WILDLAND FIRE AND RESILIENCE

QUESNEL FORESTRY THINK TANK
MAY 3 AND 4, 2018

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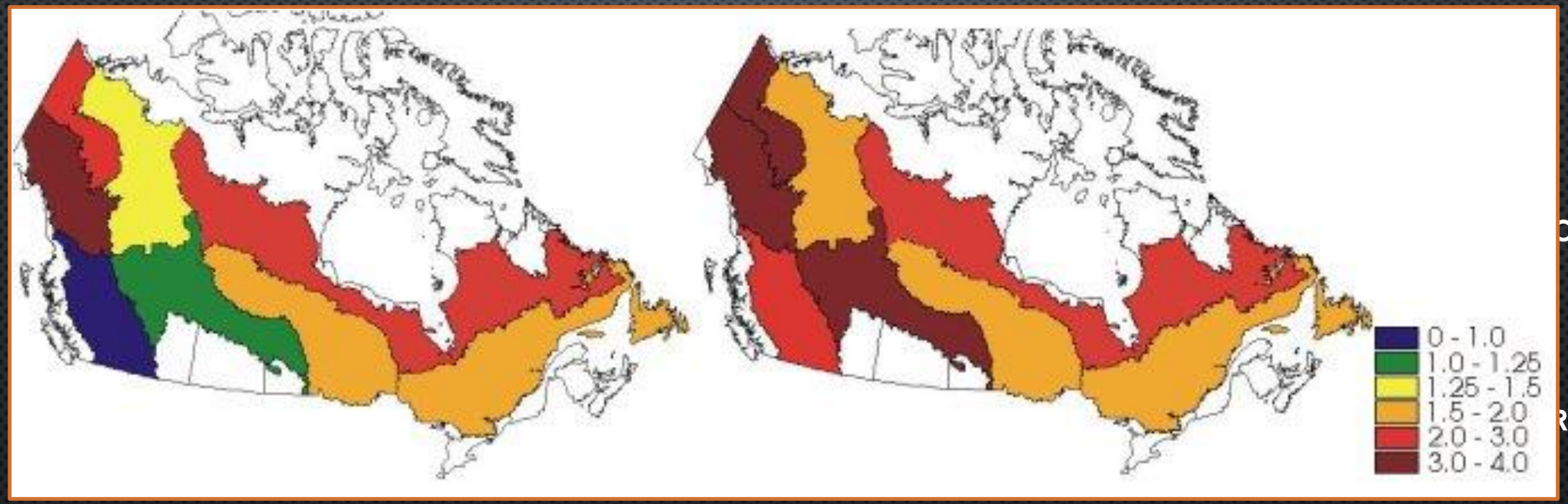
Responding to the challenge of climate change

- Do we have a robust enough forest health strategy to address significant and growing challenges of climate change (drought, fire, pest, disease, maladapted plantations, etc.)?
- Do we need to shift the focus of forest management to resilient forest ecosystems, rather than timber, in order to better protect our forests and our future fibre supply from the risk of catastrophic disturbances? What would such a shift mean for forest management policy and practice?

THE CLIMATE CHALLENGE



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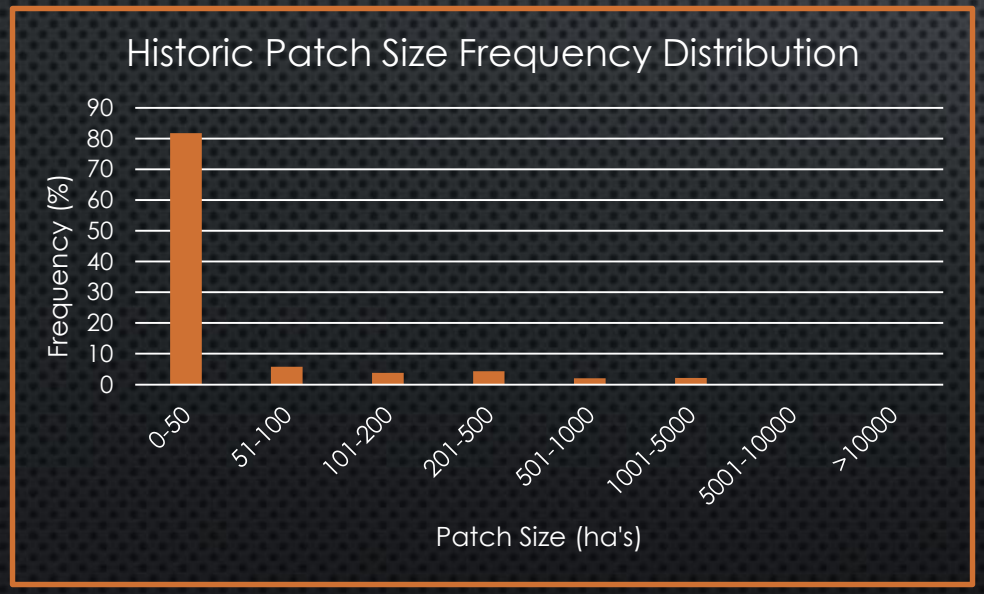
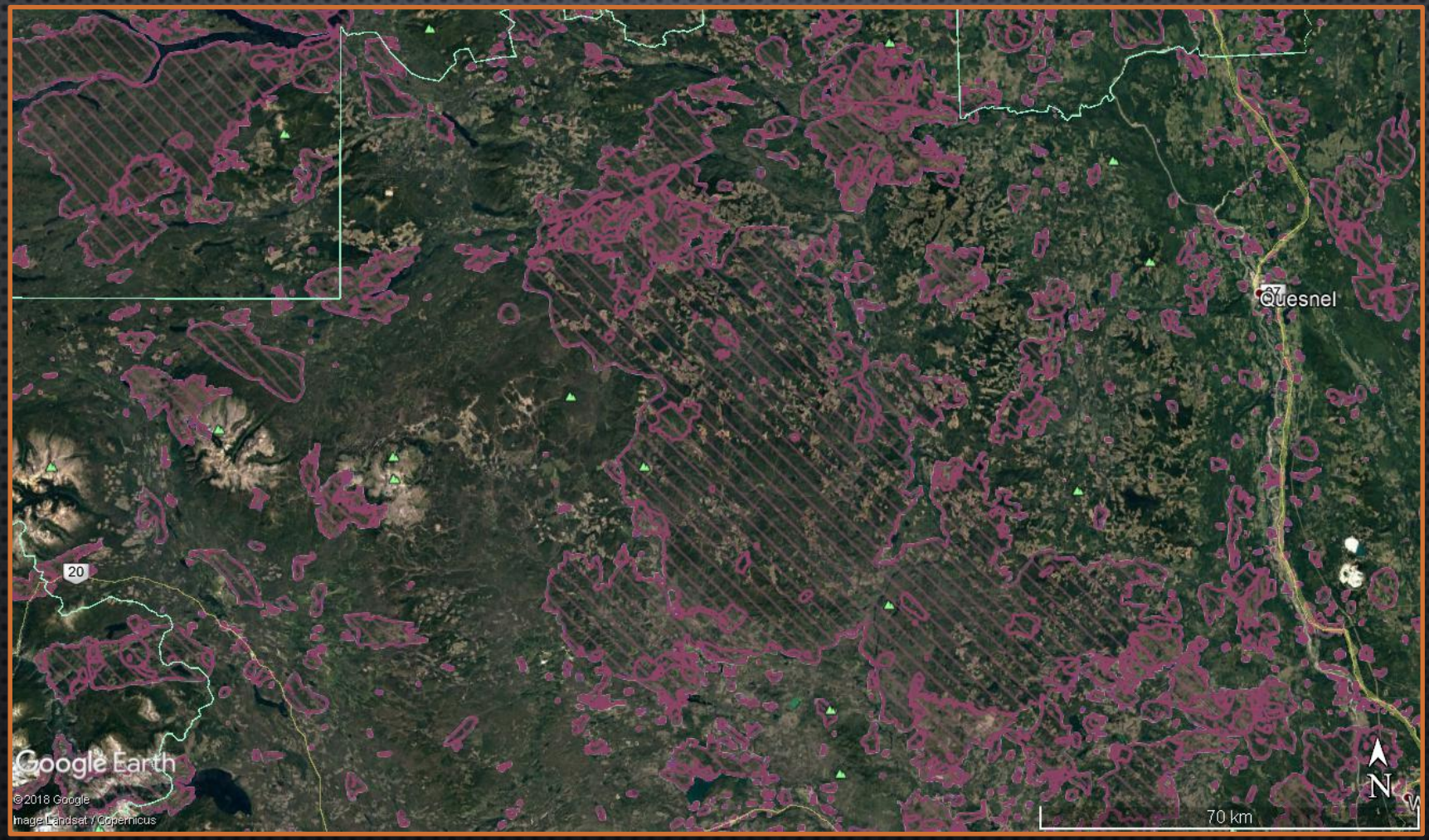
HISTORIC LANDSCAPE PATTERNS: LANDSCAPE MADE UP OF SMALL TO MEDIUM SIZED PATCHES WITH VARYING INTERNAL FUEL CONDITIONS

- **Mean fire size: 1,634 ha's**
- **Fire cycle: 47 years**
- **Mean burn rate (1869 – 1921): 0.58%**
- **Very large fires were rare but did occur (e.g., 1869, 1922, 1939)**



Francis et al. 2002. Characterizing fire regimes in sub-boreal landscapes: fire history research in SBPS and SBS Biogeoclimatic Zones of Cariboo Forest Region. Report to Lignum Ltd.

CONTEMPORARY LANDSCAPE: VERY LARGE DISTURBANCE PATCHES MIXED WITH SMALLER PATCHES BUT VERY LITTLE FUEL HETEROGENEITY



LANDSCAPE SYNCHRONIZED FOR LARGE FIRE AND REPEATED LARGE FIRE






REBURN RESEARCH AND CLUES TO LANDSCAPE-LEVEL WILDFIRE RESILIENCE

Influence of Past Burn Mosaics to Future Fire Behavior and Implications for Management

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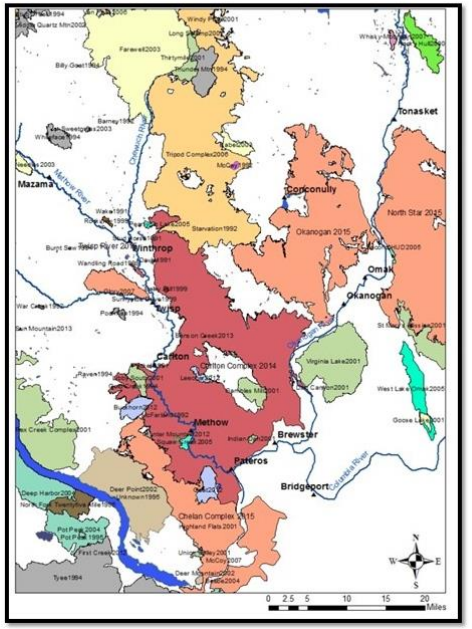
Research Questions

How do the location, size and age of past wildfires influence subsequent wildfire behavior and effects?

Were past wildfires effective as barriers to subsequent fire spread or to mitigate burn severity?

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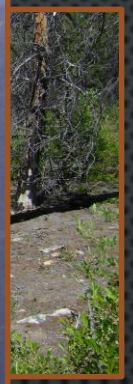
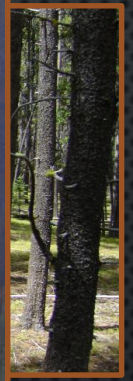
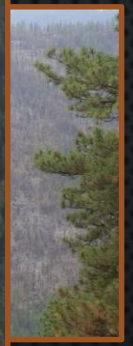
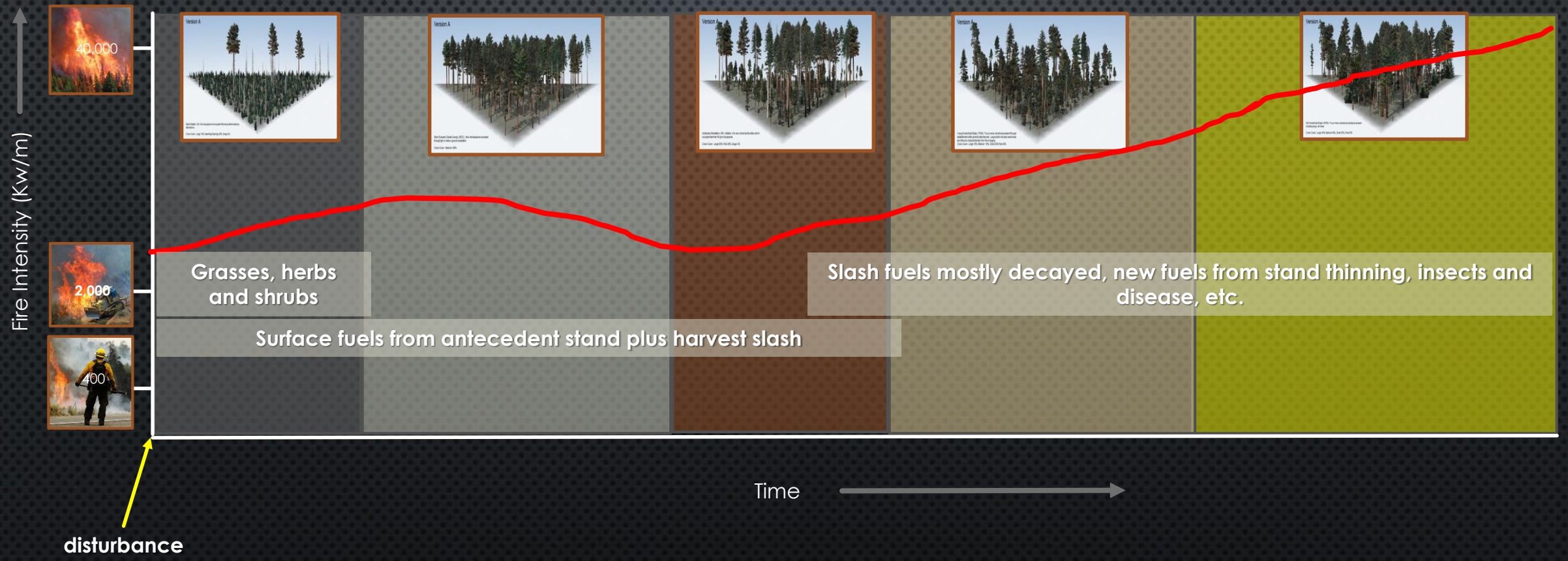




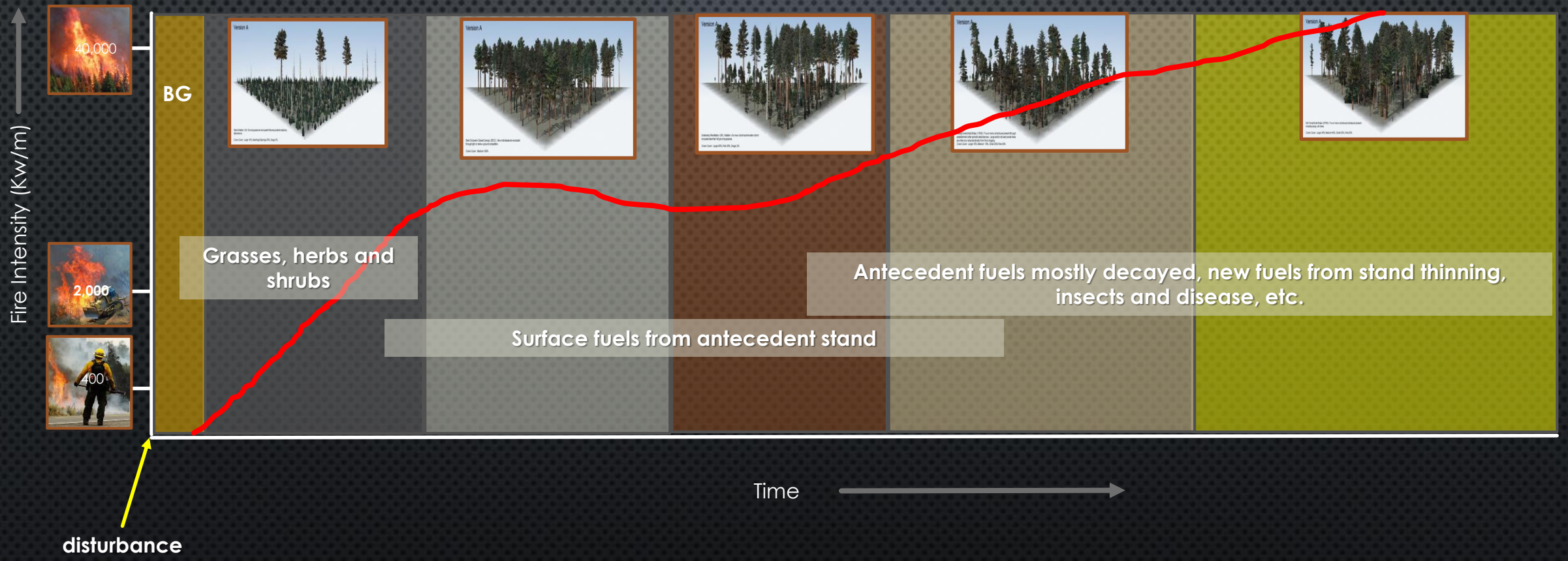


REBURNS AS A NATURAL PROCESS

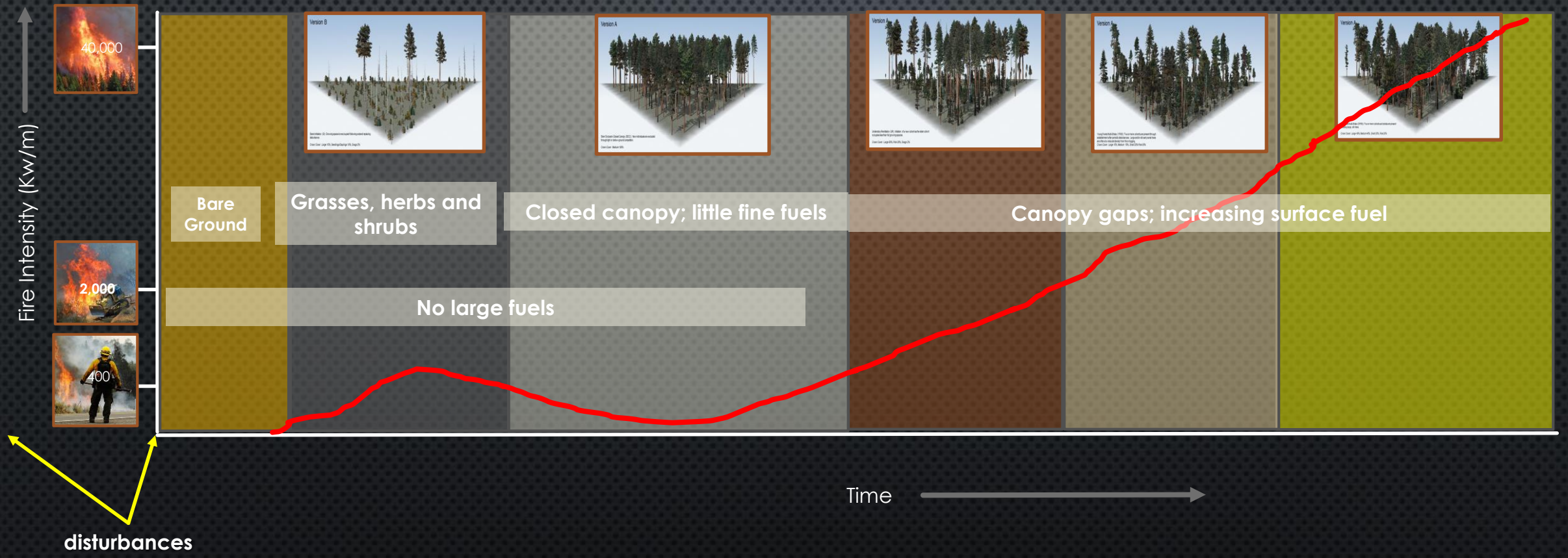
SUCCESSION TRAJECTORIES, FUEL LOAD, AND POTENTIAL FIRE INTENSITY: TRADITIONAL HARVEST AND REPLANT



SUCCESSION TRAJECTORIES, FUEL LOAD, AND POTENTIAL FIRE INTENSITY: WILDFIRE (NO SALVAGE) AND REPLANT



SUCCESSION TRAJECTORIES, FUEL LOAD, AND POTENTIAL FIRE INTENSITY: REBURN AND REPLANT



PERIOD OF INFLAMMABILITY

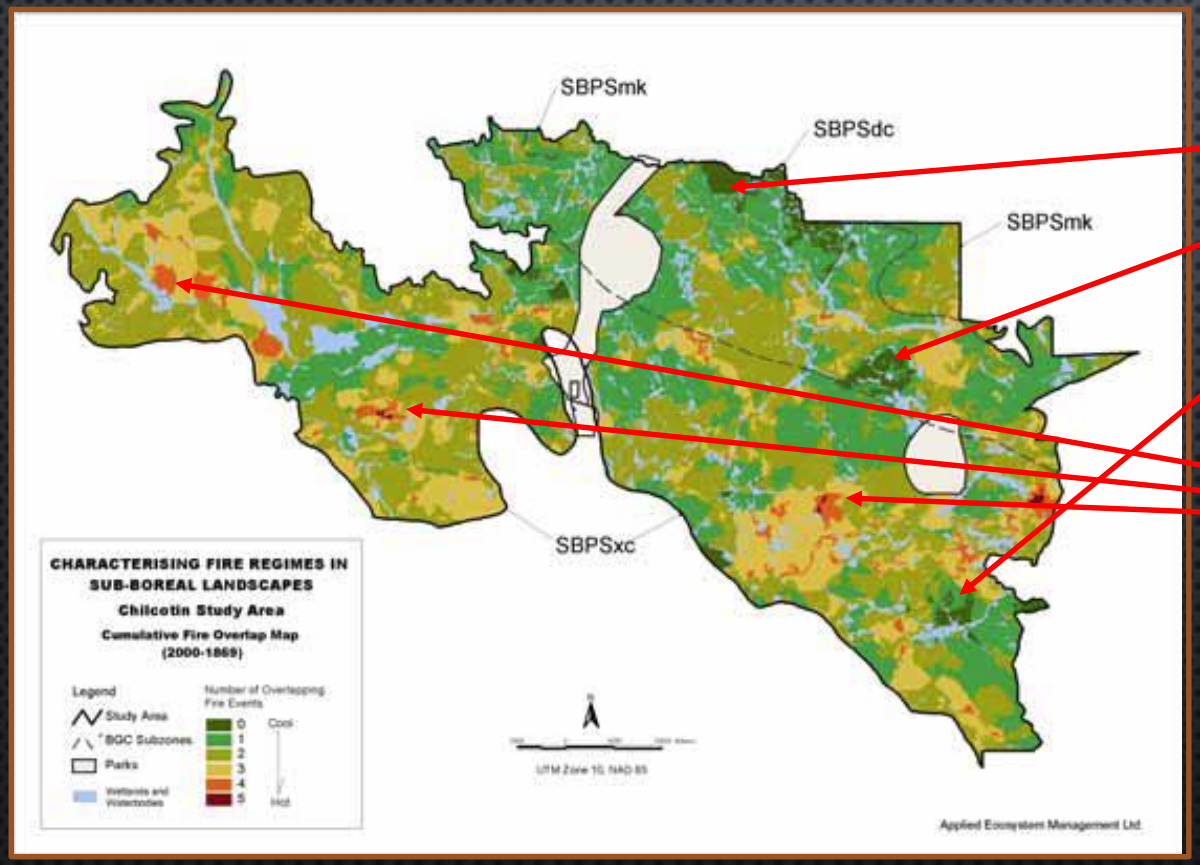
5 to 10 years (in some cases up to 20+ years)

40 to 120 years[1]

40 to 80 years

[1]Longer period of low flammability on cooler and steeper aspects.

HISTORIC FIRE PATTERNS AND HOW BIOPHYSICAL ATTRIBUTES ATTENUATE FIRE FLOW



These areas may be good candidate sites for old forest

These areas in the study experience multiple fires suggesting a pattern of predictable fire spread location.
Use as containers for fire and manage with managed wildfire or prescribed fire.

Francis et al. 2002. Characterizing fire regimes in sub-boreal landscapes: fire history research in SBPS and SBS Biogeoclimatic Zones of Cariboo Forest Region. Report to Lignum Ltd.

What would a resilient landscape look like and what forest products will be available?

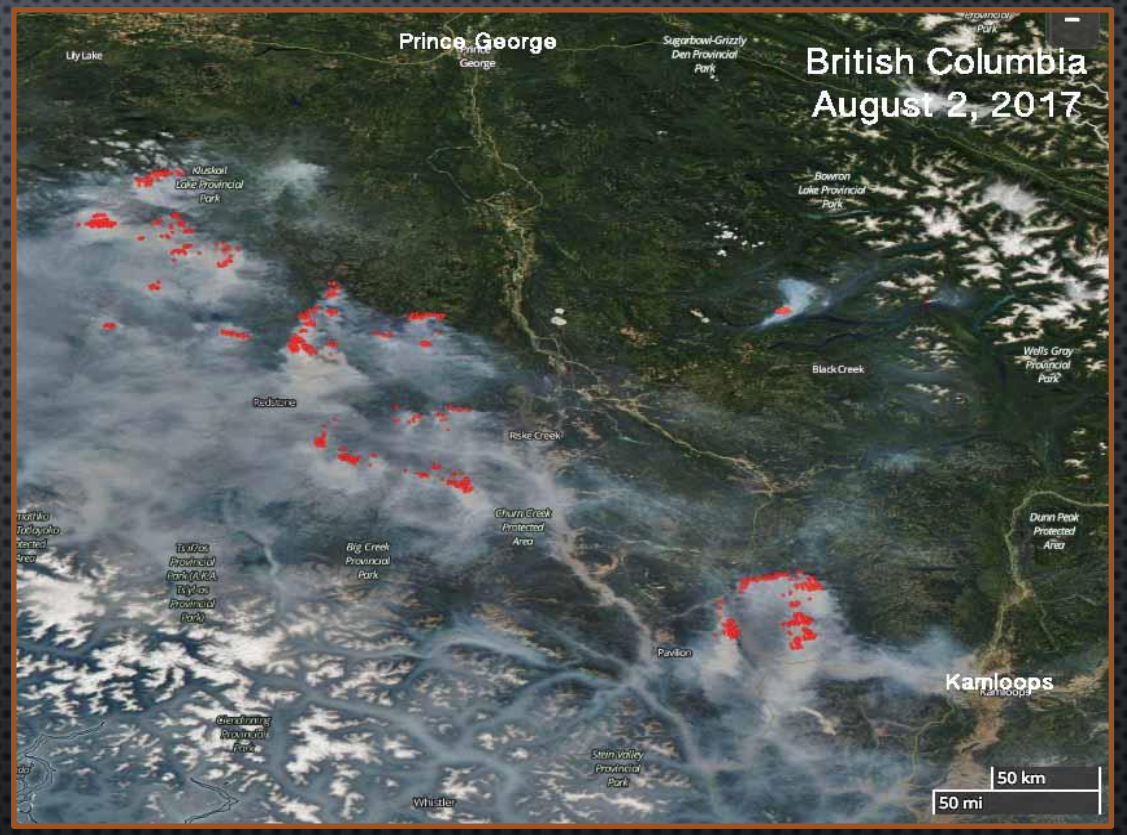
- Research suggests upwards of 40% of the landscape needs to be maintained in low flammability forest conditions
- Use frequently fired sites as containers for fire – steer fire into these areas and maintain as grass/herb/shrub or convert to deciduous
- Build and maintain fire spread barriers (deciduous forest, reburns) around areas where we want to grow and maintain old forest (incorporate terrain features)
- Significantly reduce fuels on recently burned sites (once the dead trees start to fall) through prescribed fire or modified suppression

What would a resilient landscape look like and what forest products will be available? (cont'd)

- Landscape will not produce or support much old forest and what old forest that is produced will be transient and best focused on providing wildlife/fisheries habitat, etc.
- Conifer forest management should target mature stem exclusion closed canopy forest structure as it transitions to understory reinitiation (increasing flammability)
- Manage for large patches of closed deciduous (thousands of hectares in size – need closed internal conditions to reduce flammability)
- Increase utilization of dead wood – both standing and especially once it falls

CARBON

- Best carbon management strategy is to reduce the area capable of supporting high-severity fire
- Shift to a higher proportion of the area capable of supporting low-severity fire
- Liang, S., Hurteau, M.D., and A.L. Westerling. 2018. Large-scale restoration increases carbon stability under projected climate and wildfire regimes. Frontiers in Ecology. http://onlinelibrary.wiley.com/doi/10.1002/fee.1791/suppinfo



- Focus is on fire severity (impact on surface fuels and soils)
- Fire severity by treatment arranged from highest to lowest:
  - No prior fire
  - A single wildfire or prescribed fire
  - A combination of wildfire and prescribed fire

- Walker, R.B., Coop, J.D., Parks, S.A., and L. Trader. 2018. Fire regimes approaching historic norms reduce wildfire-facilitated conversion from forest to non-forest. Ecosphere. Vol. 9(4):1-17.