



# **Implications of the Changing and Unstoppable Nature of Canadian Wildfires**

**JAMES O'BRIEN, PAUL SOMERVILLE**

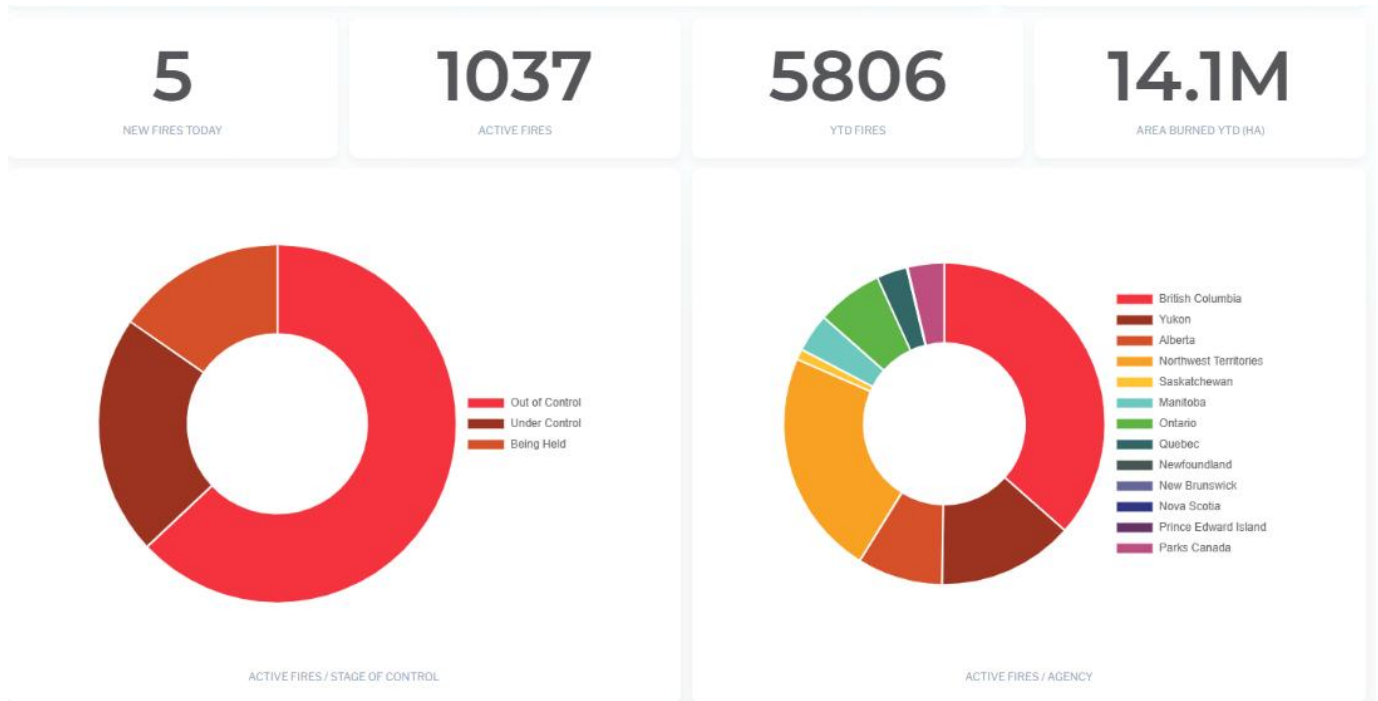
David Wallace-Wells (2023a,b) has recently described the rapidly evolving nature of Canadian wildfires and the apparent inability to control them with any effective means. The part of this briefing that follows the charts has been excerpted, rearranged and edited from his opinion column (Wallace-Wells, 2023a), which is elaborated upon in his podcast (Wallace-Wells, 2023b). Paragraphs shown in quotation marks are direct excerpts.

Wallace's comments from early August are particularly relevant as the fires in Canada are still burning more than two weeks later. As the ABC is reporting and as is widely acknowledged elsewhere, Canada is enduring its worst wildfire season with over 5,800 fires recorded so far for the season with more than 14.1M hectares burned.



August 20, 2023 Situation Report Map. Source CIFFC | Home

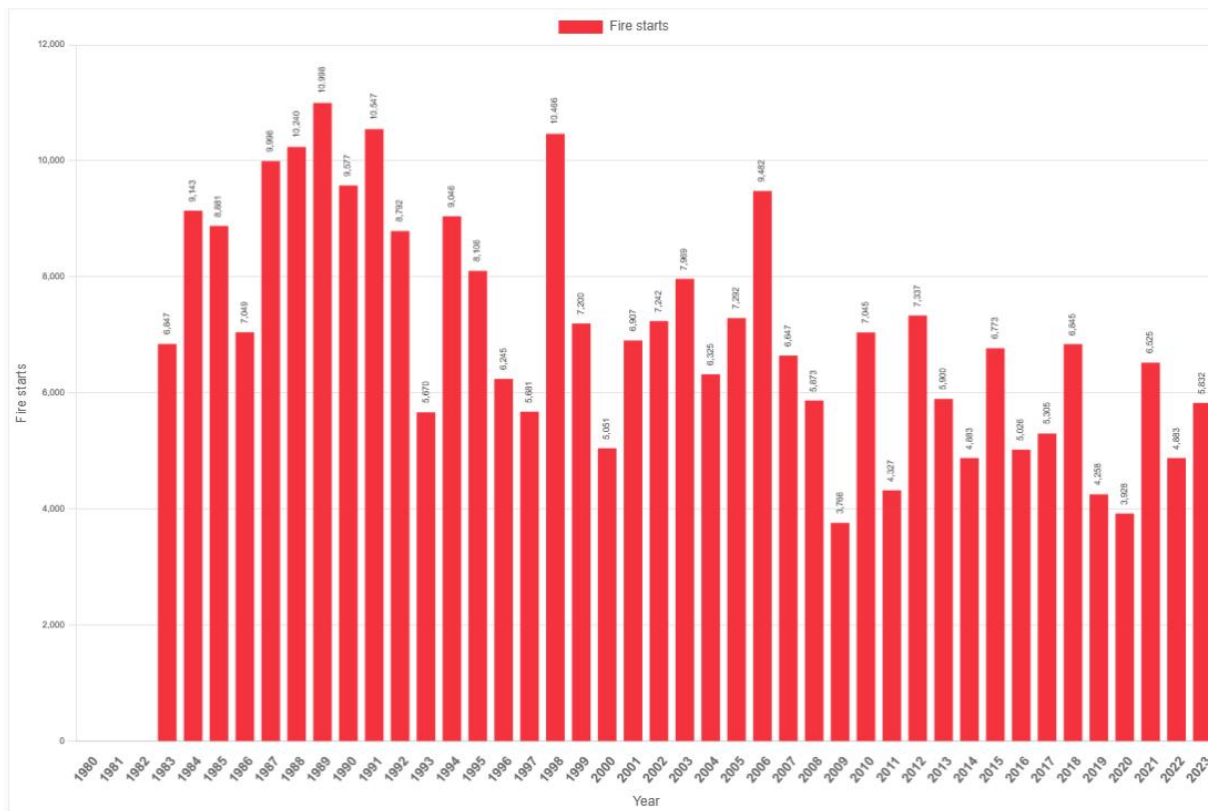
The above map shows the dire situation at the time of writing with over 600 fires “out of control” and 159 “being held” and the infographic below shows that 9 of the 10 Canadian provinces and 3 territories are currently represented (Newfoundland, New Brunswick, Nova Scotia are not currently affected and Prince Edward Island is so far unaffected by fire). In the Canadian context “out of control” is relatively self-explanatory and means it is not responding to fire suppression efforts and is expected to grow and there is no controlled perimeter but also means that growth is expected. “Being held” or “contained” or “partially controlled” means firefighters have established a boundary or perimeter around the fire and doesn’t necessarily mean the fire won’t escape that containment. “Under control” is defined as being completely contained within an established perimeter, is no longer growing or spreading, and is moving toward being extinguished.



August 20, 2023 Situation Report Dashboard, Source CIFFC | Home

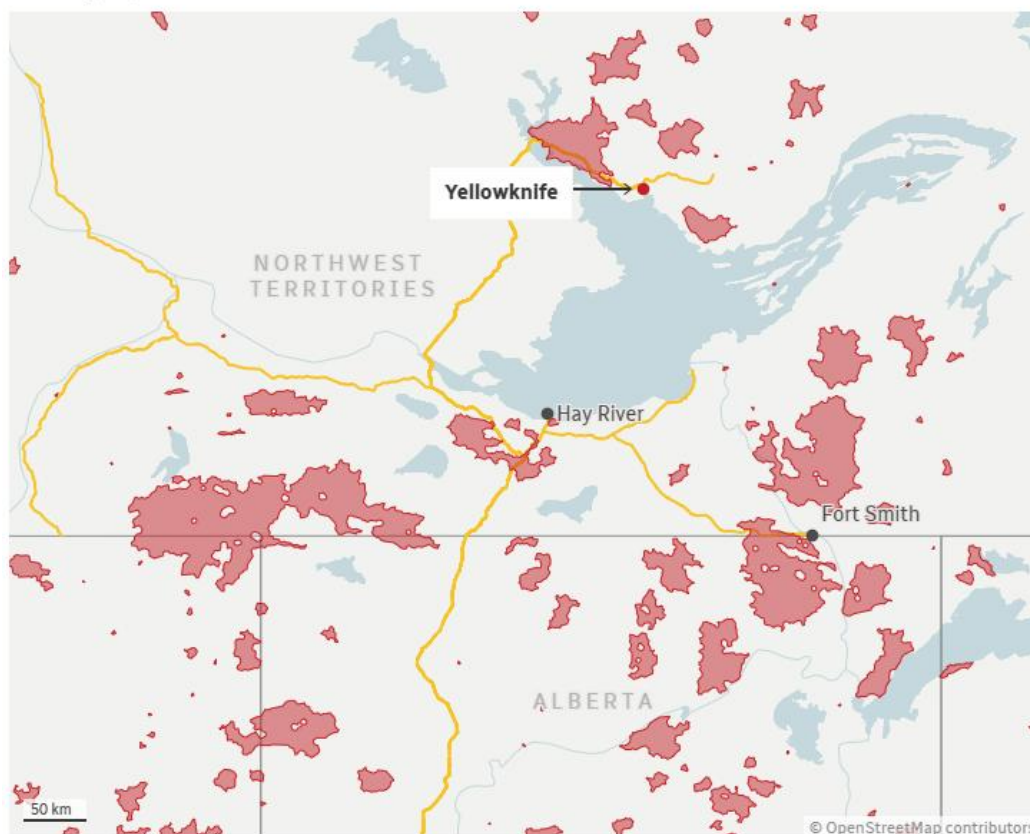
While there have historically been a greater number of fires in Canada, these fires have been smaller and the current season has burned twice as many hectares as the previous worst year (1995) which was at the end of a sustained El Nino period (1990-95) which was the longest on record (Trenberth et al., 1996). It is an overused term but “unprecedented” is an appropriate way to describe the mandatory evacuation of the entire city of Yellowknife, the capital of the Northwest Territories, with a population of 20,000. With only one highway as the evacuation route out of the city, evacuations also took place by air. At the time of writing the fire is yet to reach the town and significant firefighting resources from across Canada as well defense and other personnel are attempting to create defensive lines around the city in the event it is encircled by fire. Across British Columbia, 30,000 people are on evacuation order with 36,000 more under evacuation alert, and 58 structures have been lost to wildfires burning across three cities in the Central Okanagan including West Kelowna.

Annual Fires in Canada



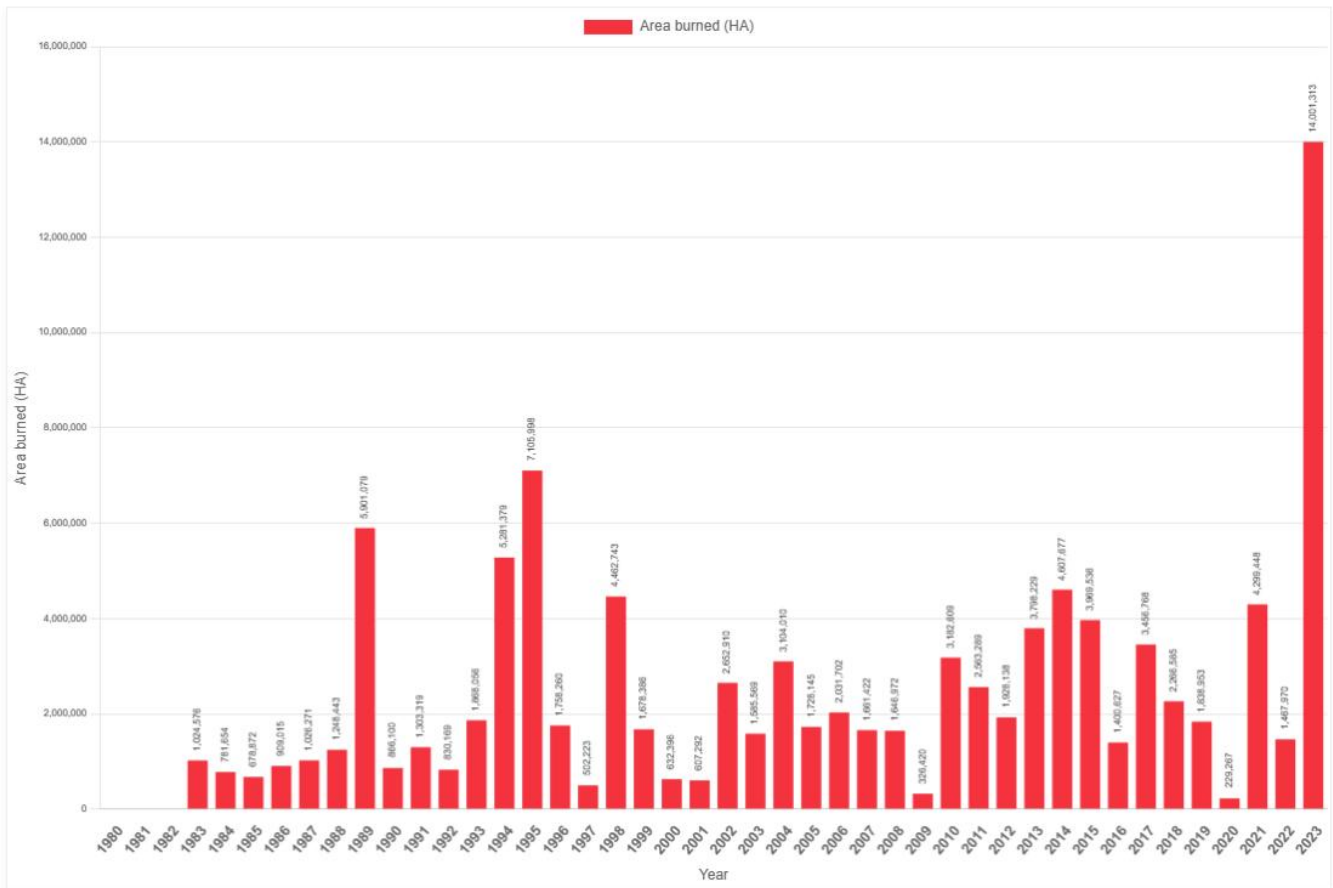
Source - CIFFC | Fire Statistics

As of Aug. 20, 2023 at 11:00 a.m. MT



Map showing estimated fire perimeters in Northwest Territories. Source - Canadian Wildland Fire Information System | Interactive map (nrcan.gc.ca)

## Annual Area Burned in Canada



Source - CIFFC | Fire Statistics

In the 20th-century, firefighters extinguished wildfire flames wherever they found them, ultimately contributing to a continental buildup of the dry forest, grassland and scrub that fire experts casually call fuel (e.g Taylor, 2000). Nowadays, to reduce it, fire scientists and forest ecologists try to cultivate more of what they call “good fire.” The goal of most current forest management in North America is to manage fire rather than always rushing to extinguish it, to focus suppression efforts on denser human settlements and elsewhere to find ways to allow some burning.

“In Quebec, more land was torched in June this year than in the previous 20 years combined, with a single out-of-control complex growing to 2.5 million acres in a section of the province where, in recent years, the average total has been a tenth of that. Across Canada, the total was more than 25 million acres, or about two and a half times as much land as burned in any of the worst American seasons of the past 50 years. With most of Canada’s fire season still ahead, this puts the country on track to produce more carbon emissions from the burning of boreal forest than all of its other human and industrial activities combined.”

“But whose responsibility is the carbon produced when forests burn? In the age of extreme weather and climate agreements, the world has learned to tabulate ecological guilt nation by nation, dividing responsibility for the current crisis into so many slices of pie. Wildfire emissions typically aren’t even recorded on the balance sheet of any particular country’s ledger, but according to some tabulations, in 2021 wildfires in North America and Eurasia contributed more carbon dioxide to the atmosphere than any nation but China, the United States and India. Moreover, the toxic smoke from those fires increasingly travels elsewhere, regularly choking the air and blotting out the sun not just in cities built into nearby wildland but also in major concrete megalopolises whole continents or even oceans away. Whose responsibility is that?”

“If the 20th century taught us the perversity of aggressive fire suppression, the 21st is already teaching us the limits of that lesson. A firefighting approach based on the principle that humans and human settlements should be protected but that otherwise forests should be allowed to burn is sensible if the aim is to reduce property damage and loss of life. But if the costs to human health of wildfire smoke are larger than from the fires themselves, should the goal be recalibrated? Could it be? If the aim is to manage the health of the planet by limiting the emission of carbon from wildfire, what kind of approach does that require? Is it even possible? In California the record-setting fire season of 2020, which produced five of the state’s seven largest fires in modern history, also entirely erased its emissions gains over the previous 16 years — putting twice as much carbon into the atmosphere as was saved by all of the state’s decarbonization policies from 2003 to 2019. Canada has a gargantuan per capita carbon footprint, in fact, by some measures larger than that of the United States. But it is not itself singularly to blame for the changes unfurling in its remote forests or capable of truly controlling the new megafires that result.”

Fire control is also growing harder because the fires themselves are changing. They produce such thick walls of smoke now that tanker planes sometimes can’t fly into them. Canadian planes drop 30 bathtubs’ worth of water at a time and can extinguish fires with an intensity of up to 10,000 kilowatts per meter of fire line, but today’s megafires are a different order of magnitude, sometimes exceeding 100,000 kilowatts per meter (Mance, 2023), 10 times as intense. Water dumped from above can evaporate before it reaches the ground.

Modern megafires routinely produce whole new fire-weather systems, including pyrocumulonimbus clouds, laced with lightning and whipped by tornadoes, which can shoot toxic aerosols all the way through the troposphere into the lower stratosphere. These fires are unstoppable. In the paradox of climate adaptation, the disruption of the natural world seems to require further intervention, with the answer to the problem of losing control being to impose more control (Kolbert, 2021). However, when it comes to rolling climate change, total control may be an illusion. Until now, humans have seemed to have moved at a faster pace than the natural world, but now the natural world is moving as fast or faster than we are: faster than humans, faster than technology, and faster than history (Vaillant, 2023).

In addition to the thick smoke and potential ineffectiveness of water, the volatility of weather conditions, particularly wind speeds and directions on the fireground make aerial firefighting operations even more challenging. It’s possible that these unusual and unexpected conditions have been contributors to recent aerial firefighting crashes.

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Paul is Chief Geoscientist at Risk Frontiers. He has a PhD in Geophysics, and has 45 years experience as an engineering seismologist, including 15 years with Risk Frontiers. He has had first hand experience of damaging earthquakes in California, Japan, Taiwan and New Zealand. He works with Valentina Koschatzky in the development of QuakeAUS and QuakeNZ.



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James is Risk Frontiers' Chief Geospatial Scientist developing solutions and providing thought leadership for the integration of physical, social science and climate change factors in modelling risk, exposure, vulnerability and resilience for people, property and infrastructure using geographical information science.

