Nonwilderness Wildland Fire Use Is Born on Kaibab National Forest

David P. Mills

While the very first outside-the-wilderness flames of the USDA Forest Service's wildland fire use (WFU) program burned on the Kaibab National Forest in the spring of 2003, the planning for that unprecedented undertaking began a full decade before.

During the early 1990s, many of us in wildland fire management were interested in the changing relationship between humans and wildfire. We listened carefully to Dr. Wally Covington and others at Northern Arizona University whose studies indicated an ecosystem out of balance due to fire exclusion.

We heard Steve Servis and Paul Boucher at the Gila National Forest explain their efforts to reestablish a low-intensity–high-frequency fire regime using appropriate management response. We read Stephen Pyne's account of *Fire in America* (Pyne 1982) and other papers that examined evidence of aboriginal fire use as a landscape management tool.

We noticed how our increasing effectiveness at suppressing small wildfires meant that unmanageable and highly destructive fires ultimately moved across the landscape. We saw how fire suppression efforts often did more damage than the fire itself—as we also questioned the high costs of aggressive fire suppression.

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At the same time, we watched our neighbors at Grand Canyon National Park continue to develop their fire use program. During these years, many other fire managers, researchers, writers, and speakers provided inspiration and leadership for our evolving fire use perspective.

Skeptics Voice Concern

With encouragement from the Forest Service Southwestern Regional Office, the Kaibab National Forest began the process of composing a forest-wide WFU plan, seeking public involvement in 1996. Four years later, in 2000, it was finally signed by the forest supervisor and ready for implementation.

The 250-acre (100 ha) Antelope Wildland Fire Use Fire, in 2003, was one of the first five wildland fire use fires on nonwilderness USDA Forest Service lands—all occurring that year on the Kaibab National Forest. Photo: USDA Forest Service, 2003.

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During this process, many people wondered if such a program could actually work. Even some members of the wildland fire management community found it difficult to imagine allowing wildfires to burn outside of wilderness boundaries—especially on a national forest with:

- High recreational use,
- Ranching,
- Private inholdings,
- Scattered communities and subdivisions,
- Historic and prehistoric archaeological sites,
- Wildlife concerns, and
- Smoke-sensitive areas such as Grand Canyon National Park.

Gradually, concerns and issues were resolved. By 2003, the Kaibab National Forest's WFU plan was implemented.

Successful Treatments

Starting that spring, decisions were made to use a total of five lightning-started wildfires for resource benefits. The North Kaibab Ranger District gained the distinction of managing the first WFU on the Kaibab National Forest. That fire, named the South Rock WFU Fire, grew to 15 acres (6 ha).

After fire season peaked and potential forest fire conditions were less volatile, the Tusayan Ranger District continued this Forest Service's national christening of WFU implementation outside wilderness areas.

In early August, the Horse WFU Fire burned about 150 acres (60 ha). At that time, this seemed to be a major accomplishment. A few weeks later on the Tusayan District, the Antelope WFU Fire burned almost 250 acres (100 ha). We were ecstatic to have successfully treated nearly 400 acres (162 ha)—watching fire function once again within northern Arizona's fire-adapted ponderosa pine ecosystem.

The lightning-triggered Horse Wildland Fire Use Fire—due to fairly high relative humidity and fuel moisture following the 2003 summer rains—burned with low intensity. Photo: USDA Forest Service, 2003.

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After the arrival of summer rains, the North Kaibab Ranger District together with the Tusayan Ranger District had successfully managed a total of five WFU fires.

Confidence Is High

The success of the 2003 season was followed by a more ambitious year in 2004. More than 4,000 acres (1,620 ha) were treated on the Tusayan Ranger District. A few hundred additional WFU acres were also accomplished on the Kaibab's Williams Ranger District.

Because the spring of 2005 ushered in some relief from the drier-than-normal conditions, the decision was made to begin considering WFU fires with that year's earliest lightning strikes. This resulted in the treatment of more than 8,000 acres (3,240 ha) on the Tusayan Ranger District—with no serious smoke impacts and very little high-severity burning.

Of course, Kaibab National Forest fire managers realize that an increase in WFU acres each year—such as occurred the past few seasons—is not sustainable. Nonetheless, much has been learned about this necessary application of fire on the landscape. Simultaneously, confidence in the WFU program from resource specialists—as well as among the local public—is high.

Even with the current return of drier conditions, we expect to continue the use of this new and exciting tool.

And while these more restrictive droughty conditions in 2006 might not provide us with as many opportunities to manage WFUs as we received last year, we are, nonetheless, still confident that the roots of a viable, long-term WFU program on this forest have successfully taken hold.

References

Pyne, S.J. 1982. Fire in America: A cultural history of wildland and rural fire. Princeton, NJ: Princeton University Press. ■

Lessons Learned from First Nonwilderness Wildland Fire Use Fires

David P. Mills

As with any new approach, in planning and implementing some of this country's first wildland fire use (WFU)—nonwilderness—fires on the Kaibab National Forest, we have found some things that work well.

And some that don't.

Perhaps one of the most important lessons is that the WFU program requires participation and support from internal personnel as well as local residents and neighboring agencies.

Fire information has to be readily available, timely, and accurate. Concerns or complaints need to be heard and addressed quickly. In our experience, many local residents became interested in the program. We quickly realized that it is worth the effort and time to provide opportunities for the public to see, for themselves, the results of our burning activities.

Inside Tips

For WFU to be successful on the Kaibab National Forest, we have chosen lightning starts that occur in areas where containment is not difficult. Within our local topography—given the prevailing southwest winds—this usually means to the north and east of a fire start.

Inside ponderosa pine stands, we strive to establish backing fire as the primary movement. This decreases the possibility for undesirable effects or escapes outside of our planned perimeter. As more of our forest experiences this return of fire, events in which a head fire is acceptable are becoming more numerous.

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On the other hand, we have also discovered that fire starts within areas dominated by piñyon and juniper are less likely to be productive—*unless* fire behavior occurs at a higher intensity. This, in turn, means that:

- Containment can be more difficult,
- Fire effects can be more dramatic—and possibly undesirable, and
- The potential for damaging sensitive features (such as archeology, wildlife habitat, and airshed) is more likely.

Incentives for wildland fire use need to be built from a vision of restoring forest health.

So far, our WFU acres in piñyon and juniper woodlands have been minimal.

Five Topmost Observations

A list of our WFU program's lessons learned could fill several pages. I will therefore share what I feel are the most important observations that we've made on the Kaibab National Forest:

1. WFU fire results in a mosaic that can range from unburned and low-intensity patches to high-intensity areas—with size depending on the fire environment (fuels, topography, and weather).
2. Reasons for suppressing a fire (risks, costs, safety) are still more numerous than reasons for allowing it to grow. Incentives for WFU need to be built from a vision of restoring forest health.
3. One of the biggest challenges for fire practitioners is to step back and watch. We have a tendency to want to speed things up or slow them down.
4. In addition to support from line officers, specialists and researchers, a viable WFU program *must* have the support of the local public.
5. Some aspects of risk management require courage. True success comes from practice.

Perhaps the most beneficial aspect of implementing WFU on the Kaibab National Forest has been the opportunity for all of us to participate in a new and exciting program of wildland fire management that results in a healthier forest, improved skills, and a lot of pride in our work.

Wildland Fire Use Success Stories

David P. Mills

Several times during the 2005 fire season on the Kaibab National Forest's Tusayan Ranger District, Grand Canyon, AZ, wildfire burned through areas that had been previously treated by burning or mechanical thinning, or both. Each time, these prior treatments helped to reduce wildfire intensity and severity.

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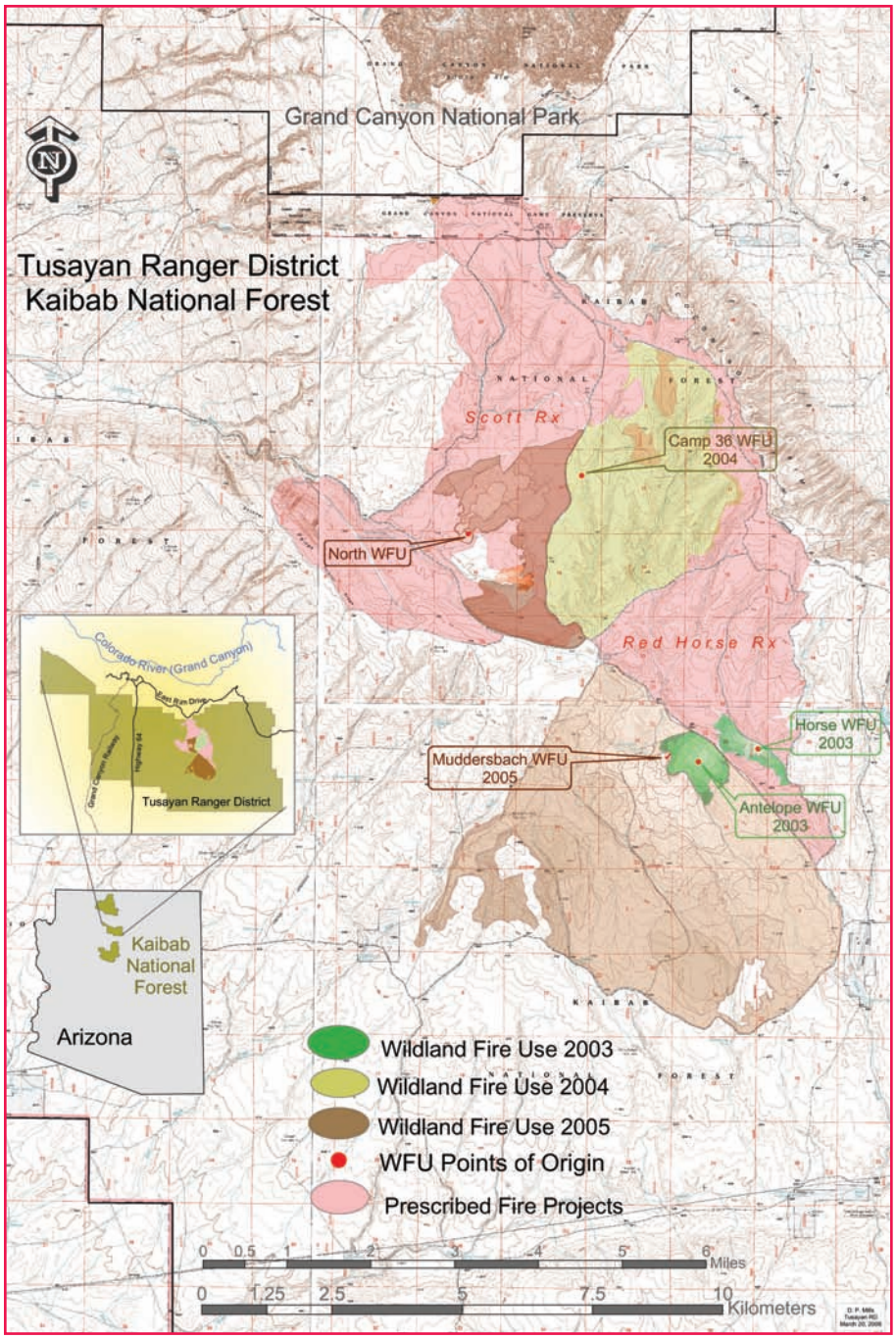
Even though it was dry and hot, these spot fires were very easy to contain and extinguish with hand tools.

Ideally—as was demonstrated in 2005 on the Tusayan Ranger District—a mix of mechanical thinning and prescribed burning can provide stand characteristics that will allow wildfire to move through the forest—even in the middle of fire season—without causing excessive damage to ecosystem components.

Even where mechanical treatments have not been implemented, prescribed burning or wildland fire use (WFU) treatments that occur during the later and cooler part of

Fire managers correctly predicted that the Muddersbach Wildland Fire Use Fire on the Kaibab National Forest would burn with high intensity until it moved into the surrounding areas that had previously been treated with fire use. Photo: USDA Forest Service, 2005.



the fire season begins the process of reducing fuels and moving ecosystem conditions closer to those that provide resilience for in-season wildfire occurrence.

It could be argued that low-intensity burning may not sufficiently reduce tree density in grossly overstocked stands. However, with frequent return intervals (less than 7 years), fire intensity can increase *without* severe consequences—resulting in a gradual thinning of trees by natural means.

The following three events from these 2005 occurrences in Arizona demonstrate these beneficial effects that previous fuel treatments in ponderosa pine forests can have on current fires.

Once again, previous burning appeared to significantly reduce susceptibility to severe fire effects.

Mixed Treatments

In the mid-1990s, approximately 50,000 acres (20,250 ha) of the Tusayan Ranger District were mechanically treated by precommercial thinning and limited sales of saw timber. In 1997, this area was prescribe burned. Treatment prescriptions primarily involved thinning from below coupled with low-intensity burning.

These management actions left a somewhat overstocked stand of intermediate-aged ponderosa pine, scattered oak clumps, and very light grasses and forbs. Dead and down fuel loading had been reduced to less than 8 or 9 tons/acre (3 or 4 tons/ha).

In 2003, some of this area was burned again by the Horse WFU Fire. This fire was started by lightning and—due to fairly high relative humidity and fuel moisture following summer rains—burned with low intensity.

Post-fire tree mortality was therefore minimal, less than 15 percent in intermediate growth, and nearly 0 in mature and older yellow pine.

In 2005, the Muddersbach WFU Fire burned west of this area, separated by a well-traveled road. Because the Muddersbach WFU Fire burned with moderate to high intensity, numerous spot fires were ignited and burned within the area of the 2003 Horse WFU Fire.

Even though it was dry and hot—conditions that normally contribute to rapid burning with moderate resistance to control—these spot fires were very easy to contain and extinguish with hand tools.

The prior tree removal and reduction of dead and down fuels by the previous prescribed burning clearly resulted in a forest that was capable of accepting mid-season fire occurrence with few—if any—undesirable effects.

Reducing Severe Fire Effects

In 2003, in the same portion of the district—within an area that had *not* received significant mechanical treatments—the Antelope WFU Fire started burning just as the Horse WFU Fire was stalling out. While conditions were still relatively cool and humid, fire intensity was occasionally moderate due to:

Required elements include frequent ignitions; competent fire managers; and the support of line officers, specialists, and the public.

- Dense clumps of pine reproduction—dog hair thickets with 500 to 2,000 trees per acre (1,250 to 5,000 trees per ha), measuring less than 6 inches (15 cm) in diameter;
- Overstocked intermediate growth—150 to 250 trees per acre (370 to 620 trees per ha) where research indicates pre-settlement conditions were 1/10 or less of this tree density range; and
- A considerably heavier fuel load of surface litter—11 to 16 tons/acre (5 to 7 tons/ha).

Within this area, while tree mortality in younger trees may have been closer to 20 percent, mortality in mature and older pines was still less than 5 percent.

Two years later, the Muddersbach WFU Fire ignited just west of the Antelope WFU Fire and burned with even higher intensities. Tree stands just north of the Antelope WFU Fire that were burned by the Muddersbach WFU Fire suffered severe, stand-replacing fire intensities. All trees in one 35-acre (14-ha) area were killed.

When the Muddersbach WFU Fire started, fire managers recognized that the point of origin and prevailing winds would likely push the fire toward the previously burned Horse and Antelope WFU areas. They knew this would afford an opportunity to moderate the forward spread of the Muddersbach fire as it reburned into this area that had already been treated with fire.

For the first several days, this did prevent the Muddersbach fire from moving to the northeast. As conditions became hotter and drier, the fire moved rapidly with high intensity to the north and south around the Antelope WFU Fire area. This resulted in high intensity burning for a couple days—until the fire's forward spread was impeded by roads as well as the previously treated area of the Horse WFU Fire.

In the days that immediately followed, the fire moved through the Antelope fire site with much lower intensity and more acceptable fire effects. Once again, previous burning appeared to significantly reduce susceptibility to severe fire effects.

The Camp 36 Wildland Fire Use (WFU) Fire proved to be a prime example of how these natural WFU fires can result in a broad mosaic of hot, cool, and unburned patches. This 3,052-acre (1,220-ha) fire burned sporadically—with a variety of effects—during the summer rains throughout August 2004. It burned with the desired low to moderate intensities through a variety of fuel types—including goshawk nesting areas. The fire accomplished several objectives, including providing a patchwork of tree clumps and openings necessary for healthy goshawk nesting and foraging. Photo: USDA Forest Service, 2004.

Moderate Fire Effects

A third area on the Tusayan Ranger District had received a combination of mechanical and prescribed burning treatments prior to the occurrence of the 1,035-acre (420-ha) North WFU Fire in 2005.

This fire burned into a portion of the previous prescribed fire project that had been burned with low intensity in various blocks from 2002 through 2003. In addition, approximately 150 acres (60 ha) had been thinned soon after the initial prescribed burning. In the spring of 2005, the area's lopped and scattered slash was reburned.

Then, in mid-June 2005, the North WFU Fire was ignited by lightning. It started in a location that allowed the fire to move with prevailing winds through these nearby previously treated stands.

As fire weather conditions moved toward the hotter end, the North WFU Fire exhibited increased fire behavior—including rapid surface runs, isolated and group torching in denser stands, and frequent spotting.

Depending on stand densities, fuel loads, and previous treatments, the North WFU Fire burned with varying intensities and effects.

Due to an almost total lack of available fine fuels, the North WFU Fire did not reburn the area of thinning slash that had been prescribed burned earlier that spring. In other parts of the burn, fire intensity was high enough to cause mortality in more than 20 percent of the intermediate-aged and younger trees. However, mortality in the older pines was rarely more than 5 percent. Most of the fire's effect—even when wind-driven—was moderate or low-intensity burning.

In summary, to achieve these beneficial fire results takes more than prior mechanical and prescribed fire treatments. Required elements include frequent ignitions; competent fire managers; and the support of line officers, specialists, and the public. ■

Wildland Fire Use Makes Headway With U.S. Fish and Wildlife Service

John Segar

While prescribed fire continues to be the U.S. Department of the Interior, Fish and Wildlife Service's preferred means for managing fuels and fire-adapted habitats—the agency started using this "tool" to manage wildlife habitat back in the 1930s—an increasing number of the service's refuges are now using wildland fire use (WFU) as a fire management strategy.

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At present, several refuges have land management and fire management plans that allow for utilizing WFU as an appropriate management response to natural wildland fires. Several other refuges are considering WFU and are updating plans to allow this fire use option as an appropriate management response.

Refuge size, flammability, and boundary defensibility are the most common reasons why more refuges have not made greater use of WFU. Refuges tend to be smaller than most other Federal land units and have a higher proportion of light, flashy fuels. This creates situations in which fires can often spread outside refuge boundaries within one burning period. In addition, many refuges are located adjacent to wildland/urban interface areas.

Refuge utilization of WFU will likely increase as fuel treatments increase the defensibility of values and boundaries, adjoining landowners become more receptive to accepting WFU fires, and agency staff become more proficient in managing fires under WFU strategies. ■