

Alaska firefighters experiment with targeting blazes to save carbon

The Bureau of Land Management pilot program represents a shift designed to help curb climate change

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September 8, 2023 at 6:00 a.m. EDT



The burned boreal forest on the Yukon Flats National Wildlife Refuge is pictured in 2010 after a wildfire in 2009 that caused permafrost to thaw. (Torre Jorgenson)

Firefighters are embarking on an ambitious experiment to stamp out blazes deep in the Alaskan wilderness as a way to avert carbon emissions in what experts say is a seismic shift in thinking in modern wildfire management that has traditionally focused only on fires that threaten human life, property or commercial interests.

In what several scientists said is a first for the United States or Canada, the Alaska Fire Service in the Interior Department's Bureau of Land Management has agreed to sometimes tackle flames in selected areas of the remote Yukon Flats National Wildlife Refuge that do not threaten people but could trigger the thawing of the region's ancient, carbon-rich permafrost and exacerbate climate change.

The experiment is so far only theoretical — after an unusually quiet Alaska fire season, Yukon Flats Refuge Manager Jimmy Fox said the agency’s fire service has not yet fought a fire with a goal only of protecting carbon. The approach also has its skeptics, who believe limited firefighting resources should be devoted exclusively to wildfires that could encroach on human development, such as the devastating fire that killed at least 115 people on Maui, Hawaii, last month.

The federal agency has so far not budgeted any additional funds for the limited pilot, one of its organizers said. One study found that it would cost almost \$700 million a year over the next decade to keep carbon emissions from Alaska wildfires at historical levels.

But many scientists said wildfires, which are increasing in frequency and burning more land in Alaska due to climate change, release vast emissions that further heat the planet. That cycle could be broken in part by fighting fires to protect carbon, scientists hope.

“Even if we really put the brakes on climate change, there’s so much momentum in the system that over the next few decades we’re going to keep seeing intensification [in fires],” said Brendan Rogers, a scientist at the Massachusetts-based Woodwell Climate Research Center who focuses on the boreal forest, a vast subarctic ecosystem that spans much of the Yukon Flats and wider Alaska, as well as Canada, Scandinavia and Russia. Rogers was involved in research that underpins the Alaska experiment.



The Kichatna fire burns west of Talkeetna, Alaska, on June 6, 2022. (Alaska Division of Forestry /AP)

“Integrating the carbon impact of fires into fire management needs to be the next big thing we do,” Rogers said.

In a statement, an Interior spokeswoman said that the experiment is the “culmination of several years of collaboration with fire managers, scientists and the local indigenous partners who support the project due to the direct impacts they are experiencing from fire and climate change.”

She added, “Analysis of that effort may inform future suppression efforts.”

Canada’s record-breaking fire season this year emitted at least three times the annual emissions of all sectors of the country’s economy combined, according to preliminary estimates by its government’s natural resources department.

All wildfires emit carbon dioxide, but fires can trigger an especially dangerous feedback loop in the boreal forest by burning through its carbon-rich soils and triggering the thawing and decomposition of its underlying permafrost — soil, gravel and sand that has been frozen for thousands of years. The high ice content of the Alaska permafrost, which harbors the bones of mastodons and saber-toothed lions, makes it vulnerable to abrupt thaw that can quickly disfigure the surrounding landscape and trigger carbon releases elsewhere. Fires are accelerating this process.

Permafrost thaw is now inevitable, said Torre Jorgenson, an affiliate professor at the University of Alaska Fairbanks. But, he said, “if you can preserve this stuff for another 100 years, that buys you some more time to address the climate crisis.”



A cliff, 33 meters tall, formed by thawing permafrost along the Itkilik River in northern Alaska, shows the large volume of ice wedges that form tall columns in the exposed soil. (Torre Jorgenson)

The boreal forest stores more carbon than is found in the atmosphere and twice as much as all human-caused emissions since 1870, according to the Woodwell Center.

In Alaska, the Yukon Flats National Wildlife Refuge, managed by Interior's Fish and Wildlife Service, is a wild, roadless landscape sweeping across more than 8 million acres of Alaska's northeastern interior. From its spine, the Yukon River, spreads a flat, lake-speckled valley between two mountain ranges.

Alaska is warming twice as fast as the global average. The Yukon Flats refuge has warmed nearly 5 degrees Fahrenheit since 1950, and winter warming on the refuge is at almost 9 degrees, according to Fox, and the temperature rise is causing an increase in lightning, which triggers wildfires.

The new firefighting experiment was Fox's brainchild. He proposed the pilot in consultation with scientists and fire managers after watching 750,000 acres of the refuge burn in his first summer after he began as the Yukon Flats refuge manager in 2019. He estimates those fires emitted 13 million tons of carbon dioxide and 31,000 tons of methane — the equivalent, according to the Environmental Protection Agency's online calculator, of the annual output of almost four coal-fired power plants.

"I thought, 'Wow, this is disturbing,'" he said. He dug into the literature and was "shocked" to learn that the permafrost under one-third of the refuge is some of the oldest, deepest and most carbon-rich in the world.

A paper that Fox read found it cost on average \$12.63 to avoid one ton of carbon dioxide emissions by reducing fire size in Alaska. The study, led by Woodwell and the Union of Concerned Scientists, said that cost "compares favorably" to other carbon dioxide mitigation measures.

Fox and the BLM worked with scientists to select eight pockets of as yet unspoiled permafrost, spanning 1.8 million acres of the Yukon refuge, where fires would be upgraded from a status in which they are generally only monitored to one where they are sometimes fought, mainly in the first, drier part of the summer season.

Under the experiment, Fox said the BLM will dispatch firefighters only if they believe the blaze can be fully contained in 72 hours and if fires in critical areas do not require their attention. It will withdraw firefighters after three days, whatever the outcome, to avoid tying up resources, he said.

Proponents of the experiment point out that combating the worsening fires could help protect key tree and animal species and improve human health, in addition to serving as a way to curb climate change. Smoke from Canada's fires this summer shrouded D.C., New York and many other American cities in a gray haze, triggering air quality alerts and advice to wear masks.

Even so, not everyone in the scientific and firefighting communities supports the new approach.

Some scientists warn the pilot program is a tiny effort that would be challenging to expand to levels that could have significant impact. Even if extinguishing fires works on the Yukon Flats, it would be physically difficult to scale up to other parts of the North American and Russian boreal because of the sheer distances and remoteness, said Steve Taylor, a fire research scientist at the Canadian Forest Service.



BLM Alaska Fire Service Firefighter Colton Witt walks a section of the more than three miles of fuel break that the North Star Crew cut around the village of Venetie on Aug. 10, 2021. (Beth Ipsen/BLM Alaska Fire Service)

Mike Flannigan, a wildfire scientist at Thompson Rivers University in British Columbia, predicted that the only fire seasons when the BLM would have the bandwidth to fight the wildland fires would be in relatively moist years when they are not too busy fighting fires that threaten people. As a result, he said he feared the blazes in subsequent drier years would be left to burn more deeply on the wild lands, charged by fuel leftover from prior suppression and thereby emitting more carbon.

“I don’t see it succeeding,” he said.

Fox acknowledges the risk associated with leftover fuel from past fires. “You have to be successful every year until we figure it out,” he said, adding that the ultimate goal was only to bring fire back down to historical levels, not to extinguish all fires. He believes the two fires that occur on average each year on the experimentation areas will be manageable, and he says his team and the BLM will decide fire-by-fire whether suppression is desirable.

Then there is the cost, as worsening fires put people and infrastructure more and more at risk.

Flannigan, the wildfire researcher, said fire agencies “don’t have the bandwidth or resources to deal with carbon,” adding that “they barely have enough to deal with the loss of life and communities” as demonstrated in Canada and Hawaii this year.

Dominic Lozano, president of the Alaska Professional Fire Fighters Association and a battalion chief at the municipal fire department in Fairbanks, said wildfires that threaten urban areas have become “an international crisis.” Ordinarily, BLM wildland firefighters back up his crews in town when needed, which he worries would be more difficult if they were also concerned with fighting fires on the refuge. He said even with a quiet fire season in Alaska this year, the Fairbanks wildland crew had been working nonstop with deployments to Canada and Oregon.

But scientists said the gravity of the climate situation requires experimenting with new approaches. If successful, fire suppression must just be one of “multiple tools in our toolbox,” said Merritt Turetsky, a scientist researching wildfire regimes at the University of Colorado at Boulder.

The scientists stress that, ultimately, reducing the carbon impacts of worsening fires must be part of a broader fight against climate change.

“The first line of defense has to be governments taking serious actions to reduce greenhouse gas emissions and reliance on fossil fuels,” said Jennifer Baltzer, an ecologist specializing in climate warming impacts in boreal forests at Wilfrid Laurier University in Ontario. “Right now governments aren’t doing that, they aren’t taking it seriously — even when we have a fire season like we just had in Canada.”