

CENTRE FOR ENHANCED FOREST MANAGEMENT



ADVANCES IN FORESTRY RESEARCH

DEPARTMENT OF RENEWABLE RESOURCES

EFM RESEARCH NOTE 06/2009



Aspen invades the upper foothills region of Alberta

LANDHÄUSSER, S.M., DESHAIES, D., AND LIEFFERS V.J.

Mature trembling aspen (*Populus tremuloides* Michx.) is a rare sight in the upper elevations of the upper foothills region of west-central Alberta because of the unfavourable conditions for establishment and growth at these higher elevations. These areas are currently dominated by lodgepole pine and black spruce. In recent years, however, it appears that aspen has been successfully establishing from seed in this zone and that it has been doing so mainly as a result of forest harvesting. The objective of this research was to determine the frequency of establishment and the type of microsite needed for the successful establishment of aspen seedlings at these higher elevations.

Methods: The current distribution of mature aspen and the presence and absence of aspen seedlings in harvested areas were determined in an area south of Robb, Alberta. Using ground and aerial surveys we located the current distribution of mature aspen in the area. In an intensive study, 12 belt transects (180 m long and 5 m wide) were established in areas disturbed by forest harvesting at high elevations where no aspen was present prior to harvesting. Transects were surveyed seven growing seasons since the harvest and the microsites occupied by aspen seedlings were described for their substrate and microtopography.



Results: On level ground surfaces, aspen seedling regeneration was found at elevations 200 m higher than the nearest mature aspen in the adjacent undisturbed forests. Results from the more detailed study showed that an average of 428 seedlings/ha established on these cutblocks. Aspen seedlings established in each of the seven years since harvest. Nearly all of the

seedlings (93%) had established on mineral soil microsites and virtually no seedlings were established

on undisturbed forest floor layers. Significantly more seedlings were found in concave microtopographic positions.

Implications: This study indicates that aspen establishment from seed is currently not a rare event and that aspen is rapidly expanding its range upslope. However this expansion is only possible when accompanied with ground disturbances that expose mineral soil substrates through forest harvesting or fire. A warming climate is likely critical for this expansion.



The regenerating aspen and pine seedlings currently are growing at a similar rate, as a result a mixture of co-dominant pine and aspen trees can be expected to replace these pure conifer stands. In the future these aspen-pine mixtures might resemble stands currently found at lower elevation.

The change in canopy composition from conifer to deciduous forests at these higher elevations will have far-reaching implications for ecosystem processes and functions and forest productivity.

Funding was provided by Natural Sciences and Engineering Research Council of Canada (NSERC).

Further Information:

Landhäuser, S.M. Deshaies, D. and Lieffers, V.J. 2009. Disturbance facilitates rapid range expansion of aspen into higher elevations of the Rocky Mountains under a warming climate. *J. Biogeography* (in press).

<http://www.cefm.rr.ualberta.ca/>

Centre for Enhanced Forest Management, Dept. of Renewable Resources, U. of A., Edmonton, AB T6G 2H1

Simon.Landhausser@ualberta.ca; Victor.Lieffers@ualberta.ca

"Fundamental and applied research to enhance the productivity of Alberta's northern forests"