Annual Report
2004–2005

WESTERN BOREAL GROWTH AND YIELD ASSOCIATION

April 2005

CONTENTS

Executive Summary and Highlights

The Western Boreal Growth and Yield Association first met in the mid 1980's as an informal group of agencies involved in forest growth, yield, inventory and planning in western Canada. The association works to: encourage member agencies to work in a coordinated fashion to improve the efficiency of their research and development efforts; facilitate data sharing; and, provides a forum for communication. We are focused on development and dissemination of growth and yield modeling technology and information for both natural and regenerated stands in the western boreal mixedwood region, primarily aspen and spruce.

Current membership in the association includes seven forest companies and three provincial/territorial governments (Alberta, Saskatchewan and the Northwest Territories).

Continuing work on the long-term study designed to examine the effects of manipulating aspen density on growth and yield of mixedwood stands during 2004 included final cleaning and archiving of data collected through 2002, revision of the field data collection manual, and analysis of data. Work on the Mixedwood Growth Model continues, with support received from the Forest Resource Improvement Association of Alberta (FRIAA) and the Mixedwood Management Association for major work on refining the modeling of young stands and improving representation of tending practices. In addition, a number of studies are underway that will hopefully contribute to better or more efficient tending of young mixedwood stands. We have also collaborated with Foothills Growth and Yield Association in development of a study examining effects of aspen competition on lodgepole pine.

This Annual Report presents highlights of work accomplished during 2004, and briefly outlines plans for 2005.

Message from the Chair

April 2005

It is hard to believe that another busy year has passed by since the last annual report. This year has seen a number of accomplishments. Cleanup of data from the Long-Term Study through 2002 was completed thanks to the hard work of Rongzhou Man, Mike Bokalo and Susan Hill. A substantial amount of work was invested in improving the modeling of small trees in MGM, this work involved use of LTS data and data from other sources in developing growth and mortality functions for small trees. MGM 2005 was released in April as a result of work by Steve, Mike and Ken and members of the MGM Strategic Development Team.

We had a very successful and interesting fall meeting in Prince Albert in September. WESBOGY LTS sites were visited as part of tours connected with the CIF-SAF convention in Edmonton in September.

A number of collaborations with other groups have occurred in 2004 and include participation in: a) mixedwood tour hosted by the B.C. Ministry of Forests; b) examining the application of the Northern Interior Vegetation Management Associations (NIVMA) TRENDS monitoring protocol for collecting growth and yield data; c) AFRI workshop on linking silviculture and growth and yield; and, d) collaboration with Dick Dempster and the Foothills Growth and Yield Association in development of studies examining lodgepole pine reponses to thinning, fertilization, and aspen competition.

2005 promises to keep us very busy, with ongoing work on MGM, analysis of LTS data, graduate student research, and collaboration with other groups.

Further information on WESBOGY and related projects is provided in this report. Please contact us if you would like any further information.

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Chair, WESBOGY

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Mission

The purpose of the Western Boreal Growth and Yield (WESBOGY) Association is to conduct research projects that contribute to the development and dissemination of growth and yield modeling technology for both natural and regenerated stands growing in the boreal mixedwood region, primarily aspen and spruce.

Goals

1. To develop and implement a program of research in the study of growth and yield focused on problems of interest to members of the Association.
2. To increase knowledge and awareness of growth and yield relationships, as they exist in western and northern Canada.
3. To foster communication, cooperation and exchange of information among the members as well as various agencies and groups concerned with management and development of boreal forests.
4. To focus on the dynamics of mixedwood stands of aspen and white spruce growing in the boreal forest. Basic relations to be studied will include establishment, ingrowth, growth, and mortality. While the major species of interest are aspen and white spruce, other species such as poplar, lodgepole pine, and black spruce will also be studied where sufficient data is available. In developing simulation models based on these relations, provision will be made for projecting stands subject to multiple interventions (treatments) through the life of the stand. Differences between Natural Subregions (Ecoregions) and site productivity will also be evaluated where there is sufficient data.
5. To encourage the establishment and continued monitoring of standardized permanent sample plots (PSPs) to quantify the effects of intensive forest management practices in natural and regenerated stands, and in general to coordinate the acquisition of high priority growth and yield data;
6. To identify, evaluate, rank and address areas of research which are: of regional importance, of shared mutual interest, and most effectively approached by the Association rather than by individual efforts;
7. To facilitate the dissemination of growth and yield data through the development of appropriate procedures, standards and databases for members' use.

5-Year Objectives

The following table lists objectives identified in the 2001-2005 Agreement. It also includes links to the overall goals of the Association.

5-Year Objectives	Related Goals
1. To maintain the WESBOGY long-term study designed to evaluate the effect of spruce and aspen density levels on the development of plantations from establishment to final harvest. Maintain and update the database for the WESBOGY long-term study. Complete 10-year analysis of data. Encourage new members to participate in the long-term study	Goal #1 and #5
2. To develop growth and mortality relationships for other peripheral species and incorporate these new relationships into the MGM growth simulator	Goal #1 and #2
3. To expand the scope of the MGM growth simulator as a tool for the development of managed stand yield projections for the major commercial tree species in the region	Goal #4, #5, and #6
4. To maintain a website that will identify, evaluate and disseminate information on trends in growth and yield research	Goal #3 and #7
5. To hold annual field and technical meetings for dissemination of information obtained from ongoing research projects as well as other speakers invited to address other relevant growth and yield issues	Goal #3 and #7
6. To expand the scope of WESBOGY activities by recruiting new members and seeking opportunities to augment the research component by alternative matching funding from granting agencies	Goal #1, #2, #3 and #6
7. To identify and summarize regional PSP database standards and protocols for data exchange and use with regional growth models	Goals #2, #3, #5 and 7
8. To identify and prioritize research needs and to initiate new projects as appropriate under the direction of the Steering Committee and members.	Goals #1, #2 and #6

Membership

Agency/Company	2001	2002	2003	2004
Alberta Sustainable Resource Development	X	X	X	X
Alberta-Pacific Forest Industries Inc.	X	X	X	X
British Columbia Ministry of Forests	X	X		
Canadian Forest Products Ltd.	X	X	X	X
Daishowa-Marubeni International Ltd.	X	X	X	X
Louisiana-Pacific Canada Ltd., British Columbia	X	X	X	X
Louisiana-Pacific Canada Ltd., Manitoba	X	X	X	X
Manning Diversified Forest Industries Ltd.	X	X	X	X
Northwest Territories Resources, Wildlife and Economic Development	X	X	X	X
Saskatchewan Environment and Resource Management	X	X	X	X
University of Alberta	X	X	X	X
Hinton Wood Products Ltd.	X	X	X	X
Weyerhaeuser Company, Alberta Forestlands	X	X	X	X
Weyerhaeuser Company, Saskatchewan Forestlands	X	X	X	X

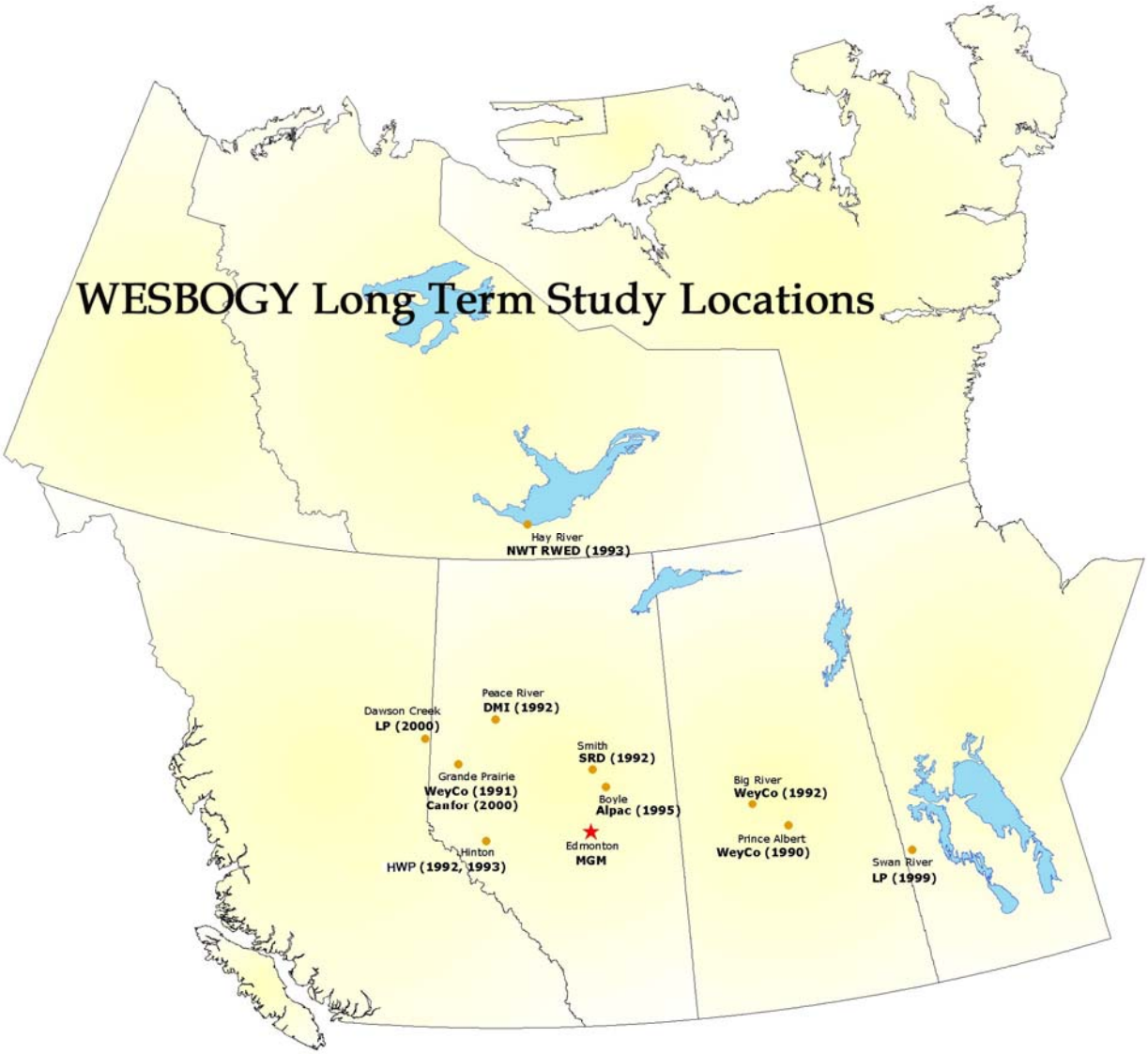
Steering Committee Members

A Steering Committee, consisting of three members elected to the Committee at the Annual Fall meeting, and the Chair and the Research Scientist sets policy, develops strategic objectives and priorities, reviews work plans, adjusts annual membership assessments in light of planned activities, and deals with other items which may arise.

2000 Titus, Wang, Behuniak, Niemi, Weeks
2001 Titus, Behuniak, Niemi, Nichol, Ewan
2002 Titus, Bokalo, Comeau, Behuniak, Niemi, Nichol, Ewan
2003 Comeau, Bokalo, Titus, Behuniak, Niemi, Nichol, Ewan/Ashley
2004 Comeau, Bokalo, Titus, Behuniak, Nichol, Ashley, Whittaker

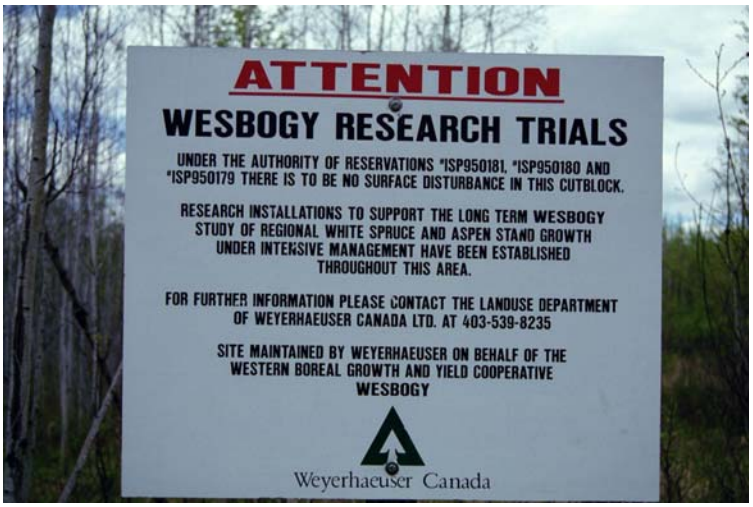
Long Term Study of Aspen/Spruce Stand Development

The design of the Long-Term Study involves planting white spruce seedlings in recently clearcut areas where aspen regeneration had already been established. Spruce seedlings were planted in both the plot and buffer areas. For the first 5 years, vegetation is controlled by clipping or using plastic mulch mats within a 40 to 50 cm radius of the spruce. After 5 years, both the spruce and aspen are thinned to desired treatment densities. The objectives of the thinning are to achieve desired densities but retain potential crop trees at relatively uniform spacing. The study uses a randomized block design with each agency setting up and maintaining one block, comprised of two installations. Each installation consists of two replications of a series of 15 plots.



Long Term Study Measurement Schedule

Company or Agency	Agency Code	Site	Year Spruce Established	Measure-ments incl. 2004	Contact Person
Alberta Sustainable Resource Development	SRD	Med	1992 2001	13 4	Dave Morgan (780) 422-5295 Daryl Gilday (780) 422-5257
Alberta-Pacific Forest Industries Inc.	ALP	High Med	1995 2001	8 8	Dave Cheyne (780) 525-8261
Canadian Forest Products Ltd.	CFR	High Med	2000 2001	4 3	Jill Ashley (780) 538-7793
Daishowa-Marubeni International Ltd.	DMI	High Med	1992 1992	13 13	Gary Whittaker (780) 624-7232
Louisiana-Pacific Canada Ltd., Manitoba	LPC	High Med	1998 1998	7 7	Paul Leblanc (204) 734-7724
Louisiana-Pacific Canada Ltd., Dawson Creek	LPD	High Med	2001 2001	4 4	Christy Nichol (250) 782-3302 ext 223
Northwest Territories Resources, Wildlife and Economic Development	NWT	High Med	1993 1993	12 12	Paul Kitchen (867) 874-2009
Hinton Wood Products Ltd.	HWP	High Med	1992 1993	13 12	Sharon Meredith (780) 865-6654
Weyerhaeuser Company, Alberta Forestlands	WGP	High Med	1991 1991	14 14	Greg Behuniak (780) 539-8207
Weyerhaeuser Company, Saskatchewan Forestlands	WPA	PAHigh PAMed BRHigh BRMed	1990 1990 1992 1992	15 15 14 13	Michael Leblanc (306) 953-5154



Data collection continues on schedule by all agencies. Along with the annual collection of tree data, the focus in 2004 was the continued cleaning of all data collected through 2003. The data to 2003 will be ready for distribution in mid to late 2005. The adoption of the Alberta Sustainable Resource development condition codes for 2004 requires that the condition codes used to 2003 need to be transformed into the new format. This is an additional task that will be the focus in 2005. Once cleaning and archiving of the data to 2003 is completed, the 2004 data will be next on the agenda. Following this data cleaning, input should occur annually following the protocol presented in the flow diagram shown on the following page.

In 2004 all agencies with installations were asked to fill out a data collection history table that documented the actual harvesting, planting and measurement schedule followed over the life of their installation. Additional information requested included the stock type planted and the year the ecological, spatial, soils and site data was collected. These data are necessary for maintaining a historic record of activities.

Plans for 2005 are directed at the acquisition and inputting of the spatial, ecological, site and soils data. This data will be input into new Access 2000 tables and reside along with annual re-measured data. The process will involve the creation of new database structures as well as data forms for data input. For those agencies who have completed the spatial, ecological, site and soils data collection this is the opportunity to transfer it into digital form and standardize it as has been done with the plot measurement data. For those agencies who have not collected these data, the procedures for the collection and input will revisited.

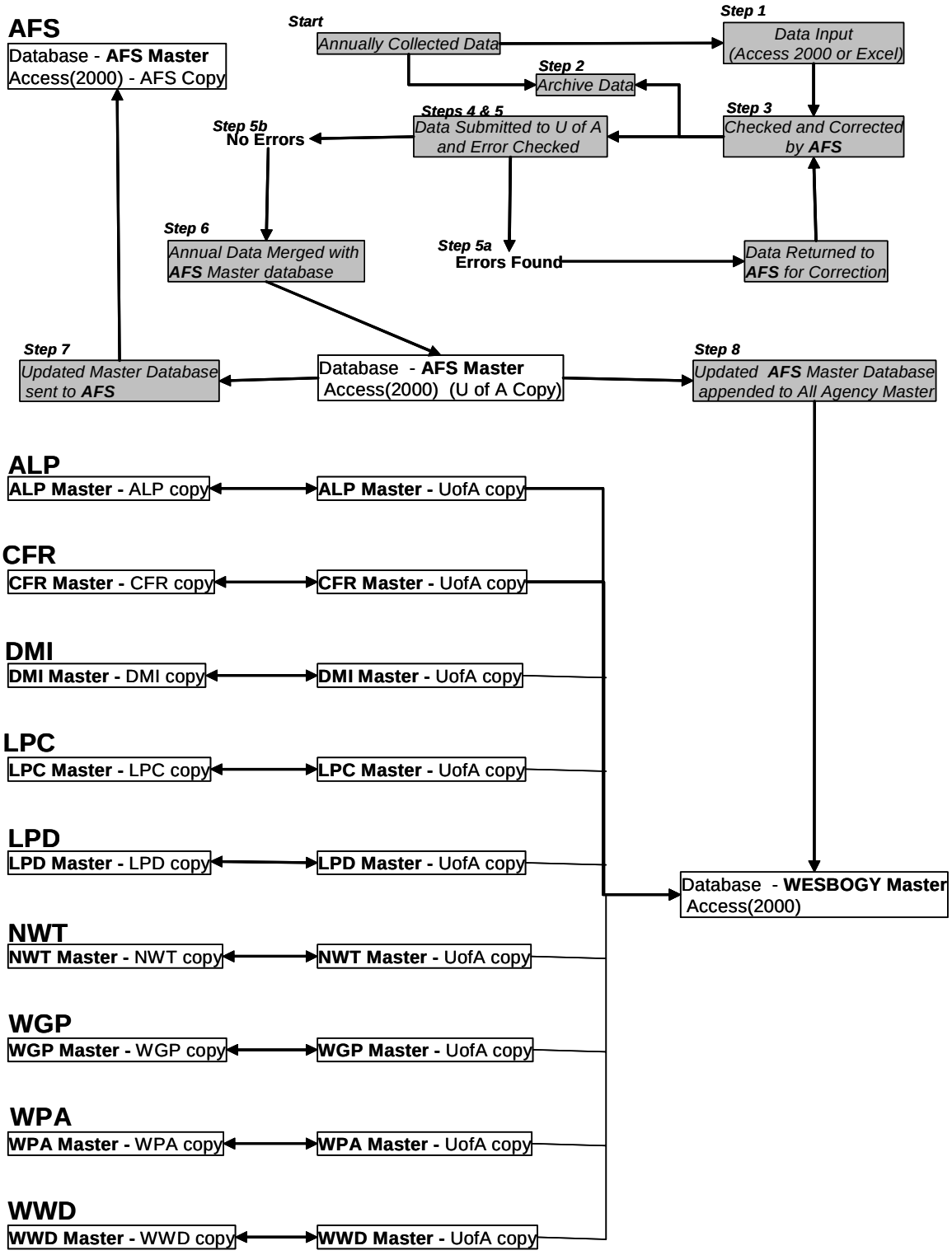
2004 Data Collection and Procedures Manual

The Data Collection Manual for the long term study underwent major revisions in 2003 and early 2004 and was released in April 2004.

As the Long-Term Study matures, protocols must evolve to deal with unforeseen changes. Several measurement protocols have changed. Two notable changes are the adoption of the Alberta Sustainable Resource Development (SRD) condition codes for the 2004 measurement year. The SRD condition codes are more detailed and are supported by a complete illustrated manual that is available to all members. The second notable change is the adoption of an alternating year measurement schedule for installations after year 10. Measurement are now required in years 12, 14 and 16.

The manual is available for downloading in PDF form from the WESBOGY website http://www.wesbogy.rr.ualberta.ca/data_manual.asp

Data Handling Procedures Flow Diagram

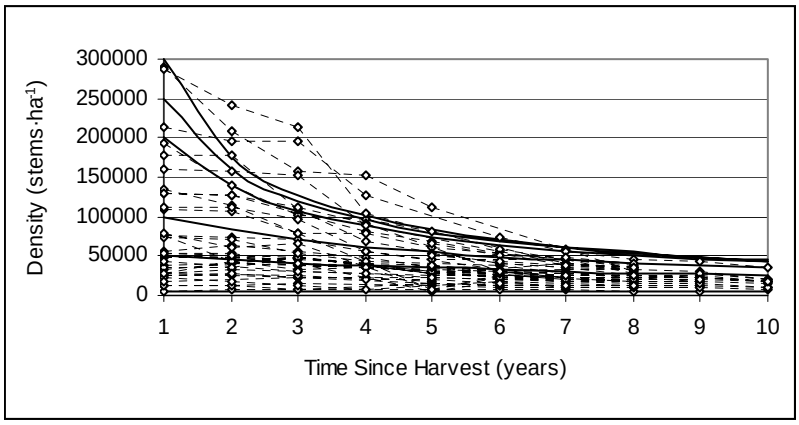


Data Analyses—Aspen Mortality

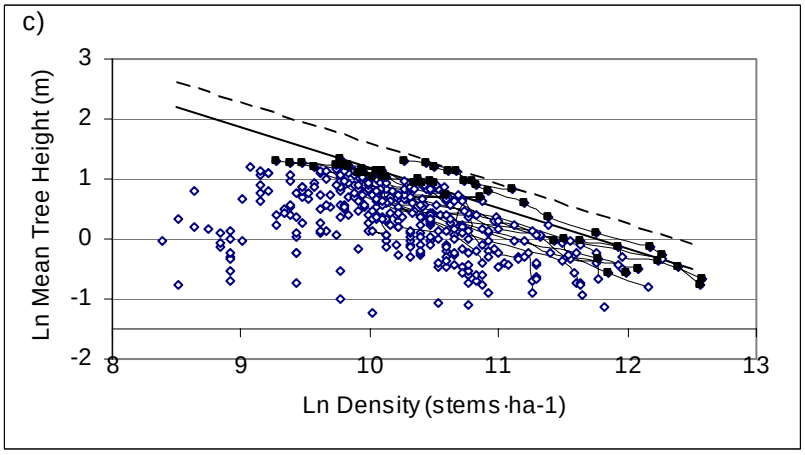
Mike Bokalo, Phil Comeau and Ken Stadt

In 2004 one focus of the LTS database was the development of a juvenile aspen mortality function for inclusion into MGM. The LTS data is the first aspen data set that has annual re-measurements beginning immediately after harvest which has allowed for us to successfully model aspen mortality. The three models used to predict Aspen Mortality in MGM:

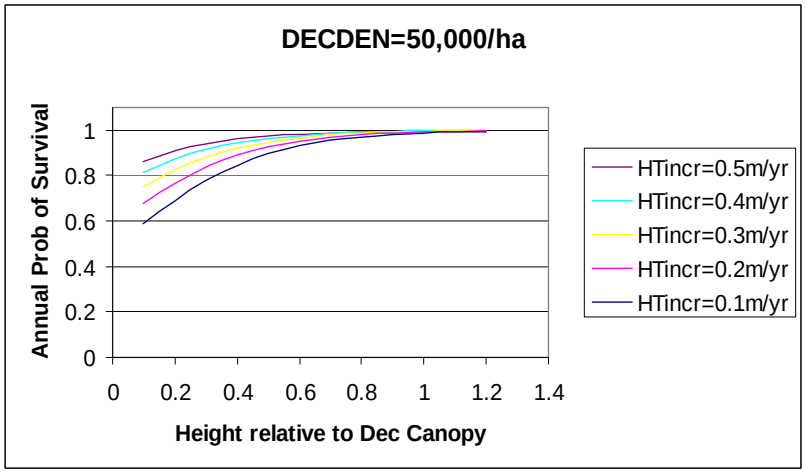
a) Exponential decay function to predict future juvenile aspen density based on current density. (Mike Bokalo, 2004)



b) -3/2 power function for juvenile aspen fit on the upper 10th percentile of mean tree volume by density to act a maximum-size density function. (Mike Bokalo, 2004)



c) Logistic function to distribute aspen mortality within the tree list based on height increment, aspen density and a tree relative position in the canopy. (Ken Stadt, 2004)



Data Analysis—Effects of Aspen density on spruce performance—Hinton Wood Products Installations

Phil Comeau and Mike Bokalo

Results from analysis of data from the Hinton Wood Products Medium Site LTS installation indicate that treatments have not significantly affected spruce height or root collar diameter in 2002, but have had a significant effect on height:diameter ratio (HDR) (Table 1). Trends in height, rcd and hdr are illustrated in Figure 1 for selected plots.

Analysis of data from the Medium 1 installation indicate significant ($P<0.01$) relationships between aspen basal area and spruce height, rcd, and HDR (Figure 2). Height and RCD decrease as aspen basal area increases and HDR increases as aspen basal area increases.

Table 1. Treatment means (letters indicate where means differ significantly using Tukeys test $\alpha=0.10$) (Hinton Wood Products medium site data, 2 installations, n=2 reps/installation; randomized block design).

Aspen Density	0	200	500	1500	4000	unspaced	p
Sw Height 2002 (m)	1.530	1.610	1.472	1.689	1.569	1.436	0.966
Sw RCD 2002 (cm)	3.438	3.644	3.119	3.405	2.867	2.178	0.388
Sw HDR 2002	0.449c	0.442c	0.478bc	0.502bc	0.554b	0.668a	0.001

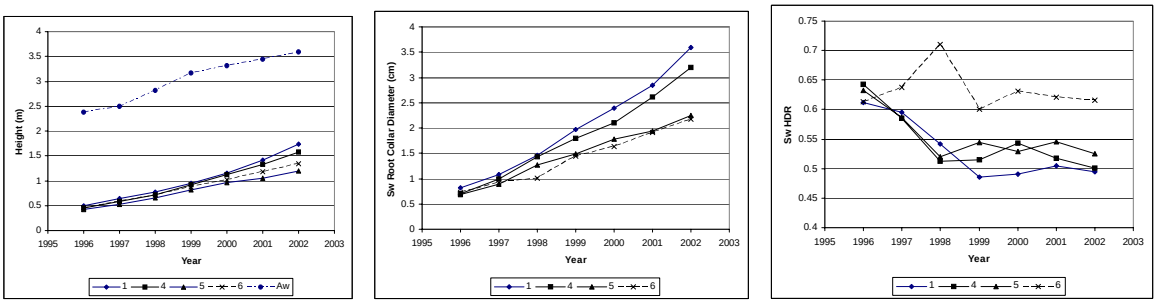


Figure 1. Trends in height, diameter and HDR over tim for spruce growing at 3 aspen densities (Plot 1= 0 aspen/ha; Plot 4=1500 aspen/ha; Plot 5=4000 aspen/ha; Plot 6=unspaced (natural)). Data shown are for planted white spruce, except for the inclusion of aspen in the graph for height.

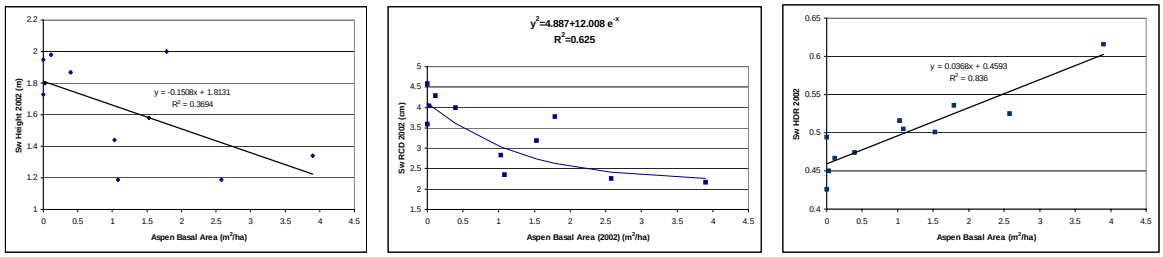


Figure 2. Relationships between aspen basal area and spruce height, rcd and hdr for 12 plots from Medium Site, Installation 1 only.

Data Analysis—Effects of Aspen density on spruce performance—DMI Installations

Phil Comeau and Mike Bokalo

Analysis of data from the DMI Medium and Superior installations illustrates effects of aspen basal area on spruce size 6 years after thinning of the aspen. Points shown on these graphs represent average values within each plot. The relationship between spruce height and aspen basal area is weak (R^2=0.0545) due to substantial variation in spruce height within different levels of aspen basal area (Figure 1). The upper boundary line indicates the relationship between maximum spruce height and aspen basal area and suggests some decline in spruce height after aspen basal area exceeds 6 m^2/ha. Spruce RCD decreases as aspen basal area increases (Figure 2) and spruce HDR increases as aspen basal area increases (Figure 3).

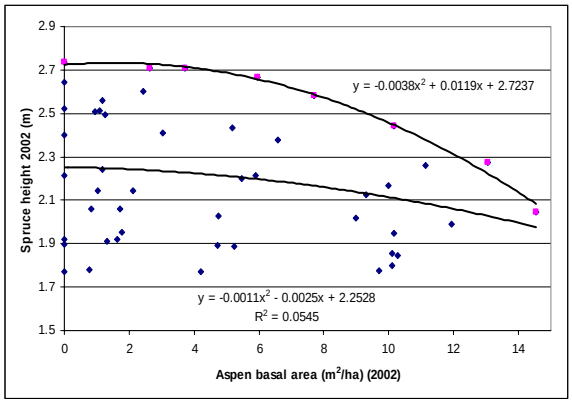


Figure 1. Relationships between aspen basal area and spruce height. The upper line represents a boundary line describing the upper limit of spruce height observed at any value of aspen basal area.

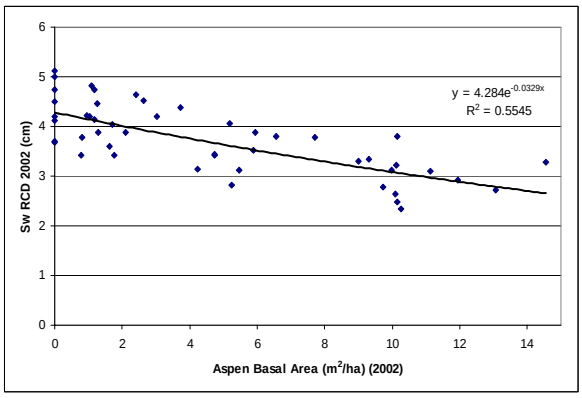


Figure 2. Root collar diameter (RCD) of white spruce in 2002 declines as aspen basal area increases. The line is described by the equation shown on the graph.

A detailed analysis of effects of competition on growth of selected individual spruce is underway. This analysis is evaluating a number of different competition indexes as well as the optimum radius of plots used for competition assessment.

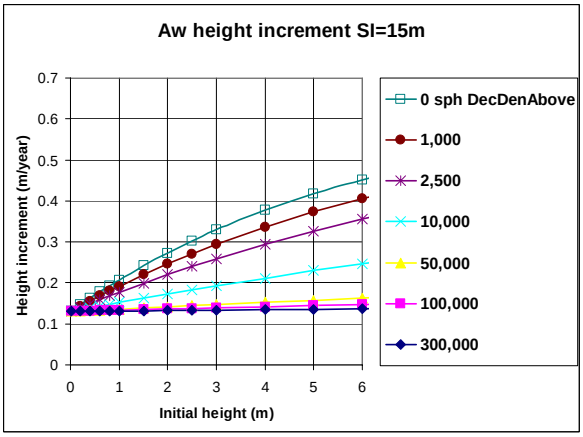
In 2004 a study was initiated to examine the influence of aspen density and understory vegetation on soil moisture and temperature. In eight selected plots, soil moisture and soil temperature is being monitored at the center of two 2 m x 2 m subplots. Glyphosate herbicide was applied to one of the subplots in each plot in June 2004 to control understory vegetation. Relationships between soil moisture and overstory and understory LAI are being examined.

Mixedwood Growth Model (MGM) Development

The development of MGM in 2004 was driven by the success in obtaining 3 years of funding from the Forest Resource Improvement Association of Alberta - Open Funds Initiative to further develop MGM's capabilities. This collaborative project involving the University of Alberta Department of Renewable Resources, the Government of Alberta, the Western Boreal Growth and Yield Association and the Alberta Mixedwood Management Association (MWMA) is lead by Phil Comeau (Principle Investigator) and Mike Bokalo (Project Leader). The project is designed to incorporate into MGM the flexibility and functions that are needed to model and assess growth and yield implications of current and future forest management strategies and silvicultural prescriptions in Alberta's boreal mixedwood forests. Project funding has allowed us to hire Dr. Ken Stadt as a Research Assistant Professor to handle many details of this project. The project is being directed by a Strategic Development Team whose members are: Phil Comeau, Steve Titus, Mike Bokalo, Ken Stadt, Greg Behuniak, Gitte Grover, Ken Greenway, and Willi Fast.

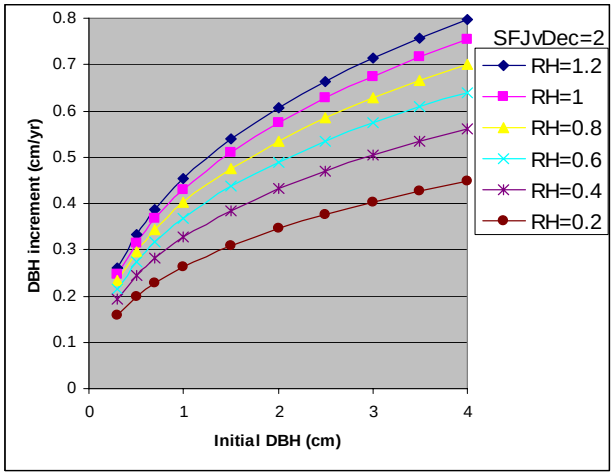
MGM development during 2004 involved on three major components. First, MGMs conversion to operate entirely within the framework of a Microsoft Excel workbook and Visual Basic for Applications (VBA) was completed and tested by Steve Titus. The second focused on shifting the MGM data analysis and programming responsibilities to Mike Bokalo. The third was to improve the representation of early tree and stand growth using newly available juvenile stand data (WESBOGY LTS, SRD SDS, Monitor Plot, and other data). This third component focuses on improving existing growth and mortality functions for trees in natural stands and adding the capacity to model post-harvest and treated natural stands. In 2004 six new height increment, dbh increment and mortality functions were re-fit for juvenile aspen and spruce and incorporated into MGM. The following figures are some examples of the new functions developed using WESBOGY LTS, SRD SDS and Industrial PSP data.

Aspen Height Increment



Juvenile aspen height increment as a function of site index, deciduous density above and initial height (Ken Stadt, 2004)

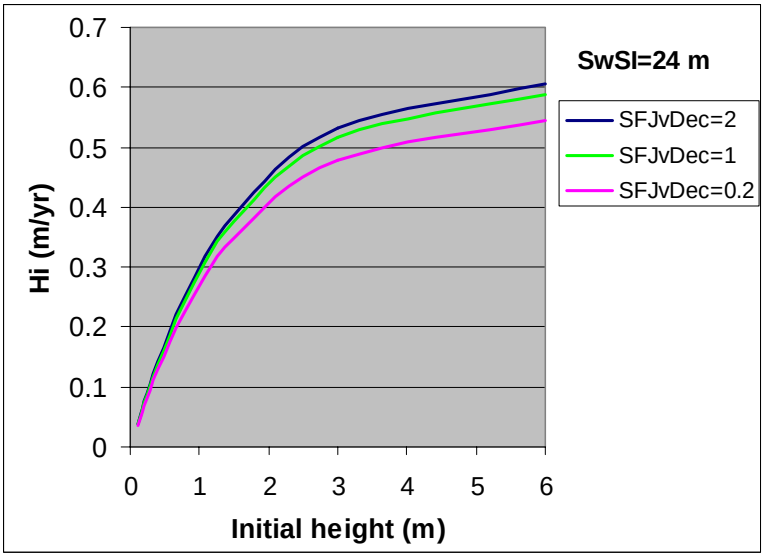
Aspen Diameter Increment



Juvenile aspen diameter increment as a function of basal area, relative height and spacing factor of the juvenile decidous (Ken Stadt, 2004)

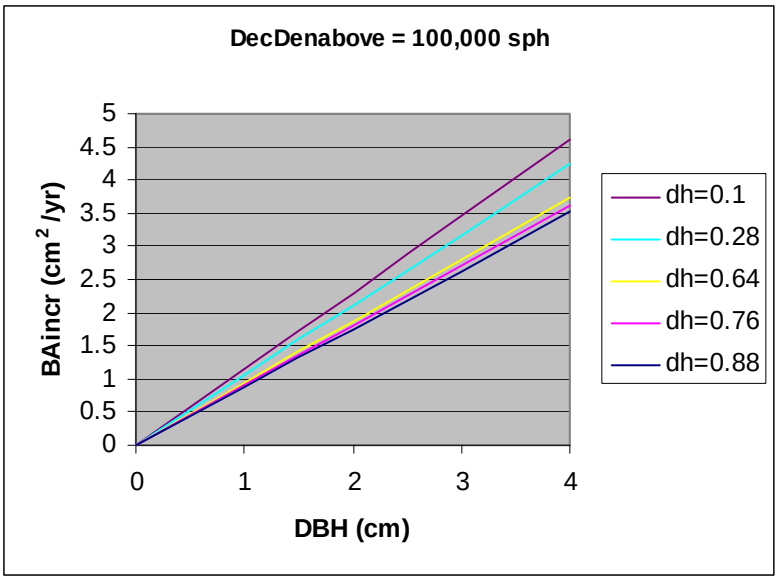
Spruce Height Increment

White spruce juvenile height increment as a function of juvenile aspen spacing factor , initial height of the spruce and site index. (Ken Stadt, 2004)



Spruce Diameter Increment

White spruce juvenile basal area increment as a function of viewfactor, deciduous height and deciduous density above. (Ken Stadt, 2004)



MGM Project plans for 2005

In 2005 and 2006 the project will continue to add new functionality and capabilities to MGM through:

1) Developing and enhancing the capability of MGM for predicting the response of mixedwood stands to silvicultural practices (such as: under-planting, understory scarification and seeding, juvenile spacing, harvesting with understory protection, partial cutting, herbicide treatment, and brushing) using a combination of empirical and process-oriented modeling approaches.
2) Developing volume loss factors (VLF) to adjust model predictions to fall more in line with actual mean volumes.

Evaluating the predictive performance of several growth models calibrated for Saskatchewan

Mike Bokalo, Cosmin Tansanu and Phil Comeau

A two year project funded by the Saskatchewan Forest Centre, Forest Development Fund, Saskatchewan Environment - Forest Service, Weyerhaeuser Prince Albert, the University of Alberta and WESBOGY was initiated in 2004 to compare and evaluate the predictive performance of the following models:

–Saskatchewan Provincial Empirical Yield Curves, Golder and Associates Ltd, 2001.
–Dendron and Flewelling Growth models; Preliminary natural stand growth and yield estimation for Saskatchewan, 1995.
–Mixedwood Growth Model (MGM). S.J.Titus, University of Alberta

The general approach of the project is to use permanent sample plot (PSP) data to initialize each model and allow the models to project growth into the future following the re-measurement schedule of each PSP. Then to compare the actual known growth of the permanent sample plots to the predicted model growth over time. The selected PSPs will come from 3 pure strata (spruce, pine and aspen) and 2 mixed strata (conifer leading mixedwood and deciduous leading mixedwood). The projections will involve both short and long term projections and model performance will be assessed based on predicted versus actual volume(m3/ha), basal area(m2/ha), quadratic mean diameter (cm), height (m) and density (sph). Camparison methods include a paired t-test approach (predicted versus actual), using a general + or - 10% criteria of the actual and graphically.

Graduate Students and their thesis project titles

Cosmin Filipescu (Ph.D.) - Effects of competition, site, and age on white spruce growth.

Dan MacIsaac (Ph.D) – Stand dynamics in young aspen-spruce mixedwoods.

Mihai Voicu (M.Sc. defended October 2004) - Spatial influences of young aspen in adjacent openings.

Cosmin Man (M.Sc.) - Competitive effects of aspen and understory vegetation.

Francesco Cortini (M.Sc.) – Effects of red alder and paper birch competition on growth of young conifers.

Cosmin Tansanu (M.Sc.) – The influence of aspen and hazelnut competition for light on the growth of the white spruce in young mixedwoods.

Evaluation of small radial treatments for controlling aspen competition with white spruce

Phil Comeau (U of A), Milo Mihajlovich (Incremental Forest Technologies) and Susan Hill (U of A)

In 2000 we initiated a study to evaluate the effectiveness of spot control of aspen around white spruce seedlings in comparison to broadcast treatment using basal bark application of triclopyr ester (Release) and brushsaw treatments. The study site was a four-year-old white spruce plantation with approximately 9000 young aspen per hectare located northeast of Slave Lake, Alberta in the Central Mixedwood natural subregion on a mesic-medium low-bush cranberry ecosite. The study was funded by NSERC, Dow Agrosciences, Weyerhaeuser, Hinton Wood Products, and in-kind support was provided by Alberta Plywood.

The following 7 treatments were applied: 1) Untreated (U); 2) Complete removal – triclopyr ester (TA); 3) Complete removal manual (BA); 4)1 m radius treatment with triclopyr applied to all aspen around 300 spruce/ha (T1) ; 5) 2 m radius treatment with triclopyr applied to all aspen around 300 spruce/ha (T2) ; 6) 1 m radius motor-manual applied to all aspen around 300 spruce/ha (B1); 7) 2 m radius motor-manual applied to all aspen around 300 spruce/ha (B2)

Each treatment was randomly assigned to four plots. Treatment plots were 50 m x 50 m. Triclopyr ester (Release) herbicide mixed with isoparaffinic mineral oil at 20% concentration (v/v) was applied as a basal treatment in October 2000. Motor manual treatments were completed in mid-June, 2001 using brushsaws. Major results are illustrated in the figures below.

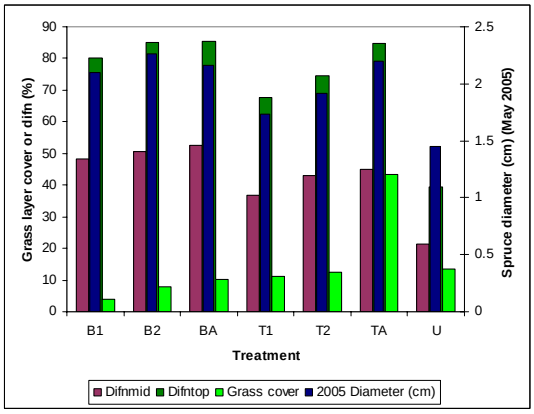


Figure 1. Treatment effects on spruce diameter, difn (light) and grass layer cover. Root collar diameter and stem volume index in 2005, were significantly higher in the three motor-manual brushing treatments (B1, B2, and BA) and in the complete triclopyr (TA) treatment than in the untreated with the radial (1 m and 2 m) triclopyr treatments showing intermediate results that did not differ significantly from either the motor-manual, TA or untreated. The broadcast triclopyr treatment (TA) resulted in a substantial and significant increase in grass (predominantly *Calamagrostis canadensis*) cover compared to the other treatments.

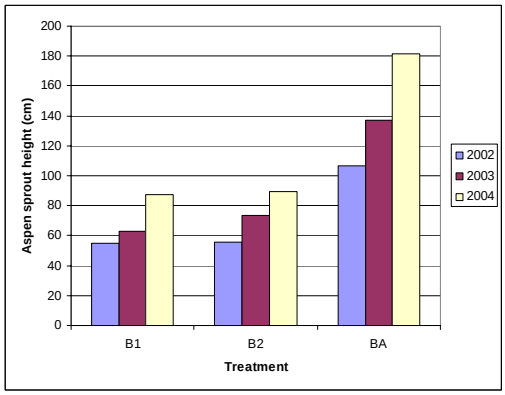


Figure 2. Brushing a 1 or 2 m radius significantly reduced the height of regrowing aspen over that observed in the completely brushed plots (Figure 1). In 2004, aspen in the 1 and 2 m radius treatments were on average less than half the height of aspen in the completely brushed treatment. Faster regrowth of the aspen in the BA treatment will likely result in reductions in light reaching spruce in this treatment during the next few years as regrowing aspen overtop the spruce and close

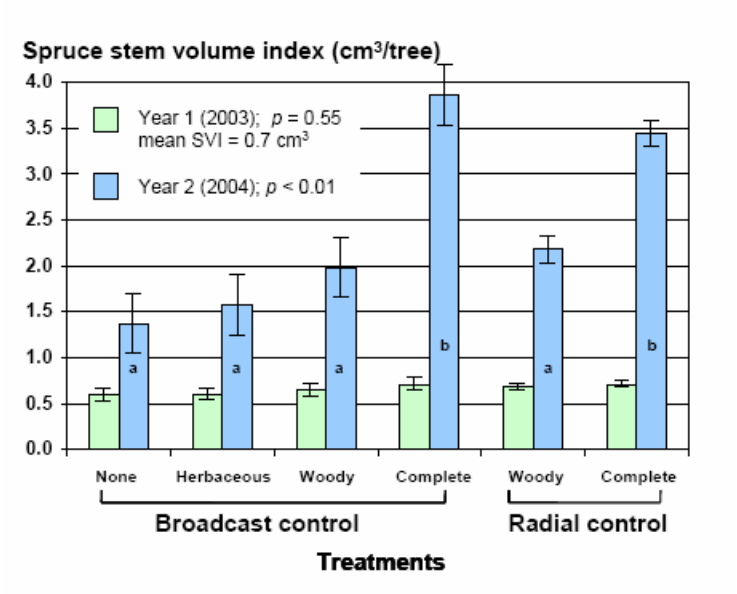
Effects of herbaceous vegetation control and aspen stem density on boreal mixedwood stand development

Doug Pitt (Canadian Forest Service), Phil Comeau,(U of A), Milo Mihajlovich (Incremental Forest Technologies), and Dan MacIsaac (Canadian Forest Service).

In 2002, a study was initiated to examine the role of vegetation management in establishing mixtures of white spruce and trembling aspen following clear felling. We are examining the effects of establishing and tending a component of white spruce (e.g., 400 stems/ha), while aspen are grown in the intervening areas between the spruce. One initial objective of the study is to explore the effect of early competition control around the planted spruce. Two research sites, situated near Whitecourt Alberta and Timmins Ontario, employ a response-surface design that combines the effects of early, radial (2 m radius) vegetation control (0, 2, and 4 years duration) with thinning of aspen to different densities at age 5 (400, 800, 1200, 2000 and natural (i.e., unthinned)). Five additional reference treatments were applied: a) untended mixedwood plantation; b) mixedwood plantation with control of grass and herbaceous vegetation only; c) pure spruce plantation with control of all competition; d) pure spruce plantation with control of woody competition only, and e) pure aspen. Growth responses of the aspen and spruce are being compared among treatments and treatment impacts on selected environmental factors (e.g., air temperature, soil temperature, soil moisture, light, and soil N availability) are being measured.

Following two growing seasons at the Alberta site, planted white spruce receiving both woody and herbaceous competition (complete) control, either as a broadcast or radial treatment, exhibited 50 to 60% gains in stem diameter over untended trees, resulting in 2.5- to 2.8-fold gains in stem volume index . Spruce receiving control of only woody or herbaceous competition exhibited 15 to 58% gains in stem volume index over untreated trees. Aspen crop trees in plots receiving either broadcast or radial herbaceous vegetation control exhibited 37 to 43% gains in stem volume index over aspen in untreated or radial woody control plots.

Funding for the Alberta component of this study is being provided by: NSERC; Alberta Herbicide Task Force; AFPA; Blue Ridge Lumber Ltd.; Canadian Ecology Centre - Forestry Research Partnership; Canadian Forest Products Ltd.; Dow AgroSciences Canada Inc.; Louisiana-Pacific Corp.; Millar Western Forest Products Ltd.; and, Monsanto Canada Inc.



Planted spruce responses at the AB site. Treatments are grouped as *reference* [broadcast control = none (*n*=6); herbaceous-only (*n*=3); woody-only (*n*=3); and complete (*n*=3)] and *response-surface* [radial = woody-only (*n*=9) and complete (*n*=16). Means with the same letter do not differ in year 2 (a=0.05, Tukey's HSD).

April 28, 2004 Spring Meeting Agenda (Meeting held at the University of Alberta)

Long-Term Study Progress
- Database management
- Results from Self-thinning study

MGM Progress
Mixedwood Competition Dynamics Studies
Stand Reconstruction Project
Priorities for 2004/2005 and beyond
Financial Statement for 2003/2004
Budget for 2004/2005
Annual Report for 2003/2004
Website
Fall Meeting—Prince Albert Saskatchewan

August 31, 2004 Annual Meeting Program Meeting hosted by Saskatchewan Environment– Forest Service, Prince Albert Saskatchewan

Start	End	Speaker	Title
08:00	08:15	Phil Comeau	Opening Remarks
08:15	09:00	Phil Loseth/Doug Campbell *Forest Service, Saskatchewan Environment*	Saskatchewan - Data Sharing Issues
09:00	09:45	John Parton *Ontario Provincial Growth and Yield Coordinator*	Ontario - Data Sharing
09:45	10:00		***COFFEE***
10:00	10:45	Sharon Meredith *Forest Management Coordinator*	Weldwood – Data Sharing
10:45	11:30	Mark Gillis *Manager, National Forest Inventory*	Canada's National Forest Inventory
11:30	12:00	Fern Gruszka (moderator) *Information Management Branch, Saskatchewan Environment*	Panel Discussion and Question Period
12:00	13:00		***LUNCH***
13:00	13:30	Phil Comeau	Research Update
13:30	14:30		Student Research Presentations
14:30	14:45		***COFFEE***
14:45	15:30	Mike Bokalo/Ken Stadt	MGM Development
15:30	16:15	Mike Bokalo	Research Update
16:15	16:30		***BREAK***
16:30	17:30		Business Meeting *(members only)*
18:30			***Hosted DINNER***

September 1, 2004 – Field Tour Agenda

8:00 a.m.	Load vans @ Marlboro Inn	
8:30 a.m.	Weyerhaeuser tree improvement	Visit to Weyerhaeuser's seed orchard near Henribourg, about 15 minutes north of P.A., presentation by tree improvement specialist.
	Weyerhaeuser's installation of WES-BOGY long-term mixedwood study plots	Located within the Clarine Lake Demonstration Forest, near Emma Lake, this was one of the earliest WESBOGY installations.
	Weyerhaeuser's Growth Assessment Plots	Paired plots in mixedwood stand – planted vs. natural regeneration.
		(if time permits, visit paired plots in a Siberian Larch plantation – thinned vs. unthinned)
12:00 noon	Lunch at Waskesiu townsite, Prince Albert National Park	Short presentation by Jeff Weir, Vegetation Specialist, Prince Albert National Park
	Natural Stand Permanent Sample Plot	Visit a mixedwood PSP established by Saskatchewan government circa 1950, with re-measurements by Saskatchewan government and by Weyerhaeuser.
approx 3:00 p.m.	*Intersection of Highway #2 with #3/ #55 at north end of Prince Albert*	*NOTE: The above stops are north of Prince Albert, within the Weyerhaeuser FMA area. The following stops are located west of Prince Albert, in the Nisbet Provincial Forest. Participants needing to depart early may find this a convenient time to part ways.*
	Thinning Jack Pine – CFS research trial MS-19	One of the oldest Jack pine thinning trials in Canada, established in 1927. The data has been used in CFS reports by Bella, Cayford, and others.
	Permanent Ecological Sample Plot	Discussion of monitoring program.
5:00 p.m.	Return to Marlboro Inn	

WESBOGY Website

With the assistance of Judy Jacobs (U of A, Department of Renewable Resources Web Designer) our website is up and running. Changes include: having our own web address, a secure members area, and inclusion of both historical and current documents in readily accessible formats.

Check out our website at: http://www.wesbogy.rr.ualberta.ca/

Planned WESBOGY Meetings in 2005

The 2005 Annual Spring Meeting is planned for April 26, 2005
The 2004 Annual Fall Conference, hosted by Northwest Territories Resources, Wildlife and Economic Development is planned for August 29 to Sept 1st in Hay River, NWT

History of WESBOGY Meetings

Date	Sponsor	Location
2004 Aug 30 - Sept 1	Saskatchewan Environment – Forest Service	Prince Albert, SK
2003 Sept 9-11	Canadian Forest Products Ltd.	Grande Prairie, AB
2002 Sept 9-11	Louisiana-Pacific Canada Ltd.	Riding Mountain, MB
2001 Sept 9-11	Daishowa-Marubeni International Ltd.	Peace River, AB
2000 Sept 6-8	Weyerhaeuser Company, Drayton Valley	Edson, AB
1999 Sept 23-25	Weyerhaeuser Company, Prince Albert	Anglin Lake, SK
1998 Oct 7-9	Alberta-Pacific Forest Industries Ltd.	Athabasca, AB
1997 Oct 7-9	British Columbia Ministry of Forests	Dawson Creek, BC
1996 Nov 6-8	Daishowa-Marubeni International Ltd.	Peace River, AB
1995 Oct 11-13	Weldwood of Canada Ltd.	Hinton, AB
1994 Oct 12-14	Weyerhaeuser Company, Alberta Forestlands	Big River, SK
1993 Nov 4	University of Alberta	Edmonton, AB
1992 Oct 6-7	Weyerhaeuser Company, Grande Prairie	Grande Prairie, AB
1991 Oct 24-25	Weyerhaeuser Company, Prince Albert	Prince Albert, SK
1990 Nov 22	University of Alberta	Edmonton, AB
1989 Mar 15	Canadian Forest Service	Saskatoon, SK
1988 Nov 4	Canadian Forest Service	Whitecourt, AB
1998 Feb 4-5	Canadian Forest Service	Hinton, AB
1987 Mar 27	Canadian Forest Service	Edmonton, AB
1986 Feb	Canadian Forest Service	Edmonton, AB
1985 Nov 15	Canadian Forest Service	Edmonton, AB
1985 Oct 24	Canadian Forest Service	Banff, AB
1985 Mar 23	Canadian Forest Service	Edmonton, AB

Financial Report for 2004/2005

Expenditures

	Budget April 1 2004 - March 31 2005	Actual Expenditures	Difference
Salary and Benefits - Bokalo	$60,000	$70,456	-$10,456
Salary and Benefits - Man	$10,000	$5,333	$4,667
Graduate Student Support	$15,500		$15,500
Supplies	$2,000	$4,155	-$2,155
Postage/Telephone	$2,000	$1,185	$815
Travel & meeting	$17,000	$5,533	$11,467
Equipment (Computer)	$0	$3,039	-$3,039
			$0
University Overhead (15%)	$15,000	$13,040	$1,960
Total	$121,500	$102,740	$18,760

Revenues

Member Dues	$100,000

Account Balance

Opening Balance April 1, 2004	$243,871
Net Revenues - Expenditures (April 1 2004 - March 31 2005)	-$2,740
Account Balance April 1 2005	$241,131

Budget for 2005/2006

	Budget April 1 2005 - March 31 2006
Salary and Benefits - Bokalo	$73,000
Salary and Benefits - Data Management Support	$10,000
Salary and Benefits - Annual Report and Web Site	$2,000
Graduate Student Support and Field Travel	$15,500
Supplies	$3,000
Postage/Telephone	$2,000
Travel & Meetings	$10,000
Equipment (Computer)	$0
University Overhead (15%)	$15,000
Total	$130,500

Projected Revenues 2005-2006

Member Dues	$100,000

Account Balance

Opening Balance April 1, 2005	$241,131
Net Revenues - Expenditures (April 1 2004 - March 31 2005)	-$30,500
Account Balance April 1 2005	$210,631

Western Boreal Growth and Yield Cooperative (WESBOGY)

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