Why the Flagstaff Restoration Model Should Not Be Applied To Public Forest Lands

SOUTHWEST FOREST ALLIANCE

September 2000


photo by Martos Hoffman

Cover

Result of a Forest Logged According to the Flagstaff Restoration Model
Only 12% of the Trees Where Left Standing In This Specific Site
Fort Valley Project, Coconino National Forest Near Flagstaff, Arizona

Photo by Martos Hoffman

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September 1, 2000

This summer's severe fires have prompted a national discussion regarding their underlying causes and the actions that should be taken to reduce the potential for extensive fires in the future. In the search for solutions the "Flagstaff model" has been held up by some as the silver bullet that will solve the West's forest fire problems. Instead of being a solution, the Flagstaff model has the potential to cause the same kind of damage that we fear from the high intensity fires that are currently raging. While it is clear that some proactive measures need to be taken to cure the problems created over the last century by overgrazing, old growth logging, and fire suppression, it would be a grave mistake to resort to extreme measures like the Flagstaff model.

Like the outdated commodity extraction model of forest use that caused the fire problems that we face today, the Flagstaff model is an experiment that threatens to deepen many of the wounds already inflicted on our forests. As the enclosed briefing packet shows, the Flagstaff model not only fails to restore the beauty and ecological integrity of the forest but, in many cases, is more extreme and damaging than the industrial logging that has caused so much controversy in the past.

The timber industry has seized upon this summer's intense fires as an opportunity to return to the unfettered policies and practices that brought us to the very position that we find ourselves in today. Ironically, under the guise of forest restoration, the proponents of the Flagstaff model are in effect following the same path. The practices that characterize the Flagstaff model have prompted an outcry by those who are concerned about wildlife, ecosystem function, and aesthetics. Even more significantly, many scientist have come to deeply question the basis of the Flagstaff model and its impact on forest dependent wildlife species.

The environmental community recognizes the need to address the problems at hand. Proposed solutions include the use of prescribed fire and judicious thinning where appropriate. The Southwest Forest Alliance, in conjunction with a working group of forest and fire ecologists from around the intermountain west, has initiated a program to develop ecologically sensible forest restoration guidelines. We are also working in rural communities to develop the broad-based agreements necessary to implement these guidelines in a manner that addresses the ecological concerns of the environmental community as well as many of the economic needs of rural communities. These two issues need not be at odds.

We believe that clear ecological criteria must be fully integrated into the solutions. These criteria need to address the ecological aspects of forest structure, function, and composition. We are encouraged by a proposal offered by Forest Service Chief Dombeck to focus thinning efforts on the removal of small trees from high priority urban-interface areas. Focusing on community protection is the best first step toward developing the capacity and the wisdom to address the larger ecological issues of forest restoration.

It is clear that the high potential for continued controversy could impede efforts to deal with these problems. The Flagstaff model is at one extreme of the spectrum of possible answers. It has already spawned opposition in the Southwest, and across the nation, with no end in sight. We therefore urge decision makers to recognize the problems inherent in the Flagstaff model and the controversy and ecological problems it would create if adopted.

For more information please contact Martos Hoffman, Southwest Forest Alliance Executive Director or Todd Schulke, Southwest Forest Alliance Restoration Coordinator at the addresses listed above.

Publication quality digital images of all photographs included in this briefing packet are available upon request.

SUMMARY OF PROBLEMS WITH THE FLAGSTAFF MODEL

- It represents the most extreme treatment in the spectrum of forest restoration models available today. It removes up to 80-90% of the trees in the areas where it is applied.
- It leaves no room for error. The extreme reduction in trees and forest structure eliminates any possibility for adaptive management in the near future.
- Its overly aggressive thinning leads to serious ecological problems at both the stand and landscape level.
- It removes large trees, the very ones that will develop into mature forest structures the fastest.
- It has unknown and potentially severe impacts on forest-dependent wildlife, like the northern goshawk, that require interlocking and mature tree canopy structures.
- It drastically decreases the structural and age diversity of trees within the forest.
- It tends to produces an evenly spaced, tree farm like structure.
- It fails to acknowledge any uncertainties in determining the state of the forests in the 1870s, and our ability to recreate it today.
- It cannot be applied to other forest types such as mixed conifer, conifer, pinyon-juniper, etc.
- It assumes that ponderosa forests are static and fails to account for climatically induced regeneration pulses of the 1910s and 1920s, as well as others, which would have naturally altered the forest structure.
- It attempts to re-create the approximate number of presettlement trees and their locations, however this is not the same as re-creating a presettlement forest.
- In the designation of the trees which are left standing, it fails to sufficiently take into account the mortality of trees due to: 1) the logging operation itself; 2) prescribed fire; or 3) natural mortality over time. It also fails to account for the inability to find all of the presettlement evidences and the effect of climatically induced tree population dynamics. The net result is that the model the leaves far to few trees standing after its treatment.
- Extreme thinning produces tremendous amounts of logging slash, drier soils, and results in higher wind speeds within thinned forests, all of which cause extreme behavior.

FIGURE 1 Aerial View of a Flagstaff Restoration Model Logging Area
Fort Valley Project, Coconino National Forest near Flagstaff, Arizona

FIGURE 1	Aerial View of a Flagstaff Restoration Model Logging Area Fort Valley Project, Coconino National Forest near Flagstaff, Arizona

Aerial photograph of Flagstaff restoration demonstration blocks #1 and #2 on the south side of the San Francisco Peaks, Coconino National Forest near Flagstaff, Arizona.

Area was thinned in the late fall of 1998 and was burned using a prescribed fire in the spring of 2000.

The large open area with scattered trees in the lower left side of the photograph resulted from a fire in the mid 1900s.

- Diamond shaped area (80 acres) of thinned trees near center of photograph illustrates the extreme reduction in forest density that results from the application of the presettlement restoration methodology that characterizes the so-called “Flagstaff model.”

- The lower half of the diamond shaped area was thinned using the same logging prescription (the Flagstaff model) that is being recommended by the Forest Service for use across the majority of the Fort Valley treatment area.

FIGURE 2 Removing 88% of Trees Results In An Unnaturally Sparse Forest
Fort Valley Project, Coconino National Forest near Flagstaff, Arizona

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Flagstaff model demonstration block #1 which used a “full” presettlement restoration prescription that retained either 1.5 or 3 trees for each presettlement tree evidence, depending upon the size of the replacement trees (a 1.5/3 replacement rate). The cover photograph illustrates another example from this same demonstration block.

- 88% of the trees from this site were removed.
- Low number of retained trees results in an unnaturally open forest condition.
- Area fails to replicate the random groupiness that is typical of southwestern ponderosa pine forests.
- Site no longer contains suitable tree density or canopy closure for many forest canopy dependent species (e.g. northern goshawk, Mexican spotted owl, Abert squirrel).

FIGURE 3 Flagstaff Model Removes Some of the Largest Trees
Fort Valley Project, Coconino National Forest near Flagstaff, Arizona

FIGURE 3	Flagstaff Model Removes Some of the Largest Trees Fort Valley Project, Coconino National Forest near Flagstaff, Arizona

Flagstaff model demonstration block #2 which used a “modified” presettlement restoration prescription that retained trees at the rate of 2 or 4 trees per identified presettlement tree evidence (a 2/4 replacement rate).

The 2/4 replacement rate prescription is the thinning prescription that the Forest Service is calling for as their preferred method for the Flagstaff model.

Stump in center foreground is approximately 20” diameter at its base (the lens cap on the center of the stump is 2” in diameter).

- 83% of the trees from this site were removed.
- 75% of the largest trees (those in 16” to 21” diameter at breast height size range) that were established after 1870 were removed because these large trees were growing in the “wrong” place according to the Flagstaff model. Such trees were more than 60 feet from a presettlement evidence.
- The result of logging these trees is a loss of the biggest existing trees, which are the ones most likely to quickly develop into the large trees that were the most prevalent component of natural forests.
- Ecological restoration of this site is thus further delayed than if these large trees were retained.
- Other restoration scientists emphasize that thinning the small trees, while simultaneously retaining the large trees, is the best means to reduce the potential for high intensity fires and is the most ecologically prudent means to restore forests.

FIGURE 4 Extremely Open Forest and Log Decks Created by the Flagstaff Model Fort Valley Project, Coconino National Forest near Flagstaff, Arizona

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Fort Valley Project, Coconino National Forest near Flagstaff, Arizona

Log decks and the extremely open forest resulting from the application of the Flagstaff model.

The 2/4 restoration prescription used in this area is the Flagstaff model thinning prescription that the Forest Service is calling for as their preferred method for the majority of the Fort Valley Project.

- Openings of two or more acres such as this are common results of this model.

FIGURE 5 Large Trees Are Logged While Leaving Small Trees
Mt. Trumbull Restoration Site, Grand Canyon-Parashant Nat. Mon., AZ

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Mt. Trumbull Restoration Site, Grand Canyon-Parashant Nat. Mon., AZ

The Flagstaff model (also called the presettlement reconstruction model) often results in the cutting of the largest trees because of its cookbook prescription which calls for finding replacement trees for presettlement tree evidences within only a set search radius (30 or 60 feet depending upon the specific prescription being used) from the presettlement evidences. The net result is the removal of some of the largest trees from a site because these large trees are outside of the rigidly applied search radius.

The Flagstaff presettlement restoration model being used in the Fort Valley area has been applied by Dr. Wallace Covington across more than 1,000 acres of ponderosa pine forest at Mount Trumbull, within the newly designated Grand Canyon-Parashant National Monument. Restoration treatments in this area utilize nearly the same prescription as that used in the Fort Valley area near Flagstaff and thus serve as examples of what these treatments will look like when applied in different places around the southwest.

FIGURE 6 Logging Slash Compacted by Bulldozers Causes Significant Soil Damage
Mt. Trumbull Restoration Site, Grand Canyon-Parashant Nat. Mon., AZ

FIGURE 6	Logging Slash Compacted by Bulldozers Causes Significant Soil Damage Mt. Trumbull Restoration Site, Grand Canyon-Parashant Nat. Mon., AZ

Photograph taken of a restoration unit at Mt. Trumbull where cutting was completed in the fall of 1999. (Unit #96-3)

- Large amount of logging slash created as a result of removing up to 90% of the trees from a site creates significant problems in controlling the intensity of the first prescribed fire following the logging treatment. (See Figures 7 and 8 which show the effects of these post-logging prescribed fires.)

- In an attempt to reduce the intensity of the first burn following the logging a bulldozer was run over this entire site to compact the logging slash.

- Significant soil disturbance resulting from this bulldozer compaction operation begs the question of whether or not this can be considered ecological restoration. Exotic plant species are likely to become the dominant herbaceous plants in areas of such extreme disturbance.

- Multi-acre openings, with only a few leave trees typically result from the application of the presettlement restoration model.

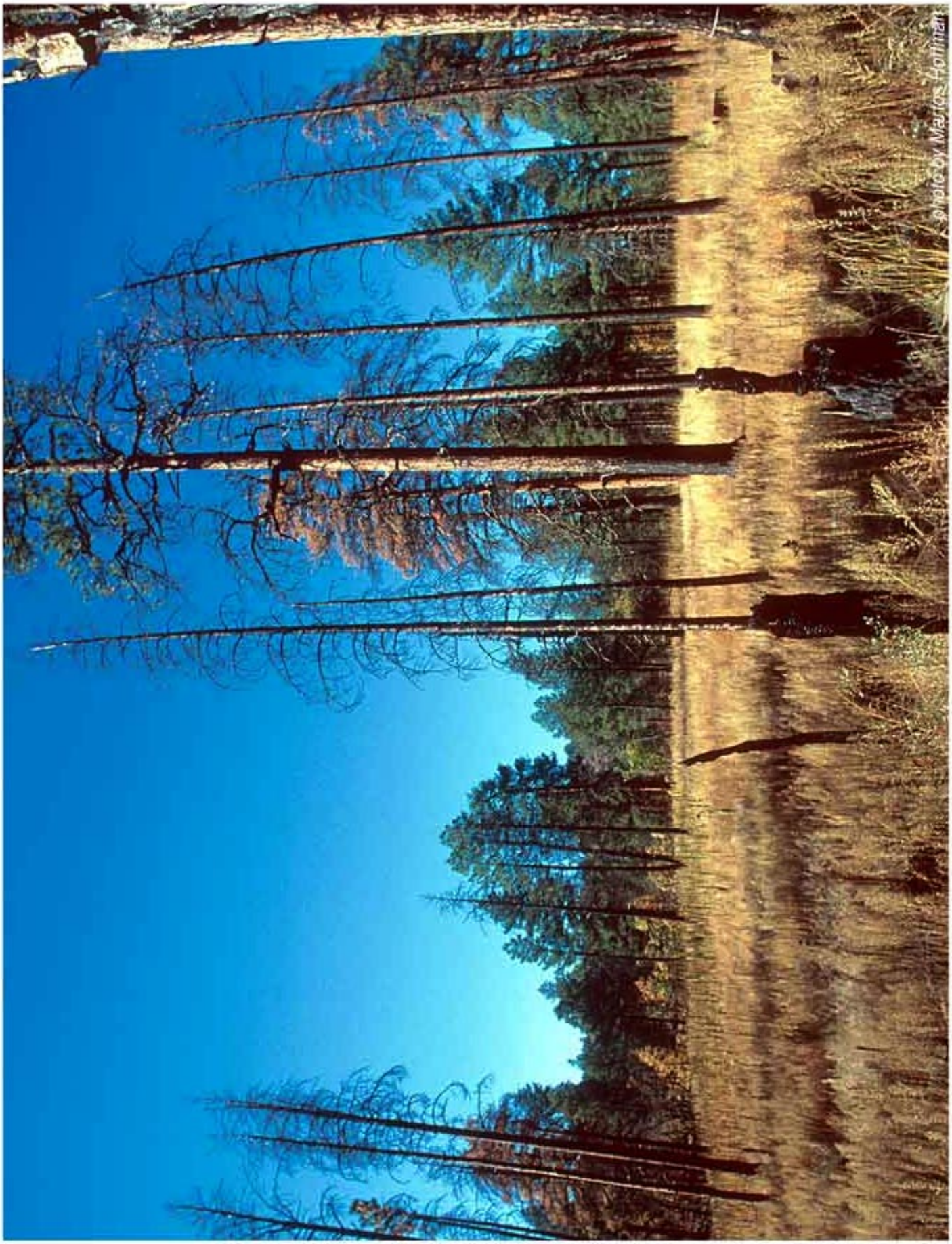

FIGURE 7 Tree Mortality From the Prescribed Burn Following Restoration Logging
Mt. Trumbull Restoration Site, Grand Canyon-Parashant Nat. Mon., AZ

FIGURE 7 Tree Mortality From the Prescribed Burn Following Restoration Logging Mt. Trumbull Restoration Site, Grand Canyon-Parashant Nat. Mon., AZ

First restoration treatment unit at Mt. Trumbull that was burned in the fall of 1997. (Unit #96-1)

- Majority of trees left to replace the previously logged presettlement trees were killed in the first prescribed fire following the restoration logging operation. This demonstrates one reason why the presettlement model's cookbook replacement system is flawed because it leaves far to few trees.

- Area was seeded with herbaceous and shrub seeds two times during the first year following the prescribed burn.

- All of the restoration demonstration projects completed by Dr. Covington, except for the Flagstaff Fort Valley Project, have been reseeded as part of the treatment. Therefore, conclusions drawn about the amount of herbaceous growth that results from these demonstration units cannot be extrapolated to other restoration treatments that do not receive similar reseeding.

FIGURE 8 Tree Mortality From Prescribed Burn Following Restoration Logging
Grandview Point, Kaibab National Forest Near Grand Canyon Nat. Park

FIGURE 8 Tree Mortality From Prescribed Burn Following Restoration Logging Grandview Point, Kaibab National Forest Near Grand Canyon Nat. Park

Presettlement restoration project adjacent to Grand Canyon National Park's southern boundary burned in December 1999. The same model has been proposed for use within Grand Canyon National Park.

- The small diameter trees left standing to replace the previously logged old growth trees have been killed by the prescribed fire following the restoration logging.

- Multi-acre openings typically result from the application of the presettlement restoration model.

- Cutting of the majority of the trees at a location and burning results in fire intensities and an end result that is no better than high intensity crown fires.

FIGURE 9 Relict Natural Old Growth Ponderosa Pine Forest
Powell Plateau, Grand Canyon National Park

FIGURE 9	Relict Natural Old Growth Ponderosa Pine Forest Powell Plateau, Grand Canyon National Park

This represents the premiere example of what ponderosa pine forests were like across the southwest prior to fire suppression and logging. Powell Plateau is an isolated plateau off the North Rim that has had the least amount of natural process disruption over the past century and a half than any other place in the southwest. It therefore serves as an exemplar for successful forest restorations.

- Compare the number, size, groupiness, and canopies of the trees in this photograph with the end result of the presettlement restoration logging as shown in Figures 1 through 8.

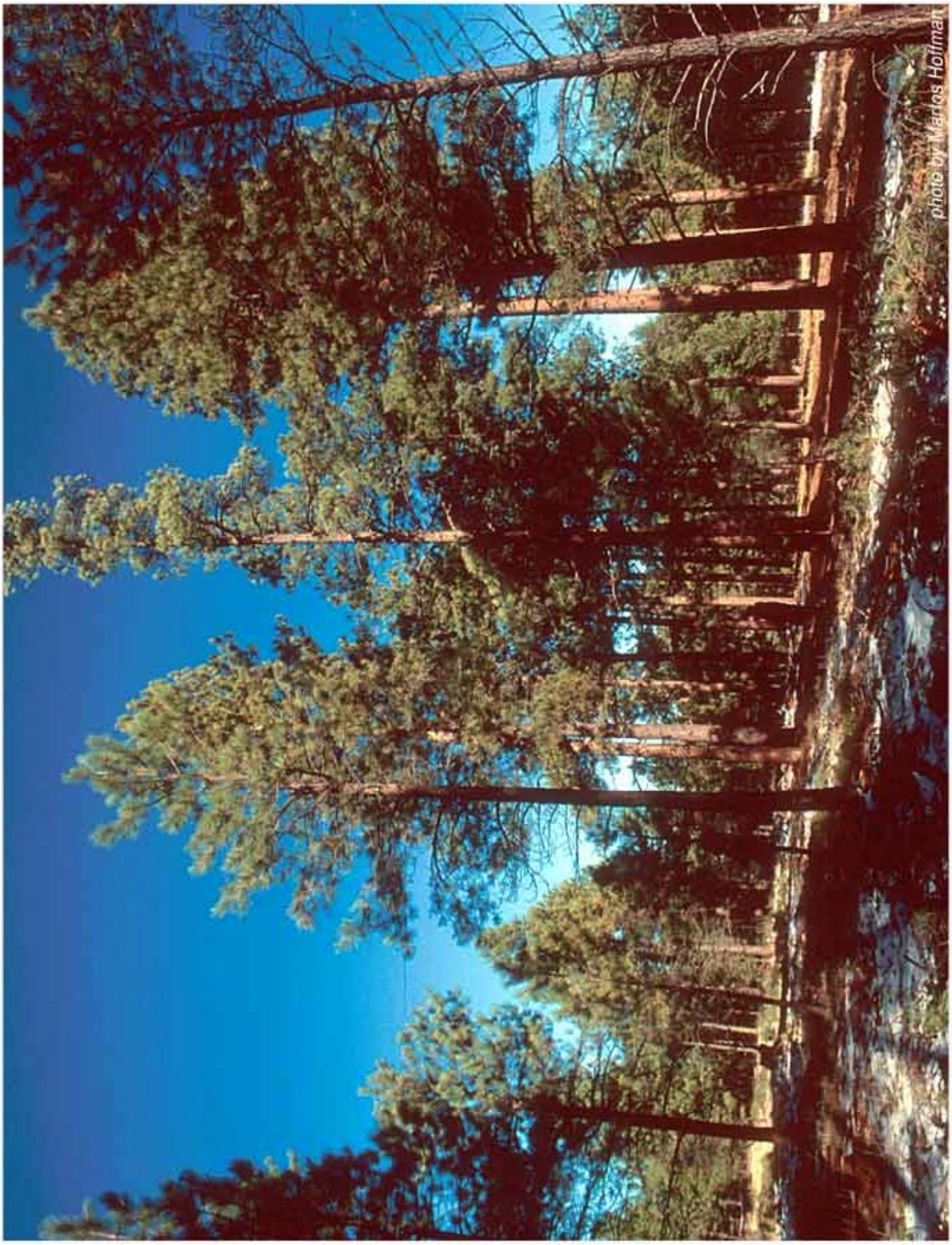

FIGURE 10 Southwest Forest Alliance's Restoration Mimics Natural Forest Structures
Kaibab National Forest between Flagstaff and Williams, AZ

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Kaibab National Forest between Flagstaff and Williams, AZ

The Southwest Forest Alliance has developed and applied its "**Natural Processes Restoration Model**" on the Williams Restoration Demonstration site. **A summary of this restoration model is attached at the end of this briefing packet.**

The Southwest Forest Alliance's Natural Process Restoration Model involves conservative thinning of small diameter trees with the of goal of altering the fuel conditions enough that natural fire can once again assume its keystone ecological role in shaping forest structure and function.

Note the similarity in tree density and pattern between this figure and the intact old growth forest illustrated in Figure 9.

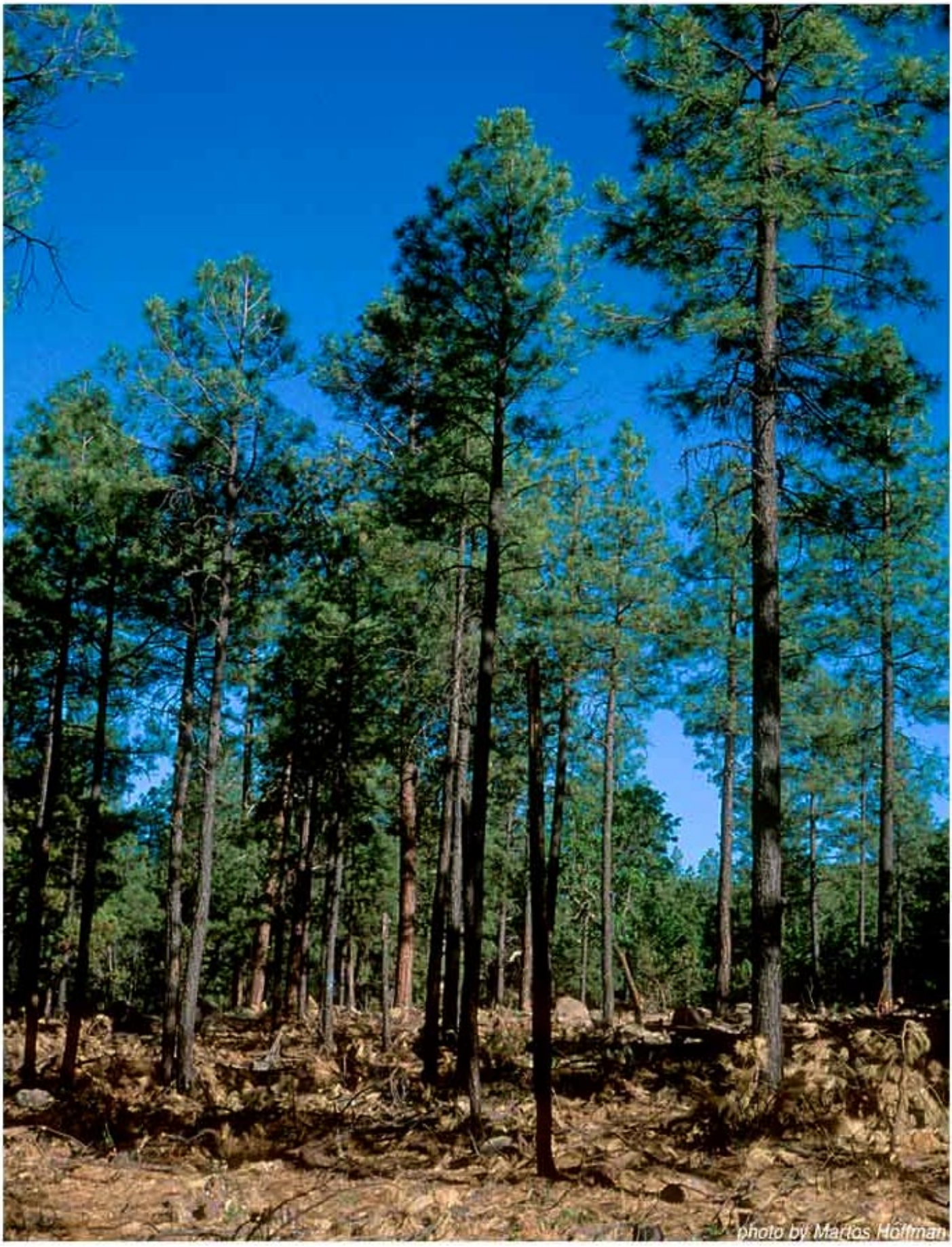

FIGURE 11 Southwest Forest Alliance's Restoration Mimics Natural Forest Structures
Gila National Forest near Silver City, New Mexico

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Gila National Forest near Silver City, New Mexico

This Southwest Forest Alliance restoration demonstration site was thinned in the fall of 1998 and was successfully burned by a natural lightening caused fire in the summer of 1999 without mortality of the trees left following the thinning.

Again, note the similarity in the tree density and pattern between this figure and the old growth forest shown in Figure 9.

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Natural Processes Restoration **Principles**

February 2000

Natural Process Restoration Model Overview

The overall goal of the Southwest Forest Alliance's Natural Processes Restoration (NPR) model is to reintroduce or enhance natural processes such as frequent fire, hydrological cycles, nutrient cycles, and competition that shaped forests prior to European settlement. High priority objectives include significant reduction of the potential for large crown fires, decreasing competition among trees that results from excessive tree densities, as well as protecting and enhancing habitat for imperiled and sensitive species. The NPR model seeks to increase the diversity and quantity of the understory vegetation component through the definition of a network of well-defined openings between tree groups and a variety of thinning intensities within tree groups.

The NPR model is a conservative, light touch, restoration approach that is based upon the concept that structural manipulation should consist of only that minimally needed to allow natural ecological processes (particularly low intensity fire) to function again in shaping the structure of ponderosa pine forests. The comparatively conservative approach of the NPR model strives to reverse the downward trend in ecological health while explicitly incorporating the habitat needs of imperiled and indicator wildlife species.

The NPR's minimal structural manipulation approach recognizes that restoration is not a single event, but a process that occurs over time. Beginning the restoration process with minimal structural manipulation does not direct the forest to look a certain way, but instead creates conditions that enable natural ecological processes to become shaping agents of the forest over time. Minimal structural manipulation at the outset of the restoration process leaves options open for the future as more is learned about the practice and effectiveness of ecological restoration.

Natural Processes Restoration incorporates a variety of treatment options across a restoration area including a non-treatment option for some parts of an area, treatments that involve no removal of material from the site, minimal thinning prescriptions, as well as burn only options. It also considers landscape patterns and scale issues, as well as wildlife habitat requirements in determining the pattern and intensity of all types of treatment.

Goals

The Natural Processes Restoration model works to achieve the following suite of goals:

- Restore forest structures, processes, and composition so they are within their natural range of variability.
- Increase resilience of the ecosystem to disturbance events, including fire, drought, insects, and regional climate fluctuations.
- Prepare the forest for, and reintroduce the fire process at appropriate frequency, extent, seasonality, and intensity.
- Reduce the risk of large high intensity fires and associated soil and watershed damage.
- Reduce anomalous densities of small-sized trees.
- Restore the natural range of trees ages, sizes, and spatial patterns.
- Restore habitat conditions for sensitive and declining species.
- Incorporate restoration strategies that protect interim habitats for imperiled species.
- Protect and invigorate the remaining old-growth trees.

General Restoration Strategy

Natural Processes Restoration is an integrated approach that includes: prescribed fire, conservative thinning, grazing deferment, erosion control, road closures, native seed planting, and intensive ecological monitoring. Some specific strategies include:

- Retain all large or old conifer trees (16" dbh or greater) and snags.
- Retain all oaks and aspen.
- Retain representatives of 20th century regeneration pulses.
- Incorporate best currently existing forest structures.
- Ensure interim and long-term habitat for sensitive plants and animals.
- Introduce frequent low intensity fire.
- Monitor the effects of restoration treatments.

Implementation Principles

- In order to maintain habitat structures currently important to plants and wildlife, and to ensure that forests develop quickly toward their natural range of variability, restoration efforts will take advantage of valuable existing forest structures such as large trees, group structures, and canopies.

- Restoration of the natural clumpiness typical of ponderosa pine forests will be accomplished by identifying and retaining the larger, more vigorous trees currently on the landscape. Groups created around these trees will retain full canopies that will function, as best as possible, like pre-disturbance groups.

- Natural Processes Restoration works to restore ecological as well visual diversity to homogenous and degraded forests. Ponderosa pine forests historically contained a percentage of trees that were saplings, poles, and blackjack sized trees. To account for this, a diversity of tree sizes will be retained both within tree groups as well as across the restoration treatment area. Removing all of the smaller trees would result in oversimplification of the forest's structure and distribution of trees by age class. However, the majority of the trees thinned are under 9" dbh.

- Horizontal and vertical diversity similar to pristine forests will be retained where possible. The range of natural variability will be incorporated into the marking guide, allowing for a range of stems/acre, basal areas, and canopy covers.

- All yellow and yellowing pines will be retained regardless of size. Trees established before 1900 will be retained as well.

- Most of the trees immediately surrounding yellow pines will be aggressively thinned to reduce the risk of crown fire and competition from overstocking. Some blackjack or younger trees may be retained in these groups to replace old trees removed by logging and to provide a diversity of trees at various ages that will serve to perpetuate the yellow pine tree groups over time.

- Significant effort will be made to enhance existing oak groups as well as encourage oak regeneration by thinning overstory pines that are shading oak groups. No thinning within oak groups will occur. The 16" dbh diameter cap for ponderosa pine applies even when thinning for oak enhancement.

- All dead standing snags will be preserved. All downed logs greater than 10" diameter will be preserved. Efforts to protect these snags and downed material will be made during the initial prescribed fire treatments.

- All slash will be lopped, scattered, and left onsite to provide material for nutrient cycling and fuel for initial fire treatments. Excessive duff will be raked away from the boles of yellow pines prior to the introduction of prescribed fire.

- Wildlife cover areas adjacent to drainages, roads, and water sources will be identified and will be marked as non-treatment zones. Attention will also be paid to travel corridors between cover areas as well as small patches of cover between the larger designated cover areas.

- Livestock grazing deferment should occur following the initial fire treatment to allow for understory recovery. Long-term or permanent deferral is most desirable.

- No new roads will be constructed. Over time there will be a reduction in road densities, allowing for more natural fire regimes, less habitat fragmentation, and larger roadless areas.

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Founded in 1994, the Southwest Forest Alliance is a coalition of environmental and sportsman organizations—with over 50,000 members—in Arizona and New Mexico charting a new course for the Southwest's public lands. The Alliance is dedicated to restoring a natural balance to our public lands by promoting solutions that preserve the remaining mature and old-growth forests and restoring degraded watersheds and forest ecosystems. This vision includes working for positive changes in forest management while helping forest-dependent communities become self-sustaining. The Alliance seeks to create the need for large-scale change in the Bureau of Land Management's and the Forest Service's land management practices by highlighting problems at the local level. The Alliance, in concert with its member organizations, also works to protect regional biodiversity and natural ecosystem integrity by seeking legal protection of candidate species under the Endangered Species Act and by advocating permanent protection of lands as Congressionally designated Wilderness.

Southwest Forest Alliance Member Organizations

Amigos Bravos Friends of the Wild Rivers; Ancient Forest Rescue, San Luis; Arcosanti; Audubon Council, Arizona; Audubon Society, Central New Mexico; Audubon Society, El Paso; Audubon Society, Huachuca; Audubon Society, Maricopa; Audubon Society, Mesilla Valley; Audubon Society, Northern Arizona; Audubon Society, Prescott; Audubon Society, Sangre de Cristo; Audubon Society, Southwest New Mexico; Audubon Society, Tucson; Arizona League of Conservation Voters; Black Mesa Permaculture Project; Carson Forest Watch; Center for Biological Diversity; Coalition for Justice and Peace; Columbia River Bioregion Campaign; Committee of Wilderness Supporters; Desert Fly Casters; Earthlaw; Forest Trust; Flagstaff Activist Network; Friends of the Gila River; Friends of the Owls; HA:SAN; Lifenet; National Audubon Society; National Parks and Conservation Assoc.; New Mexico Wilderness Alliance; New Mexico Wilderness Study Committee; Prescott National Forest Friends; Public Forestry Foundation; Rio Grande Bioregions Project; Rio Grande Restoration; Santa Fe Forest Watch; Sierra Club, El Paso; Sierra Club, Colorado Plateau; Sierra Club, Grand Canyon Chapter; Sierra Club, Palo Verde; Sierra Club, Prescott; Sierra Club, Rincon; Sierra Club, Rio Grande Chapter; Sierra Club, Sedona/Verde Valley; Sierra Club, Southern New Mexico; Sierra Club, Southwest Region; Sky Island Alliance; Sky Island Watch; Sonoran Biodiversity Project; Southern Rocky Mountain. Service Corps; Southwest EnviroNew Mexicoental Center; Southwest Trout; Student Environmental Action Coalition; T & E Inc.; Trout Unlimited, Zane Grey Chapter; Upper Gila Watershed Alliance; Western Game Bird Alliance; White Mountains Conservation League; The Wilderness Society; The Wildlands Project; Wildlife Damage Review; Zuni Conservation Project