

Experts see climate change fingerprint in worsening heat waves and fires

A new study found nearly 40 percent of burned area in the West can be attributed to carbon emissions

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An all-too-familiar scene is [playing out](#) in western Canada this week: forests in flames amid extreme heat while [hazardous smoke](#) engulfs cities downwind of the fires. Over the last several years, similar scenes have unfolded across the globe, including in Australia, California, the Pacific Northwest, Europe and China. As both heat waves and wildfires worsen, recent research is tying these extremes ever more strongly to climate change, painting a troubling picture if the world continues on its emissions path.

About 1.3 million hectares (3.2 million acres) have burned so far this year in Canada, which is far above the 20-year average of 55,050 hectares for this point in the season, according to [data from](#) the Canadian Interagency Forest Fire Center. Firefighting agencies are at preparedness level 5 nationally, the highest level, and extra resources from the United States have joined the fight.

“This is a concerning situation given there is so much fire on the landscape already,” said Michael Flannigan, a professor of wildland fire at Thompson Rivers University in British Columbia. “You need a lot of rain, at least 2 inches, to really get a handle on the situation or a lot of fire management effort.”

In addition to extreme heat, the fires this week have been fueled by wind from passing cold fronts, underlying drought and a spring landscape that is not yet green. The weather may soon shift, Flannigan said, but another dry cold front would only provide more wind to fan the flames. There are 92 active fires in Alberta and at least 200 in Canada overall.

Flannigan said higher temperatures dry out vegetation but also increase the likelihood of lightning, which can ignite fires. “In Canada, fire area burned has doubled since the early 1970s,” he said. “My colleagues and I attribute this largely to human-caused climate change.” Larger wildfires typically happen in bursts, with 3 percent of fires accounting for 97 percent of the area burned annually.

“It is really the extremes that drive the fire world in Canada and I would argue in the western United States as well,” he said. “Much of this happens on a relatively small number of days during episodes of extreme fire weather like we are seeing right now.”

Linking worsening fires to fossil fuels

As heat-driven fires continue to become real-world disasters, there is more evidence pointing to the fuel behind them. A [study published](#) Tuesday in the journal *Environmental Research Letters* measured the link between forest fires and the fossil fuel emissions, finding that nearly 40 percent of the total forest area burned in the western United States and southwestern Canada between 1986 and 2021 can be attributed to emissions from the largest 88 fossil fuel producers and cement manufacturers. That represents about 20 million acres, an area bigger than Ireland.

While the research focuses on a region farther south than where the intense Alberta wildfires are burning, many of the same issues are at play, with larger wildfires burning more severely during longer seasons. “Even though the dynamics of the boreal forest are somewhat different than the study area that we looked at, we are seeing a lot of the same trends in both ecosystems,” said lead study author Kristina Dahl, a climate scientist with the Union of Concerned Scientists. “We will see repeated incidents like this where you have a massive wildfire outbreak because it is just easier when the vegetation is really dried out to have any sort of spark that leads to a large wildfire.”

The key link in the chain is a metric called the vapor pressure deficit, a measure of the ability of air to dry out the land and ecosystems as temperatures rise. Western forests, which have abundant fuel, are particularly sensitive to warming and drying. They also store carbon that is released back into the atmosphere during major wildfires, perpetuating the warming cycle, Dahl said.

The long-term upward trend in temperature and vapor pressure deficit is also making droughts more severe, including the Western megadrought of the past 23 years, as hot and dry conditions pull more moisture from the landscape. The study found that nearly half of the rise in vapor pressure deficit since 1901 can be traced to emissions from major fossil fuel producers.

Unprecedented temperatures

The steady rise in global temperatures is also translating into heat events that were once unimaginable, which in turn feed into wildfire disasters. In summer 2021, a fast-moving fire destroyed the village of Lytton, about 60 miles northeast of Vancouver, one day after it hit the highest record temperature in Canada of 121 degrees Fahrenheit.

Experts said the early season heat strongly resembles the setup of the devastating heat wave during summer 2021, which was centered further south over the Pacific Northwest. “The key difference is the seasonal timing. If this were occurring a couple months later the impacts would have been much worse, and potentially in a similar realm to 2021,” said Sam Bartusek, a doctoral candidate at the Lamont-Doherty Earth Observatory at Columbia University in New York.

Decades ago, the 2021 heat wave would have been virtually impossible but is now likely to happen every 200 years. That could jump to every 10 years when global warming reaches 2 degrees Celsius near mid-century, according to a study published by Bartusek and his colleagues last November. “Even with just a warming of the global average temperature, we expect to see a huge increase in the frequency of extreme heat waves,” he said. “Temperatures that have never been experienced during the observational record in a certain place will likely start occurring and put communities at risk.”