



Bonnefield

FARMLAND *for* FARMING

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Understanding the Impact of Wildfires on Canadian Agriculture

2023 has so far proved to be Canada's most intense wildfire season in history. At the time of writing, more than 135,000 square kilometres of forest and other land has been burned by wildfires and forest fires (collectively referred to as "wildland fires") since the beginning of the year¹. This amount surpasses the previous record for area burned in a single year, which was set in 1989 when 75,596 square kilometres of land across Canada was affected by fires². The total amount of land burned to date in 2023 is more than seven times the average area burned per year over the past decade³.

While there have been numerous evacuation orders across Canada in recent months due to fires, we are relieved and thankful to report there has been no direct impact to any of Bonnefield's farms as of the time writing. It is important to note that Canadians living and working in rural areas – including farmers and agribusiness operators, as well as the communities of which they are a part – are most directly impacted by these events.

As Canada is home to expansive forests and grasslands, fires are not an unusual occurrence in summer months. Wildfires and forest fires typically occur beginning in May and through to September, with most fires occurring in remote areas⁴. However, the intensity of wildfires in 2023 begs the question "why did this year's wildfire season eclipse prior years so significantly, and what is the potential impact to Canada's agricultural sector?"

An Unusually Intense Fire Season

For context, the Canadian Interagency Forest Fire Centre reported that there were approximately 900 active wildfires as of mid-July, most of which were considered uncontrolled burns⁵. Through May and June, wildfires persisted in Northern Alberta and Northern British

Columbia, and forest fires in Northern Quebec led to unprecedented levels of wildfire smoke and poor air quality across Quebec and Ontario as well as parts of the Northeast United States⁴. By late June the total amount of Canadian land burned by wildfires in 2023 surpassed the total area burned in 2016, 2019, 2020, and 2022 combined⁶ and, in mid-July the federal government mobilized the Canadian Armed Forces and the Canadian Coast Guard to assist with firefighting efforts in British Columbia⁷.

There are three key factors that lead to wildfires and forest fires: 1) ignition (either lightning or due to human activity), 2) hot and dry weather, and 3) vegetation (trees, shrubs, and brush) which is made drier and more flammable by arid weather conditions⁸. It is believed potential cumulative effects of climate change, along with woodland management practices, have increased the risk of fires starting and rapidly spreading⁹. More specifically, drought conditions, high temperatures, and increased frequency of lightning strikes – which start roughly half of Canada's fires – are thought to be the main climate change-related effects that are contributing to heightened wildfire risk⁹.

This summer has been exceptionally hot with record-breaking high temperatures observed globally. In fact, the U.S. National Oceanic and Atmospheric Administration recently reported that June 2023 was the warmest June since global temperature record-keeping commenced in 1850, and the European Union's Copernicus Climate Change Service indicated that the first two weeks of July 2023 likely represented the warmest two weeks in the planet's history¹⁰.

In a recent briefing, Northern Forestry Centre at the Canadian Forest Service director general Michael Norton discussed the impact that continued unusually warm and arid conditions across Canada through the summer months will likely have through the rest of the season, stating that "expected warm and dry conditions will increase wildfire risk from British Columbia and the Yukon across the country right to Western Labrador", and that "it is anticipated that many parts of Canada will continue to see above normal fire activity"⁹.

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Where do Fires Occur, and How Are They Managed?

Canada is home to the third-largest forest area in the world with over 3.6 million square kilometres of forests, representing approximately 40% of the country's total land base¹. Only 6% of Canada's forests are privately owned by non-governmental entities such as forest companies and private owners (e.g., family-owned forests and woodlots), with provincial and territorial governments owning 90% and the federal government owning the remaining 4%². The primary areas that experience "normal course" wildland fire activity are southern British Columbia, and across the boreal forest that extends from Alaska across the northern parts of British Columbia, the Prairies, Ontario, Quebec, and the Maritimes³.

Much of the country's forested land is remote and sparsely inhabited; however, approximately 17% of that land is considered part of Canada's wildland-urban interface (WUI)⁴, where homes and community structures, commercial and industrial activity, and infrastructure such as roads and railways meet or intermingle with forested areas⁵. Wildfires pose a significant risk to WUI areas due to their proximity to the natural vegetation that serves as fuel for wildfires. Researchers have also noted that in these areas, there is also an increased risk of fires being started due to human ignition⁶. Moreover, the threat posed to WUI areas by wildfires is growing both in Canada and elsewhere as urban areas continue to expand into wildlands and existing rural areas experience population growth.

The 2016 Horse River Wildfire in Northern Alberta serves as a particularly significant example of wildfire risk in Canada's WUI. Though firefighters attempted to suppress the blaze that began southwest of the town of Fort McMurray, Alberta, the fire grew extremely quickly as result of hot and dry weather; ultimately, 80,000 people were evacuated from the area and more than 2,400 man-made structures were lost as result of fire⁷. The estimated total economic impact of the Horse River Wildfire was nearly \$9 billion, and the event represents the most expensive insured natural disaster in Canadian history⁸. While it is an extreme example, the Horse River Wildfire illustrates just how quickly wildfires can evolve into large-scale disasters with significant detrimental impacts.

Given the toll that Canadian wildland fires can take in a given year, it is important to consider where responsibility lies for fire management and how fires are managed. As noted, the majority of Canada's forests are owned by provincial and territorial governments, which also have responsibility for wildland fire management in their respective jurisdictions⁹. Federal government agencies are responsible for wildland fire management in select areas including national parks and military bases¹⁰, and Canada has also entered into agreements with other countries, such as the United States, to share firefighting resources and expertise²⁰.

It is worth noting that Canada's approach to wildfire management has shifted over time. Fire suppression (fully putting out fires) was historically the primary goal of wildfire management strategies until the 1970s when recognition of fire's ecological benefits to forests began to grow¹¹. The current approach to wildfire management across the country involves various levels of fire suppression ranging from complete extinguishment to limited (or no) intervention, and the decision as to whether to fight a fire or let

it burn out naturally is made by the government agency responsible for fire management in the area where the fire is occurring, based on that agency's hierarchy of fire management priorities¹⁹. While many fires are left to burn out naturally, active fire suppression generally takes place within the southern parts of the boreal forest where human activities such as forest harvesting, mining, urban developments, and agriculture are more concentrated¹⁴.

Fire's Impacts on Canadian Agriculture

Wildfires present numerous risks to people, property and economic activity, though some may be less immediately apparent than others. In addition to the direct risk to human life and property, poor air quality as result of lingering fire smoke can have serious adverse health effects, such as respiratory illnesses and psychological distress²¹.

From an agricultural perspective, crop yields may also be impacted by fire smoke due to reduced sunlight levels that can impact the photosynthesis process necessary for plant maturation, as well as increased ground-level ozone that can be damaging to plant tissue²². As it is impractical for scientists to conduct controlled experiments involving wildfire smoke and thus difficult to specifically isolate the effects of smoke from other factors that ultimately determine crop yields, the direct impact that wildfire smoke has on crop production is unknown; however, this remains an active area of research, and scientists often focus on measuring the effects of smoke events as they occur²².

Additionally, it has been reported that prolonged exposure to smoke can affect the taste of fruits and vegetables²³. As one example, following the wildfires that affected British Columbia's Okanagan Valley in 2021, winemakers in the region conducted lab tests on their grapes and found that high levels of airborne smoke molecules had been absorbed by the fruit²⁴. Ultimately, this led to wines that were bottled in the region that year being affected by "smoke taint", or an ashy flavour profile that many winemakers view as a negative impact to the quality of the wine that can reduce the end product's appeal and affect the marketability of a wine vintage²⁴. Smoke taint may be less of a concern for farm operators who primarily grow row crops that are more commodity-like in nature and are often processed into higher value products such as seed oils. However, the economic impacts of smoke on higher-value crops including fruits and vegetables may become a greater concern for some Canadian farmers over time as wildfires become more frequent and more intense.

Understanding & Managing Investment Risks

As a leading Canadian farmland and agriculture investment manager, we believe that it is necessary to understand the risks associated with investing in Canadian farmland to the fullest extent possible. Since inception, Bonnefield's investment process has considered regional risk factors that can impact farming including regional soil types, typical area weather patterns, water availability, as well as investment-specific characteristics such as topography, drainage, and other similar attributes.

Though some risks (such as large-scale wildfires, or intense droughts or floods) are difficult to predict and quantify, Bonnefield

has contemplated environmental risks as part of our investment process since the firm's inception and our team has continued to enhance our analysis of these risks over time. A few examples of how our team has integrated major environmental risks into the investment process include:

- Collaboration with our extensive network of farmer partners and industry participants, such as agrologists, appraisers, and brokers, to understand and determine specific nuances of environmental risks (e.g., flooding, hail) that affect a particular region;
- Leveraging satellite imagery and historical environmental data to better understand both long-term and recent climatic trends and conditions; and
- Using underwriting models that include multiple scenarios (e.g., different levels of crop yields) and risk premiums appropriate for a farmland property in a specific region.

As we look ahead to the remaining summer months and beyond, it seems clear that wildfires, along with other major climate and weather events, will continue to be a major theme. However, we are heartened knowing that Bonnefield properties have not to date been directly impacted by this year's fire activity. We also recognize that a single year of increased wildland fire activity, while notable, is not enough to draw meaningful conclusions from, or change our current practices. Indeed, a year like 2023 provides valuable insight and data to refine our understanding of climate and other risks facing the agricultural industry in Canada. Bonnefield will continue to monitor developments and use this information to support both our farm partners and our investors. 🦋

About Bonnefield Financial

Bonnefield is a leading Canadian farmland and agriculture investment manager, providing financing to progressive farmers and agricultural operators through land-lease and non-controlling equity solutions. Bonnefield is dedicated to preserving farmland for farming, and the firm partners with growth-oriented operators to help them grow, reduce debt, and finance retirement and succession. The firm's investors are individuals and institutional investors who are committed to the long-term future of Canadian agriculture. www.bonnefield.com

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