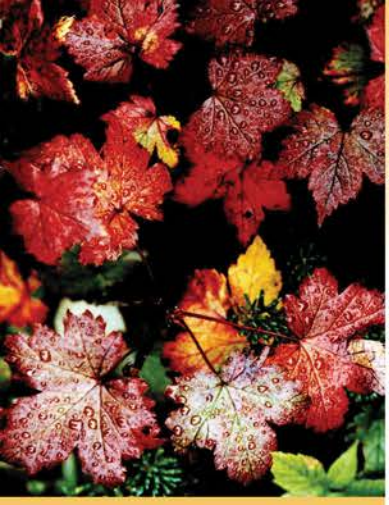

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Insights from Prescribed Burning in Forested Peatlands: the Red Earth Creek Project

Figure 1: The high water retention capacity of Sphagnum moss reduces depth of burn compared to the surrounding feathermoss forest floor. The orange handle in the picture is 15cm long for scale. (photo: D. Thompson, May 2016)

Since the devastating wildfires in Kelowna, British Columbia, in 2003, many Canadian communities adpoted FireSmart®, a wildfire mitigation program initiated by Alberta Environment and Sustainable Resource Development in 1990. While the benefits of FireSmart® treatments in pine and deciduous mixed-wood stands are well established, the effects of these treatments in forest types unique to the Canadian boreal forest remain relatively unknown.

Among the forest types with the most uncertainty surrounding FireSmart® impacts is lowland black spruce (also commonly known as muskeg), which can be found at the edges of many communities located near wetlands, rivers, and shorelines. Lowland black spruce forests are often inappropriate sites for building communities, given their poor drainage and deep moss-covered organic soils, but they can still put adjacent communities at risk during a wildfire due to the large amount of firebrands produced and the rapid rate of spread in mature stands.

In the Fall of 2013, Alberta's Wildfire Management Branch partnered with the Canadian Forest Service (CFS) and FPInnovations' Wildfire Operations Research Group to conduct a series of prescribed burns in FireSmart®-treated lowland spruce stands. The study had three main objectives:

- Improve the understanding of fire behaviour in FireSmart®-treated lowland spruce forests.
- Examine the implications of FireSmart® treatments on the Sphagnum and feathermoss ground cover common to lowland spruce forests in Alberta.
- Incorporate insights on moss impacts as well as fire behaviour into designing innovative FireSmart® treatments specifically for lowland spruce environments that better mitigate wildfire risk in communities.

"We selected several lowland spruce stands near the hamlet of Red Earth Creek, two hours north of Slave Lake, Alberta," explains Dr. Dan Thompson, a forest fire research scientist with the CFS. "The prescribed burning program was designed to accomplish both scientific investigations and community fuel reduction. After the Province consulted with local stakeholders, we treated the stands between early 2014 and the spring of 2015, with a full inventory of wildfire fuels conducted both before and after the inter-tree spacing treatments and strip-mulching conducted at the sites."

Canada

Inter-tree spacing and strip-mulching are the two most common FireSmart® treatments. Inter-tree spacing involves thinning the stand to a minimum 2- to 3-meter spacing between tree crowns; strip-mulching involves chipping entire trees in 3-meter wide strips to create space between tree crowns.

The winter of 2015 brought little snow to the region, carrying over the dry conditions from the previous fall. With the prescribed burn scheduled for the week of May 11th, typical dry winds from the southeast quickly eliminated any remaining winter moisture. Crews from Alberta Wildfire Management, FPInnovations, the Canadian Forest Service, and McMaster University arrived at the site to sample fuel moisture before the fire. A large network of metal pins, called burn pins, was inserted into the peat to record the depth of burn across the site and to examine the patterns of organic soil smoldering inside and outside the FireSmart® treated area. Temperature recorders and cameras installed by FPInnovations monitored the rate of the fire's spread throughout the plot.

On May 14th at 2 pm, an ignition specialist using a helicopter-borne torch ignited an untreated control area next to the treated areas. With moderate winds and low humidity conditions, the fire gained momentum very quickly in the control area and spread into the two treated areas. After only 4 hours the fire was fully contained and no longer smoldering. That evening and the following day, the research team worked at the site to collect data, including the fire rate of spread and depth of burn. They also measured the extent at which the tree canopy was consumed by the fire.

Thompson concludes that, “Preliminary data suggests a small increase in the depth of burn in understory areas that were exposed to more sunlight after the thinning treatments. However areas with the wetter Sphagnum mosses showed almost no combustion of the moss layer, either inside or outside the treatment. Previous moss ecology studies have shown that the more burn-resistant Sphagnum moss grows best in open sites such as those created by the FireSmart® treatments, but with only one year between thinning and the prescribed burn, the Sphagnum moss layer may not have had sufficient time to become more abundant in the increased sunlight caused by the fuels treatment.”

“This prescribed burn trial showed us how FireSmart® treatments applied to Sphagnum moss in the understory of boreal peatlands may be able to mitigate the risk of smoldering and fire,” says Thompson. “As we move forward, our research team plans to investigate best practices in managing for both tree canopy and moss cover to minimize wildfire risk in this common boreal ecosystem.”

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See the related article in this special issue of Insights: FIRETEC – a Better Way to Understand Fire Behaviour.

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