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Wildland Fire Use in Southwestern Forests: An Underutilized Management Option?

When I approached Toby Richards to be interviewed for a synthesis project on fuels management, he wanted to meet me in a remote, forested corner of New Mexico rather than in his Forest Service office. Toby is the fire management officer for the Black Range Ranger District of the Gila National Forest and along with other resource managers he is responsible for managing wildland fires.[1] This remote forest was where he was executing perhaps the most important part of his job, managing a naturally ignited fire. The gut response of most firefighters in a similar situation would be to put out a fire as soon as it is discovered in the forest and prevent its "destructive" spread. Toby and the resource staff of the Black Range Ranger District, however, were only interested in letting this fire, the Taylor Fire, spread across the landscape in its natural fashion. As this particular fire was closely monitored and allowed to burn over the landscape for several weeks, it most likely provided numerous benefits, including reducing uncharacteristically high levels of fuel in the form of woody debris, brush, and small trees; recycling nutrients; and improving wildlife habitat. In addition, these benefits would be provided with relatively little cost compared to other management activities.

This practice of letting naturally ignited fires spread is in accord with an important goal of the Forest Service, "restore fire-adapted ecosystems."[2] This goal stemmed in part from the thinking of the great conservationist of the twentieth century and advocate for wilderness areas, Aldo Leopold. Early in his career with the U.S. Forest Service, Leopold too was a proponent of suppressing wildfires. However, his views changed when, in 1936, he visited forest systems in northern Mexico that were relatively untouched by humans and still largely influenced by frequent wildfires. Contrary to the heavily grazed and fire suppressed forests of Arizona and New Mexico, he noticed that the Mexican forests presented "so lovely a picture of ecological health."[3] With this observation, Leopold

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1. For more about Toby Richards and fire management on the Black Range District in New Mexico, see Adam Burke, *Keepers of the Flame*, HIGH COUNTRY NEWS, Nov. 8, 2004, at 1.

2. U.S. DEP'T OF AGRIC. & U.S. DEP'T OF THE INTERIOR, TEN-YEAR COMPREHENSIVE STRATEGY (2001).

3. Aldo Leopold, *A Conservationist in Mexico*, 43 AM. FORESTS 118 (1937).

planted a seed, the idea that fire is a natural and important component of many forested systems of the western United States.

The official term that describes the practice of allowing wildfires to burn is "wildland fire use for resource benefit," but most managers refer to this practice as "wildland fire use" for short. This practice began to a limited extent in the late 1960s and early 1970s. Around this time managers were recognizing, as Aldo Leopold did decades earlier, that practices such as fire suppression and extensive livestock grazing had excluded this vital process of fire from many ecosystems for decades. The exclusion of fire was beginning to have rather dire consequences for forest health. This was especially true in systems that were adapted to relatively frequent (i.e., occurring every five to fifteen years) and low intensity fire. In these systems, the build up of fuel was increasing the potential for spread of very dangerous and destructive wildfires, which historically were not seen in these forests. It was thought that slowly and carefully returning the natural role of fire to these systems would reverse the trend of accumulating fuels and more severe fire regimes. Returning the natural role of fire would in turn improve ecosystem health by recycling nutrients and improving habitat for a variety of plants and animals. Prescribed natural fires, as they were then called, were lightning-ignited fires that instead of being suppressed were allowed to burn in an attempt to return fire to fire-adapted ecosystems to restore natural processes and improve forest health.

Prescribed natural fires were first used almost exclusively in wilderness areas or in National Parks that were managed as wilderness. Wilderness areas are meant to be managed as areas that are impacted primarily by the forces of nature where there is little influence or imprint from man.[4] Thus, they are "managed" mostly by leaving them alone. However, this wilderness ethic has been complicated by the fact that fire suppression, certainly an influence of man, has prevented fire from moving into wilderness areas, disrupting the natural forces that should shape these landscapes. Outside of wilderness areas, managers often attempt to restore historical forest structure through mechanical thinning, which focuses on the removal of small trees. This practice makes reintroduction of fire much easier because the removal of fuel reduces the potential for fires to burn with high intensity. Fires of high intensity are generally undesirable in these systems because they are difficult and dangerous to suppress and can have detrimental effects on ecosystems by degrading wildlife habitat and increasing the potential for soil erosion. To restore fire, managers often ignite fires under relatively benign conditions following a thinning operation. These practices have been very successful, but they are largely excluded from wilderness areas. Use of any kind of mechanical equipment

4. Wilderness Act, Pub. L. No. 88-577, 16 U.S.C. § 1131 n., §§ 1131-1136 (2000).

is often strictly prohibited in these areas and even management-ignited fire is considered by some to be "man's influence" and thus inappropriate for wilderness areas. Prescribed natural fires were regarded as a promising compromise.

The prescribed natural fire program had a modest beginning, with just a few parks and wilderness areas experimenting with the practice in the 1970s. These included Sequoia-Kings Canyon and Yosemite National Parks, and the Selway-Bitterroot and Gila/Aldo Leopold Wilderness areas managed by the U.S. Forest Service. Naturally ignited fires were generally allowed to burn as freely as possible as long as unacceptable impacts did not occur. The potential undesirable effects could vary depending on the area, but included threats to visitor safety, damage to infrastructure, smoke impacting communities or visitor facilities, or fires of greater intensity than would have occurred under historical conditions. On the Gila National Forest, for example, at first fires were only allowed to burn when lower temperature and higher relative humidity would have encouraged low intensity fire and in the later half of the burning season when fires would have been less likely to burn for several weeks. Even though this may not have always been consistent with the natural fire regime, the fuel build up was deemed too risky to allow fires to burn when high temperatures might promote extreme fire behavior, especially if fire-extinguishing rains did not materialize. With rare exception, these early programs were regarded as success stories, and, thus, the prescribed natural fire program steadily grew throughout the Forest Service and the Park Service through the 1970s and 1980s. By 1988, 26 national parks and 50 forest service wilderness areas used prescribed natural fire to some extent and up to 15,000 acres were burned each year on average.[5]

The prescribed natural fire program was severely tested with the wildfires that occurred in the northern Rocky Mountains in 1988. In a very unusual year, over 3.7 million acres burned throughout the western United States, including 750,000 acres in Yellowstone National Park.[6] Both human-caused fires and prescribed natural fires were responsible for burning vast amounts of the park. Many of these fires burned with high intensity, the kind of fires that produce dramatic fire behavior and seem to destroy everything in their path. While researchers have suggested that these high intensity fires were characteristic of how this particular forest type would have burned historically, the show of uncontrollable wildfires and their

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5. David J. Parsons, *The Challenge of Restoring Natural Fire to Wilderness, in* WILDERNESS SCIENCE IN A TIME OF CHANGE: VOL. 5, WILDERNESS ECOSYSTEMS, THREATS, AND MANAGEMENT (Conference Proceedings, USDA Forest Service, Rocky Mountain Research Station, RMRS-P-15, David N. Cole et al. eds., 2000).

6. *Id.*

impact on the nation's first national park led policy makers to question the practice of letting natural fires burn. The prescribed natural fire program was suspended until a review of the program could be completed. The review found that the program was basically sound, but recommended more detailed prescription criteria. Because many parks and wilderness areas did not meet the recommended guidelines, prescribed natural fire programs declined precipitously in 1988 and 1989.

Other events in the 1990s continued to shape the policy of prescribed natural fire. In particular, the 1994 South Canyon fire in Colorado, which was managed as a wildfire (not a wildland fire use fire) and tragically claimed the lives of 14 firefighters, led many to question the practice of exposing firefighters to unnecessary risk, especially when wildfires pose no immediate threat to communities or other values. A further review of prescribed natural fire was conducted following the South Canyon fire. As a result of this review, prescribed natural fires became known as wildland fire use for resource benefit, although most managers now refer to the practice as wildland fire use. This review also led to some specific guidelines for implementing wildland fire use that are generally practiced today. In order to be considered an option on any management unit, wildland fire use must first be an approved practice in the fire management plan.[7] This plan must designate areas across the management unit that are suitable for wildland fire use. This may include areas that are relatively remote where fire is not likely to impact communities. If a fire starts in a designated area by natural ignition, then wildland fire use may be considered. However, numerous factors must be evaluated and documented before a fire can be declared a wildland fire use event. These include number of personnel available, weather conditions, fuel conditions, and whether or not the fire is likely to be beneficial to resources. Some of these factors are evaluated through rather sophisticated models that determine, for example, the historic likelihood that a season-ending rainfall event will occur before a fire can spread to a valued resource.[8] Once a fire is designated a wildland fire use event, numerous factors such as weather, fire behavior, and direction of fire spread are monitored constantly to assure that the fire is accomplishing resource benefits and not imposing undue risk. If a fire begins to pose a threat, it can be suppressed, but a fire cannot be reclassified as wildland fire use once a decision to suppress it has been made.

The southwestern United States seems like a particularly good place to encourage more wildland fire use for the benefit of natural

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7. U.S. DEP'T OF AGRIC. & U.S. DEP'T OF INTERIOR, WILDLAND FIRE USE: IMPLEMENTATION PROCEDURES REFERENCE GUIDE (2005).

8. RARE EVENT RISK ASSESSMENT PROGRAM, RERAP USER'S GUIDE (Version 7.01 2006).

resources and community safety. The abundant lightning and relatively dry conditions historically allowed low intensity fires to burn naturally with high frequency in many forest types in Arizona and New Mexico. By some estimates fires would have occurred in these landscapes every three to fifteen years, mostly consuming grass, pine needles, and small trees and brush in the understory while barely damaging the large old pine trees. This all began to change as Euro-Americans settled the region in the late 1800s and brought with them their novel management practices:[9] Logging removed the large fire-resistant trees, livestock grazing removed the grass that carried fire, and fire suppression removed fire altogether. After several decades of these practices, forests in this region have changed from open stands with large trees and grassy understories to dense stands with many small trees that exclude grasses and forbs.[10] When wildfires do ignite in these stands under dry, hot, and windy conditions, they tend to burn with much higher intensity than fires burning through more natural open stands. These high intensity fires tend to consume tree crowns and houses and leave behind barren landscapes that are prone to exotic plant invasions, severe flooding, and soil erosion. These severely burned landscapes may not return as forests for decades, if ever. Natural resource managers throughout Arizona and New Mexico have recognized the unsustainable nature of these dense forests and are in a race to alter their structure. Much of this can be accomplished through mechanically thinning small trees and removing the material from the forest. However, certain ecological functions, like recycling nutrients and creating landscape heterogeneity necessary for wildlife habitat, are best achieved with fire. Whether through management-ignited prescribed fire or wildland fire use, it is widely recognized that fire is a vital ecosystem process in these systems.

There are several millions of acres of forested land across Arizona and New Mexico that have been significantly altered because of practices in the nineteenth and twentieth centuries. However, because of several economic, environmental, and social restraints, managers are often able to mechanically thin or prescribe burn only a very small fraction of these acres every year. Currently, much of these efforts are focused on thinning forested areas around communities, in the so called wildland-urban-interface, to protect homes and other infrastructure from the threat of severe wildfire. While it is necessary to prioritize these treatment areas, other resources such as wildlife habitat, sensitive watersheds, and old

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9. Thomas W. Swetnam & Christopher H. Baisan, *Historical Fire Regime Patterns in the Southwestern United States Since AD 1700, in* FIRE EFFECTS IN SOUTHWESTERN FORESTS: PROCEEDINGS OF THE SECOND LA MESA FIRE SYMPOSIUM (USDA Forest Service, Rocky Mountain Research Station General Technical Report RMRS-GTR-286, Craig D. Allen ed., 1996).

10. Wallace W. Covington & Margaret M. Moore, *Southwestern Ponderosa Pine Forest Structure – Changes Since Euro-American Settlement*, 92 J. FORESTRY 39 (1994).

growth forests in more remote areas are in need of protection from severe wildfire as well. Ultimately, protection of communities near forests from fire and maintenance of forest health will require allowing either naturally ignited or management ignited fires to burn in these forests on a continual basis, on the order of every five to fifteen years in the Southwest. Yet, managers currently only have the capacity to treat select areas of highest priority, which usually are areas that have not seen fire for decades. One thing everyone seems to agree on in this region is that more resources are needed in order to treat the acres that need to be treated.

In the Southwest, the Gila National Forest seems to lead the pack in terms of number of acres each year in which fire is reintroduced to the landscape. While other forests are able to treat an average of 20,000 acres a year with mechanical treatments and prescribed fire, the Gila National Forest will treat on average 50,000 acres with wildland fire use alone, and another 20,000 using management-ignited prescribed fire. They are also able to accomplish this with a cost per acre that dwarfs other forests. Mechanical treatments are generally the most expensive option, costing on average between $200 and $500 per acre. Management-ignited prescribed burns are generally less expensive, costing between $25 and $100 per acre on average. In addition, both actions require planning processes that can be very expensive and are not reflected in these costs. The Gila National Forest is able to use naturally ignited fires at an average cost of about $25 per acre.

The numerous fires that have burned in wildland fire use and prescribed natural fire events over the 30 years that the program has been implemented have resulted in many ecological benefits on the Gila National Forest, including desirable changes to forest and fuel structure, wildlife habitat, and stream zones. Many areas have burned in two and three wildfires over 30 years, consistent with the natural disturbance regime in these forests. Over time, these fires have altered forest structure and fuel loads such that they are now more consistent with historical levels. This not only creates more suitable habitat for a variety of wildlife species, but also reduces the probability of undesirable severe wildfires spreading through the forest. The reductions in forest density also reduce the amount of water taken up by trees, leaving more to be deposited in riparian areas. While no scientific studies have addressed this, some long-term residents of the area have noticed ephemeral streams returning to perennial streams following wildland fire use events in certain watersheds. Some have expressed concern that frequent fire will remove important wildlife habitat characteristics such as snags and large down logs, which are used by a variety of birds and mammals. However, these habitat characteristics do not seem to be adversely affected by the relatively frequent fire on the Gila

National Forest.[11] While these habitat components are consumed in fires, more snags and large down logs are also created.

There are several reasons why the Gila National Forest is able to accomplish more with wildland fire use than other forests are able to accomplish with prescribed fire or mechanical treatments. This is partly a function of different policy directives surrounding these treatments. Wildland fire use, which is funded through fire suppression accounts, needs to be approved in a fire management plan, which must designate areas where wildland fire use is likely to achieve resource benefits without imposing undue risk to communities, wildlife habitat, and cultural or other resources.[12] With each potential wildland fire use event, a systematic and thorough procedure is followed in the decision process to assure that a fire will not pose significant threats to valuable resources. However, unlike management-ignited prescribed fire and mechanical treatments, each wildland fire use event does not require planning processes that are subject to extensive review and appeals. The planning process for wildland fire use is done upfront, when the fire management plan is written and updated each year, a process that seems to be more efficient than completing individual plans for every fuel treatment project. While such processes are important for assuring that management actions will not result in unacceptable environmental impacts, they can add considerably to the time and resources that are required to complete mechanical treatments and prescribed fire. The planning process for fuel treatments can take years, while the decision to declare a fire a wildland fire use must be done within eight hours of fire detection.

There are other aspects of the Gila National Forest that make it uniquely suitable for wildland fire use. First of all, it contains some very remote areas, including the first wilderness area designated in the United States. Thus, managers often do not have to worry about fires burning up houses or other infrastructure nestled in the forest. Smoke management can also be a significant impediment to wildland fire use as the public often has little tolerance for dirty air and such fires are subject to clear air regulations.[13] Yet, the smoke from wildland fire use events in the remote Gila National Forest is often dissipated in the atmosphere long before it reaches downwind communities. However, the Gila National Forest is certainly not immune from complaints from communities regarding smoke. In 2004 and 2005 several people in nearby communities complained of smoke from wildland fire use events.

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11. Zachary A. Holden et al., *Ponderosa Pine Snag Densities Following Multiple Fires in the Gila Wilderness, New Mexico*, 211 FOREST ECOLOGY & MGMT. 140 (2006).

12. U.S. DEP'T OF AGRIC. & U.S. DEP'T OF INTERIOR, *supra* note 7.

13. Clean Air Act, Pub. L. No. 95-95, 42 U.S.C. §§ 140–146 (2000).

The advantage of remoteness, however, is not the only reason that the Gila National Forest has been successful with wildland fire use. The success is also attributed to a longstanding commitment to fire and an agency culture that accepts and encourages its role in the forest. Over 30 years, the program has resulted in a patchwork of wildfires that have left their imprint across the forest. This fire history has made it easier for managers to continue to utilize wildfires. For example, areas that burned in 1997 may make a perfect buffer for a fire that starts in 2007. There are few incentives for allowing fires to burn, other than thinking that it is the right thing to do to allow natural processes to shape the landscape. For example, Forest Service units are mandated to treat a minimum number of acres each year with prescribed fire or mechanical treatments. Yet, ironically, acres burned in a wildland fire use event are not considered to fulfill this mandate.[14] In addition, funds are generally available, through the burned area rehabilitation program, to mitigate areas that burn in a wildfire by planting native species or taking other measures to prevent excessive soil erosion and water runoff. Such funds might be useful for wildland fire use as it is not uncommon for localized areas to burn with high fire intensity or for fire to impact other values such as fences meant to control livestock or forage. Yet, these funds are not available for wildland fire use events.[15] Despite the lack of incentives, managers on the Gila National Forest remain committed to wildland fire use, partly because they have pride in the history of the program and the benefits it has provided for forest health.

Wildland fire use is certainly not without risk, even in the remote Gila National Forest. For example, there are several species of threatened and endangered fish in the Southwest that can be negatively impacted by fire. In extreme cases in the Gila National Forest, fish are removed from streams and temporarily placed in areas safe from fire. Similarly, habitat of threatened bird species like the Mexican spotted owl may be adversely affected by wildfire, as this species prefers more dense forest conditions. While populations of these species certainly survived wildfires in the past, their small population sizes make any disturbance, natural or otherwise, a significant threat to their survival. Thus, these species need to be considered in wildland fire use operations. While human population density is nowhere near as high as in other fire prone areas of the Southwest, there are homes and people within and near the Gila National Forest and they also need to be considered in wildland fire use operations.

Certain measures can be taken to reduce the threat of fire to values at risk. For example, wildland fire use fires are manipulated to keep fire out

14. Lisa Dale, *Wildfire Policy and Fire Use on Public Lands in the United States*, 19 SOC. & NAT. RESOURCES 275 (2006).

15. *Id.*

of certain areas or to alter its behavior. A fire manager may set a back fire against an existing wildland fire use fire to keep it from burning into Gila trout watersheds or Mexican spotted owl habitat. Or this habitat may be allowed to burn, but only if it appears that a fire is burning such that it meets management objectives for wildlife habitat. Managers on the Gila National Forest have also invested a lot of time in establishing relationships with people who live adjacent to forest lands and may be impacted by wildfire use events. They have been successful in working with landowners, educating them on the importance of mechanically removing small trees and brush around their homes. In some cases, people who have taken the necessary measures to protect their homes from wildfire have been supportive of wildland fire use events being allowed to spread up to the edge of and even onto their properties.

Several other management units across the Southwest have recognized what has been achieved on the Gila National Forest with wildland fire use and are making steps to encourage more wildland fire use on their management units. For example, the Kaibab National Forest and Grand Canyon National Park in particular have increased the number of acres burned in wildland fire use events in recent years and other Forest Service units are updating their forest plans to allow for wildland fire use. Other agencies, such as the Bureau of Land Management and the Fish and Wildlife Service, have recently incorporated wildland fire use into their management plans. While managers are concentrating on treating areas near communities with mechanical treatments and prescribed fire, it is thought that, once values such as these are protected, there will likely be more opportunities for wildland fire use in areas in and around the wildland-urban interface.

Other management units are likely to face more barriers to wildland fire use than the Gila National Forest. Smoke from wildland fire use events would be more likely to impact communities in the less remote areas that encompass most of the Southwest. There is also a perception that prescribed or wildland fire use fires are dangerous and have the potential to burn up communities. This became apparent after the Cerro Grande Fire, a prescribed fire in 2000 that got out of control and burned over 200 structures in Los Alamos, New Mexico. Unlike prescribed fires, which generally burn over the course of one day, wildland fire use events can burn for weeks or months. The longer a fire burns, the more potential there is for adverse conditions to develop that can exacerbate fire behavior. Fires that burn with extreme fire behavior are almost impossible to control and can certainly threaten communities.

Many of these barriers to wildland fire use can be overcome with extensive public education campaigns. Such campaigns have been successful in giving the public a better understanding for the importance of fire and the importance of protecting their homes from wildfires. These

campaigns can also increase public acceptance of smoke. However, air quality regulations will always be a barrier to wildland fire use. To overcome this, managers will have to be strategic about where and when they allow wildland fire use fires to burn. The perception of risk can be alleviated partly from being aggressive about mechanical fuel treatments near communities so that they should not be impacted should a wildland fire use event spread close to communities. It is important to note as well that wildland fire use events are carefully monitored on a daily basis and manipulated to achieve desired fire behavior or direction of fire spread. These actions should reduce the chances of undesirable effects.

Given the fragmented nature of landscapes and the finite area where wildland fire use will be an option, wildland fire use alone is never likely to be a sufficient tool for meeting all fuel management and forest health needs.[16] Historically, fires that ignited in areas with high incidence of lightning may have spread far and wide into areas where lightning strikes are less common; burning episodes may have lasted over weeks or months. Today however, roads, cities, and power lines disrupt the landscape such that natural low intensity fire is not likely to spread to the extent that it once did. Thus, management-ignited fire will always be needed to return fire to certain portions of the landscape.

There are certainly areas where wildland fire use will never be an option: for example, in areas where the risk of fire impacting communities is too high. However, there is also room to increase the number of acres treated with wildland fire use in the Southwest. If the Gila National Forest is any example, increasing this practice should provide numerous benefits for ecosystem health and protection of communities. One can only suspect that Aldo Leopold, the founder of the Gila Wilderness, would approve of the way the resource managers of the Black Range Ranger District on the Gila National Forest are managing this piece of land.

16. Carol Miller & David J. Parsons, Can Wildland Fire Use Restore Natural Fire Regimes in Wilderness and Other Unroaded Areas? (Final report submitted to the Joint Fire Science Program, 2004).