



Barriers to Prescribed Fire Implementation, Possible Solutions, and An Estimate of Fire Damage in Calendar Year 2021 That Could Have Potentially Been Avoided

Background

The Department of the Interior, Environment, and Related Agencies Appropriations Bill, 2022 (House Report 117-83), includes the following language:

The Committee encourages the Department of the Interior and the U.S. Department of Agriculture, Forest Service to continue utilizing prescribed burns as a forest management tool in the western United States. Within 180 days of enactment of this Act, the Committee directs the Department of the Interior and the Forest Service to submit a report detailing the barriers to implementing prescribed burns in the western United States, possible solutions, and an estimate of fire damage in 2021 that could have potentially been avoided had the agencies implemented a more robust prescribed burn regime.

The U.S. Department of Agriculture, Forest Service implements hazardous fuels reduction vegetation management treatments¹ to reduce wildfire risk and maintain or restore healthy, resilient forests within their natural fire regimes. This work occurs on National Forests across the country and is integrated into local Land and Resource Management Plans and programs of work. Special focus and prioritization are given to treatments near critical infrastructure, community drinking water sources, critical habitat, and tribal lands.

Prescribed fire is one of many fuels treatment methods and a key component of the hazardous fuels management program. It is a critical component of overall fuels management because it re-establishes fire's natural role in the ecosystem and improves the effectiveness of mechanical and other vegetation management treatments. Prescribed fires are conducted for two main reasons:

1. Reduce hazardous fuels to decrease wildfire risk to communities and critical infrastructure. These prescribed fires typically take place near communities (sometimes described as wildland urban interface or WUI) or near other developed areas with critical values or infrastructure (such as power transmission lines or recreation areas). Their primary purpose is to remove grass, brush, small trees, and other dead and down forest debris (leaves or pine needles, twigs, branches, etc.) that can fuel wildfires in hotter, drier conditions.
2. Improve ecosystem condition by restoring the natural fire cycle to reduce forest competition, open gaps in the forest canopy to sunlight, recycle nutrients to the soil for re-growth, provide habitat, and increase plant and animal biodiversity.² The optimum conditions for using prescribed fire for these purposes can be challenging, especially with overgrown forests and/or altered fuel conditions across much of the National Forest System.

¹ Hazardous fuels reduction treatments can include burning, chipping, mechanical removal, pruning, and thinning the forest understory to reduce flammable materials.

² Hazardous fuels reduction treatment objectives include but are not limited to reducing fuels, modifying wildlife habitat, and restoring ecological function.

Trained specialists use the best available science and technology, fire modelling, and local knowledge to carefully plan prescribed fires months in advance. These burn plans establish the “prescriptions” under which the fire should be ignited to ensure the achievement of planned objectives. They identify conditions under which trees, plants, and other organic material will burn to safely achieve the desired results. Burn plans consider temperature, humidity, wind, vegetation moisture, and conditions for smoke dispersal to limit public exposure and health impacts. Prescribed fire specialists compare conditions on the ground to those outlined in the burn plan to make sure they align with the requirements in the plan or within a “burn window.” A burn window occurs when the prescription parameters for temperature, wind, relative humidity, air quality and other factors are met, and the necessary firefighting staff, including contingency resources are available. Specialists prepare the prescribed fire project areas in advance with control lines, and, if necessary, with fire hose, water, and other equipment to ensure a higher level of control. When these conditions are met, qualified burn bosses ignite the fire following the guidelines established for that burn unit and in compliance with any required burn permits. If the prescription parameters are not met and sustained, ignitions must cease.

In FY 2022, the Forest Service hazardous fuels program completed approximately 3.21 million acres of fuels treatments on National Forest System and adjacent lands to mitigate wildfire risk. Approximately 2.26 million of the treated acres were in high-risk wildland urban interface areas. About 2.05 million acres, or 64 percent of the total acres, were treated with prescribed fire or wildfire that met resource management objectives.³

Barriers to Prescribed Fire

Prescribed fires are complex; therefore, there are many barriers to their implementation. In a 2019 study, which highlights the top barriers, “a majority of land managers indicated that lack of adequate funding and capacity...were their primary barriers to conducting more prescribed fire.”⁴ Other hurdles that prescribed fire practitioners regularly cite include air quality and smoke management, weather, liability/insurance, low prioritization permitting/legal concerns, public perception/wildland urban interface/population growth. The barriers listed in Table 1 are discussed in depth below.

Table 1. Prescribed Fire Barriers (in priority of importance):

Barriers	Description
Capacity/Funding	Limited personnel, training, private contractor availability, partnerships, and equipment, as well as limited funding and high implementation costs.
Air Quality/Smoke Management	Smoke impacts to visibility and human health
Weather	Narrow burn windows, widespread drought, and few available burn days.
Liability/Insurance/Prioritization	Liability, insurance availability, competing priorities, risk aversion.
Permitting/Legal Concerns	State and federal laws, burn bans, local restrictions, and the impact of the National Environmental Policy Act process on burn windows.
Public Perception/Population Growth in the Wildland Urban Interface	Lack of public understanding/acceptance, and urbanization of wildlands.

³Lightning fires that achieve natural resource goals and restore fire regime, supported by land management plans and the National Environmental Policy Act. All fires that threaten life or property are suppressed.

⁴ 2019 https://www.fs.usda.gov/rm/pubs_journals/2019/rmrs_2019_schultz_c002.pdf

A national team of Forest Service personnel with partner representation from municipalities, counties, states, and non-governmental organizations from across the country, conducted a review of the Forest Service National Prescribed Fire Program in 2022. The *National Prescribed Fire Program Review Report*⁵ details many of these barriers as well as solutions. In response to the review report, the Forest Service developed a National Prescribed Fire Resource Mobilization Strategy that includes opportunities for enhanced resource mobilization and expanded training opportunities to facilitate safe and effective prescribed burning.

Capacity and Funding

Insufficient trained staff is the primary barrier to using prescribed fire at a sufficient scale to meet the needs on the land. Wildland firefighters serve as the primary trained prescribed fire workforce. They operate at maximum capacity, responding to increasingly difficult wildfires and longer fire seasons, while also increasing prescribed fire outputs.

With supplemental funding from the Bipartisan Infrastructure Law and Inflation Reduction Act, the Forest Service is working to hire additional personnel to increase workforce capacity. However, it takes training, time, and experience to attain prescribed fire qualifications primarily held by mid- to upper-level fire management personnel. Training builds on wildland fire suppression experience and develops skills in burn planning, prescription, implementation, and specific coursework in smoke management. It takes roughly eight years, based on training analysis completed by the National Advanced Fire Resource Institute, for an individual to achieve the training and experience required to qualify through the Incident Qualification and Certification System (aka to get a “red card”) to oversee a prescribed fire implementation as a “burn boss.” Given the time it takes to develop prescribed fire practitioners, it will take several years for today’s investments through the Bipartisan Infrastructure Law, Inflation Reduction Act, and other efforts to qualify individuals into these highly technical positions.

Prescribed fire burn windows often occur when most firefighters are committed to wildfire response. These firefighters are also prescribed fire practitioners, which means that prescribed fire project work is often put on hold when suppression takes priority. The extended fire season, now referred to as a “fire year,” also impacts wildland firefighters’ mental health and work/life balance. This is especially true for seasonal wildfire response-oriented workforce for prescribed fire due to their work schedule, training, and their priority mission of wildfire response.

Air Quality/Smoke Management

Smoke from wildfires and prescribed fires contain particulate matter (PM 2.5), carbon monoxide, and numerous other components that are harmful to firefighter and public health. Specialists plan prescribed fires for smoke dispersal that minimizes impacts to health in compliance with state or local smoke management programs or state implementation plans as guided by 42 U.S. Code § 7418.⁶ Burn bosses also use Basic Smoke Management Practices to address these issues, and to maintain safety on roadways.

The Environmental Protection Agency delegates to states and local air quality regulatory agencies the requirements to meet the National Ambient Air Quality Standards and revises them every five years. The potential for smoke to become a significant prescribed fire barrier is increasing as these standards are tightened. It is critical that air quality and land management objectives align to mitigate the risk of high

⁵ <https://www.fs.usda.gov/news/releases/usda-forest-service-chief-randy-moores-statement-announcing-actions-forest-service>

⁶ <https://www.govinfo.gov/content/pkg/USCODE-2010-title42/html/USCODE-2010-title42-chap85.htm#:~:text=7418.%20Control%20of%20pollution%20from%20Federal%20facilities>

severity fire and future smoke events. In recent years large, destructive wildfires have caused serious health impacts from long-duration and hazardous smoke exposure. These impacts are far more significant than those from prescribed fires. However, all wildland fire smoke (and specifically fine particulate matter) impacts public health. Efforts to plan for and mitigate these impacts would help reduce this barrier to more prescribed fire while reducing the public burden of smoke. Areas treated with prescribed fire also can help reduce wildfire intensity, in turn, aiding in fire response operations and ultimately reducing smoke impacts to the public.

Weather

Climate change produces variance in local weather patterns which has led to more unpredictable, faster changing weather patterns (e.g., more extreme wind events). Extended drought in the West has also limited burn windows. The overall effect of these trends has reduced the predictability, availability, and duration of opportunities for prescribed burning. If qualified people are not available on a particularly critical day, prescribed fire projects can be put on hold or never get implemented.

Liability, Insurance, and Prioritizing Prescribed Fire

Many firefighters are concerned about their liability if a prescribed fire does not go as planned. Agency support for fire personnel implementing prescribed burn operations is critically important. The agency reimburses half of employees cost for personal liability insurance. As important, the agency has shown internal and public support for employees who have had unintended outcomes such as escaped prescribed fires as long as the employees were working within the parameters of the prescribed fire burn plan and the employees were working within their red carded fire qualifications.

In most agencies, incentives are limited for managers to pursue prescribed burning whereas the reasons to avoid burning are many (e.g., risk aversion, personal liability concerns, smoke impacts, and political considerations in the case of a declared wildfire). Competing land management needs (e.g., wildfire response, planning or recreation management) also can draw attention and staff away from this work.

Permitting/Legal Concerns

The National Environmental Policy Act process can be lengthy and may face legal review, which can slow implementation. However, research data indicates that 95% of fuels management decisions are supported by either an EA or CE, expediting consideration.⁷ Once National Environmental Policy Act requirements are met, regulations and permitting requirements (initial and subsequent surveys, monitoring, and permitting processes such as wildlife or cultural surveys, Endangered Species Act consultation, smoke permitting, etc.) may be required. Notably, enactment of the Bipartisan Infrastructure Law (BIL) authorized the agency to take emergency actions to protect public health and safety, critical infrastructure and natural resources on National Forest System lands, to accelerate planning, consultation, contracting, hiring and implementation of fuels and forest health treatments across the 250 high-risk firesheds. The agency will use our authorities strategically and thoughtfully to plan and carry out prescribed fire, and other treatments.

Endangered Species Act requires the time and resources (i.e., money and personnel) needed to complete surveys. While there was increased investment in forest health under the Bipartisan Infrastructure Law, there was not any new investment in personnel at Fish and Wildlife Service to support implementation of the law. While the average ESA consultation is less than 90 days, staffing shortages may result in delays

⁷ US Forest Service Implementation of the National Environmental Policy Act: Fast, Variable, Rarely Litigated, and Declining, Fleischman, et al., Journal of Forestry, Volume 118, Issue 4, July 2020, Pages 403–418, <https://doi.org/10.1093/jofore/fvaa016>

in project clearances which result in missed burn windows. Areas that have endangered species may be deemed fire exclusion areas or limit the timing of burns (for example, nesting seasons) and may limit the opportunities to use prescribed fire as a tool.

Increasing prescribed fire use will necessitate changes and further investment in smoke management efforts, mitigation, and programs to ensure that implementation of the National Ambient Air Quality Standards⁸ effectively excludes emissions from prescribed fire and public tolerance for smoke continues. This will help ensure that air quality does not become a more significant barrier to prescribed burning. To achieve these outcomes, the Environmental Protection Agency and state, local, and Tribal air agencies would need to streamline existing smoke management programs, including the Exceptional Events Rule⁹, especially in the West and the Southeast.

Public Perception/Wildland Urban Interface/Population Growth

Fear of escaped prescribed fire, intolerance for smoke, and a lack of understanding the training and science required for prescribed fires are all factors that can limit public support in some areas of the country.

Perceptions and acceptance of prescribed fire vary widely. For example, prescribed fires in the Eastern United States are widely practiced and have a greater level of public acceptance than the Western United States. However, many members of the public recognize fire's ecological role. Prescribed fire had been practiced by Indigenous peoples of North America for millennia.¹⁰

Some studies suggest that people living in high-fire-prone areas have a sophisticated understanding of the need for fire. Nevertheless, they remain concerned about smoke and prescribed fire's effects on vegetation and its proximity to homes. Public trust and support are vital to successful prescribed fire implementation. Continued efforts to address smoke management and increased investments in Smoke Ready communities¹¹ could improve the public's view of the air quality impacts of prescribed fire.

As more people move into the wildland urban interface, the need for proactive prescribed fires to protect these communities increases. However, many people who move into these areas are unaware of the wildfire risks and do not want to be impacted by prescribed fire.

Possible Solutions to Prescribed Fire Barriers

Invest in Increased Capacity

In response to the *National Prescribed Fire Program Review Report*, the Forest Service has developed a National Prescribed Fire Resource Mobilization Strategy. This strategy recommends the agency implement Prescribed Fire Implementation Teams (structured like Incident Management Teams) that expand and contract to meet the need and complexity of prescribed fire on the ground. This is currently being piloted on several national forests in the western U.S. This focus on prescribed fire capacity includes the following:

⁸ <https://www.epa.gov/naaqs>

⁹ <https://www.epa.gov/air-quality-analysis/treatment-air-quality-data-influenced-exceptional-events-homepage-exceptional>

¹⁰ Tribal and Indigenous Fire Tradition (<https://www.fs.usda.gov/features/tribal-and-indigenous-heritage>).

¹¹ <https://www.epa.gov/air-research/smoke-ready-communities-research-prepare-wildfires>

1. Create dedicated prescribed fire crews to augment current workforce capacity to achieve prescribed fire and other fuels reduction work.
2. Create employee training opportunities that provide the science, analysis, and communication skills necessary for effective project planning.
3. Create partnerships with universities to develop degree programs that prepare graduates for challenging fire management positions that would support the agency's land management restoration goals over the next several decades.
4. Encourage more contractors to enter the industry by offering more prescribed fire project opportunities. Currently, the Forest Service can leverage contractors for this work. However, qualification requirements and liability concerns inhibit standalone contractor execution of prescribed fire on federal land without qualified, lead agency personnel (of which there is a shortage).

Coordinate on an interagency level for smoke management

The Forest Service entered into a Memorandum of Understanding with the Environmental Protection Agency, the Department of the Interior, and the Centers for Disease Control and Prevention for Wildfire and Air Quality Coordination. Among the goals are to engage in measures to protect the public from the adverse health impacts of wildland fire smoke, promote the mutual objectives of protecting public health from the impacts of smoke and enabling land management practices, including prescribed fire, that may reduce the risk of future large, high severity fire and smoke events, and collaborate on smoke forecasting, monitoring capabilities and new technologies that will enable Federal agencies and other land management and public health partners to better inform and prepare communities for smoke events.

This coordination will help maximize opportunities to use prescribed fire to protect communities and prevent larger, more destructive fires and the associated smoke events.

Continue to expand capabilities with Tribal Nations and partners at all levels

National, state, local, tribal and private partners have expertise to share and want to be part of the solution¹². Tribes have utilized prescribed burning for centuries for a variety of outcomes (ecology, fuel reduction, and to encourage the growth of plants used for food, medicine, or tools). Partnering with tribes who conduct cultural burning for resource management and capitalizing on their Indigenous Traditional Ecological Knowledge (ITEK) should be expanded. An excellent example is the Additionally, the Forest Service is leveraging funding to build on long-standing partnerships and create large national-level agreements with organizations that will allow us to execute priority projects quickly and efficiently while we grow Forest Service institutional capacity. Partnerships with groups such as The Nature Conservancy (TNC) who are leaders in prescribed fire illustrate the success of partnerships already underway. The Agency recently entered into a Keystone Agreement and expanded our Memorandum of Understanding with The Nature Conservancy. The Nature Conservancy regularly trains prescribed fire practitioners and conducts prescribed burns. The agency anticipates developing additional agreements, including with tribes and/or tribal organizations. Additionally, collaborating with local partners who are invested in communities and landscapes can help expand agency capability for mutual benefits.

Improve weather prediction capability

Investments in science and research to improve practitioners' prediction, monitoring, and awareness of weather conditions can help identify burn windows and assist in reducing unintended prescribed fire outcomes. Partnerships are in place with the National Weather Service to support Predictive Services at the National Interagency Fire Center. The Forest Service is ensuring that remote automatic weather

¹² <https://www.fs.usda.gov/detail/r5/landmanagement/?cid=fseprd581503>

stations are functional and maintained to standard so that local weather data is integrated into prescribed burning decision making.

Invest in communication and public engagement

Public perception and support of prescribed fire varies across the country. Although challenging, improved regional and national communication is critical to the public's understanding of prescribed fire and support for its use. Having a centralized communication point with shared, consistent messages, like during wildfire response, could help stakeholder communication and collaboration. Building on existing wildfire smoke communication tools like the Environmental Protection Agency-Forest Service Fire and Smoke Map¹³ and enhancing it for prescribed fire smoke could aid in this process.

Estimate of 2021 wildfire damage that could have potentially been avoided

The Forest Service is unable to provide an estimate of the damage that could have been avoided if it had implemented a more robust prescribed fire program. Calculating such an estimate is highly complex and speculative and would require broad assumptions about the location and acres of treatments needed to effectively impact the 2021 wildfires. Additional complexities include the degree to which weather, fire behavior, and firefighter availability might have aligned to allow responders to engage those fires and use the presumed fuels treatments to their advantage.¹⁴

However, there is a large body of research that demonstrates that fire is self-regulating and that previous fire scars are associated with fewer, smaller, and less severe future fires. Based on this science the Agency developed and is now implementing a 10-year strategy to confront the wildfire crisis. This science-based strategy focuses on treating high-risk firesheds (areas roughly 250,000 acres in size) that pose the greatest threat to communities, infrastructure, and natural resources. The science behind this strategy is that treating 20 percent or more of these high-risk firesheds can reduce 80% of the risk. The treatment of these high-risk firesheds will focus on completing mechanical treatments where needed to allow for the reintroduction of fire.

Summary

Prescribed fire is a highly valuable tool, particularly for cost efficiency at scale, that reduces hazardous fuels and the risk of wildfires, and restores forest health and resiliency in fire-adapted and dependent ecosystems. Several key barriers to prescribed fire implementation exist across jurisdictions and are common and consistent among all who work in fire and fuels management. While these barriers are significant and will take time to address, opportunities to move the Forest Service, the Department of the Interior and other state and local prescribed fire programs forward exist. Continued evaluation of the agency's prescribed fire program, such as the 2022 *National Prescribed Fire Program Review*, and seeking solutions to make the agency nimbler and more responsive will help achieve the goal of increasing the pace and scale of prescribed fire to reduce wildfire severity and damage and maintain and restore healthy, resilient forests.

¹³ <https://fire.airnow.gov/>

¹⁴ Joint Fire Science Program supported research found evidence that as acres treated by prescribed fire increases, the number of structures damaged tended to decrease (https://www.firescience.gov/projects/14-5-01-12/project/14-5-01-12_final_report.pdf)