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# Friendly fire: assessing the effects of firing operations in managing wildfires

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**Abstract**
Over the last quarter century, there has been a perceptible increase in the frequency of large-scale high-intensity wildfires. This rise in wildfire activity has mainly been attributed to the effects of excessive fuel accumulations from past fire suppression coupled with the effects of climate change that is causing prolonged droughts and longer fire seasons. Some of this recent increase in wildfire size and severity may also be the result of *current* fire suppression actions using indirect attack strategies with firing operations called backfires and burnout. This paper will present a critical discussion the possible role of suppression firing operations in recent large wildfires, the significant environmental and ecological effects of backfires and burnout, some examples of the negative social impacts when firing operations 'backfire,' and conclude with a call for increased documentation, monitoring, and analysis of the role of suppression firing operations in large fire management. The goal of this discussion is to inspire greater mindfulness of the need to integrate safety, ethical, and ecological concerns in '*managing fire with fire*.'

## Introduction

The technique of ' fighting fire with fire' has long been part of the toolbox of fire management, and was likely first learned by early foresters from Native Americans. Indeed, Pyne's (2001) ' *Year of the Fires*' and Egan's (2009) ' *The Big Burn*' provide numerous examples of backfires ignited by firefighters in desperate attempts to save towns during the 1910 Fires in the northern Rockies. In some cases these backfires successfully halted the advance of wildfires, but in other cases the backfires were ineffective or actually 'backfired' on firefighters and destroyed some or all of the towns that they were attempting to save. These opposing outcomes of suppression firing operations underlie my use of the term, 'friendly fire,' which has a double meaning. On one hand, friendly fire refers to the notion of a 'good fire' that accomplishes its intended beneficial purpose, e.g. to protect a threatened community or restore a degraded ecosystem. On the other hand, friendly fire also refers to notion of ' bad fire' in the same sense that the military uses it to refer to intentional firing that accidentally causes death or destruction of one's own forces. The concept of friendly fire in this paper thus symbolizes suppression firing operations that are always ignited with the best of intentions but can lead to either good or bad outcomes.

### *Mega-fires and the 'hidden hand' of fire management*

For several years both fire scientists and fire managers have been reporting that there is a growing frequency of large-scale high-intensity wildfires including what the newsmedia have dubbed 'mega-fires.' For example, in the last decade, Arizona, New Mexico, Colorado, Oregon, and California have had the largest wildfires in their states' recorded histories. Global warming-induced climate change that is creating prolonged droughts and longer fire seasons, or excessive fuels accumulations resulting from past fire suppression have been the most common explanations for the relatively sudden appearance of these fast-spreading mega-fires. Scientists have studied nearly every relationship between biophysical variables in the fire environment

(fuels, weather, and topography) to understand wildfire dynamics and craft better models for predicting fire spread, fire behavior, and fire effects. They have researched all variables except one: what I liken to Adam Smith's 'hidden hand' of firefighters and their firing operations.

Most people associate fire suppression with stopping fires, not starting them, but as every firefighter knows, there is a considerable amount of fire-lighting involved in firefighting. But with few exceptions, fire researchers and managers have rarely considered the relationship of fire management actions to other variables affecting fire spread, nor designed a study to monitor or analyze the role and effects of firing operations on wildfire size and severity. Anecdotally, firefighters report that they are increasingly employing indirect attack strategies with lots of firing operations, especially on large wildfires in unroaded areas with steep slopes, dense fuels, or extreme fire weather conditions. This is not surprising, since these strategies and tactics are generally the safest methods for firefighters to contain wildfire spread under these conditions. Nevertheless, when the newsmedia breathlessly report that a given wildfire has grown an alarming number of acres in a given day, never do they ask if any of this rapid growth in wildfire size was due to firing operations. If reporters did ask this question, fire managers would have no reply since they almost never document the data needed to track the location and spread of firefighter ignitions.

In places where the newsmedia did report that the Forest Service or other agencies were igniting backfires or large burnouts, this became an issue of public interest and concern. For example, in the aftermath of the 2008 wildfires in northern California where extensive firing operations were conducted, local Native American tribes charged that some of their sacred sites were severely burned by backfires, forest conservation activists accused the agency of deliberately burning old-growth stands in order to later offer salvage timber or hazard tree sales, private timber owners complained that backfires burned up valuable commercial timber stands on both public and private lands, and rural homeowners charged that backfires ignited by CALFIRE actually destroyed several homes in the community of Concow. Fire managers needed to respond to these concerns and criticisms, but because the agencies do not track the locations or spread of suppression ignitions, they had no real data to use to refute some of the more ' incendiary' claims made by local citizens. Both fire researchers and managers need to address this data deficit and absent analysis.

*Fire suppression does not equate with fire exclusion*

Over the last two decades many people have implicitly assumed that fire suppression is the main cause of fire exclusion, and in fact, the former concept has been used almost interchangeably with the latter concept as if they were the same thing. The argument has been made that by fighting fires this has excluding fire across the landscape, which in turn has allowed excessive fuel loads to accumulate and feed increased wildfire activity including mega-fires. On the contrary, because firefighters routinely 'fight fire with fire,' fire suppression involves a fair amount of human-caused fire *reintroduction* rather than absolute fire exclusion. The ironic fact that firefighters start fires in order to stop wildfires is counter-intuitive and misunderstood by much of the public. Some people must wonder, why are firefighters putting *in* more fires when they're supposed to be putting them *out*? A brief introduction to some of the motives and methods of suppression firing operations follows.

There are two main types of firing operations: backfires and burnout. Backfires are high-intensity fires designed to consume all available fuels in front of an advancing wildfire, and apply force to change the wildfire's intensity or direction. Burnouts are low-intensity fires that

remove fuels adjacent to firelines, and thus help widen and secure them. Burnouts are also ignited deep within wildfire interiors on 'green islands' of unburned vegetation and fuel. Increasingly, the two types of firing have become conflated with the advent of large-scale burnouts that some Forest Service fire spokespersons dubbed 'backburns' during the 2008 wildfires in northern California. So-called backburning has become common practice on wildfire 'complexes' (a cluster of adjacent wildfires) to merge separate smaller fires into a single large wildfire. It is generally far safer and more efficient for firefighters to work on one large fire perimeter than to send them in between several smaller fires trying to contain and control each one individually. Given that most of the recent mega-fires started out as fire complexes that later merged into huge wildfire areas, it raises the question: compared to natural fire spread, what role did backburning did play in the formation of these mega-fires?

The 1999 Big Bar Fire in northern California and the 2002 Biscuit Fire in southern Oregon were the largest and most expensive wildfires in the nation in their respective years. Both were lightning-caused fire complexes that burned mostly across designated wilderness and inventoried roadless areas, and firing operations were used extensively on both wildfires. Two unpublished reports (Ambrose 2001; Ingalsbee 2006) examined the scale of backburning on these fires: an estimated 44,000 acres out of 144,000 total acres on the Big Bar Fire, and over 100,000 of the total 500,000 acres of the Biscuit Fire resulted from backburning operations. Although there have been no systematic studies of firing operations and no hard data available to either support or refute this statement, an educated guess is that generally 30% of the total burned acreage on large wildfires result from firing operations. This is not an insignificant amount of land being burned by the 'hidden hand' of fire management!

Beyond questions of size or scale, questions remain as to the environmental and ecological effects of firing operations. If they successfully contained the wildfire, then no further questions are asked and they are assumed to be beneficial actions. But this *assumption* that firing operations are always good or better for the ecosystem than unfettered wildfire spread needs to be put to a scientific analysis comparing fire effects. A discussion of some of the potential adverse environmental and social impacts of firing operations follows.

*Scorched Earth suppression: the environmental impacts of firing operations*

One of the most obvious environmental impacts of firing operations is that they kill vegetation and consume fuel. Typically small-diameter understory fuels are the target, but sometimes large overstory trees are killed by backburns. Given the pretense that firefighting is supposed to protect forests and saves trees from wildfire, backburns that kill large numbers of big old trees represents one of the clearest examples of (bad) friendly fire. Creating large patches of big, old dead trees may not necessarily be a significant impact, though, if the amount of high-severity acres are within the natural range of variability within a given watershed. In fact, large-diameter snags and logs are highly valuable as wildlife habitat structures, but if the legacy of commercial logging in the surrounding landscape had already reduced the number or extent of old-growth stands, then further losses from backburns might be a significant long-term impact. Moreover, even if the percentage of high-severity acreage is within a watershed's natural range of variability, it is not simply a matter of size but also the pattern of fire spread that is important. Backburns that cause unnatural sizes, shapes, or locations of high-severity patches may have adverse impacts that are more significant on a qualitative if not quantitative level.

Another environmental impact of suppression firing operations is that they kill wildlife. While most species that evolved in fire-prone environments have developed various adaptations

and instincts that help them escape, survive, or recover from wildfire disturbances, the location, timing, pattern, or intensity of backfires may alter what would otherwise be natural fire spread, causing higher mortality of individuals than might have occurred naturally. Animals that are adept at evading slow-moving wildfires such as deer may become entrapped between a wildfire and a backfire they lose their ability to escape. In the 'kill box' between the two flame fronts, fireline intensities can reach extreme levels, where it must be assumed there are few survivors.

One of the benefits of wildfire burning at various intensities and severities is that across the landscape it creates a multitude of habitats referred to as the 'fire mosaic.' It is trite but true: pyrodiversity enhances biodiversity. Thus, from an ecological standpoint, one should not assume that low-severity burnout is always (good) friendly fire. Large-scale burnouts that create uniformly burned large patches, or target 'green islands' of unburned vegetation within wildfire interiors, can eliminate vital refugia for some plants and animals, and result in a homogenization of fire effects that diminishes the fire mosaic. Thus, both high and low intensity firing operations can have paradoxical beneficial or adverse effects.

*Backfires that backfire: the social impacts of firing operations*

When the conditions for igniting backfires are just right, they get pulled into the main wildfire and slow or stop its spread, but when something goes wrong, they can literally backfire and either fail to meet up with the main fire—becoming their own new wildfire—or even turn against firefighters, putting them in peril. One of the more notorious firing operations that went awry is the 2000 Cerro Grande Fire. Speaking at the Association for Fire Ecology's Third International Fire Ecology and Management Congress, former Interior Secretary Bruce Babbitt admitted that it was a backfire ignited to contain an escaped prescribed fire that, in turn, escaped firefighters' control and destroyed over 200 homes in Los Alamos, New Mexico. At the International Association of Wildland Fire's 2008 conference in Jackson, Wyoming held on the 20th Anniversary of the Yellowstone Fires, former president of the Association for Fire Ecology, Dr. Michael Medler, made the startling confession that it was an ill-planned backfire ignited by his Forest Service firefighting crew that had roared towards Old Faithful lodge, nearly destroying it.

The 2009 Station Fire presents an excellent example of the paradox of firing operations and the two kinds of good and bad friendly fire. On the one hand, backfires saved the community of La Crescenta from certain wildfire destruction, but on the other hand, two firefighters were killed from a backfire they ignited. Use of extensive burnout enabled firefighters to eventually corral the blaze that burned for weeks on steep, extremely rugged, densely vegetated slopes. However, Forest Service Chief, Tom Tidwell, in testimony before Senator Feinstein's Interior Appropriations Committee stated that it was the burnout operation conducted by initial attack crews that had escaped their control, later becoming that huge wildfire. The Station Fire has been the focus of harsh media criticism and several Congressional investigations revolving around the charge that the Forest Service was not sufficiently aggressive enough during initial attack and let the wildfire grow to its huge size. But, ironically, one could also argue the opposite: the agency was possibly *over-aggressive* and *made* it a mega-fire with its use of burnout and backfires.

*To burn or not to burn? that is not the question!*

According to Pyne (1995), we are a fire-tending species--the only creature on Earth with the ability to both stop and start fires. Indeed, it may be our species' ecological role as a disturbance agent to supply ignitions at the times, places, patterns, and frequencies that would not occur by natural lightning alone. In many areas around the world, individual species, biological

communities, and entire landscapes have co-evolved with human-caused ignitions as a recurring part of the local fire regime. Firing operations thus may help maintain our role as fire-tenders, paradoxically igniting fire in the act of suppressing it, reintroducing it to areas where it has been excluded in the past while limiting some of its spread or severity in places where burning is socially unacceptable.

There is no escaping the inherent paradoxes of suppression firing operations: firefighters starting fires in order to stop them, putting in more fire than they physically put out, and in the process sometimes killing or destroying the very things they are striving to protect. Consequently, it is time to ask some tough questions: are natural resources and rural communities that are meant to be protected by these (good) friendly fires more often than not falling victim to (bad) friendly fire? We cannot answer that question because we have yet to even ask it! Ignitions are set on wildfires with a single-minded focus on containing fire spread, but managers rarely if ever ask themselves if their firing operations will cause more severe fire effects than if they simply let the wildfire spread to the same area on its own.

There has been little research interest and no management attempt to conduct a systematic scientific analysis of the influence of firing operations on wildfire size, spread, behavior, or effects, but it is time for such an analysis to begin. With the development of the new Wildland Fire Decision Support System, there will be new opportunities to generate and record essential data on the locations of firing operations, and the environmental variables of fuels, weather, and topography that influence their behavior and effects. Increasingly sophisticated mapping and monitoring tools, and more accurate modeling programs are being developed that will enable us to track the spread of backburn operations, and better predict their effects. At the present, documentation of suppression actions is currently very sketchy, and there are serious concerns over the validity and reliability of this data, but with these new research and management tools now is time to start generating, recording, and analyzing data from suppression incidents in order to answer this ‘ burning question’ of growing public interest and concern.

Firefighters United for Safety, Ethics, and Ecology strongly advocates the use of fire to *manage* instead of ‘ fight’ wildfires. Indeed, our pro-fire use philosophy is best symbolized by our organization’s acronym—FUSEE--and our motto: ‘We’re *torchbearers* for a new fire management paradigm.’ Suppression firing operations that are done the right way can accomplish both protection objectives (e.g. stopping wildfire from spreading toward a community, or limiting its intensity in a sensitive natural area or endangered species habitat), and restoration goals (reintroducing fire of appropriate intensities to places it has been excluded). There is no escaping the inherent risk and multiple paradoxes of using fire to suppress fire, but at least some of this risk can be mitigated if firefighters are more mindful of the positive and negative effects of their firing actions. With the right management motives and methods, firing operations could be the least damaging and most ‘natural’ way to manipulate fire spread and mitigate fire severity so that the ecological benefits of burning are maximized while the environmental impacts of suppression are minimized.

Given the multiple legal and social constraints against proactive prescribed burning, wildfires are the most opportune venues for conducting ‘ controlled burns’ to restore the role of fire as a vital ecological process. Indeed, using wildfire ignitions as trigger points for the times and places to burn, firefighters could utilize burnouts and backfires to steer flames into areas that fire planners have previously identified as needing to burn for various ecological restoration reasons, while stopping fire from spreading into areas that for social reasons should never burn, such as near human communities. With ecologically appropriate firing operations, the whole

distinction between prescribed burning and wildfire use may even dissolve as firefighters implement an integrated, holistic fire management praxis.

**Conclusion**

Under the Obama Administration's new guidance for implementing the Federal Wildland Fire Policy, fire managers are empowered to use all the tools in the management toolbox to manage fires for multiple social and ecological objectives simultaneously. Thus, we may see an increase in Fire Use strategies and tactics to accomplish both fire restoration goals and fire suppression objectives. But what will we be accomplishing when we're simultaneously suppressing and using wildfire for multiple resource objectives? There is no way we can account for successes or learn from mistakes unless and until we begin to critically examine the effects of suppression actions, especially firing operations. Along with the greater managerial discretion that the new policy guidance provides comes the need for more transparency and accountability in wildfire management including firing operations. Above all, a greater intentionality or mindfulness needs to guide our use of backfires and burnout so that they are oriented towards a wider set of social and ecological objectives besides simple fire containment.

As Pyne (2004) would put it, we're igniting the 'fires of choice' (backburns) in order to avoid the 'fires of chance' (wildfire); however, it is time to acknowledge that while we have little choice whether or not to use fire to manage wildfire, we take chances with every firing operation. The key is to become more mindful of the risks of the two kinds of friendly fire, and strive for the right mixture of human and natural fire spread that yields the kind of fire behavior and effects that society wants and nature needs. In FUSEE's vision, some day in the future the term 'fire fighter' will become as anachronistic as the term 'smokechaser' is today. Instead, we will be using terms like fire-lighters, fire-guiders, or possibly fire-rangers to better describe the occupation and the way we safely, ethically, and ecologically manage wildland fire.

**References**

Ambrose C (2001) 'The 1999 big bar fire complex.' Citizens for Better Forestry report.
Egan T (2009) 'The big burn: Teddy Roosevelt and the fire that saved America.' (Houghton Mifflin Harcourt: Boston)
Ingalsbee T (2006) 'Collateral damage: the environmental effects of firefighting: the 2002 biscuit fire suppression actions and impacts.' Firefighters United for Safety, Ethics, and Ecology report. (http://www.fusee.org/docs/SuppressionImpacts/FUSEE_Collateral_Damage_Biscuit_Fire_Report.pdf)
Pyne SJ (1995) 'World fire: the culture of fire on Earth.' (University of Washington Press: Seattle)
_____ (2001) 'Year of the fires: the story of the great fires of 1910.' (Viking: New York)
_____ (2004) 'Tending fire: coping with America's wildland fires.' (Island Press: Washington)