

Institute for Catastrophic Loss Reduction

Building resilient communities

Institut de Prévention des Sinistres Catastrophiques

Construction de resilient communities

# Cutting through the myths of wildfires in Canada

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Institute for Catastrophic Loss Reduction June 16, 2022









## Wildfires in Canada

- 8,300 wildfires a year (10 year average)
- Affect an average 2.3m hectares/year
- Only 3% go beyond 200 hectares
- However, those over 200 hectares account for 97% of area burned
- Fire suppression costs vary, ranging from about \$500 million to \$1 billion each year
- Lightning causes about half of all wildfires, with humans causing the other half
  - Chainsaws, trains, power lines, ATVs, heavy equipment, industry, campfires, cigarettes etc

#### Wildfires in Canada



## What is the 'WUI'?

- Wildland/Urban Interface
- "Not a place, but a set of conditions"
- Where structures are located in places where topographical features, vegetation/fuel types, local weather conditions, and prevailing winds result in the potential for buildings to ignite from flames and/or firebrands of a wildland fire

# **Types of wildfire**

- Surface
  - Burn only surface litter, duff and grass
- Ground
  - Occur in deep accumulations of humus, peat and other dead vegetation
- Crown
  - Trees burn their entire length to the top. The most intense and dangerous of wildland fires





#### **Canada = forest**



III Store Resures Security Internet

## **Canada's boreal forest**

- The boreal zone (aka taiga) circles the northern hemisphere
  - 14% of Earth's land surface
  - □ 33% of Earth's forested area
  - 1.9 billion hectares in total
  - 28% lies in Canada, almost 60% of the country
- Largely coniferous forest (i.e. trees are leafless or needled)
- White and black spruce, jack pine, tamarack and balsam fir
- Fire-dependent species

### **Canada's boreal forest**

- Fire is good and a natural part of the boreal
  - Stimulates regeneration of plant species
  - Recycles phosphorous
  - Removes accumulated plant matter including deadwood
  - Part of the coniferous cycle for millennia
- Natural burn cycles are being interrupted, greatly by fire suppression
  - Obstructs natural renewal
  - Changes species composition
  - Causes increased fuel loads, meaning bigger fires

#### Two wildfire seasons

- Fire season generally runs from April to October, with the peak running from May to August
- Perception that wildfires only burn in late summer/early fall after long, hot, dry summers
- This is only partly true
- The 'other' wildfire season occurs in early spring, after the snow, but before 'green up'
  - 2011 Slave Lake, Alberta (May 14)
  - 2016 Fort McMurray, Alberta (May 1)

#### **Canada = forest**



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#### Wildfires in Canada



#### **Climate change and wildfires**



- Miramichi Fire (October 1825)
- Destroyed Newcastle, Douglastown, Moorefield, Napan, Black River Bridge, Chatham, Nelson, Doaktown and 1/3 of Fredericton
- Burned 1 million hectares
- 160 to 500 dead



- Fernie, British Columbia (August 1908)
  95% of town wiped out in <90 minutes</li>
- \$5 million (1908 dollars) in damage



- Great Porcupine Fire (July 1911)
- Timmins, Ontario and area
- 200,000 hectares burned
- 73 dead (official, but real numbers unknown)



- Matheson Fire (July 1916)
- Matheson, Ontario
- 200,000 hectares burned
- More than 225 deaths



- Great Fire of 1922 (October 4/5)
- 18 Townships in Ontario, 1,680 sq kms
  - Destroyed North Cobalt, Charlton, Thornloe, Hailybury, Heaslip and several others plus two communities in Quebec
- 43 dead



#### **More recent events**

- Okanagan Mountain Park Fire (Sept. 2003)
- Kelowna, B.C.
- 239 homes destroyed
- Insured damage \$266.5m (2020 dollars)



#### **More recent events**

- Flat Top Fire (May 2011)
- Slave Lake, Alberta
- Approximately 500 homes lost
- Insured damage \$514m



















## The day 'everything' changed...

- Horse River Wildfire (May 3-19, 2016)
- Fort McMurray, Alberta
- Human caused (likely accidental)
- ~2,400 structures lost (<10% of town)</p>
- ~49,000 claims filed
- Insured damage \$3.64b
- Largest insured loss in Canadian history
   Largest insured wildfire in world insurance history for a time

#### Fort McMurray





- 'Why some homes survived: Learning from the Fort McMurray wildfire
- disaster'
- Why did some homes survive this wildland/urban interface disaster with little or no damage, while others were vulnerable to ignition and destroyed?
- "...wind-driven embers were the most probable cause for the majority of early home ignitions..."



Full report at www.iclr.org



Ember accumulation on lee side of deck chair









[Photo Credits: Bill Bereska]

[John Gibbins/U-T San Diego/ZUMA Press]













#### **Other recent fires**

- Southern California wildfires (December 2017)
   Thomas fire
- Northern California wildfires (October 2017)
  - Tubbs fire (Santa Rosa)
- Great Smoky Mountains wildfires (November 2016)
  - Chimney Tops fire
- Lytton, BC (June 2021)

Chetco Bar Fire **Owens** Fire Ward Fire Modoc July Complex (includes Cove Fire) Shore Fire Young Fire Klamath Fire Whitepine Fire Dode Fire 4-10 fire Orleans Complex Fay Fire 4-4 Fire Centerville Fire Marble Fire Warner Mountain Lightning W-2 Fire Bradley Fire **Translator Fire**  Corner Fire Jones Fire Peg Fire Oak Fire Sandy Fire R-4 Fire North Fire Mud Fire Sway Fire Bolla Fire Benson Fire Blocksburg Fire Buck Fire **River** Fire Mills Fire Miller Fire Paskenta Fire 32 Fire Evans Fire Slides Fire Skyway Fire Cherokee Fire **Farad** Fire Rebie Fire Skeleton Fire Grade Fire Grizzly Fire Beale Fire Greenhorn Fire Grape F asper Fire Ice Fire Table Fire Bo tle Fire efuge Fire Slinkard Fire Tubbs Fire (Central LNL Complex) Ranch Fire Winters Fire Chris Fire Fort FireFort Fire Sandra Fire Estate Fire Bode Toll Fire Qualt Fire Gold Fire Creek Fire Willow Fire Fish Fire Jable Fire Twist Fire Range Fire Fallon Fire Weller Fire, Ranch Fire Ben Fire Falls Fire Mission Fire Bear Fire Tilton Fire Power Fire 26 Fire Shaver Fire Freedom Fire Silver Fire San Juan Fire Wild Fire. Hill Fire York Fire King Incident Dinely Fire Lion Fire Indian Fire Bitterwater Fire Pine Fire Derrick Fire - Globe Fire Schaeffer Fire Lockwood Fire Park Fire Cove Fire . Hog Fire Hawk Fire Caldwell Fire Pine Fire Highway Fire Linne Fire Tower Fire Pozo Fire Tarina Fire Tank Fire Alamo Fire Hudson Fire Rose Fire California Rucker Fire Me sa Fire orman Fire Whittier Fire Rye Fire High Fire **Thomas Fire** sta Fire Meyers Fire Mile Fire Blaine Fire Palmer Fire Eagle Fire Lambs Fire wildfires Canyon Fire . . . Reed Fire Loma Fire Lost Fire Montezuma Fire Jennings Fire (2017)**Island Fire** Church Fire Border Fire



Above normal significant wildland fire potential indicates a greater than usual likelihood that significant wildland fires will occur. Significant wildland fires should be expected at typical times and intervals during normal significant wildland fire potential conditions. Significant wildland fires are still possible but less likely than usual during forecasted below normal periods. Map produced by Predictive Services, National Interagency Fire Center Boise, Idaho Issued December 1, 2017 Next issuance January 1, 2018

- A complex of 29 fires (December 2017)
- Six became large, total 124,000 hectares burned
- **230,000 evacuated**
- Thomas fire (Ventura and Santa Barbara counties) became the largest wildfire in modern California history (Dec 4-Jan 12)
  - 1,063 structures lost
  - 280 damaged
  - Two killed
- Insured losses from the 3 worst fires totalled ~USD 2.1b







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- 250 fires broke out in Northern California in October 2017
- ~100,000 hectares burned
- ~8,900 structures lost, including costly Napa Valley wineries
- Tubbs fire (Sonoma and Napa counties) alone burned ~5,600 hectares
   USD 7.7b insured

Most destructive in world insurance history

Southern and Northern fires combined
 USD 14b insured









#### **Smoky Mountain wildfires**



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#### **Smoky Mountains wildfires**

- A complex of fires (late November 2016)
  - Several fires over the late Nov-Dec period
  - High winds caused fire to create other fires due to ember spotting and downed power lines
  - □ 14 killed, 134 injured
- Chimney Tops fire (November 24)
- Pigeon Forge and Gatlinburg, Tennessee
   Human caused (criminal arson)
   +2,400 buildings damaged or destroyed
  - USD 919m insured

#### **Smoky Mountain wildfires**









#### Wildfire modelling







#### Lytton, BC June 2021

# \$100+ million insured damage

#### **Fire pathways**

Many pathways for fire to spread to homes
 Many begin with embers, include multiple fuels, and terminate with ignition of a home – unless interrupted by mitigating conditions



### **Breaking the chain**





# Lesson 2: Wildfires don't happen how you probably think they happen

- Myth about how wildfires spread and how fire enters communities
- Most think wildfires roll through the forest like a steamroller, reach the edge of 'town', then keep rolling
- In reality, very few structures are lost due to direct contact with flames or by radiant heat
- Vast majority of structures are lost due to ember ignition and subsequent fire spread
  - Structures can ignite due to direct contact with embers
  - But usually fuel around the home is ignited (wood piles, landscaping), spreading fire to the structure

# Lesson 3: Wildfires don't always happen where you think they will happen

- Gatlinburg, TN: Southeastern US in November 2016
- Santa Rosa, CA (Tubbs Fire, Oct 2017): Majority of houses lost were in the 'Moderate' risk area of the city
  - Fire risk maps didn't take wind/ember transport into consideration
- Fort McMurray
  - No one thought the fire could jump the Athabasca River





## Wildfire and liability

- Any entity can be sued for causing a wildfire
  - Governments
    - Escape of prescribed fire
    - Failure to suppress
  - Business entities
    - Railroads
    - Public utilities
      - Numerous California fires blamed on the electrical utility
      - Vegetation management policy(?)
  - Individuals
    - Arson
    - Abandoned campfires
    - Carelessly discarded cigarettes
    - Use of chainsaws etc.
    - Vehicles

#### To recap

- Canada is one of the most forested countries in the world and wildfires are common occurrences
- However they seldom lead to large property losses in part due to active suppression programs
- The future will be one of more and larger fires and we won't be able to fight every one
  - More property losses in the future
- Need to understand that wildland fire is not a bad thing
- Along with fuels management, need to make communities in the Wildland/Urban Interface less flammable
- ICLR has free loss control info that you can use for your insureds



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