

Wilderness Management and the Restoration of Fire: An Analysis of Laws and Regulations in Northern Arizona



The Ecological Restoration Institute

The Ecological Restoration Institute at Northern Arizona University is a pioneer in researching, implementing, and monitoring ecological restoration of southwestern ponderosa pine forests. These forests have been significantly altered over the last century, with decreased ecological and recreational values, near-elimination of natural low-intensity fire regimes, and greatly increased risk of large-scale fires. The ERI is working with public agencies and other partners to restore these forests to a more ecologically healthy condition and trajectory—in the process helping to significantly reduce the threat of catastrophic wildfire and its effects on human, animal, and plant communities.

Cover photo: Frequent-fire, old-growth forest mosaic on the Powell Plateau, Grand Canyon National Park.

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Table of Contents

Executive Summary	1
Introduction	2
Fire in Southwestern Forests and Wilderness Areas	3
Case Studies: Federal Agencies in Northern Arizona	4
Bureau of Land Management	5
USDA Forest Service	7
National Park Service	9
Conclusions and Recommendations	13
Endnotes	16

Executive Summary

Our recognition of the ecological importance of fire has increased to the point where the operative question is no longer “Should we have fire on our public lands?” but “How should we restore fire as an essential ecosystem process?”. This white paper places the restoration of fire in the context of the 1964 Wilderness Act, and then examines the implementation of federal fire law and policy in five Wilderness Areas (WAs) in northern Arizona dominated by ponderosa pine (*Pinus ponderosa*) ecosystems. The analysis of these WAs reveals that while the three federal agencies involved in the study (Bureau of Land Management, U.S. Forest Service, and National Park Service) share similar fire legislation and policies, implementation varies from agency to agency. Although initiated in northern Arizona, the implications of this study span wilderness ecosystems throughout the United States and suggest the need for a comprehensive national Wilderness fire policy.

As a result of this study and analysis, I offer the following observations and recommendations:

- Managers considering the use of fire in WAs will need to bring interested parties together to discuss alternatives well before developing and publishing their plans.
- There must be a clear demonstration that the WA is out of its natural range of variability and is in need of restoration through the use of fire.
- Managers must consider whether the use of natural lightning-produced fires (WFU), or active management in the form of prescribed burns and/or single-entry light thinning is the best means of restoring a ponderosa pine ecosystem. Many of these decisions will be driven as much by value judgments about how best to maintain the properties and essence of wilderness character as by scientific evidence aimed at restoring ecological integrity and diversity.
- Decisions to use WFU or more-active treatments will require full support from NGOs or local officials as well as from agency supervisors, superintendents, and managers in regional and national offices.
- The success or failure of treatment in a WA can be measured in terms of how much fuels were reduced, how much damage was done, and what wilderness values were gained or lost.

A science of land health needs, first of all, a base datum of normality, a picture of how healthy land maintains itself as an organism. . . . Paleontology offers abundant evidence that wilderness maintained itself for immensely long periods; that its component species were rarely lost, neither did they get out of hand; that weather and water built soil as fast or faster than it was carried away. Wilderness, then, assumes unexpected importance as a laboratory for the study of land-health.

Aldo Leopold (1941)

Only in a natural environment can people thrive, an environment where there are still places of beauty to go to. The effort to protect humanity's living space from desecration is one of the greatest challenges of this age. Wilderness is more than camping or hiking; it is a symbol of a way of life that can nourish the spirit.

Sigurd F. Olson (1968)

Introduction

Our understanding of the ecological importance of fire has increased to the point where the operative question is no longer “Should we have fire in our public lands?” but “How should we restore fire as an essential ecosystem process to our public lands?”. When considering this latter question in terms of ecological restoration in Wilderness Areas (WAs), managers soon realize that they face more challenges than they do on other public lands. While the laws and policies regarding fire control and suppression are clear for congressionally designated WAs and National Park Service (NPS) backcountry, the laws and policies that regulate ecological restoration—including the restorative use of fire—in such areas are less so. As a result, ecological restoration, in particular returning fire as a core ecological process, remains a challenge for agencies on a significant proportion of public land in the United States.

Wilderness Areas harbor relatively undisturbed ecosystems as refugia for biodiversity, and provide outstanding opportunities for solitude and primitive recreation. Managing agencies engaged in restoration in WAs must work with both human expectations and ecological constraints. In practice, implementation of wilderness fire management policies has been inconsistent across and within land management agencies for a host of reasons--the greatest of which is the lack of a comprehensive national wilderness fire policy.¹

The analysis I present in this document places the restoration of fire in the context of the 1964 Wilderness Act, and then examines fire policy and implementation in northern Arizona across five Wilderness Areas and three agencies: the Bureau of Land Management (BLM) and the National Park Service (NPS) in the U.S. Department of Interior, and the U.S. Department of Agriculture Forest Service (USFS). This analysis reveals that all three agencies share many common legislative mandates and internal agency policies regarding wilderness and fire, although the final implementation of those policies varies from agency to agency.

Wilderness is defined in this analysis as those lands either designated as WAs by Congress or as NPS backcountry areas designated to retain their wilderness character and, by policy, managed as if they were designated Wilderness. In terms of the 1964 Wilderness Act, “A wilderness, in contrast with those areas where man and his own works dominate the landscape, is hereby

recognized as an area where the earth and its community of life are untrammelled by man, where man himself is a visitor who does not remain. An area of wilderness is further defined to mean in this Act an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions.”²

The differences between natural and untrammelled have been the subject of several analyses.³ While the Wilderness Act does not provide a clear definition of natural, one generally accepted definition of a natural ecosystem is one whose structure, function, and species composition are similar to the same ecosystem prior to the arrival of Euro-Americans.⁴ “Natural” fires, then, would burn with roughly the same frequency, intensity and size as historic fires, and produce effects roughly equal to those that dominated prior to Euro-American influences.⁵ In southwestern ponderosa pine forests, these would be primarily low-intensity, ground-level fires rather than catastrophic crown fires.

The meaning of untrammelled is much more clear.⁶ An untrammelled system is unmanipulated, free, wild; it is self-willed.⁷ Untrammelled wilderness is a place where “man himself is a visitor” and the area “generally appears to have been affected primarily by the forces of nature, with the imprint of man’s work substantially unnoticeable.”⁸

Fire in Southwestern Forests and Wilderness Areas

This paper focuses on the long-term goal of restoring fire to federal lands across the Southwest. It is generally recognized that fire, as an ecological processes, is missing from many North American ecosystems.⁹ By legal definition, federal land management agencies can return fire to an ecosystem either as prescribed fire (management-ignited fire) or as wildland fire use (WFU). Wildland fire use consists of naturally ignited fire that is allowed to burn to fulfill natural resource management goals. But current conditions—especially the overly dense conditions of most southwestern ponderosa pine forests¹⁰—make simply allowing lightning-ignited fires to burn in the hot, dry months extremely dangerous. For that reason, commonly used restoration tactics include the use of prescribed fire in highly controlled situations; some thinning of snags or small trees close to old growth and then prescribed fire; and major thinning with tools that range from handsaws to chainsaws to large logging equipment, followed by prescribed burns. Agency policy is clear that most public lands in the ponderosa pine ecosystem may be thinned lightly or heavily by mechanical means, and then burned with prescribed fire to reduce high fuel loads (i.e., to mitigate fire risk), and ultimately return fire back to the system. But what actions may be conducted in the invaluable WAs and NPS backcountry?

Reintroducing fire into wilderness should be a priority.¹¹ The literature documenting the scientific and philosophical issues that surround restoring fire to wilderness has been periodically reviewed, first as a purely scientific consideration in 1985,¹² then as a broader inter-agency issue in 1999,¹³ and finally placed firmly into the restoration lexicon in 2001.¹⁴ The 1995 Federal Wildland Fire Policy and 2001 review recognized the ecological benefit of fire and encouraged more WFU.¹⁵ Yet, despite the recognition that fire is a part of healthy ecosystems, Bureau of Land Management (BLM), U.S. Forest Service (USFS), and NPS managers remain

cautious about restoring fire on a wide scale on any lands,¹⁶ much less in Wilderness.¹⁷ The primary obstacles are these:

- Risks to human life and property are perceived as too great to let fires “wander” for weeks at a time across the 6.5 million acres of southwestern ponderosa pine forests.
- Limited funding is available to defray expenses (costs are dependent on the intensity of restoration action).
- Questions remain as to the ecological effects of such fires on soils, water, and air.
- There are questions as to public acceptance of altered forests¹⁸ and smoky conditions.¹⁹
- Public acceptance (or lack thereof) of what some perceive as manipulation or trammeling of Wilderness Areas.
- Institutional barriers to Wildland Fire Use.²⁰
- Limits on strategies for controlling the intensity of fire in Wilderness Areas.²¹

Fire suppression to protect resources inside and outside WAs was built into the 1964 Wilderness Act, which reads “In addition, such measure may be taken as may be necessary in the control of fire, insects, and diseases.”²² Nearly every Wilderness designation since 1964 has included a clause allowing fire suppression. Ironically, fire suppression is now cited as one of the biggest threats to wilderness.²³ The challenge is this: What activities can be conducted to return fire to wilderness ecosystems that will not compromise the wilderness character of those same ecosystems?

Case Studies: Northern Arizona

I selected five Wilderness Areas in northern Arizona for this analysis—Mount Logan (BLM), Mount Trumbull (BLM), Kendrick Mountain (USFS), Kachina Peaks (USFS), and the Grand Canyon National Park (USNPS). These five areas are comparable in that they are all subject to the 1964 Wilderness Act, all have significant acreage of ponderosa pine forest, all are relatively distant from wildland-urban interface areas (WUI), and all are subject to requirements of the National Fire Plan (Table 1). In addition, human use of these areas has caused the exclusion of fire since the 1880s and, today, agency managers continue to suppress fires to one degree or another. Despite these similarities, management occurs under three different agency missions and within three different institutional contexts. As a result, differing enabling legislation, overlaid with divergent agency histories and associated regulations and policies, creates a complex quilt of criteria that managers must consider before getting fire back in the forests. The size, ecological history, and geographic location of specific WAs also play an important role in agency decisions.

When agency officials determine the management goals and objectives for a particular WA, they work within a regulatory system where the enabling legislation takes precedence; then the enabling legislation for the monument, national forest, or park unit; and lastly the broader agency-wide management policies. A comparison of regulations and legislation between the three agencies reveals that, for all practical purposes, each agency has the same mandate for Wilderness Area fire restoration. However, current practices are constrained by natural conditions, public expectations, and agency history.

Table 1. Wilderness Areas and NPS lands with ponderosa pine ecosystems assessed in this analysis.

Wilderness Area	Federal Agency	Regional Authority	Acreage	Year Est.
Mt. Logan	Bureau of Land Management	BLM/NPS Grand Canyon–Parashant National Monument	14,650 ^a	1984
Mt. Trumbull	Bureau of Land Management	BLM/NPS Grand Canyon–Parashant National Monument	7,880 ^a	1984
Kendrick Mountain	USDA Forest Service	Coconino National Forest	5,000 ^a	1984
		Kaibab National Forest	1,510 ^a	
Kachina Peaks	USDA Forest Service	Coconino National Forest	18,616 ^a	1984
North Rim, Grand Canyon National Park	National Park Service	Grand Canyon National Park	≈65,000 ponderosa pine ≈50,000 mixed conifer and spruce-fir ^b	1919

^a Acreages taken from *www.wilderness.net*, reflecting agency reports.

^b Acreages from the GCNP Fire and Aviation department.

Bureau of Land Management

The 1976 Federal Land Policy and Management Act (FLPMA) made wilderness management one of the multiple uses for the Bureau of Land Management (BLM).²⁴ Subsequent case law has underscored the agency’s right and obligation to protect Wilderness character.²⁵

The 1983 Manual Section 8560 “Management of Designated Wilderness” outlines the specific management goals, uses, and allowable nonconforming uses for BLM Wilderness. Manual 8560 specifies that 1) the agency must develop a Wilderness Management Plan for each WA, 2) all fires must be controlled to prevent loss of human life or property, and 3) fires must be prevented from spreading outside of WAs.²⁶ The manual also states that “natural fire (i.e., lightning-caused) is normally a part of the ecology of wilderness, and human effort to ban this agent may have resulted in significant ecological changes”²⁷ and that such fires may be allowed to burn if there is a Fire Management Plan. The directives of the manual also allow managers to use prescribed burns to reintroduce or maintain natural conditions, restore fire, perpetuate a primary wilderness value, or perpetuate an endangered species.

The Mount Trumbull and Mount Logan WAs were designated in the Arizona Wilderness Act of 1984.²⁸ There are no specific statements regarding fire or ecological restoration in that enabling legislation, although important guidelines for Wilderness management in the BLM are contained in H.R. Report 101-405, commenting on P.L. 101-628--the Arizona Desert Wilderness Act of 1990. The objectives for fire management contained in the report suggest that “lightning-caused fires play, as nearly as possible, their natural ecological role within wilderness,” although managers cannot use “vegetative manipulation” to justify WFU, and “prescribed fires ignited by man may be permitted to reduce unnatural buildup of fuels.”²⁹ Despite the recognition of the role of fire in ecosystems, by 1997 the BLM had not conducted any prescribed burns in Wilderness Areas.³⁰

Mount Trumbull and Mount Logan WAs are relatively unique in that they are dominated by ponderosa pine ecosystems, which are uncommon on other Arizona BLM lands. Furthermore, they have completed Wilderness Management plans³¹ and Fire Management plans (FMP).³² The authors of the FMP report that 54 fires burned 213 acres from 1980 to 2003 in the two WAs, including one in 1989 that burned 84 acres on Mount Trumbull. All fires were suppressed. But the significance of the plans is that the BLM is empowered to allow both WFU and prescribed fire.

The most recent regulations regarding the implementation of the FLPMA on BLM Wilderness are 43 C.F.R. 6300 and 43 C.F.R. 8560, both of which became effective January 16, 2001. The only specific reference to fire in these regulations is for control; no reference is made to restoration. When the BLM issued its Final Rule on December 14, 2000, one commenter urged that the regulations include provisions authorizing BLM to use prescribed burns in appropriate situations. The BLM

believes that wording in the final rule is broad enough to allow prescribed fire as a management tool in BLM Wilderness.³³ I find the wording rather vague: “(b) Prescribe conditions under which other Federal, State, or local agencies or their agents may use, build, or install such items to meet the minimum requirements for protection and administration of the wilderness area, its resources and users; (c) Authorize officers, employees, agencies, or agents of the Federal, State, and local governments to occupy and use wilderness areas to carry out the purposes of the Wilderness Act or other Federal statutes.”³⁴ Later language is a bit clearer if one interprets “prescribe measures to control fire” as the permission to conduct restoration activities that incidentally restore fire. The BLM may likewise prescribe restorative measures to control factors (noxious weeds, non-native invasive plants, insects, and diseases) that may compromise the character of wilderness.



Significant amounts of accumulated downed trees and pine needles, along with dense stands of young ponderosa have made conditions right for a catastrophic fire at the Mt. Trumbull Wilderness Area.

Managers prescribed burned 264 acres on Mount Logan in the late-1990s to protect an ecological restoration research area. The BLM is proposing to reenter that area in 2007 even though it is a relatively small proportion of the entire WA. Much of Mount Logan has small-diameter, even-age ponderosa pine trees and any fire would crown out with nearly 100% mortality.

The BLM has not yet initiated any fire program in the Mount Trumbull WA, much less a full restoration program like those that been implemented by the Ecological Restoration Institute in non-Wilderness areas between the two WAs.³⁵ Conditions are ripe for a big fire in the Mount Trumbull WA³⁶ and managers are concerned about what may happen if a wildfire gets out of control. In response, they released, in November 2005, a Draft Resource Management Plan–Draft Environmental Impact Statement that proposes to restore the area.³⁷ The proposed action includes using prescribed fire or WFU on 6,000 acres during the next 20 years. According to the DEIS, the BLM “could use appropriate tools to construct control lines” and would protect old-growth trees by raking around the tree bases or “using minimum tools to fell and buck small-diameter trees” that might fuel crown fires.

USDA Forest Service

Policies governing the area that would later become Kachina Peaks WA and the Kendrick Mountain WA date to the Organic Act of 1987, which created the National Forest Service for the express purpose of preserving a perpetual supply of timber for home industries.³⁸ Decades later, the Multiple Use Sustained Yield Act of 1960 (MUSY) expanded the mission of the agency by specifying that “the national forests are established and shall be administered for outdoor recreation, range, timber, watershed and wildlife and fish purposes.” In 1964, the Wilderness Act added wilderness management to the USFS mission. The 1976 National Forest Management Act (NFMA) indicated a significant shift in how the USFS makes management decisions.³⁹ The law reaffirmed many directives in MUSY, but subsequent regulations added a specific planning process to develop Forest Management Plans.^{40, 41} In 2005, new NFMA planning regulations generated a great deal of controversy because they were written to streamline the planning process and allow for more flexible Forest Management Plans that can be adapted as new information becomes available.⁴² Although comments from the public on the proposed rule changes addressed ecological restoration, biological conservation and prescribed fire, these topics are not addressed in the new NFMA regulations. The presumption is that these issues will be considered at the level of individual national forests.

Significantly, the USFS has always interpreted the Wilderness Act and the NFMA to include ecological restoration: “[W]ilderness shall be so administered as to meet the public purposes of recreational, scenic, scientific, educational, conservation, and historical uses; and . . . in such a manner as to preserve and protect its wilderness character. . . . and, where necessary, restore the wilderness character of the land and its specific values of solitude, physical and mental challenge, scientific study, inspiration, and primitive recreation. To that end: (a) Natural ecological succession will be allowed to operate freely to the extent feasible” (emphasis added).⁴³

Despite this language, the USFS is extremely limited in its ability to use prescribed fire in WAs. With the exception of Alaska and the three national forests in Florida, the agency does not allow the use of prescribed fire unless it will help reduce hazardous fuels.⁴⁴ The USFS has used WFU but, relative to the total acres of designated Wilderness in the USFS system (29 million acres), the percentage of land treated by that method remains very small (0.2 percent).⁴⁴

The Arizona Wilderness Act of 1984 is the enabling legislation for Kendrick Mountain WA, which is split between the Kaibab and Coconino national forests, and Kachina Peaks WA, which lies wholly within the Coconino National Forest.⁴⁵ No special restoration provisions for fire were included in the legislation.

In 1994, a USFS-funded assessment of the Kendrick Mountain WA warned of a dangerous accumulation of fuels and claimed that when—not if—a fire started in or near the WA, the results could be devastating. In June 2000, the Pumpkin Fire started due to a lightning strike outside the Kendrick Mountain WA and burned 14,760 acres, including much of the WA. The USFS employed full suppression efforts, and saved a lookout tower and cabin. The fire burned in a mosaic pattern across the landscape. Some areas burned very hot, and all organic material was consumed, leaving behind burnt stumps and mineral soils that experienced high rates of erosion. Other areas experienced moderate- to low-intensity fire with moderate to low tree mortality and no erosion. Although the ignition was “natural,” the fire’s intensity was not, and the recovery period for some areas will be measured in centuries. Other portions of the Kendrick Mountain WA present an excellent opportunity for WFU because those areas can burn with little or no risk of a crown fire or fire escape. The entire WA is relatively small—6,500 acres—so fire will probably need to be management-ignited to maintain a two- to four-year fire return interval, thus leaving the area “trammed.” To move to an untrammed scenario, Kaibab and Coconino national forest managers might allow a WFU fire to move freely across the Wilderness boundaries, thus increasing the likelihood that lightning ignitions will burn into the WA.

The USFS allows WFU on the Kaibab portion of the Kendrick Mountain WA, although they will suppress any fire that threatens to escape or burn the historic fire tower on top of the mountain. The Kaibab National Forest has taken steps to be able to let fire burn in Kendrick Mountain WA by burning nearby Forest Service land—928 acres in 2005. In FY06, 2,184 acres were treated with several prescribed fires in the Kendrick project area.⁴⁶ There still are problems at the Wilderness boundary, however. The agency did not allow the prescribed fire into the WA because there was not enough time to properly complete the NEPA Environmental Assessment process. The USFS holds that Wilderness is not acceptable as a Categorical



Are these results acceptable in the USFS Kendrick Mountain Wilderness Area five years after the Pumpkin Wildfire?

Exclusion to the NEPA process. Once proposed, the agency would have to enter into a long dialogue as to whether prescribed fire is “natural.” The issue revolves around the fact that prescribed fire is generally ignited in northern Arizona in April, May, October, or November under predictable and relatively mild wind conditions. Alternatively, fires due to lightning typically start in June or July in pre-monsoon conditions (dry lightning ignitions without rain) with unpredictable and often high wind conditions. Resolving this difference is essential to Wilderness management in the region.

Kachina Peaks WA is in San Francisco Peaks on the Coconino National Forest, just north of Flagstaff. It has high visitor usage and public visibility. Wildland fire under “prescribed conditions” is allowed to play a natural role in this WA.⁴⁷ However, the “prescribed conditions” are so restrictive that no natural ignition fire (or prescribed fire) has been allowed to burn in the area. One reason for tight restrictions is compliance with the 1973 Endangered Species Act and concerns for habitat for the endangered Mexican spotted owl.⁴⁸

Nonetheless, controlled fire may be needed in the Kachina Peaks Wilderness Area. The WA varies in altitude from about 7,000 to more than 12,000 feet in elevation, and includes several forest types with ponderosa pine covering about 2,840 of its 18,616 acres. Aspen and mixed conifer forests dominate more than 10,000 acres at higher elevations. Records indicate that these forests historically experienced both frequent, low-intensity fires and large, stand-replacing fires.⁴⁹ Recent research has demonstrated that plant species composition has changed since 1880 when fires were excluded from the ecosystem.⁵⁰ Restoration treatments are recommended especially for the lower-elevation ponderosa pine forests, although some fire should be allowed to run upslope to create a mosaic of conditions that returns more natural ecosystem processes to higher-elevation forests as well.⁵¹

National Park Service

In 1916, Congress passed the National Park Service Organic Act, the purpose of which “is to conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.”⁵² The contradictory nature of this mission statement has been quoted extensively, although a preponderance of historical evidence suggests the intent of Congress was that preservation trumps recreational access.⁵³ Congressional intent does not always translate into practice, however, and recreation dominated NPS planning for decades.⁵⁴ The Redwood Act Amendment in 1978 expanded the Organic Act to ensure that park visitation would not “impair” natural resources.⁵⁵ In the 1990s, the NPS recognized the need for more natural resources research and initiated the Natural Resources Challenge, which has stepped up research as well as the restoration and preservation of ecosystems.⁵⁶ Both policies recognize the primacy of managing for natural conditions.

To manage natural resources within Wilderness, the NPS guidelines are: “Management intervention should only be undertaken to the extent necessary to correct past mistakes, the impacts of human use, and the influences originating outside of wilderness boundaries.

Management actions, including restoration of extirpated and endangered native species, altered natural fire regimes, controlling invasive alien species, and the protection of air and water quality, should be attempted only when the knowledge and tools exist to accomplish clearly articulated goals.”⁵⁷ Furthermore, “fire management activities conducted in wilderness areas will conform to the basic purposes of wilderness. If a prescribed fire program is implemented, these plans will also include the prescriptions and procedures under which the program will be conducted within wilderness.”⁵⁸

Restoration activities are mandated by NPS policy, especially for fire. However, restoring fire in dense stands of ponderosa pine is delicate business. If fire is to burn in a dry year in the hottest months of June and July, as would have been the case under “natural” conditions, some land managers and citizens will likely call for judicious thinning preceding the fire.

The 1919 enabling legislation for Grand Canyon National Park (GCNP) directs that management activities be conducted for the benefit and enjoyment of the people and in accordance with the 1916 Organic Act.⁵⁹ In the GCNP Enlargement Act of 1975 (as amended), Congress recognized “that the entire Grand Canyon . . . is a natural feature of national and international significance” wherein the Secretary of Interior is required to make recommendations of any suitable area for preservation as Wilderness.⁶⁰ A Wilderness designation has not been forthcoming, however, despite the fact that more than 90 percent of GCNP was recommended as Wilderness in the late 1970s.⁶¹ These early documents also do not explicitly refer to restoration activities. Nonetheless, guiding principles exist in the 1998 GCNP Wilderness Management Plan, which requires the area to be managed to preserve its wilderness character.⁶² Such provisions also exist in broader NPS policy documents, specifically, the NPS Director’s Order #41 in 1999⁶³ and the 2001 NPS Management Policies. Both affirm a policy established in 1988 that put the following definition: “for the purposes of applying NPS wilderness policies, the term ‘wilderness’ includes the categories of suitable, study, proposed, recommended and designated wilderness.”⁶⁴ Although the GCNP backcountry is not designated Wilderness, each action to be conducted there is in practice reviewed for minimum tool requirements so that wilderness characteristics may be retained.



A clear, clean fire line two years after a prescribed fire on the North Rim of the Grand Canyon National Park shows positive progress toward adopting widespread Wild Fire Use.

Among federal agencies, the NPS has the longest history of reintroducing fire into ecosystems. Kings Canyon–Sequoia National Park, in 1968, and Yosemite National Park, in 1970, initiated prescribed fire regimes after a new issue of NPS policies acknowledged that “Fires in vegetation resulting from natural causes are recognized as natural phenomena and may be allowed to run their course when such burning can be contained within predetermined fire management units and when such burning will contribute to the accomplishment of approved vegetation and/or wildlife management objectives.”⁶⁵ Furthermore, prescribed fire may be employed as a substitute for natural fire.⁶⁶ The prescribed fire program demonstrated that fire could be managed and controlled, and, by the early 1970s, the NPS was a leader in the application of prescribed fire for the purpose of restoration.⁶⁷ This policy emerged into allowing for natural ignition fires to burn for resource benefit (prescribed natural fires) and as the 1995 National Fire Plan has been instituted, natural ignitions are categorized as WFU. As early as the 1980s there was debate on whether fire alone is enough to correct the influence of past management decisions or whether other manipulation is required.⁶⁸

The North Rim of the GCNP is the focus of this analysis because it is large, remote, and closed to most visitors for about seven months a year. The predominant forest type is ponderosa pine grading into mixed conifer and spruce-fir. Areas of mixed conifer and spruce-fir forest are difficult to manage for fire because the fire regime may include stand-replacement fire and slow re-establishment of old growth. Prescribed fire and WFU have been used as management tools in GCNP since the late 1970s.⁶⁹ However, park managers still suppress “out of prescription” fires, including those that occur, as they would have before Euro-American settlement, during the dry, hot fire season of June and July.



Wild Fire Use comes with risks like the inadvertent loss of this mixed conifer forest on the North Rim of Grand Canyon National Park.

There are several advantages to implementing fire restoration in GCNP, as compared to other forests in the region: 1) The fire history and pre-Euro-American conditions are relatively well known;⁷⁰ 2) current conditions indicate that the system is out of its natural range of variability; 3) there are recommendations from within the park unit to restore fire and reduce fuel loads;⁷¹ 4) there appears to be widespread support for restoring fire to the ecosystem;⁷² 5) staff and personnel are in place; and 6) a Fire Management Plan has gone through the NEPA process and a full Environmental Impact Statement should be in effect by 2007.

In addition, researchers have conducted recent site-specific research on the ecological effects of several different ponderosa pine restoration treatments in the GCNP and, given their findings, they recommend that GCNP managers employ some thinning before burning, especially around old-growth trees, to restore forest

conditions. Such thinning could be carried out without large equipment, but might require chainsaws.⁷³

However, if one overlay the Wilderness Act with the National Fire Plan, it initially appears that such restoration efforts will require an army of park rangers with two-man cross-cut saws and buckets of water to patrol the fire perimeter to contain a prescribed fire. There are no legal barriers that prohibit park managers from employing chainsaws if they are determined to be the minimum-impact tool. Managers may determine that chainsaws are safer than cross-cut saws and that the end result of controlled fires will enhance wilderness characteristics. According to NPS Management Policies, “Administrative use of motorized equipment or mechanical transport will be authorized only: If determined by the superintendent to be the minimum requirement needed by management to achieve the purposes of the area as wilderness, including the preservation of wilderness character and values; or in emergency situations (search and rescue) involving the health or safety of persons actually within the area.”⁷⁴ In 2002, a Finding of No Significant Impact for a research experiment at GCNP demonstrated that nothing in the law prevented mechanical thinning conducted with chainsaws. However, the preferred alternative was not implemented when the level of public resistance to mechanical thinning was made clear to the NPS. On the North Rim of GCNP, chainsaws are only used sparingly to clear “black lines” and roads that act as barriers for prescribed fires and WFU programs.

Researchers have also investigated whether fire alone can achieve restoration goals. Research on a prescribed fire that escaped in 1993 indicated that sufficient mortality occurred to fulfill restoration objectives,⁷⁵ although the fire was much hotter than planned. It’s likely that, despite positive ecological results, managers who fear damage to resources or humans will not use such hot fires. When a fire gets hot enough to burn off forest-floor detritus and kill younger established ponderosa pines—or, in other words, to fulfill the role it played before Euro-American settlement—the risk that it will get out of control may be just a little too high for administrators to tolerate.

The NPS National Wilderness Steering Committee has struggled with the natural/untrammeled debate in restoration activities, and has proposed classifying actions into three categories.⁷⁶ A Class I action is a short-term disturbance with long-term wilderness character enhancement, Class II is a long-term recurring entry with both benefits and costs, and Class III actions support laws and policies but “do not directly enhance wilderness character.” In the end, however, the park superintendent is the one to make the call between a Class I, II, or III action, and the issue still hinges on whether the tradeoff for a temporary trammeling sufficiently “enhances” Wilderness.

The GCNP Fire Management Plan to be issued in 2007 will, presumably, forecast the long-term goals of WFU and prescribed fire in the park, and will determine whether or not the North Rim forests will move toward both more natural and more untrammeled conditions, and how that goal will be accomplished. Ideally the density of ponderosa pine will be reduced, fire suppression will stop, and naturally ignited fires would be allowed to burn in all seasons. Fire in the park is gaining acceptance with the general public. A recent survey revealed that five times as many visitors to GCNP supported some sort of fire in the park as compared to those who opposed all fires in the park.⁷⁷

Conclusions and Recommendations

What lies in store for ecological restoration, fire, and Wilderness management for the BLM, USFS, and NPS? All three agencies share the National Fire Plan policy directive to restore fire to ecosystems, including designated Wilderness. All three agencies are subject to the 1964 Wilderness Act and have interpreted that legislation to include restoring natural conditions. Ostensibly, in ponderosa pine ecosystems, the goal is to create conditions where lightning can start a fire any time of the year and managers can just watch it burn. The open forest conditions will allow sunlight to nourish the same sorts of understory grasses and other vegetation that grew in the period preceding Euro-American settlement of the region, along with a representative host of associated fauna.

The NPS has an aggressive prescribed fire strategy on the North Rim of the GCNP that uses heli-torch ignition and old roads or trails as fire boundaries. Undoubtedly WFU is emerging as a significant management tool there. The BLM manages two relatively isolated “islands” of ponderosa pine–dominated forest in the Mount Trumbull and Mount Logan WAs that have yet to see any action other than fire suppression. The USFS Kendrick Mountain WA had a fairly dramatic wildfire, while the Kachina Peaks WA has near-total fire suppression because conditions are never right to let a fire burn. But the USFS is employing prescribed fire on surrounding lands, and the Kaibab National Forest has a WFU policy in place, with the Coconino National Forest soon to follow. Theoretically, at least, the Kendrick Mountain WA could have regular fire. Each agency is also seeking to develop a long-range Wilderness fire policy that will leave these areas both more natural and less trammled. The public will undoubtedly play a role in any future decisions, with national wilderness advocacy organizations leading the way. For these organizations and other wilderness supporters, the opposition to manipulating conditions in WAs is extremely high, even when faced with the argument that if the agencies do nothing the ecological consequences could be severe. In fact, those ecological consequences will probably have to be demonstrated with more than models if they are to sway public opinion in favor of pro-active restoration treatments.

If all parties do agree that fire needs to return to WAs, that the wilderness character of each area needs to be maintained, and that the many political and ecological challenges in wilderness management need to be faced, I offer the following recommendations.

- Managers who are considering action will need to gather interested parties together well before developing alternatives. Agency personnel should have given the issue careful consideration before putting anything specific to paper. The motto should be to collaborate or consult early and often.
- Managers need to ask whether the area is out of its natural range of variability. There must be a clear demonstration that the WA is out of its range of natural variability and is indeed degrading. The research should be conducted by an independent organization or at least in concert with several interested parties. The core issue is trust, and nowhere is trust between agencies, researchers, and NGOs put more to the test than in Wilderness.⁷⁸

Once the evidence clearly demonstrates that the area requires a change in management, then a step-by-step process of escalating intervention may be considered.

- Managers must also ask whether the WA can be restored with WFU? In other words, although fuel loads may be high, is there a good likelihood that a lightning strike may occur in one of the cooler months within the next few years? Or that lightning may strike on a section of the WA where prevailing winds will send the fire into an old burn, off a cliff, or into another barrier? In parts of the Southwest, lightning is likely to strike only in the hot, dry season when the consequences of wildfire might be unacceptable to managers and the public. However, if lightning is common, then lightning-ignited fire may demonstrate that WFU can work. The WFU option requires that managers accept a higher degree of risk than before. Management decisions in Wilderness will require full support from NGOs or local officials who sign off on an agreement, as well as from agency supervisors, superintendents, and managers in regional and national offices.
- No one should lose a job because of a decision to use WFU. The success or failure of a WFU event can be measured in how much fuels were reduced, how much damage was done, and what wilderness values were lost or gained. Once it has occurred, we may be surprised that WFU will work, or surprised that it is impossible—but we will know. WFU has the added advantage of being the most cost-effective strategy.
- Managers should then ask, if WFU is not appropriate or sufficient, can prescribed fire work alone. Lightning may not supply a steady stream of ignition into a relatively small WA. For example, the extensive North Rim of the Grand Canyon has multiple opportunities to “capture” lightning every year, while the 7,880-acre Mount Trumbull WA may not experience many lightning events that either fall into an appropriate weather window or onto an appropriate location. Prescribed burns may be warranted in such a situation, even though they are not natural, because the eventual effect and intention of such a burn may warrant its application. Lessons regarding the intensity of prescribed burns may be learned (or in many cases already have been learned) outside of Wilderness. Land managers relying on prescribed fire will have to again accept a slightly higher level of risk, including damage to trails and/or a small percentage of old trees, or even burning on the edge of acceptable mortality. Prescribed fires have escaped, they have burned hotter than intended, and they are never totally predictable. There will need to be full support for any prescribed burning action on all levels of management and from the public. Before prescribed fire can be applied, the agency bears a burden of proof that WFU will not be sufficient.
- Finally, managers must ask, if prescribed fire is insufficient, can light thinning with a single entry fulfill their goals and objectives? Thinning small stems around old-growth trees and scattering the slash may provide enough protection to the old-growth trees and endangered species habitat. However, spokespersons from several NGOs have indicated that any proposal to remove trees within WAs will have a higher likelihood of approval if it is a one-time operation, if there is no woody biomass removed, and if the efficacy of minimal hand tools, such as cross-cut saws, is at least thoroughly tested. Cross-cut saws are not generally preferred (they are infamously referred to as “misery whips”), but creative management alternatives may suggest that volunteers with hand tools can thin enough small-diameter trees to fulfill management objectives. In contrast, tall stumps and the effect of all those people tromping around with hand tools may be considered

unacceptable. The public may instead condone the use of chainsaws for a one-time treatment. In either case, anyone who values wilderness shudders at the thought of stumps and burn piles, no matter how noble the goal—even if it is to make an area more natural and less trammled. These stumps are artificial structures and long-lasting, and brush piles require re-entry burning or other trammeling. There is a very real chance that some organization will never accept the use of chainsaws in Wilderness Areas. Exhausting all other opportunities, though, will greatly increase the odds of wide spread support.

At each of these steps there must be a rigorous system of evaluation and monitoring. While it is federal land managers who must go through these steps, public support is essential at all levels. That support includes a sincere contribution to ideas and strategies that can get fire as a significant natural process back into the system. Granted, fire itself is only one part of restoring fire as a process, but it is a significant step towards ecological health. Managers may conclude that natural conditions have degraded sufficiently that intervention is warranted, or that WFU will not work under current conditions in the foreseeable future. Non-government organizations invested in wilderness should review the information, test the extent of data and then, if appropriate, publicly support management decisions in order to minimize the professional risk that a land manager takes. Wildland Fire Use is more unpredictable than controlled burns, and both are more unpredictable than pre-fire thinning. Fires do escape their “boundaries” at times, so if the decision is to use WFU or controlled burns as the minimum tool, managers need public support.

Nothing in this document should be construed to promote one specific action over another. Any eventual solution or decision will take years of hard work, and probably extend beyond many individual careers. The first managers to embark on this journey will set standards and precedents for future action on all WAs where fire is an issue. The lessons learned in ecological and political terms will be inestimable. Wilderness areas, as well as many other southwestern ponderosa pine forests, have been degraded through action, inaction, benign inattention, and heavy use for more than a century. It will require steadfast determination and vision to restore even a portion of these areas to their natural composition, structure, and function without losing important species or values. It may take decades, spanning entire career of individual land managers, just to identify, find, and put back the pieces of these important ecosystems. But to do nothing, or to do something in haste, may be worse.

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ERI White Papers: Issues in Forest Restoration

Ecological restoration is a practice that seeks to heal degraded ecosystems by reestablishing native species, structural characteristics, and ecological processes. The Society for Ecological Restoration International defines ecological restoration as “an intentional activity that initiates or accelerates the recovery of an ecosystem with respect to its health, integrity and sustainability....Restoration attempts to return an ecosystem to its historic trajectory” (Society for Ecological Restoration International Science & Policy Working Group 2004).

In the southwestern United States, most ponderosa pine forests have been degraded during the last 150 years. Many ponderosa pine areas are now dominated by dense thickets of small trees, and lack their once diverse understory of grasses, sedges, and forbs. Forests in this condition are highly susceptible to damaging, stand-replacing fires and increased insect and disease epidemics. Restoration of these forests centers on reintroducing frequent, low-intensity surface fires—often after thinning dense stands—and reestablishing productive understory plant communities.

The Ecological Restoration Institute at Northern Arizona University is a pioneer in researching, implementing, and monitoring ecological restoration of southwestern ponderosa pine forests. By allowing natural processes, such as fire, to resume self-sustaining patterns, we hope to reestablish healthy forests that provide ecosystem services, wildlife habitat, and recreational opportunities.

The ERI White Papers series provides overviews and policy recommendations derived from research and observations by the ERI and its partner organizations. While the ERI staff recognizes that every forest restoration is site specific, we feel that the information provided in the ERI White Papers may help decisionmakers elsewhere.

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