

Abstract

6th International Fire Behavior and Fuels Conference

Blueprint for Wildland Fire Science in Canada (2019-2029)

Wildland fires in Canada

Canada is experiencing longer, more intense wildland fire seasons. With approximately 347.1 million hectares of forested land (9% of the world's forests) wildfire events are expected. Many of our forests depend on these fires to maintain health and diversity. Canada experiences an average of 7500 wildland fires per year, burning an average of 2.4 million hectares.¹ Scientists predict the area burned could double over the next 100 years and that overall fire occurrence will increase 75% within the same time frame.² The total costs to fight these fires ranges from \$500 million to \$1 billion (more in years of high fire activity), but these numbers are also increasing; experts say national average costs could exceed \$1.4 billion by the end of the century.³

As the occurrence of fire in our forested landscapes becomes more complex, the challenges and risks for Canadians do as well. Canada has 116.5 million hectares of wildland-urban interface (WUI), areas where infrastructure and homes are in close contact with forest and vegetation.⁴ The area of WUI is increasing as more human activities spread into forested land, creating the potential for more evacuations, higher health risks (both physical and mental), and the disruption and destruction of infrastructure, communities, and regional and national economies. Because many Indigenous communities are located within the WUI, Canada's Indigenous Peoples face disproportional effects during wildfires. One-third of all wildfire evacuees are Indigenous and more than half of all smoke-related evacuations involve Indigenous communities.⁵

Canada at a critical crossroad

The trend of increased intensity and size of wildfires is being fueled by an array of factors such as climate change, increased lightning strikes, longer fire seasons, drier forests,⁶ and forest pest infestations (such as mountain pine beetle). Within the past five years alone, Canada has experienced record-breaking fire events, driving up firefighting costs and placing more Canadian lives and livelihoods at risk. The world watched as the 2016 Horse River wildfire in Fort McMurray and northeastern Alberta became the costliest natural disaster in Canadian history, resulting in an estimated cost of \$3.8 billion to insurers, and evacuation of more than 85,000 people.⁷ Wildfires in British Columbia in 2017 and 2018 set records for area burned -- more than 1.2 and 1.3 million hectares respectively.⁸ The intensity of these fire seasons reached levels that experts did not expect would happen for decades to come.⁹ The cost of these wildfires have been monumental, as the cost of federal government disaster financial assistant payments between 2011-2016 was \$1.8 billion.

The 2018 national fire season also placed a spotlight on the increasing challenge Canada faces around scarcity of domestic firefighting resources.¹⁰ Budgets for fire operations are limited and Canada is becoming increasingly reliant on international partners for response support.¹¹ During the 2018 B.C. wildfires, more than 3,372 firefighters were

¹ Canadian Wildland Fire Strategy: a vision for an innovative and integrated approach to managing the risks, 5.

² Blueprint, iii.

³ Hope, E.S.; McKenney, D.W.; Pedlar, J.H.; Stocks, B.J.; Gauthier, S. 2016. Wildfire suppression costs for Canada under a changing climate. PLoS One 11(8):e0157425. Accessed 8 August 2018. doi:10.1371/journal.pone.0157425

⁴ Johnston, L.M.; Flannigan, M.D. 2017. Mapping Canadian wildland fire interface areas. Int. J. Wildland Fire 27:1–14. doi://doi.org/10.1071/WF16221.

⁵ Amy Christianson

⁶ Blueprint, 2.

⁷ CCFM report

⁸ CIFFC seasonal reports, 2017 and 2018.

⁹ The future looks grim after 2 years of devastating B.C. wildfires,

¹⁰ Notes from Steve Taylor.

¹¹ Canadian Wildland Fire Strategy, a 10-year review and renewed call to action, 8.

battling wildfires, including 436 firefighting personnel from other provinces, Parks Canada, Australia, Mexico, and New Zealand.¹² As Canada faces record wildland fire events, more activity in the WUI, and scarcity of firefighting resources, there have been concomitant reductions in national investments on science research and development. Natural Resources Canada's Canadian Forest Service (CFS), is home to the largest contingent of wildland fire researchers within a single organization in Canada. Work ranges from research on fire behavior and ecology to fire management, risk prediction and assessment, human dimensions, effects of climate change, and development of decision-support tools. This work is enhanced by research done by provincial and territorial governments, largely in the areas of wildfire operations and response support and land and resource management. Most of Canada's wildland fire research is done by academics at postsecondary institutions. Research is also done by non-governmental organizations. However, number of full-time research scientists currently invested in wildland fire research remains relatively small (about 60-70 individuals) and current combined annual expenditure amounts to approximately \$5 million. When each of these factors are coupled with the looming retirement of many of Canada's leading wildland fire researchers, a picture of limited capacity to meet ongoing and future fire management needs emerges.

Canada is at a critical crossroad. The rate of investments for critical fire science and innovation are mismatched with the increasing complexity of wildland fire. There is also a question of whether existing strategies for mitigating and suppressing wildfires are effective against the changing face of wildland fire on our landscapes.

Developing a national strategy

In 2004, following a series of serious fire seasons, the Canadian Council of Forest Ministers (CCFM) called for the development of a national wildland fire management strategy. The resulting Canadian Wildland Fire Strategy (CWFS) was released the following year, establishing a shared national vision, goals, and priorities for wildland fire management. The CWFS set three primary objectives: resilient communities and an empowered public; healthy and productive forest ecosystems; and modern business practices.¹³

Subsequent reviews of the CWFS concluded that while the original goals and objectives remained relevant to the emerging needs of wildfire mitigation, more could be done to enhance its implementation.¹⁴ In 2016, the CCFM once again reviewed the CWFS. Its *10-year Review and Renewed Call to Action* again identified a need to fully implement the original goals and objectives of the CWFS.¹⁵ Specifically, the 2016 review noted that "the problems of the future will not be resolved by relying on the science of the past, nor will they be resolved without focused programs in government and universities."¹⁶ Additional recommendations were made; one was a call for increased collaboration between federal, provincial, and territorial governments. Another recommendation was for enhanced innovation and collaborative research capacity.¹⁷

In response to the 2016 CWFS, the Canadian Forest Service collaborated with a broad cohort of experts across the country to develop the *Blueprint for Wildland Fire Science in Canada (2019-2029)*.

Blueprint for Wildland Fire Science in Canada (2019-2029)

As wildfires become more severe and complex, fire management needs evidence-based decisions, policies, and practices informed by strong science, technological innovations, and fire-related expertise. The *Blueprint* makes a business case for increasing investments into Canadian wildland fire science. It identifies existing research

¹² Terrace Standard, <https://www.terracestandard.com/news/b-c-declares-state-of-emergency-as-wildfires-rage/>.

¹³ Wildland Fire Management Working Group: Strategic Direction 2014-2019, 2.

¹⁴ Canadian Wildland Fire Strategy, a 10-year review and renewed call to action, 6.

¹⁵ Blueprint, 1.

¹⁶ Canadian Wildland Fire Strategy: A 10-year Review and Renewed Call to Action.

¹⁷ Blueprint 1

knowledge gaps and priority research needs and presents a series of recommendations to enhance the nation's wildland fire science capacity.

Six science themes

The *Blueprint* is organized around six interlinking themes that represent important areas in wildland fire research. Working with experts and stakeholders from across the country, existing knowledge gaps and national research priorities are identified for each theme. The six themes are:

- 1. Understanding fire in a changing world**
Conducting fundamental physical fire science as a foundation for improved decision-making;
- 2. Recognizing Indigenous knowledge**
Recognizing Indigenous knowledge and collaborating with Indigenous peoples for better wildland fire management;
- 3. Building resilient communities and infrastructure**
Protecting forest-based communities and infrastructure from wildland fire events;
- 4. Managing ecosystems**
Understanding the effects of fire, both desirable and undesirable, on forest ecosystems;
- 5. Delivering innovative fire management solutions**
Transforming management through research and innovation; and
- 6. Reducing the effects of wildland fire on Canadians**
Addressing the long-term physical, mental, social, and economic well-being of people living with wildland fire.

The *Blueprint* also presents fifteen recommendations grouped under five broad goals, to enhance Canada's future wildland fire science capacity. The five goals are:

1. Increase national capacity for research and innovation in wildland fire science;
2. Recognize Indigenous knowledge as a complementary approach to delivery and development of wildland fire research;
3. Enhance knowledge exchange mechanisms to improve the ways in which wildland fire science and technology are shared, understood, and implemented;
4. Expand partnerships and welcome new partners; and
5. Improve governance and coordination to establish national priorities and define national needs.

Through the cohesive efforts of governments, Indigenous partners, academics, science-funding agencies, industry, and non-profit sectors, the *Blueprint for Wildland Fire Science in Canada (2019-2029)* can help fully realize the goals of the CWFS for the next 10 years, set the course for wildland fire research well into the future, and contribute to Canada's resiliency.