FPInnovations
Wildfire Operations

Government of Northwest Territories

2023 Enterprise After Fire Report – lessons learned and future work

Wildfire Preparedness Workshop

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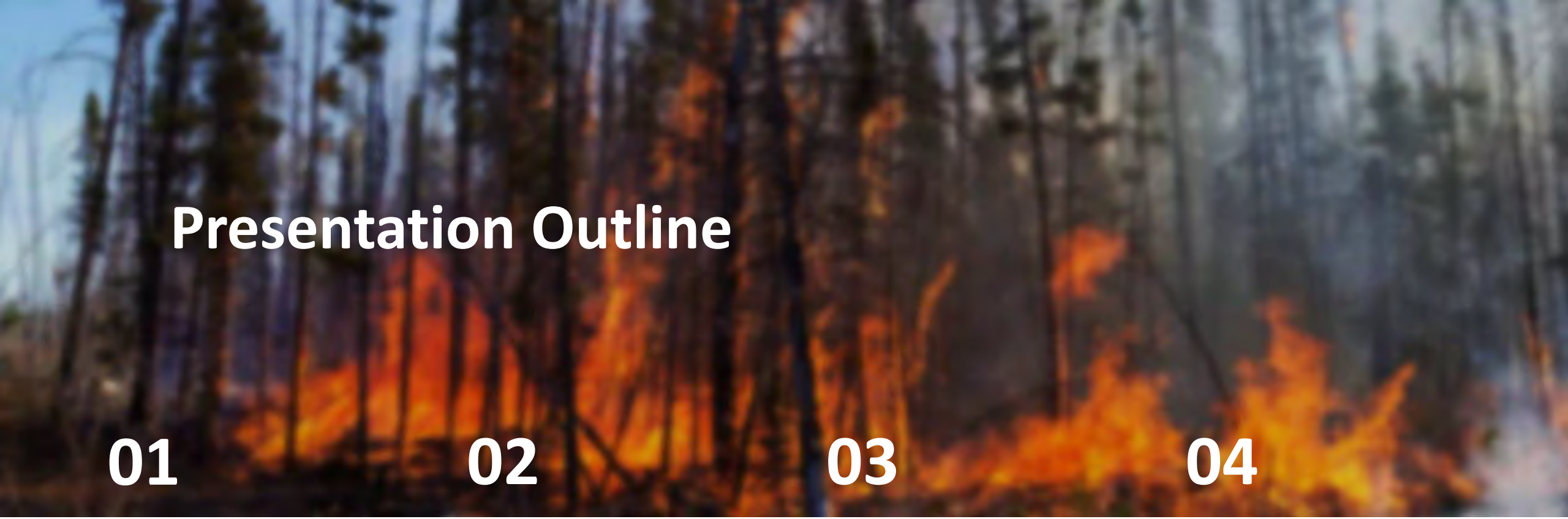
April 23, 2025

FPInnovations



Presentation Outline

01

Background

- Began in BC 2021
- BC 2023
- Enterprise 2023

02

Methods

- Fire Behaviour
- Fuel Treatments
- Home Assessment App
- Structural Investigation

03

Learnings

- Enterprise
- Shuswap, West Kelowna
- Los Angeles 2025

04

Future

- WCIR – About/Objectives
- We Need your help!
- Access/Human resources

Background

A brief history

- FPInnovations began a data collection project in 2021.
- Objective was to support FireSmart practices and identify structural and fuels characteristics that increase structural survival from wildfire impacts.
- Attempted to collect data before/during and after a wildfire enters a community.
- Added a Post-fire data collection framework Spring 2023

Objectives

FireSmart BC, BCWS and FPInnovations

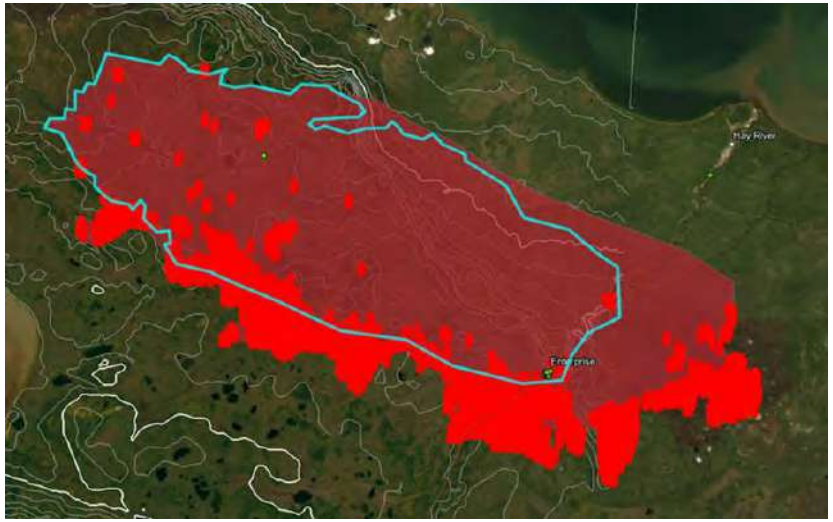
1. Identify how fire moved into a community.
2. Determine how the fire spread through the community once it had entered.
3. Compare damaged and undamaged structures.
4. Determine the impact that structure protection efforts had within the community and on individual structures.
5. Identify if fuel treatments modified fire behaviour.

Methods

Fire Behaviour

Includes:

- Physical evidence
- Fire weather data
- Fuels
- Personal observations - photos
- Models
- Satellite images



Methods

Fuel Treatments

These Includes

- Thinning
- Tree Species
- Clearing
- ‘Ball diamonds’

Methods

FireSmart Wildfire Mitigation App

Includes:

- 7 sections – multiple questions
- Includes 30 m from the structure to the HIZ:

  assesses vegetation and other

  'combustible' fuels.

Seven Sections

- Roofs and eaves
- Siding, Vents and Openings
- Decks, Porches and structural attachments
- Immediate zone (0 – 1.5 m)
- Intermediate zone (1.5 – 10 m)
- Extended zone (10 – 30 m)
- Accessory Structures and personal property

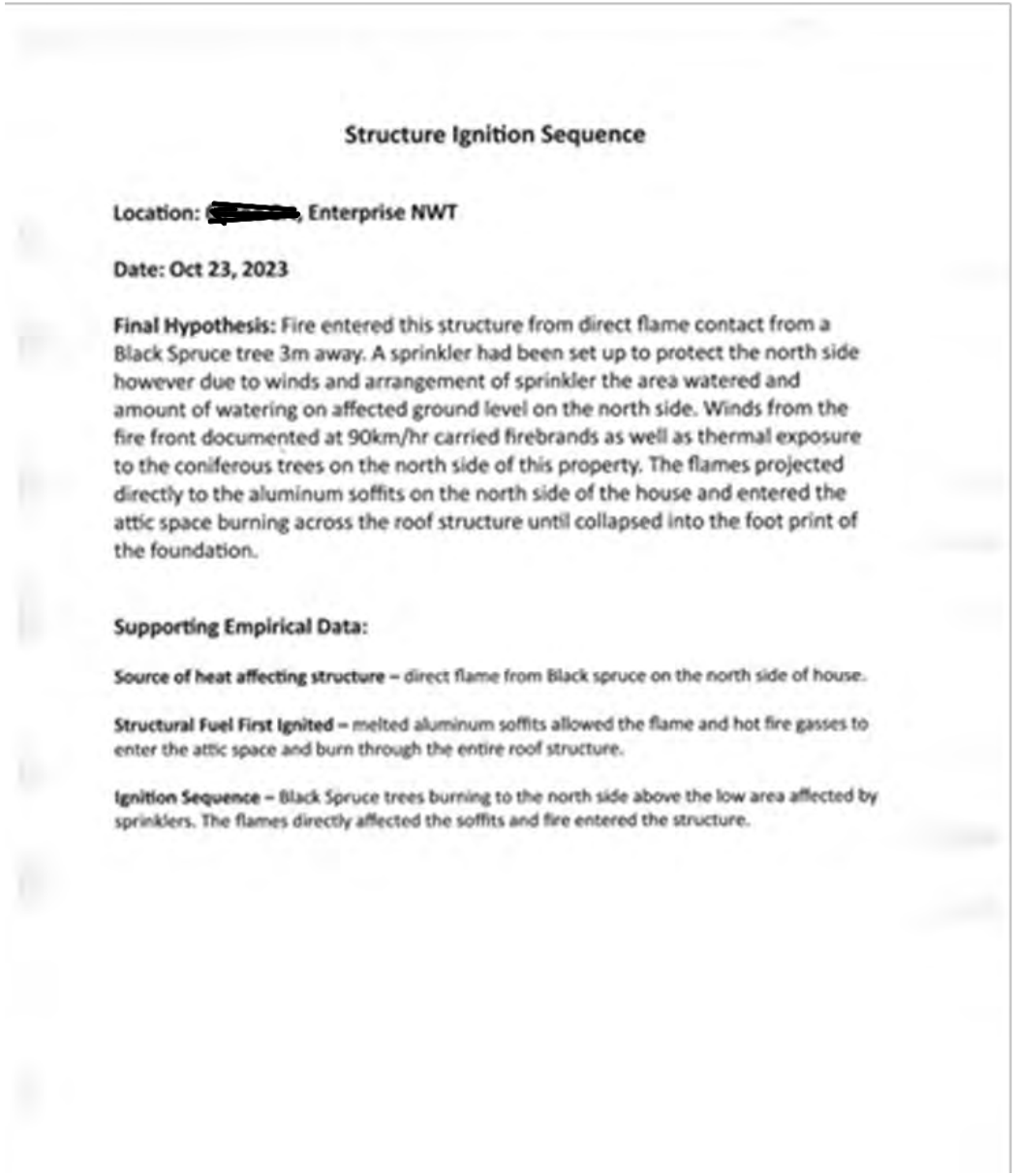
Courtesy of Wildfire Canada

Methods

Structural Fire Inspection

Includes:

- NFPA 921 methodology (Guide for Fire and Explosion Investigations)
- Fire spread direction
- Approach from 30 m away to structure
- Collapse patterns
- Location fire moved inside structure



Structure Ignition Sequence

Location: [redacted], Enterprise NWT

Date: Oct 23, 2023

Final Hypothesis: Fire entered this structure from direct flame contact from a Black Spruce tree 3m away. A sprinkler had been set up to protect the north side however due to winds and arrangement of sprinkler the area watered and amount of watering on affected ground level on the north side. Winds from the fire front documented at 90km/hr carried firebrands as well as thermal exposure to the coniferous trees on the north side of this property. The flames projected directly to the aluminum soffits on the north side of the house and entered the attic space burning across the roof structure until collapsed into the foot print of the foundation.

Supporting Empirical Data:

Source of heat affecting structure – direct flame from Black spruce on the north side of house.

Structural Fuel First Ignited – melted aluminum soffits allowed the flame and hot fire gasses to enter the attic space and burn through the entire roof structure.

Ignition Sequence – Black Spruce trees burning to the north side above the low area affected by sprinklers. The flames directly affected the soffits and fire entered the structure.

Results

Fire Behaviour

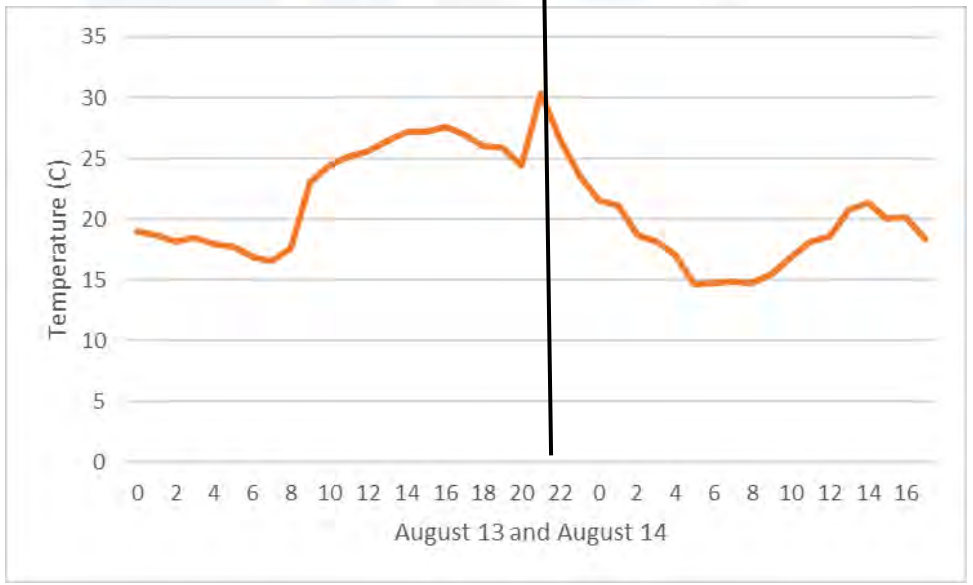
- Drought conditions existed over large parts of western Canada and the NWT – producing very dry fuels.
- Spread direction – 305° (NW)
- Wind Speed – gusts up to 91 kmh. Steady winds 35+ km/h
- Models predict: 43 m/min ROS in C-2 (boreal spruce) fuel type.

Station	Date	FFMC	DMC	DC	ISI	BUI	FWI
Enterprise	Aug 12	87.1	114.7	709	4.7	163	22.5
Enterprise	**Aug 13**	**92.4**	**118.9**	**716**	**24.9**	**168**	**66.9**
Enterprise	Aug 14	77.3	92.4	723	1.2	140	7

Results

Fire Behaviour

Fire weather – fire entered community with peak gusts, high temperatures and Low relative humidities.



Results

Fire Behaviour – Fuel treatments

Thinning of 1400 and 800 stems/ha. An experimental burn in same fuel type showed surface fuels carried fire as fast as in untreated stand.

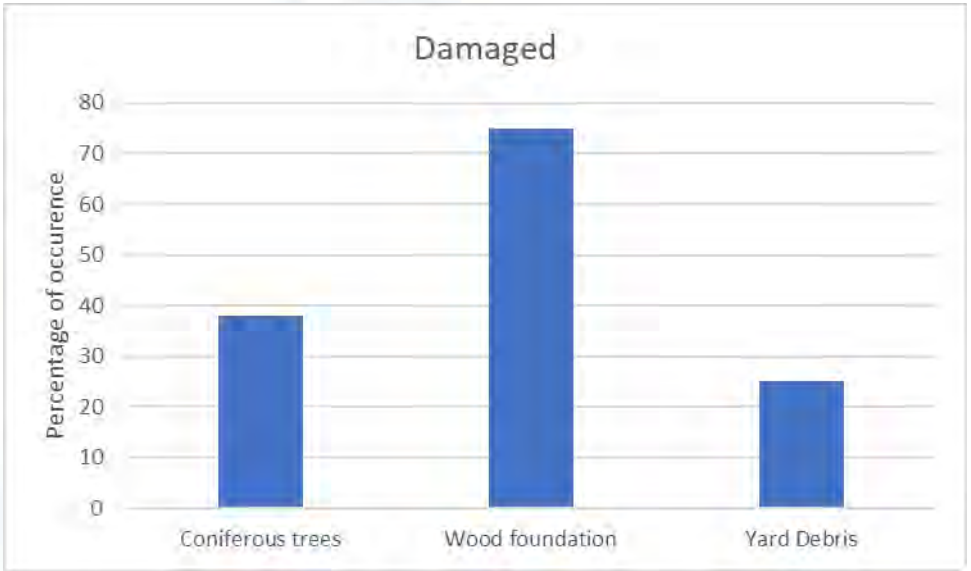
Results

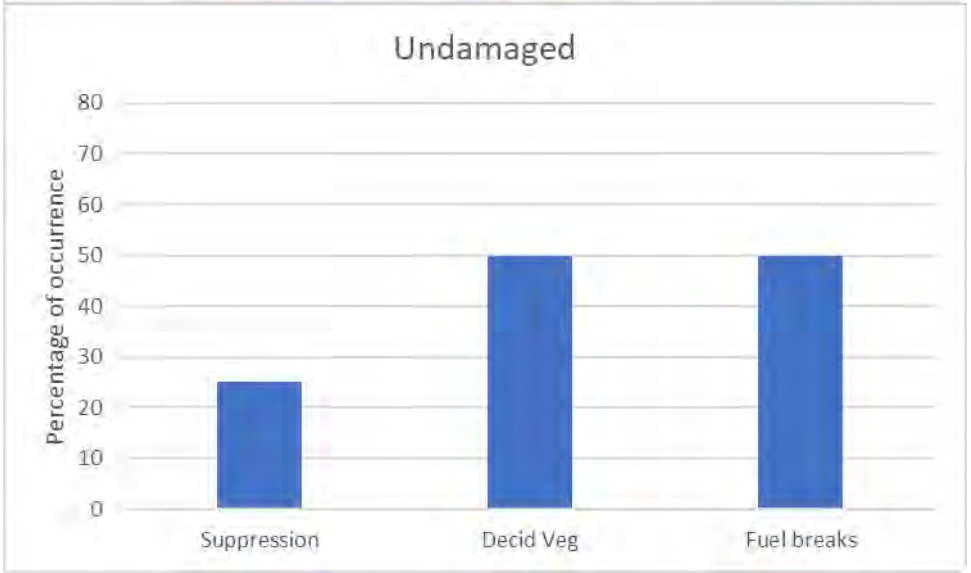
Fire Behaviour – Fuel treatments

- Higher percentage of structures survived downwind of ‘treated’ areas.
- These include: ball diamonds; thinning treatments, and fuel removal.

Results

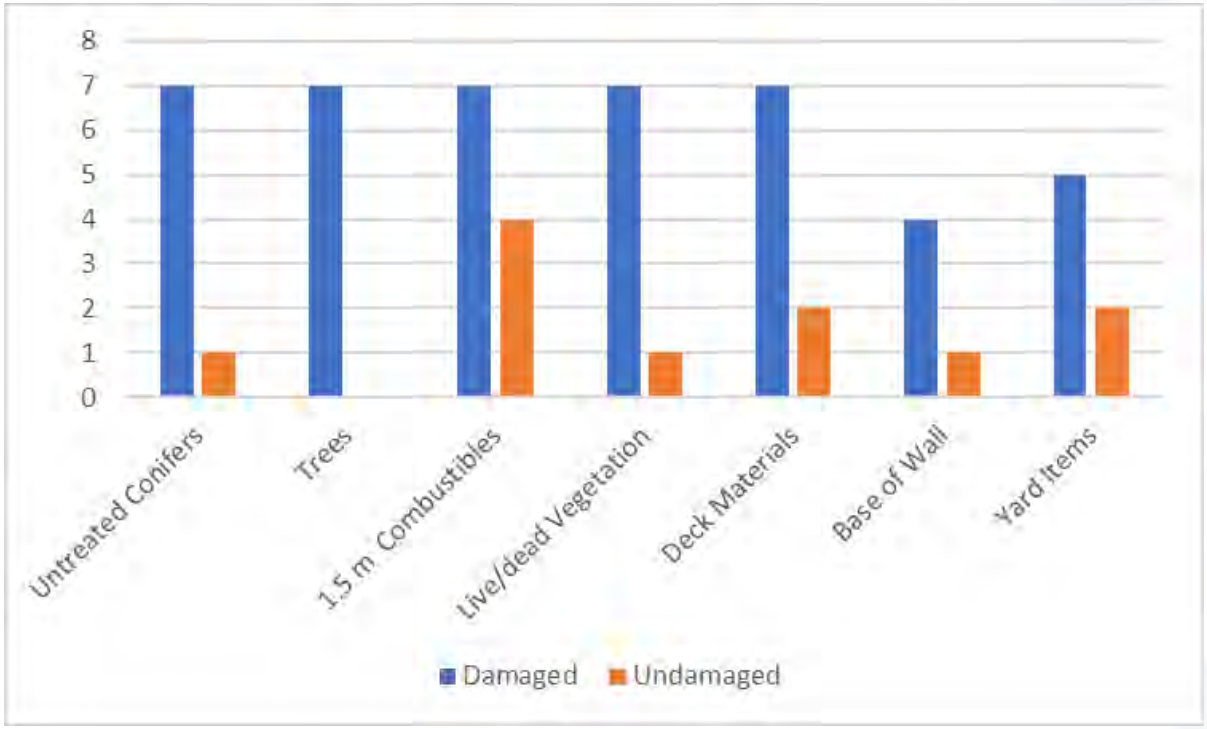
Structural Fire Investigation - Findings





Results

FireSmart Wildfire Mitigation App



Learnings

Environmental – Fuels based

- **No flammable fuels** – vegetative or non-vegetative within 1.5 m of a structure. **This is critical**.
- **Vegetation Management** – especially within 10 m of a structure.
- **Space and prune coniferous trees** within 30 m of a structure.
- **Fuel removal and species conversion** along community edge (includes green spaces (grass) and aspen trees instead of coniferous.

Learnings

Structural

- Skirting needs to be made of fire-resistant material with no defects such as holes. Gravel, sand or other non-flammable materials should cover the base of the skirting. This also is critical with the base of walls where there is no skirting.
- The bottom 15 cm at the base of the walls should be clear of fuel and constructed of fire-resistant material.
- Deck material should be fire-resistant material.
- Excess flammable debris within 10 m of a structure should be reduced or managed

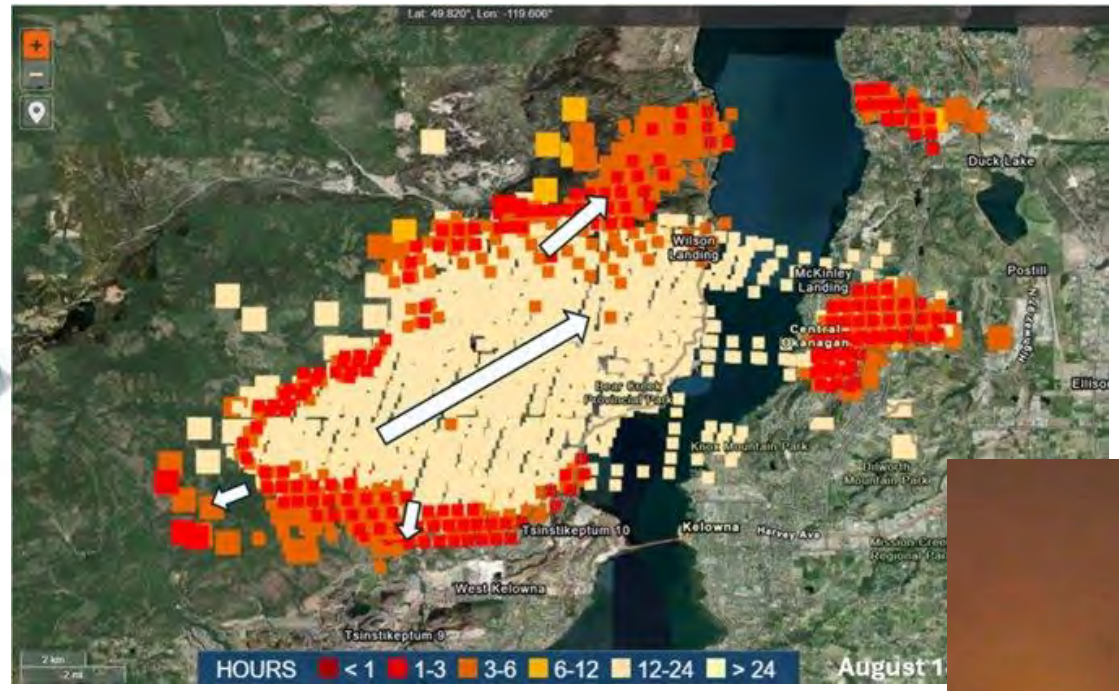
Recommendations

Recommendation	Homeowners & Residents	Government			Private Business
		Local	Territorial	Federal	
Increase structure ignition resilience:					
Construct decks from fire resistant materials; keep well-maintained; remove combustible items located on and under decks.	X	X			X
Non combustible base of Walls	X				X
Skirting condition and materials	X				X
Reduce combustible material in HIZ:					
Establish a 1.5 m zone around structures that is free of all combustible material (vegetation and non-vegetation).	X	X			
Remove or relocate combustible items (e.g., firewood, scrap lumber, vehicles, recreational equipment, etc.) within 10 m of a structure.	X	X			
Manage coniferous vegetation from 1.5 to 10 m from a structure according to FireSmart guidelines using spacing, thinning, pruning, and planting leafy (deciduous) species.	X	X			
Plant low-flammability deciduous tree species 10 to 30 m from structures.	X	X	X		X

Learnings – Other Case Studies

Structural

1. Embers are the primary ignition agent – NOT the wall of fire.
    - Can travel many km's – crossed Okanagan Lake (a minimum of 2.5 km's)



Strong winds, high temperatures, low relative humidities (Cold fronts are a common cause of extreme fire spread)

Learnings – other Case Studies

Structural

2. Home Ignition Zone (HIZ) – vegetation or any other combustibles within 1. 5 m of a structure is the primary fuel that ignites and spreads fire onto and into the structure.

2 km

Learnings – other Case Studies

Structural

3. Structure to structure (Jasper)
4. Vegetation Management Works – Green grass; fuel reduction and spacing (pruning)

Learnings – other Case Studies

Structural

5. Sprinklers Work – either through SP Units or the residents

Other Case Study Findings Contributing to Structure Ignition

Shuswap

- Combustible fuels in 0 to 1.5 m zone

Enterprise

- Combustible fuels in 0 to 1.5 m zone
- Fuel treatments
- Skirting

Jasper

- Cedar shingles
- Combustible fuels in 0 to 1.5 m zone
- Structure-to-structure ignition

LA – initial findings

- Combustible fuels in 0 to 1.5 m zone
- Structure-to-structure
- Building materials

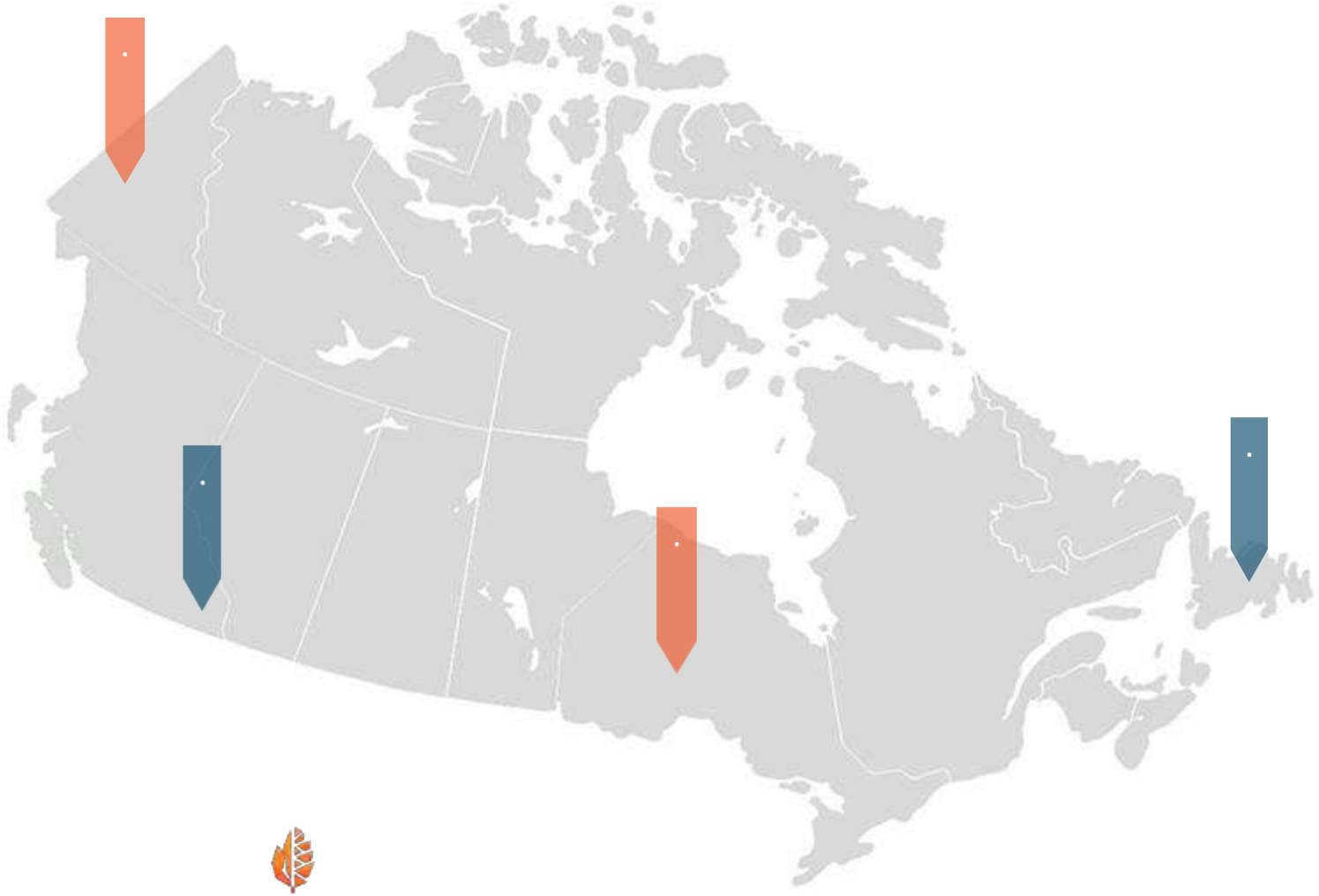
Combustible fuels in the immediate (0 - 1.5 m) zone

Future Work - WCIR

Wildfire Community Impact Research

National in Scope – federal funding

- Post-fire documentation across the country – cities, rural areas, First Nations
- Train data collectors – compile roster
- Quick access
- Looking for assistance!



Standardize

- Methodology
- Data Management
- Accessible
- Repository

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QUESTIONS ?

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