Special Issue: Wildland Fire Use

What better way to learn about fire ecology than to allow fires to burn during their own season, at their own pace, and without interference from humans? The strategy known as wildland fire use (WFU) does just that, and is being increasingly applied, with over one million acres in the United States managed with WFU between 2003 and 2006. This issue of Fire Ecology highlights the strategy of WFU with six articles.

The issue begins with an article by van Wagtendonk recapping the parallel histories of WFU in the Forest Service and the National Park Service. Both agencies started the practice of allowing fires to burn in relatively large and remote wilderness areas. The first proving grounds for WFU included Yosemite, Sequoia-Kings Canyon, and Saguaro National Parks, and the Selway Bitterroot and Gila wilderness areas. Today, the Fish and Wildlife Service, Bureau of Land Management, and Bureau of Indian Affairs also have WFU programs. Early practitioners of WFU recognized the ecological need for fire but had to counter a prevailing belief that fire is bad. These pioneers were unfailing in their commitment and advocacy of the program (Kilgore 2007), and as a result, the WFU program has repeatedly withstood political fall-out after dramatic wildland fire events.

The next two articles look at the results from a few long-running WFU programs. Holden *et al.* exploited the 30-year history of WFU in the Gila and Suguaro wilderness areas to study effects of multiple fires on forest stand structure. They found diverse stand structures, and that long fire-free intervals can have lasting legacies on tree size class distributions. Van Wagtendonk and Lutz used fire history information and burn severity data derived from satellite imagery to compare WFU fires to wildfires and prescribed fires in Yosemite National Park. The three types of fires were different in their duration, burning conditions, size, and severity. Several other excellent articles have recently reported on studies of WFU. Fulé and Laughlin (2007) found that WFU fires can effectively restore forest structure in Grand Canyon National Park, even after an unusually long fire-free period. Collins and Stephens (2007) found that the frequency and extent of WFU fires in two basins in Yosemite and Kings Canyon national parks were similar to historical (pre-fire-suppression) fires. Collins *et al.* (2007) examined two WFU fires in these same study areas to discern the abiotic and biotic factors responsible for patterns in burn severity. Keeling *et al.* (2006) examined forest structure and composition after multiple fires in the Selway-Bitterroot and Frank Church River of No Return wilderness areas and found that, as expected, densities of shade tolerant trees decreased with fire frequency, but that this effect was highly variable across the landscape. DeLuca and Sala (2006) studied nitrogen cycling and availability on these same sites and found that frequent fire increased the availability of inorganic nitrogen. Collectively, all these studies point to myriad and potentially complex ecological effects from WFU that are long term and cumulative.

The fourth article, by Collins and Stephens, demonstrates that WFU fires are not only valuable for improving our understanding of fire effects, but also for providing insight into the fire history record. Dendrochronological evidence of fire is often used to reconstruct fire frequencies and extent—crucial information for land managers. Although some recent studies have shown that the fire scar record can accurately reconstruct the frequency and extent of fires (Farris, University of Arizona, unpublished data), we still have very incomplete knowledge on what it takes to scar a tree, and thus, incomplete understanding of the uncertainty in the fire scar record. Collins and Stephens used modern fires to learn what affects the probability of scarring in Jeffrey pines.

While long-lived WFU programs help increase our understanding of fire ecology, newer WFU programs can also provide valuable knowledge. In the fifth article of the issue, Cohen *et al.* report new information from the fledgling WFU program at Great Smoky Mountains National Park. While the number of WFU fires and the area burned to date are still small, the authors have gleaned useful insights about fire ecology in these southern Appalachian forests—namely that we have a lot to learn about fire extinguishment and spread. Their article also illustrates how important it is to continually synthesize and analyze data contained in fire reports to inform fire management.

Looking at the results from our past WFU programs and monitoring our present programs are perhaps most powerful when complemented with a look to the future. Can WFU programs help us to achieve what we want on the land? In the final article of this issue, I use a simulation approach to quantify the consequences of different fire regimes on land management objectives. As WFU is applied more widely and where management objectives may be quite diverse, WFU will need to be justified in terms of specific ecological objectives. Using simulation to narrow down the range of potential outcomes will become increasingly important.

What does the future hold for WFU? As more areas are authorized for WFU, we should see an upward trend in the area burned by WFU. An increase in long duration in-season fire events will be a great benefit to fire-dependent ecosystems. However, because some ecosystems may not benefit from fire—such as those altered by invasive plant species—we will need to temper our enthusiasm for more fire. Past successes in applying the WFU strategy are largely responsible for the increasing policy emphasis on point protection strategies rather than perimeter control strategies for fire suppression. Although I suspect these policy shifts toward more freely burning fires are economically driven, I believe the need for management based on ecology has never been greater. I hope managers will continue to keep and use fire records so that we can learn as we go. I invite and encourage researchers to study the ignition, spread, extinguishment, and consequences of WFU fires so that managers can apply this understanding to all fires. Indeed, what better way to learn *and* apply fire ecology?

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