

IMPACTS OF CLIMATE CHANGE: Wildfires in Canada

Laurel Sun, Myura Nimalan, Unisha Poudel, Tanya Niak

TABLE OF CONTENTS

01

**Causes &
Impacts**

02

**Impacts on native
plants & animals**

03

Social Impacts

04

**Past Fires and
Future Impacts**



01

**Causes of Canadian
Wildfires**

Causes & Impacts

- Canada's 2023 wildfires produced around 3 billion tons of carbon dioxide
 - Roughly 4 times more carbon dioxide than emissions of global aviation sector
- Air pollution spread to Europe and China
- Increase in aerospace abundance creates cooling pattern and weather pattern changes similar to volcanic eruptions



Causes & Impacts

- Has global impacts beyond Canada
 - Cornell scientists estimated over 30 people from Wisconsin died from wildfire-related health complications
 - Estimated 64,300 chronic deaths in North America and Europe attributed to air pollution from 2023 Canadian fires
- Wildfire smoke contains chemicals that are dangerous to elderly, children, and those with existing illnesses

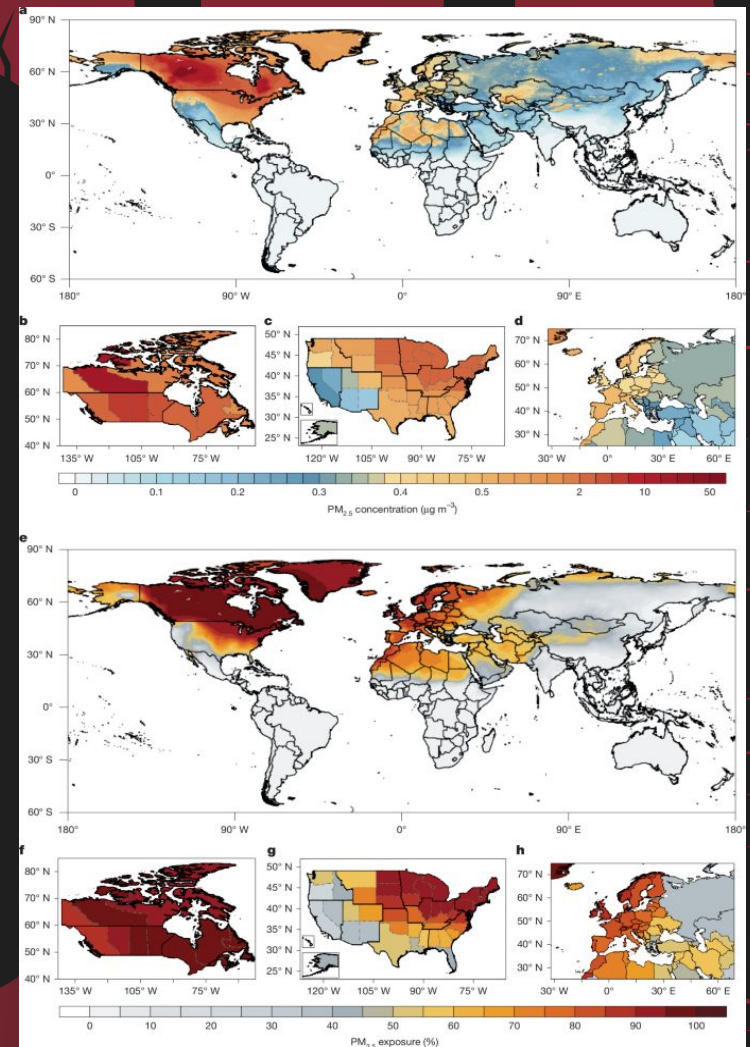
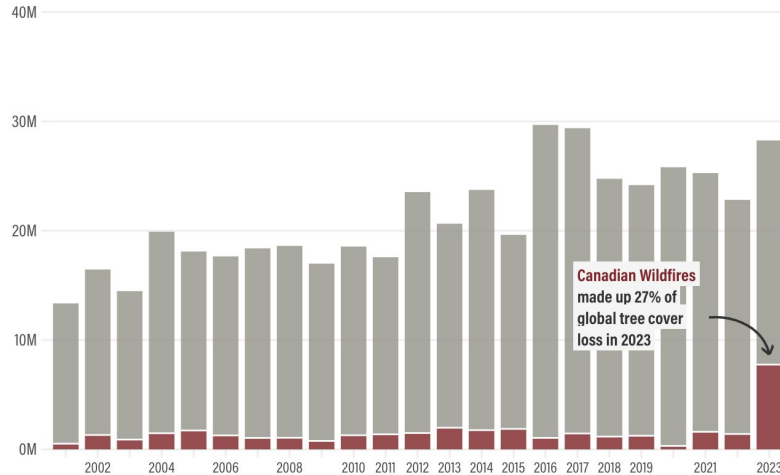


FIGURE S

Global tree cover loss in 2001-2023

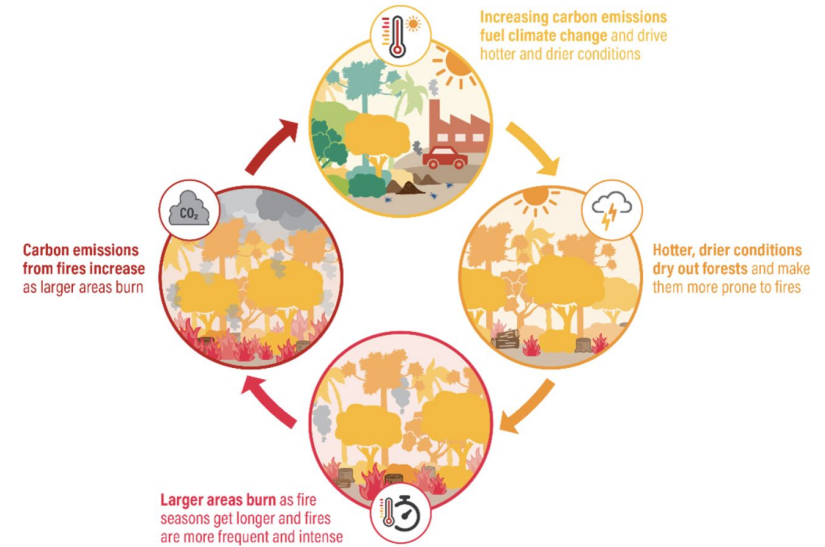
■ Tree cover loss from Canadian wildfires ■ All other forest loss globally

Tree cover loss (hectares)



Non-fire related loss can occur from mechanical clearing for agriculture and logging, as well as natural causes such as wind damage and river meandering. All figures calculated with a 30 percent minimum tree cover canopy density.

Fires and the Climate Feedback Loop



Source: Global Forest Watch.



02

Canadian Wildfires Impact on Wildlife



Natural Habitat



Canadian boreal forest species have evolved alongside fire and even rely on it.

Species like Jack pine and lodgepole pine have serotinous cones, when open, they release seeds that germinate in the nutrient-rich ash, giving way to a new generation of trees.



Practice: Indigenous Peoples have long used cultural burning to manage land and support ecosystems, distinct from arson.

Disruption: Colonial laws banned these fires, leading to dangerous fuel buildup.

Solution: Reviving cultural burning is now recognized as a way to mitigate today's destructive wildfires.



Habitats Impacted



Wildfires destroy wildlife shelter and food sources, displacing animals, and altering ecosystems. The fires lead to long-term issues like:

- Low water and soil quality
- releasing massive amounts of CO_2 into the atmosphere
- Destroying vegetation hurts the Earth's ability to absorb carbon and changes the quality of the land.



Native Species Impacted



- Woodland Caribou: These caribou depend on old-growth forests for food, especially lichen, which can take decades to regrow after a fire.
- Canada Lynx: This species requires both mature conifer forests for cover. Severe fires that eliminate the mature trees needed for shelter are detrimental.
- Wolverine: These predators require large, undisturbed habitats are threatened
- Burrowing Owl: These birds nest in prairie grasslands, and the fires have impacted the grasslands and natural nesting areas.

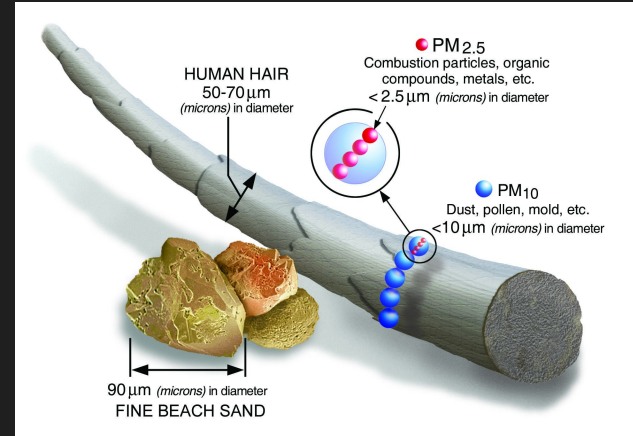


03

Social Impacts of Canadian Wildfires

Social Impacts – Health

- Wildfire smoke = O_3 , CH_4 , CO , fine particulates
- Result = Chest pain, wheezing, coughing, asthma attacks, sinus irritation, heart palpitations
- Highest risk: citizens w/ existing illnesses or health conditions, elderly, infants, pregnant women



Social Impacts – Communities

- Everyone is affected
- BUT indigenous groups are most impacted
 - 80% of indigenous communities in Canada located in fire-prone areas
 - More than 42% of wildfire evacuations have been from majority-Indigenous communities





04

**Past & Future of
WILDFIRES**

Slave Lake Fire



2011

- The Slave Lake Fire occurred during May of 2011, where the large wildfire burned through slave lake, Alberta, Canada.
- Many First Nation Indigenous people lost their homes and had to evacuate.
- After the fire, they were involved in the recovery process as well, such as working with the government of alberta on recovery strategies.

- The Horse River Fire occurred during May of 2016.
- Many first nation indigenous peoples faced health issues as a result of the fire, such as stress, and reliving traumatic events.
- Reported that the indigenous community was not given adequate health response.

2016



Horse River Fire

Manitoba Fire



2025

- The Manitoba Fire is a recent fire that occurred this year in the summer.
- One of the worst fires faced by Canada, and the first nation were severely impacted by the fires due to lack of preparedness, resources.

How do Changes in Climate Forecasts Impact the Future of Wildfire Incidents?

- Due to the increasing temperatures and decreasing humidity in air and soils, forest fires are expected to increase.
- In Quebec, forest fires will increase by 50-100% by the end of the century
- Increased area of burned land and large fire frequency

REFERENCES

MacCarthy, J., Tyukavina, A., Weisse, M., & Harris, N. (2024, June 27). Canada's record-breaking 2023 wildfires released nearly 4 times more carbon than global aviation. World Resources Institute.
<https://www.wri.org/insights/canada-wildfire-emissions>

Roşu, I.-A., Mourgela, R.-N., Kasoar, M., Boleti, E., Parrington, M., & Voulgarakis, A. (2025). Large-scale impacts of the 2023 Canadian wildfires on the Northern Hemisphere atmosphere. *Npj Clean Air*, 1(1).
<https://doi.org/10.1038/s44407-025-00022-9>

Schwabe, A. (2025, September 17). What changes in Canada's wildfire season mean for Wisconsin. Wisconsin State Climatology Office.
<https://climatology.nelson.wisc.edu/what-changes-in-canadas-wildfire-season-mean-for-wisconsin/>

Zhang, Q., Wang, Y., Xiao, Q. et al. Long-range PM_{2.5} pollution and health impacts from the 2023 Canadian wildfires. *Nature* 645, 672–678 (2025). <https://doi.org/10.1038/s41586-025-09482-1>

REFERENCES

Wildfire smoke and your health. Government of Canada. (2025, August 12).

<https://www.canada.ca/en/health-canada/services/publications/healthy-living/wildfire-smoke-health.html>

“Fact Sheet: Climate Change and Wildfires in Canada.” Canadian Climate Institute,
3 June 2025, climateinstitute.ca/news/fact-sheet-wildfires/.

Montesanti, S., Fitzpatrick, K., Azimi, T., McGee, T., Fayant, B., Albert, L. 2021. Exploring Indigenous Ways of Coping After a Wildfire Disaster in Northern Alberta, Canada. *Qual Health Res*.
DOI:10.1177/10497323211009194

Government of Alberta. 18 May, 2011. Update on wildfires in Slave Lake and other communities.
Accessed 24 November 2025.

https://www.alberta.ca/release.cfm?xID=3047104C4D336-A9D2-EEA5-1AE237121B96CD86&utm_source=chatgpt.com

References

Public Safety Canada. 30 October, 2025. Government of Canada provides update on 2025 wildfires as support continues. Accessed 24 November 2025

<https://www.canada.ca/en/public-safety-canada/news/2025/10/government-of-canada-provides-update-on-2025-wildfires-as-support-continues.html>

Ouranos. 2020. “Forest fires - Projected changes”. Ouranos. Accessed 26 October 2025.

<https://www.ouranos.ca/en/climate-phenomena/forest-fires-projected-changes>

References

Lodgepole Pine Cones Release Seeds When Triggered by Fire — Biological Strategy — AskNature. (2025).

Asknature.org. <https://asknature.org/strategy/lodgepole-pine-cones-release-seeds-when-triggered-by-fire/>

Austen, I. (2023, August 27). How Indigenous Techniques Saved a Community From Wildfire. The New York Times.

<https://www.nytimes.com/2023/08/27/world/canada/canada-wildfires-kelowna-british-columbia.html>

Reynandez, R. (2019). All About Wildfires: Causes, Effects, and Educational Activities. Project Learning Tree.

<https://www.plt.org/educator-tips/wildfires-causes-effects-educational-activities>

Lyons, A. L., Gaines, W. L., Lewis, J. C., Maletzke, B. T., Werntz, D., Thornton, D. H., Hessburg, P. F., Begley, J.,

Vanbianchi, C., King, T., Blatz, G., & Fitkin, S. (2023). Climate change, wildfire, and past forest management challenge conservation of Canada lynx in Washington, USA. *Journal of Wildlife Management*, 87(5).

<https://doi.org/10.1002/jwmg.22410>



**THANK
YOU**