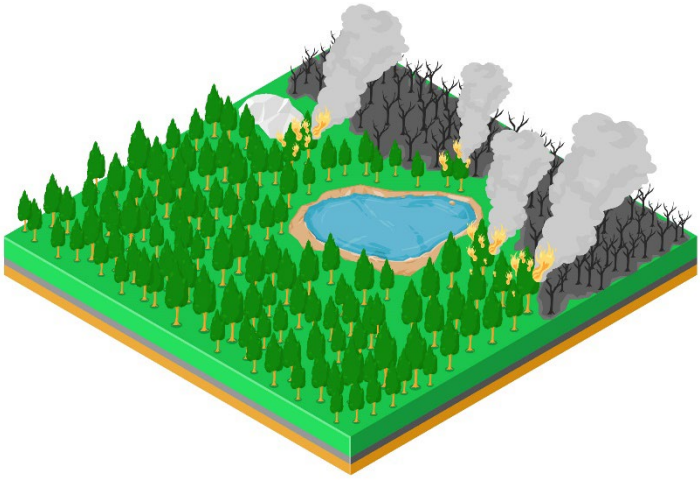
HOW WE DO IT: Managing Forest Fires

Fire is a natural disturbance in many forest ecosystems. Depending on the region and type of forest, wildfires have often played an important ecological role in opening up space on the forest floor, returning nutrients to the soil and sparking new cycles of growth and biodiversity. However, changing climate conditions — coupled with long-term patterns of fire suppression and human development into fire-prone areas — are leading to an increasing number of wildfires. Some of these fires can become uncharacteristically large and severe and have the potential to cause catastrophic damage to forests, watersheds, wildlife and communities. That's why it is essential that we address fire risk as much as possible through careful management of our forests, proactive outreach and engagement with communities, and close partnerships with state and federal agencies and other forest landowners.



KEY POINTS

- **Fire has always been a natural part of the landscape, though fire frequency and severity vary widely by region and forest type.**
  Drier forests on the eastern slopes of the Cascades in Oregon and Washington, for instance, are often dominated by ponderosa pine and have evolved with more frequent fires of low to moderate intensity. The probability of fire in these forests is greater, even as their severity has generally been lower.[1] In historically wetter forests, such as those on the Cascades' highly productive western slopes, fire is still a natural part of the ecosystem even though those environments have typically seen fires only at intervals of more than 200 years. These forests tend to grow more quickly and densely, so the fires that do reach them are able to feed off naturally heavy fuels, as well as trees that have not evolved to resist fire quite as well. So while the overall probability of fires in westside forests has been lower, the potential severity of fires that do occur can be higher.

- **Well-managed forests are less susceptible to fire.**
  We cannot prevent all fires, but the proactive steps we take to manage fire risk in our forests — from clearing excess fuels on the forest floor to building fire breaks and periodically thinning smaller trees — support overall forest health and can play an important role in reducing the frequency and intensity of fires that do occur.

- **Active forest management is not just about prevention and mitigation — it can also be a powerful force to accelerate forest and landscape recovery after a fire and other natural disasters.**
  We have the resources and expertise to replant where appropriate as quickly as possible following a major disruption, and we have proven — including after the Mount St. Helens eruption in 1980 and the 2020 fires in Oregon[2] — that we can jump-start regeneration and more swiftly rehabilitate forests and restore the benefits they provide, from wildlife habitat to clean air and water for surrounding communities. Quick and careful regeneration also helps reduce the likelihood of landslides after a burn as new growth begins to restabilize slopes.

[1] Though fire severity has historically been lower in these eastside forests, the impacts of fire on surrounding communities can nonetheless be devastating, especially when certain compounding variables are involved (extreme drought, excess buildup of fuels, topography, wind speed and direction, etc.).
[2] As part of our recovery efforts following the Oregon fires, we prioritized replanting tree buffers along sensitive streams and connecting tributaries. Many of these streams feed municipal water systems and help provide clean drinking water for up to 100,000 residents in surrounding communities; others provide critical habitat for wildlife, including salmon. Targeted replanting in these areas can help reduce sediment delivery to waterways and also minimize potential detrimental effects to stream temperature and aquatic ecosystems.

KEY POINTS – *continued*

- **The threat of uncharacteristically large and severe fire events is greater than ever.**
  While large, severe fires are not new — the Silverton Fire in 1865, for instance, was a single fire that burned a million acres in Oregon — changing climate conditions and more people living in the wildland-urban interface will almost certainly contribute to increasingly dangerous fires. These extreme fires often burn at high intensity, spread quickly,[3] reach and engulf the crowns of trees, and can ultimately cause as much as 100 percent mortality in a forest.

- **Many of our employees are actively trained to support fire suppression.**
  Our Timberlands teams undergo thorough fire prevention training and readiness drills every spring. And whenever a fire does approach our forests, our employees and contractors work alongside federal, state and local firefighting crews to establish fire breaks and perimeters, reduce vegetation and fight the fires. We also combat active fires with aerial surveys, quick-response teams, tanker trucks and helicopters.

- **We help provide resources and support the mental health of wildland firefighters**.
  In 2022 we launched a partnership with Firefighters Behavioral Health Alliance, Fighting First Together, to create an online resource hub that includes content especially designed for wildland firefighters and their families, including mental health tips, educational articles and contacts for support groups and counselors located in the Pacific Northwest (including B.C.). Addressing mental health challenges without stigma is critical to keeping firefighters safe, during and after fire season, as they risk their lives to protect our forests and communities.

- **Our goal with all of the timberlands we manage is to create healthy, resilient forest ecosystems.**
  We manage our forests to ensure they are filled with healthy trees that resist pests and disease and are less likely to die and become dry fuel for fires. We continually conduct research to better understand fire ecology and respond to wildfires, including under changing climate conditions. And we partner with government agencies and academic institutions to continue learning more and better ways to integrate science into our practices.

SUPPORTING RESEARCH

- A 2020 study in *Environmental Research Letters*[4] explores the new reality of fires in an increasingly arid American West and how we need to be more responsive and adaptable in learning to live with fire. Fire is a shared challenge across landscapes, and the research highlights the need for collaborative, integrated approaches to assessing risk and preparing for and responding to fires.

- In a 2016 paper in the *Proceedings of the National Academy of Sciences of the United States of America,*[5] researchers found that increased forest fire activity across the western U.S. in recent decades has likely been enabled by a number of factors, including the legacy of fire suppression and human settlement, natural climate variability, and human-caused climate change. The authors estimated that climate change, in particular, has likely contributed to an additional 10 million-plus acres of forest fire between 1984 and 2015 — nearly doubling the amount of fire that would have been expected under normal conditions.

- A separate 2017 study in *Proceedings of the National Academy of Sciences of the United States of America*[6] found that human-started wildfires account for 84 percent of all wildfires, and roughly half of all burned acreage. Humans often play a key — and in many cases preventable — role in starting fires, and this research highlights the need for successful mitigation efforts to include engagement and outreach to improve overall awareness and understanding of forest fires.

- In a 2020 paper in *Hydrological Processes*[7] on the Valley Fire in the northern California Coast Range, researchers found that salvage logging following a fire was associated with a short-term *decrease* in hillslope sediment yield — such as through infiltration, runoff, erosion and sediment delivery to streams — compared to areas that had burned but were not actively managed. By three years after the fire, differences in rates of soil movement were not detectable.

[3] Of the 240,000 acres burned in Oregon's Tillamook fire in 1933, most — about 75 percent — of the burn occurred in a 24- to 36-hour period during an east wind event, even though the fire had started 10 days before.
[4] "Wildfire risk science facilitates adaptation of fire-prone social-ecological systems to the new fire reality," *Environmental Research Letters* (2020)
[5] "Impact of anthropogenic climate change on wildfire across western US forests," *PNAS* (2016)
[6] "Human-started wildfires expand the fire niche across the United States," *PNAS* (2017)
[7] "Hillslope sediment production after wildfire and post-fire forest management in northern California," *Hydrological Processes* (2020)

FREQUENTLY ASKED QUESTIONS

Is fire a new threat to our forests?

Fire has always been a natural part of the landscape. It's not a new challenge, nor is it new to forest management. In fact, Indigenous peoples of North America have long used fire intentionally, through what is now called prescribed burning, to manage forests sustainably. Developed through generations of experience and observations of forest fires, prescribed burns can mimic naturally occurring fires that burn at a lower intensity and generally promote improved forest health. At Weyerhaeuser, we sometimes use prescribed burns in our timberlands in the U.S. Southeast to help clear out woody vegetation under trees, prepare new seedbeds and reduce woody debris on the forest floor. In these areas, prescribed burns can have positive impacts on biodiversity by creating open-canopy pine habitat that's ideal for certain species, such as the red-cockaded woodpecker, gopher tortoise and Louisiana pinesnake.

Is it possible to prevent all wildfires?

No, we can't prevent all fires — nor should we, given the important benefits they bring to certain forest ecosystems (some trees, such as lodgepole pine, have even evolved with fire and depend on it for regeneration, with thick protective bark and serotinous pine cones that release seeds only after a fire has passed). We've also learned that completely suppressing wildfires causes other, more destructive damage, so we must learn to live with fire.

But why are we seeing more — and especially larger and more severe — wildfires?

There's no single factor responsible for fire size and severity. Several related and compounding variables are at play, and some of the key drivers include extreme dry conditions, excess buildup of fuels in forests and on the forest floor (downed trees, branches, leaves, etc.), topography and a range of meteorological factors, including wind speed and direction, humidity, temperature and precipitation. Another contributing factor is that communities have gradually spread farther into historically forested and fire-prone areas, which increases the risk to people, homes and infrastructure — and also removes some of the natural buffers in an ecosystem that might otherwise slow a fire's progress, such as open space in and around forested areas (as a result, fire crews often spend more time defending structures than forests during a fire). There's also no question that climate change has accelerated and expanded some of these risks, including extending fire seasons through longer and hotter summers, intensifying droughts, and creating conditions for insect and disease infestations that can weaken individual trees and forest ecosystems.

Does that mean all forests are more vulnerable to fire?

Two of the most important considerations when gauging fire risk are region and forest type. Forests on the eastern slopes of the Cascades in Oregon and Washington, for instance, have evolved more closely with fires of low to moderate severity. These drier forests, often dominated by ponderosa pine, tend to have wider spacing, fewer trees and less forest fuels, and they are more resistant to fire overall — especially when properly managed. The probability of fire in these forests is greater, even as their severity has generally — if not always — been lower. Yet if you look at historically wetter forests, such as on the Cascades' highly productive western slopes, fire is still a natural part of the ecosystem even though these environments have typically seen far less frequent fires, generally at intervals of more than 200 years. These forests tend to grow more quickly and densely, and when fires do reach these fast-growing forests, they are able to feed off naturally heavy fuels — as well as trees that have not evolved to resist fire quite as well. In this case, the overall probability of fires is lower, though the potential severity of fires that do occur can be higher.

So how does active forest management help mitigate this fire risk?

All fires need three ingredients: fuel, oxygen and ignition. The easiest variable for us to control is managing the fuel load in our forests. To achieve optimal forest health and productivity, our foresters follow a number of best practices in our timberlands, including selective harvesting and thinning treatments to reduce crowding, and brush and debris removal to limit available fuels, such as branches and dense undergrowth. We also place fuel breaks, which create more spacing between trees to slow the spread of fires. Coupled with well-maintained roads, these breaks have an added benefit of providing firefighters with better opportunities to contain wildfires and protect communities, plus safer evacuation routes for displaced individuals and communities.

Ignition is another variable that can be mitigated through proactive management — particularly with regard to human-caused ignitions. Working closely with neighboring landowners and local authorities to minimize human-caused ignitions is an important step in reducing fire frequency in the regions where we operate.

FREQUENTLY ASKED QUESTIONS – *continued*

Is the risk of fire greater in unmanaged forests?

From a fuel perspective, yes. Throughout the 1900s, many land managers, including the U.S. government, enforced strict fire-suppression policies, generally trying to prevent or put out every fire immediately. One legacy of these practices is that many national forests, particularly on the eastern slopes of the Cascades, have become unnaturally dense and packed with fuel. Though fire-suppression efforts have often delayed fire, they haven't eliminated the risk. As a consequence, we're seeing uncharacteristic fires that burn hotter from feeding off the excess fuels, and that present considerable danger to forest ecosystems and surrounding communities, particularly when exacerbated by weather conditions.

Does that mean all forests should be actively managed?

Public forests are not — and *should* not be — always managed for the same values as private working forests, and not all private forests are managed for the same objectives. But *all* forest owners have a responsibility to manage for forest health, resilience and fire across the landscape, as fires easily move across boundaries and impact adjacent forests and communities. That's why we partner with other private landowners and local, state and federal agencies to ensure consistent approaches and best management practices for managing fire risk, as well as appropriate funding for firefighting.

But don't managed forests burn more intensely than unmanaged forests?

It's complicated, but generally no. Particularly following Oregon's historic 2020 fire season, there was a fair amount of speculation that plantation forests — which feature trees of a single species, all of similar age[8] — suffered hotter and more severe damage. With few exceptions, that was simply not the case, and there's little science to support the idea that working forests are more susceptible to hotter fires. Also, while it's true that working forests don't typically have as many old trees as unmanaged forests, severe fires can burn due to extreme local weather and topography, and not even all old-growth trees can necessarily survive such extreme conditions.[9] We have many old trees, for instance, in our permanent forest buffers, and they were damaged equally in Oregon. But it's important to remember that active management isn't strictly about whether our practices can lower the severity and frequency of fires. It's also about our ability to help these forests bounce back through immediate, careful and sustained replanting efforts to accelerate the recovery of the ecosystem.

Could any forest have survived the most intense fires in Oregon?

Probably not. There were several overlapping conditions that fueled those devastating fires, including drought conditions in normally wet forests, as well as strong easterly winds that dramatically fanned the fires across vast landscapes. Yet while conditions might fluctuate from year to year, even favorably at times, there's not much debate that climate change is contributing to longer, hotter, drier summers in the Pacific Northwest, which will invariably increase fire risk throughout the region — including in areas that historically experienced fire only rarely. Warmer climates will also expand the range of catastrophic insect infestations, such as the widespread damage from pine beetles in Colorado and British Columbia. In the face of these emerging challenges, we take very seriously our responsibility to manage our forests well so that they continue to thrive for generations to come.

Are managed forests more vulnerable to insect infestations or disease?

It's true that having one dominant tree species across a large area of our timberlands, such as Douglas-fir in the Pacific Northwest, could potentially make a forest more vulnerable to insect attacks compared with a more heterogeneous forest. But we offset that risk through our intensive silviculture practices and focus on high-quality seedlings, carefully matched to the right site and growing conditions. Stressed trees can provide signals for insects to move in, but when you manage your forests well to ensure healthy, resilient, vigorous trees, you have less likelihood of infestations overall.

[8] The idea that working forests are "even aged" is itself a misnomer. We conduct management at the level of stands — which are much smaller parts of a forest — so no forest is ever entirely the same age, but rather a mosaic of stands at different ages and stages of growth.

[9] Evidence from the 2020 fires in Oregon and California suggests that under certain scenarios, no forest will survive, regardless of age or stand structure.