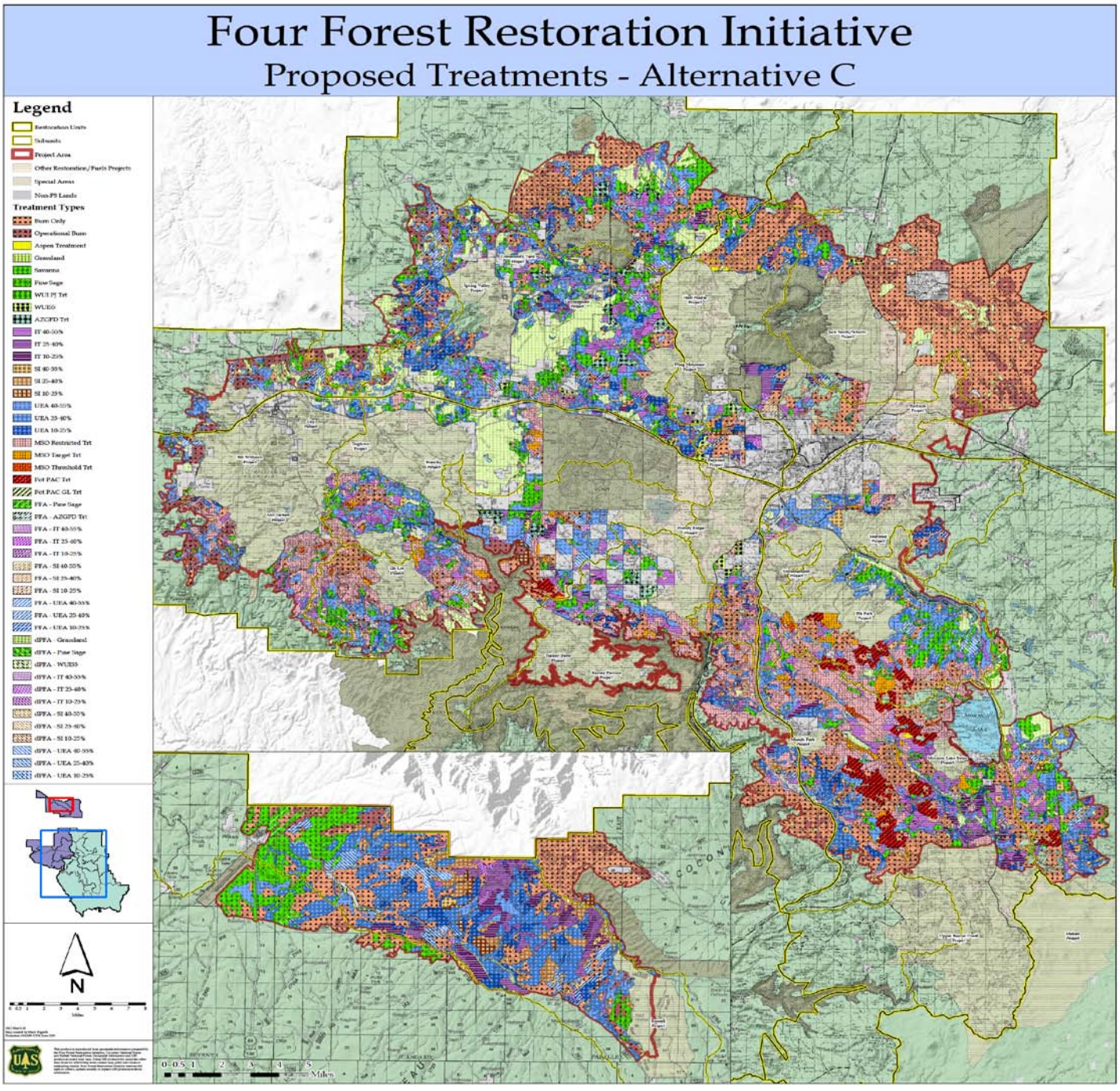


Figure 3. Alternative C vegetation and prescribed fire treatments

Alternative D

Alternative D responds to issue 2 (smoke) described on page 4 by decreasing the acres to be prescribed burned by over 50 percent (in comparison to alternative B). In this alternative, prescribed burning is predominantly used on grassland vegeation and on steep slopes where trees have been cut by hand.

The Coconino and Kaibab National Forest would conduct restoration activities on approximately 567,279 acres over a period of 10 years or until objectives are met. Approximately 20,000 to 30,000 acres of vegetation would be treated annually. Treatment objectives and the methods used for mechanical treatment and prescribed burning are the same as described in alternative B. Restoration activities would:

- Mechanically cut trees and dispose of slash through various methods including chipping, shredding, mastication, and removal of biomass off-site on approximately 388,427 acres; this includes mechanically thinning up to 16 inch dbh within 18 MSO PACs
- Cut trees by hand and pile and burn slash on slopes greater than 40 percent on approximately 99 acres
- Prescribe burn-only on approximately 178,753 acres
- Construct 118 miles of temporary roads for haul access and decommission when treatments are finished
- Open approximately 175 miles of existing, closed roads (maintenance level 1) and return to closed status when treatments are finished
- Reconstruct 27 miles of existing open roads for natural resource, health and human safety concerns
- Restore 78 springs
- Restore 43 miles of ephemeral channels
- Construct 82 miles of protective (aspen and springs) fencing
- Allocate 104,367 acres (35 percent) of ponderosa pine and 8,311 acres (70 percent) of pinyon-juniper woodland on the Coconino NF and 65,613 acres (33 percent) of ponderosa pine and 7,315 acres (59 percent) of pinyon-juniper on the Kaibab NF as old growth

Four non-significant forest plan amendments would be required on the Coconino NF and two would be required on the Kaibab NF. The amendments are the same as described in alternative B (see page 15). Figures that display treatment by location, amount, and habitat type (where appropriate) and display the old growth allocation are under development.

Design Criteria, BMPs, Forest Plan Requirements and Monitoring

Best management practices (BMPs), forest plan requirements, mitigation measures, and design feattures are the same as presented for alternative B (appendix D- under development). The implementation plan and monitoring and adaptive management plan that is part of this alternative will be located in appendix E and appendix F.

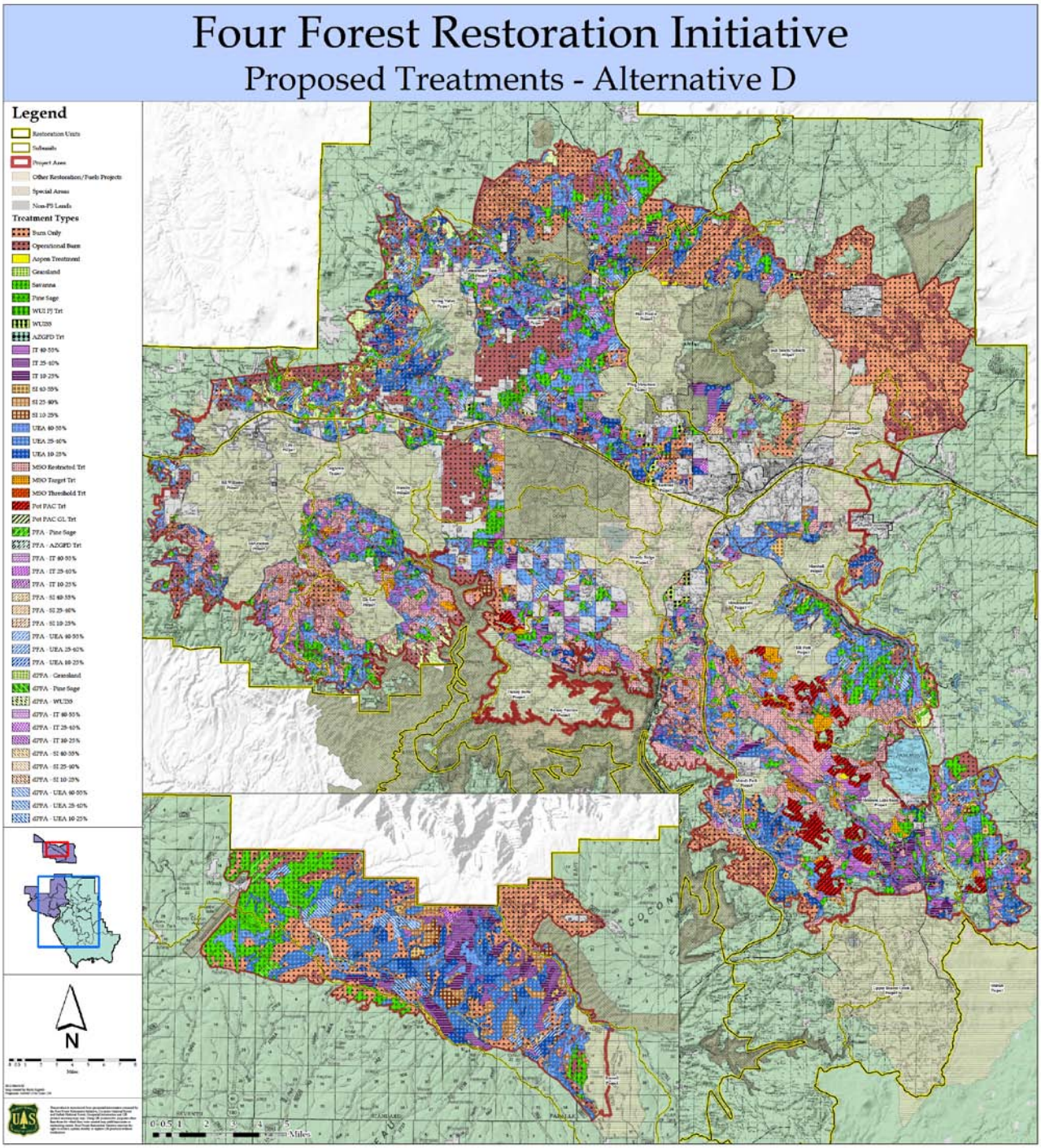


Figure 4. Alternative D vegetation and prescribed fire treatments

Row No.	Proposed Activity	Alternative B – Final Proposed Action	Alternative C	Alternative D
1	Silviculture Treatments (UEA, IT, SI, savanna)	388,526 acres Responds to P/N and 8 months of collaboration and public involvement	434,038 acres Increases grassland treatment acres, adds proposed RNA acres, less mechanical (2,860 acres) due to wildlife and watershed research	388,526 acres same as Alt B
2	Prescribed Burning	587,924 acres	593,211 acres Adds 2,860 acres of prescribed burning from research and acres from RNA burning	178,852 acres prescribed burn – Responds to smoke issue
3	Research	N/A	Construct 15 weirs (max of 3 acres) and 20 weather stations in restoration unit 1, 3, and 4 (see changes to mechanical and burning acres in lines 1 and 2)	N/A
4	MSO PACs	Mechanically thin up to 16" dbh in 18 PACs Prescribe burn 18 MSO PACs 2 forest plan amendments for MSO	Mechanically thin up to 18" dbh in 18 PACs Prescribe burn 56 MSO PACs including nest cores 3 forest plan amendments for MSO	Mechanically thin up to 16" dbh in 18 PACs 2 forest plan amendments for MSO
5	Spring, seep, channel restoration	78 springs/43 miles of ephemeral	Same as Alt B	Same as Alt B
6	Road	1,111 miles	Same as Alt B	Same as Alt B

	Decommission			
7	Temporary Road Construction	118 miles	Same as Alt B	Same as Alt B
8	Temporarily open existing, closed (ML 1) roads	175 miles	Same as Alt B	Same as Alt B
9	Road Reconstruction	27 miles	Same as Alt B	Same as Alt B
10	Mechanically treat and burn Aspen	Mechanically treat 1,397 acres, prescribed burn, and construct up to 82 miles of protective fencing	Same as Alt B	Mechanically treat 1,397 acres, and construct up to 82 miles of protective fencing, no prescribed burning
11	Old Tree Retention Strategy (OTRS)	Included in purpose and need, design features, and as appendix	Same as Alt B	Same as Alt B
12	Large Tree Retention Strategy	Not included LTRS in project record as document submitted during scoping	Modified LTRS included in P/N, design features, project record Whether to include as appendix to be determined	Not included LTRS in project record as document submitted during scoping

Forest Plan Amendments

Alternative B and D:

Coconino NF: 4 amendments: (1) to allow vegetation treatments within 18 Mexican spotted owl (MSO) PACs to improve habitat structure, (2) to allow for mechanically treating up to 16 inch dbh within 18 MSO PACs to improve the structure of nesting and roosting habitat and reduce fire risk, (3) to allow for managing for less than 40 percent canopy cover and less than 3 to 5 reserve trees per acre in 27,455 acres of goshawk non-PFA habitat, and, (4) to add a definition of interspaces and clarification language for interspaces and open-ness as it relates to vegetation structural stages (VSS).

Kaibab NF: 2 amendments: (1) managing for less than 40 percent canopy cover in VSS 4-6 and less than 3 to 5 reserve trees per acre in 18,025acres of goshawk non-PFA habitat to facilitate savanna treatment, and, (2) to add a definition of interspaces and clarification language for interspaces and open-ness as it relates to vegetation structural stages (VSS).

Alternative C:

Coconino NF: 5 amendments, same as described in Alternative B and D with two exceptions: Amendment 2 mechanically treats up to 18 inch dbh in 18 MSO PACs to improve habitat structure, and an additional amendment, Amendment #5, allows for using prescribed fire within the 100-acre no treatment area (nest cores) within 56 PACs to minimize impacts to protected habitat.

Kaibab NF: 3 amendments: Same as described in Alternative B and D with one exception: Alternative C includes a third amendment (Amendment 3) to allow for mechanically treating and prescribed burning up to 400 acres in the proposed Garland Prairie Research Natural Area (RNA).