

POSTER PRESENTATIONS

POST-HARVEST STAND DEVELOPMENT CONFERENCE

BENDING STRESS INFLUENCES THE TREE BOLE TAPER AND PROPORTION OF LATEWOOD

We explored the impacts of bending stress caused by wind on C allocation via diameter and stem growth, and wood characteristics of mature lodgepole pine. Bending stress applied to tree boles was altered by tethering groups of trees at 10m height in a web pattern at four sites across Alberta. Six years of tethering resulted in a large increase in height growth and radial growth at the tethering height and above. The amount of wood added to the stem was closely related to the bending stress applied at these heights. Tethering treatment also resulted in an increase in the proportion of latewood at the tethering height.

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COMPETITIVE EFFECTS OF WOODY AND HERBACEOUS VEGETATION IN A YOUNG BOREAL MIXEDWOOD STAND

Results from a study examining the influence of aspen and herbaceous/grass vegetation on light, soil moisture, soil and air temperature, nitrogen availability and white spruce growth will be presented. This study is part of a large, long-term experiment established near Whitecourt, Alberta by Dr. Phil Comeau, Dr. Doug Pitt, Mr. Milo Mihajlovich, and Mr. Dan MacIsaac in 2002. We are examining the effects of treatments designed to control only woody or both woody and herbaceous vegetation on leaf area index (LAI) of both the woody and herbaceous components and relationships between leaf area index of these components and light, soil moisture, soil temperature, nitrogen availability or spruce growth. Results indicate significant treatment effects on LAI, light, nitrogen availability, and spruce growth. Due to wet weather throughout 2004 and 2005 there do not appear to be any treatment effects on soil moisture.

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EFFECTS OF SPACING DENSE YOUNG ASPEN STANDS ON GROWING SEASON-FROST REGIME

An important management challenge in young boreal mixedwoods is finding the appropriate balance between the benefits of spacing the dense overstory of aspen (increase light availability) and the benefits of maintaining a partial aspen cover (protective effects e.g. frost protection). Our study examines how spacing influences the air and soil temperature regime, special attention given to growing-season frost. Plots with different aspen densities were used at two WESBOGY field installations, near Peace River and Grande Prairie. Our results show that the intensity and length of radiative frost events increase with decreasing aspen cover. Maintaining a partial aspen cover can provide some degree of protection to understory spruce against frost damage. The study provides ecological information that will help refine silvicultural guidelines for establishing and managing boreal mixedwoods.

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EVALUATING THE PREDICTIVE PERFORMANCE OF THREE GROWTH MODELS CALIBRATED FOR USE IN SASKATCHEWAN

Growth and yield information is needed to build reliable management plans and establish the allowable annual cut. This poster compares the predictions of three growth and yield models for Saskatchewan based on existing measured permanent sample plots. The three models are:

- 1) Mixedwood Growth Model, developed by S. J. Titus at the University of Alberta
- 2) The Dendron and Flewelling growth model; Preliminary natural stand growth and yield estimation for Saskatchewan, 1995.
- 3) The Saskatchewan Provincial Yield Curves.

A number of 140 plots located in pure and mix stands, having as dominant species one of the following: white spruce, black spruce, jack pine and trembling aspen, were selected. The projections of the plots characteristics were compared with subsequent measurements of the same characteristics.

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FOOTHILLS GROWTH AND YIELD ASSOCIATION

The scientific assessment of forest productivity is essential for effective management of Alberta's timber resource. The Foothills Growth and Yield Association is helping managers to better assess the productive capacity of lodgepole pine ecosystems, the sustainable level of timber use, and the selection of enhanced forest management practices. The mandate of the Association is to continually improve the assessment of lodgepole pine growth and yield in managed stands. Projects include a major lodgepole pine regeneration trial and modeling effort, comparisons of post-harvest and fire-origin stand development, maintenance and analysis of historic research trials, and new studies into nutrition and density management. The poster describes the Association's program, summarizes the main projects, and includes a map illustrating locations and current extent of field trials.

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GAP DYNAMICS OF REGENERATION FOLLOWING HARVEST OF ASPEN STANDS

This poster summarizes research on the dynamics of post-harvest gap development in aspen-dominated mixedwood forest stands in northwestern Alberta. The pattern of gap development over time was determined from analysis of air photos taken pre-harvest and 1, 4, 10, and 12 years postharvest. We also measured regeneration characteristics, microsite, soil, light and browse conditions in aspen regeneration gaps 14 years postharvest. Gaps of different origin were cumulative over time, with a combined gap area of up to 29% of the stand area 12 years postharvest. There was little evidence of on-going regeneration within gaps, indicating that gaps will probably persist over time. Results suggest that *Calamagrostis* cover and browsing are important factors in the maintenance of these gaps. This poster discusses how the spatial heterogeneity resulting from these gaps could be advantageous, either as part of ecosystem-based management emulating natural disturbance or as a template for mixedwood management, where white spruce are established in gaps.

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THE MIXEDWOOD GROWTH MODEL (MGM)

The three year, FRIAA-sponsored project was initiated to improve the functionality of the MGM growth and yield model. The overall objective of the project was to incorporate into MGM the flexibility and functions that are needed to assess growth and yield implications of current and future forest management strategies and silvicultural prescriptions in Alberta's boreal mixedwood forests. The poster will briefly outline work underway to enhance the capability of MGM to model development of regenerating mixedwood stands and to represent silviculture practices

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STAND STRUCTURE CLASSIFICATION

New quantitative methods have been developed to more reliably distinguish differences in stand structures as they relate to diameter distributions, and so too to differences as it relates to species occurrences within those distributions. 17 new classes have been developed for use in the Cariboo. A field guide is available to support their identification in the field and through aerial photo interpretation. A stand structure compiler is available for classifying plot data. The classification has been used to build stand and stock tables for inventory 220,000 polygons in the Cariboo and to characterize Cruise plot data in the Prince George TSA. Within the Cariboo the stand and stock table information has been used to simulate the spread of bark beetles across the landscape within the next 15 years, from one stand to the next, the spread of bark beetles within a stand from 1 tree to the next, and the resultant process of log degrade and loss of recoverable volume following the death of trees. This information will be used for harvest scheduling and log supply forecasting. The stand structure classification system has application in the design of silviculture systems and standards. It is broadly applicable to boreal, sub-boreal, montane and interior Douglas-fir types.

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TASS III BOREAL MIXEDWOOD MODELLING: LIGHT AND UNDERSTOREY TREE GROWTH

We are currently developing TASS III understorey white spruce and lodgepole pine growth relationships to enable simulations of aspen-spruce and aspen-pine boreal mixedwoods. We are focusing our efforts on developing the key growth relationships between height, diameter and crown growth and understorey light. To create a solid foundation for the TASS III relationships, we conducted a comprehensive review of existing published information on the relationship between light and growth (Astrup 2005a & b). The review has indicated there is a large variation in potential growth model functional forms. For our purposes, we are exploring the use of maximal frontier functions (Cummings et al. 2001, Nepal et al. 1996) which may quantify the upper boundary of light dependent relative height growth. We will be using all available tree level data from various sources to estimate the most appropriate functional coefficients.

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**WESTERN BOREAL GROWTH AND YIELD (WESBOGY) ASSOCIATION LONG TERM STUDY:
DEVELOPMENT AND DYNAMICS OF YOUNG ASPEN-SPRUCE MIXEDWOOD STANDS**

The Western Boreal Growth and Yield Association (WESBOGY) is a regional association of industrial, federal, and provincial foresters and researchers, and university researchers interested in evaluating the dynamics of boreal forest development and the yield implications of silviculture practices. The four western provinces and the Northwest Territories are represented among the members. The WESBOGY long term study, which involves planting white spruce seedlings in recently clearcut areas where aspen regeneration had already been established, was specifically designed to advance our understanding of the dynamics of mixedwood stands following tending. This poster presents the study design, results and conclusions.

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