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CANADIAN FOREST SERVICE

Science HIGHLIGHTS

WILDFIRE SUPPRESSION

Will climate change overwhelm fire suppression capacity?

Climate change could increase the number of forest fires that grow out of control

Today, three percent of forest fires are classified as large—over 200 hectares, or about 400 football fields in size. These large fires account for 97 percent of the area burned in Canada each year.

"Once they get going, you can't do much about these large fires because they become too intense for suppression resources, even airtankers dropping water, to be effective," says Mike Wotton, a researcher at Natural Resources Canada's Canadian Forest Service who teaches at the University of Toronto.

Climate change means more fires and a test of our ability to fight them

Wotton is exploring the link between climate change, increases in forest fires and our ability to fight them. "There may be only a decade or two before increased fire activity means fire management agencies cannot maintain their current levels of effectiveness with today's levels of resources. In the future, under a warmer climate, we expect longer fire seasons, more severe fire weather, more ignitions and with all that combined—more area burned." This will make fighting fires more difficult because attacking a fire quickly is key to suppressing it. But with more fires, it will become difficult to respond to them all quickly.

Currently more than 90 percent of all fires detected in Canada are fought at some level. In some areas in remote regions of the north or wilderness areas, fires are allowed to burn or are fought on a limited basis unless they approach high-value areas like commercial forest land or the forest-urban interface. As climate change increases fire activity, forest fire management agencies will need to adapt and modify their management strategies.

A small increase in fires could lead to a big increase in the area burned

Wotton is concerned about the impact of even a small increase in fires that "escape" and become large fires. Fire is a natural part of the boreal forest ecosystem. But if three percent of fires go on to become large fires and are responsible for 97 percent of the area burned, what will the boreal forest look like with even relatively small increases in the number of fires "escaping?"

"These findings will be critical for forest fire management agencies trying to plan fire management strategies under a changing climate," Wotton says.

Overview

Three percent of fires are responsible for 97 percent of the area burned.

Climate change has the potential to increase the number of large fires.

Fire-fighting resources are already stretched.

A CL415 drops water as part of ongoing operations on an escaped fire (photo courtesy of Ontario Ministry of Natural Resources)

Already, fighting fires costs Canadians between $500 million and $1 billion every year. How will resources and budgets keep up with the increasing number of fires predicted under climate change scenarios? Answering this question will determine whether an increase in the area burned is greater than what researchers might expect based solely on an increase in fires caused by climate change.

Fire-fighting costs will increase just to maintain today's level of suppression

Looking out 30 years to 2040, in what he calls "a relatively conservative assessment," Wotton's models show a 15 percent increase in the number of fires occurring. But this could lead to an increase in the number of escaped fires, which would rise by 30 percent without extra investment.

"We also showed that fire-fighting resources would have to be increased by over 100 percent above today's levels to keep the escape fire percentage at the level we see today," Wotton says.

In a parallel study Wotton's Canadian Forest Service colleagues have used models developed from about 40 years of historical data about the empirical relationships between fire and weather, combined with climate change scenarios of future weather; this research suggests a 75 percent to 120 percent increase in the area burned in Canada by the end of the century.

"That would mean an area almost the size of Nova Scotia could burn every year," Wotton says.

A large escaped fire in north western Ontario