



# Firestorm and Flat Top

*Are recent Canadian wildfire disasters  
a warning shot of climate change?*

**Institute for Catastrophic Loss Reduction**

**Workshop on**

**Protecting Canadian homeowners  
and communities from wildfire  
in a changing climate**

**March 20, 2012**

**Peter Fuglem**

# Presentation topics

- **Compare and contrast 2003 and 2011**
  - Similarities
  - Differences
- **Context**
- **Conclusion and lessons learned**

Firestorm = 2003 fire season in British Columbia that affected Kelowna and Barriere .

Flat Top = Flat Top Complex of three fires that affected Slave Lake, Poplar Estates, Widewater and Canyon Creek.

# 2003 Firestorm in BC

- Extreme dry overwinter conditions
- 1:200 yr summer drought – > 3 months
- 2500 fires (context of 2200 average)
- 22 communities threatened
- Major damage to Barriere & Kelowna
- 334 homes and businesses destroyed
- Insured losses over \$200M (2003\$)

# Putting 2003 in Context

## Summer Rainfall (mm):

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	<b>2003</b>	<b>10 Year Avg</b>	<b>Record</b>
<b>Cranbrook</b>	8.7	63.6	worst
<b>Kamloops</b>	3.4	54.0	worst
<b>Vancouver</b>	36.7	132.4	26.4 (1951)

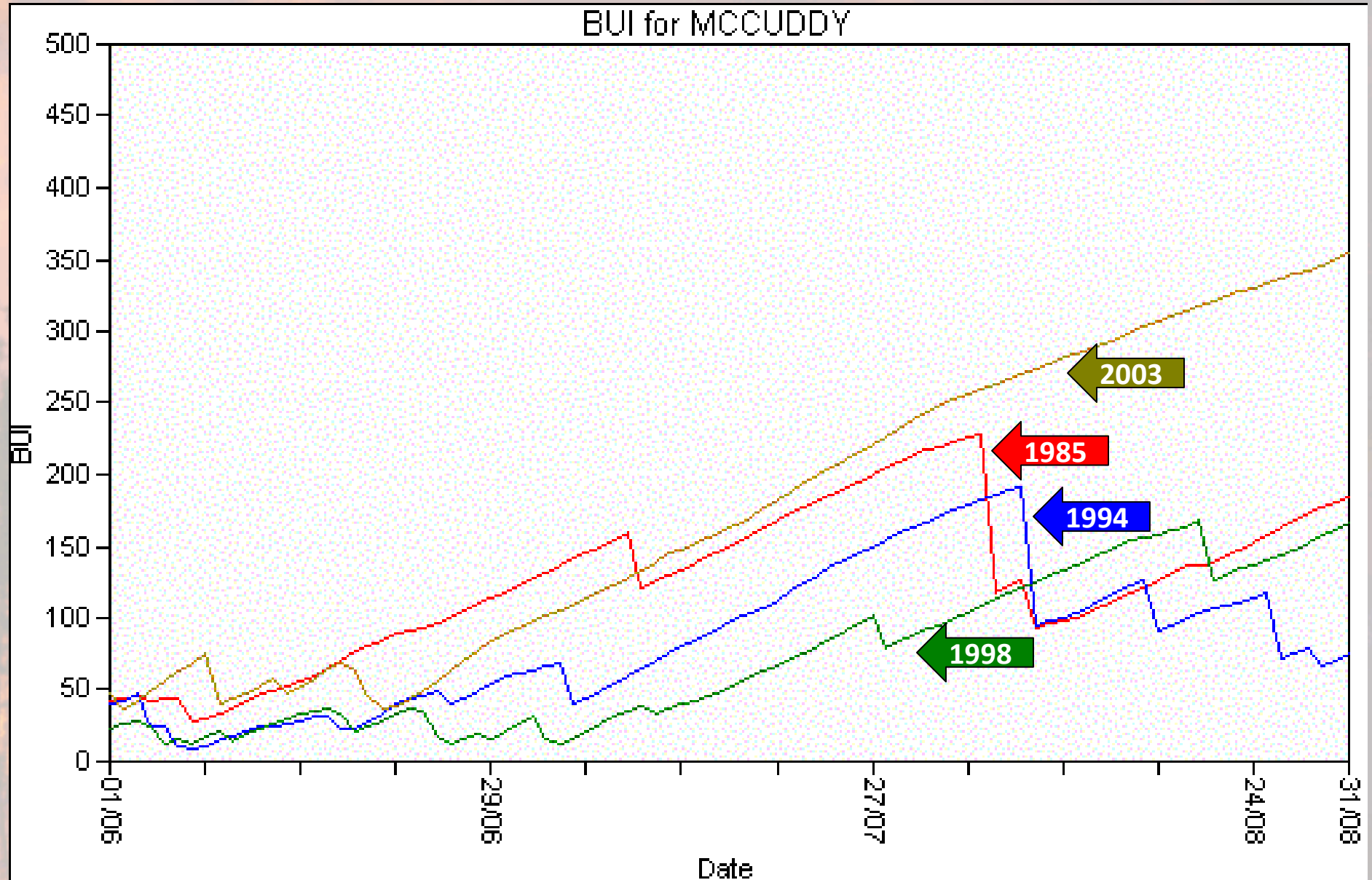
## Drought Code:

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	<b>2003</b>	<b>10 Year Avg</b>
<b>Cranbrook</b>	1090	390
<b>Kamloops</b>	960	425
<b>Vancouver</b>	500	345

# Buildup Index

BUI for MCCUDDY

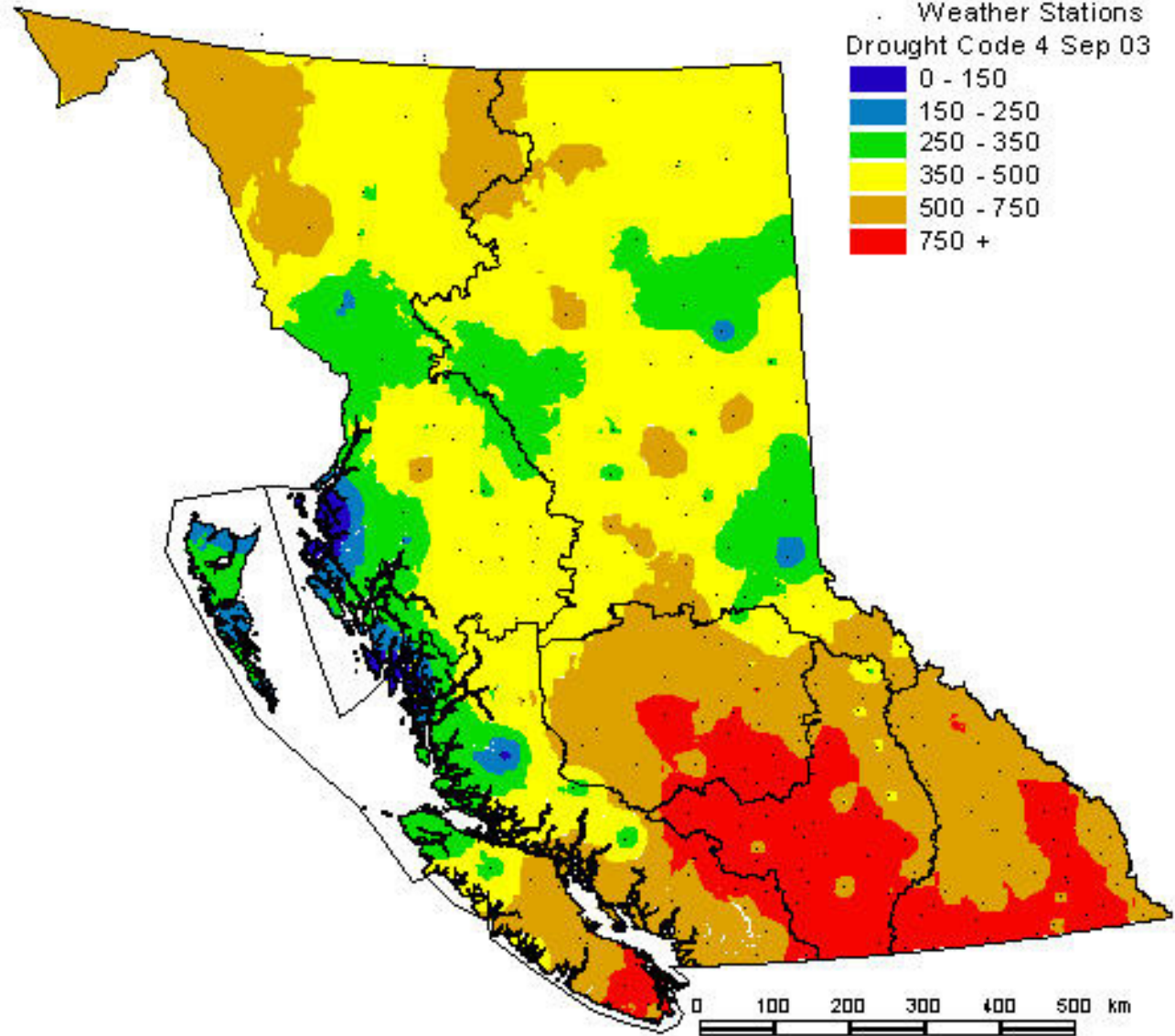
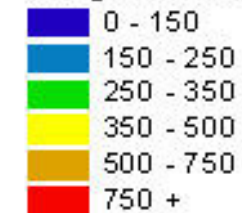


**Drought  
Code:  
September 4,  
2003**

## British Columbia Forest Protection

Weather Stations  
1300 PDT

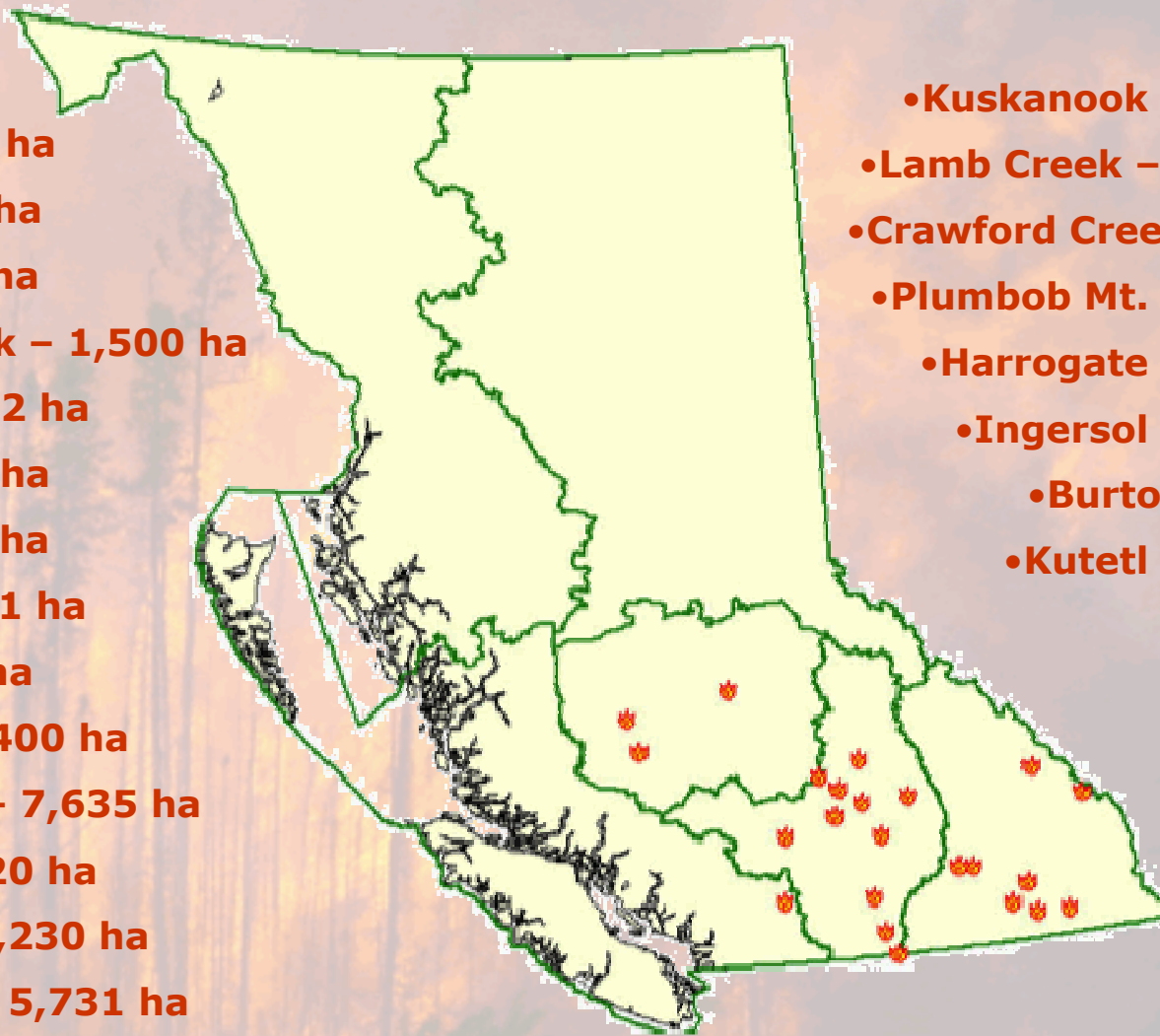
Weather Stations  
Drought Code 4 Sep 03



# Major Fires in British Columbia

July 16 - August 27, 2003

- Hell's Gate – 136 ha
- Soda Creek – 40 ha
- Tatla Lk – 1,867 ha
- SW Bonaparte Lk – 1,500 ha
- Chilko Lk – 29,202 ha
- McLure – 26,420 ha
- Vaseaux – 3,300 ha
- Vermillion – 3,981 ha
- Sicamous – 100 ha
- McGillivray – 11,400 ha
- Venables Valley – 7,635 ha
- Cedar Hills – 1,620 ha
- Anarchist Mt. – 1,230 ha
- Strawberry Hill – 5,731 ha
- Okanagan Mt. Park – 25,600 ha



- Kuskanook – 4,832 ha
- Lamb Creek – 10,979 ha
- Crawford Creek – 107 ha
- Plumbob Mt. – 2,870 ha
- Harrogate – 1,018 ha
- Ingersol – 6,700 ha
- Burton – 530 ha
- Kutetl – 7,808 ha

# British Columbia Daily Maximums 2003

- **New fires 218 (763 fires over 6 days)**
- **220 rotary wing helicopters**
- **7,668 firefighters**
- **746 fires burning**
- **\$9 million**





# 2003 Significance

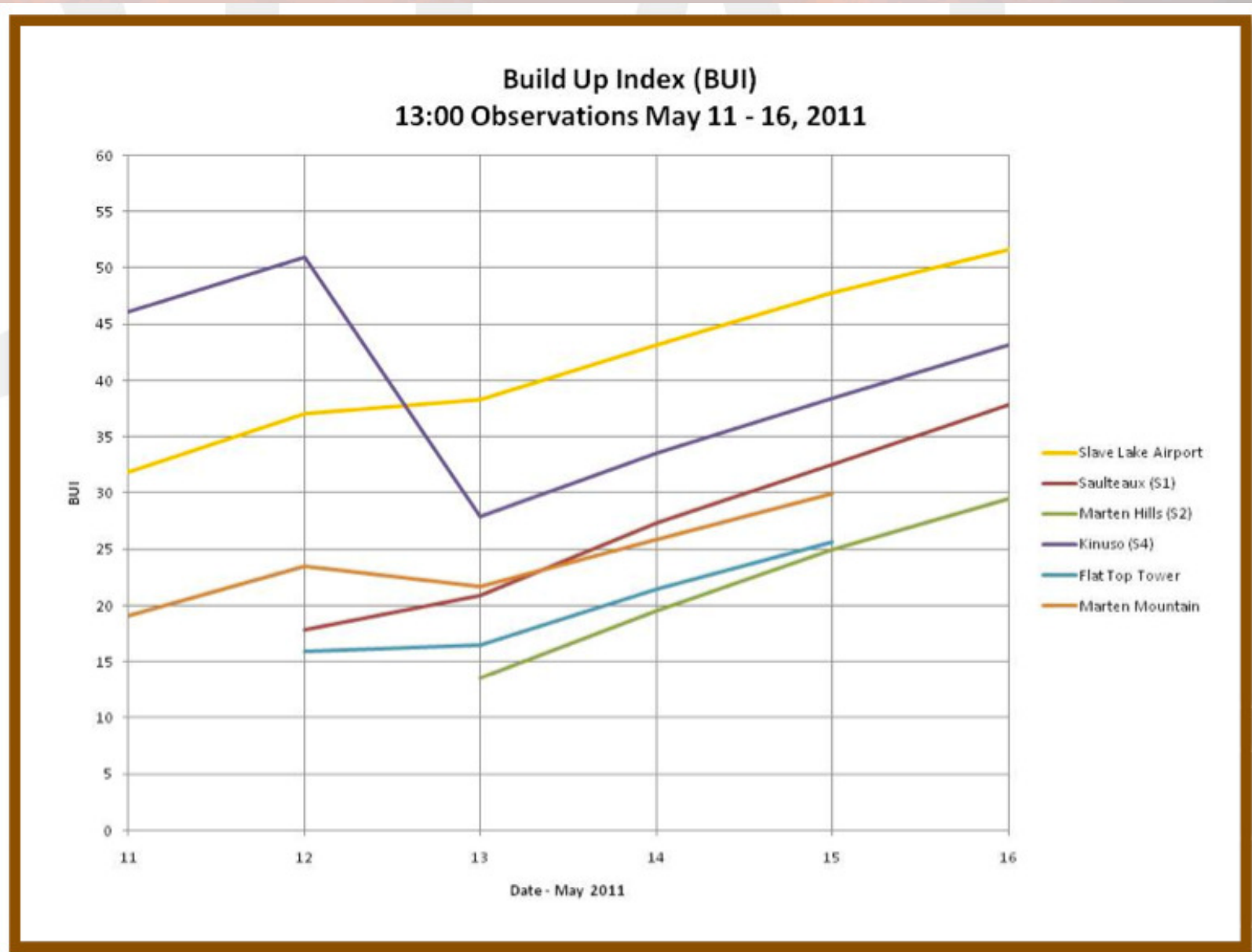
	2003	10 Yr Avg.	Previous Record
<b>Interface Fires</b>	<b>37</b>	<b>8</b>	<b>15 (1998)</b>
<b>Homes lost</b>	<b>334</b>	<b>4</b>	<b>18 (1998)</b>
<b>Suppression Costs</b>	<b>\$350 million</b>	<b>\$54 million</b>	<b>\$153 million</b>



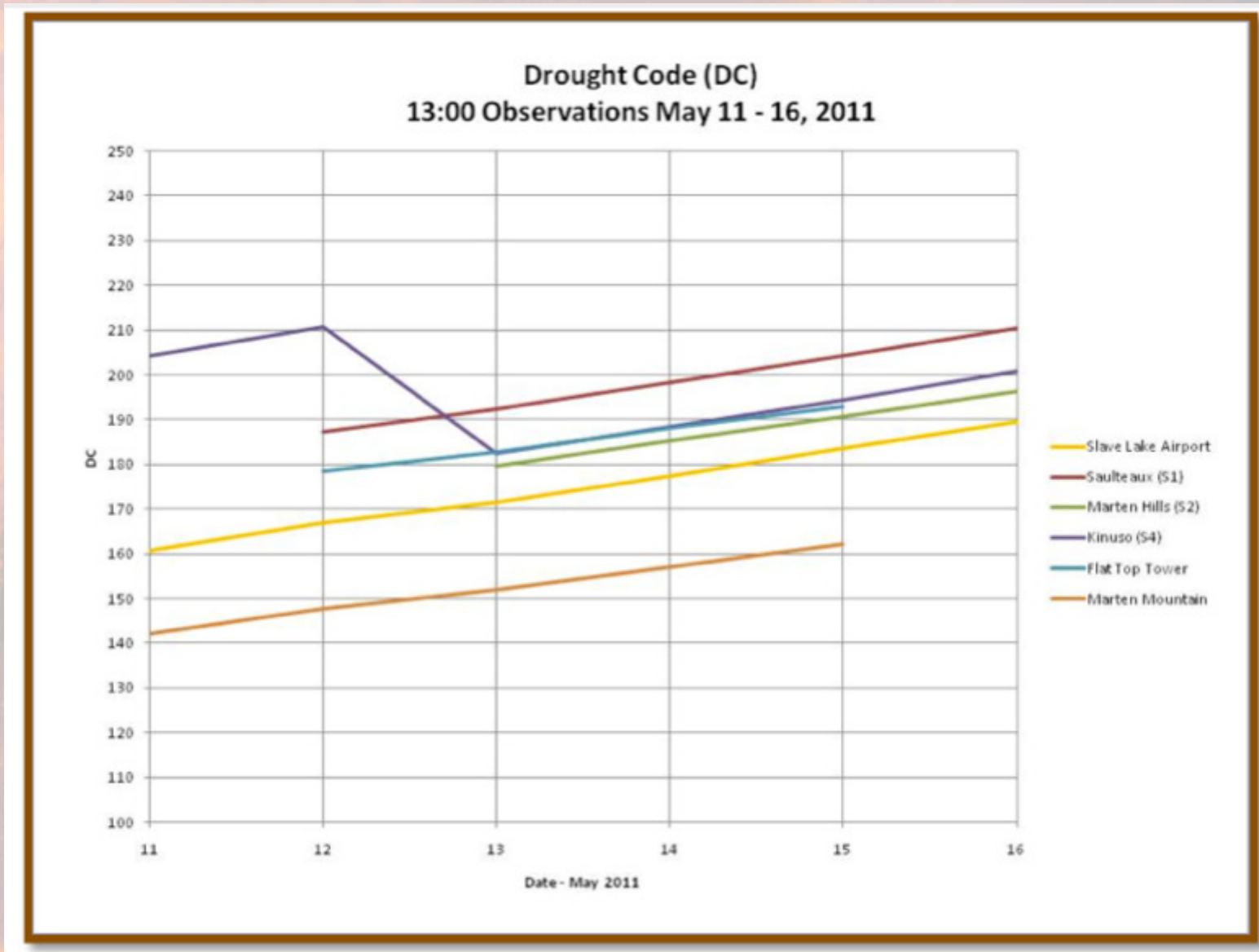
# 2011 Wildfire Season in Alberta

- Wet overwinter conditions
- Season 1150 fires (context of 1541 average)
- Extreme wind event – 5 days
- 23 communities threatened
- Major damage to Slave Lake, Poplar Estates, Widewater, Canyon Creek
- 400 homes and businesses destroyed
- Insured losses over \$700M

# Build Up Index

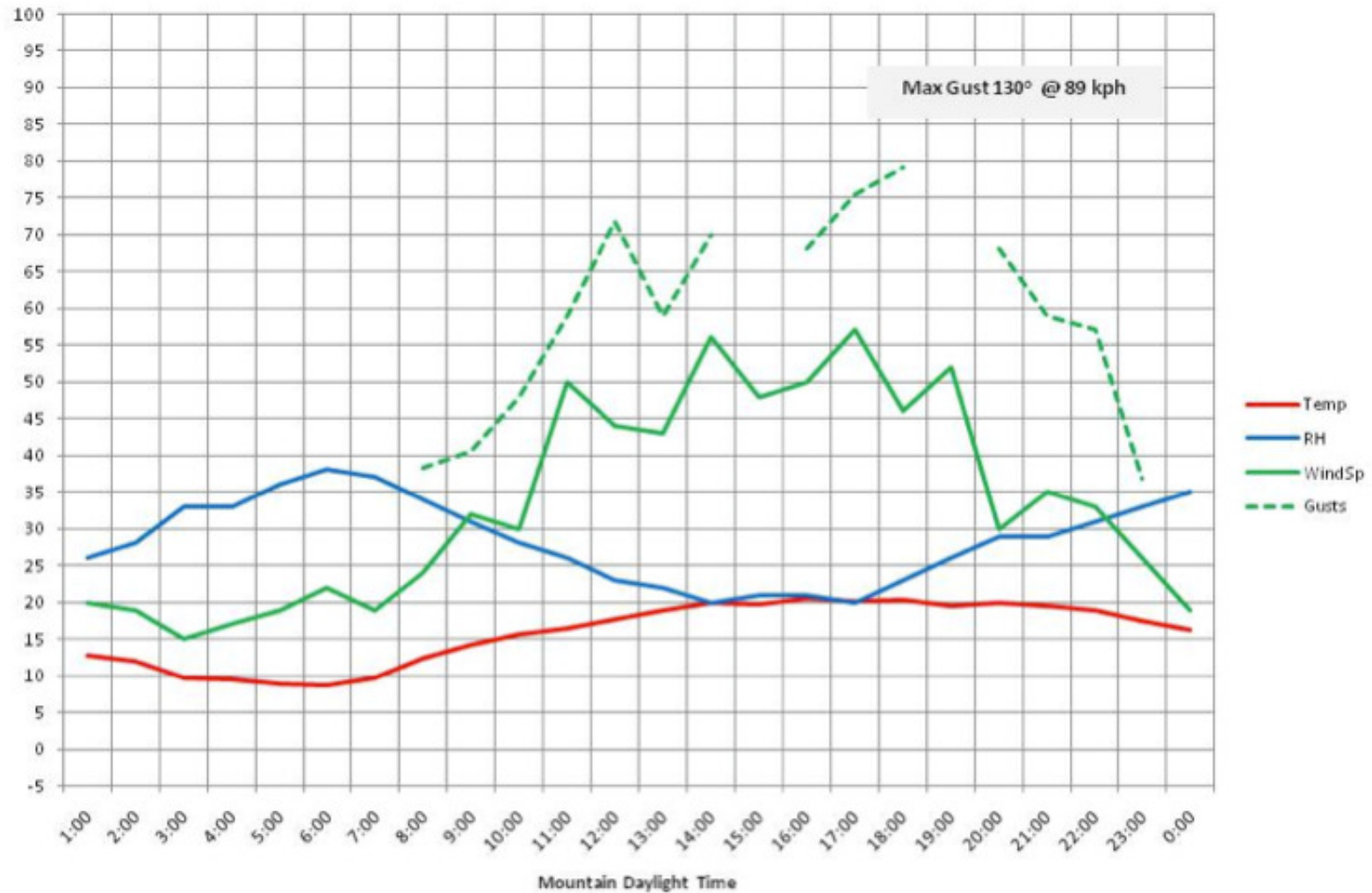


# Drought Code



# Slave Lake Weather May 15

Diurnal Weather May 15, 2011  
Slave Lake AWOS (YZH) Station



# Fire Intensity Class



## Intensity Class 1 = $<10\text{kW/m}$

Smoldering ground or creeping surface fire. These fires have no open flame and produce white smoke. Self-extinguishing unless high DC and/or BUI values prevail, in which case extensive mop-up is generally required.



## Intensity Class 2 = $10\text{-}500\text{kW/m}$

Low vigour surface fire. RoS:  $< 1.5\text{ m/min}$ . These fires produce visible open flame; have little or no spread, and have an unorganized flame front. Direct attack by firefighters with hand tools and water possible. Constructed fire guard should hold.



## Intensity Class 3 = $500\text{-}2000\text{kW/m}$

Moderately vigorous surface fire. RoS:  $1.5\text{ - }3.0\text{ m/min}$ . This is a vigorous surface fire with an organized front and may display candling. Hand-constructed fire guards likely to be challenged. Heavy equipment generally successful in controlling fire.



## Intensity Class 4 = $2000\text{-}4000\text{kW/m}$

Highly vigorous surface fire, torching or passive crown fire. RoS:  $3.0\text{ - }6.0\text{ m/min}$ . This type of fire produces grey to black smoke, has an organized surface flame front, and has a moderate to fast rate of spread along the ground. Short aerial bursts and short range spotting will occur with these fires. Control efforts at fire's head may fail.



## Intensity Class 5 = $4000\text{-}10000\text{kW/m}$

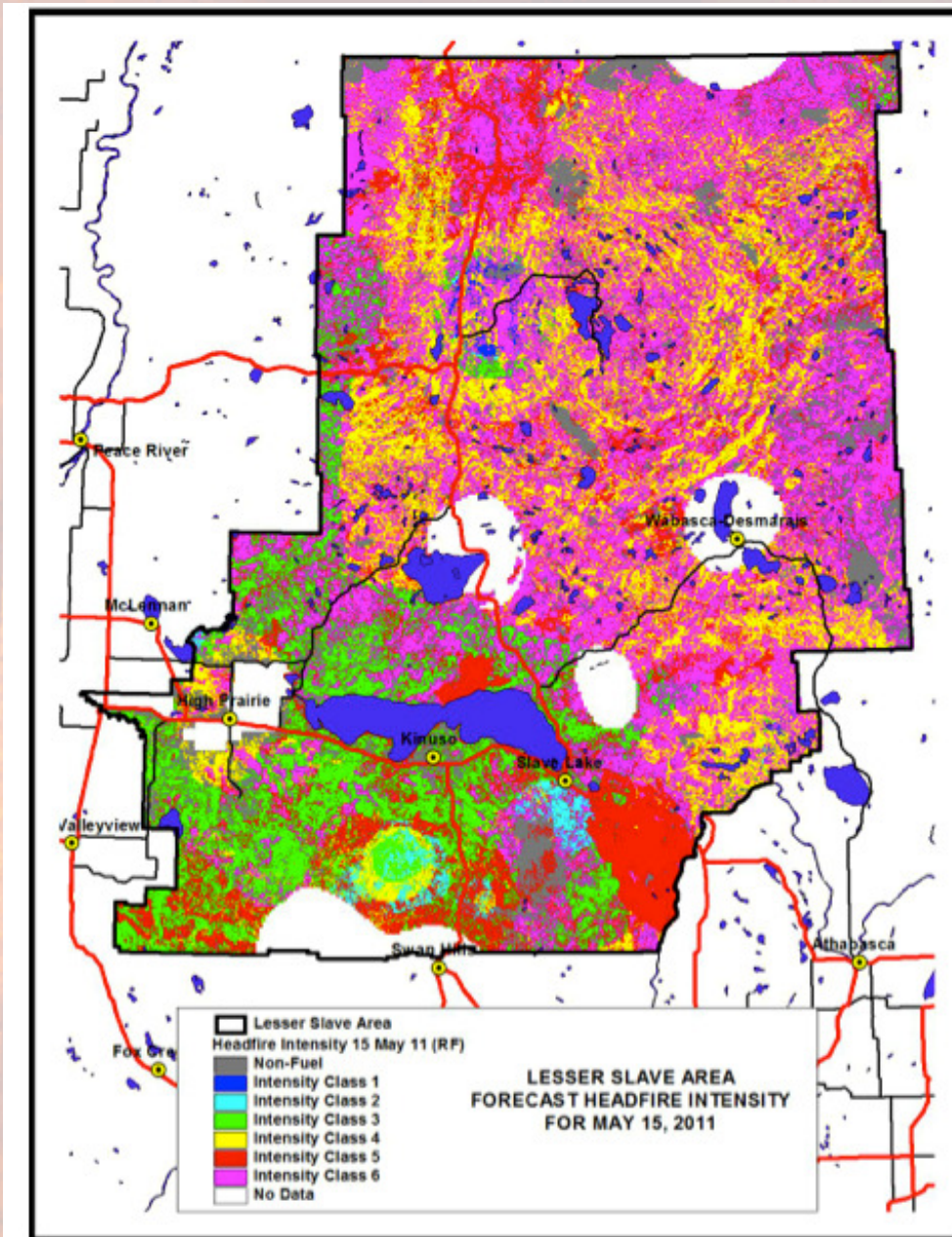
Extremely vigorous surface fire or active crown fire. RoS:  $6.0\text{ - }18.0\text{ m/min}$ . This type of fire produces black to copper smoke, has an organized crown fire front, moderate to long-range spotting and independent spot fire growth. Very difficult to control. Suppression action must be restricted to fire's flanks. In direct attack with aerial ignition may be effective.



## Intensity Class 6 = $>10000\text{kW/m}$

Blow-up or large disastrous fire. RoS:  $> 18.0\text{ m/min}$ . Violent fire behaviour, an organized crown fire front, and moderate to long-range spotting are characteristic of this fire type. There may be fireballs and whirls. Suppression actions should not be attempted until burning conditions improve.

# Head Fire Intensity



# 2011 Significance

- **2<sup>nd</sup> largest insured loss in Canadian History**
- **700 families affected**
- **Loss of town infrastructure and records**
- **Major economic impact (National GDP)**





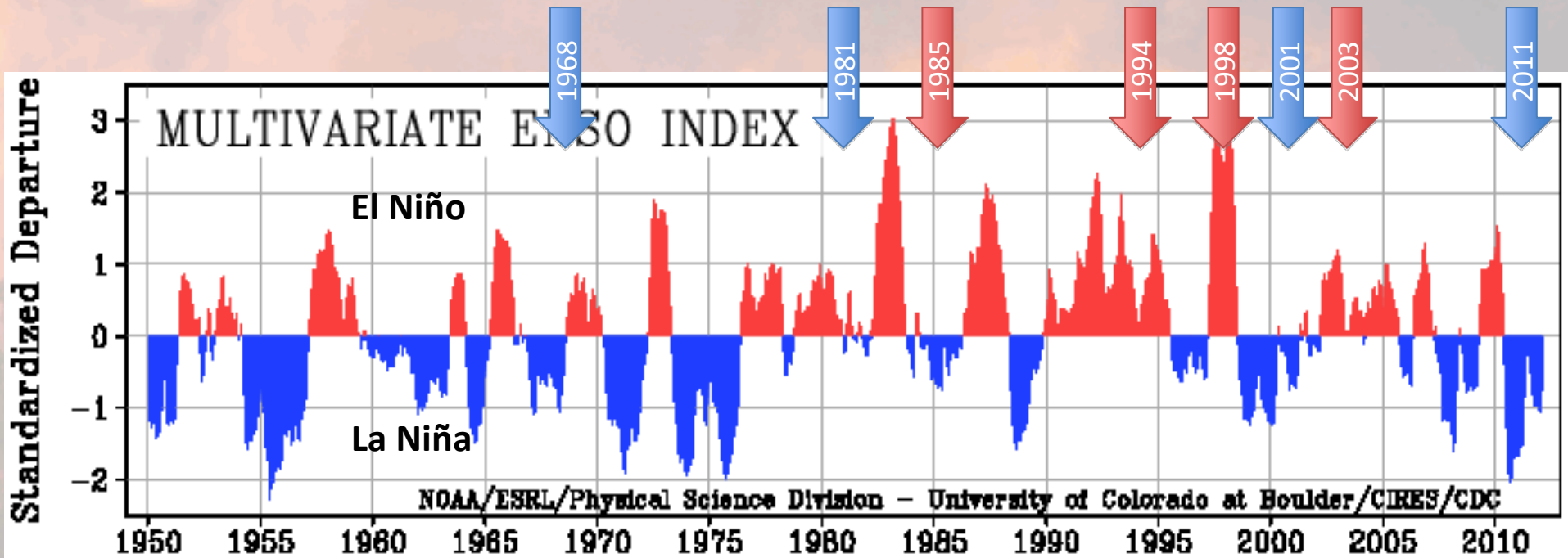
# 2003 vs 2011 Similarities

- **Coincidental major fire seasons elsewhere**
  - 2003 – California, Australia, Europe
  - 2011 – South-central US
- **Agencies were reasonably well prepared**
- **Widespread threats to many communities**
- **Significant damage to communities late in the event**
- **Significant engagement with local fire services**
- **Emerging FireSmart efforts**

# 2003 vs 2011 Differences

	<b>FireStorm 2003</b>	<b>Flat Top 2011</b>
Over winter	Extremely dry	Wetter than normal
Drying period	Extended (3 months)	Very short (4 days)
Winds	Moderate-strong (diurnal)	Extreme with gusts (5 days)
Fire Danger	DC, BUI, HFI Extreme	DC, BUI Low; HFI Extreme
Extreme fire growth period	5 days	27 hours
Area burned	270,000 hectares provincially	970,000 hectares provincially
Structures lost	334	400+
Lives lost	3 pilots	1 pilot
ENSO	El Nino	La Nina
Insurance subscription rates	Very High in Kelowna Low in Barriere	Medium in Slave Lake and area

# El Niño/Southern Oscillation?

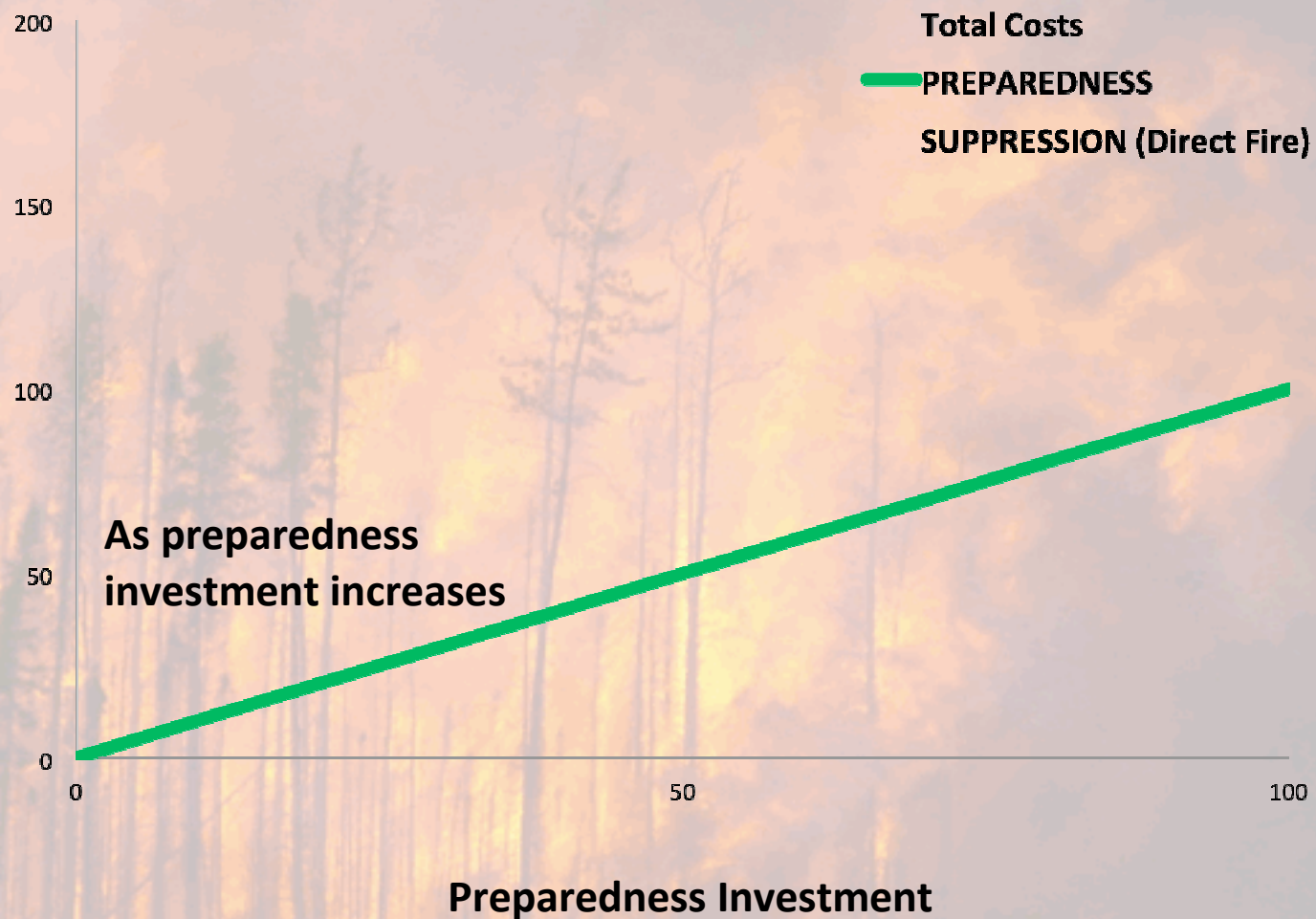


← Alberta season of note

← BC season of note

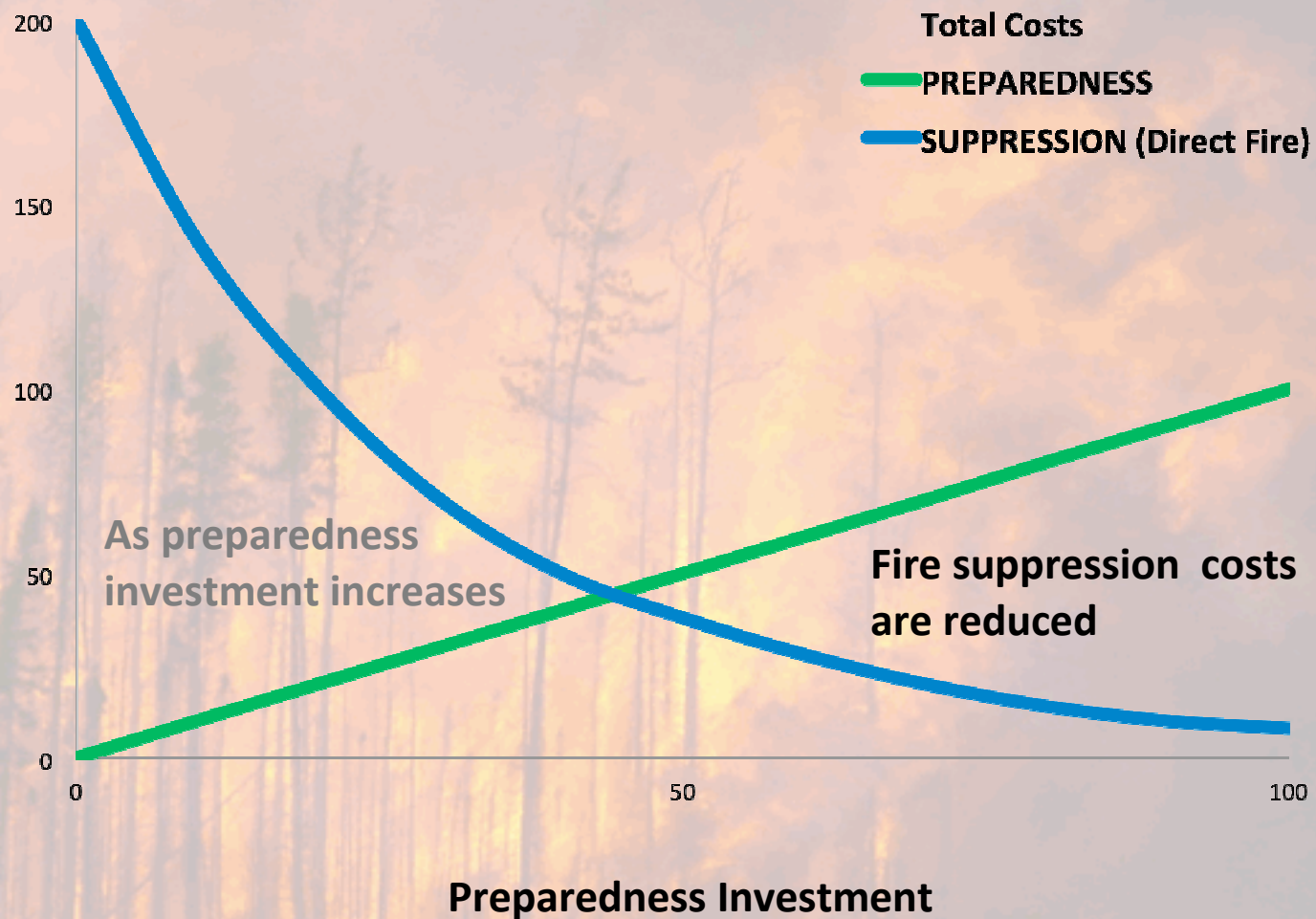
# Is the preparedness investment appropriate?

## *Wildfire Least-Cost-Plus-Loss Theory (Costs)*



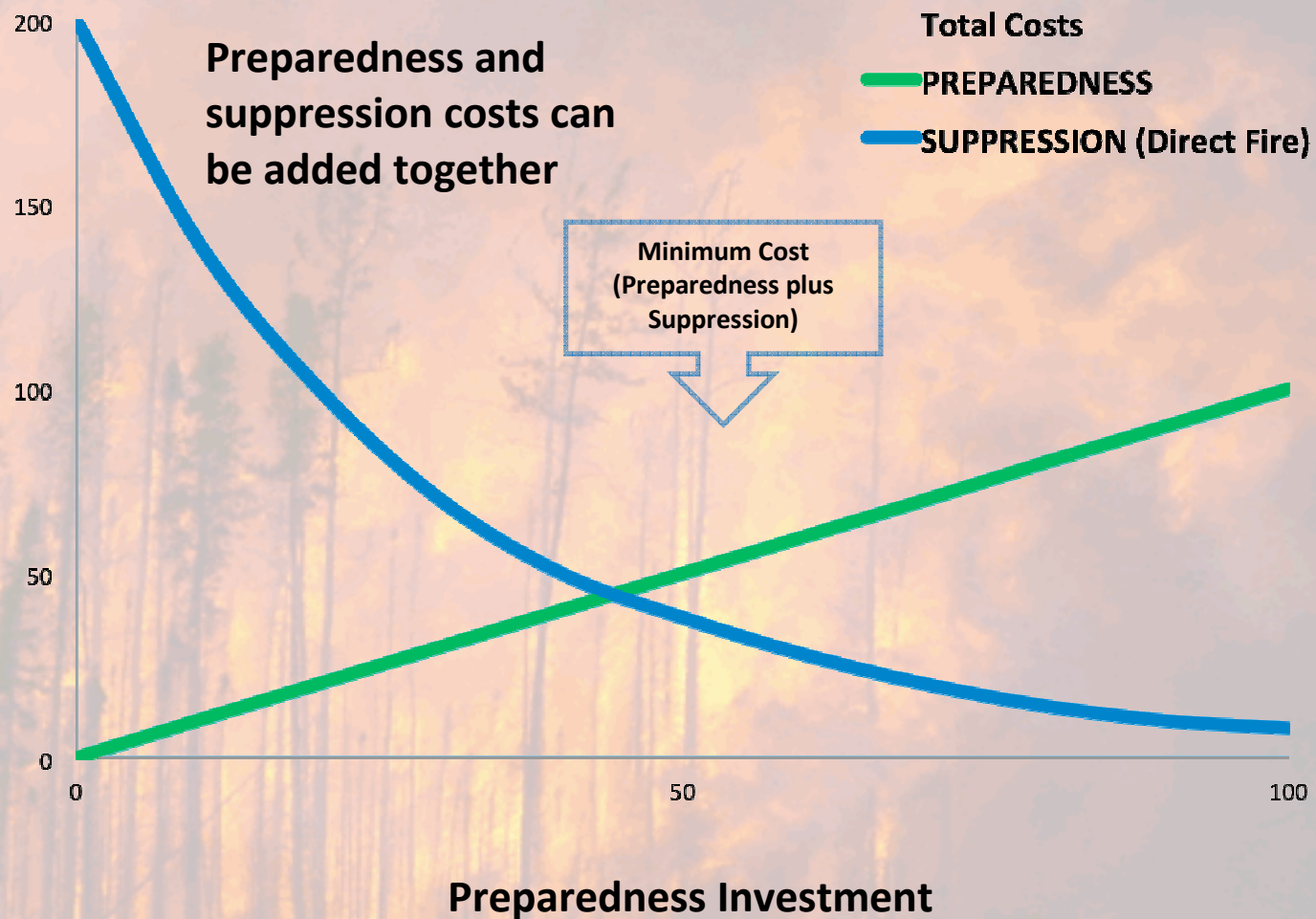
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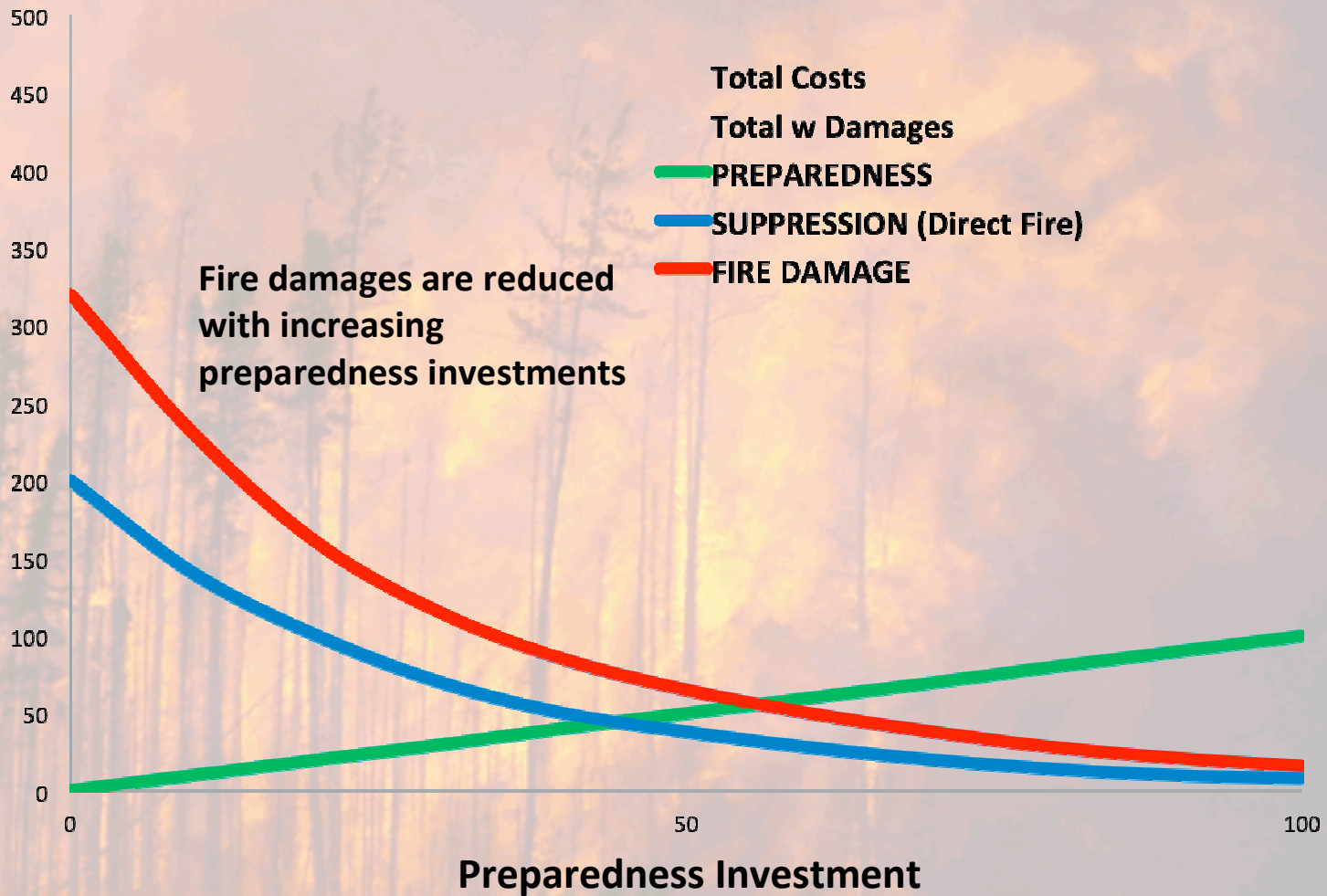


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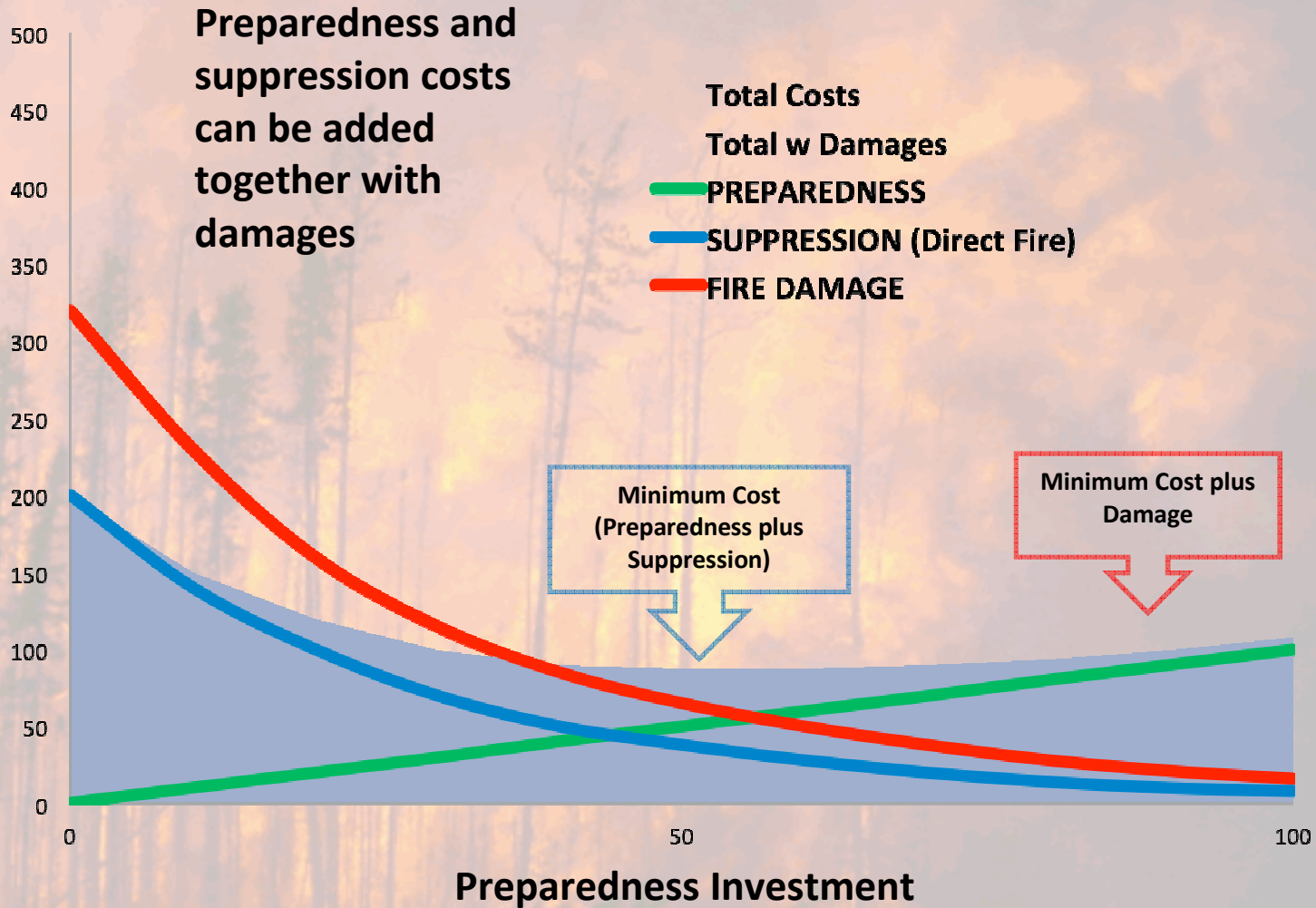
## *Wildfire Least-Cost-Plus-Loss Theory (Costs)*



# What happens if damages are considered?

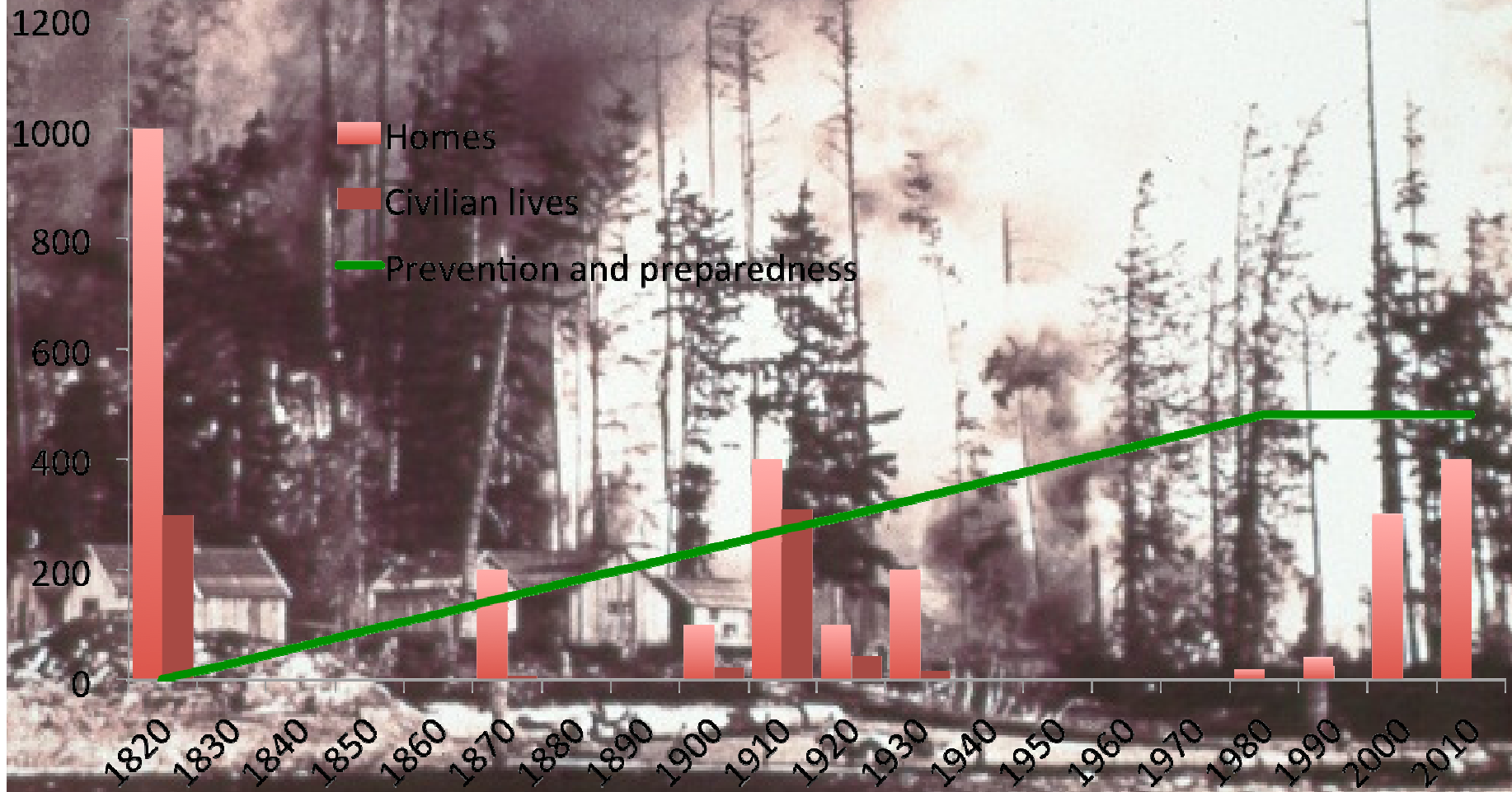


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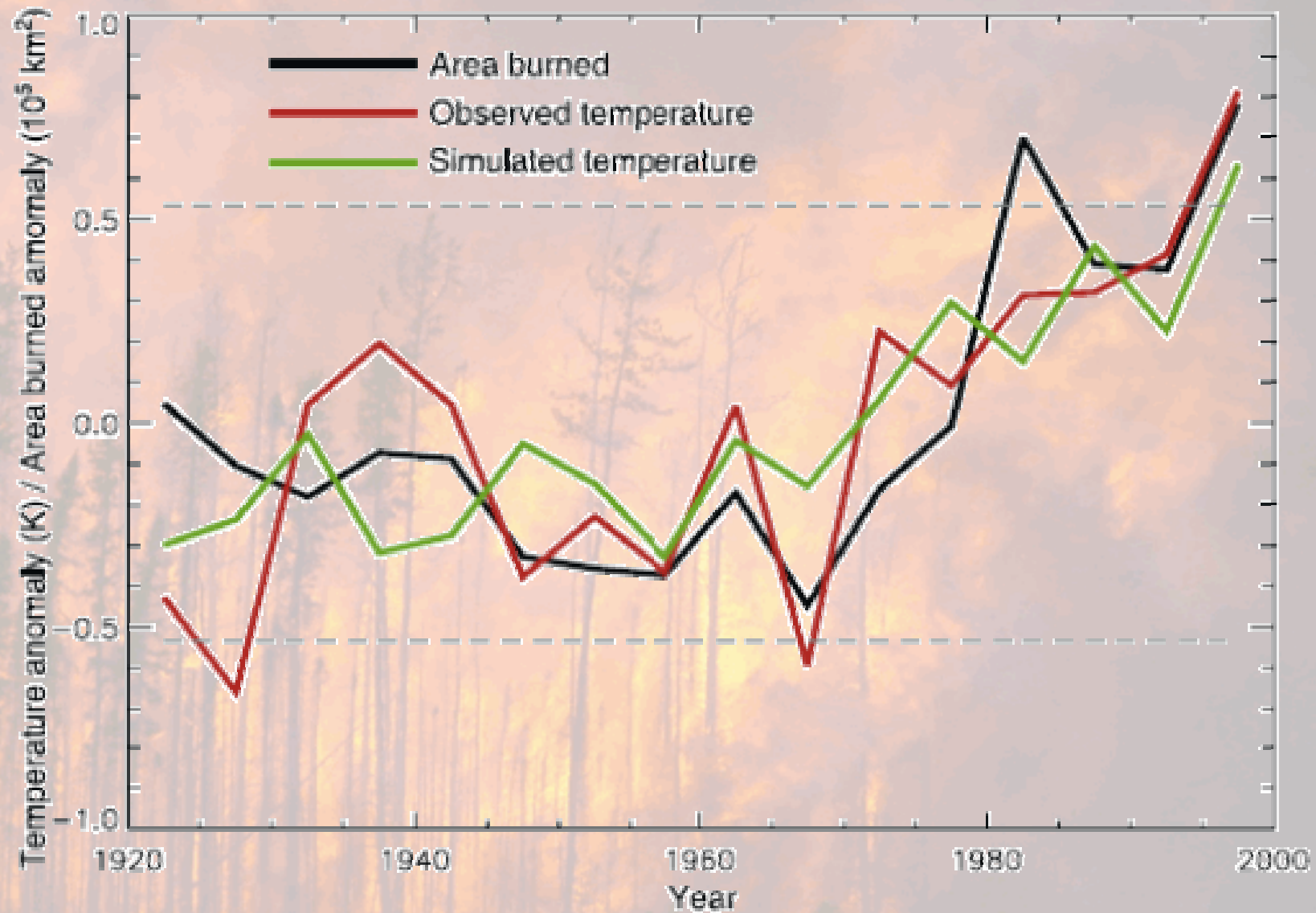
# Canadian Wildfire Impacts



# **Suggested causes for the recent increase**

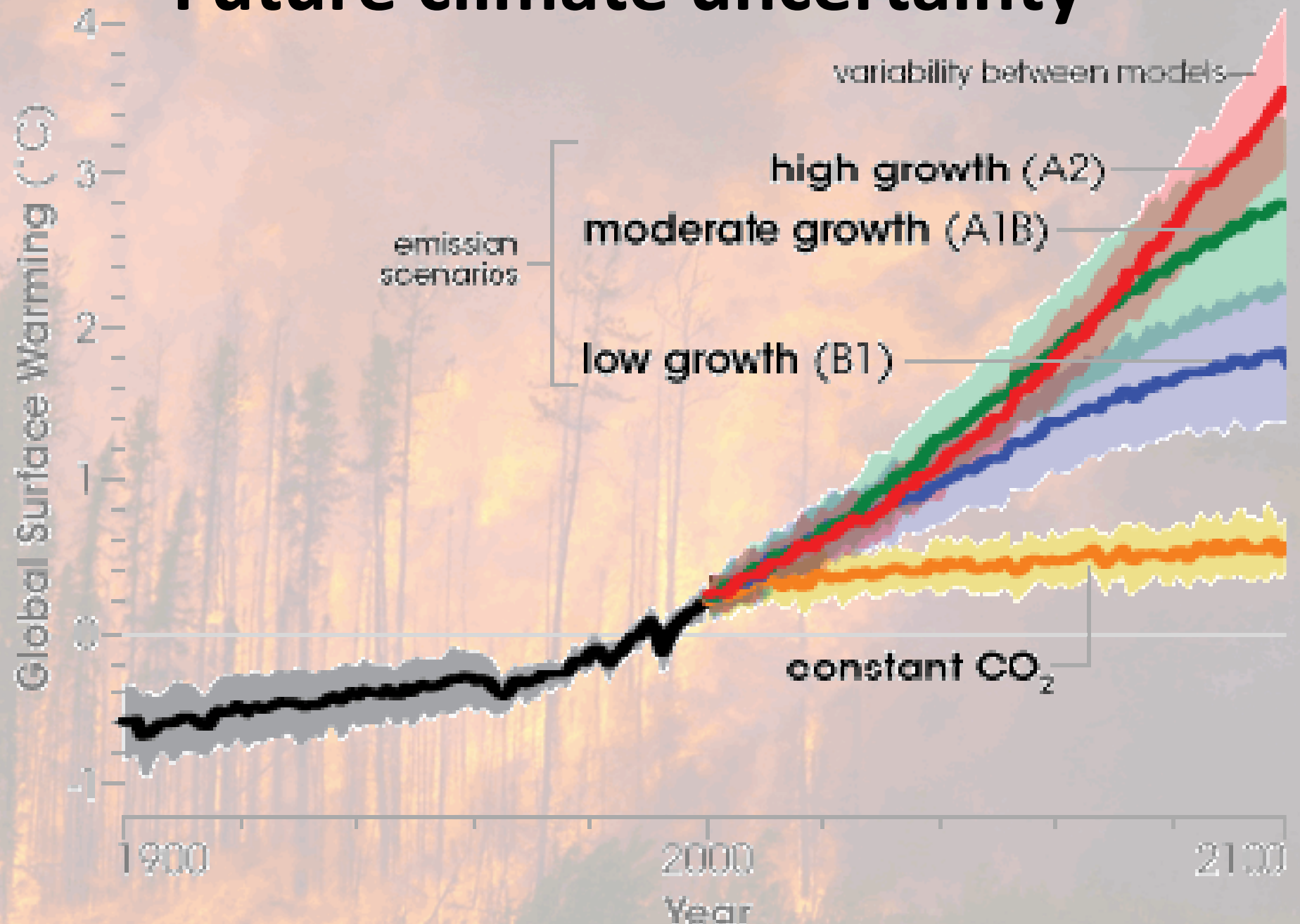
- **Climate change**
- **Expanded use of wildlands:**
  - **development, recreation, resource extraction, etc.**
  - **increased fire occurrence & values at risk**
- **Historic wildfire suppression**
  - **resultant forest fuel buildup**
- **Plateau of wildfire resources/technology**
- **Cutbacks in research and development**

# Climate change and wildfires

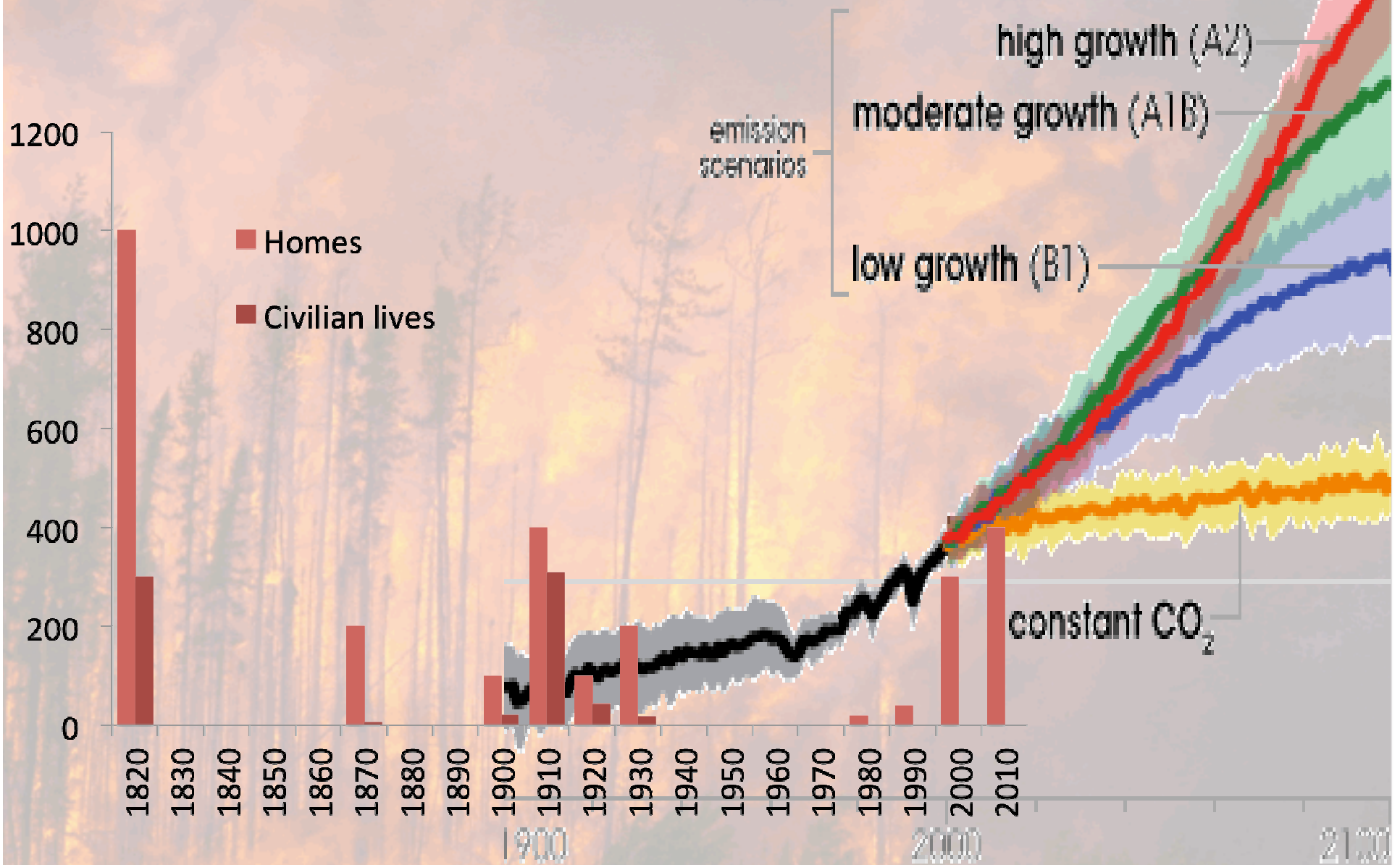


Gillett, N.P. et al. 2004. Detecting the effect of climate change on Canadian forest fires. *Geophysical Research Letters*. 31(18), L18211, doi:10.1029/2004GL020876.

# Future climate uncertainty



# Future climate change impacts?



# Firestorm and Flat Top

*Are recent Canadian wildfire disasters a warning shot of climate change?*

- **Climate change likely plays a part**
- **Wildland fuel conditions are deteriorating**
- **Increased development and wildland use contributes**
- **Plateau of investment in prevention and preparedness is likely a factor**
- **Reduction in research and development is a concern**

# Lessons learned

- **No wildfire agency can deal with worst case seasons, resource sharing will continue to help**
- **Communities and fire departments must be part of the solution**
- **Wildfire will play a role on the landscape, managed or otherwise**
- **We need research and development to help chart the path forward**
- **Climate change will likely be a major force in future seasons, even without it, there are major challenges ahead**