Canadian Wildfire Grading Index

Definition of the Index

The **Canadian Wildfire Grading Index** is a national fire risk index that assigns a relative severity score to the level of wildfire risk for all insurable buildings across Canada. Continuously enhanced each year, the Index incorporates the latest research and methodologies, ensuring it remains a leading-edge tool for assessing wildfire exposure.

At its core, the Index is a **continuously improving data system** that brings insurers and local governments together under a common framework for quantifying wildfire risk. Its foundation in Canadian-published research, standards, and guidelines ensures that all parties are working from the same trusted reference points.

For clarity, the terms *local governments* and *municipalities* are used interchangeably throughout, though they may carry different legal meanings in specific jurisdictions. Fire Underwriters Survey (FUS) works closely with all forms of Canadian government—large and small, municipal and regional—to ensure that both wildfire risk and emergency response capacity are measured in a consistent, standardized manner, regardless of jurisdiction type.

The Issue with Wildfires and Urban Conflagrations

The most pressing wildfire issue in recent decades—for both property insurers and municipalities—has been the escalating trend of large outdoor fires encroaching on the built environment and transforming into full-scale urban conflagrations.

Urban conflagrations have shaped the growth and decline of cities for centuries. From fires following earthquakes to accidental outbreaks fueled by drought and dense construction, these catastrophes have left an indelible mark on communities across the globe. The Great Fire of London in 1666 remains one of the earliest well-documented urban conflagrations, and its conditions—dry weather, human ignition, and tightly packed structures—are strikingly similar to those that drive today's wildfire-driven urban fire events. [1]

Between the 1600s and the early 1900s, urban conflagration was a constant threat worldwide. In North America, vast timber resources led to widespread use of wood-frame construction, creating urban centers primed for conflagration. Lack of well-organized and funded Fire departments, water systems and lack of enforcement of building and fire codes greatly contributed to the risk of any small fire growing quickly into an uncontrollable conflagration. Boston experienced three major urban conflagrations in just 15 years (1820–1835), while the Great Chicago Fire of 1871 killed 300 people and destroyed more than 17,000 structures. These tragedies underscored the urgent need for change, spurring the development of Insurance Company Boards/Associations (e.g. NBFU, CFUA) that worked to create fire risk indexes that were used to connect insurance pricing with the level of measured/indexed fire risk and response capacity.

Once fire risk indexes and risk maps for the built environment were developed, insurers gained a powerful tool to better understand their exposure and price risk with greater accuracy. These tools not only improved underwriting profitability but also created a new level of transparency for communities. As local governments realized that Insurance Associations and Boards would be assessing their level of fire protection—and that those assessments would directly influence insurance pricing and availability—they became increasingly proactive in managing fire risk.

Over time, municipalities began to recognize the economic value of strong fire protection ratings. Investments in modern building and fire codes, as well as the expansion of firefighting capacity, were no longer viewed simply as public safety measures but also as strategies to improve insurance affordability and accessibility for every property owner in their jurisdiction. This alignment of insurance incentives and municipal action fundamentally reshaped community-level fire risk management, creating a system where mitigation efforts directly translated into financial and social benefits.

Canadian Fire Risk Indexes - Background

The Canadian Fire Underwriters Association (CFUA) was originally formed in 1883 and has operated to measure and map the level of fire risk across all Canadian communities [2]. The CFUA continues to operate today as Verisk Canada's Fire Underwriters Survey.

FUS continues to measure fire risk and fire prevention and suppression levels for all of Canada. Over the past two decades, it has transitioned more than 100 years of fire risk data into an online ArcGIS Server-based platform accessible to insurance companies and Canadian municipalities.

FUS publishes the Dwelling Protection Grade Index for personal lines and this system provides a ranking (1-5) of the effectiveness of the emergency service response for every insurable one and two family dwelling in Canada.

FUS also publishes the Public Fire Protection Classification Index for commercial lines which provides a ranking (1-10) of the effectiveness of the emergency service response for every commercial lines insurable building in Canada.

FUS collects data from every level of government in Canada on all aspects of fire risk and emergency response capacity, as well as prevention activities, including the development and enforcement of building and fire codes. Additionally, FUS has established a cutting-edge GIS Analytics Department that has created GIS services to support all types of risk and emergency response analysis.

As large outdoor fires increasingly escalated into urban conflagrations, it became clear that this type of event fell outside the scope of the two fire risk indexes previously published by FUS (for dwelling fires and commercial lines fires).

The reason was straightforward: the design fire event for wildfire-driven urban conflagration is fundamentally different, requiring a distinctly different scale of mitigation and emergency response. Recognizing this gap, FUS has developed a third fire risk index—focused specifically on wildfire events and their potential to ignite and spread through the built environment. This new index provides insurers, governments, and communities with a dedicated system to assess, manage, and mitigate the growing wildfire risk to the built environment.

Canadian Wildfire Grading Index

The Canadian Wildfire Grading Index was initially developed in 2014 and released in 2017. Since its launch, the system has been continuously refined, with new improvements and upgrades added each year as data, research, and feedback from subject matter experts in research departments, municipalities and insurance companies has been received and integrated.

The Index is deliberately designed to align with the **National Research Council's Wildland Urban Interface (WUI) Guide** [3] and **FireSmart Canada** publications [4]. By grounding the system in these nationally recognized frameworks, insurers and municipalities can work from a shared set of definitions and standards. This alignment ensures that all stakeholders—whether underwriting policies or implementing local mitigation measures—are speaking the same language and operating with consistent terms of reference.

Some of the most important features of the Canadian Wildfire Grading Index include:

- it provides a standardized, indexed measure of the level of wildfire risk for all insurable buildings in Canada
- it connects insurers and municipalities to the same index of risk levels
- it facilitates the Economic Incentive (between insurers and municipalities) for improving risk, which is needed for local governments to invest in the prevention and suppression tools necessary to bring the risk under control
- it is continuously being updated in terms of data and methods to leverage the best available technologies and research
- it provides a data system that is continuously being populated and improved with numerous data providers at all levels from the property-level through to the federal government level

The Canadian Wildfire Grading Index is designed to provide a stable system of indexing wildfire risk for all insurable buildings (Values at Risk), and to regularly review and update processes and approaches as new data and research becomes available.

FUS representatives actively participate in the following relevant committees to ensure that the best available research and approaches are being integrated into the methodology used to Index risk:

- NRC Blueprint for Wildland Fire Science [5]
- NRC WUI Guide [3]
- CAFC Climate Adaptation Committee
- International Association of Fire Safety Science - Large Outdoor Fires and the Built Environment
- NFPA 1140, Standard for Wildland Fire Protection [6]
- Society of Fire Protection Engineers Foundation WUI Working Group [7]
- Underwriters Laboratories Technical Committee on Wildland-Urban Interface Fires [8]

Wildfire Risk Classifications are determined for each location in Canada primarily by determining:

1) The **Hazard Severity** for the zone (number and size of significant fires, frequency of significant fires, climate factors that drive wildfires, ecozones, etc.)
2) The **Exposure Severity** to wildland fuels (WUI Zone) (blended risk assessment of percent of surrounding area with vegetation/fuels that will produce radiant heat, short-range embers and long-range embers)
3) The Base Wildfire Risk Class (WRC) is a function of the Hazard and Exposure, the greater that each value is, the greater the inherent risk at that location. Conversely if either Hazard or exposure is nil, then the base risk is also nil.
4) The Base Wildfire Risk Class is adjusted for location specific conditions including topography, access to water supplies, strong initial response from local fire departments, etc. to present an adjusted Wildfire Risk Class to the user.
5) This information is useful to both insurers and municipalities as it illustrates where values at risk exist and where mitigation strategies should therefore be considered.

There is a tremendous amount of information going into each of the reference layers and the methodology is very aligned with the NRC WUI Guide [3] approach (although not exactly the same). The system is designed so that FUS can continuously update the reference layers with the best possible data as it becomes available (land cover maps, fire history, local mitigation activity, etc.), and recognize public investments in preparation, mitigation and response capacity.

The Wildfire Risk Class indicates the importance of local mitigation activities such as FireSmart inspections or investment in building-level prevention and hardening, which increases as the value approaches 10.

In areas of communities with a concentration of Values at Risk with high Wildfire Risk Classes, communities are encouraged to manage the fuels and develop pre-incident plans to protect Values at Risk using effective methods such as pre-installed (or quick-deploy) structure protection exterior sprinkler units with adequate water supplies, fire breaks, fuel treatments, etc. as described in the NRC WUI Guide [3], FireSmart Canada references [4], NFPA 1140 [6] and NIST Technical Note 2205 Community Fire Hazard Mitigation Methodology [9].

Distribution of Wildfire Grading Index Data

Subscribing insurance and reinsurance carriers are provided with the following options for connecting to the Canadian Wildfire Grading Index:

- Online Graphic User Interface with Wildfire risk data details and interactive wildfire risk maps with layer access and controls
- Web service (API) system for connecting digital underwriting systems to pull data elements in real time (with access to direct analysis of geocodes or utilizing the Opta Proprietary Advanced Multi-source Canadian Address Geocoding System)
- Portfolio Analytics system provides access to batch data processing for large numbers of risks, simultaneous analysis with results in tabular formats

New Features available in 2025 in Beta

- Current Wildfire Information System
  - Includes an analysis of the location's proximity to the most current (up-to-the-day) wildfire information, including:
    - Proximity to
      - Active Fire Points
      - Fire perimeters
      - Fire M3 HotSpots
    - Fire Danger Rating based on current weather conditions
- Office of the Superintendent of Financial Institutions (OSFI), Data elements for Wildfire component of Climate Scenario Exercise [10], including:
  - **Build Up Index (BUI) – 95th percentile**, based on **RCP 4.5 scenario** for reference periods:
    - Baseline 1971-2000
    - Future 2041-2070
  - **Fire Season Length – 95th percentile**, based on **RCP 4.5 scenario** for reference periods:
    - Baseline 1971-2000
    - Future 2041-2070
  - Derived **"Scenario Bucket"** (based on the BUI result value)
- Subdivision Scale Directional Vulnerability to Large Outdoor Fires [11]

Features in Development

- Community Wildfire Resilience Grade
  - Data is being collected from Canadian communities on the level of mitigation, prevention and suppression capacity relative to the measured level of wildfire risk.
- Subdivision Scale Structure to Structure Vulnerability
  - Structure-to-structure vulnerability assessments are in development and aligned with NIST Hazard Mitigation Methodology [9]. This layer is expected to be released for usage in 2026.

Limitations

Determination of wildfire risk and urban conflagrations is an evolving science. The risk indexes published by FUS are limited by the accuracy and up-to-datedness of the underlying information provided to FUS. The information provided in the Indexes published by FUS is provided as-is with no guarantees as to the accuracy of the underlying information.

References

[1] Insurance Institute for Business & Home Safety (IBHS), "The Return of Conflagration in Our Built Environment," Insurance Institute for Business & Home Safety (IBHS), 2023.

[2] C. L. Hives, The Underwriters, the history of the Insurers' Advisory Organization and its predecessors, the Canadian Fire Underwriters' Association and the Canadian Underwriters' Association, Vancouver: UBC, 1985.

[3] N. e. a. Bénichou, National guide for wildland-urban-interface fires: Guidance on hazard and exposure assessment, property protection, community resilience and emergency planning to minimize the impact of wildland-urban interface fires (NRCC-CONST-56449), Ottawa: National Research Council of Canada., 2021.

[4] Canadian Interagency Forest Fire Centre (CIFFC), "FireSmart Canada Resources," [Online]. Available: https://firesmartcanada.ca/resources-2/. [Accessed 14 January 2023].

[5] Natural Resources Canada, "Blueprint for wildland fire science in Canada (2019–2029)," Government of Canada, Ottawa, 2019.

[6] National Fire Protection Association (NFPA), "Standard for Wildland Fire Protection," National Fire Protection Association (NFPA), Quincy, 2022.

[7] Society of Fire Protection Engineers (SFPE), "SFPE Foundation Wildland-Urban Interface Working Group Initiative," 30 June 2022. [Online]. Available: https://www.sfpe.org/foundationtest/initiatives/wui3.

[8] Underwriters Laboratories, "UL Standards & Engagement Selected by the Standards Council of Canada to Lead Wildfire Resilience Efforts," 5 August 2025. [Online]. Available: https://ulse.org/news/ulse-selected-standards-council-of-canada-to-lead-wildfire-resilience-efforts/.

[9] National Institute of Standards and Technology., "Wildland-urban interface fire exposures: A review of data and methodologies (NIST Technical Note 2205)," NST, 2022.

[10] Office of the Superintendent of Financial Institutions Canada (OSFI), "OSFI - Standardized Climate Scenario Exercise," [Online]. Available: https://www.osfi-bsif.gc.ca/en/data-forms/reporting-returns/standardized-climate-scenario-exercise. [Accessed 12 March 2025].

[11] J. L. B. &. A. M. Forbes, "Assessing directional vulnerability to wildfire," *Natural Hazards*, vol. Volume 117, p. pages 831–849, 2023.

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Contact **information@verisk.com** for more information about the Canadian Wildfire Grading Index or other fire risk indexes published by Fire Underwriters Survey.

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