

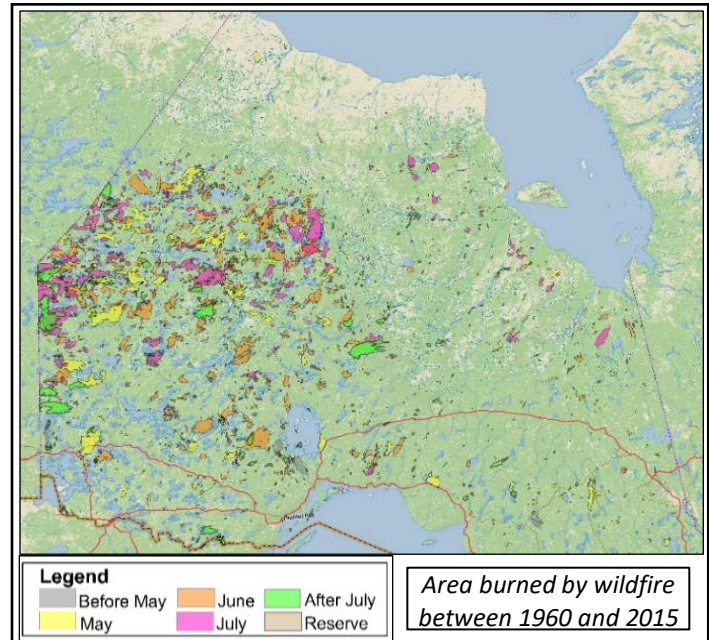


Wildfire – Natural but Risky

Fire is a natural and essential part of many ecosystems including the boreal forest in northern Ontario. It can also, sometimes, be a threat to people and communities. So, it is critical to explore how climate change may change wildfires on the land.

Why are there wildfires and why are they important?

In many of Earth's ecosystems, fire plays an important role. In fire-adapted environments like the boreal forest, natural wildfires are frequent and serve to renew the forest by clearing away dead material, like branches, that have collected over time allowing for the growth of new plants and trees. After a fire, trees like aspen and birch come back quickly because they grow from their stumps. Jack pine cones open from the heat of the fire and release seeds to grow the next generation of trees. Some animals like moose are attracted to this new forest of young trees. Fire creates a pattern of forest of various ages which provides habitat for a large variety of plants and animals. In northwestern Ontario, a high proportion of the forest has burned at some point in the last 50 years.



How is climate change impacting wildfires?

Warmer temperatures

Climate change is bringing warmer temperatures to all regions of Canada. In Ontario, summer temperatures in 2050 are predicted to be as much as 3°C to 5°C warmer than the average summer temperatures in 1985-2005. Hotter temperatures draw more moisture out of plants and soils (an effect called evapotranspiration), and these drier conditions cause wildfires to ignite and spread more easily. Changes in other seasons, like warmer winters with less snow, warmer springs and faster spring melt, and warmer fall weather, can also influence the wildfire season. In many places, the wildfire season now starts earlier in the year and lasts longer into the fall than it has before. Climate change is impacting the timing, frequency, and intensity of wildfires on the land.



Evapotranspiration

Insect damage

Trees that are severely damaged or die in insect outbreaks can increase wildfire risk by becoming potential wildfire fuel. Climate change is predicted to make some forest insect outbreaks, like eastern spruce budworm, more severe. Eastern spruce budworm is a native moth; the caterpillar life stage of the budworm feeds on the needles of balsam fir and white spruce and can cause widespread tree damage in the boreal forest. One study predicted that climate change will lead to eastern spruce budworm outbreaks lasting longer and causing more damage, especially in the northern portion of its range¹.



Defoliation caused by the spruce budworm
Photo <https://www.nrcan.gc.ca/>.



Severe Weather

Climate change has the potential to make storms happen more often and be more severe than in the past. Many people in First Nation communities across the north have already noticed a change, saying wind storms are stronger now than they used to be, and hearing of tornados in their area for the first time in living memory. Storms and severe weather can impact wildfire through:

Micro bursts and tornados

When trees are blown down by strong winds or tornados, the dead wood becomes fuel for forest fires as it dries out. As these events become more common, the amount of forest fire fuel across the landscape can also increase.

More lightning and more lightning-caused fires

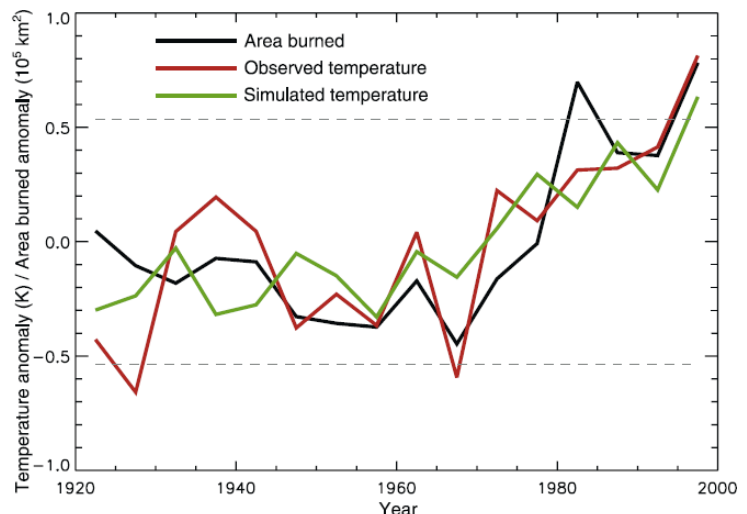
More storms bring the possibility of more lightning, a trend some say they are already seeing. Lightning is how most natural wildfires start. Drier conditions on the land also mean that lightning strikes are more likely to ignite wildfires, making the impact of increased lightning strikes even more significant.



Severe weather blew over trees near Pickle Lake, ON. Photo Dave Cleaveley.

How do we know that the change in fires is because of climate change?

There are, of course, multiple factors that contribute to the ignition and growth of wildfires. Some people may use this fact to try to downplay the relationship between human-caused warming and wildfire occurrence. However, when researchers look at wildfires over a long period of time, like decades, many have found a clear and stable trend between wildfire and temperature. The graph to the right, looking at Canadian forest fires from 1920 to 1999, is an example of this, with temperature (the red line) and area burned in forest fires (the black line) following each other closely. Trends like this are good evidence that warmer temperatures are leading to more wildfires. It also means that, as warming continues, we will likely see even more wildfire activity in the future.



This graph shows the relationship between temperature (the red line) and area burned by wildfire (the black line) in Canada over time. The two lines follow each other closely, illustrating their relationship. The green line is the trend predicted by a computer model, which also follows the two lines closely. Graph from Gillett, N. P. et al 2004².

Wildfire is natural but the fire season is changing. Warmer temperatures are drying forests, severe weather and insect outbreaks are happening more often all increasing the risk of fire. We need to ask ourselves if animals and plants can adapt and how will these changes impact people.

Want to know more? <https://sites.ualberta.ca/~flanniga/climatechange.html>

¹Gray, D. R. 2008 The relationship between climate and outbreak characteristics of the spruce budworm in eastern Canada. *Clim. Change* 87, 361–383.

²Gillett, N. P., Weaver, A. J., Zwiers, F. W. & Flannigan, M. D. 2004. Detecting the effect of climate change on Canadian forest fires. *Geophys. Res. Lett.* 31.