

Integrated Fire Management: developing landscape level wildfire resiliency in British Columbia, Canada

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OUTLINE

1. Background – Imperative to change forest management practices
 - Global situation and predictions regarding wildfires
 - British Columbia's situation and predictions regarding wildfires
2. Integrated fire management – British Columbia's approach
3. Resiliency concepts
4. Pilot projects to develop more wildfire resilient landscapes
 - Northern Wildfire Resiliency Initiative
 - Quesnel Forestry Initiatives Program (FIP)
 - SIFCo's Wildfire Resiliency Program
 - BC Burning Questions
5. Lessons Learned
6. Acknowledgements and for further information

Background

1. Global situation and predictions regarding wildfires

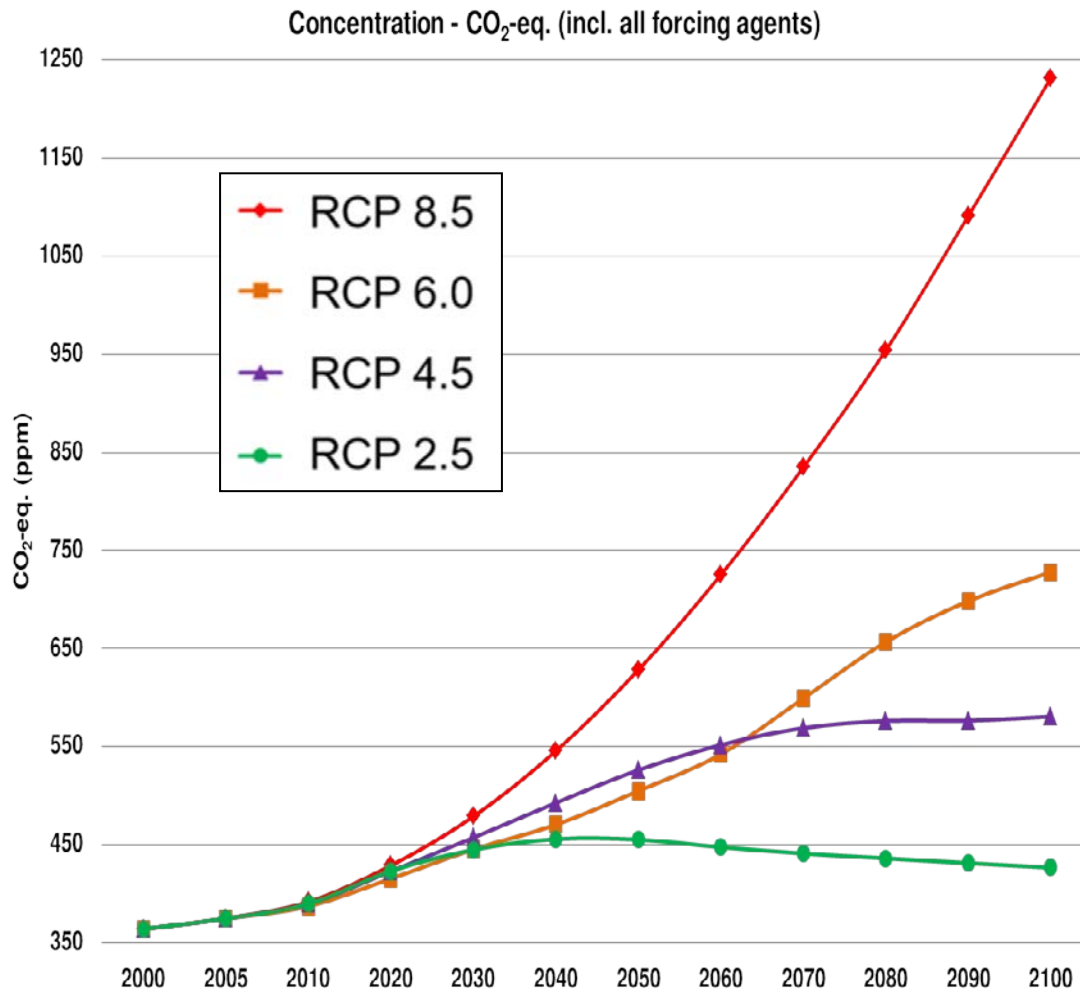
- Greenhouse gases
- Global temperatures
- Wildfire risk

2. British Columbia's situation and predictions regarding wildfires



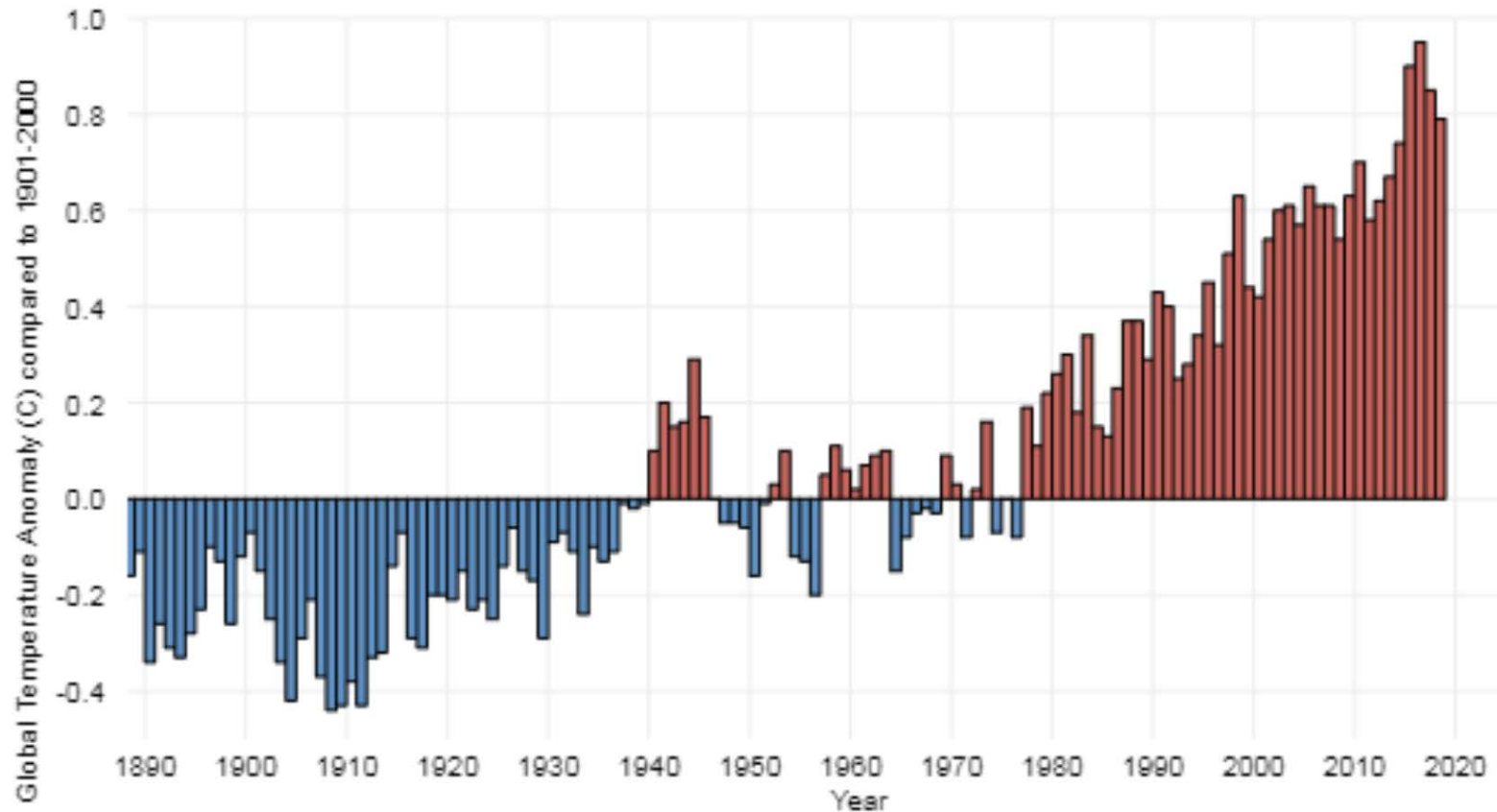
IPCC AR5 Greenhouse Gas Concentration Pathways

Representative Concentration Pathways (RCPs) from the fifth Assessment Report by the International Panel on Climate Change



GHG emissions are predicted to increase leading to increases in global temperatures and more extreme weather events.

History of global surface temperature since 1880



From Climate Change: Global Temperature *by* [Rebecca Lindsey and LuAnn Dahlman](#)
August 1, 2018

<https://www.climate.gov/news-features/understanding-climate/climate-change-global-temperature>

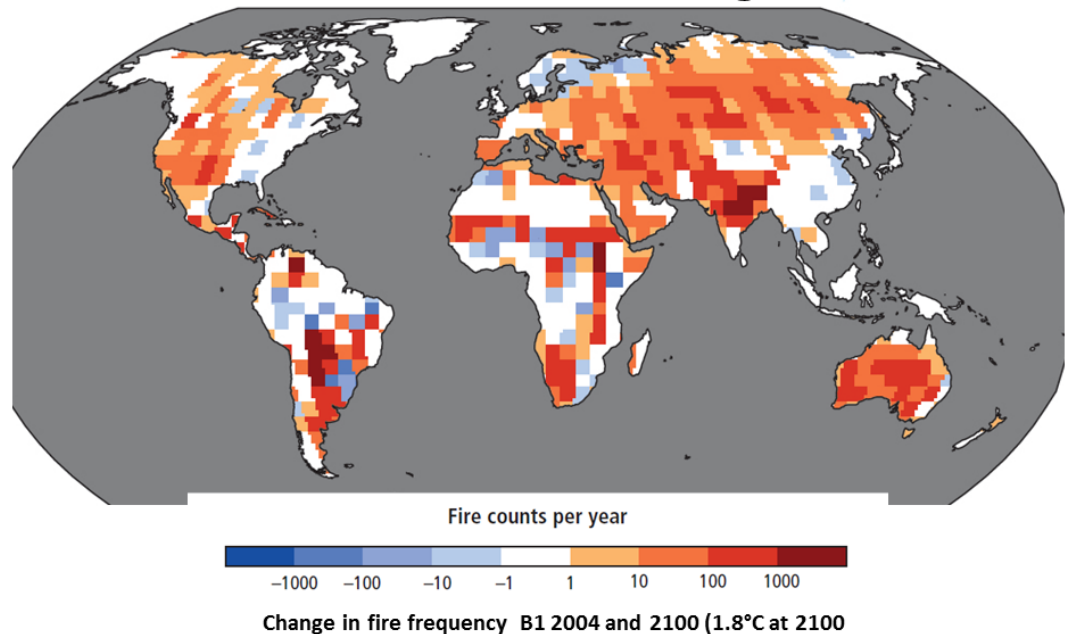
Predicted Change in Fire Frequency by 2100 with 1.8 °C Warming

Large Global Forest Fire Increase at 1.8°C Warming

Global mean from 1850

“Predicted increases in droughts and heatwaves increase the risk of **fire occurrence**”

“Projected impacts on forests as climate change occurs include increases in the intensity of storms, **wildfires** and pest outbreaks”



IPCC AR5 WG2 Figure 4-6 | Projected changes in meteorological fire danger, fire probability, and fire frequency

From IPCC 2014 report. Also available from:
https://www.climateemergencyinstitute.com/ecosystems_and_species.html

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GLOBAL FIRE CHALLENGES IN A WARMING WORLD

Summary Note of a Global Expert Workshop on Fire and Climate Change

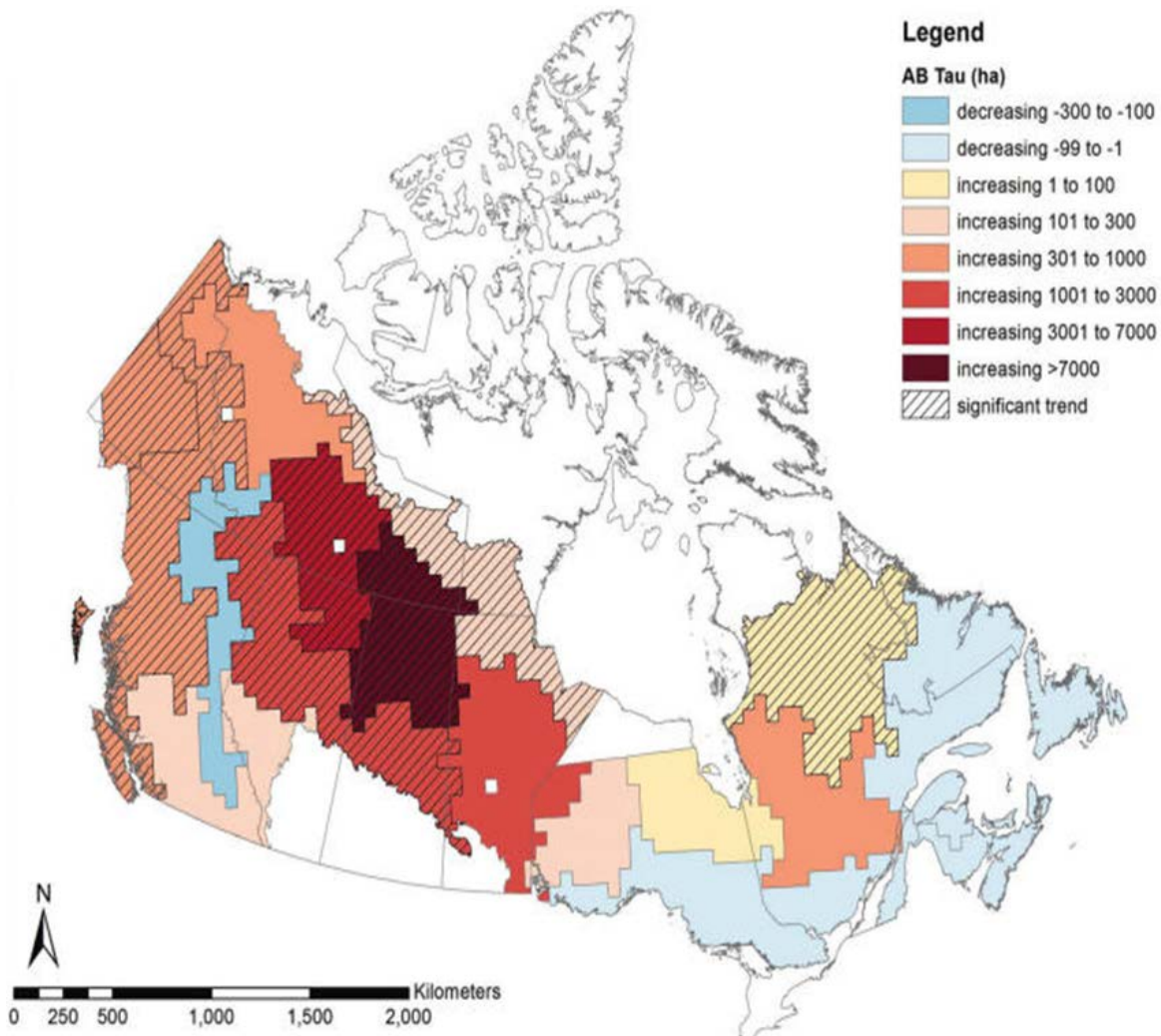
Edited and coordinated by:

François-Nicolas Robinne, Janice Burns, Promode Kant,
Mike D. Flannigan, Michael Kleine, Bill de Groot, D. Mike Wotton.



“Available data shows a trend of **increasing frequency and intensity of uncontrolled fires** adversely affecting biodiversity, ecological services, human well-being and livelihoods and national economies”

Increase in Area Burned in Canada (1959 to 2015)

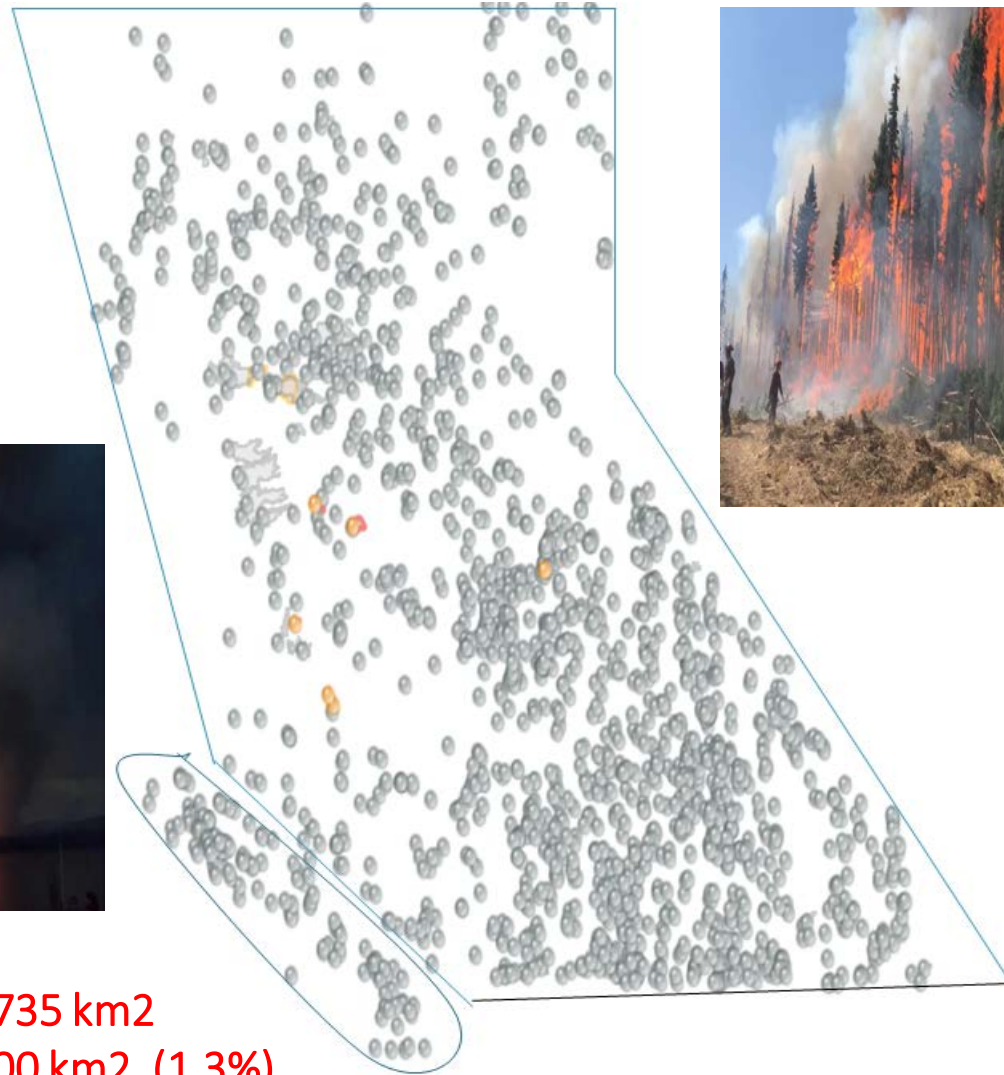


“ Climate change is predicted to worsen all three ingredients required for wildfire (fuel, ignition, weather) across most of Canada, making global warming a triple threat to our forests’

From:
<https://climateatlas.ca/forest-fires-and-climate-change>

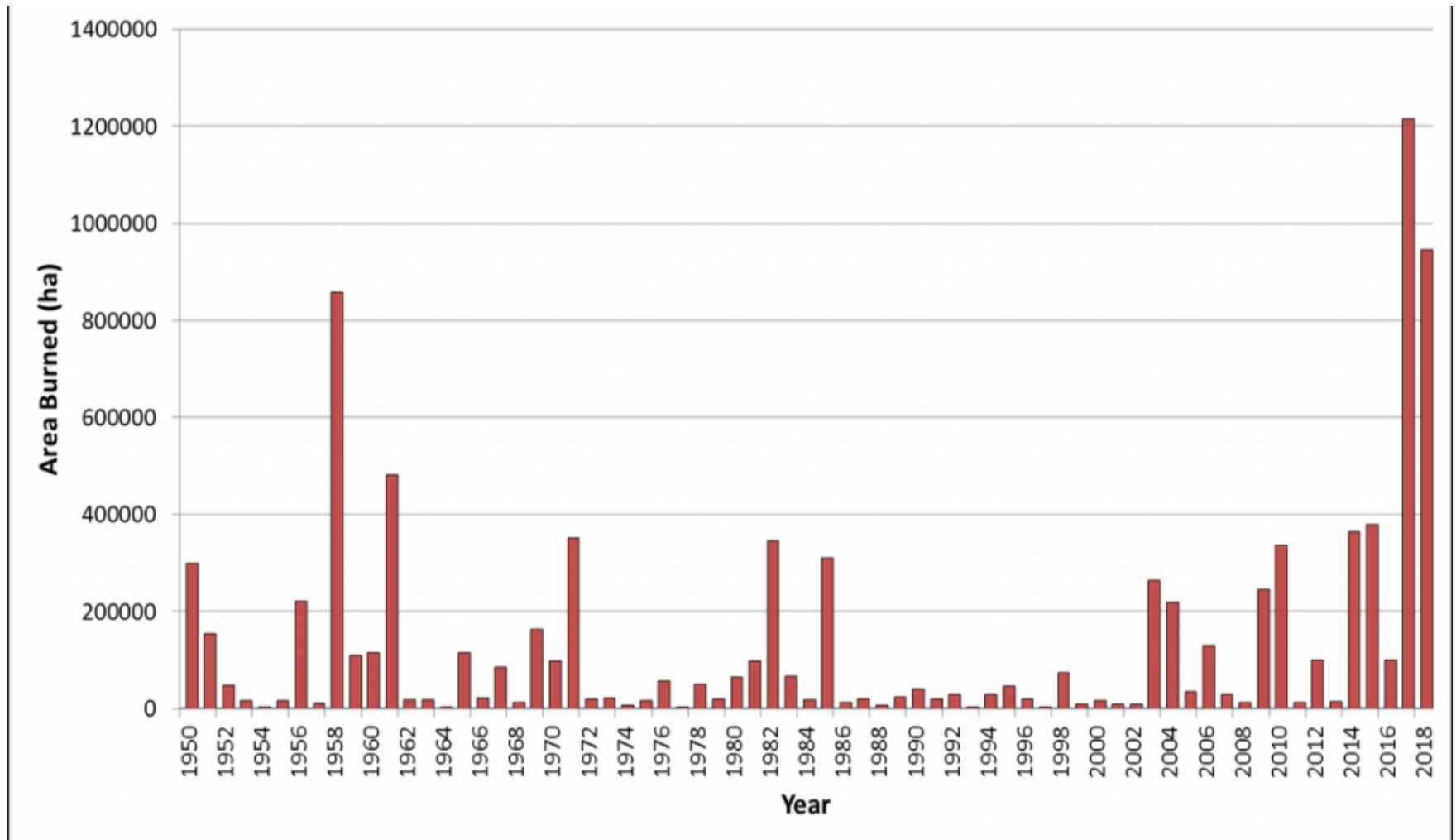
From: Fire-regime changes in Canada over the last half century. C. Hanes, X. Wang, P. Jain, M. Parisien, J. Little, and M. Flannigan · 2019 CJFR 49(3): 256-269, <https://doi.org/10.1139/cjfr-2018-0293>

Location of Wildfires in BC - 2018 Fire Season



Size of British Columbia: 944,735 km²
Area Burned in 2018/19: 13,000 km² (1.3%)

Area Burned in British Columbia by Year

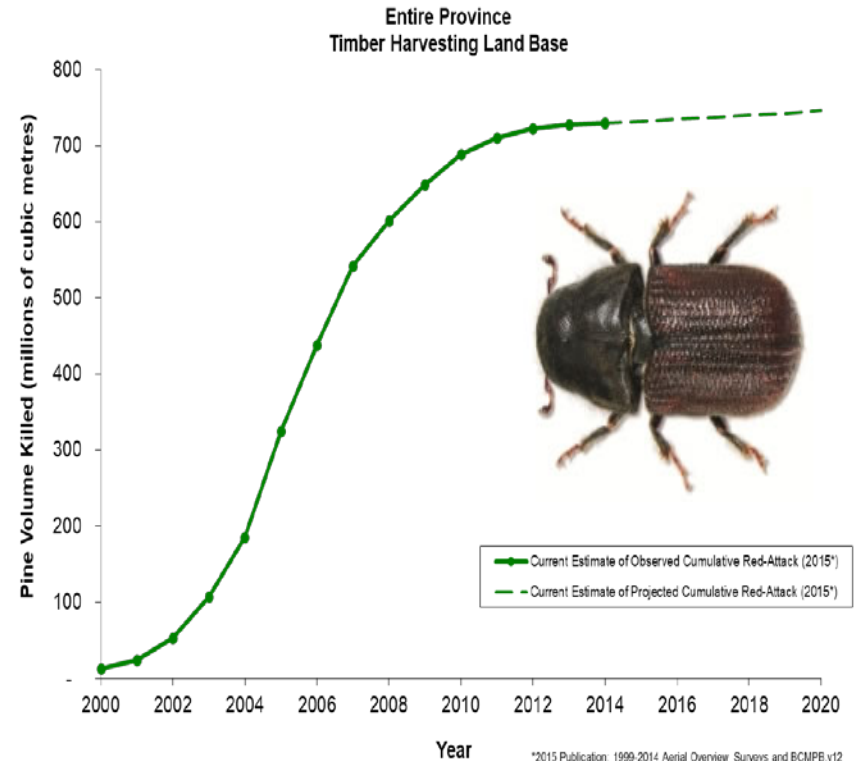


Source: National Fire Database (1950-2015), BC Wildfire Service (2016-2019)

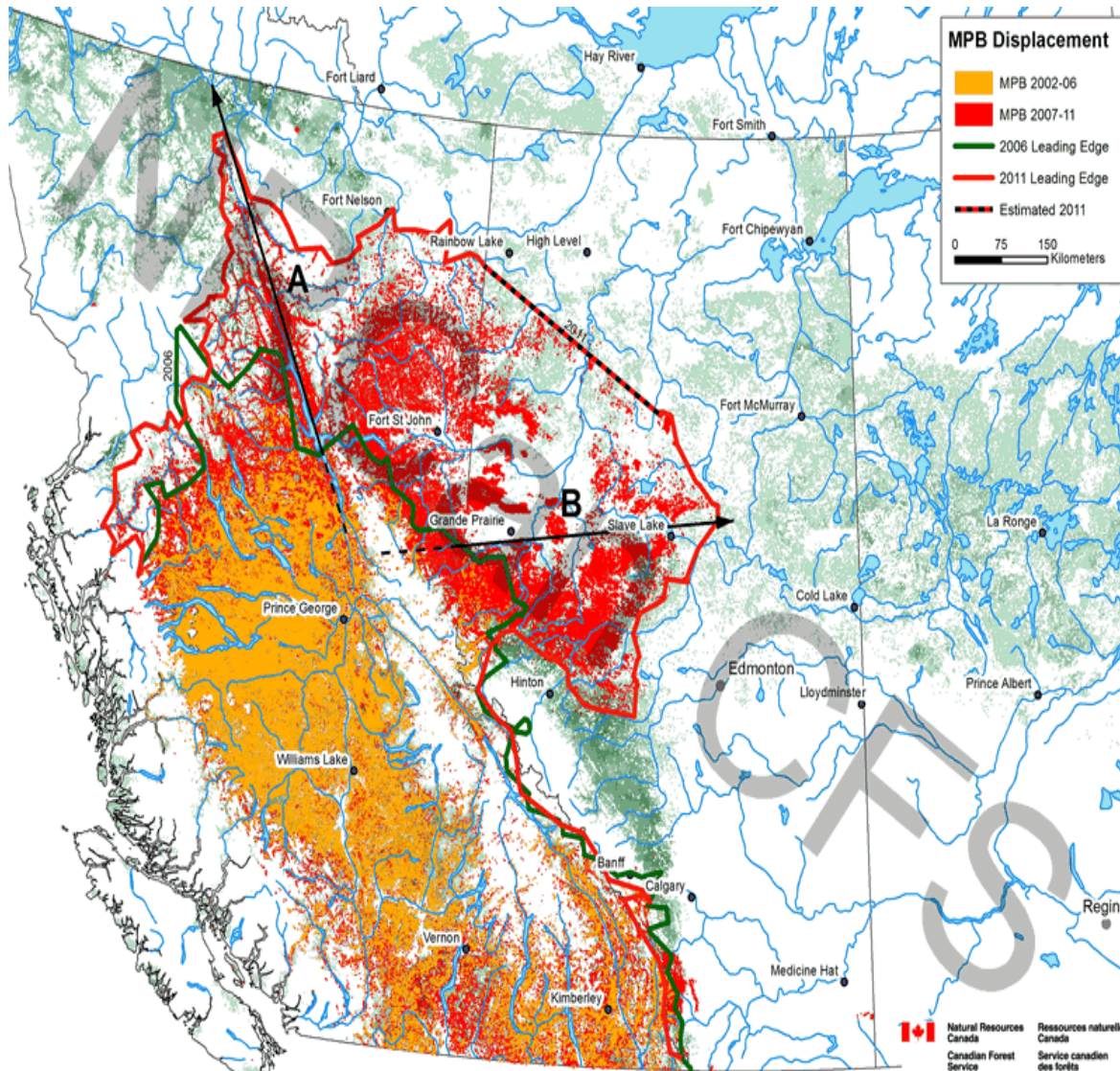
Mountain Pine Beetle (MPB) Impact in BC



<https://forestinvasives.ca/Meet-the-Species/Insects/Mountain-Pine-Beetle>



<https://www2.gov.bc.ca/gov/content/industry/forestry/managing-our-forest-resources/forest-health/forest-pests/bark-beetles/mountain-pine-beetle/mpb-projections>



Spread of the Mountain Pine Beetle in British Columbia and Alberta from 2002-2006 (yellow) to 2007-2011 (red).

<https://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/cfs/assets/file/1550>

Integrated Fire Management Components	British Columbia's Approach	
	Current Approach	Possible Future Directions
Assessment and analysis of situation and issues	<ul style="list-style-type: none"> Several provincial assessments (Filmon 2004 , Abbott and Chapman 2018) Climate Change and Wildfire Strategy Strategic Risk Assessments done and updated regularly 	Clear priorities and approach
Fire management goals and desired ecosystem condition	<ul style="list-style-type: none"> Evolving from fire suppression/protection to developing wildfire resilient landscapes and communities (e.g. BVRC Burns Lake workshops, Quesnel & Kootenay pilots) 	Clear goals wrt resilient landscapes and communities (i.e. desired future conditions, fire management goals) that account for climate change
Laws, policy and institutional framework	<ul style="list-style-type: none"> Revised Wildfire Act and Wildfire regulation 2016 - fire use, wildfire prevention & control, rehabilitation Open Burning Smoke Control Regulation Forest management legal framework (FRPA 2002 and Regulations) does not include resilience Emergency Program Act 	Legal framework that ensures wildfire resiliency
Prevention and education	<ul style="list-style-type: none"> Ongoing wildfire prevention & community protection (e.g. public announcements, FIRESMART in WUI, Community Resiliency Initiative consultations (6 workshops this fall)) 	More public dialogue around wildfires – positive and negative aspects etc. to gain acceptance for prescribed burning, & managed wildfires
Fire use	<ul style="list-style-type: none"> Prescribed fire used for restoration in dry open forests since 1980s Prescribed fire (logging slash burning) widely used in in 1980s and 90s and now being re-introduced. Slash pile burning done extensively in cutblocks to reduce hazard – now looking to reduce GHGs 	More education and training about how to use prescribed fire Adaptive management trials
Preparedness and response	<ul style="list-style-type: none"> Significant effort underway wrt fire suppression for many decades (e.g. Initial Attack, Field Stations) 	
Restoration, recovery and maintenance	<ul style="list-style-type: none"> Restoration in dry open forests initiated over 20 years ago Evolving concepts of resilience and role of fire 	Clear goals for management – wrt basic, adaptive and transformative resiliency
Adaptive management, research and information transfer	<ul style="list-style-type: none"> Adaptive Management – landscape level pilot projects in Lakes TSA, Quesnel, & Kootenays Research - Key BCWS questions Wildfire threat and risk – what are best assessment methods Historic fire regimes - relationship to forest/fuel structure & wildfire threat (Eng 2019) Wildfire risk modelling - how to improve fire weather inputs used Fuel management practices - determining most effective treatments (McCullock) Fuel loading - how to best determine across ecosystems & management practices 	<p>Implementation of pilots</p> <p>More Research</p> <ul style="list-style-type: none"> Define goals (e.g. resiliency) What role should fire be allowed to play in the landscape? Where? How? What constraints limit fire from playing an ecologically appropriate role? What mix of fire use, prevention and suppression strategies should be utilized? How will local communities be involved?

Integrated Fire Management – Adaptive management , research and information transfer - British Columbia’s current approach and possible future directions

Adaptive management, research and information transfer

- Adaptive Management – Landscape level pilot projects (Lakes TSA, Quesnel, & Kootenays)

Development and implementation of landscape level pilot projects

Research - Key BCWS questions

- Wildfire threat and risk – best assessment methods
- Historic fire regimes - relationship to forest/fuel structure & wildfire threat (Eng 2019)
- Wildfire risk modelling - improving fire weather inputs
- Fuel management practices - determining most effective treatments (L. McCulloch)
- Fuel loading – how to determine across ecosystems & management practices

More Research

- Define appropriate goals (i.e. resiliency)
- What role should fire be allowed to play in the landscape? Where? How?
- What constraints limit fire from playing an ecologically appropriate role?
- What mix of fire use, prevention and suppression strategies should be utilized?
- How will local communities be involved?

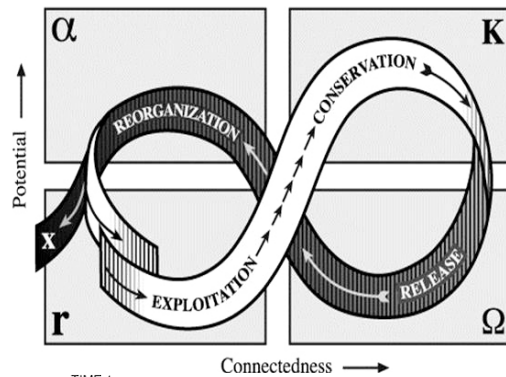
- Information Transfer – public consultation (BCWS) and extension (FIRESMART, Fraser Basin, ACT etc)

Further public dialogue and participation

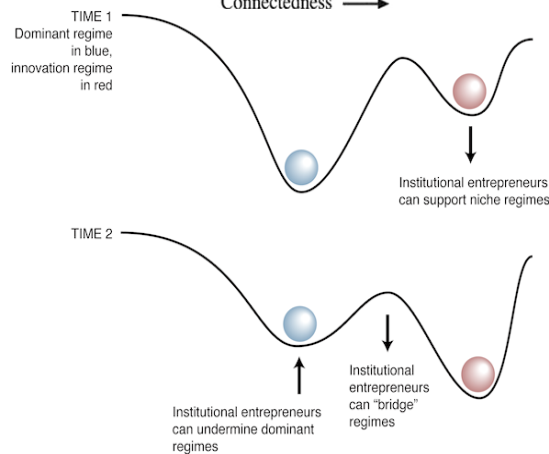
Resiliency Concepts



- Basic resilience - the capacity of a system to “recover” and maintain the same general structure, composition, and feedback processes following disturbances and other ‘shocks’. (Holling 1973)



- Adaptive resilience – ability to adapt to new or dynamic conditions by changing fundamental characteristics of the system.
- Transformative resilience - creation of fundamentally new systems through profound shifts to embrace the dynamic and rapidly changing role of fire. Required when conditions are changing rapidly. Allows for an intentional transition to a new system that will be desirable under future conditions.

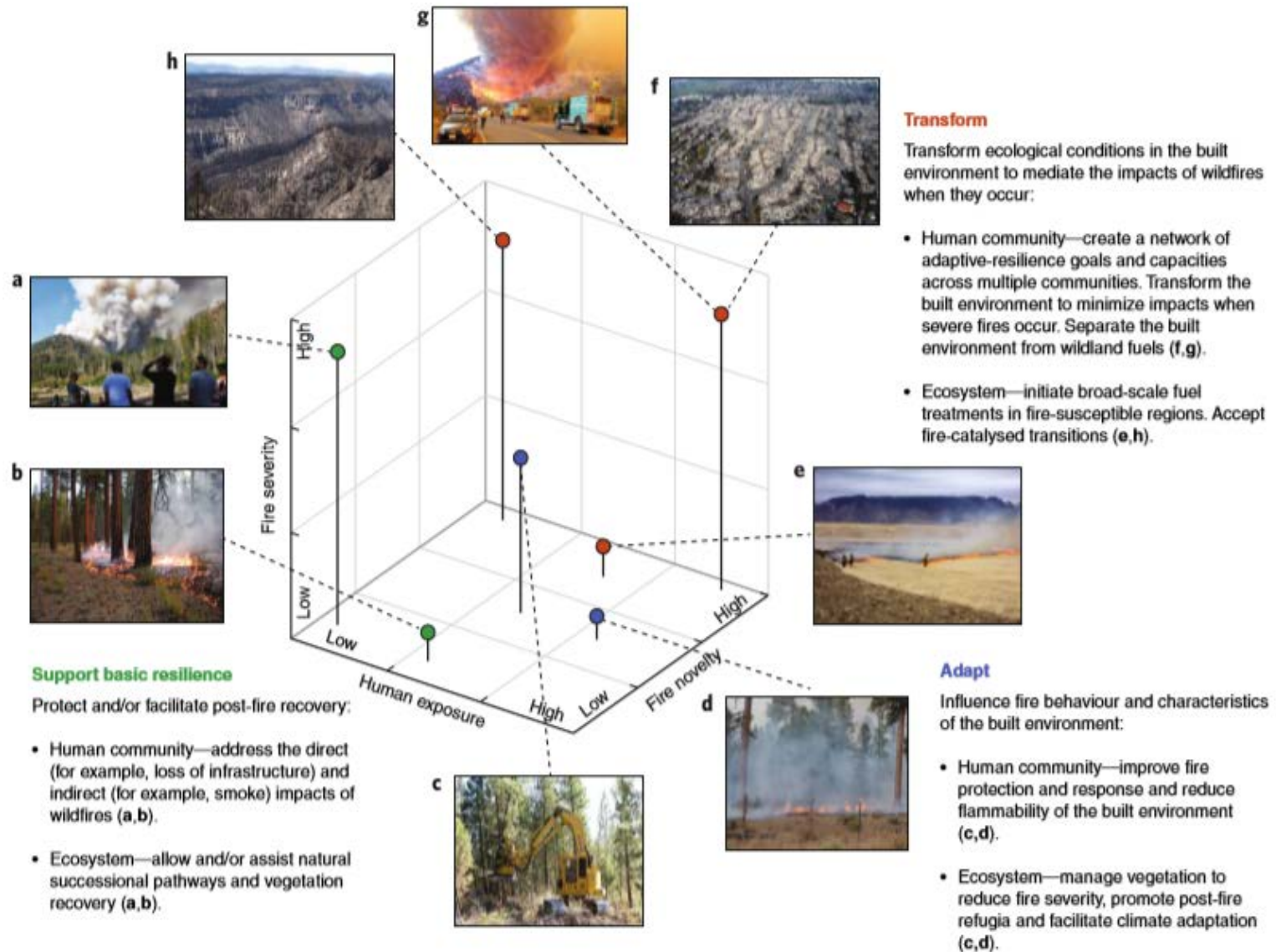


From McWethy, DB et al 2019 Rethinking resilience to wildfire

www.nature.com/natsustain

<https://doi.org/10.1038/s41893-019-0353-8>

Resiliency Concepts



Case Study 1. Northern Wildfire Resiliency Initiative

Background

- Severe wildfires, extensive forest mortality (MPB) recently and more predicted
- Isolated, forest dependant rural communities with industrial and community forests

Overview

- A collaborative effort led by the Bulkley Valley Research Centre, funded by governments, industry, and tenure holders to increase wildfire resiliency in northern BC.
- Workshop March 2019 with 160 invited participants from government, industries, public, practitioners, First Nations, scientists and other experts
- Developed consensus on the need for a resiliency based approach to wildfire management
- Provincial government committed to a landscape level pilot project - being scoped out now
- For more information see www.bvcentre.ca



Figure 11: Slide from keynote presentation by Dr. Lori Daniels, Professor, Forest and Conservation Sciences, Faculty of Forestry UBC – Transformative changes to wildfire and forest management.



Case Study 1. Northern Wildfire Resiliency Initiative

continued...

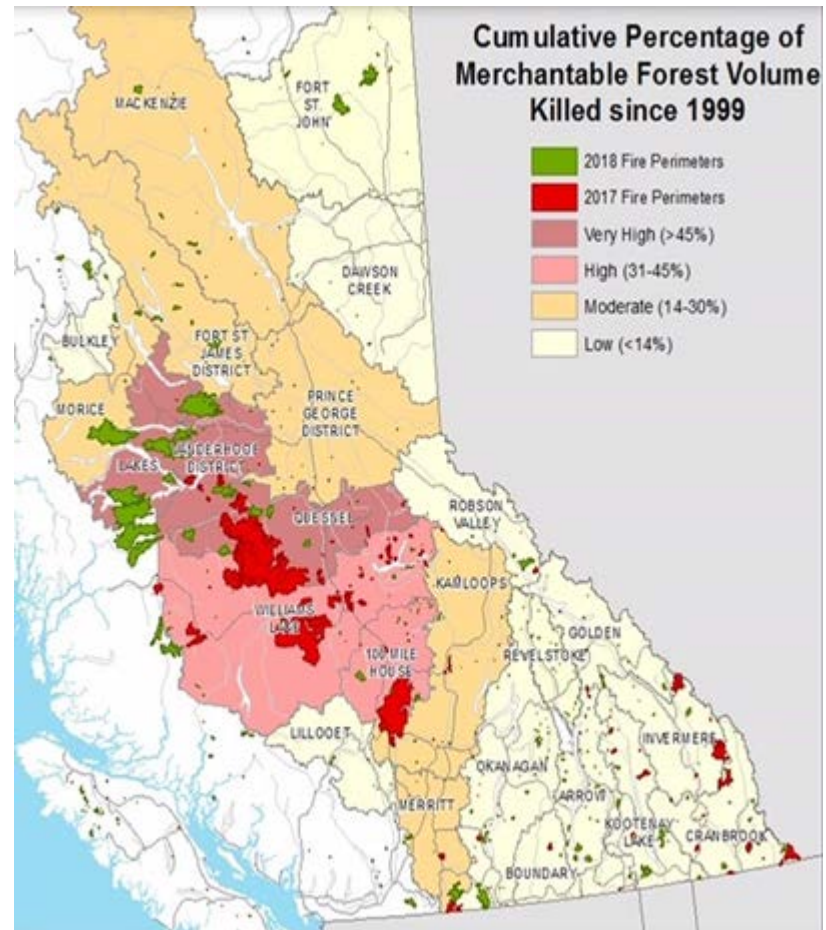


Recommendations for Actions:

6. Determine what is needed for **post-fire landscape rehabilitation**
7. **Protect natural old forest** values on landscapes
8. **Return broadcast burns** as a management tool
9. Identify what expertise is available, **additional expertise needed** and how it could be developed
10. Determine **research /information needs** especially regarding landscape resiliency

Case Study 2. The Quesnel Forestry Initiatives Program

- A forest dependent community severely impacted by MPB and 2 consecutive severe wildfire seasons
- Workshop (2018): local forest industry, researchers, & governments to explore opportunities for alternate forest management
- Forestry Initiatives Program (FIP) - Community Wildfire Protection Plan (CWPP), FireSmart principles, managing the land and encouraging new industries
- FIP working with government to support landscape level analysis and restoration work to manage for wildfire resiliency
- Workshop (2019) for local people to discuss resiliency and how to achieve it



- Contact is Erin Robinson
- See www.quesnel.ca

Case Study 2. The Quesnel Forestry Initiatives Program

Landscape Level Analysis and Restoration

- goal is to shift to managing ecosystems for multiple values
- learning laboratory on the land west of the Fraser River to test alternate forms of ecosystem management
- research, management and planning to better understand the role of fire and forest health on ecosystem functions
- ways that prescribed fires can restore landscapes that are resilient to a changing climate and potential future mega-fires
- different fuel management techniques, including thinning, spacing, and utilizing more of the fibre left behind from traditional harvesting practices

<https://www.quesnel.ca/city-hall/major-initiatives/forestry-initiatives-program>



Case Study 3. Kootenays

Background – the area has been affected by wildfires and other climate change related events.

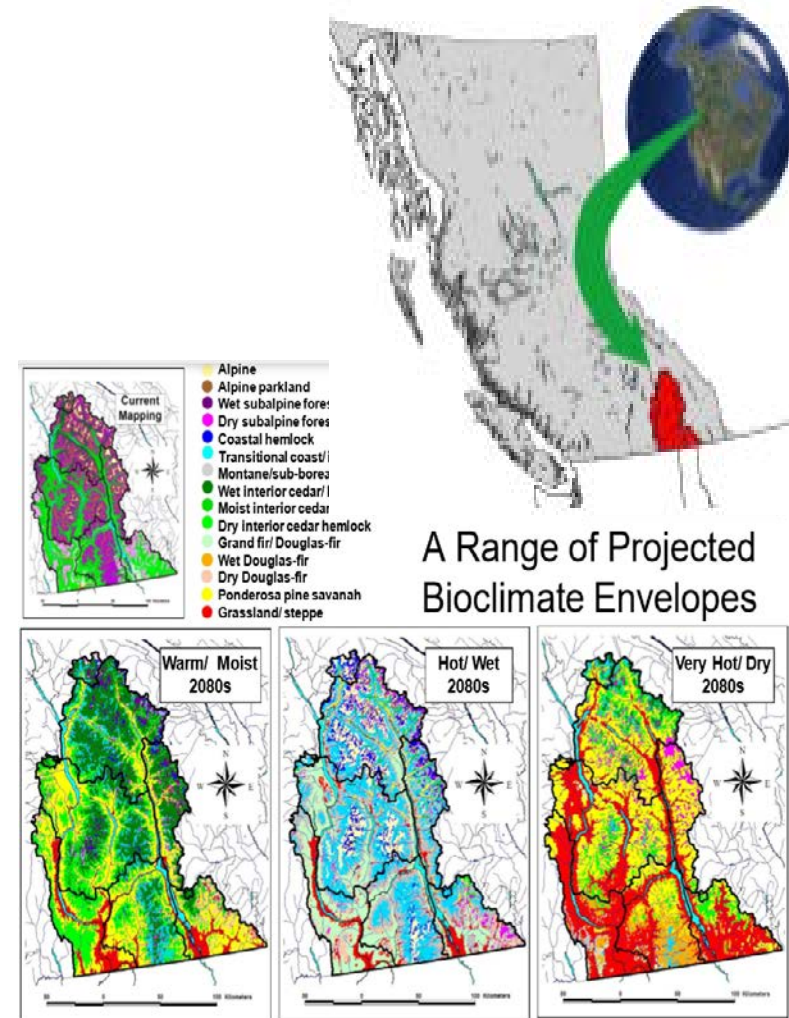
Team assessed climate change predictions and how forest ecosystems will likely be affected – including wildfires.

Workshops with forest and land managers and public to share learning about climate change impacts.

Determined potential management strategies for adapting to changes at various scales (e.g. tree species planted, provincial policies).

Spawned the Slocan Integral Forestry Cooperative (SIFCo) Wildfire Resiliency Program.

<http://www.kootenayresilience.org/>



Case Study 3 Kootenays - Slocan Integral Forestry Cooperative (SIFCo) Wildfire Resiliency Program

- Demonstration of climate change adaptation & wildfire preparedness at landscape scale
- Landscape level planning, community consultation/education/training, interagency cooperation, WUI Mitigation, Fire Smart, & emergency planning
- Use FLAMMAP model to predict likely future fire behaviours and plan treatments
- Fuel Managed Zones across main fire movement corridors to create large fuel breaks
- Treatments used include timber harvesting, thinning, dead wood removal & prescribed burns
- Contact is Stephan Martineau. See <https://www.sifco.ca/>



Some Lessons Learned

- Importance of involving the full range of stakeholders
- Importance of public education and information sharing
- Need to ensure decision maker support from the onset through their involvement
- Importance of involving industry to ensure buy in
- Need to ensure a means for people to develop needed new skills (e.g. prescribed burning)
- Value of a local “champion” or leader.

THANK YOU for your interest

For further information – check out

www.bvcentre.ca

www.db2020.net – for this and other talks
and reports

Or contact me Evelyn Hamilton at

ehhamilton16@gmail.com

Acknowledgements

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Fenwick, Sybille Haeussler and others