CENTRE FOR ENHANCED FOREST MANAGEMENT

ADVANCES IN FORESTRY RESEARCH

DEPARTMENT OF RENEWABLE RESOURCES

EFM RESEARCH NOTE 04/2004

What impact does salvage logging of aspen stands have on their regeneration and early growth?

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Salvage cutting has become a common forest management decision to capture timber killed by wildfire or insect outbreaks. Recently there has been a significant increase in the salvage of aspen from burned areas, but little is known about the impact of salvage cutting on aspen regeneration. Salvage operations are generally carried out in the first two years after fire but can sometimes be prolonged by salvage for specialty uses (e.g.: fire wood or timber for log homes). Salvaging timber after aspen suckering has already occurred could have significant impacts on regeneration success and growth.

Aspen stand in the Chisholm burn and the reserve plot two years after the fire.

This study was conducted on the Chisholm fire near Slave Lake, Alberta (55º17'N; 114º46'W). The fire burned during late May/early June 2001, shortly after the deciduous trees had flushed.

During the winter of 2001/2002 one growing season after the fire, areas were salvage logged. Over an area of 50 ha, 22 circular plots (200 m^2) were flagged prior to salvage and left standing undisturbed. Aspen regeneration was assessed in 10 m^2 plots established in the undisturbed plots and paired with areas outside the undisturbed plots. One of four ratings of machine traffic intensity was assigned to each regeneration plot and this subjective rating was based on a visual estimate of the amount of scuffing and mineral soil exposure. The four ratings ranged from low (only slight scuffing of the organic surface or no visually trafficked area, no mineral soil exposure) to severe where large areas had with all organic matter removed, or areas had exposed roots and some ruts.

Aspen regeneration was assessed in the 10 m^2 plots. In each plot, the total number of one-year old (suckered in 2002) and two-year old aspen suckers (suckered in 2001) and the height and leaf area of the largest sucker was collected.

Our findings showed:

- There was significant physical damage to suckers as a result the salvage logging operations.
- All trafficked areas showed significant recruitment of new suckers during the second growing season after the salvage operation (12,000 st/ha).
- Despite the recruitment of new suckers, areas with the highest level of machine disturbance in the salvage-logging study had 60% fewer suckers compared to the non-trafficked plots.
- There was reduced stand leaf area indices in relation to the amount of traffic; leaf area indices ranged from 2.2 m^2_{leaf} m^{-2}_{ground} in the undisturbed and low level traffic areas, compared to 0.74 m^2_{leaf} m^{-2}_{ground} in medium trafficked areas to less than 0.65 m^2_{leaf} m^{-2}_{ground} in areas with high and severe levels of machine traffic

Implications:

Salvage logging of aspen during and after the first growing season after the fire has had a significant negative impact on aspen regeneration. This could have implication for the future growth and productivity of the regenerating stands. In addition, we anticipate that since many of the suckers were wounded during the salvage operations future wood quality could be negatively impacted.

Funding was provided by Ainsworth Lumber Co. Ltd., Alberta-Pacific Forest Industries Inc., Daishowa-Marubeni International Ltd., Louisiana-Pacific Canada Ltd., Millar Western Forest Products Ltd., Slave Lake Pulp Corporation, Weldwood of Canada Ltd., Weyerhaeuser Company, and NSERC.

Further Information:

Fraser, E.C., Landhäusser, S.M. and V.J. Lieffers. 2003. The effect of fire severity and salvage logging traffic on regeneration and early growth of aspen suckers in north-central Alberta. Forestry Chronicle (in press).

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