

Wildfire in the West

Climate Change Increases Fire Risk in Idaho

Starting a wildfire requires three ingredients: oxygen, a spark and fuel. Outdoors, oxygen is not hard to come by. Lightning or humans can provide the spark. But the fuel, that's really the key.

Trees, grasses and other flammable vegetation compose the fuel for a wildfire. The drier the fuel, the more likely fires will spread.

In Idaho, earlier drying and snow melt have extended the fire season. Since the 1980s, the fire season — or when the vegetation is dry enough to sustain a fire — has lengthened by roughly a month, said John Abatzoglou, an associate professor in the [College of Science's Department of Geography](#).

“That is increasing the window of opportunity for a stray cigarette butt or lightning strike to hit that landscape and start a fire,” Abatzoglou said. “Climate doesn't cause fire. It enables fire.”

Climate change can directly affect the dryness of these areas of vegetation, Abatzoglou said. In Idaho, rising temperatures are desiccating fuels earlier in the summer. In addition, warmer springs have led to earlier snow melt, which characteristically acts as a supplemental hydration source for plants during the growing season.

Idaho's Changing Fire Regime

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Idaho's forests and rangelands need a certain amount of wildfire. Fire rejuvenates the land by removing dead vegetation, clearing understory, thinning grass and releasing resources for a new generation of plants.

“Fire is essential for the health of our forests and rangelands,” said [Penelope Morgan](#), a professor in the [College of Natural Resources' \(CNR\) Department of Forest, Rangeland and Fire Sciences](#). “Fires open up space for the next generation of forests and often create habitat for animals and plants.”

But, as climate change becomes more pronounced, the fire regime is shifting across the American West, a landscape already burdened with a heavy fuel load. The United States began to suppress wildfires in the 1910s, allowing fuels to accumulate.

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— John Abatzoglou, geography associate professor

By the middle of the 21st century, researchers project the amount of area burned will increase by two to five times, Morgan said. According to the [National Interagency Fire Center \(NIFC\)](#), [Idaho wildfires in 2017 consumed a higher than average 686,262 acres](#), which is more than twice the size of Grand Teton National Park. In addition, extremely large fires, often referred to as megafires, have become more frequent over the past 30 years. In 2017 [more than 10 million acres burned across the U.S.](#), at least 50 percent more than the average of the previous 10 years.

“Over the past 50 years, fires have become much larger, and the amount of landscape being burned by fire is increasing rather dramatically,” Abatzoglou said. “Those changes are a West-wide phenomenon.”

The increase in fires hasn't gone unnoticed by those fighting them. According to NIFC, in 2000 [the U.S. Department of the Interior and the Forest Service](#) spent more than \$1 billion on fire suppression costs. Since 2000, there have been 13 years in which the federal agencies have spent more than \$1 billion per year, including almost \$3 billion in 2017.

Abatzoglou's research on the intersection of climate change and burned area suggests precipitation declines attributable to human-caused climate change are responsible for approximately half of the summer dryness of vegetation.

“Areas that are usually wet, like areas next to streams, are now more apt to burn,” said [Crystal Kolden](#), an associate professor in the CNR Department of Forest, Rangeland and Fire Sciences. “That is 100 percent a climate change issue. That is not a management issue.”



Swirling embers in the smoke column lofted by group tree torching on the Pioneer Fire, Idaho, 2016. Photo by Kari Greer/U.S. Forest Service.

Fire, an Agent of Forest Change

At first glance, a burned forest can appear barren, but usually grasses, flowers and young trees soon carpet the forest floor – the prequel to a healthy mature forest. But with climate change altering temperatures and precipitation, U of I researchers are finding wildfires are catalyzing changes in forested ecosystems.

In 2018, Morgan and her colleagues published a [study](#) concerning forest recovery after fires in Idaho, Montana and Colorado. They recorded tree regeneration at 1,485 sites across 52 fires that occurred between 1988 and 2011. In dry forest sites, less than half of areas burned since 2000 had enough tree seedlings to re-establish a forest, especially where sites were far from trees that survived fires.

“There are many sites where we do not have trees establishing,” Morgan said. “We have too few seedlings to replace the forests that were there before.”

They found, after 2000, there were never three wet years in a row – a trend not evident prior to the millennium switch. Multiple dry years after a fire impeded young trees from establishing. Planting trees after a fire can offset a loss of seed-source trees, although prescribed burns could protect the seed-source trees as well, Morgan said.

Abatzoglou expects Idaho will see an uphill recession of lower tree lines as it may be too hot and dry at lower elevations for young trees to start growing after a fire.

“Ten to 20 years from now forests will probably look like they do today, but we expect our forest area to shrink,” Abatzoglou said. “The lower tree line will be marching uphill.”



A Midewin Hotshot firefighter holds the line on the Pioneer Fire, Idaho, 2016. Photo by Kari Greer/U.S. Forest Service.

Disappearing Sagebrush on Rangelands

Of course, wildfires occur outside of forests. Idaho's rangelands – which include woodlands, shrublands and grasslands – also experience fire. In a “Goldilocks’ Paradox” some sagebrush ecosystems face too much fire, while others too little fire. Few areas experience fires that are just right for maintaining the sagebrush community, Morgan said.

In Wyoming big sagebrush steppe, open ground has previously separated islands of sagebrush. In the past, some of these islands escaped the blazes that periodically renewed the landscape. Species like sage grouse that live in sagebrush country rely on these unburned sagebrush islands for their survival. Now, invasive species including cheatgrass have combined with wildfire to reshape part of this sagebrush steppe. Cheatgrass grows everywhere, connecting the islands of sagebrush. The flammable cheatgrass, along with any sagebrush it touches, burns every few years and leaves no time for sagebrush to re-establish, Kolden said.

“Since the 1970s, we have seen what used to be a sea of Wyoming big sagebrush between Boise and Mountain Home become a sea of annual grass,” Morgan said.

By contrast, at higher elevations, juniper and other trees once kept at bay by fires now shade out mountain big sagebrush. In this case, a decline in fires in these ecosystems have fostered less habitat for sage grouse and other birds dependent on a mosaic of grass, shrubs and trees



A crown fire moves through a mixed conifer forest during the 2016 Pioneer Fire in southern Idaho. Photo by Kari Greer/U.S. Forest Service.

Humans and Fire: A Two-way Relationship

People who live in the Inland Northwest know they co-exist with fire. And whether that means removing fuels from around their homes or influencing the climate, people play a part in Idaho's changing fire regime, said [Travis Paveglio](#), an assistant professor in CNR's [Department of Natural Resources and Society](#).

Paveglio has spent his career discussing fire with Idahoans and citizens across the West. He works with land managers to inform or develop fire adaptation plans that reflect local people and conditions.

"Adapting to fire means working with local culture, understanding who people are and who they want to be," Paveglio said. "We need to figure out how we can take our existing science and co-develop ways we adapt with fire."

He said one key to creating localized fire plans is identifying everyone's land use goals, such as timber, grazing or recreation. He and his colleagues consider these goals and other matters — such as budgets, trust in government, community networks and development patterns — to inform fire regulations, suggest land use codes and determine the roles of fire districts.

“In the past our approach to fire planning has always been a one-size-fits-all,” Paveglio said. “Now, we create distinct fire adaptation pathways for different places. They are a combination of policies and programs that are meant to resonate with local people and circumstances. I call it a choose-your-own-adventure story.”

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Article by [Leigh Cooper](#), University Communications and Marketing.



A column of wildfire smoke is produced by extreme fire behavior in Clear Creek during the 2016 Pioneer Fire in southern Idaho. Photo by Kari Greer/U.S. Forest Service.

