How will Canada manage its wildfires in the future?

November 27 2017, by Mike Flannigan And Mike Wotton

The wildfires in Chile wiped out the village of Santa Olga, Maule, previously home to 4,500 inhabitants. Credit: EU/ECHO/Vladimir Rodas 2017, CC BY-NC-ND

It's been a record-setting year for devastating and deadly wildfires across Canada and throughout the world.

This year alone, wildfires globally have burned about four million square kilometres of land, taken hundreds of lives and resulted in billions of dollars in economic losses.

We can only expect wildfires to get worse.

Wildfires need a combination of three ingredients: dry fuel, ignition and weather. Climate change can influence all three of these elements, and will increase the number of wildfires and the intensity of their behaviour by mid-century.

But if we invest in wildfire science now, we can learn to manage them better so we can save lives, homes, businesses —and our forests —for the future.

Broken records

At the start of the year, a record number of wildfires erupted in Chile. Soon after, deadly fires hit Portugal and South Africa. Fires in New Zealand, Greenland and Ireland also made headlines.

California's fires have been the state's deadliest, and economic losses will likely amount to many billions of dollars. In October, deadly fires hit Spain and Portugal again, encouraged by the strong winds associated with Hurricane Ophelia.

In Canada, the wildfire season, which typically runs from April to October, started off slowly. That changed dramatically when close to 220 fires burned in British Columbia over two days in early July, forcing the evacuation of numerous communities.

It turned out to be a very long, hot, dry and smoky summer in British Columbia. In total, over 12,000 square kilometres —roughly half the

size of Vermont —burned. That's head-and-shoulders above the previous record of 8,570 square kilometres burned in 1958, which was a record then.

The Northwest Territories, Alberta, Saskatchewan and Manitoba saw a lot of fire activity too.

The direct fire management expenditures in Canada this year will probably exceed $1 billion, likely one of the costliest years on record.

Wildfires burn near Ashcroft, B.C. this summer. Credit: Mike Flannigan

More than 30,000 square kilometres of land has burned in Canada in four of the past five years, for the first time in history. The one year that did not exceed 30,000 square kilometres was 2016, the year of the Fort

McMurray fire, the most expensive natural disaster in Canadian history.

Wildfires and extremes

Climate change isn't the only reason we're seeing more fires and larger ones, but it is an important factor.

Temperatures across Canada continue to warm throughout the year. During the past 69 years, the average annual temperature has risen 1.7°C. Warmer temperatures leads to drier forest fuels and to more lightning strikes —an important trigger for wildfires.

With our changing climate, we can expect more extreme weather —high temperatures, extended heat warnings, droughts —and an increase in fire intensity. These warmer temperatures result in drier fuels that lead to higher intensity wildfires that overcome fire suppression activities and threaten Canadians.

Recent research suggests that extreme fire risk in areas like Northern Alberta has already increased by 1.5 to six times due to climate change.

Battling wildfire

Canada's largest wildfires —those exceeding two square kilometres —represent only three per cent of the total number of wildfires, but 97 per cent of the area burned. In other words, we don't need a large increase in the number of high intensity wildfires to cause problems for society, including evacuations, loss of property and death.

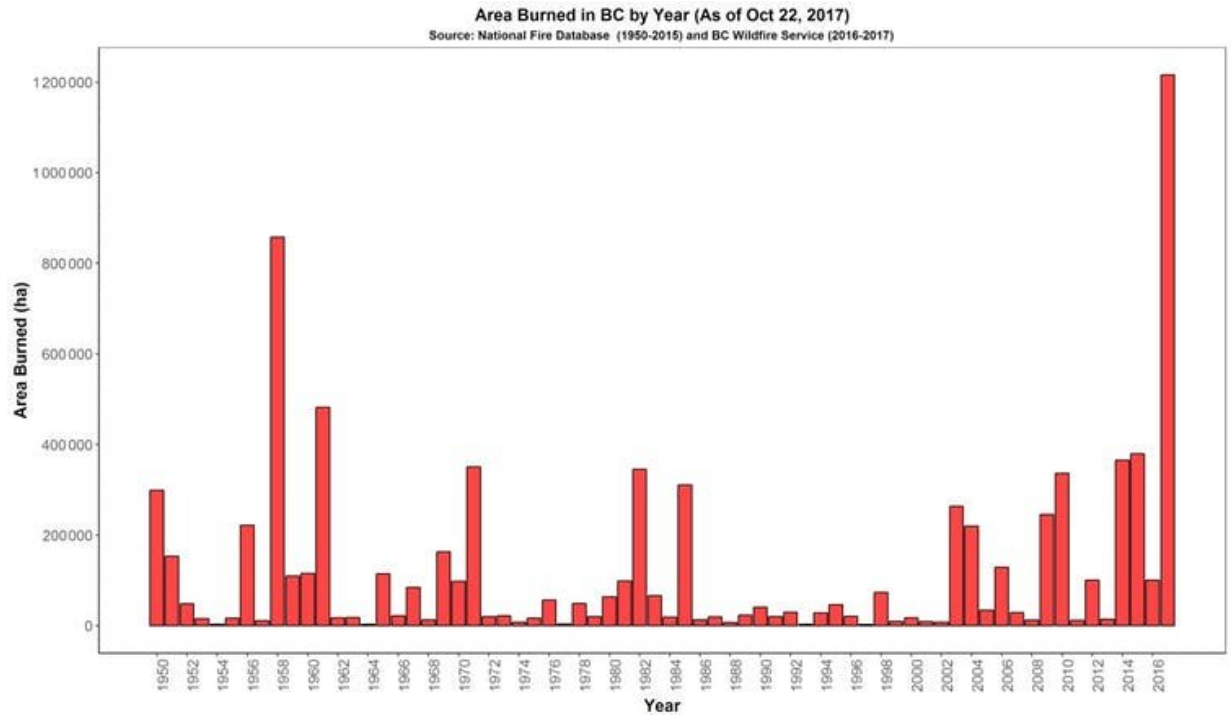
The most effective time to catch and stop an unwanted fire is right after it has started. During this brief window, fire management resources —on the ground and in the air —can suppress the fire before it has had a

chance to grow and to burn at high intensity.

But how long that window stays open depends on the weather. If it's hot and dry, it may be as short as 20 minutes.

In areas where the things we value are few and farther apart, we must step back from aggressive fire suppression and allow the fires to burn. This makes economic and ecological sense.

At the same time we'll also have to focus more effort in high value areas, both before fires happen and when they occur, so that fire management resources can respond to more imminent threats. Only by taking on more risk in some situations, can we reduce the change of major losses in others. This is a philosophical approach called appropriate response.



Wildfires burned 1.2 million hectares (12,000 square kilometres) of B.C. land in

2017, more than any other year since 1950. Author provided

The outcomes won't always be as expected. Both fire management agencies and the public need to realize and accept this.

Future tools

We need to anticipate —and prepare for —wildfires that occur in community zones, so that we can attack them early and effectively to reduce their impact or even stop their spread.

This is where fire science intersects with fire management. Fire science explores and interprets the fire environment. This includes the moisture content of important forest fuels and the ease of igniting those fuels, as well as wildfire characteristics such as spread rate, flame length and the depth of burning in the forest floor. It creates predictive tools that allow fire managers to estimate and manage risk in challenging and complex wildfire scenarios.

With the wildfire risk and the complexity of the fire management business on the rise, we need to be able to make better predictions about wildfire behaviour to support wildfire planning and decision making.

Canadian wildfire managers cannot be expected to manage the risks associated with increased fire activity with the same old tools they have been using for decades.

For example, we can use machine learning to help predict when and where to expect severe fire weather.

We are, however, trying to develop appropriate decision support aids

despite decades of under-funding of fire science in this country.

In particular, the Natural Science and Engineering Research Council, a federal funding agency, has dropped the ball. None of its funding programs have identified wildfire as a priority research topic.

However, there is no realistic amount of funding that can *fire proof* our wildland landscapes and communities. Where there are fuels, ignition sources and hot, dry and windy weather, there will be fires.

Still we must strive to make those things we value more *fire-resistant*. The urgency is upon us to begin to act, as the consequences of inaction will only grow larger as time passes.

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