

Mountain Pine Beetle Ecology Program Quicknote #3 EcoHydrology Project

By: Anne McIntosh,
Ellen Macdonald &
Uldis Silins

July 2010:

Effects of simulated Mountain Pine Beetle attack on post-attack vegetation and below-ground dynamics in lodgepole pine forests

The mountain pine beetle (MPB; *Dendroctonus ponderosae*) is a native bark beetle of western North America pine forests. It has been described as the 'most damaging biotic disturbance agent in mature lodgepole pine in western Canada'. With global warming, the MPB is anticipated to significantly expand its range and has already expanded into some of western Alberta's lodgepole pine forests. This study is examining the relationships between the overstory, understory, and below-ground dynamics of upper foothills lodgepole pine stands in Alberta with different levels of simulated MPB attack and/or forest management.



The study used individual tree injection with herbicide (glyphosate) to experimentally simulate variable intensity MPB attack at the stand scale using a before-after treatment-control study design. The research is being conducted in mature (~110 yr) pure lodgepole pine stands near Robb, AB. Twelve large replicated stand-scale plots (1.2 - 2.2 ha each) are being used to compare vegetation and below-ground responses to two levels of simulated MPB attack (50%, 100%), salvage harvest clearcuts, and untreated control stands, during the early 'red attack' stage of MPB infestation.



Stands were instrumented in 2007/2008 with meteorological stations, and overstory, understory, and below-ground sample plots. Field measurements have been completed for the pre-treatment year (2008) and treatment year (2009), and post-treatment 'red attack' data will be collected in summer 2010. Preliminary results from the first two years of the study have shown minimal change in most of the measured attributes immediately post-disturbance, such as mean understory cover and downed wood biomass. However, initial changes in nutrient cycling in some treatments, including an increase in nitrogen release in the clearcuts, were seen. We hypothesize during the 'red attack' phase we will see increases in soil moisture and nutrients, with accompanying changes in the below-ground microbial communities and nutrient cycling processes, and increases in cover of understory species that can optimize use of the additional soil moisture and nutrients. The results of this study will help inform forest management and conservation of expanding MPB-affected forested landscapes in western Canada.

The study is scheduled to run until 2012.