

Nurturing healthy and resilient forests to mitigate wildfire and climate change

Lori Daniels, Koerner Chair of Wildfire Coexistence

Faculty of Forestry, University of British Columbia, Vancouver

Ancestral Lands of the x^wməθk^wəy'əm sk_wxwú7mesh & səlilwətał



Forestry Australia Symposium: Healthy & Resilient Forests for the Future, October 2024

Strong Similarities between Our Nations



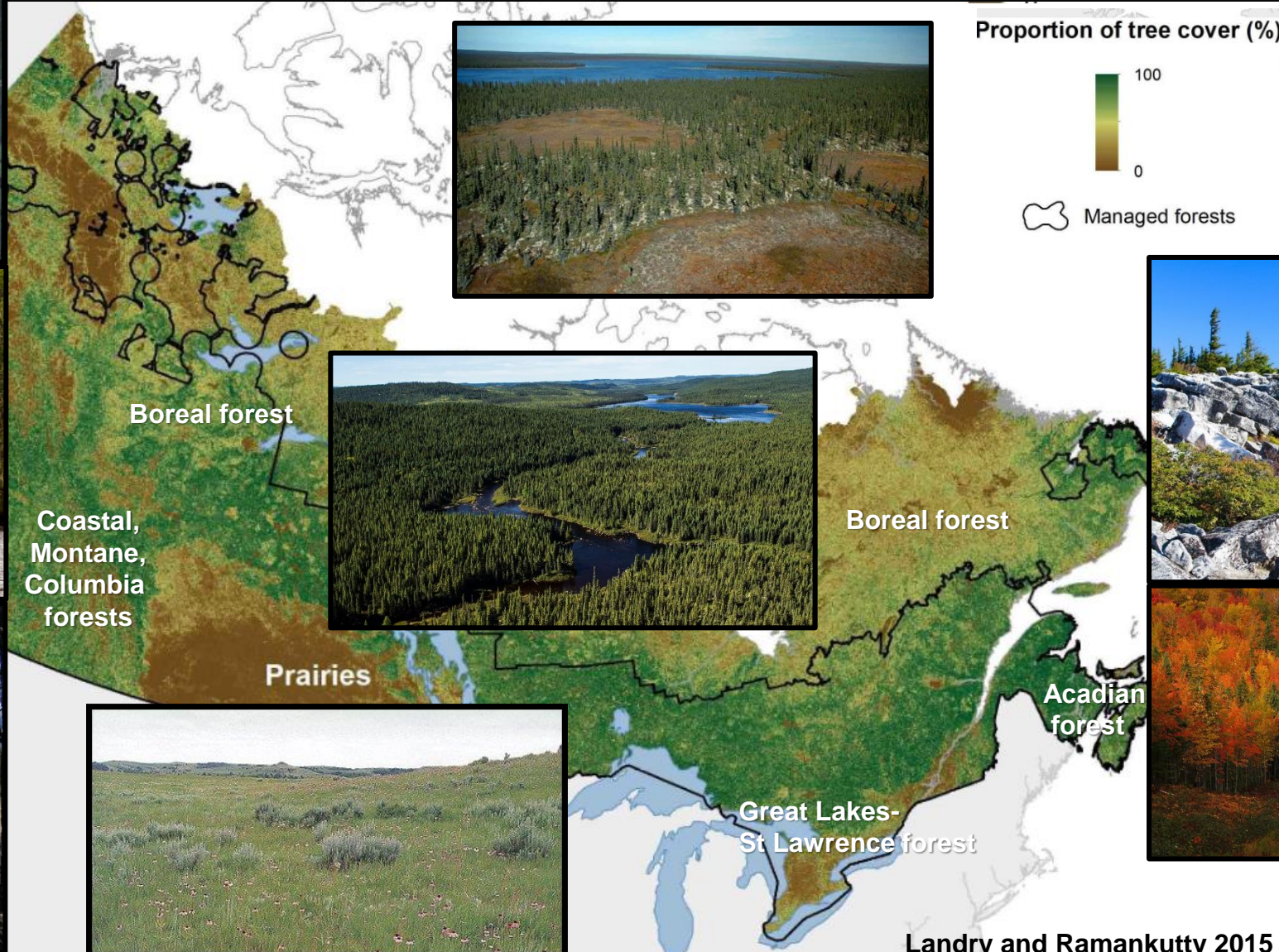
- 27 million people
- 7.7 million km²
- 1.3 million km² of forest
 - 16% of the country
 - 3% of the world's forests

- 41 million people
- 10 million km²
- 3.5 million km² of forest
 - 35% of the country
 - 9% of the world's forests

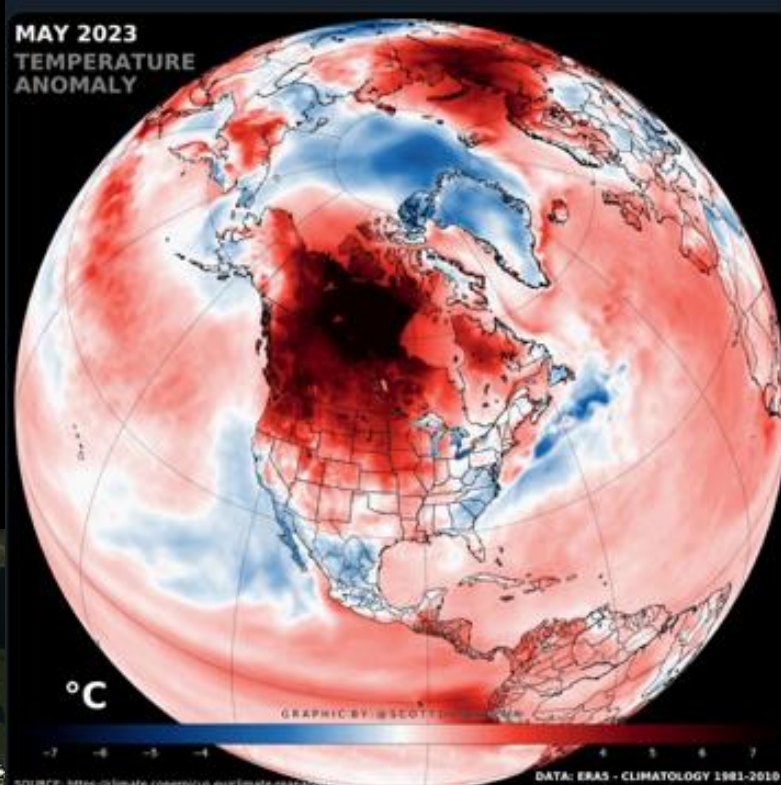
Diverse Forests of Canada



Diverse Forests of Canada

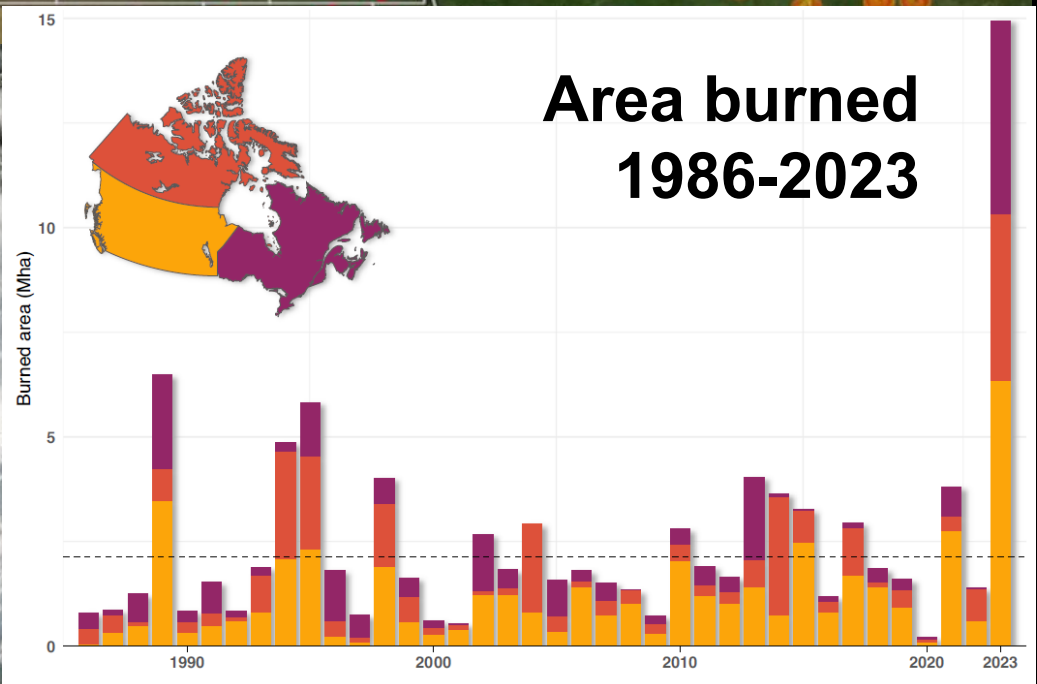


© Jetson Nguyen



2023 Wildfires in Canada

15M ha burned, releasing 410 MT of C



A topographic map of British Columbia and the surrounding regions of the Pacific Northwest. The map uses a color gradient from green to brown to represent elevation, with blue areas representing water bodies. A white outline clearly delineates the province of British Columbia. The map shows the rugged terrain of the province, including the Coast Range, the Rocky Mountains, and the interior plateau.

British Columbia

95M ha total

95% publicly owned

18 ecosystem types

14 forest types

62M ha forest

24M ha timber harvesting

200,000 ha yr⁻¹ harvested

200,000 ha yr⁻¹ burned



British Columbia

95M ha total

95% publicly owned

18 ecosystem types

14 forest types

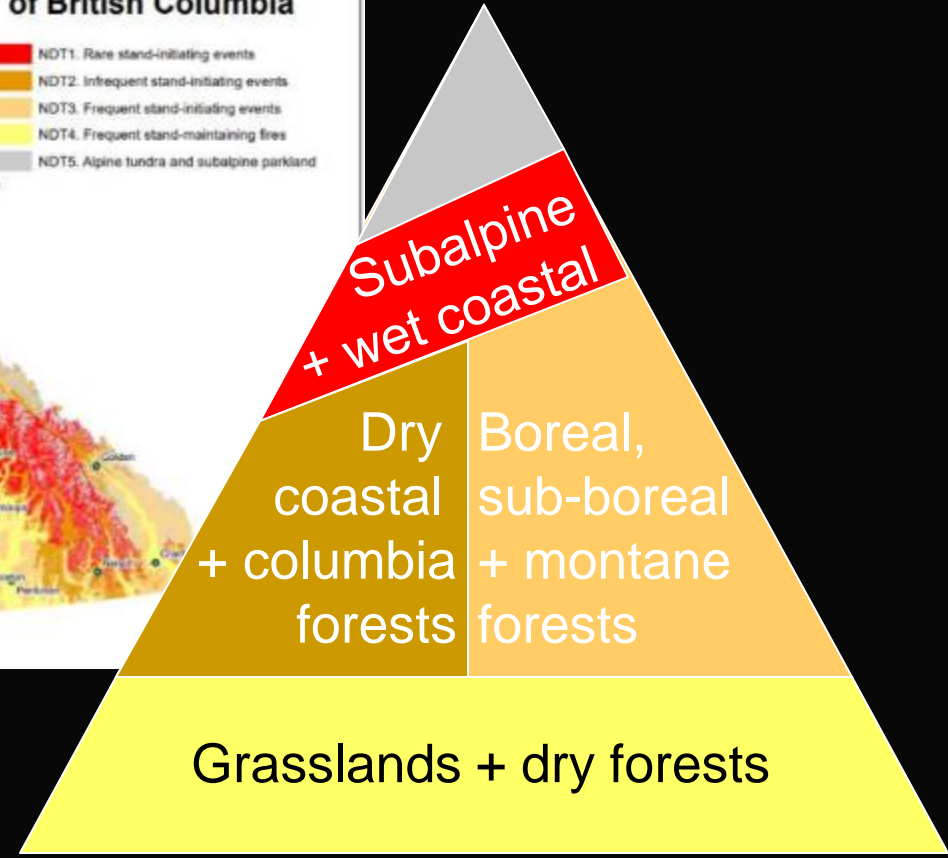
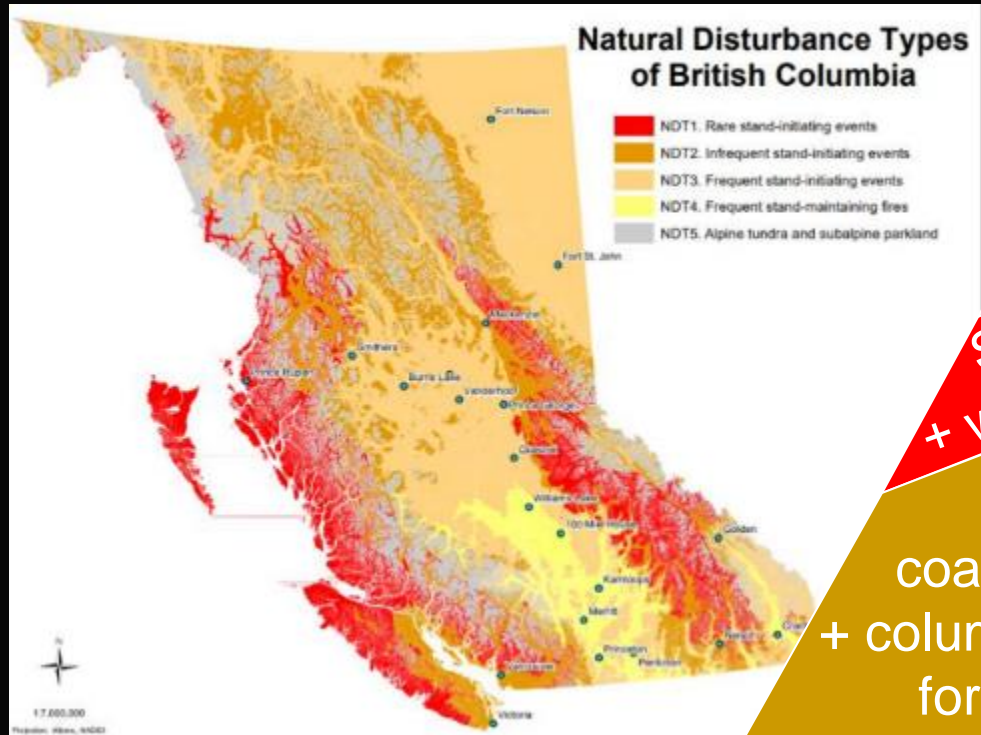
62M ha forest

24M ha timber harvesting

- ▶ 120,000 ha yr⁻¹ harvested
- ▶ 500,000 ha yr⁻¹ burned

Fire and Forest Management

Natural Disturbance Types in British Columbia



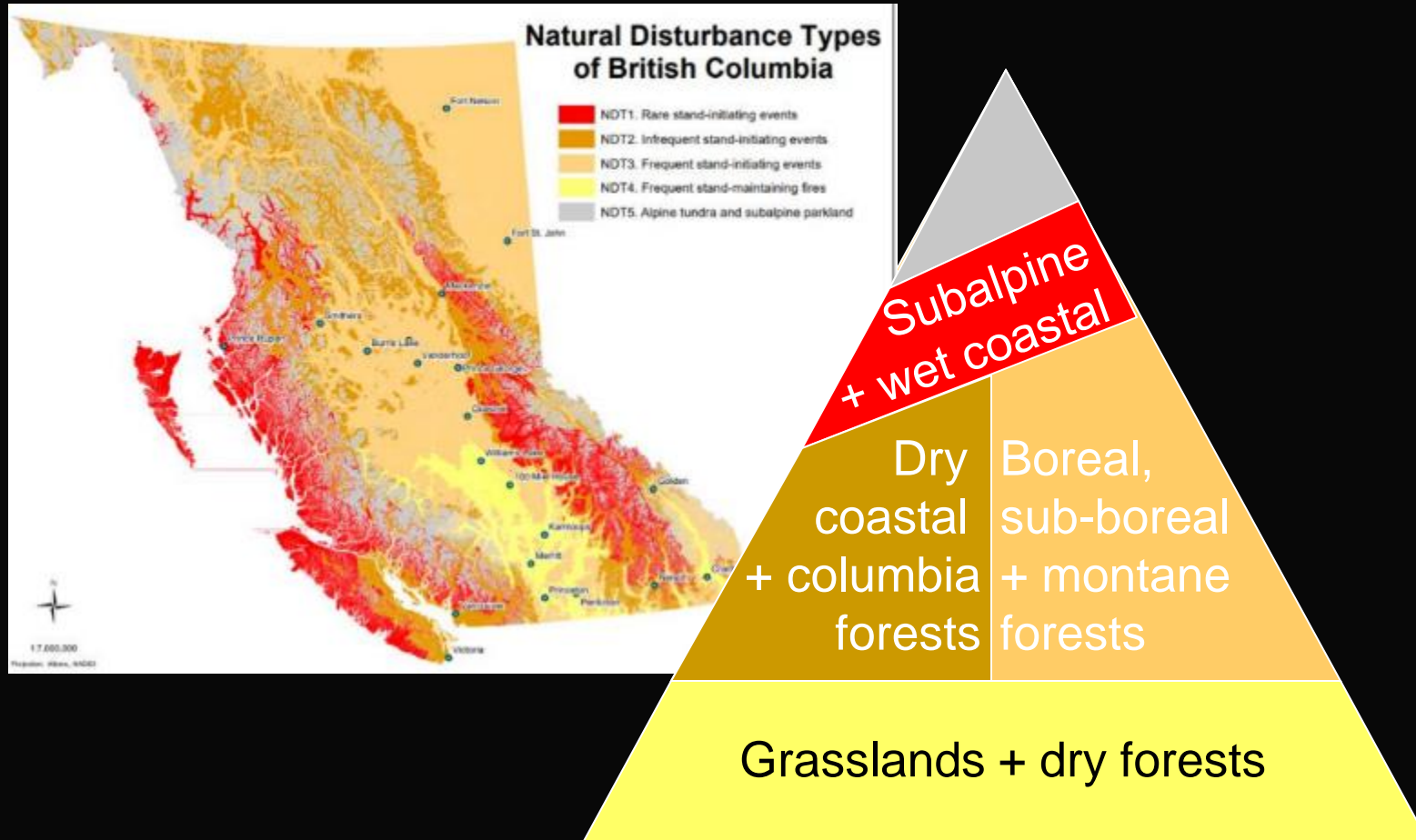
Fire Regimes:

High-severity, crown
Intervals: 100-350 yrs

Low-severity, surface
Intervals: <50 yrs

Fire as a Template to Guide Forest Management

Natural Disturbance Types in British Columbia



High-Severity Fire Regimes:

Even-aged silviculture
Rotations of ~100 yrs
Fire suppression
Old-growth forests
Ecological restoration

What if we have misinterpreted historical fire regimes?

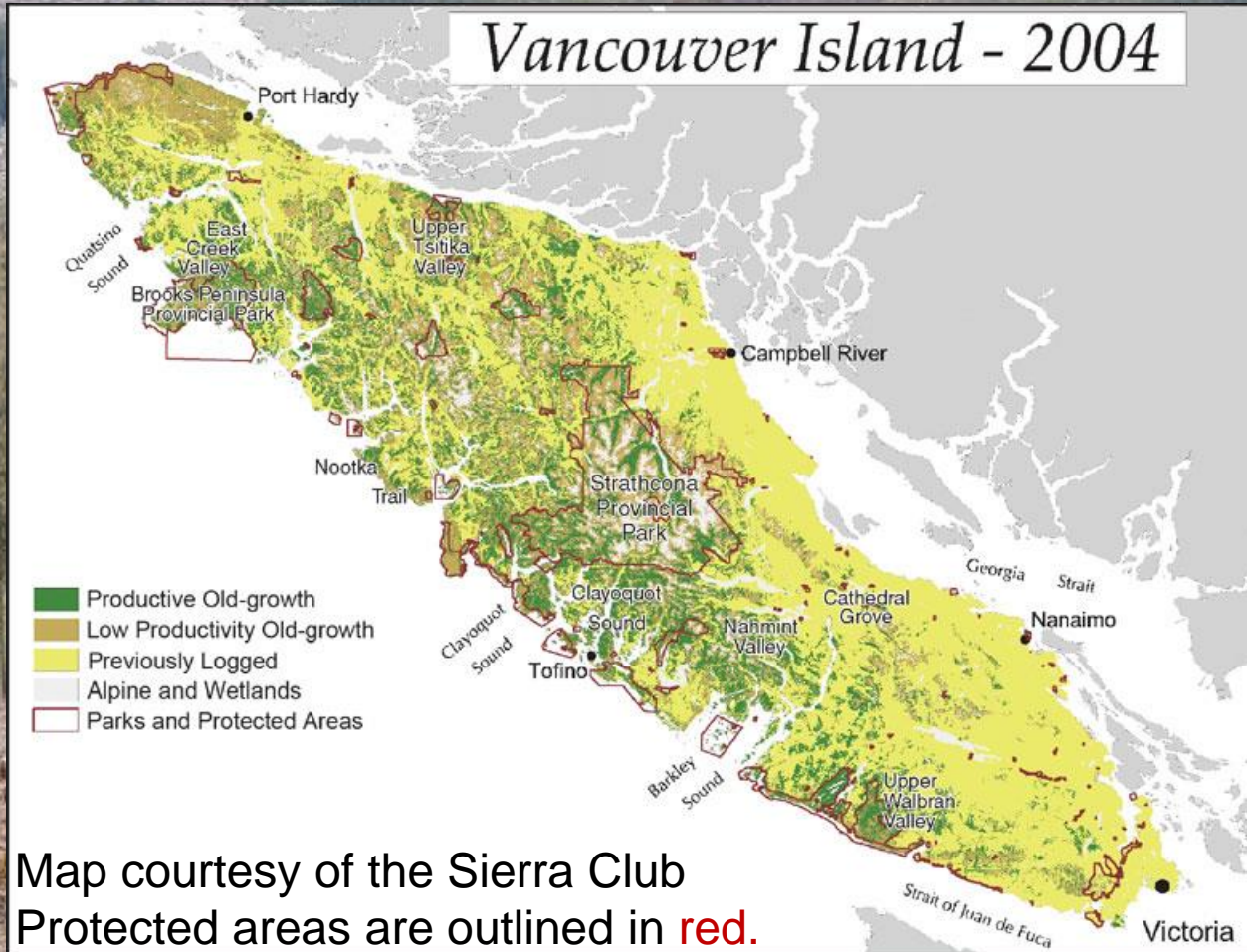
Coastal Forests of British Columbia



Map courtesy of the Sierra Club



Coastal Forests of British Columbia



Map courtesy of the Sierra Club
Protected areas are outlined in red.

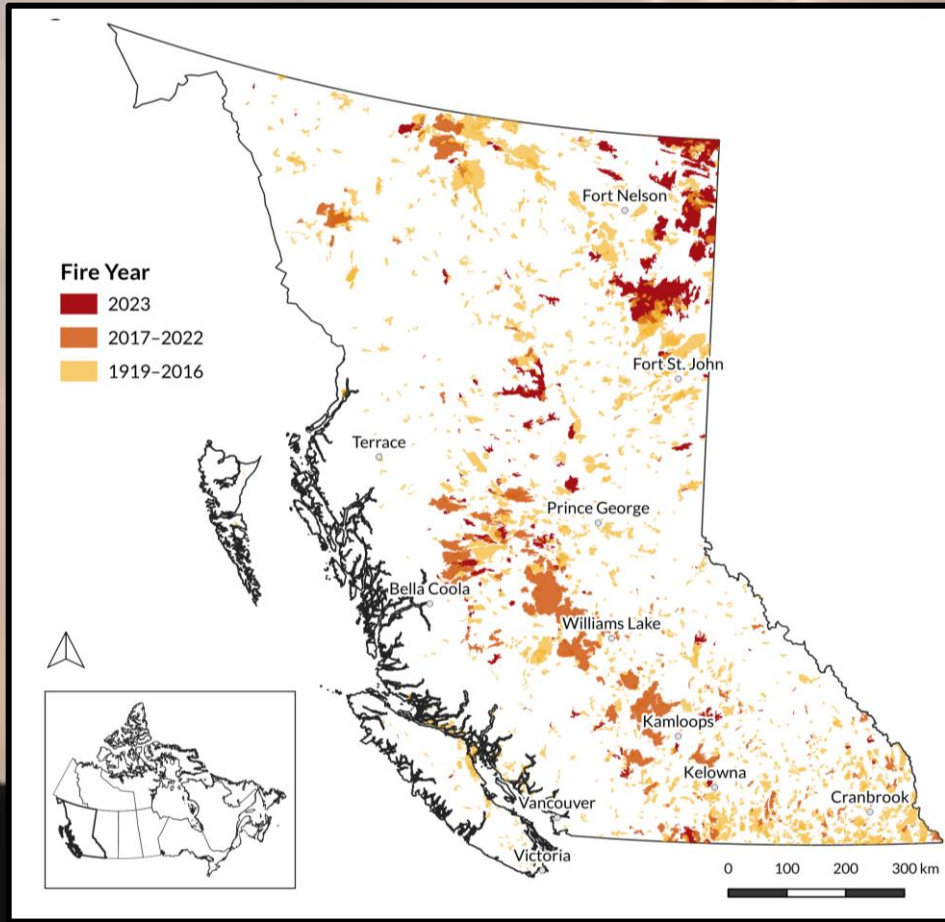


Large Cultural Cedar Protocol



Namaxsala, “Everyone on the Boat Together”, the first xwax’wāna cedar canoe in 100 years by master carvers in the H’kusam Forest and launched from Cape Mudge Beach in July 2024.

Montane Forests of British Columbia



Historical Fire Regimes: Frequent Surface Fire

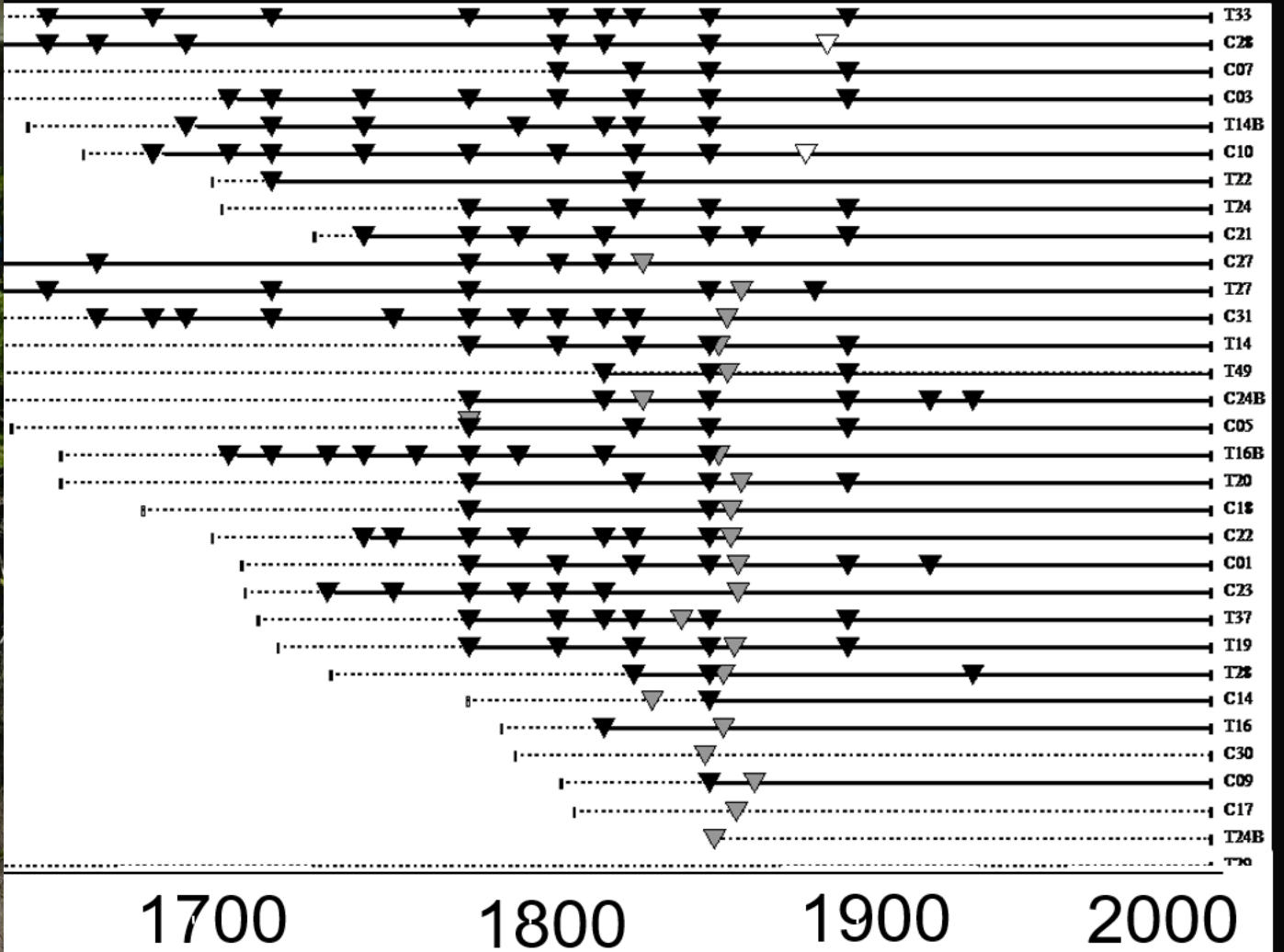
“Record” ponderosa pine
52 fire scars
1400-1894

**Centuries of history
preserved in tree rings**

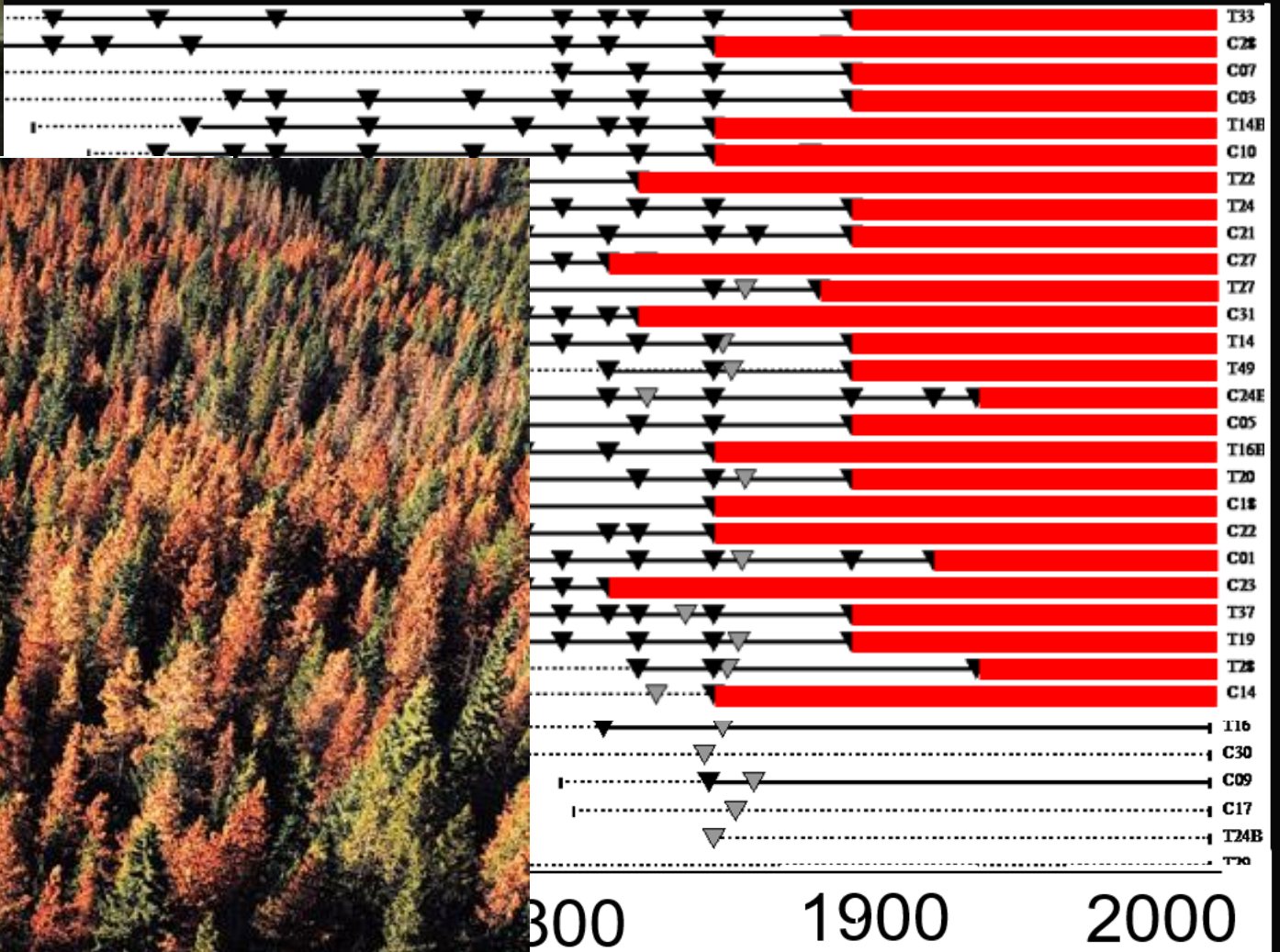


TREE RING LAB
at UBC

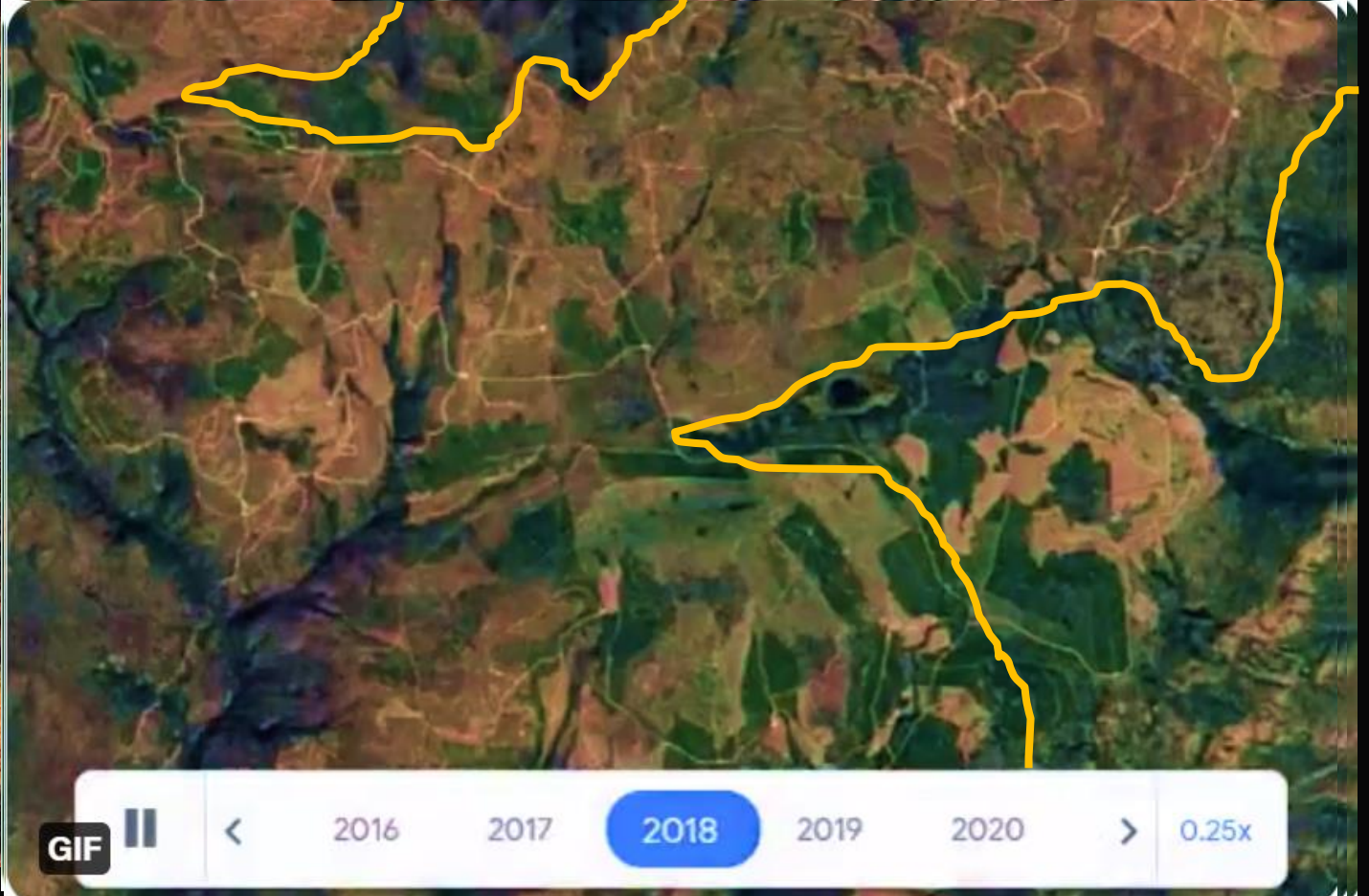
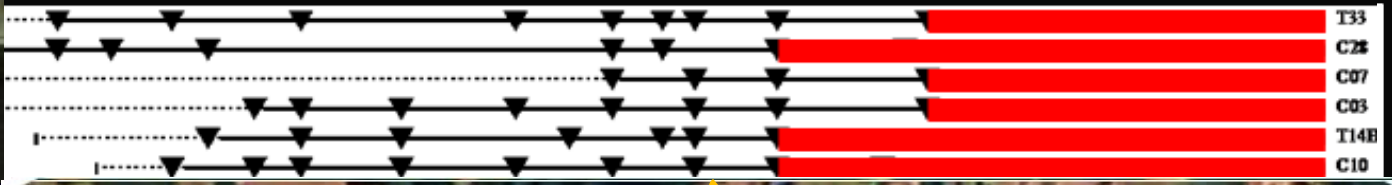
Historical Fire Regimes: Frequent Surface Fire



Disruption of Historical Fire Regimes

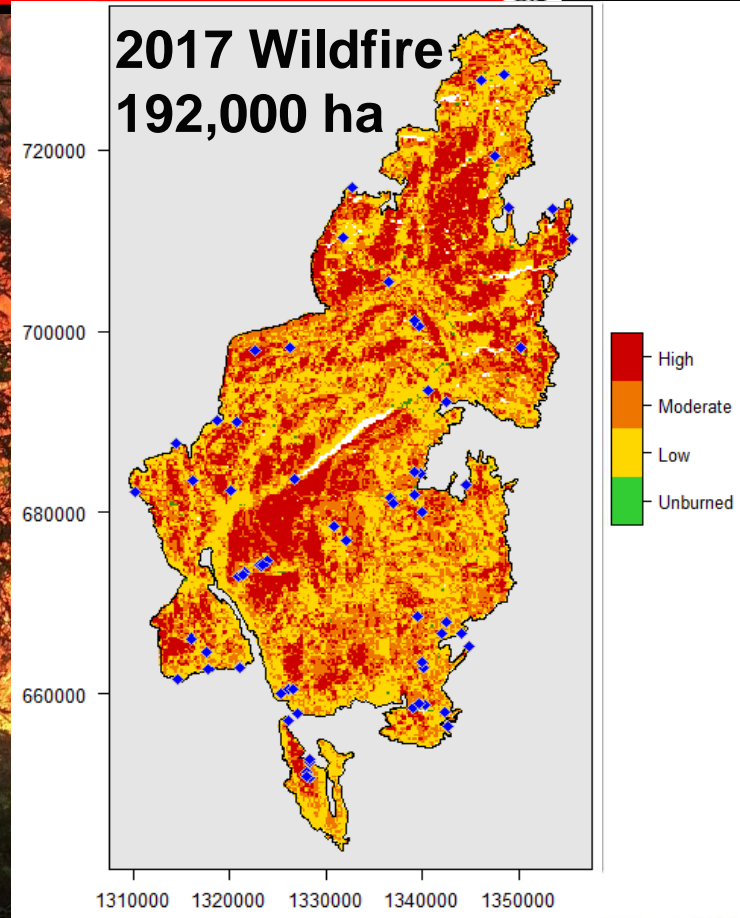


Disruption of Historical Fire Regimes Cumulative Effects of 20th Century Change



Disruption of Historical Fire Regimes

Cumulative Effects of 20th Century Change

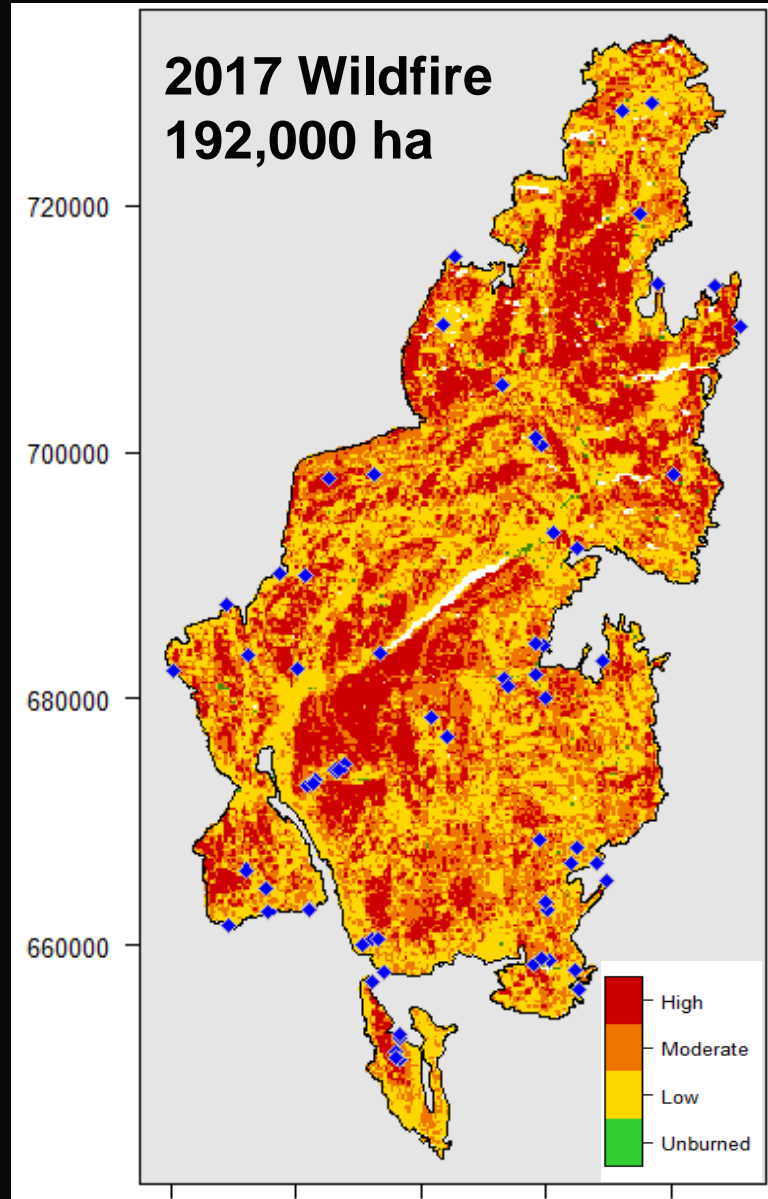


Forest Recovery

2018

2019

2024



Columbia Forests of Jasper National Park



Canada



2024 Jasper Wildfire Complex



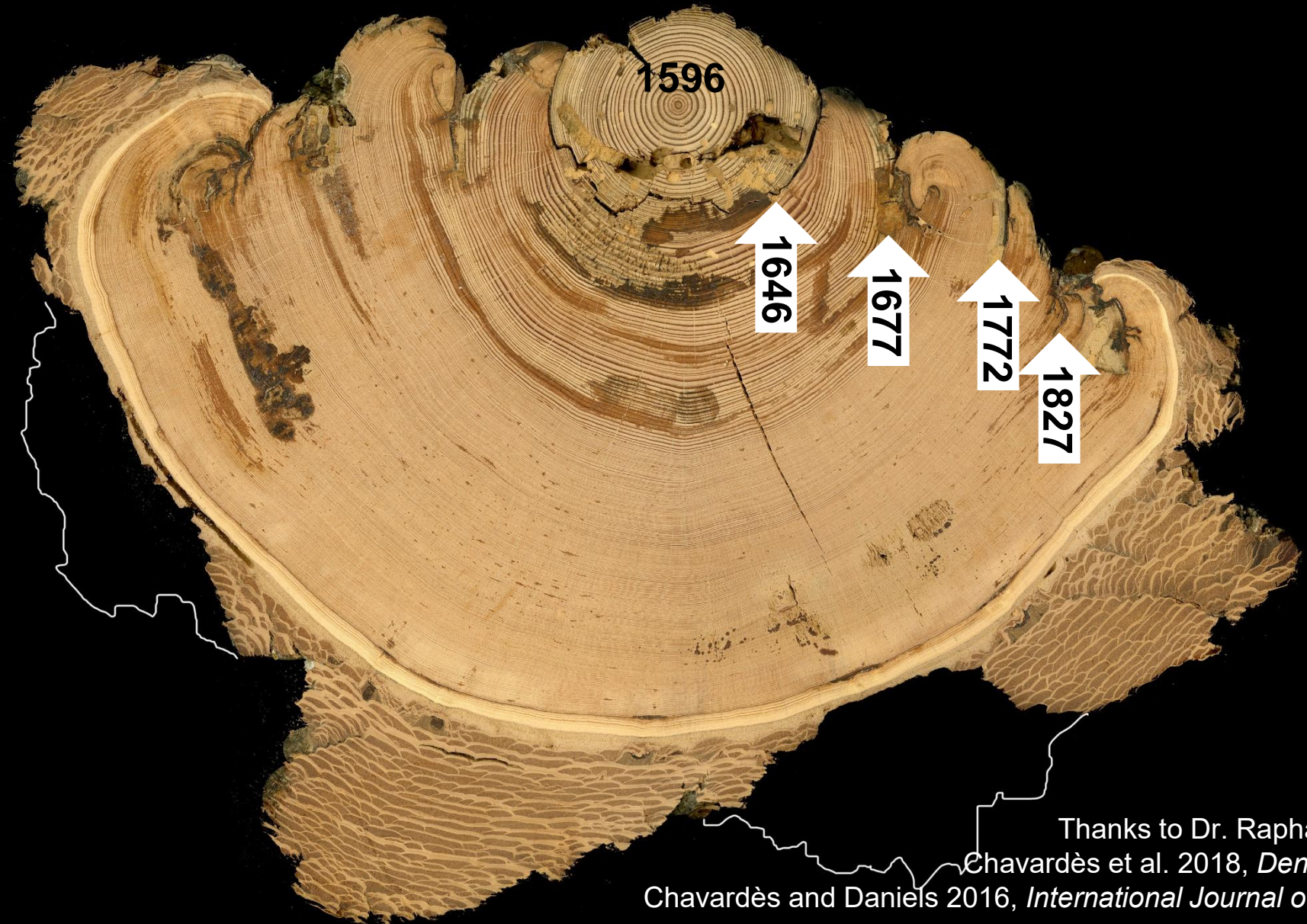
Canada

Landscape View of Jasper National Park, Alberta in 1915



M.P. Bridgland, 1915
Dominion Land Survey

Centuries of History Preserved in Tree Rings



Landscape View of Jasper National Park, Alberta in 1915



M.P. Bridgland, 1915
Dominion Land Survey

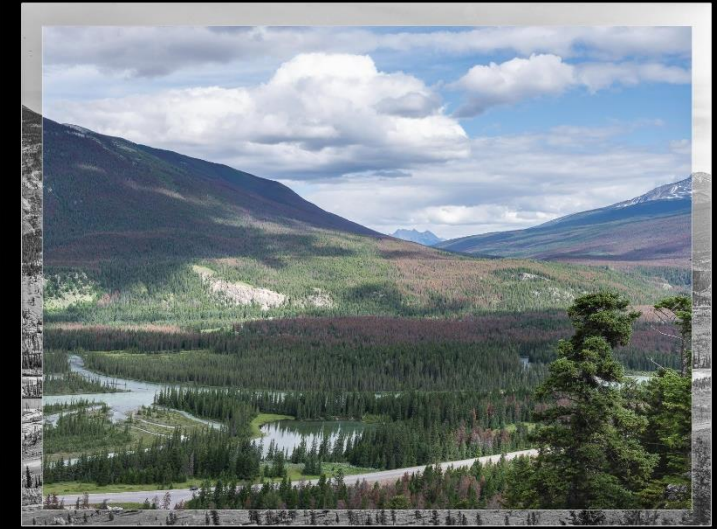
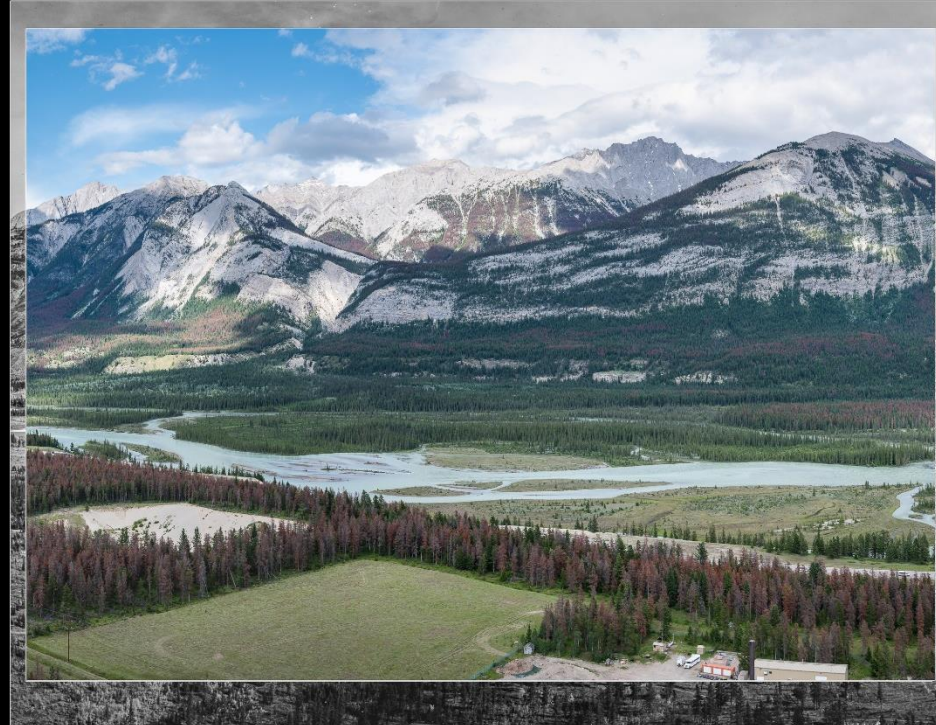
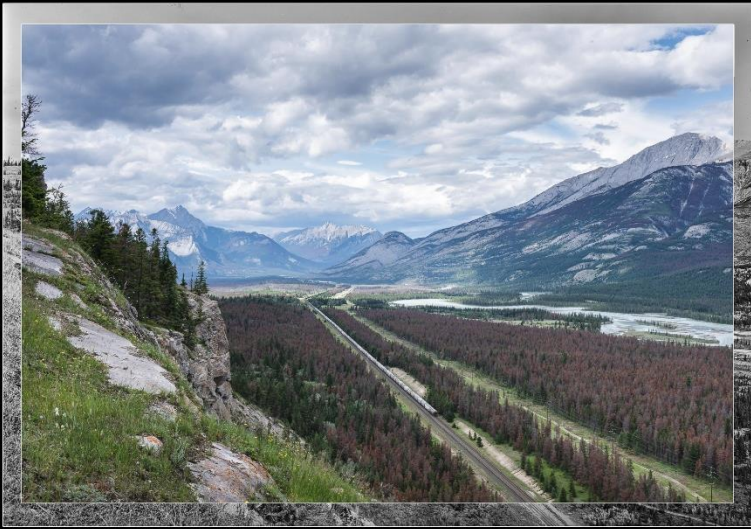
Landscape View of Jasper National Park, Alberta in 1999

Disrupted Fire Regime and Homogenized Landscape



Landscape View of Jasper National Park, Alberta in 2019

Disturbance Cascade: Fire Exclusion + Climate + Beetles



2024 Wildfire Impacts: 32,722 ha burned and 30% town lost

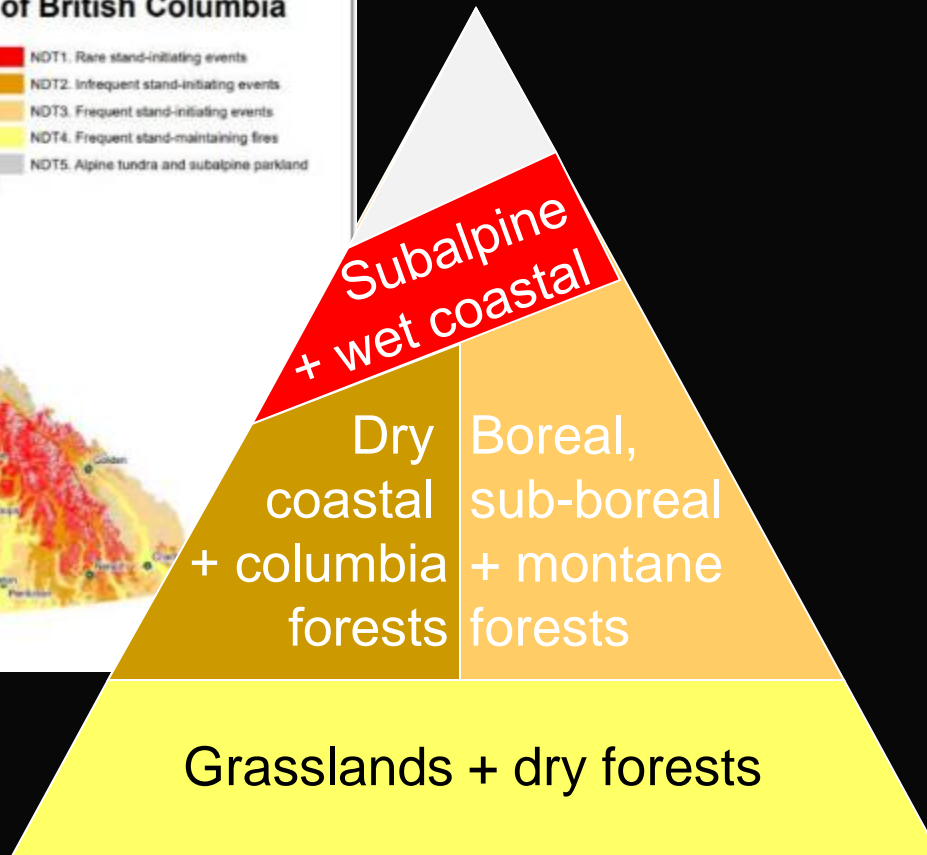
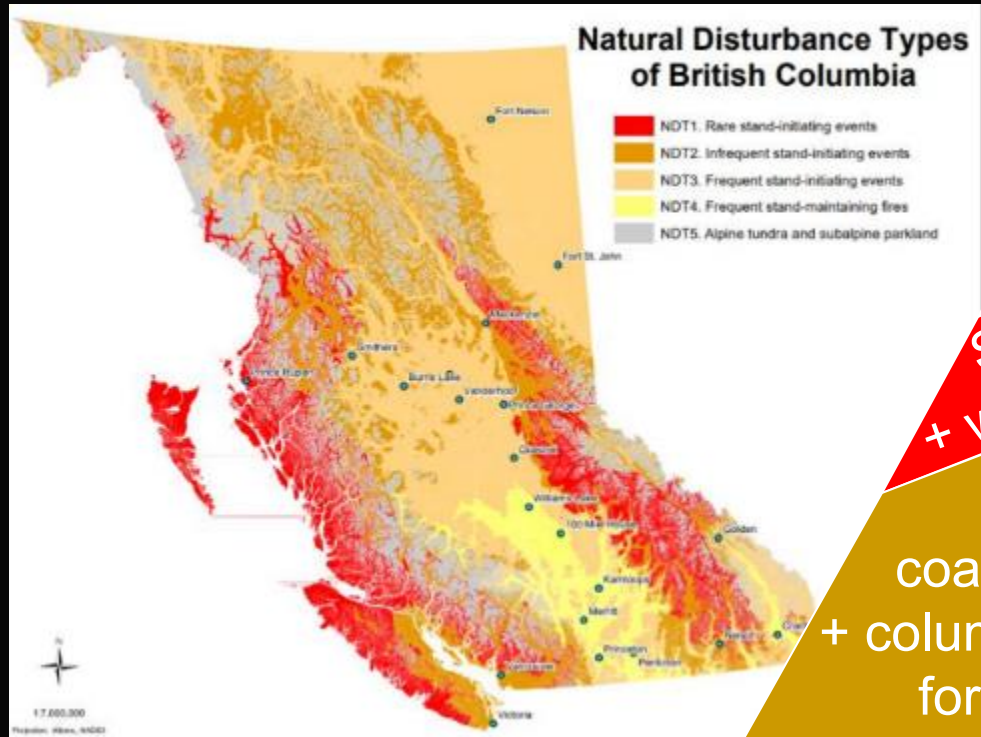


Proactive Mitigation: 70% town protected, despite extreme fire weather



Fire and Forest Management

Natural Disturbance Types in British Columbia



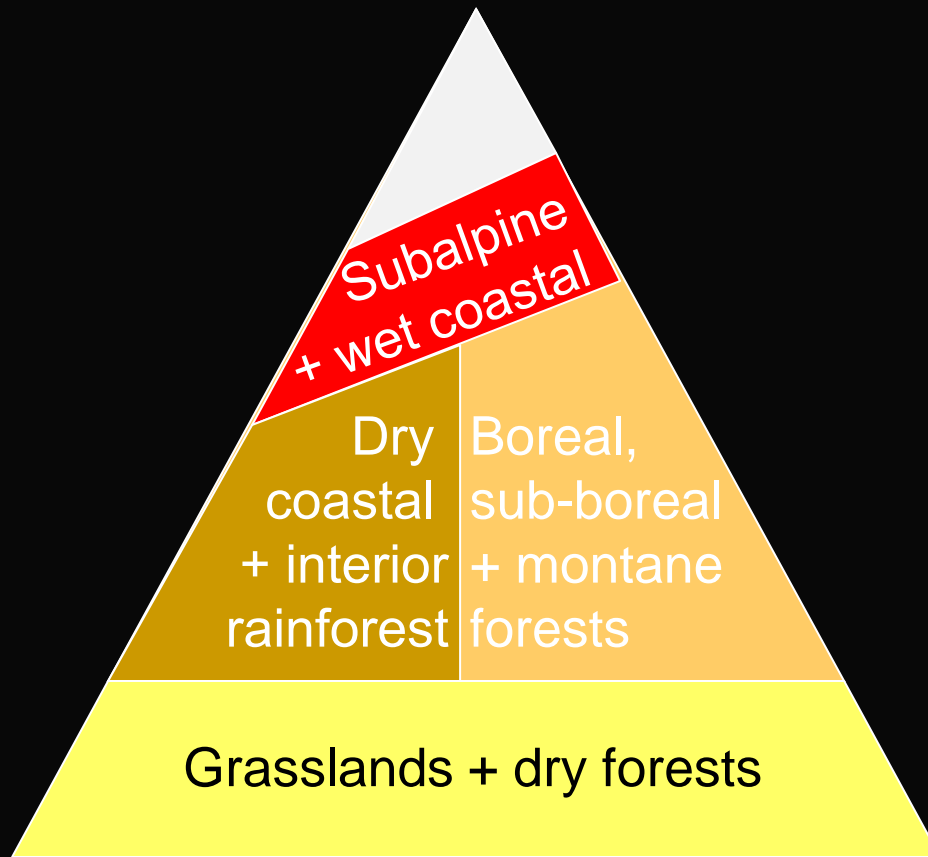
High-Severity Fire Regimes:

Even-aged silviculture
Rotations of ~100 yrs
Fire suppression
Old-growth forests
Ecological restoration

What if we have misinterpreted historical fire regimes?

Urgent Need for Transformative Change

Paradigm Shift in Fire and Forest Management

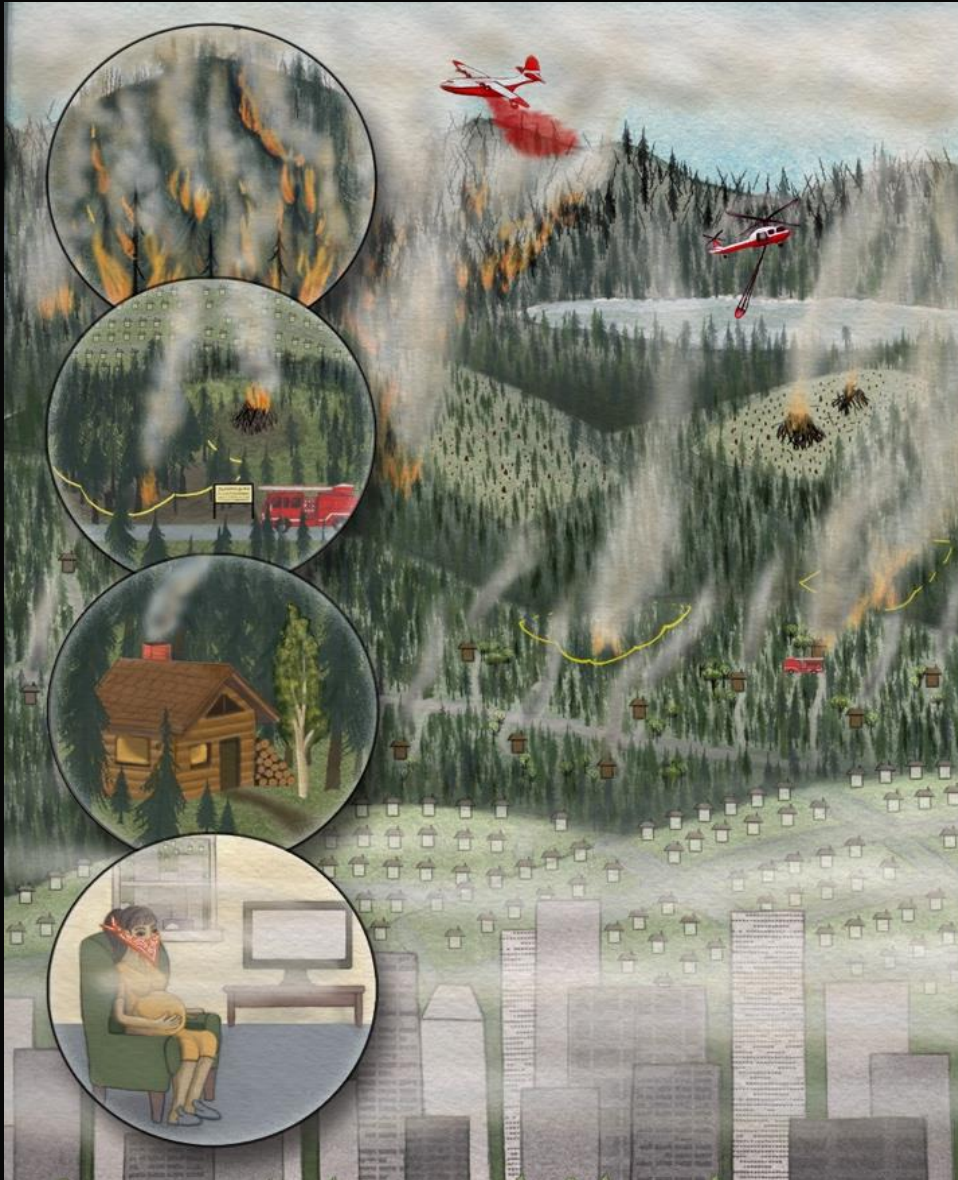


Historical Mixed-Severity Eco-Cultural Fire Regime:

Alternative silviculture
+ dynamic strategies for
old-growth + biodiversity

Proactive management
+ ecological restoration

Urgent Need for Transformative Change



Era of Megafires

Large, severe fires
Exceed suppression

Traditional fire paradigm
Timber + stand-level focus
Homogenized landscapes

Low resilience
Vulnerable communities

Urgent Need for Transformative Change

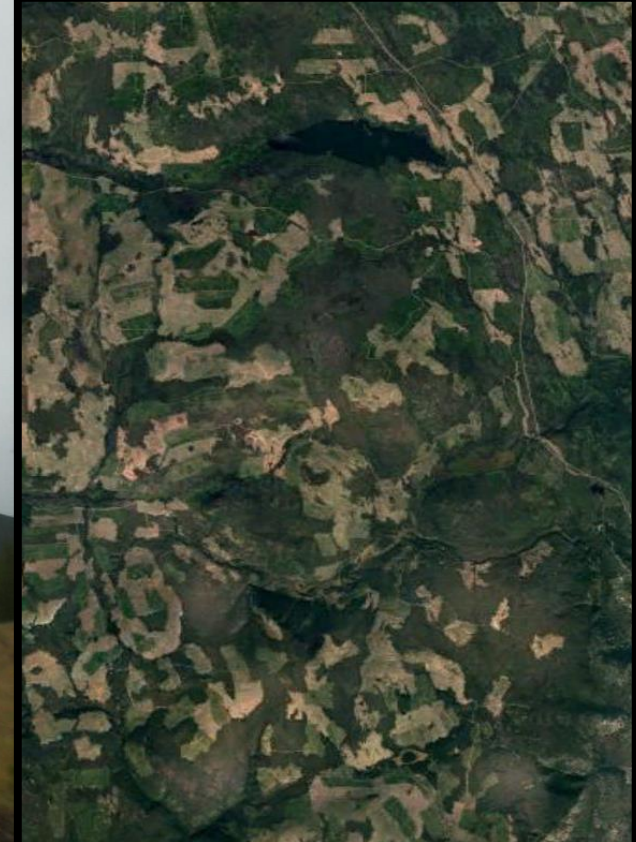


Artwork: Jen Burgess

Bowman et al. 2018

Transform Silviculture to Achieve Resilience

Address disturbance mismatches: frequency, size, magnitude
from individual trees to stands to landscapes

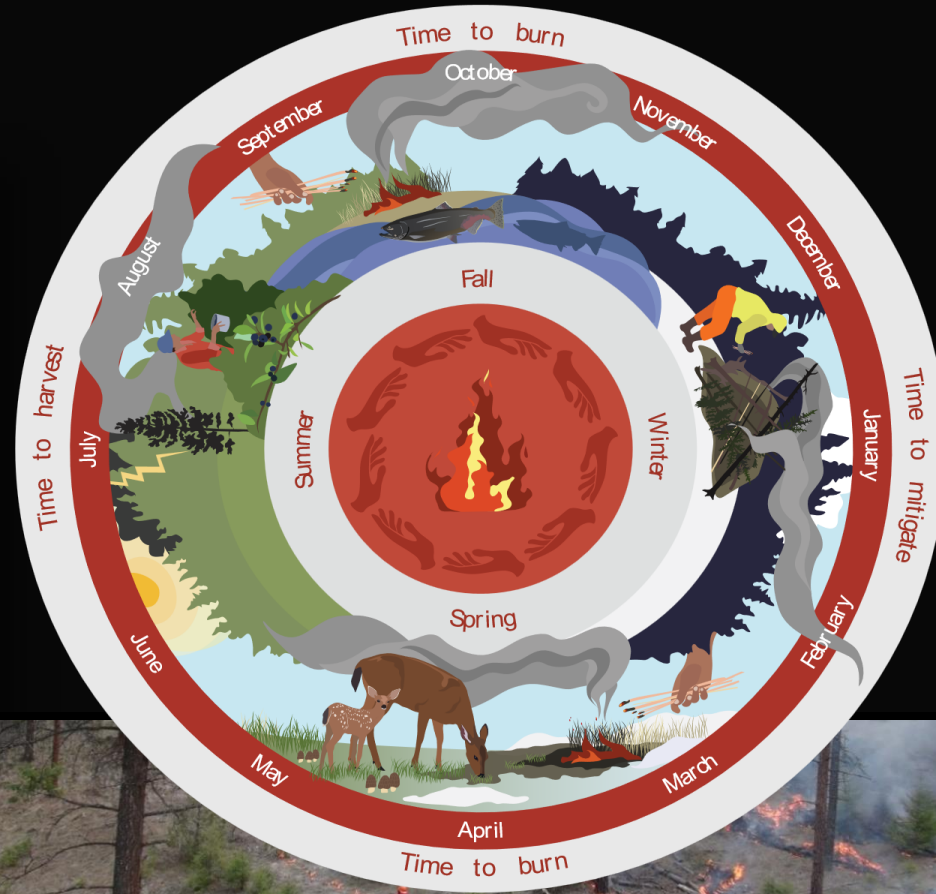


Eco-Cultural Restoration of Fire Guided by Indigenous Knowledge & Western Science

Mechanical Thinning



Prescribed Fire



Monitor for Efficacy and Surprises

Transformative Change to Achieve Resilience

Coexist with Wildfire

Diversify management
Science + Indigenous Knowledge

Evidence-based, proactive
adaptive management

Strengthen capacity,
and support collaborative,
community-based solutions

Bold leadership



An aerial illustration of a forest fire. In the upper half, a red firefighting plane and a red helicopter are dropping water on a large fire that is spreading across a forested hillside. A lake is visible in the middle ground. Below the fire, a town is shown with many small houses, some of which are being protected by yellow fire lines. In the foreground, there are several tall, grey, rectangular structures that look like gravestones or markers. The overall scene is one of a wildfire threatening a community.

*Thank you
I welcome your questions*



Dr. Greg Greene



Dr. Kelsey Copes-Gerbitz



Dr. Lori Daniels



Dr. Kira Hoffman



Sarah Dickson-Hoyle
(PhD Candidate)



Kate Kitchens
(PhD Candidate)



Ariel Eatherton
(MSc Student)



Jen Baron
(PhD Candidate)



Mike Stefanuk
(PhD Student)



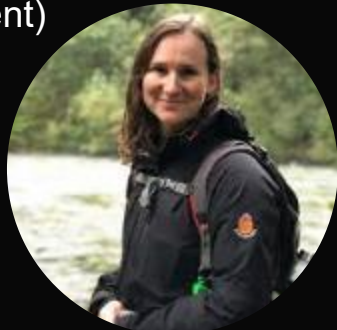
Georgina Preston
(MSc Student)



Kea Rutherford
(MSc Student)



Jeremy Greenburg
(MSc Student)



Vanessa Comeau



Dr. Florencia Tiribelli



Dr. Raphaël Chavardès



Dr. Alana Clason



Ingrid Farnell

Thanks to our collaborators and the agencies that fund our research

The Koerner Foundation



Williams Lake
FIRST NATION



BC Parks