

A Small Compilation of Research and Expert Opinion

Regarding the Question of Why Our Forests Need Management and Fire to Thrive

Assembled October 2022

“The use of prescribed burns to manage western forests may help the United States reduce its carbon footprint. Results of a new study find that such burns, often used by forest managers to reduce underbrush and protect bigger trees, release substantially less carbon dioxide emissions than wildfires of the same size. ‘It appears that prescribed burns can be an important piece of a climate change strategy,’ says Christine Wiedinmyer, a scientist at the National Center for Atmospheric Research (NCAR) in Boulder, Colo., and lead author of the new study. ‘If we reintroduce fires into our ecosystems, we may be able to protect larger trees and significantly reduce the amount of carbon released into the atmosphere by major wildfires.’ The research results are published this week in the journal Environmental Science & Technology. **The study was funded by the National Science Foundation (NSF),** NCAR’s sponsor. Drawing on satellite observations and computer models of emissions, scientists concluded that widespread prescribed burns can reduce fire emissions of carbon dioxide in the West by an average of 18 to 25 percent, and by as much as 60 percent in certain forest systems. Wildfires often consume large trees that store significant amounts of carbon, according to Steve Nelson, NSF program director for NCAR. **Prescribed fires are designed to burn underbrush and small trees, which store less carbon. By clearing out the underbrush, these controlled burns reduce the chances of subsequent high-severity wildfires, thereby protecting large trees and keeping more carbon locked up in the forest.”**

National Science Foundation. (2010, March 17). Prescribed Burns May Help Reduce U.S. Carbon Footprint. NSF. Retrieved October 11, 2022, from https://www.nsf.gov/news/news_summ.jsp?cntn_id=116626#:~:text=Prescribed%20fires%20are%20designed%20to%20locked%20up%20in%20the%20forest.

“Because fire has always been a part of the environment, it plays a vital role in maintaining many ecosystems that are adapted to fire. Many of our prairies and forests actually need fire to remain healthy and thrive. Prescribed fire is often used to mimic the low-intensity fire that would have naturally occurred on the landscape. It’s an important forest management tool that benefits forests and wildlife, while also helping to reduce the impact of wildfire hazards.

Prescribed fire improves wildlife habitat for both game and non-game species, especially when patches of unburned areas are left for nesting and cover. In fire-adapted forests, it reduces competition from species that can’t tolerate fire. It encourages the new growth of native vegetation, **increases the biodiversity of plant species,** minimizes the spread of pest insects and disease, and **recycles nutrients back into the soil.**

When conducted on a regular basis, prescribed fires help to reduce the risk of catastrophic wildfires on our land and surrounding communities by reducing the amount of leaf litter, pine needles, shrubs and other fuels in the forest. Recent studies have shown that the repeated use of fire also reduces the tick population. There are many additional benefits of prescribed burning in ecosystems that need periodic fire to remain healthy.”

Moore, A. (2021, November 22). Ask an expert: Why is prescribed fire important? College of Natural Resources News. Retrieved October 11, 2022, from <https://cnr.ncsu.edu/news/2021/11/ask-an-expert-why-is-prescribed-fire-important/>

“Our nation’s forests need prescribed fire now more than ever. Prescribed fires are a primary tool to abate wildfire risks, to expand strategic and tactical locations for more effective suppression actions, and to maintain fuels in a state that is easier and safer to manage. Prescribed fires are critical to restoring ecosystem resilience of native plant and animal communities and to other stressors, and to improving the vigor of forests warmed and dried by climate change. Maintaining managers’ abilities to implement prescribed fire is vital to our shared future.”

“Prescribed fire is one of the most widely advocated management practices for reducing wildfire hazard and has a long and rich tradition rooted in indigenous and local ecological knowledge. **The scientific literature has repeatedly reported that prescribed fire is often the most effective means of achieving such goals by reducing fuels and wildfire hazard and restoring ecological function to fire-adapted ecosystems in the United States (US) following a century of fire exclusion. This has translated into calls from scientists and policy experts for more prescribed fire, particularly in the Western US, where fire activity has escalated in recent decades.** The annual extent of prescribed burning in the Western US remained stable or decreased from 1998 to 2018, while 70% of all prescribed fire was completed primarily by non-federal entities in the Southeastern US. The Bureau of Indian Affairs (BIA) was the only federal agency to substantially increase prescribed fire use, potentially associated with increased tribal self-governance. This suggests that the best available science is not being adopted into management practices, thereby further compounding the fire deficit in the Western US and the potential for more wildfire disasters.”

Kolden, C. A. (2019). We're Not Doing Enough Prescribed Fire in the Western United States to Mitigate Wildfire Risk. *Fire*, 2(2), 30. <https://doi.org/10.3390/fire2020030>

“Carbon sequestration by forested ecosystems offers a potential climate change mitigation benefit. However, wildfire has the potential to reverse this benefit. In the western United States, climate change and land management practices have led to increases in wildfire intensity and size. **One potential means of reducing carbon emissions from wildfire is the use of prescribed burning, which consumes less biomass and therefore releases less carbon to the atmosphere.** This study uses a regional fire emissions model to estimate the potential reduction in fire emissions when prescribed burning is applied in dry, temperate forested systems of the western U.S.”

Wiedinmyer, C., & Hurteau, M. D. (2010). Prescribed fire as a means of reducing forest carbon emissions in the Western United States. *Environmental Science & Technology*, 44(6), 1926–1932. <https://doi.org/10.1021/es902455e>

“Fire is one of the most important disturbance processes in the western United States [...]. Many modern terrestrial ecosystems reflect this long evolutionary history, requiring fire to maintain species composition and structure.”

Carter, V. A., Brunelle, A., Power, M. J., DeRose, R. J., Bekker, M. F., Hart, I., Brewer, S., Spangler, J., Robinson, E., Abbott, M., Maezumi, S. Y., & Coddling, B. F. (2021, April 14). *Legacies of indigenous land use shaped past wildfire regimes in the basin-plateau region, USA*. *Nature News*. Retrieved October 11, 2022, from <https://www.nature.com/articles/s43247-021-00137-3>

“Taking fire out of the system takes resilience out of the system. In Western forests, frequent surface fires helped trees resist drought, insect outbreaks, and extreme fire and weather conditions by removing excess vegetation. Conversely, fire exclusion in the 20th century allowed many forests to become overstocked and resulted in abrupt shifts in species composition. For example, relatively sparse ponderosa pine – one of the most fire-resistant conifers in the West – and Douglas-fir forests transformed into dense forests predominated by white fir and Douglas-fir with few ponderosa pine. Today, this altered landscape exceeds the site’s ability to sustain a healthy forest and is far more susceptible to high-intensity fires and insect outbreaks. Current climate projections for a warmer, drier future in this region only add to the danger... **The scientists found that patterns of fire frequency, size, and severity were stable for at least several hundred years prior to 1880.** After that date, livestock grazing and a policy of fire suppression led to a reduction in fire spread, but not ignition. **An increase in the fuel continuity in formerly open, dry mixed-conifer forests was spurred by the invasions of shade-tolerant white fir and Engelmann spruce, leaving the landscape more prone to crown fires capable of spreading into the high-elevation forests.”**

Banegas, D. (2021, July 29). *Tree Rings Tell The History of Fire and Forest Health*. USDA. Retrieved October 11, 2022, from <https://www.usda.gov/media/blog/2019/04/12/tree-rings-tell-history-fire-and-forest-health>