THE WILDERNESS SOCIETY

CLIMATE CHANGE FACTS

Fire and Forest Management

The Earth's climate is changing. In the past, the climate warmed and cooled due to natural processes. Now humans are changing the climate by burning fossil fuels and permanently deforesting landscapes. Many of our wildlands are being stressed beyond their natural ability to adapt to these dramatic changes, and the full extent of how to deal with these changes remains unclear.

What is clear, however, is that healthy, strong, and naturally functioning forests are the most likely to survive the effects of a changing climate.

Fire and Climate Change

Fire is a natural part of most forests in the United States. Where hot, dry conditions were common, vegetation adapted to frequent fire—with grasses, widely spaced trees, and light surface "fuels" (i.e., logs, shrubs, leaf litter) resulting in natural "low-severity" fires.

For the past 100 years we have fought wildland fire, which sometimes has resulted in a thick cover of trees in these once open, dry forests. Many fires in what are now dense forests burn uncharacteristically hot, killing trees and damaging soils. In addition, timber management has created large swaths of forests of the same age ("even-aged"), which are particularly susceptible to large, destructive fires due, in part, to these forests' lack of diversity. As the climate warms, the weather that drives fire behavior will become more common, and it is likely that fire activity will increase. Researchers have found that the fire season in the Western U.S. has lengthened by 78 days in the past 30 years—effectively adding another "summer" to the fire season.

Forests are at their healthiest when key functions and processes—including fire—are most intact, and it is these forests that will be best able to adapt to and withstand the effects of a changing climate. It is critical that agency managers focus on ecological restoration and stewardship to ensure forests are at their most healthy and resilient. Forest managers have a number of tools at their disposal to accomplish this goal, including removing hazardous fuels and controlled burning, as well as utilizing natural fire.

LOW SEVERITY FIRE
A low-severity fire removes surface fuels in a mixed conifer forest. The fire mainly consumes small trees and grasses, leaving large, fire-resistant trees intact. *Photo: R. Fairbanks 2007*

UNNATURALLY HIGH SEVERITY FIRE
Parts of this fire (the Hayman Fire, Colorado, 2002) burned in uncharacteristically large patches of high severity. While fires of similar size are thought to have occurred historically, there is no evidence that any fire in prehistoric times produced such extensive destruction in ponderosa pine forests. *Photo: Divide Colorado Fire Department*

Forest Management and Climate Change

While reducing forest fuels is a key part of restoring forests to a state where they can best adapt to and withstand a changing climate, a one-size-fits-all solution is not the answer.

What Works:

The Right Kind of Thinning, in the Right Places: Forest managers use thinning, or the removal of smaller trees, to "restore" open forests that will burn without harming the remaining trees. Thinning does not eliminate fire from the forest, but it can help change fire behavior from a damaging "crown" fire to a "surface" fire in dry forests historically accustomed to low-severity surface fires. A critical element of successful thinning is to follow it with a prescribed, or controlled, burn. This ensures that the branches and other fuels left by the thinning do not remain on the ground, where they can fuel a subsequent crown fire, even after thinning. Thinning to restore open, more fire-resistant conditions is not appropriate in forests that historically have experienced infrequent catastrophic fires.

Thinning is Not Appropriate for All Forests: The most important place to thin fuels is around homes and communities. This lowers the probability that buildings will ignite and helps create defensible space for firefighters. Forest managers should next focus thinning operations where they create or maintain naturally functioning forests—those low-elevation, dry forest types where vegetation is adapted to frequent, low-severity fire. Scientific evidence suggests that thinning in low-elevation, dry forests can help restore these forests so they can better withstand fire. Thinning in wetter, higher-elevation forests is not a priority in these forests that are accustomed to stand-replacing fires.

Using Fire, Not Eliminating It: When a lightning strike occurs in an area away from people and property, allowing the fire to burn can be a useful tool that not only saves resources, but also helps maintain and restore healthy forests. Forest managers also can use prescribed fire to help reduce fuels, reestablish natural fire regimes, and maintain natural forest functions.

What Does Not Work:

The Wrong Kind of Thinning, in the Wrong Places: Thinning, when done improperly (for example, where forest structure is naturally dense) or when it is not followed by removal of the downed material that remains, can exacerbate the fire problem. It can increase wind speed, surface temperature, and surface fuels. In typically cool or moist places, forests are not adapted to frequent fire. These forests only burn under extreme weather conditions and are adapted to regenerate after large "crown" fires. Thinning in these forests is far less likely to reduce fire behavior and may create problematic unnatural conditions.

Large-Scale Logging Operations: Logging that removes larger trees is not an effective way to address climate change or fire. In fact, it actually adds to the fire threat because of flammable fuels deposited on the ground during harvest and because of dense regrowth. Even-aged forests that grow back after clearcutting are at particular risk because the small trees that sprout provide a continuous "fuel bed." Logging also requires transportation that is run on fossil fuels, which releases carbon into the atmosphere and contributes to climate change.

"Permanent" Storage in Wood Products: Nearly half of the carbon in a harvested tree is left in the woods, much of which is burned as slash. Another quarter of the tree's carbon is lost as mill residue, which is also burned. In the end, only about 15 percent of the harvested tree's carbon, corrected for transportation emissions, winds up stored in durable woody products. Even then, softwood lumber has a half-life (the time it takes for half of the product to decay) of 34 years, hardwood lumber about 13 years, and paper about 5 years. This is clearly not permanent carbon storage.

Conclusions

Healthy and naturally functioning forests are the most likely to survive the effects of a changing climate. Aggressive timber harvesting, suppressing all fires, and/or locking away carbon in wood products will not help forests adapt to climate change. In fact, these activities can make the situation far worse by further altering important natural processes—leaving forests vulnerable to unnaturally severe fires that can actually release more greenhouse gases into the air and further reduce the forest's ability to sequester carbon. Restoring or maintaining naturally functioning forests—including natural fire—is the most effective way to help forests prepare for, and adapt to, a changing climate.

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