FPInnovations
Wildfire Operations

Lessons from Canada

Kelsey Winter

November 2024

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Agenda

Introduction

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Wildfire Operations Group

Our research themes

23/24 Wildfire seasons

Unprecedented

Coast-to-coast-to-coast

What we're trying to find out

Wildfire Community Impact

Fuel Treatment Efficacy

Detection & Suppression

Living labs

Discussion/Questions

Contact information

Kelsey Winter

Manager Wildfire Operations

Education

- Bachelor of Commerce
- Masters of Natural Resources
- Masters Certificate in Fire Ecology, Technology and Management
- Master Certificate in Restoration Ecology
- PhD candidate in Public Administration (focus on policy barriers to wildfire resiliency)

Relevant work history

- BC Wildfire Service 2009-2023
- Chair BC FireSmart Committee 2017-2023


Tim Hortons
Tim Hortons

FPINNOVATIONS IS A RTO

RESEARCH AND TECHNOLOGY ORGANISATION

FUNDAMETAL RESEARCH

TO DEVELOP KNOWLEDGE AND TRAIN THE NEXT GENERATION

TRANSLATE FUNDAMENTAL KNOWLEDGE

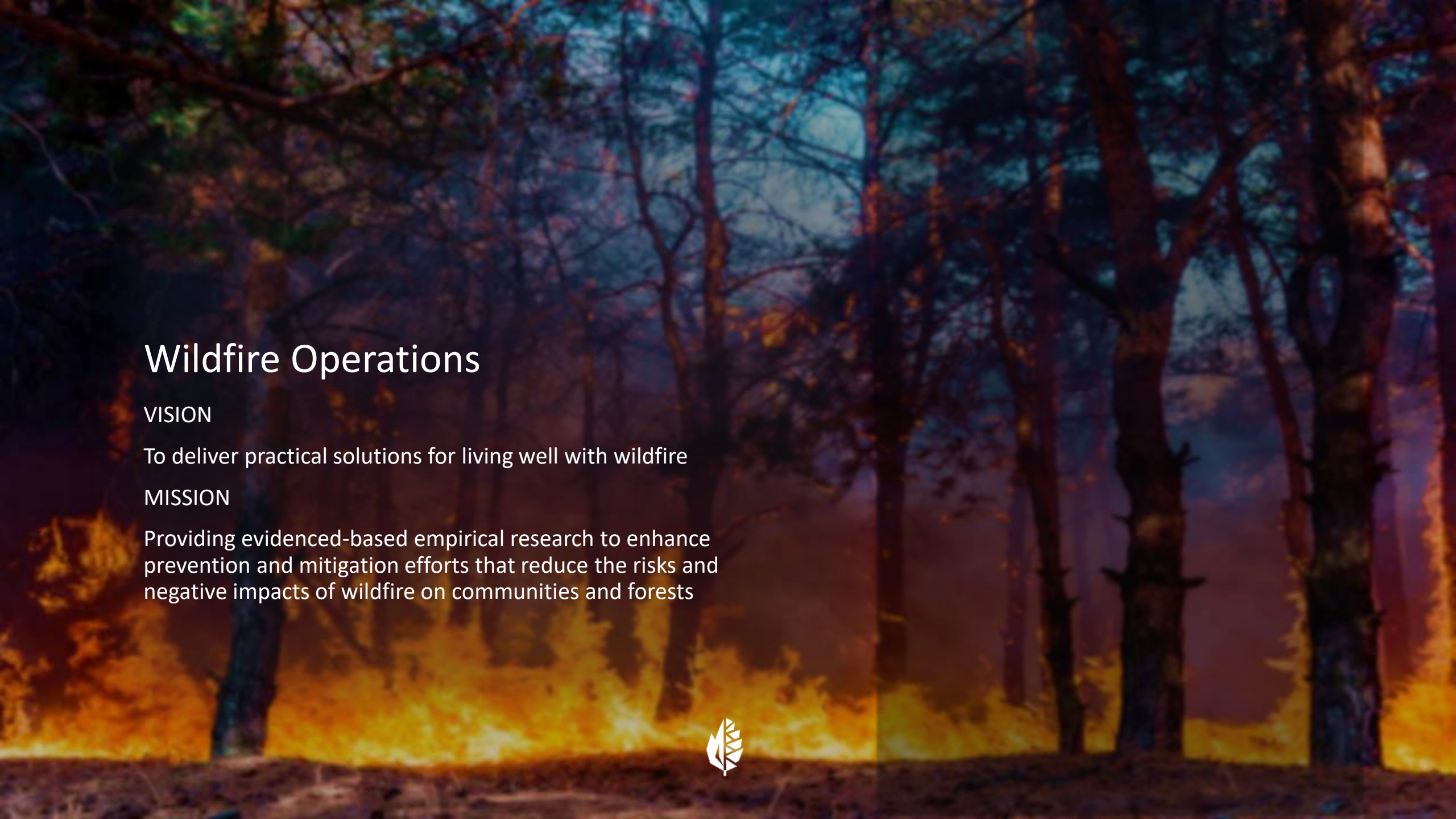
INTO APPLIED SOLUTIONS

TO RESPOND TO INDUSTRY CHALLENGES AND CREATE ECONOMIC VALUE

MODERNISATION

VS.

TRANSFORMATION



Wildfire Operations

VISION

To deliver practical solutions for living well with wildfire

MISSION

Providing evidenced-based empirical research to enhance prevention and mitigation efforts that reduce the risks and negative impacts of wildfire on communities and forests

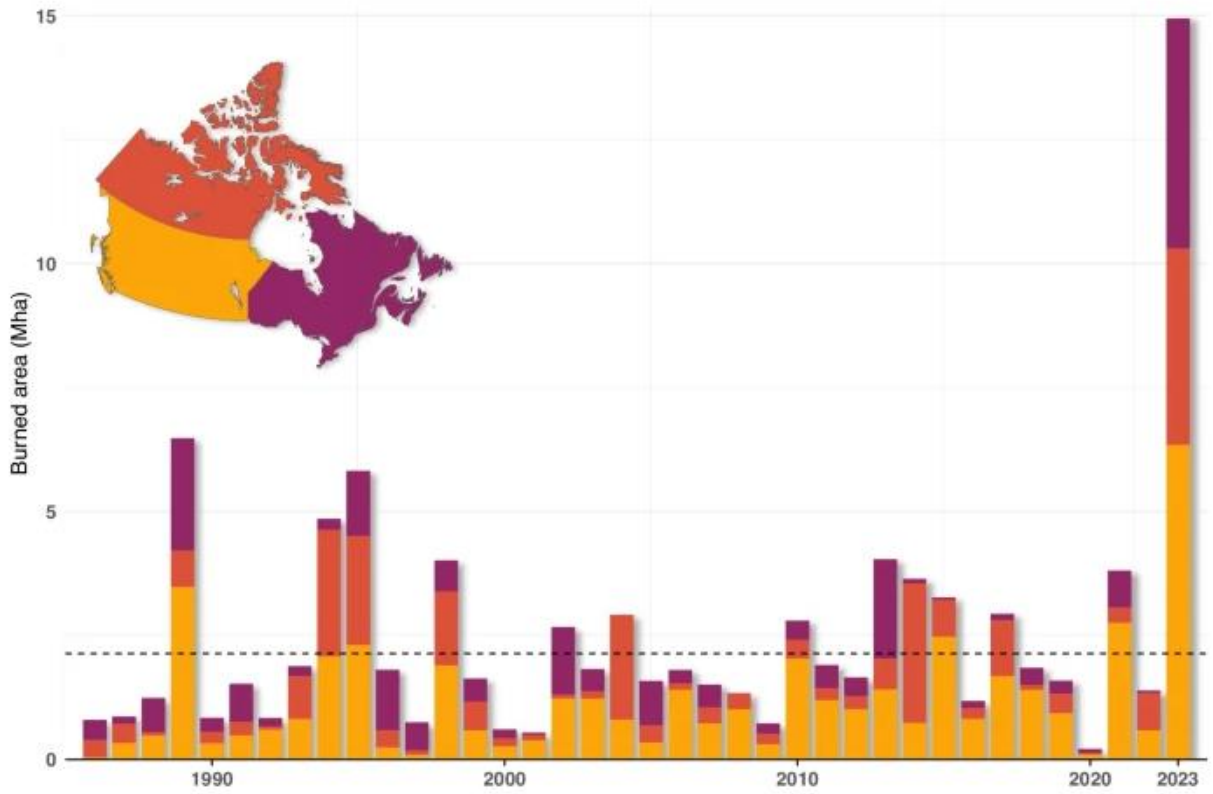
Research Themes

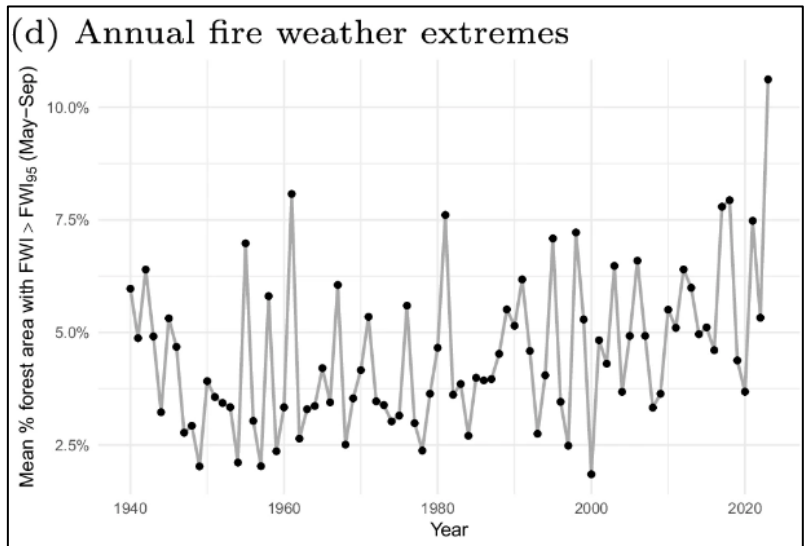
- **Mitigation and prevention:** reduction of probability and severity of unwanted wildfires
    - Fuel treatment efficacy studies
    - In-stand microclimate comparative analysis
    - Evaluating mulching in fuel treatments
    - Large scale experimental burns
- **Wildfire response:** improving suppression success, pre-suppression tactics, firefighter safety, and maximizing efficiencies
    - Equipment evaluation
    - Detection systems and program evaluations
- **Post-fire response and recovery:** post-fire recovery and rebuilding to increase forest health and resilience
    - Evaluation of changes to built environment
    - Structure-ignition research
    - Post-fire examination studies
- **National wildfire data collection:** strategy and implementation

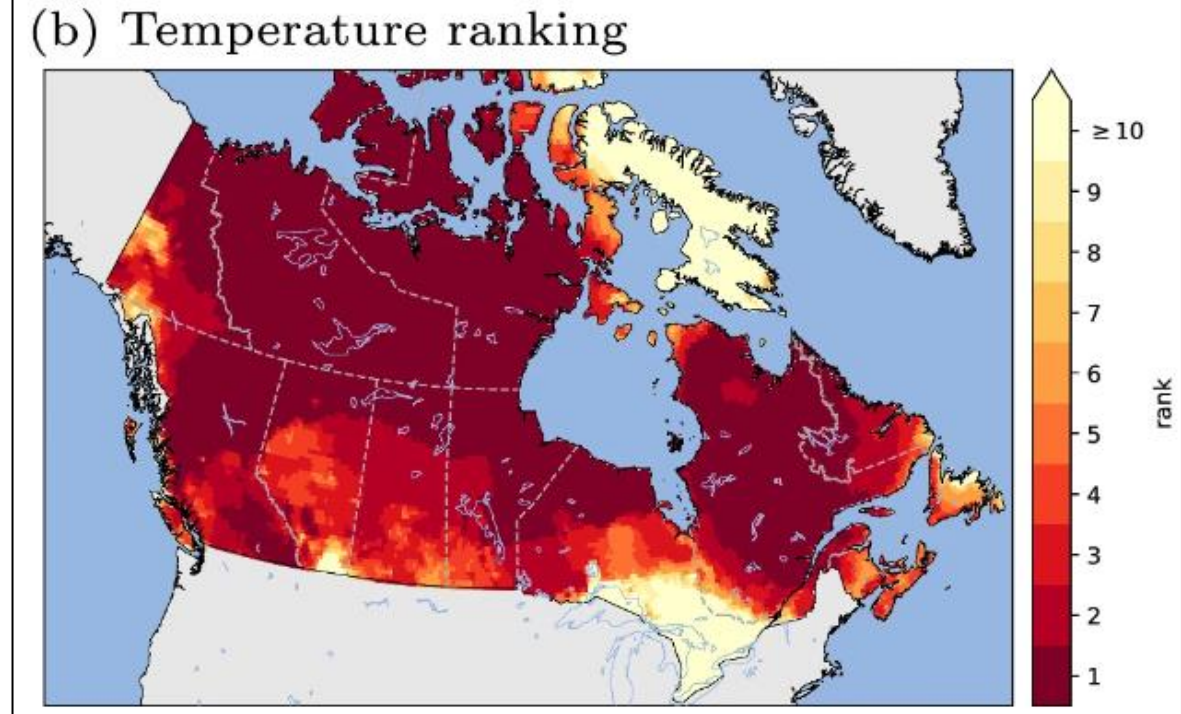
Some related research areas of interest

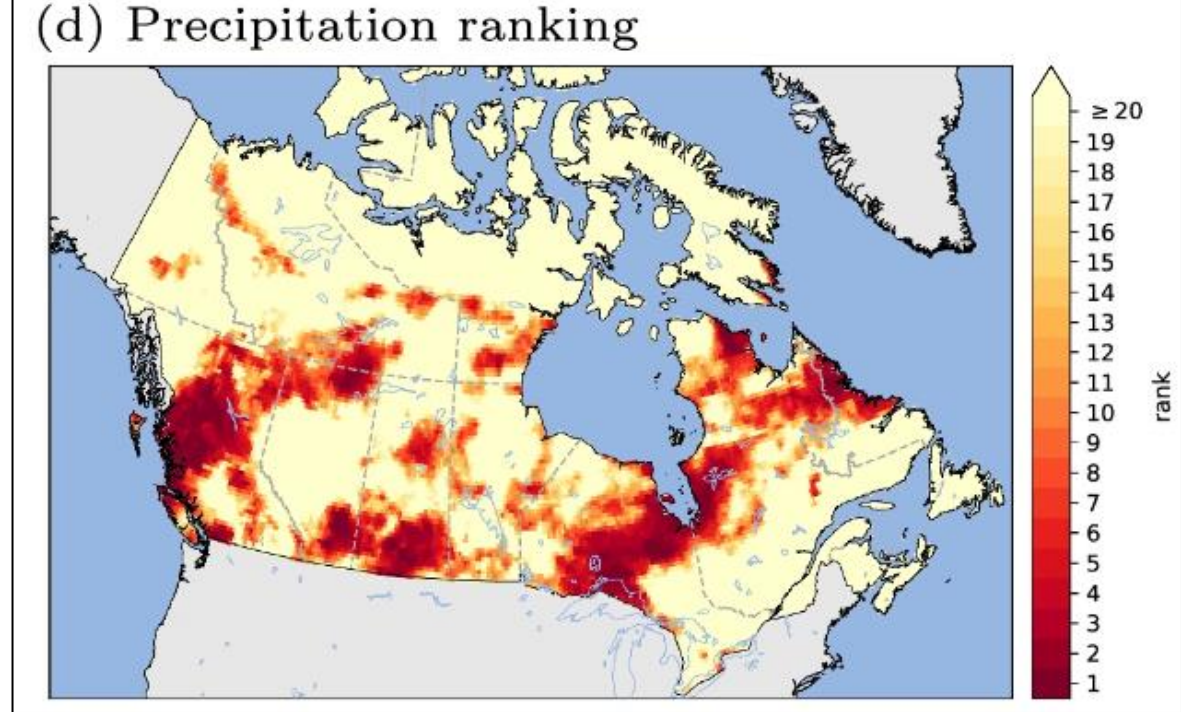
- Creation of a Canadian WUI building code
  - Solidifying the external and internal structure fire research to support that work
- Standardizing residential structures for wildfire exposures
- Wood construction and resilient communities and affordable housing
- Climate-related building resilience (multi-hazard)
- Modelling fire progression in the built environment
- Fire salvage harvesting
- Burn pattern classification for recovered wood

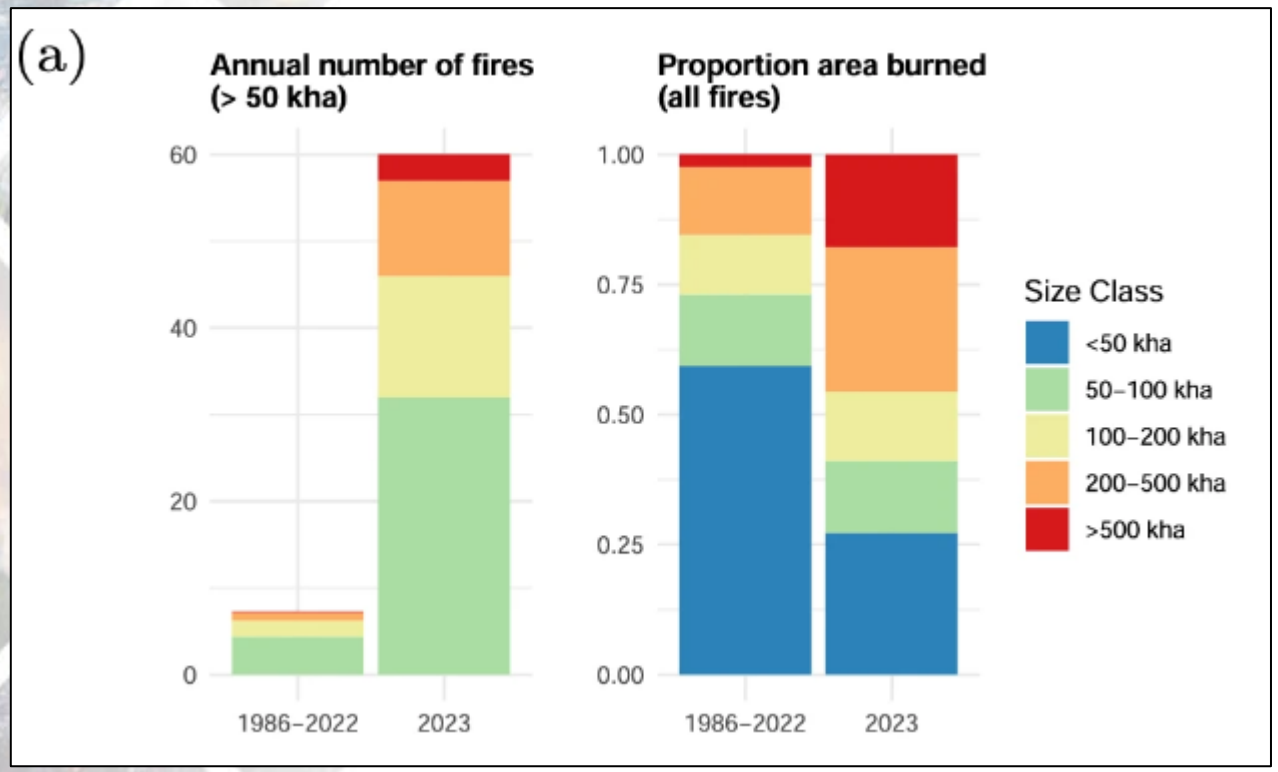
Fig. 2: Annual area burned time series for Canada.

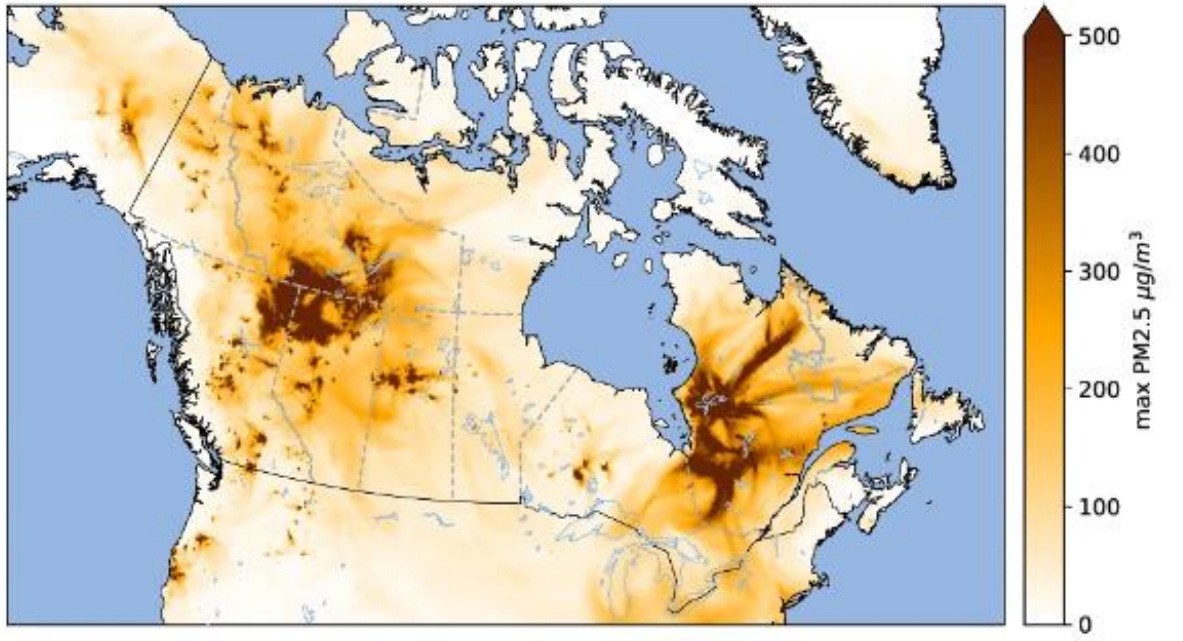


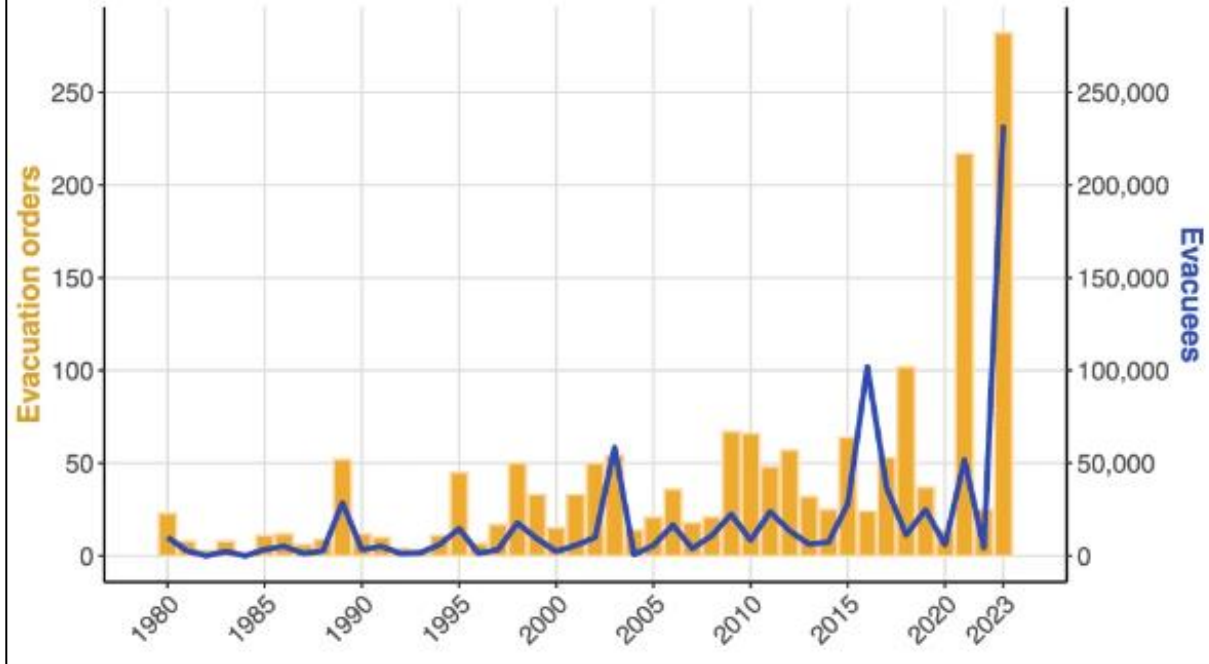







(a)
Annual number of fires
(> 50 kha)
60
40
20
0
1986–2022
2023
Proportion area burned
(all fires)
1.00
0.75
0.50
0.25
0.00
1986–2022
2023
Size Class
<50 kha
50–100 kha
100–200 kha
200–500 kha
>500 kha


500
400
300
200
100
0
max PM2.5 µg/m³


Evacuation orders
250
200
150
100
50
0
250,000
200,000
150,000
100,000
50,000
0
Evacuees
1980
1985
1990
1995
2000
2005
2010
2015
2020
2023

CANADA'S 'APOCALYPTIC' WILDFIRES

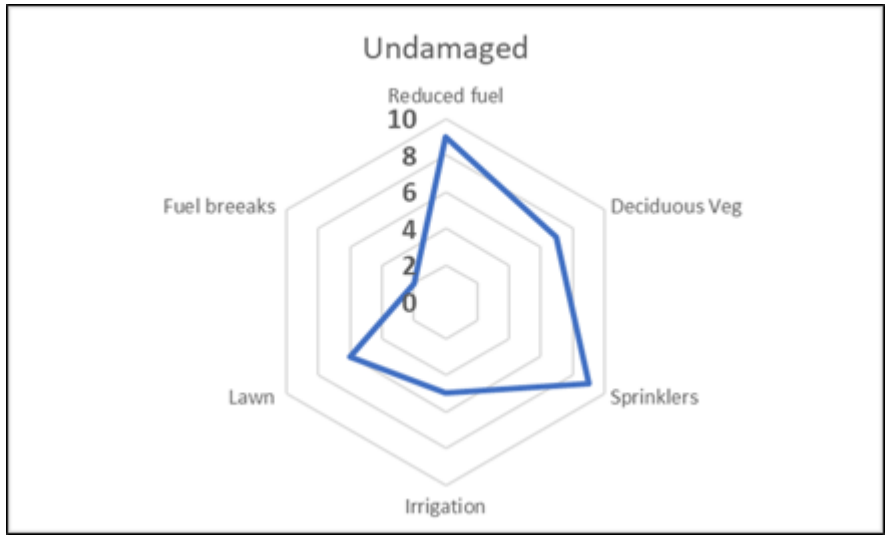
What we’re trying to find out

Wildfire community impact research

- Ensures important evidence within the wildland, interface and urban zones are not lost or compromised
- Furthers our knowledge and understanding of how wildfires enter communities, and why some homes burn, and others do not, can help improve wildfire suppression effectiveness.
- Generates homegrown research and analysis to make sure policies and practices are directly applicable to the conditions in Canada
- Leads to developing predictive models for use in determining the most cost-effective actions that individuals and governments can take to minimize structure ignition from wildfires
- Critical to our ability to prevent further disasters and recover quicker and more effectively when they do occur.
- Ultimately saves lives

23/24 overall recommendations

- Remove combustibles in the 1.5 m area around all structures
- Treat flammable vegetation around property 1.5-10 m from structure(s)
- Manage fuel below slope
- Attend to decks and combustible yard items



Fuel treatment effectiveness - Case studies

Objective

- Assess the effectiveness of community fuel treatments in moderating fire behaviour.

Preliminary results

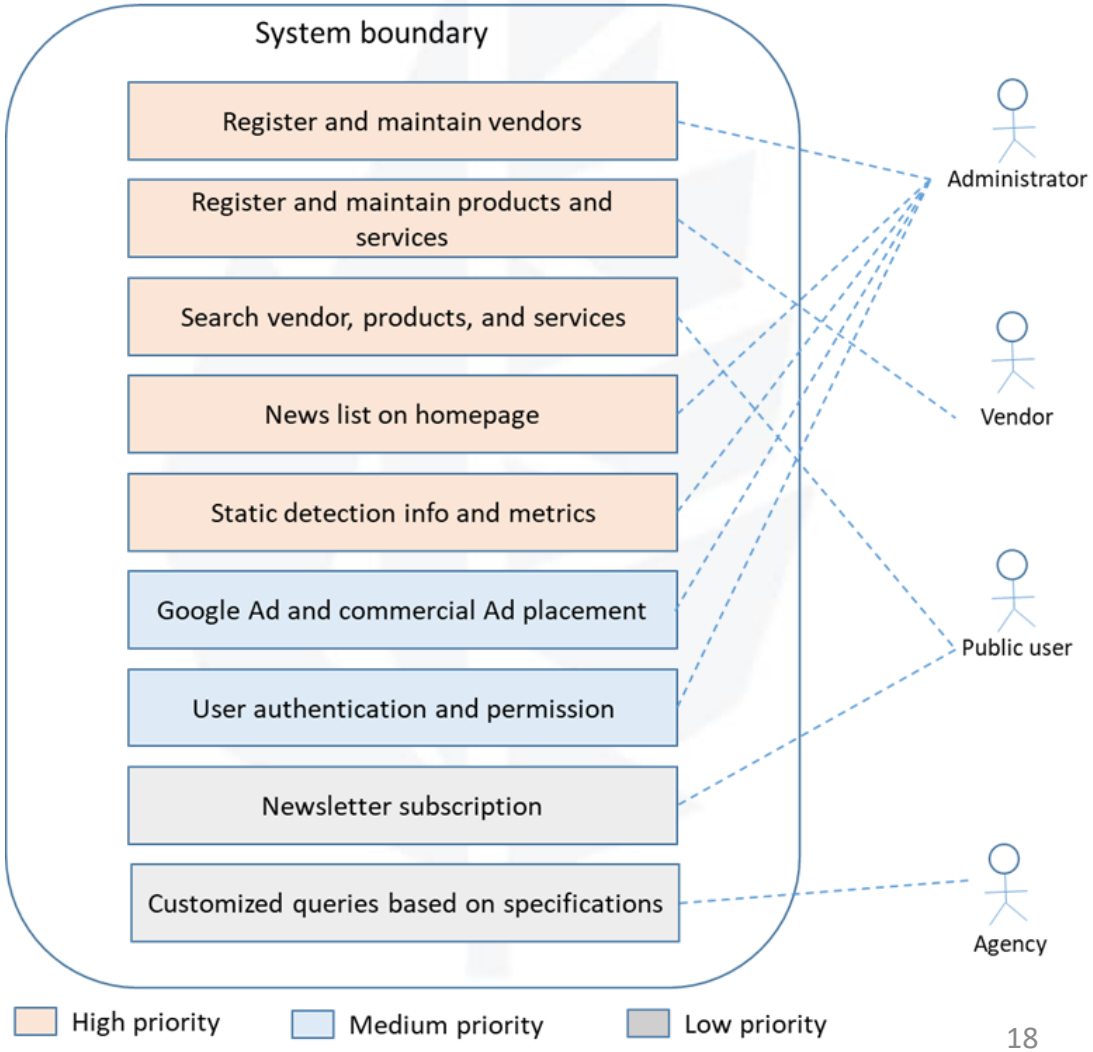
- **Nicomen Indian Band** – Planned ignitions in fuel treatment areas were used successfully as a defensive tactic.
- **Nohomin Creek** – Wildfire encroachment showed a reduction in fire behaviour as the fire moved through the fuel treatment area.
- **St. Mary's River** – Reductions in fire behaviour were observed in fuel treatments, legacy wildfires, and prescribed burns.
- **West Kelowna** – Conditions exceeded the capabilities of the fuel treatment. Fire behaviour was reduced, but crowning still occurred.
- **Westshore Estates** – In the absence of suppression interventions, fuel treatment areas moderated fire intensity.
- **Rainbow Lake** – Successful use of FireSmart treatments to anchor a burnout operation in C-2 fuels.

In-stand microclimates: evaluating impact of canopy cover reduction on surface level ‘in-stand’ climate and fuel moisture

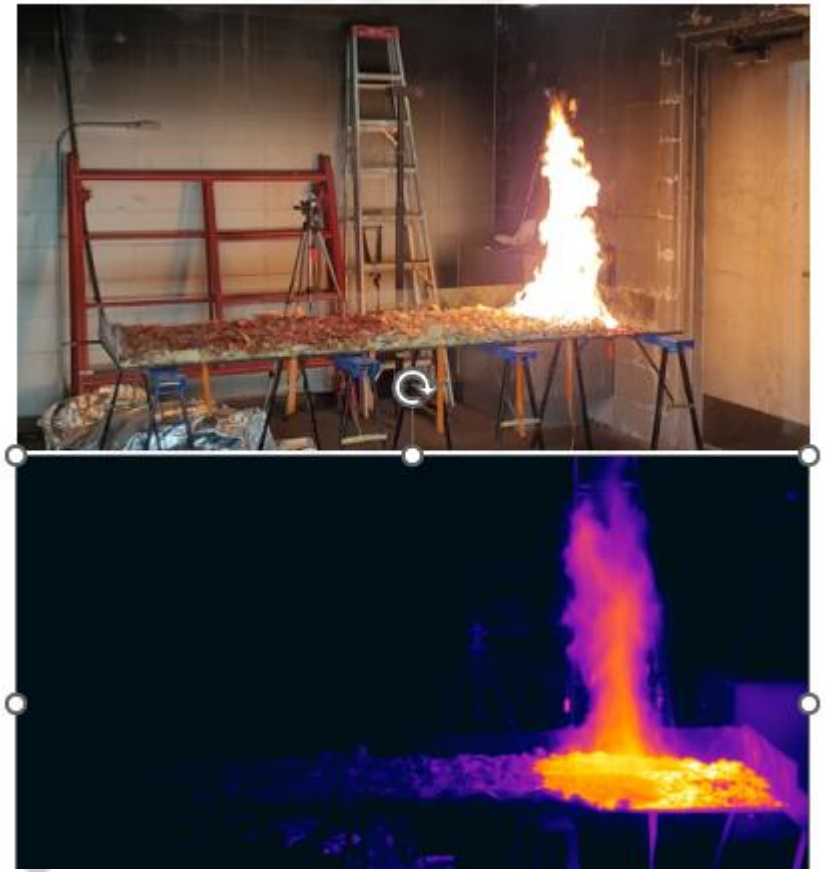
Flammability of chipped debris

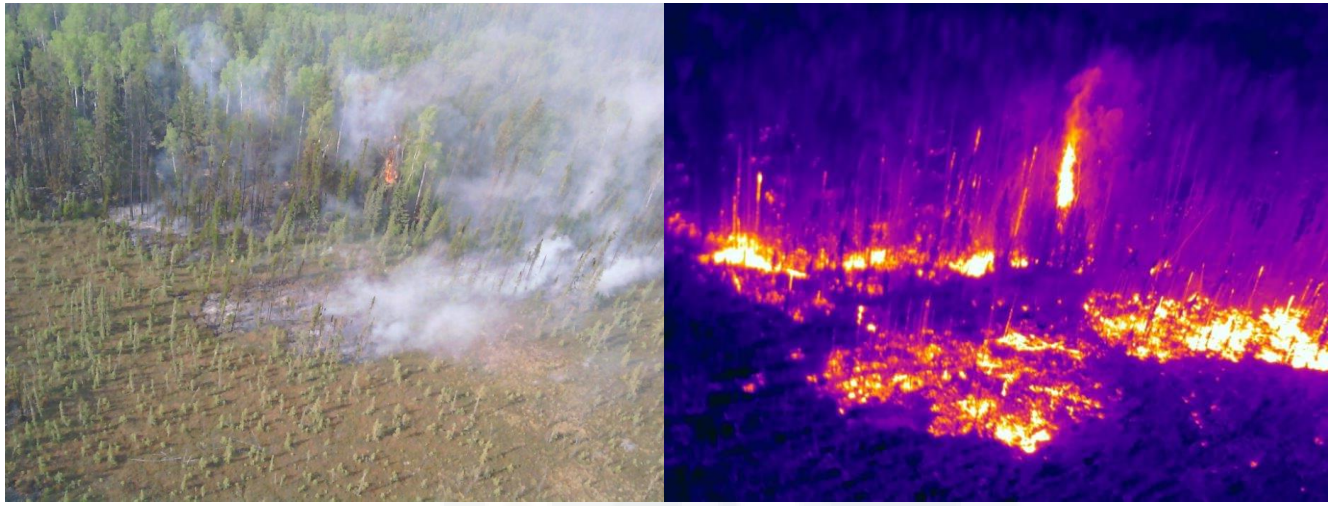
Wildfire risk reduction fuel treatment evaluation

Detection Program



Performance of retardant products

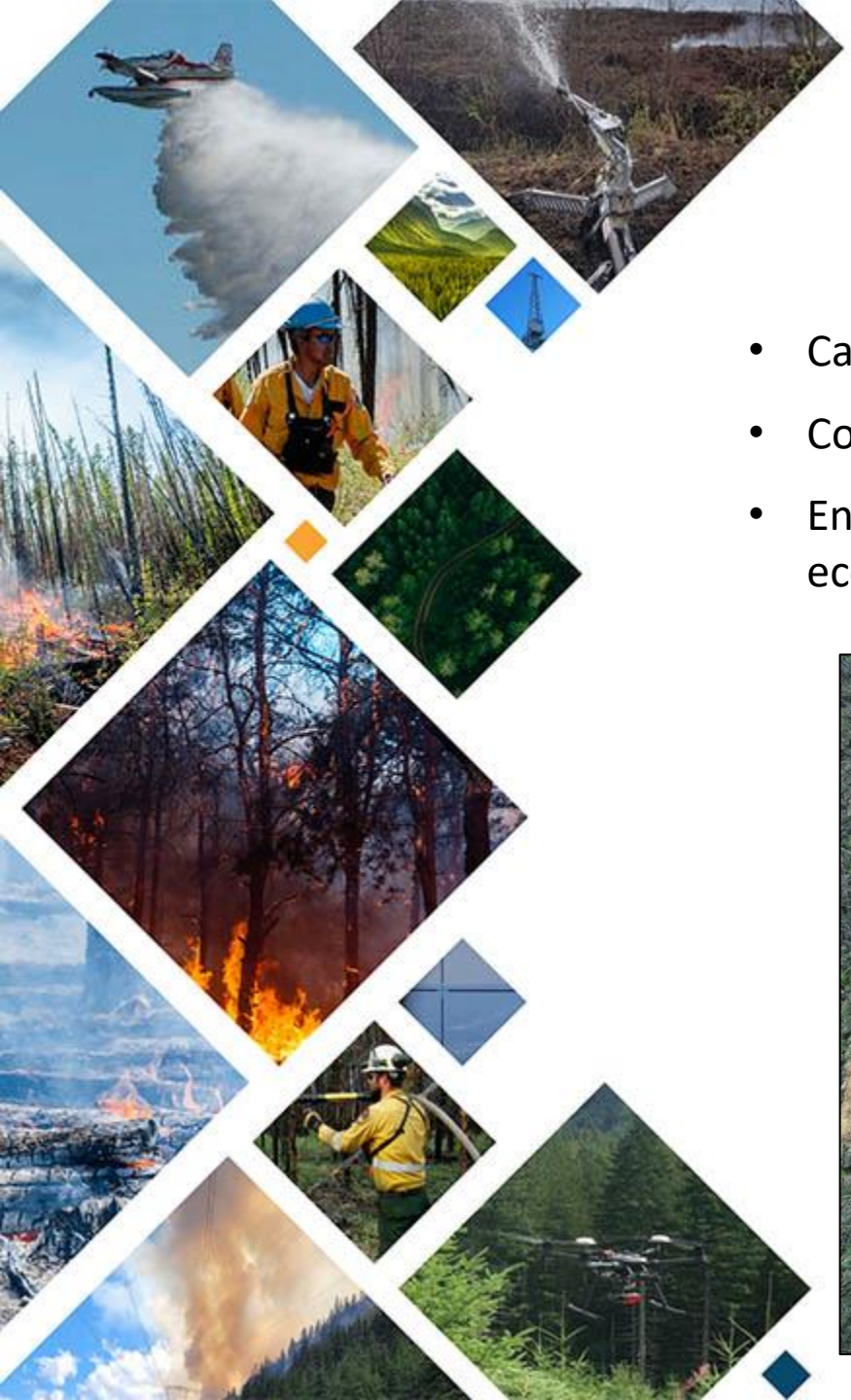




Method for quantifying effectiveness of chemical suppressants during aerial operations

Effectiveness of night-time aerial suppression

Improvements to airspace management

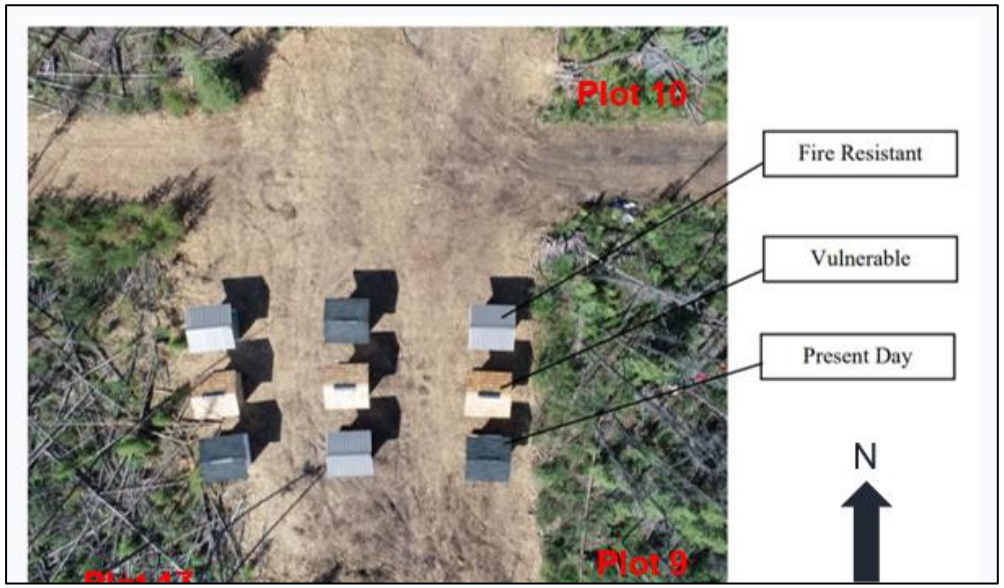


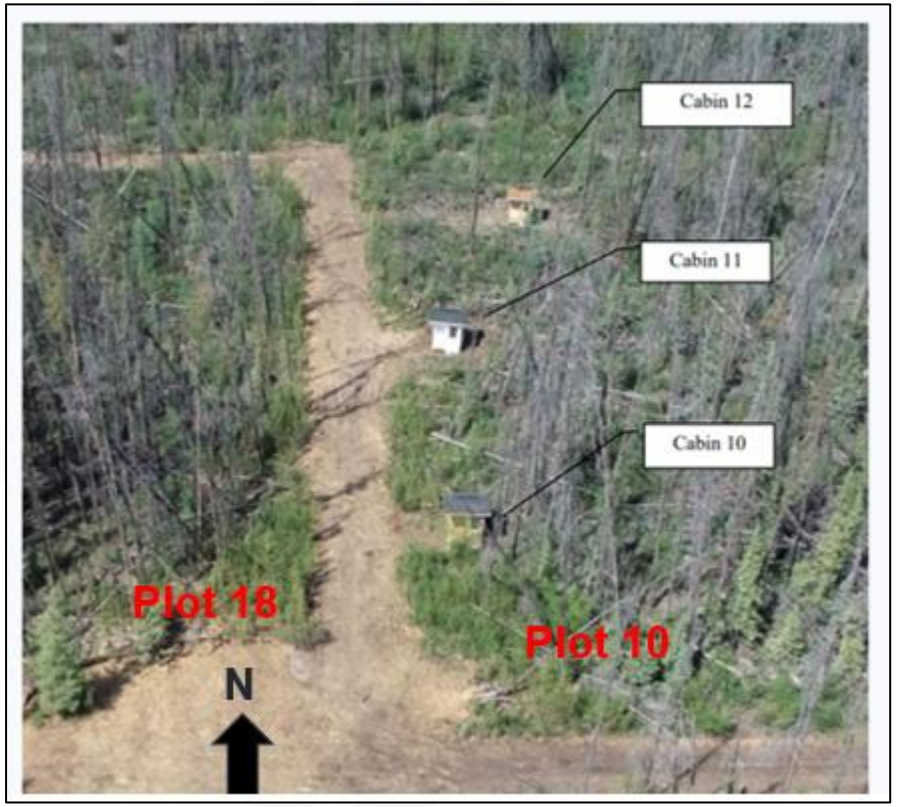
Living Labs

- Can extend burning season
- Conduct burns at the 90+ percentile
- Encompass different fuel types and forest ecosystems

Fort Providence FireSmart and Sprinkler research

- FireSmart Village
- 9 scaled structures: fire resistant, vulnerable and present day (e.g. most common from FireSmart BC assessment results)





- Sprinkler research
- Testing traditional vs low volume sprinklers with different degrees of spray (e.g. 180 vs 360)

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THANK YOU

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