PRESCRIBED FIRE AND U.S. WILDERNESS AREAS

South Fork Sun River Prescribed Fire (2011)
Scapegoat Wilderness, Helena-Lewis and Clark National Forest, Montana

Barriers and Opportunities for Wilderness Fire Management in a Time of Change

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Introduction

Fire is one of the greatest gifts given to humankind. Fire has lived on the North American continent since its beginning, shaping ecosystems and shaped by people. In the modern era, the balance between fire, land, and people has been unsettled, disrupting both ecosystems and society. Many of these challenges are expected to worsen in the years to come.

Fire is a powerful force that humans have used to create a reciprocal relationship with the land, but which also carries danger. The power of fire to harm people and transform place led to land management policies that formed the basis of a century or more of widespread fire exclusion across North America. However, fire exclusion has produced many unintended and unwanted consequences. Landscapes across the continent increasingly do not resemble the lands historically shaped by millennia of lightning strikes and generations of fire use by Indigenous stewards. In rethinking our current relationships with fire and the land, we find opportunities to regain the living power of fire for land stewardship. This includes caring for places designated as wilderness, which are intended to be free from the influences of modern humans.

This paper presents a framework for understanding how prescribed fire may be used to restore and maintain wilderness ecosystems in an era of intensifying environmental change. It further includes an assessment of current barriers for prescribed fire in wilderness identified by a group of experts in fire and wilderness management who participated in a workshop held in 2022 at Western Colorado University. Finally, areas of expert agreement around opportunities to overcome these barriers are presented as potential paths forward that could allow managers to more fully realize the benefits of prescribed fire in wilderness.

Changing Fire, Changing Wilderness

The Wilderness Act of 1964 created the National Wilderness Preservation System, currently a network of more than 800 designated wilderness areas within 44 states and territories, comprising approximately 112 million acres of land managed by the Bureau of Land Management, National Park Service, Fish and Wildlife Service, and Forest Service.[1] In addition, the Mission Mountains Tribal Wilderness (Confederated Salish and Kootenai Tribes) and Blue Lake Wilderness (Taos Pueblo) are managed by Tribes following substantially similar principles as the Wilderness Act. Managing agencies are mandated by law to preserve wilderness character on these lands for present and future generations. Though the Act allows for the control of fire, insects, and diseases, there are many unanswered questions about how to best manage fire in a manner consistent with the preservation of wilderness character.[2]

The advocates and legislators who wrote and passed the Wilderness Act recognized that fire regimes had already substantially departed from historical norms, which were themselves a product of both natural processes (e.g., lightning ignitions) and human acts.[3] Scientific understanding since 1964, upon which an additional half-century of fire suppression and accelerating climate change are imposed, affirms the magnitude of such departures.[4] Multiple lines of evidence, including lake sediment records,[5] tree-ring fire scars,[6] and documented observations,[7] demonstrate the varied ways that wildland fire was abundant across much of

the North American continent prior to European colonization, including through the intentional use of fire by Indigenous peoples.[8,9]

Historical fire regimes were highly variable but are generally understood to represent a fluid balance determined by interactions between ignitions, fuels, topography, and climate. Because fire reduces fuels, fire activity can be self-limiting over varying temporal and spatial scales.[10] In many areas, some of which are now protected by the Wilderness Act, fire regimes were also substantially shaped by Indigenous ignitions and cultural burning practices.[11,12] Colonization and the takeover of Indigenous lands led to the transformation and eventual cessation of Indigenous burning.[13] Across large areas, intensive livestock grazing also removed surface fuels and the fire regimes they supported.[14] Aggressive fire suppression followed and continues through the present.[7]

Over a century of fire exclusion has produced a fire deficit in many wilderness landscapes.[15,16] Where fire has been excluded, increased fuel density and landscape homogeneity have reduced ecosystem resilience to a range of disturbances including inevitable future fire.[17] Compounding these shifts, climate change is heightening fire activity in much of the United States.[18] Fires are growing larger, more severe, and exhibiting more extreme behavior; these patterns are projected to escalate in coming years.[19,20] Consequently, contemporary and future wildfire activity will decreasingly resemble the historical processes that shaped many wilderness ecosystems prior to their designation. In fire-adapted ecosystems where fire continues to be routinely suppressed, extreme wildfires will increasingly threaten a range of wilderness values, and more broadly, ecosystems and society. Wilderness and fire managers working in this context will thus face ever more complex decisions about fire use in the wilderness system.

Powderhorn Wilderness, BLM Gunnison Field Office, Colorado

Prevailing Wilderness Fire Management

In 2022, the Center for Public Lands at Western Colorado University surveyed and interviewed wilderness and fire managers to investigate how fire management in wilderness varies among agencies, organizations, and geographic regions of the United States.[21] By analyzing the decision-making rationale of managers regarding fire in designated wilderness, this research aimed to understand both the management ideals that motivate decisions and the adequacy of plans, policies, and practices to meet those ideals (see research methods described in **Box 1** below).

Findings indicate strong agreement among experienced land managers regarding ideal conditions of fire activity in wilderness areas: to honor the mandates of the Wilderness Act, 1) fire should be allowed to move about the landscape to the maximum extent possible provided it does not harm people or property, 2) fire should be characteristic of past fire regimes, and 3) fire should maintain ecosystem composition and patterns within historical norms. Research findings also showed that most land managers perceive a growing gap between current and ideal wilderness conditions due to a century of fire exclusion in many regions.

Chilliwack Complex (2022) – Stephen Mather Wilderness, North Cascades National Park, Washington

While allowing lightning-ignited fires to burn in wilderness may present opportunities toward restoring the historical role of fire, this strategy alone will be insufficient due to the increasing risks of fire burning under unfavorable and unpredictable conditions and wilderness connectivity with adjacent landscapes that experience aggressive fire suppression. Moreover, the vast majority of lightning ignitions in wilderness areas are subject to immediate suppression due to perceived risks to values both within and outside of wilderness.[22,23] Finally, more than a century of fire exclusion has built up fuel and homogenized landscapes in many wilderness areas, and lightning ignitions increasingly occur under a warmer and drier climate. Consequently, lightning ignitions can result in large, intense, and severe fires exceeding historic norms and producing historically uncharacteristic ecological changes.[24]

Prescribed Fire

Prescribed fire is a management action used to restore ecosystem processes and achieve desirable ecological outcomes including fuels reduction, increased landscape heterogeneity, improved habitat for particular species, and diminished risks and consequences of large, severe, and unplanned wildfire. Its effectiveness in incrementally restoring historical fire regimes, reducing subsequent wildfire severity, and sustaining ecosystem components is well-documented.[25,26] Not only can prescribed fire imitate long-used Indigenous burning practices and natural ignitions that historically shaped landscapes, it provides one of the only means managers have to meaningfully address landscape-scale fuel loads exceeding historic norms and ubiquitous effects of climate change.[27,28]

Prescribed fire in the West Elk Mountains (2022) – GMUG National Forest, Colorado

Currently, interpretations of the suitability of prescribed fire in wilderness vary between agencies, individuals, and among the public,[21] and prescribed fire is rarely implemented within designated wilderness. The Wilderness Act does not prohibit prescribed fire. Rather, it requires that any activity, including prescribed fire, be consistent with preserving wilderness character, and any tools used in conjunction with an activity, including prescribed fire, be the minimum necessary. Policy for all four federal wilderness managing agencies permits the use of prescribed fire in wilderness areas to preserve wilderness.[29] However, tension exists between the perceived threat of prescribed fire to wilderness values, the harm of continued fire suppression, and the risk of anomalous fire behavior from unplanned ignitions burning under novel conditions. Managers use Minimum Requirements Analyses (MRAs) to determine if action is necessary to preserve wilderness character and then the minimum amount of activity needed. In the case of prescribed fire, the analysis considers existing conditions of wilderness character and whether those conditions require consideration of prescribed fire and tools to implement it. The decision to take any action is made by comparing alternatives and their impacts to all qualities of wilderness character to identify the alternative that maximizes preservation of wilderness character as a whole.

Barriers to Wilderness Prescribed Fire

In December 2022, 21 individuals from land management agencies, Tribes, and organizations from across the United States met to consider the challenges of managing fire in wilderness after over a century of fire exclusion and in an era of rapid global change. These experts, collectively holding hundreds of years of relevant experience, shared perspectives developed during long careers in wilderness and fire management. Details about workshop organization, participants, and goals are described in **Box 1** below. In their deliberations, the group identified a perception among land managers and the informed public that the use of prescribed fire may be antithetical to maintaining wilderness character, which in turn has limited the implementation of prescribed fire in wilderness and deterred the establishment of agency policies and priorities that support its use. A lack of understanding of the historical role of Indigenous and cultural burning in shaping wilderness ecosystems also contributes to public misperceptions around wilderness and reluctance to actively restore historical processes.

During the two-day workshop, issues of agency policy, leadership, cooperation, public engagement, budget, staffing, and training also emerged as fundamental barriers to developing consistent strategies for applying prescribed fire in wilderness. Attendees considered decision makers' risk-aversion towards wilderness prescribed fire to be a result of lacking incentives or rewards, unclear leadership intent, and real or perceived political influence. In addition, workshop attendees attributed the lack of widespread prescribed fire use in wilderness to limited communication and collaboration across jurisdictional boundaries and the erosion of trust between the public, agencies, and experts. The group further identified that the capacity to carry out prescribed fire in wilderness is hampered by unstable budgets, insufficient training, and inadequate staffing, resulting in a lagging ability to hire and retain personnel to conduct this work. After finding areas of agreement around these barriers, participants were asked to identify opportunities for overcoming obstacles to implementing prescribed fire in wilderness.

Potential Paths Forward

Workshop participants identified 21 opportunities to overcome barriers to prescribed fire in wilderness, organized below under eight themes. These opportunities recognize strategies currently used to implement prescribed fire in wilderness, the need to reduce barriers and provide incentives, the experience of working in transitioning sociopolitical atmospheres, the importance of incorporating ever-improving scientific understanding, and the intensifying pressures of global climate change. Workshop participants agreed that these opportunities uphold wilderness values, honor Indigenous homelands, and support ecosystem function and resilience in wilderness landscapes across the United States. Participants were surveyed to determine level of agreement with each opportunity; there were high levels of agreement across all participants (see **Box 1** below for a description of research and workshop methods).

1 Acknowledge Indigenous cultural burning in wilderness

- Indigenous cultural burning in wilderness could be better recognized and promoted as a means to educate agency personnel, special interest groups, and the public that human-ignited fires have been important components of historical fire regimes.
- Scientific literature, policy language, and public messaging about fire would benefit from the inclusion of Indigenous ecological knowledge and cultural burning practices.
- Tribal participation as voting members on the federal Interagency Wilderness Policy Council and Interagency Wilderness Steering Committee would allow for more effective incorporation of Indigenous ways of knowing fire and stewarding landscapes into the management of wilderness.

2 Develop messaging about the relationship between wilderness and fire

- Educational initiatives could help agency leaders, special interest groups, and the general public better understand the historical role of fire in wilderness and the potential for prescribed fire to restore fire regimes, reduce wildfire severity, and respond to pressures of climate change.
- Clarification that prescribed fire is legal and permissible in wilderness where it is the minimum action necessary for preserving wilderness character could increase acceptance of prescribed fire as a management option that can return wilderness ecosystems to healthier, more resilient conditions.

3 Expand and formalize collaboration

- Increased cooperation, collaboration, and communication among federal land management agencies, Tribes, local and state governments, and NGOs would improve opportunities for effective wilderness stewardship including the use of prescribed fire.
- Co-stewardship agreements with Tribes would facilitate knowledge-sharing and increase trust among partners.

- Building partnerships that include Tribes as well as other non-federal entities in all phases of planning and implementation for prescribed burning in wilderness would increase effectiveness and trust.
- Developing multi-agency agreements based on established partnerships would increase the effectiveness and efficiency of sharing resources for implementing prescribed fire in wilderness.

4 Initiate proactive and far-reaching public engagement

- Revised timeframes for earlier public engagement would increase involvement with agency partners and the public regarding plans to implement prescribed fire.
- Public trust around the use of prescribed fire in wilderness could be built by first developing a shared vision of desired outcomes, rather than communicating decisions late in the process.

5 Increase access to training

- Training curriculums and experiential learning opportunities focused on prescribed fire in wilderness would benefit from an increased focus on understanding historical fire regimes, Indigenous cultural fire, fire ecology, and associated fire effects. Such training could be required for those involved in planning or implementing prescribed fire in wilderness, including wilderness specialists, resource specialists and advisors, fire personnel, and line officers.
- Increased understanding of the Minimum Requirements Analysis Framework (MRAF) process and how to implement a Minimum Requirements Analysis (MRA) that specifically considers prescribed fire would benefit managers in making effective wilderness stewardship decisions.
- Inviting the Arthur Carhart Wilderness Training Center to participate in training opportunities at the Prescribed Fire Training Center(s), particularly when one is established in the western United States, would help educate practitioners about the use of prescribed fire in wilderness.
- Seeking Tribal participation for developing and instructing training specific to Indigenous burning practices could promote the sharing of Indigenous knowledge where it has been maintained, and rebuilding it where it has been lost.

6 Create comprehensive and consistent interagency guidance and messaging

- Comprehensive interagency messaging around prescribed fire in wilderness would support consistent interpretation of the Wilderness Act as it relates to fire management, and provide a better understanding of the value, benefits, and importance of considering prescribed fire as a tool that can support the preservation of wilderness character.
- A multi-agency review to understand each wilderness management agency's policy, guidance, and flexibility around prescribed fire in wilderness would encourage consistent prescribed fire use across the National Wilderness Preservation System.

7 Build leadership support

- Developing an understanding of intent among agency leadership could encourage constructive risk-taking in support of wilderness prescribed fire.
- If leadership support exists, a letter of support among agency leaders and staff written by national-level leadership could encourage the appropriate use of prescribed fire in wilderness.

8 Budgetary and administrative change

- A dedicated fire workforce staffed with permanent full-time employees and supported by stable funding allocations would increase capacity for prescribed fire planning and implementation, both inside and outside wilderness.
- Increased compensation, career development opportunities, and workforce diversity and inclusivity would reduce barriers to hiring and improve workforce retention.

Conclusion

Both historically and in the modern era, people will continue to influence the role of fire inside and outside of wilderness. Fire remains a keystone ecological process; Western science and Indigenous knowledge confirm this basic principle. Fire continues to nurture and complement humanity. In the vast expanse of wilderness and in this era of rapid socio-ecological change, we have both the opportunity and responsibility to recognize fire's ability to renew the landscape, and reciprocate the gift of fire for present and future generations.

Box 1: *This story began with a question… How does the wilderness burn?*

To answer this question, Western Colorado University and the Aldo Leopold Wilderness Research Institute collaborated on a three-phase social science research project including the use of surveys, interviews, and a workshop with experienced wilderness and fire managers.

In May and June 2022, a faculty and graduate student team at Western Colorado University developed a survey to collect information about existing wilderness fire management conditions, including use of different strategies and policies and the decision-making processes that influenced planning and implementation. The research team sent the survey to current and former agency, Tribal, and special interest group employees who work in wilderness and/or fire, relying upon snowball sampling to reach a widespread sample. For survey administration purposes, participants were grouped based on their affiliations (e.g., federal employees, non-profit employees) and each group was asked a series of questions specific to their group as well as a set of questions asked of all participants. Sixteen of the 131 survey respondents were then identified for follow-up interviews, with an effort to interview a sample of people from different organizations and regions, as well as with diverse job titles and professional experiences. A small group of interviewees were also invited to participate in a two-day in-person workshop with the intention of ground-truthing the survey results through conversations about barriers and opportunities related to wilderness prescribed fire. Additional participants were invited to the workshop, based upon their leadership roles, breadth of experience, or subject matter expertise.

In December 2022, Western Colorado University hosted the Wilderness & Fire Management Workshop in collaboration with the Aldo Leopold Wilderness Research Institute. The workshop was organized and facilitated by the university's Center for Public Lands, whose mission is to develop creative responses to contemporary land management challenges by applying scientific and socio-economic knowledge in the context of the complex realities of planning, management, and policy development. Of 70 people invited, 21 participants attended the workshop, including line officers, program managers, fuels technicians, wilderness specialists, and research scientists.

Workshop participants received information in advance of the workshop to develop shared foundational knowledge. The first day of the workshop focused on sharing existing research and case studies to further build common ground for discussion. Subsequently, participants worked in small groups to identify real and perceived barriers that may impact the use of prescribed fire in wilderness. Emergent themes provided a framework for groups to then identify opportunities that responded to particular barriers. Through a series of work sessions, participants received feedback on identified opportunities from the perspectives of representatives of different agencies, geographies, or lived experiences. The refined opportunities were presented to the whole group, who then undertook a line-by-line review, discussing each point individually and in the context of the broader themes. Using an iterative member check process, workshop participants were surveyed for their agreement, followed by further discussion and revision for each item. Opportunities that were agreed to be the most urgent, impactful, feasible, and important are included as potential paths forward in this document.

In the months following the workshop, participants had additional opportunities to review and submit written feedback to a draft document, which was then incorporated by the Center for Public Lands team. The draft was also shared with leadership at the Aldo Leopold Wilderness Research Institute and workshop invitees who were unable to attend. Their suggestions were considered, and the revised document was shared back to the workshop participants for a final assessment of agreement.

Wilderness & Fire Management Workshop

December 2022

Workshop Organizers:

Alyssa Worsham, Master of Environmental Management, Western Colorado University
Dagny Signorelli, Master of Science in Ecology candidate, Western Colorado University
Melanie Armstrong, Professor, University of Wyoming
Jonathan D. Coop, Professor, Western Colorado University

Workshop Participants:

1. Aaron Kania, District Ranger, Forest Service (Superior National Forest)
2. Andrew J. Larson, Professor of Forest Ecology and Director, University of Montana Wilderness Institute
3. Cedar Drake, Ecologist, Fire & Aviation Management Division, National Park Service (Pacific West Region)
4. Greg Aplet, Director of Special Projects, The Wilderness Society
5. J. Dan Abbe, Forest Service Representative, Arthur Carhart National Wilderness Training Center
6. Jon F. Kaminsky, Field Manager, Bureau of Land Management (Gunnison Field Office)
7. Margo Robbins, Executive Director, Cultural Fire Management Council
8. Mark Fincher, Wilderness Specialist, National Park Service (retired)
9. Michael A. Munoz, District Ranger, Forest Service (Helena-Lewis and Clark National Forest)
10. Mike Beasley, Board President, Firefighters United for Safety, Ethics, and Ecology (FUSEE)
11. Rene Romero, Fuels Manager, Taos Pueblo
12. Riley Rhoades, Fire Management Specialist, Forest Service (Salmon-Challis National Forest)
13. Ryan LeRoy Romero, Prescribed Fire and Fuels Technician, Bureau of Land Management (Gunnison Field Office)
14. Scott Crist, Fire Management Officer, Forest Service (Shawnee National Forest)
15. Sean Parks, Research Ecologist, Aldo Leopold Wilderness Research Institute, Forest Service
16. Theo Engel, Chainsaw Coordinator, Forest Service (Gunnison National Forest)
17. Timo Rova, Fire Management Officer, Forest Service (retired)

Four additional participants wished to remain anonymous.

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ALDO LEOPOLD WILDERNESS RESEARCH INSTITUTE

WILDERNESS AND FIRE WORKSHOP
GUNNISON, CO 2022

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Photo Information

1. Phase 3 of the South Fork Sun River prescribed fire from 2011 in the Scapegoat Wilderness (Rocky Mountain Ranger District, Helena-Lewis and Clark National Forest, Montana). Phase 3 was the largest and final phase of the project, burning 11,000 acres of 16,000 total acres. Photo courtesy of Michael A. Munoz, District Ranger, USFS.
2. A stand of dead Engelmann spruce trees in the Powderhorn Wilderness (BLM Gunnison Field Office, Colorado) in 2022. This area is part of the proposed North Powderhorn Fuels Project which is intended to treat up to 20,000 acres with prescribed fire over the next 15 years. Photo courtesy of Dagny Signorelli.
3. The lightning-ignited Chilliwack Complex Fire from 2022 burning in the Stephen Mather Wilderness (North Cascades National Park, Washington). Photo courtesy of Cedar Drake.
4. A prescribed burn during the spring of 2022 in the West Elk Mountains (Grand Mesa, Uncompahgre, and Gunnison [GMUG] National Forest, Colorado). Photo courtesy of Jonathan Coop.

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