

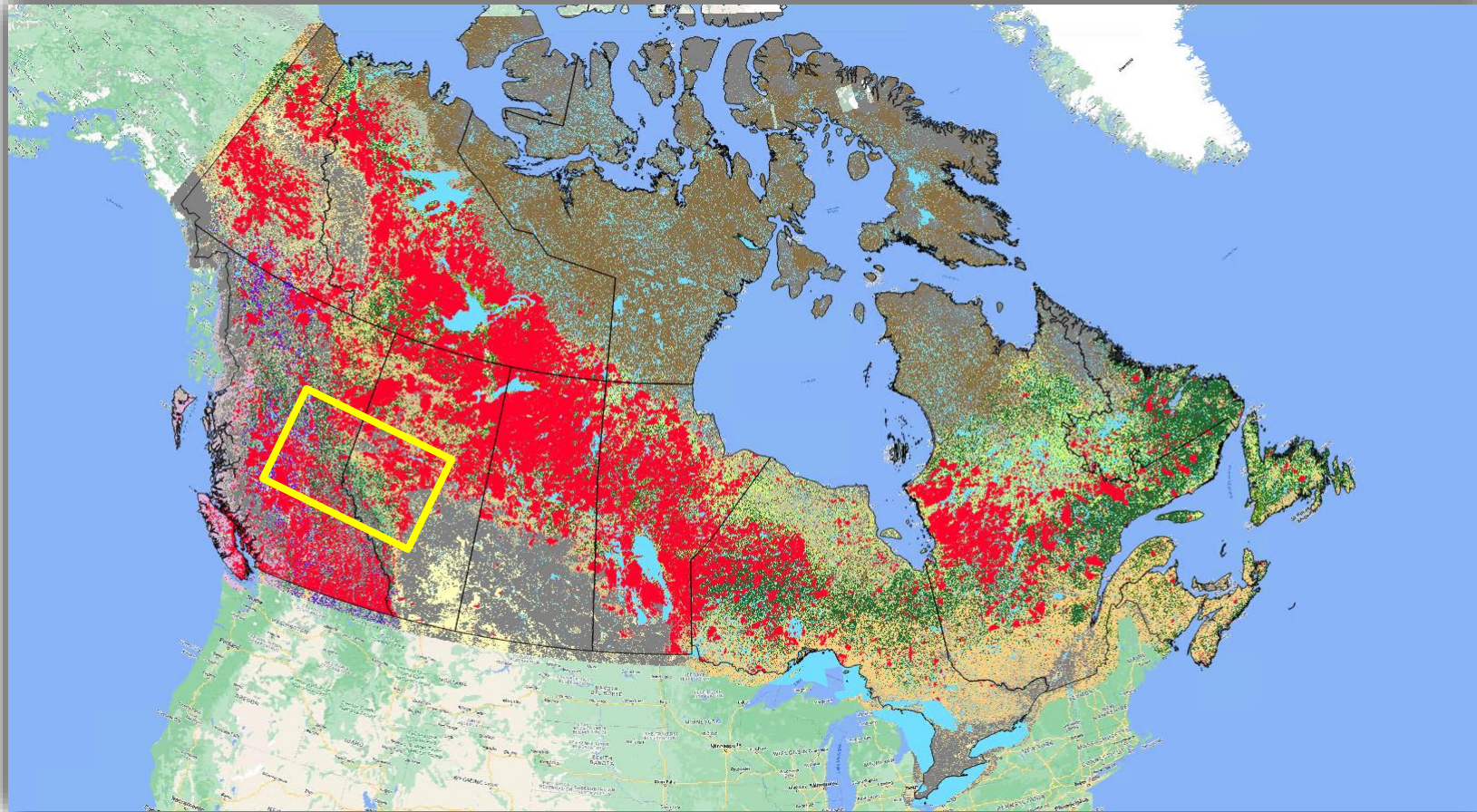
WILDFIRE RISK IN CANADA (RISQUE DES INCENDIES DE FORÊT AU CANADA)

November 10, 2023

Mark Hope, Ph.D., Chicago, Illinois, USA

Canada is a Country of Fuels

...And Fires



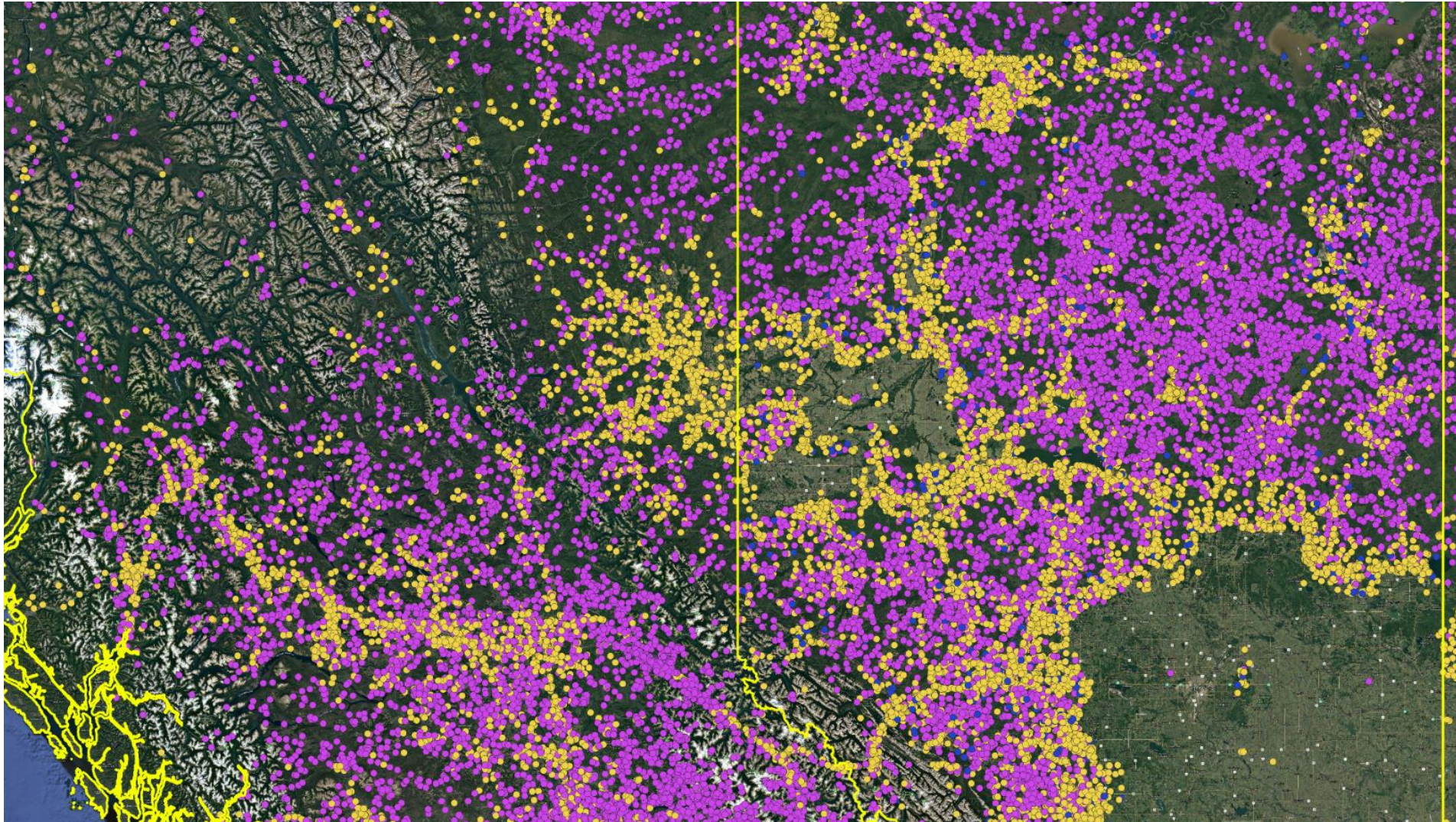
Where there are fuels there is (the potential for) wildfire

On average (since 1980) Canada annually experiences appx. 8,000 wildfires that burn 2.1M hectares (8,100 sq mi) with significant year-to-year volatility

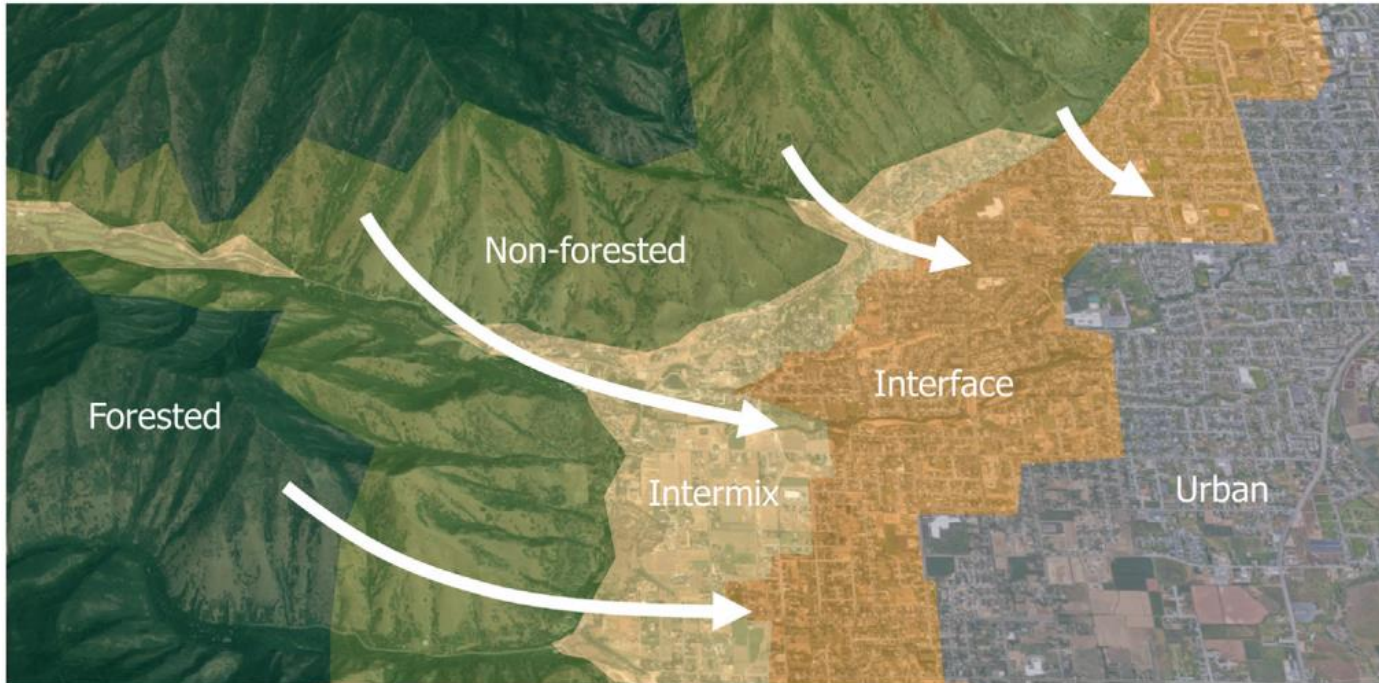
Lightning ignites appx. 50% of fires but lightning ignitions account for appx. 85% of annual burned area

Since 1991 large wildfires (>200 hectares) have accounted for 3.9% of all wildfires but 98.3% of burned area

Map of Ignitions



The Wildland Urban Interface (WUI)

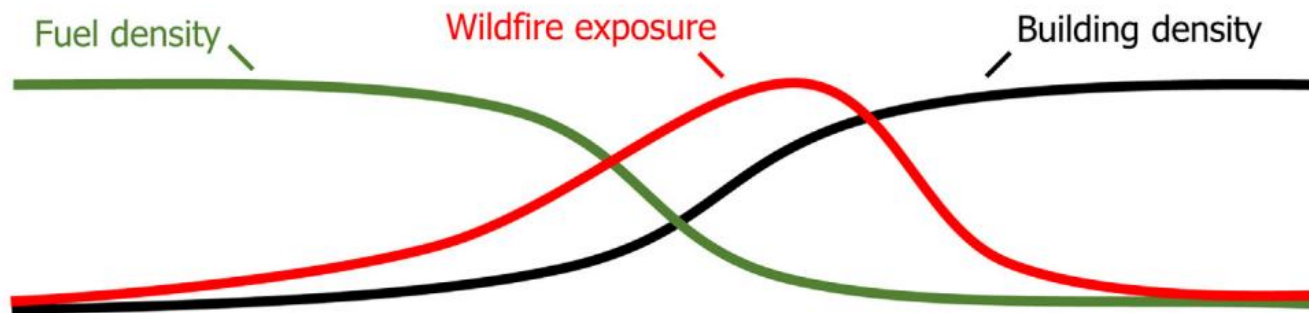


The WUI represents the areas most exposed to wildfire due to the confluence of exposed value and proximity to wildlands

However, the largest losses occur where oversized value is found in intermix or wildland areas and when fires encroach out of the WUI into urban areas

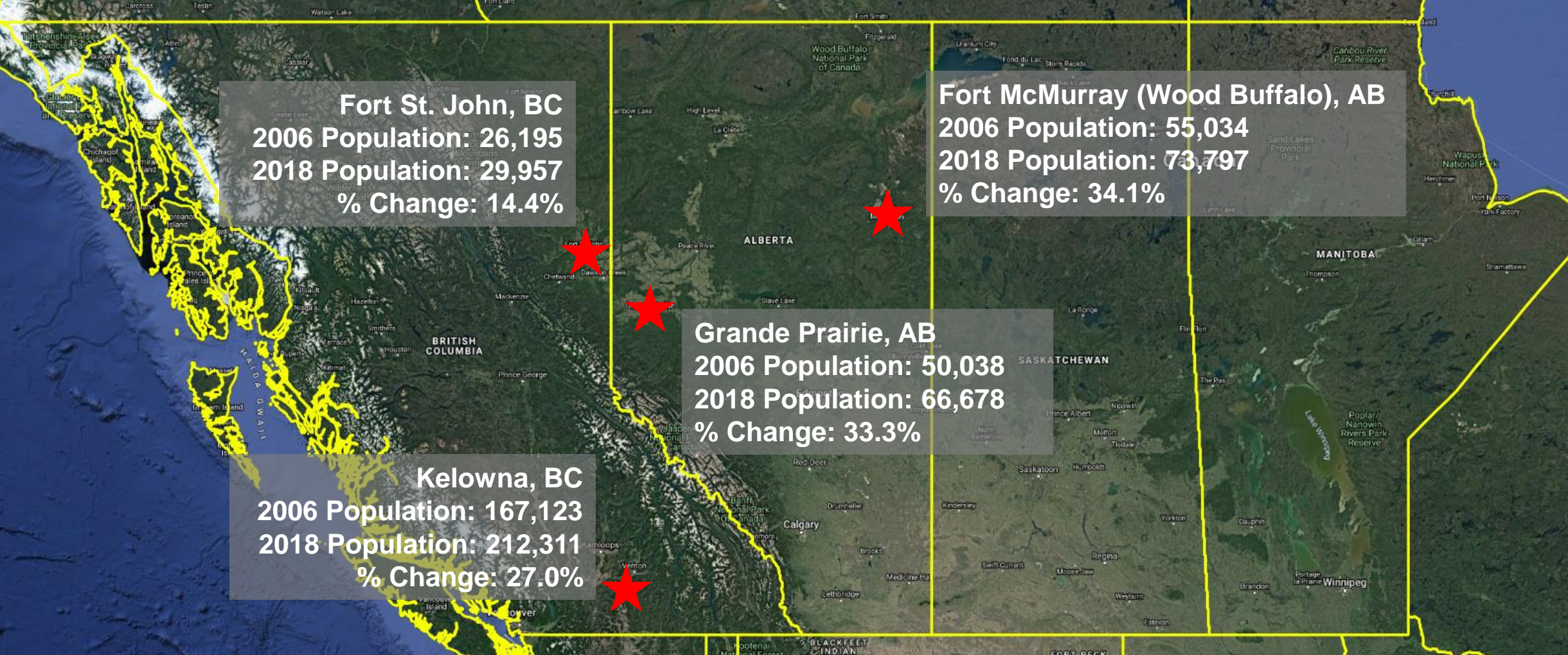
Identifying areas where large values are exposed to meaningful wildfire risk is the key to wildfire risk management

Ager, Alan A., et al. "Predicting Paradise: modeling future wildfire disasters in the western US." *Science of the total environment* 784 (2021): 147057.



$$\text{Risk} = f(\text{Impact}, \text{Likelihood})$$

Population Growth



Islands in the Wilderness



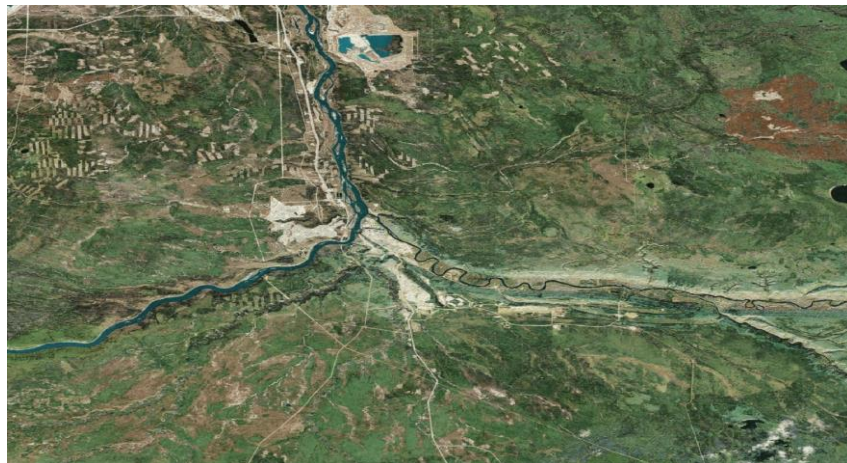
Williams Lake, BC



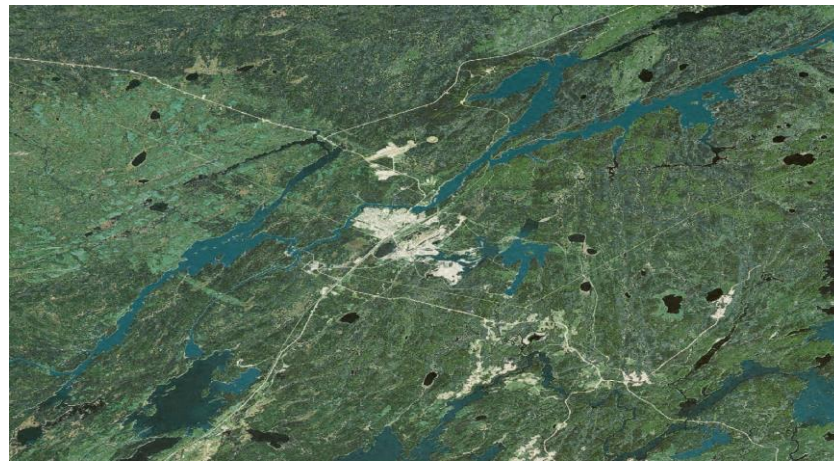
LaRonge, SK



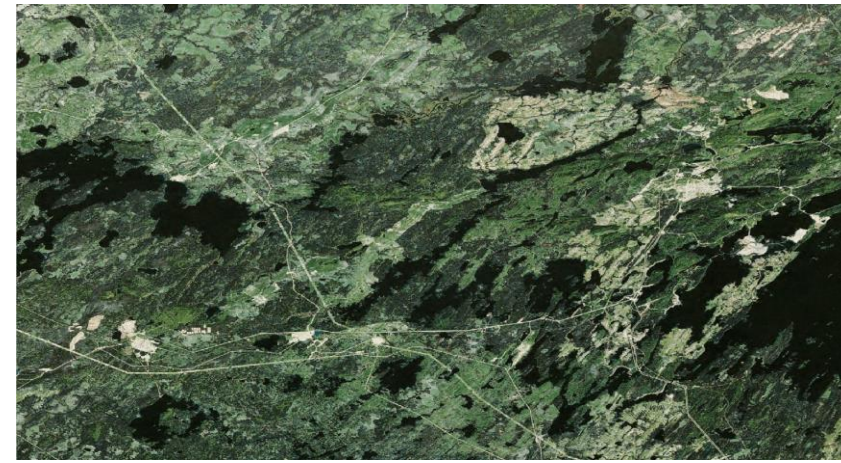
Kenora, ON



Fort McMurray, AB

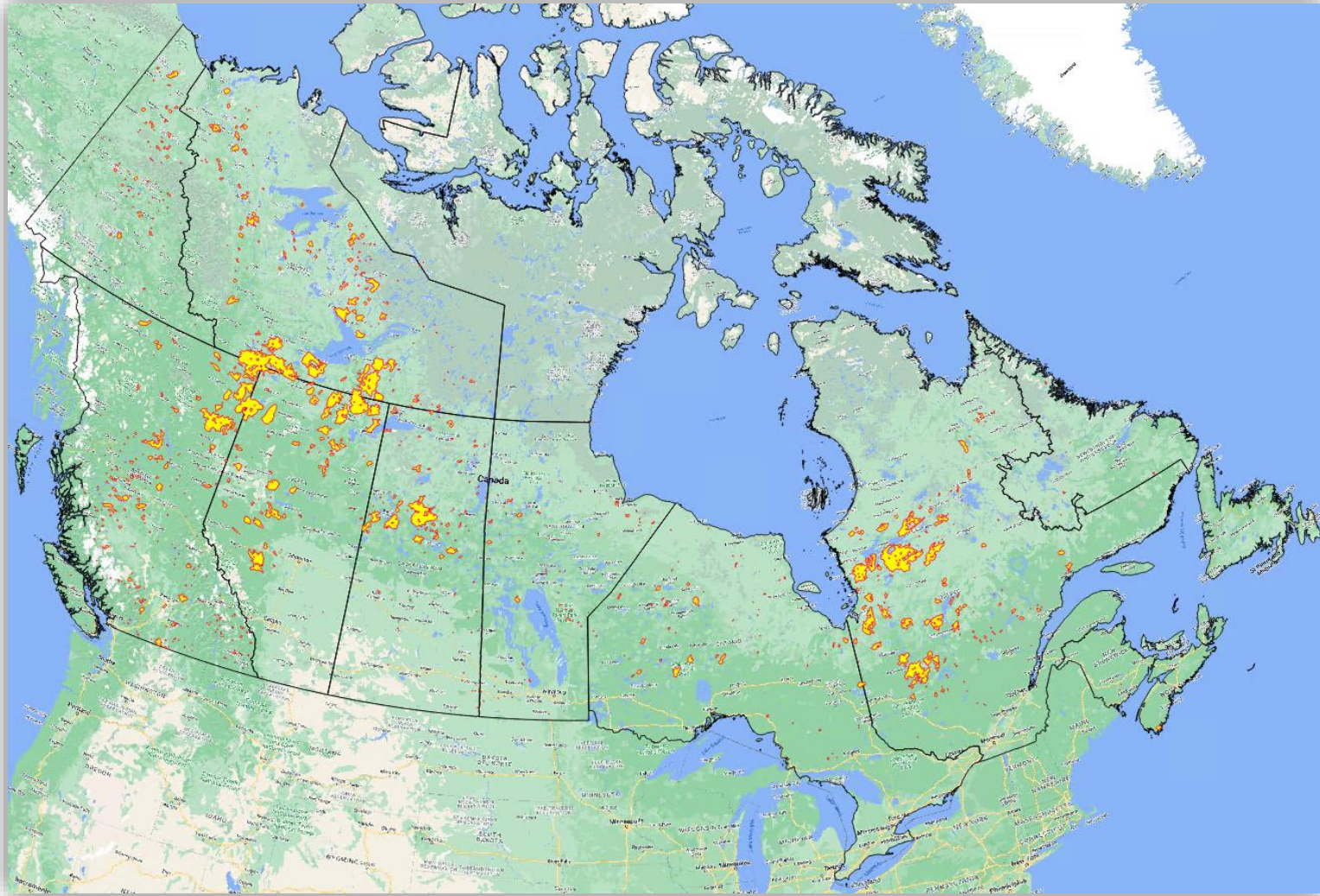


Thompson, MB



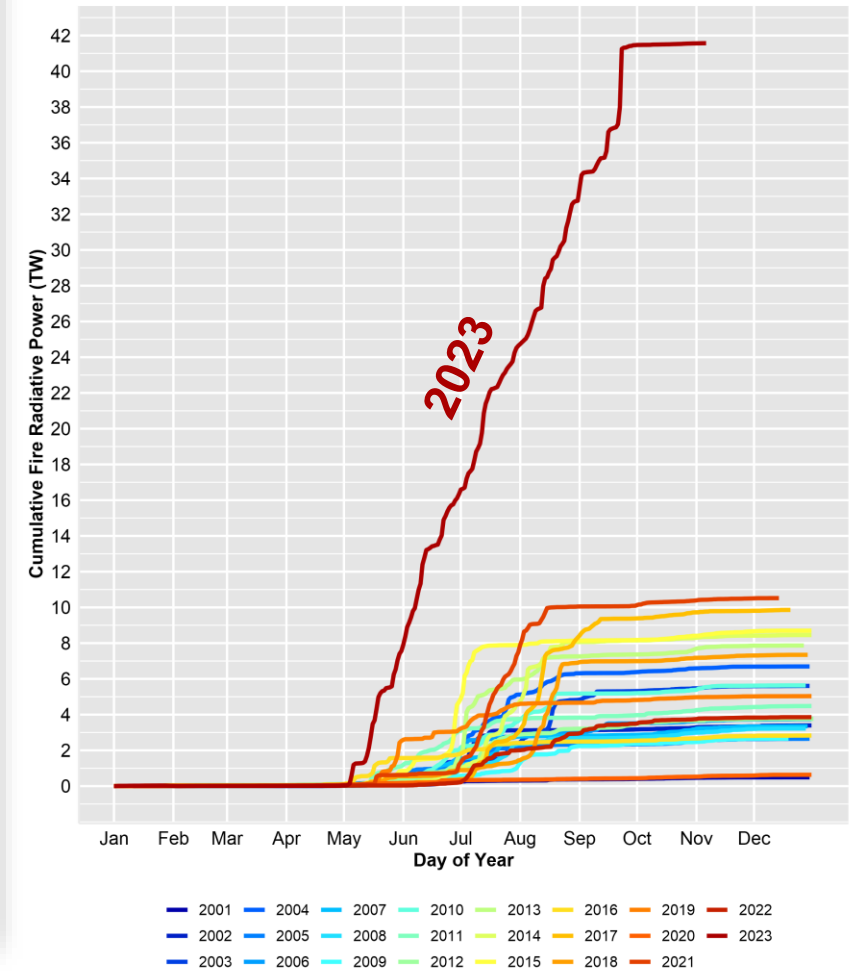
Chibougamau/Chapais, QC

2023 Wildfire Season in Canada



Annual Cumulative Radiative Power from MODIS Detections

Canada Only, Jan 1, 2001 - Nov. 6, 2023

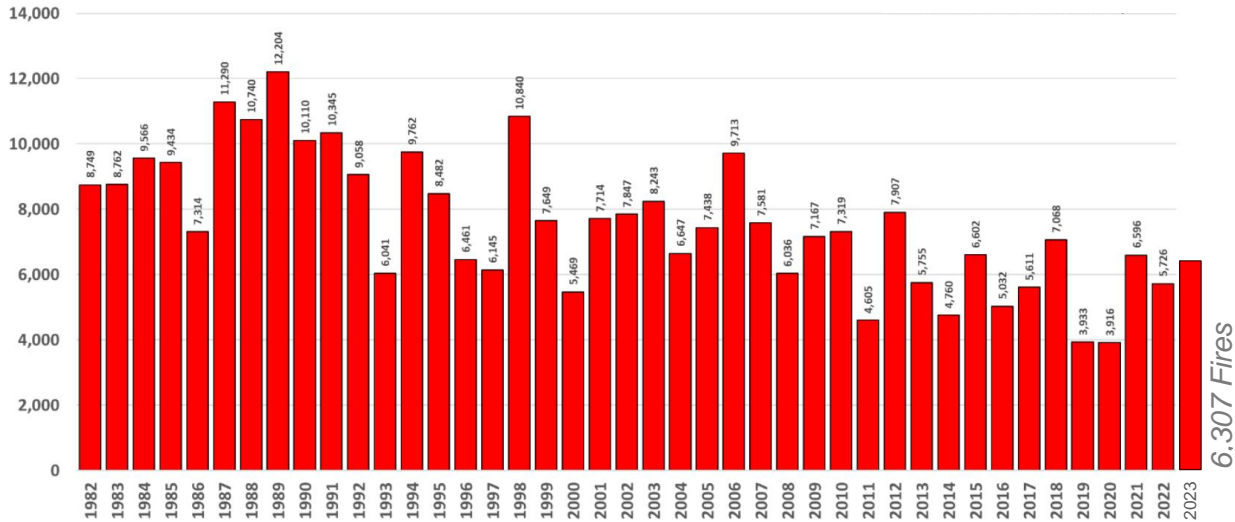


2023 Wildfire Season in Canada

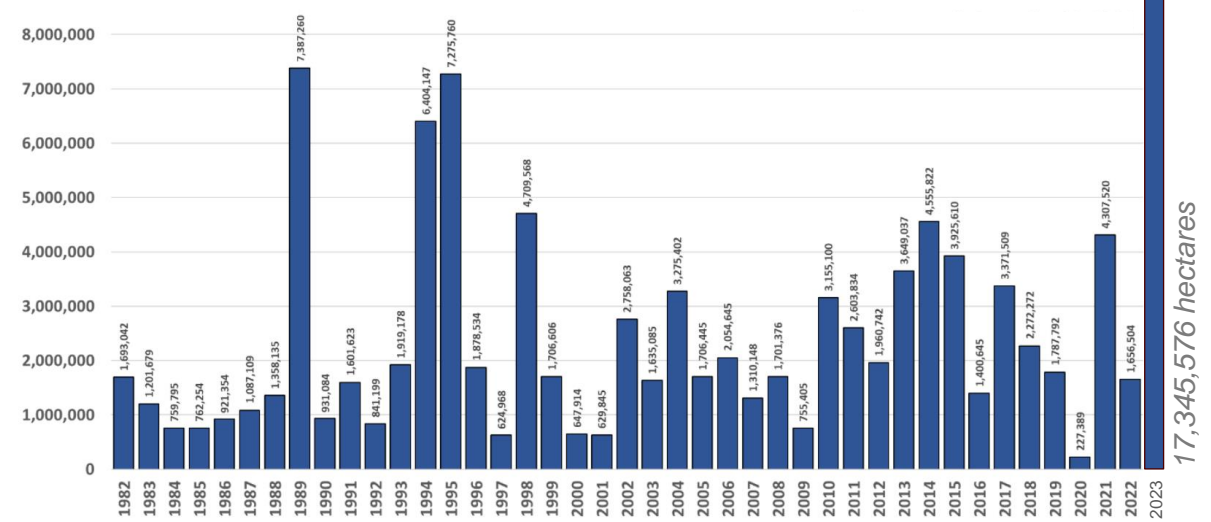
In terms of burned area (as of Nov. 6) 2023 in Canada has been equivalent to:



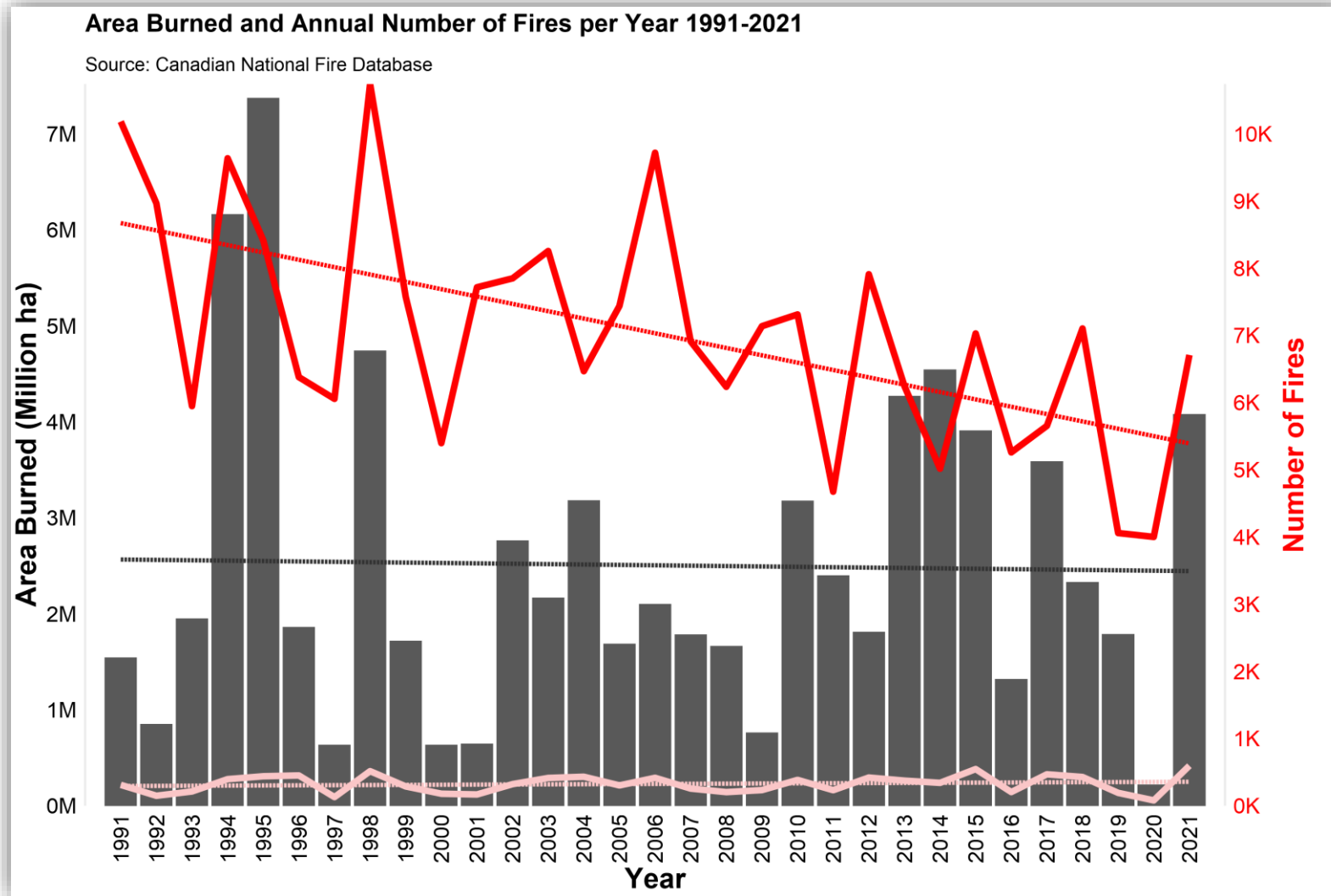
Annual Number of Fires in Canada
1982-2022



Annual Number of Hectares Burned in Canada
1982-2022



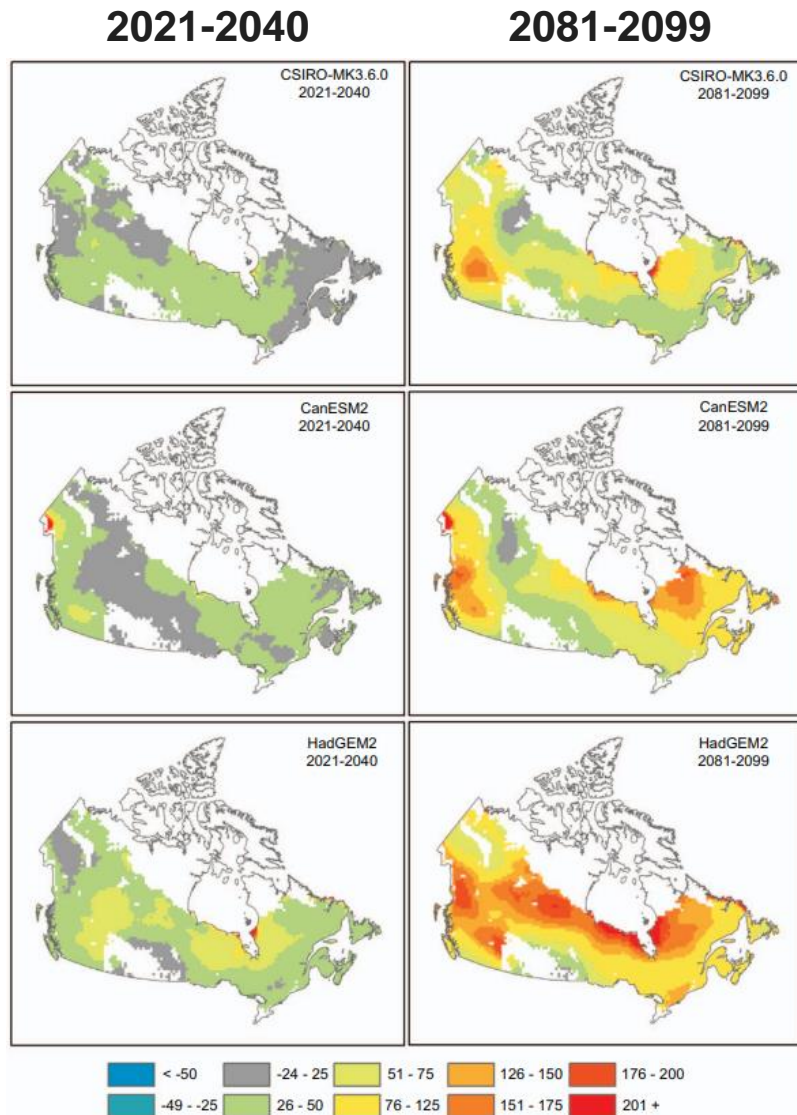
Recent Trends in Canadian Wildfire Activity



Since 1991:

- There has been an observed 1.3% annual decrease of all wildfires (in red)
- This is equivalent to an annual decrease of appx. 109 wildfires
- There has been an observed 0.2% annual decrease in burned area (in grey)
- This is equivalent to an annual decrease of appx. 4,000 hectares per year
- There has been an observed 0.8% annual increase in large fires (>200 hectares; in pink)
- This is equivalent to an annual increase of appx. 2.1 large wildfires

Impacts of Climate Change

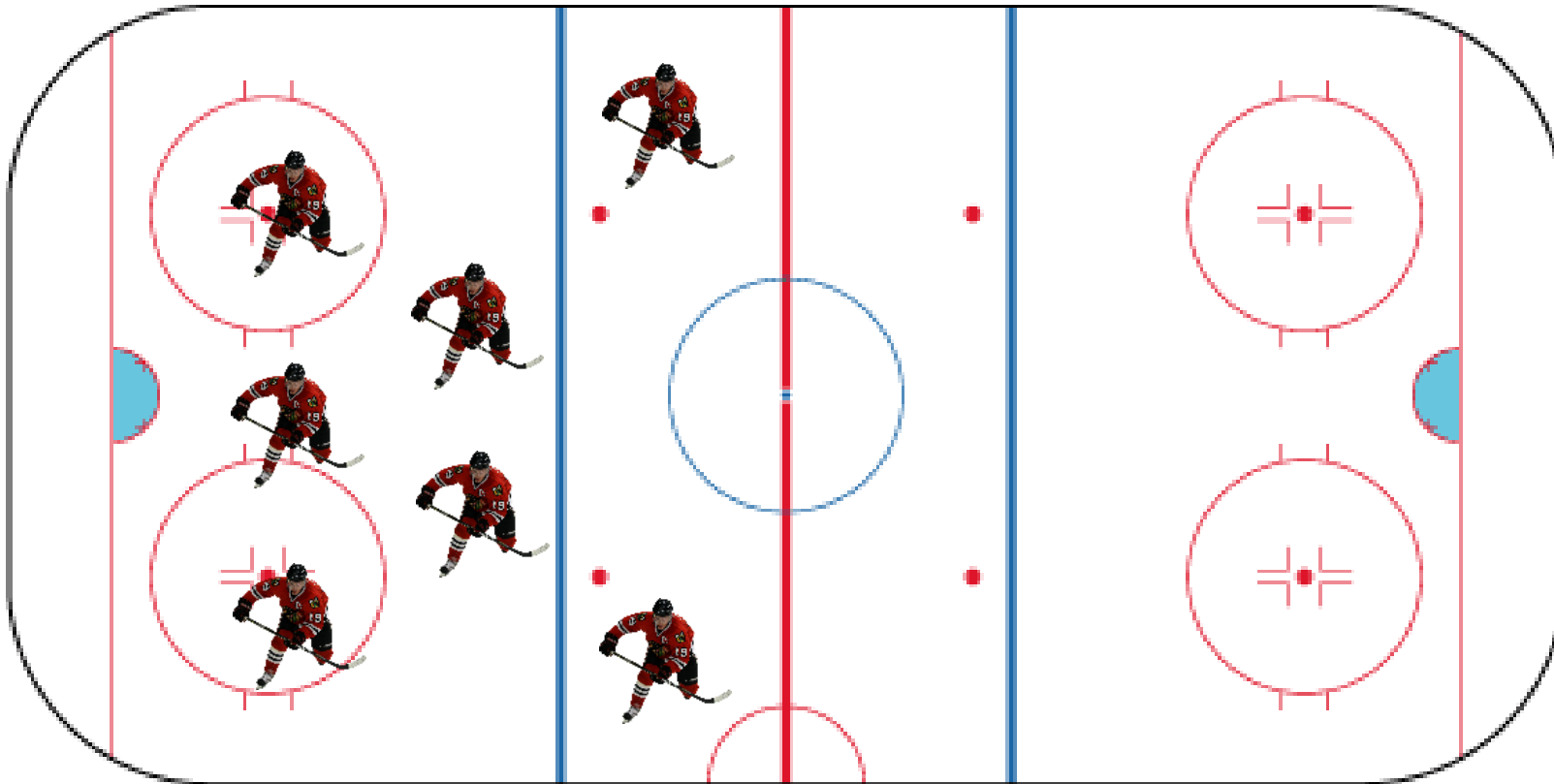


- **Spread Day Probability Model**
 - Mean number of days a fire could be expected to spread annually
 - A way to consider active fire growth
 - Image depicts: *Percent change from baseline period in the expected number of days per fire season where active fire growth potential exists*
- **Global Climate Models (3) found:**
 - Small to moderate increases mid-century
 - Significant increases by end of century
 - Boreal forest regions are predicted to see largest increase

Wotton, B. M., M. D. Flannigan, and G. A. Marshall. "Potential climate change impacts on fire intensity and key wildfire suppression thresholds in Canada." *Environmental Research Letters* 12.9 (2017): 095003.

Climate Change

Future wildfire activity and impacts are not only dependent on changing weather



What if a hockey game was played for 75 minutes instead of 60?

What if we then widened the playing surface and added players?

Longer fire weather seasons are already being observed and climate modeling indicates even longer fire weather seasons in the future

However, longer fire weather seasons do not necessarily mean more destructive fires, particularly for such a human-influenced peril

More opportunities for fires but other elements play a large role in how they will impact the built environment

- Forest management practices
- Suppression techniques
- Heightened societal awareness
- More resilient structures & communities

