Preventing Fire with Fire

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The following article was submitted as a "48 Hour Project," a hallmark of the Goldman School curriculum. The initial writing and research for this piece was completed in just two days.

The wildfire suppression policies in place during most the 20th century worked well for decades. However, these suppression methods interrupted the natural fire cycle and allowed light ground fuels to accumulate over time thus providing fodder for the extraordinary wildfires we see today. The author argues that by employing an integrated system of fire prevention techniques including targeted controlled burns, continued use of mechanical thinning, and community involvement, fire prevention agencies can work to reduce the frequency and scale of wildfires while promoting healthy forests across the United States.

Fire is neither good nor evil; it is part of the natural process of change. I challenge the American people to recognize how fire and smoke can and must continue to play an essential, natural role in the life cycle of the wildlands we live in and love.
—Secretary of the Interior Bruce Babbitt

INTRODUCTION

The wildfire suppression policies in place during most of the twentieth century prescribed that all fires be contained by mid-morning on the day after being reported.[1] While this approach worked well for decades, it led to an accumulation of woody debris and other light "fuels"—such as overgrown grasses, shrubberies and dead foliage—which natural low-intensity fires had previously cleared. This accumulation of light fuels is the primary cause of the current wildfire crisis, despite attempts to address the light fuel problem through policies such as the Healthy Forests Restoration Act (HFRA) of 2003.[2] The need to improve fire prevention strategy is made even more urgent by predictions that climate change will compound fire intensity and frequency across the Rockies, the Great Basin, and the Southwest.

To improve fire management strategy, this paper recommends that the U.S. Bureau of Land Management (BLM) do the following:

1. Utilize satellite telemetry to target low-risk, high-benefit "hot-spots" of fuel accumulation for prescribed burns;
2. Employ mechanical thinning only for heavily suppressed areas and explore ways of recouping costs for this more expensive method; and
3. Expand wildland-urban interface (WUI) management activities to involve local communities.

THE ADVANTAGES AND DISADVANTAGES OF CONTROLLED BURNS

Controlled burns are the least expensive accumulated growth clearance technique available to wildland managers. The Government Accountability Office estimates that operational costs for controlled burns range from pennies per acre up to a few dollars, whereas mechanical thinning costs can run as high as $300 per acre.[3] Prescribed burns also provide a variety of environmental benefits. The burning process releases nutrients previously isolated in the vegetative matter into the soil, allows greater water penetration to reach roots and more sunlight to reach the forest floor, reduces the risk of insect infestation and tree diseases, and stimulates the sprouting of seeds.[4] In fact, without the occasional low-intensity fire, California Redwood Sequoia seeds would not sprout.[5] A further added benefit of these fires is that they inhibit the growth of low-reaching and low-growing branches, which act as ladders for wildfires to reach the crowns of the trees—the primary route for high-intensity fires.[6]

Despite the natural and financial advantages of this method, controlled burns are problematic and highly dangerous.[7] Establishing the logistics of when and where a prescribed burn can take place requires extensive effort and planning due to factors such as air quality standards, public notification, and weather conditions.[8] Furthermore, smoke generated from a burn can be hazardous to sensitive populations (e.g., the elderly and children with asthma) and, most importantly, a prescribed burn has the ability to get out of control quickly.[9] Of the estimated 4,000 to 5,000 prescribed burns performed annually across the country, approximately 40 burns escape the controlled area, and an additional 40 to 50 burns are considered near misses.[10] Although escaped burns comprise barely one to two percent of all attempted burns, these can occasionally turn into large fires like the Cerro Grande escaped prescription fire in New Mexico that burned over 48,000 acres and threatened the Los Alamos Nuclear Laboratory.[11] Even so, when costs are scaled to include the damages from a 1% escape rate, the total can reach an expected value near $4,600 per 20 acres prescribed burn.[12] While this figure may seem large, the reported average suppression cost including estimated damages for the same acreage is approximately $39,000.[13]

Recommendation 1: Target Controlled Burns

The optimal time for low-intensity burning is normally at the peak of the "fire-cycle"—when the maximum accumulated debris will be cleared and before the risk of escape becomes too large. The fire-cycle peaks approximately every thirty years for timberland and every ten years for grasslands.[14] However, this timing has been disrupted in areas where fire activity has long been suppressed. Furthermore, the extra fuel that accumulates as a result of suppression increases the probability that a controlled burn will escape; therefore, it is crucial that the locations of intense debris accumulation be identified and treated by means other than burning. Advances in technology provide tools that can identify these areas of overgrowth as potential "hot-spots."[15] Such areas initially should be treated with methods such as mechanical thinning and then managed with a timely rotation of periodic low-intensity burns.[16]

Fire prevention managers could also benefit from integrating academic studies of wildfire behavior with data collected through remote sensing, field observations, and other forms of telemetry, such as satellite imagery. Combining all the available knowledge could be beneficial in identifying the hot spots that require immediate remedy.[17] For example, satellite spectroscopy is currently used by the EPA in the environmental monitoring of industrial sites for accidental releases and contamination as well as in evaluating superfund site clean-up progress.[18] In addition, recently the United States Forestry Service has used satellites to detect high concentrations of vegetative fuels in Colorado.[19] Satellite information should be combined with current ground-based remote sensing techniques to create a tightly knit and well-organized approach to fuel concentration management.[20] Because these satellite systems are already in place, much of the information can be shared across agencies at a low cost.[21]

Recommendation 2: Continue Use of Mechanical Thinning

"Mechanical thinning" refers to the process of mechanically reducing hazardous fuels near wildland-urban interfaces (WUIs). Although more expensive in operational costs than prescribed burns, mechanical thinning should be maintained as part of a diversified approach to fire management. Mechanical thinning should be the primary approach in certain situations, such as near previously suppressed WUIs where escaped burns can cause the most property damage. Because of this inherent risk, WUIs should be mechanically trimmed prior to any further treatment.[22]

For large WUIs, once the area has been thinned, a controlled burns policy could be implemented as long as the burns are small in size, tightly controlled, heavily monitored, and buffered by several acres from residential areas. Canada has provided successful examples where use this method has been accompanied by long-term operational cost reductions.[23]

Mechanical thinning has the added advantage of providing natural resources that can be distributed into the economy to serve a variety of other uses. For example, woody debris can be collected and used as feedstock for biomass power generators, industrial components, paper manufacturing, and chemical processes.[24] With the proper leverage, the collected resources can return revenue to the managing agency and help mitigate the higher cost of mechanical thinning.[25]

Recommendation 3: Involve the Community in Clearing Wildland-Urban Interfaces

Apart from its fire-management role, mechanical thinning can also serve as a conduit for social service. Thinning in the off-season can provide gainful year-round employment for seasonal firefighters.[26] Misdemeanor offenders can perform community service by thinning on behalf of the county near public and common interfaces. Boy Scout troops can earn merit by performing clearing operations under the proper guidance and supervision. Neighborhoods, too, might get involved in mechanical thinning in the surrounding areas.

Current requirements ask that communities work to create and maintain a 100-foot defensible space around residents' homes and property. This strategy, led BLM, has proved a successful fire prevention activity by dramatically limiting potential private property damage.[27] The program not only protects property, but also saves the managing agency up to one-third of the clearance and thinning costs at the residential interface.[28]

Conclusion

Fire policy and management is still evolving. Emerging technologies are increasing the effectiveness of federal and state efforts while the HFRA allows local agencies to be more active in fuel reduction efforts. Although unilaterally instituting a "controlled burn" policy for any situation where fuels accumulate might overlook specific needs, increasing small-scale controlled burn frequency near WUIs may be prudent based upon models derived from advanced information systems. Fire prevention policy should continue to strive for integrative management that includes controlled burns, mechanical thinning, and community efforts.

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ENDNOTES

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