quickNotes
the information note of fRI Research

fRI Research
Informing Land & Resource Management

Julie Steinke

Understory vegetation responses to simulated mountain pine beetle attack and salvage logging in lodgepole pine forests in west-central Alberta

The boreal forest is adapted to stand-replacing fires, which have different ecological impacts than less severe disturbances, such as mountain pine beetle (MPB). MPB has undergone an unprecedented range expansion into west-central Alberta's lodgepole pine forests, where it indirectly influences understory resources and vegetation. This can influence post-MPB pine regeneration, and if pine is out-competed by other vegetation, the future successional trajectories of these stands will be affected. Scientific literature suggests that the best predictor of the long-term persistence of a species is population size (IUCN 2002). Combined with this understanding is the finding that for species with a population size between 50–100 individuals, the risk of population extinction is high (Reed 2003).

Attack severity can vary by site, and responses of understory vegetation to MPB may vary with the severity of attack. The goal of this project was to measure understory vegetation responses to varying levels of simulated MPB-induced mortality and salvage logging in lodgepole pine forests in west-central Alberta.

MPB attack was simulated by injecting trees with glyphosate. They subsequently died in a fashion very similar to the effect of MPB; the needles were initially retained and turned red, then the needles were lost and the stand entered the "grey attack" stage.

Results

Seven years after simulated MPB-induced canopy death (i.e., the "grey attack" stage) or removal by harvesting, the magnitude of vegetation response varied with disturbance severity. Understory vegetation richness and diversity increased, and community composition changed, with increasing disturbance severity. This was primarily due to increased graminoid richness and cover and the establishment of shade-intolerant species. Shade-tolerant understory feathermosses were indicative of the control, while both severity levels of simulated MPB-attack resulted in a release of pre-existing, shade-tolerant species.

For more information on this or other MPBEP publications, please contact: Keith McClain.
Tel.: (780) 449 – 4416, Email: kmcclain@friresearch.ca or visit www.friresearch.ca

Both the higher severity MPB-treatment and simulated salvage logging resulted in an increased abundance of early-successional and shade-intolerant species.

Standing dead trees provided some protection for the understory environment, limiting the vegetation changes that occurred after MPB-attack. In contrast, salvage logging had much more dramatic and immediate, although mostly temporary, impacts. Vegetation was able to take advantage of increased soil nutrients and soil moisture increased, likely due to reduced uptake by trees, and understory vegetation was able to take advantage of this increase in resources. The results suggest that understory vegetation will transition to something characteristics of an earlier-successional site following MPB, with implications for tree regeneration and successional development. But the responses will be stronger in a site that is salvage-logged versus left alone

For more information on this or other MPBEP Publications, please contact Keith McClain.
Tel.: (780) 449 – 4416, Email: kmcclain@friresearch.ca or visit www.friresearch.ca