

Cluster planting: a new prescription for enhancing structural diversity in reclaimed boreal forest¹

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Abstract: Tree planting is an important step in forest re-establishment after land reclamation in the boreal forest. Trembling aspen (*Populus tremuloides*) normally regenerates after disturbance through root suckering but this regeneration mechanism is not viable on completely reconstructed sites. Therefore, planting aspen is often required but it remains to be seen what the optimal planting patterns are. For example, is it better for aspen growth and understory plant community development to have a regular distribution of trees or a clustered distribution with localized patches of high density and low density trees? Widely spaced trees may have greater maximum growth potential but individually they are more susceptible to reduced growth from intense competition and take many years to reach canopy closure resulting in “open” reclamation sites. Clustered trees, on the other hand, may have the ability to “capture the site” and reach canopy closure sooner thereby reducing vegetative competition at the risk of reduced growth from intraspecific competition between trees. Building off of past research examining the spatial distribution of naturally regenerating aspen stands and the benefits of high density planting for the development of crown closure, we tested the impacts of planting aspen in clusters of 4, 10 and 20 trees at an internal spacing of 0.25 to 0.5 m compared to a conventional planting prescription of 2,500 regularly spaced stems per ha on an industrial reclamation area in the oil sands region of Alberta, Canada. Initial first year results indicate the largest clusters reduced total vegetation competition, driven by a reduction in forb cover, and tree growth increased with clustering compared to the conventional planting prescription. This cluster planting approach also has the potential to increase the site level diversity by creating both closed canopy and open areas within a single reclamation area without increasing overall planting costs.

Additional Key Words: Reclamation, oil sands, trembling aspen, vegetation competition

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