foothills MODEL FOREST research growing into practice

Chisholm Dogrib Fire Research Initiative
Quicknote # 3

October 2003 ***By: Ember Research Services Ltd***

Aspen stands stop fires, don't they?

Introduction

Recent spring wildfires in Alberta seem to be challenging the wisdom that deciduous forest types like aspen make good firebreaks for community fire protection and for reducing fire risk to commercial forests at a landscape scale.

What is going on that the 2001 Chisholm Fire and 2002 House River Fire can grow so large (over 100 000 hectares and 250 000 ha, respectively) when lots of aspen stands were present to act as firebreaks? Do aspen stands actually "crown"?

Chisholm Fire Study

Foothills Model Forest supported a study of fire behaviour in aspen stands of different fire histories and fuel loads on the 2001 Chisholm fire, in order to help community protection planners and forest managers to understand better the effectiveness and limitations of aspen as a firebreak under severe spring burning conditions.

The study included the re-measurement of re-burned fire behaviour research plots from the 1970s and the evaluation of the re-burn of a 1968 wildfire, in which the Chisholm Fire stopped.

Aerial view of plots located in Chisholm Fire re-burn of 1968 Vega Fire area. Chisholm Fire stopped spreading in 30 year-old aspen.

Vega Fire Plot 6 SW, not re-burned by Chisholm Fire. Note absence of grass and light downed-woody fuel load.

What we found

Estimated fire intensities on re-burned aspen research plots from the 1970s exceeded 200 000 kW/m, while intensities in aspen stands that regenerated after the 1968 Vega wildfire were only 10% of that, because fuel consumption estimates were much lower on the Vega Fire re-burn.

For more information on this Quicknote, please contact: Bruce Lawson, Ember Research Services Ltd. (250) 479-2635, or visit www.fmf.ab.ca

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Why was fuel consumption lower on the re-burn of the 1968 wildfire? Primarily because the 1968 wildfire itself was a high-intensity fire under severe burning conditions (similar to the Chisholm Fire conditions) that removed a lot of fuel, and was followed by salvage logging, that removed a lot more of the remaining large woody fuel. The 1970s fire research plots, on the other hand, were originally burned at much gentler burning conditions, leaving a lot of woody biomass from killed trees to fall down and fuel the next fire, which turned out to be the 2001 Chisholm Fire.

What it means

The Chisholm Fire slowed and stopped after running a few tens or hundreds of metres into extensive young aspen stands that regenerated after the 1968 Vega wildfire, confirming that, as long as cured grass and downed woody fuel loads are minimal, aspen stands do have significant value as firebreaks, even under severe burning conditions.

The estimated fire intensities in the Vega Fire re-burn, ranging from 9 000 to 27 000 kW/m, would correspond to intermittent or continuous crown fire behavior in black spruce stands, but in aspen is characterized as high intensity surface fire. Much higher flame heights and some consumption of fine crown fuels were indicated on the re-burned 1970s research plots, where bole scorch heights averaged 3.6 m vs. only 0.5 m on the Vega Fire re-burn.

This study has shown that either or both downed-woody fuel accumulations and/or severe spring burning conditions can result in much higher fuel consumption and fire intensities in aspen stands than presently predicted by standard (Canadian Forest Fire Behavior Prediction (FBP) System) fire behavior models. Under-estimation of potential fire behavior under critical conditions could conceivably result in over-estimation of the benefits of aspen stands as fuelbreaks, particularly after greenup of tree foliage prior to greenup of grass and herbaceous cover in spring.

What should be done?

Aspen (Fuel Type D-1) fuel consumption models in the FBP System should be recognized as potentially under-predicting at high BUI (Buildup Index) values and where downed-dead fuel loads are significant. FBP System models should not be changed on the basis of this non-statistical study, but should be further studied experimentally.

From a strategic fuel management perspective, aspen fuelbreaks have been shown here to be effective at slowing and even stopping fire spread under severe spring burning conditions, when downed-dead woody fuels are light and cured grass is not a factor. Aspen fuelbreaks should be managed and maintained to maximize canopy closure in order to exclude grass growth, and to ensure that downed-woody fuel loads accumulating from either natural mortality or fire history are reduced to at most a single ground layer.

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