Wildfire Research and Extension

In 2017 and 2018, British Columbia experienced unprecedented wildfire seasons. Over the course of both wildfire seasons, approximately 2.6 million hectares of forest lands burned. The majority of fires in 2017 burned in the south-central regions of BC, while the 2018 fires burned primarily in the north-central regions. Research into the impacts of these large fires is underway to better understand how combined effects of disturbances such as insect infestations, decades of fire suppression, and a warming climate affected fire behaviour, as well as to document post-fire effects.

The research is being conducted through a collaboration with the Bulkley Valley Research Centre, the University of British Columbia, the Canadian Forest Service, and the University of Northern British Columbia, with funding from the Government of British Columbia (Forest Carbon Initiative and BC Wildfire Service) and the Government of Canada (Emergency Management Strategy Program).

Research in northern BC, undertaken by the Bulkley Valley Research Centre, is focused on sub-boreal and montane landscapes. The Research Centre seeks to answer several questions:

1. How have recent fires responded to fuel type differences associated with forest management history and natural variation in forest composition?
2. How does the current forest/fuel structure and wildfire threat relate to historical fire activity and past forest management practices, and what practices could reduce wildfire risk?
3. What is the post-fire impact on carbon dynamics in planted and naturally regenerating stands?

Of these questions, initial analysis has been completed on the influence of past forest management practices on wildfire burn severity. Specifically, evidence from the 2017 and 2018 wildfires indicates some forests were not as susceptible to fire as others were, or they burned with lower severity. Lower severity fires typically do not kill trees, which fosters greater landscape resilience. Future analyses will examine the management techniques that may have contributed to lower fire severity and may assist with informing strategic land-use and silviculture planning.

Our research focuses on 10 fires from 2017 and 2018 situated in BC's north-central Interior, as well as over 20 fires from the 1960s through to 2015 for post-fire carbon and ungulate browse research. Landscapes in the region are characterized as gently rolling plateau country consisting of a wide range of managed and unmanaged forest stands, dominated by different combinations and ages of lodgepole pine, Engelmann spruce, hybrid white spruce, subalpine fir, trembling aspen, and small amounts of Douglas-fir.

Preliminary observations based on fire severity maps prepared by the Government of British Columbia suggest young plantations may have been less susceptible to consumption by crown fires (79 per cent of 21-40 year old plantation polygons burned, compared to overall burn levels of 83 per cent[1]). These findings prompted our current research to better understand whether this trend is supported with additional in-depth analyses that accounts for past forest management activities from a number of sources. These include — but are not limited to — historic silviculture practices (broadcast burning, thinning, disc trenching, etc.), landscape features, fire weather indices and fire spread, and the state of the forest surrounding plantations.[2]

Sam Coggins, PhD, RPF; Alana Clason, PhD; and Kira Hoffman, PhD, RFE, are researchers collaborating with the Bulkley Valley Research Centre. Phil Burton, PhD, RPBio, and Evelyn Hamilton are principal investigators for the wildfire research program. The Research Centre is an independent, not-for-profit society conducting high-quality, interdisciplinary research on natural and cultural resources.

with the Bulkley Valley Research Centre

TOP: ***Ecological recovery of the herb layer among burned trees in a field plot in the Nadina Lake Fire, south of Houston, BC.*** Photo credit: Sam Coggins,PhD, RPF.

FROM LEFT TO RIGHT: ***Interior plateau fragmented landscape, with spruce, pine, aspen, and Douglas-fir dominated stands, which are subject to widespread bark beetle attack and salvage logging.*** Photo credit: Phil Burton, PhD, RPBio.

Status of lodgepole pine natural regeneration in 2015 within the Greer Creek Fire that burned in 2010. Photo credit: Phil Burton, PhD, RPBio.

A valley within the Nadina Lake fire displaying fragmented landscape, with fire damage, and salvage logging starting to regenerate. Photo credit: Sam Coggins, PhD, RPF.

Additional research suggests forests dominated by broadleaf species such as trembling aspen (often considered more resistant to fire than conifers) were subject to lower overall burn severity when compared to the broader landscape. However, the ability of broadleaf stands to remain unaffected by fire was mixed, with significantly lower burn rates in five of 19 fires, but with broadleaf stands in three of 19 fires instead exhibiting greater burn rates than expected by chance alone. Following preliminary analysis, a field program was designed to gather on-the-ground burn severity estimates to compare with satellite-derived information. Approximately 150 plots were located within four fires in north-central BC. Data was recorded in accordance with the Composite Burn Index protocol,[3] which uses visual estimates of disturbance in each of the strata (ground, herb, shrub, small trees, and mature trees). The data suggests that satellite-derived burn severity is systematically over-estimated in stands dominated by broadleaf trees.

Other aspects of the Bulkley Valley Research Centre wildfire research program are underway. Field work has been completed to examine the impacts of wildfire and post-fire reforestation activities on forest carbon and the quantity and quality of ungulate browse. Other aspects of the program are filling in gaps in the documentation of the extent and effects of historical burning, including Indigenous fire stewardship. We anticipate that increasing the practice of prescribed burning will enhance land stewardship, wildfire risk mitigation, silvicultural site preparation, and wildlife habitat management. Results from this research will be presented at conferences and published in peer-reviewed journals during 2021 and 2022.

REFERENCES

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3. Key, C.H. and Benson, N.C. 2006. Landscape Assessment (LA): Ground measure of severity, the Composite Burn Index; and Remote sensing of severity, the Normalized Burn Ratio. USDA Forest Service Gen. Tech. Rep. online: https://www.fs.fed.us/rm/pubs/rmrs_gtr164/rmrs_gtr164_13_land_assess.pdf. Accessed January 5, 2021