Independent Analysis of Managed Wildfire by the Southwest Ecological Restoration Institutes

Managed wildfire refers to a strategy whereby fire managers use natural ignitions (i.e., lightning) to allow fire to "fulfill its natural role on the landscape, meeting objectives for firefighter safety, resource benefit, and community protection"[1] as allowed by an existing, approved land or resource management plan that articulates strategies and objectives to meet specified natural resource objectives (i.e., forest plan for National Forest System lands, area management plans for Bureau of Land Management) or an existing, approved fire management plan. This strategy has gone by other terms like "let burn," "wildland fire use," "resource objective wildfire," and "other than full suppression fire," but is referred to herein as "managed wildfire." This brief distills the state of knowledge on managed wildfire and provides recommendations for using managed wildfire as part of a proactive strategy to reduce the risk of catastrophic wildfire and improve the health of forested systems and communities.

State of the Knowledge

Managed wildfires have ecological benefits and a moderating effect on future wildfires. A comprehensive review of published research on the restoration applications of managed wildfires showed that they were effective for reducing tree density and led to decreases in subsequent burn severity and fire size, among other restoration objectives, but tree density often remained above known historical ranges.[2] Studies in frequent-fire forests, such as ponderosa pine forests in Arizona, show that repeated entry with some moderate severity managed wildfire is most effective for reducing tree density and fuel loading.[2] High-severity burns were uncommon outcomes from managed wildfires due to its application in lower risk burn conditions.[3] A fire suppression effectiveness analysis[4] of the 2022 Midnight Fire in New Mexico found that a previous managed wildfire (2019 Francisquito Fire) and prescribed fire (2018 Alamosa prescribed fire) contributed to an unusually high degree of effectiveness in facilitating fire suppression when the Midnight Fire began during unfavorable weather conditions (Figure 1).[5]

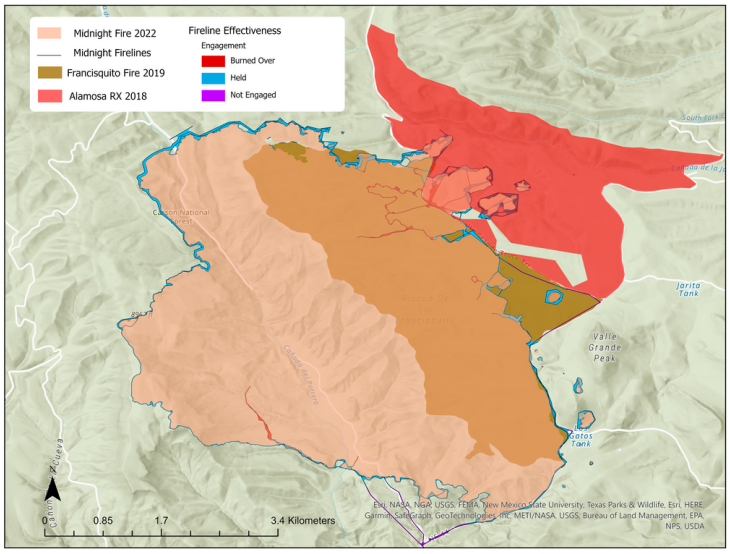

Figure 1*. This map demonstrates the fireline effectiveness of the 2022 Midnight Fire. The coral color is the 2022 Midnight Fire perimeter; brown is the 2019 Francisquito managed fire perimeter; and red is the 2018 Alamosa prescribed fire perimeter. The analysis shows that when the Midnight Fire ran into the previous burn areas, they contributed to a high degree of suppression effectiveness.*

This assessment is provided per ***Division G-Department of the Interior, Environment, and Related Agencies Appropriations Act of 2022****, under which $6 million was provided for the Southwest Ecological Restoration Institutes to continue to assist communities and land managers in applying hazardous fuels and wildfire risk reduction treatments, conducting monitoring and evaluation research, providing technical assistance, and for independent analysis of managed fire.*

The ***Southwest Ecological Restoration Institutes (SWERI)*** *were authorized by the Southwest Forest Health and Wildfire Prevention Act of 2004 (PL 108-317). As a Congressionally authorized program, the SWERI deliver actionable knowledge across a wide spectrum of affected entities to inform cross-boundary forest restoration and wildfire mitigation spanning management, ecology, policy, and research. For more info, visit* **www.sweri.org**.

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Analysis of managed wildfires demonstrates that destructive outcomes are rare. The 2021 Tamarack Fire in California was a lightning-caused fire for which the initial decision was not to engage directly due to firefighter safety concerns, not as a managed wildfire, and which resulted in structure loss and prompted scrutiny of management responses to natural ignitions. Recent research demonstrates that from 2009 to 2020, there were 32 fires with characteristics like the Tamarack Fire, of which only 6 were managed wildfires.[6] Most structure losses from wildfire are due to human ignitions on private lands that spread into adjacent areas under extreme weather conditions.[7] Managed wildfires that result in negative outcomes are rare, yet fire managers are incentivized to suppress natural ignitions to minimize short-term risk rather than use them under favorable conditions to maximize long-term risk reduction.[6]

Current policy, the 2009 Guidance for Implementation of Federal Wildland Fire Management Policy, is effective and allows for using managed wildfire when an existing, approved land, resource, or fire management plan is in place, but myriad factors can frustrate its use.[8] 1) There is inconsistent terminology and multiple terms for "managed wildfire." The approach can entail engaging fire at locations deemed safer and more effective for suppression or engaging fire to achieve natural resource or risk management objectives after analyzing risk to firefighters and local landscape values. Inconsistent terminology creates confusion when current policy (i.e., 2009 Guidance) allows for all fires to be managed for different objectives and strategies depending on the context. 2) Operational concerns also pose challenges. Fire managers may worry there are insufficient resources, leadership backing, and political or public support for implementing managed wildfire. 3) Risk aversion and uncertainty, when combined with a high degree of autonomy in local decision making and the perception that managed wildfire is risky, have resulted in hesitance to use managed wildfire approaches despite current policy. In many cases, managed wildfire is a lower risk option when considering its potential to reduce future fire risk, but when faced with a risky decision, decision-makers often take the risk-averse option of fully suppressing a fire. Rather than sharing risk across boundaries, fire managers who do opt to take a managed wildfire approach are often left carrying the burden of potential bad outcomes, which are uncommon. Managed wildfire often comes down to the willingness of individuals to take on the risk because the 2009 Guidance has not been codified into law.[6] 4) Building public and political understanding of, and support for, managed wildfire strategies, especially in the pre-season before a fire starts, can facilitate its use.[8] 5) Existing performance metrics and financial structures may also disincentivize using managed wildfire, and regional and local planning may be outdated or not explicitly demarcate alternative fire management strategies for different land or resource objectives, which can lead to additional confusion in implementing policy on the ground.[9]

There are several facilitating factors that lead to decisions to use managed wildfire. 1) Discussions of fire management options in the pre-season (e.g., creating Potential Operational Delineations (PODs) of the most effective containment opportunities and pairing those with quantitative wildfire risk assessments) can help identify and document strategic response zones where managed wildfire may prove beneficial under the right conditions.[10] 2) The characteristics of individuals, incident management teams, or organizations with experience using risk-informed decision support systems (DSSs) and the characteristics of the DSSs themselves can facilitate decision making to allow for managed wildfire use.[10] 3) Many other facilitators such as existing collaborative relationships, personal ethic to use managed wildfire, favorable conditions, reduced exposure, minimal values at risk, agency support, cost savings, and many others also encourage use of this approach.[8]

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[6] Pietruszka, B.M., J.D. Young, K.C. Short, L.A St. Denis, M.P. Thompson, and D.E. Calkin. *In review.* Consequential lightning-caused wildfires and the "let burn" narrative. *Fire Ecology*.

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[10] Beeton, T.A., M.D. Caggiano, M.M. Colavito, and C. Huayhuaca. 2022. Use of Risk Management Assistance During the 2021 Fire Season. Technical Report. Southwest Ecological Restoration Institutes.

Recommendations

Consistent terminology that better aligns with the existing 2009 Guidance should be identified, and the 2009 Guidance should be fully used. The 2009 Guidance already provides the appropriate sophistication and flexibility to respond to unplanned ignitions, both human and natural, but is not fully realized due to the barriers previously described. Once common language that adequately incorporates managed wildfire into the broader context of all wildfire management has been identified and vetted, the National Wildland Fire Coordinating Group Incident Status Summary database (ICS 209) categories for documenting and tracking wildfire should be reviewed and potentially updated to reflect this terminology. New terminology will allow for more realistic tracking, communication, and articulation of incident decision-making that highlights that wildfire response is a combination of strategy actions.

Framing should emphasize that all fires are addressed with a risk-informed, strategic approach. Expanding managed wildfire use has long-term health, safety, and risk reduction benefits. More awareness, socialization, outreach on the benefits, and communication of the complexities of fire decision making are necessary to facilitate the use of managed wildfire. Indigenous perspectives and cultural burning must be part of the conversation. Learning from success stories is invaluable for demonstrating the potential of managed wildfire to reduce future fire risk. Training programs must adapt to accommodate more nuanced framing and communication of approaches.

Leadership must share risk with fire managers and provide support, resources, and incentives for using managed wildfire. Fire managers need commitment and support to use managed wildfire from all levels of leadership and the necessary resources and incentives. Risk sharing and co-managing risk at all levels will help reduce risk aversion for individual fire managers who bear the greatest costs for the few bad outcomes. Leadership should acknowledge the reality of risk reduction, not elimination, in fire response. Leadership direction to use DSSs at all levels is also critical, otherwise using these tools often comes down to an individual's willingness, rather than as a standard procedure.

The use of risk-informed, science-based DSSs before and during incidents is critical to increasing the use of managed wildfire, and these DSSs should be better integrated into land, resource, and fire management plans to fully realize the 2009 Guidance. More agile and risk-informed DSSs that deploy resources during windows of opportunity, prioritize resources in areas that have the highest probability of success, are identified through spatial pre-season fire planning, and are incorporated into land, resource, and fire management plans are critical to success. PODs are a collaborative, strategic spatial fire planning framework and DSS that pair local knowledge and expertise with advanced spatial analytics to pre-identify areas on the landscape where there is a high likelihood of containing a fire (e.g., roads, rivers, ridges). The collaborative development of PODs in the pre-season with diverse partners and across jurisdictions[11] can inform fuel treatments to improve POD boundaries using strategic fuel breaks and/or as anchors for prescribed fire implementation.[12] During fires, it is important to use pre-identified information and strategic approaches to prioritize resources in areas that are most likely to support safe and effective response. Using pre-identified control features that have been vetted by fire management professionals and partners can hasten situational awareness, conserve scarce resources, reduce future fire risk of high-severity wildfire, and incentivize line officers and incoming Incident Management Teams to consider indirect, "big box" strategies (i.e., managed wildfire) when it is safe and effective. Utilizing the Risk Management Assistance (RMA) Dashboard and engaging in the Incident Strategic Alignment Process (ISAP) will facilitate risk-informed decisions and the development of a spatial and temporal strategy using the best available science throughout an incident.

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[11] Beeton, T.A., and M.D. Caggiano. 2022. PODs for Non-Incident Management – San Isabel National Forest. Colorado Forest Restoration Institute Fact Sheet.

[12] Beeton, T.A., and M.D. Caggiano. 2022. PODs for Non-Incident Management – San Juan National Forest Case Study. Colorado Forest Restoration Institute Fact Sheet.