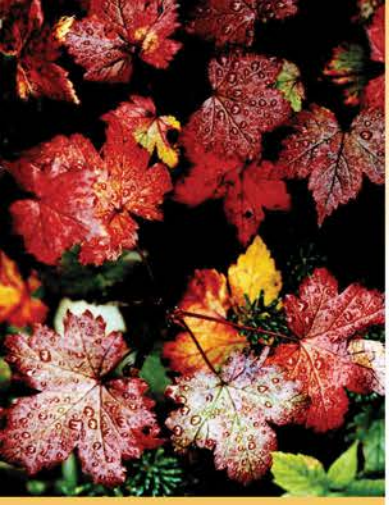

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Special Issue

Wildland Fire

4e

Insights

Canadian Forest Service

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FIRETEC – a Better Way to Understand Fire Behavior

On May 15, 2011, a wildfire driven by strong winds crossed Highway 88 and entered the Town of Slave Lake, Alberta, burning 454 buildings. This fire plus a second fire that burned along the south shore of Slave Lake burned an additional 56 homes in nearby communities. These two fires along with a third fire comprised what is commonly referred to as the "Slave Lake fire".

One year later, a Wildfire Review Committee submitted a report to the province outlining 21 recommendations directed at minimizing the effect of catastrophic events such as the Slave Lake fire on Alberta communities. One recommendation, which encourages research agencies to collaborate and develop the most effective and efficient treatments to manage fuels, is being addressed by FIRETEC, a fire model now being introduced to Canada.

Researchers at the Canadian Forest Service (CFS) are leading a project funded through Alberta's Wildfire Management Science and Technology program to address questions regarding the effectiveness of fuel treatments on fire behavior and how such treatments can help protect communities and enhance public safety in the wildland-urban interface.

Though fuel treatments are used to improve community protection from wildfires, more work is needed to validate and compare the wide range of fuel treatments used across Canada. Given the difficulty of conducting prescribed fires in the most challenging fuel conditions, the use of computer models such as FIRETEC allows for virtual prescribed burns to occur under a wide range of weather conditions and treatments.

"We propose to simulate crown and surface fire spread through a variety of stands with varying fuel treatment types and intensity using the FIRETEC model," says Kerry Anderson, a CFS fire researcher. "By comparing simulated fires in treated and untreated stands, we aim to assess fuel treatment effectiveness under different conditions. Our current research methods do not capture fire behavior in patchy, discontinuous stands; FIRETEC's advanced, high-resolution model will provide insight into these types of structures."

Figure 1: Experimental Burn (Natural Resources Canada)

FIRETEC is a computer model developed at the Los Alamos National Laboratory in New Mexico, USA, and is used to study and understand fire behavior at the stand level. FIRETEC has the unique capability to capture the two-way interaction between wildfire and the surrounding atmosphere over a wide range of scales, from meters to kilometers. It can also examine potential fire behavior characteristics in a range of weather and fuel conditions, which is typically out of the reach of conventional prescribed burn operations.

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By studying fire behavior across this range, optimal fuel treatments could be designed to mitigate the impact of fire in a variety of situations. For example, FIRETEC has been used in a wide variety of projects and trials, including fire behavior in grass land and forest fires of varying patchiness and stand densities; in bark beetle outbreaks; in Mediterranean pine and other fuels. FIRETEC has also been used to study historical events such as the experimental burns conducted as part of the International Crown Fire Modeling Experiment (1998-2002) (Figure 1), the Las Conchas fire near Los Alamos, New Mexico (2011), and the historic Mann Gulch fire in Montana (1949).

"Results from FIRETEC simulations (Figure 2) by CFS will help validate existing community protection programs and improve the scientific basis for fuel treatments," says Anderson. "We hope that this will encourage communities to accept and participate in fire prevention programs. It will also help fire management agencies determine the optimal balance between cost and effectiveness for different fuel treatment scenarios."

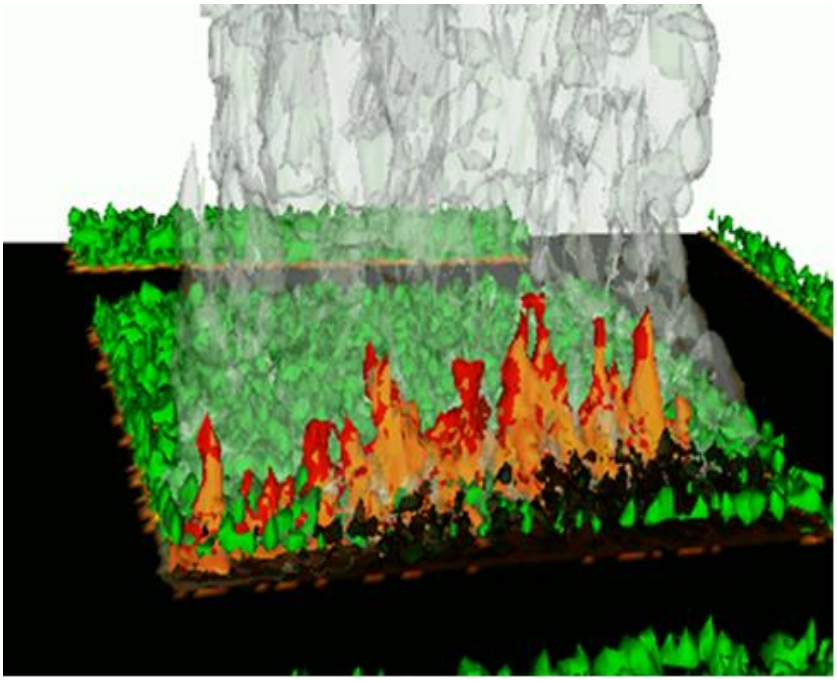

Figure 2: FIRETEC simulation of Figure 1 experimental burn (Natural Resources Canada)

The FIRETEC model has been successfully applied to a number of wildland fire trials in southwestern United States, and with Mediterranean fuel types, but its application in boreal fuels (particularly spruce) is limited. CFS researchers now have the opportunity to run FIRETEC trials in boreal forest conditions and also to work directly with FIRETEC developers to improve and adapt this model for future trials across Canada. As the scrutiny of fuel treatment practices around communities increases in the future, models such as FIRETEC are likely to play an increasing role in fire research, helping to build capacity for this type of modelling in Canadian fire science and community fire protection programs.

Finally, it is important to understand that FIRETEC does not replace prescribed burn studies in the field. Anderson underscores that, "Field studies need to be continued to ensure that FIRETEC is well grounded in science and calibrated to the conditions in Canada's forests."

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Aussi en français

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