Silvicultural and ecological strategies for the mountain pine beetle epidemic area

By K. David Coates, PhD, RPF

The mountain pine beetles are doing their thing and we watch in wonder and dismay. As a disturbance agent, the mountain pine beetle epidemic is ecologically fascinating. For a silviculturist, it is out-and-out scary.

In the short term, forest professionals will mount an unprecedented salvage operation. The silvicultural strategies we employ during the salvage will profoundly affect timber supply for affected communities over the mid-term (20 to 50 years). It will also have lasting ecological consequences. What happens to areas left unsalvaged is an even bigger unknown variable in mid-term and longer-term timber supply projections. I have lived in, worked in and studied sub-boreal forests for 25 years. I think we have to radically rethink our strategies of forest management in light of the beetle and climate change projections.

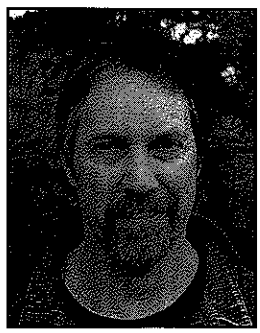
BC forest professionals are very good at conducting efficient logging operations, establishing new even-aged stands and projecting their future yields based on past performance. We know that total salvage and planting will not help communities faced with mid-term timber supply shortages. Forest professionals have a dreadful record of devising silvicultural strategies that allow another viable logging operation in the mid-term, partly because it has not been a pressing issue. It is pressing now.

I am very concerned about the ecological and economic consequences of current salvage strategies in areas affected by the mountain pine beetle. Total salvage followed by planting should be directed to areas dominated by dying and dead pine with poor or few live residual trees. We must identify stands with healthy, well-established understories or sufficient live canopy trees that have the capacity to release and grow after careful salvage of attacked pine. Such stands can mitigate mid-term timber supply shortages. We need models that can project what will happen in these complex structured stands. Stand level models must be linked to landscape level models to assess the merits of different strategies. Silvicultural plans need to consider ecological consequences, such as effects on caribou habitat needs.

Vast areas of beetle-killed pine may never be salvaged. Stands that have healthy residual trees are the most likely areas to fill in our short-term timber supply shortfall. We need to identify these areas and use modelling to project their future composition and yield. Other unsalvaged areas will require active restoration. How much restoration is needed will depend greatly on how well unsalvaged stands regenerate naturally. This is a huge unanswered question. Researchers like me can make predictions based on an understanding of important processes, but there is no substitute for regeneration surveys in unsalvaged areas to ensure restoration efforts are effectively targeted. If safety concerns can be met, a vigorous underplanting program could be valuable in areas with poor regeneration.

The consensus view of the scientific community is that anthropogenic climate change is occurring. Warming winter temperatures are a contributing factor in the beetle epidemic. Dothistroma needle blight is currently causing extensive defoliation and mortality in plantations of lodgepole pine, and killing mature pine, near the epidemic area. This unprecedented occurrence is more clearly linked to short-term climate change. Surprises are becoming the norm. Our traditional management practices have tended toward forest simplification with the implicit assumption of increased yields. We need to think carefully about species choices and stand complexity in the context of climate change projections. We should also consider species shifts on a limited basis. Our species selection decisions need to be critically assessed. At a minimum, we want to manage for diverse stands of species native to the area. We do not want to manage for single-species, even-aged stands. That would be high risk.

In the mid-term and long term, we must strive for structurally complex forests at both stand and landscape scales. A critical first step in salvage areas is a stand-level retention strategy to maintain complex forest structure. The scientific evidence for the ecological benefits of retention for a wide range of organisms and processes is compelling and conclusive. It would be a big mistake to dramatically simplify our stands and landscapes during our salvage operations. Retention should increase with salvage block size. Retention levels should be variable and up to 30 per cent in the largest salvage blocks. Forest professionals must familiarize themselves with the ecological literature on retention and must strive to create structurally complex stands that meet timber production and ecological objectives.



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