

## *FII Forest Research Program 2003/04 Annual Progress Report*

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The purpose of this Annual Progress Report is to communicate progress and achievements of your research project over the funding period and identify impacts or outcomes of the project. Information from this progress report is required to assess the final progress of the project in relation to the Recipient Agreement and to provide information required for FII Ltd. to report on annual achievements and funding investments for the Forest Research Program. Complete the required information in the unshaded text boxes for **Parts A to C**, (text boxes will expand).

### **Part A: General Project Information**

**The information provided under Part A will be available for immediate posting on the Internet in a project repository on the Natural Resources Information Network (NRIN) website.**

<b>Project No:</b>	R04-035
<b>Organisation:</b>	Ministry of Forests
<b>Project Contact:</b>	Teresa Newsome
<b>Address:</b>	#200-640 Borland Street, Williams Lake BC V2G 4T1
<b>Phone No.</b>	250-398-4408
<b>Email:</b>	<a href="mailto:Teresa.Newsome@gems8.gov.bc.ca">Teresa.Newsome@gems8.gov.bc.ca</a>
<b>Project Title:</b>	"Competitive effects of broadleaf trees on lodgepole pine and a comparison of broadleaf and conifer performance on a range of ecosystems"
<b>Final Project Abstract:</b>	Scientific data about the competitive effects of broadleaves on pine in young stands is required to assist policy and resource practitioners with relevant management decisions. Retrospective trials have provided data that was used to update the free growing guidelines for some of the IDF, SBPS and SBS subzones, but more information is needed to further refine existing guidelines and modify them for other biogeoclimatic subzones. Relationships between pine and aspen in the IDFx <sub>m</sub> and SBSd <sub>w2</sub> are described in two new publications. Light assessments within the aspen canopies provided data on relationships between two zones in the Cariboo and aspen stands in the boreal forests. Data collection has continued in the SBSd <sub>w1</sub> and SBPS <sub>xc</sub> trials where a variety of aspen densities in pine plantations are being studied. Additionally growth and yield plots for calibration of Prognosis <sup>BC</sup> were established in the SBSd <sub>w1</sub> trial. Combined study results from these different biogeoclimatic zones will show the differences in growth and development of mixed pine aspen stands across different ecological environments.

**Keywords:**

mixed species management, lodgepole pine, trembling aspen, competitive effects, competition indices, broadleaf performance, tree growth models, Prognosis<sup>BC</sup>

**Part B: Project Impacts, Outcomes, Progress, and Extension**

Information provided in Part B is used to evaluate and assess the completion of the project in relation to the terms and workplan outlined in the Recipient Agreement and assess the impacts and outcomes of the project.

**B1: Workplan and Annual Progress Summary:**

Using the table below, describe the extent to which the activities and objectives identified in the workplan (Schedule A Recipient Agreement) were achieved. Indicate any changes from the original plan in bold, and indicate date of approval and brief rationale for the change. Please list extension activities and deliverables in table B5 below (“**Outputs, Deliverables, and Extension**”)

<b>Project Component or Objective</b>	<b>Activities (Tasks)</b>	<b>Extent to Which Activities have been Completed and Objective has been Achieved</b>
Retrospective trial	Production of an extension note summarizing the seventh year report.	Not completed. The extension note series is currently undergoing changes due to the amalgamation of the Forest regions with the Ministry of Forests. It will be produced when the new extension note series is finalized. It was not written this year but is attached for your reference.  <i>The draft note entitled “Competitive effects of trembling aspen on lodgepole pine performance in the SBSdw and IDFdK subzones of the Cariboo Forest Region –1992-1999 retrospective study results” is attached.</i>
The SBSdw2 trial (Tyee Lk) developed to study the spatial relationship between pine and aspen	A publication of the 9 <sup>th</sup> year results (stand age is 9 years).	Completed - see section B2 for the web site link.  <i>Final publication, MOF Technical Report #14, is attached.</i>
The IDFxM variable density trial	A publication of the 4 <sup>th</sup> year results (stand age is 10 years).	Completed - see section B2 for the web site link  <i>Final publication, MOF Technical Report #15, is attached.</i>
Broadleaf publication	A draft report for publication of the 10 years results.	Not completed. Due to the short funding period this project could not be completed. The project was started and will continue into 2004/05.

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Installation signs	Signs on all installations outlining trial objectives and design.	Completed - Four signs were made, one for each of the plots groups on the Clusko Trial site.  <i>Signs can be viewed in our Ministry warehouse.</i>
Field tours	Extension of trial results in the field	Completed - A field tour was held for local practitioners on September 24 <sup>th</sup> . Both the IDFxm and the SBPSxc were visited.  <b><i>A Field tour handout entitled “Assessing Aspen Competition in the Dry subzones of the Central Cariboo Field Tour Sept 24<sup>th</sup> 2003” is attached.</i></b>
SBSdw1 (Horsefly) variable density trial	Second data collection, 4 years after treatment on a 15 year old stand	Completed the free growing and sucker assessments. In addition growth and yield plots were established.  <i>Data set is available to review – not attached as the summary is given in the analysis below..</i>
SBSdw1 (Horsefly) variable density trial	Data entry and analysis, and a summary report	Completed – both data entry and analysis. However, the data analysis was not completed in time for a report to be written. This will be done in 2004/05.  <i>Data analysis report entitled “EP1152: McKinley Lake Site (SBSdwd) - Year 4 (2003)” is attached.</i>
SBPSxc trial (Clusko) concerned with variable densities and spatial arrangements	Second data collection, 3 years after treatment on a 14 year old stand	Completed - the second data collection three years after treatment was completed  <i>Data set is available to review – not attached as the summary is given in the analysis below.</i>
SBPSxc trial (Clusko) concerned with variable densities and spatial arrangements	Data entry and analysis	Completed - all data was entered electronically and analyzed.  <i>Data analysis report entitled “EP1152.03: Clusko River 2003” is attached.</i>
Assessment of light regimes in young IDFdk and SBSdw stands in the Cariboo	Select four sites, Conduct stand and light measurements.	Completed – six sites were selected – 3 in the IDF and 3 in the SBS. Light assessments were completed in each stand.  <i>Data set is available to review – not attached as trial information is given in the draft report below.</i>

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<p>Assessment of light regimes in young IDFdK and SBSdW stands in the Cariboo</p>	<p>Summarize data, test existing models and determine whether models developed for boreal and sub-boreal stands are suitable for use in Cariboo-Chilcotin ecosystems</p>	<p>Completed - data analysis is complete and a draft report has been produced.  <i>Draft report tentitled “<b>Evaluation of relationships between understory light and aspen basal area in the B.C. central interior</b>” is attached.</i></p>
<p>Assessment of light regimes in young IDFdK and SBSdW stands in the Cariboo</p>	<p>Summarize information for the SBS and IDF and make recommendations for further work</p>	<p>Completed - Recommendations are given in the draft report.  <i>In draft report se above.</i></p>

**B2: Research Question:**

Restate the research question as per your original proposal and comment on the extent to which your research question has been answered during the current funding period.

What amounts of trembling aspen can be maintained in a lodgepole pine stand without seriously compromising the growth of the lodgepole pine over a range of biogeoclimatic subzones and stand ages?

**This an ongoing research study with installations at various stages. The work is best described in three groupings:**

**First there were two reports produced this year. They both summarize data collected in summer 2002. The nine year old study at Tyee Lake confirmed earlier results from a retrospective study in the SBSdw1 that showed:**

- **aspen as tall or taller than the pine was the aspen abundance variable that most strongly correlated to pine growth,**
- **pine diameter produced the highest correlations compared to other pine growth variables and**
- **the effects from aspen competition are only weakly expressed at nine years.**

**The other study in a ten year old IDfxm stand confirmed some of the previous retrospective data and provided additional observations.**

- **There was very little effect of aspen competition on pine growth when the stand was 10 years old. The retrospective study indicated that in the IDF the effects of competition were delayed compared to the SBSdw stands.**
- **Although correlations were weak tall aspen density was again the most highly correlated aspen abundance variable with pine growth.**
- **Additionally at 10 years tall aspen within a 1.0m radius was most strongly correlated to pine growth variables compared to neighbourhood radii of 0.5, 1.78, 2.5, and 3.0 metres.**
- **Although not significant, there was a strong trend indicating that aspen sprouting increased as levels of aspen removal increased.**

**Theses reports are both available on the internet at:**

**Technical report #14: <http://www.for.gov.bc.ca/hfd/pubs/Docs/Tr/Tr014.htm>**

**Technical report #15 <http://www.for.gov.bc.ca/hfd/pubs/Docs/Tr/Tr015.htm>**

**Due to the size of these documents and the difficulty in sending such large attachments they will not be attached to the electronic report.**

The second grouping included the data collected in 2003. Two study sites had field data collection completed. The third year data from a 14 year old stand in a very extreme subzone, the SBPSxc, where the climate is very cold and dry was collected and will be compared wetter warmer subzones. One of the warmer subzones it can be compared to is the installation in the SBSdw1. Fourth year results were collected from this 15 year old stand. This data combined with data collected from other subzones will allow for ecosystem specific information that can be used in managing these stands. In addition to neighbourhood competition studies, growth and yield plots were installed that can be used for the calibration of PROGNOSIS<sup>BC</sup> and other applicable models. These models will assist in forecasting the growth and development of mixed species stands which can be used in the planning processes. Data on aspen sprouting under different residual aspen densities was also collected and will be compared to the IDfxm and SBPSxc sites to determine differences between subzones. Appropriate management applications can be derived from this information.

The third grouping includes the study on light levels within the aspen canopy. Conifers require a minimum level of light for optimal performance. For example one study found that pine required 65% of full sunlight to achieve 60% of full growth. Available sunlight within aspen stands varies with density and position within the canopy. This summer assessments were made to quantify the amount of light that is available at different positions within the aspen canopy. The light data was then correlated to aspen basal area which is a variable that is more easily assessed by operational personnel at any time of the year. This data will assist practitioners in determining the best management practices in pine aspen stands.

**B3: Impacts and Outcomes:**

Describe the impacts and outcomes of the research and how the research has benefited or improved sustainable forest management. Where possible, provide quantifiable outcomes associated with this research (i.e., volume gain in terms of m <sup>3</sup> ; cost savings due to improved access, etc.).

The impacts of these studies have both financial and biological implications.

The financial implications include:

1. Reduction in brushing costs by not removing aspen in stands where it is not necessary and by focusing brushing in specific areas around the indicated crop pine where it is needed.
2. Diversifying the species within the stand to allow for changes in demand for a given species of wood.
3. Reduction in windthrow in stands where aspen is retained.

**Biological implications include:**

1. Allows for more large aspen to be left that can be used by cavity nesters and other wildlife.
2. Increases soil biodiversity with the addition of the annual leaf fall.

**B4: Users and Application of Results:**

List the user group and describe the realised or expected benefit of your research (eg, researchers, technical experts, planners, foresters, practitioners, regulators, decision makers, public). If results or information derived from the research have been used, provide the name of the individual and organisation and describe how the information has been applied.

User/User Group	Realised/Expected Benefit
Decision Makers	Policies can be more ecosystem specific using the data gathered from these projects.
Foresters	The information derived will allow for ecologically specific management of pine aspen stands. Brushing projects can be implemented from a practical need rather than a more conservative estimate due to a lack of data.
Researchers	Information from these trials can contribute the data base on mixedwood management.

**B5: Outputs, Deliverables, and Extension**

List the deliverables or extension products developed from the research during the 2003/04 funding period. Please identify a) the type of deliverable (TYPE), b) the deliverable citation, and c) whether it is (Y) or is not (N) included as part of this Annual Progress Report submission (INCL).

TYPE	CITATION	INCL (Y/N)
TEC	Newsome, T.A., J.L. Heineman, and A.F. Nemeč. 2004. Lodgepole pin response to aspen removal in variable radii in the SBSdw2 variant near Williams Lake, B.C. Min. For. Res. Br., Victoria, B.C. Tech. Rep. 014	Link shown above
TEC	Newsome, T.A., J.L. Heineman, and A.F. Nemeč. 2004. Early effects of manipulating aspen density on lodgepole pine performance, aspen sucker production and stand development in the IDFXm subzone in the IDFXm subzone near Williams Lake, B.C. Min. For. Res. Br., Victoria, B.C. Tech. Rep. 015	Link shown above
ORA	Field tour presentation on September 24 <sup>th</sup> 2003	N
OTH	Phil Comeau <sup>1</sup> , Jean Heineman <sup>2</sup> and Teresa Newsome 2004. Evaluation of relationships between understory light and aspen basal area in the B.C. central interior. Draft Journal Report. More data will be collected in 2004/05 and the article will be ready for	N (Draft only)

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	publication in 2004/2005.	
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**Note:** There are several deliverables that are not in a publishable state and are listed in the table in section B1. Hard copies have been sent for your files **only**. These are draft or portions of projects that are not suitable for circulation of any kind and will be published when appropriate. Also the NRIN summary has been completed and submitted to FORREX for posting on their site. Published reports are also attached.

**Deliverable Type Legend**

<b>TYPE</b>	<b>OUTPUT DESCRIPTION</b>	<b>TYPE</b>	<b>OUTPUT DESCRIPTION</b>
TEC	Technical Report	FGM	Field Guide or Manual
JOU	Peer Reviewed Journal Article	ORA	Oral Presentation
EXT	Extension Note or Newsletter Article	POS	Poster Presentation
NEW	Newsletter	WEB	Website
BOK	Book or Book Chapter	OTH	Other

**Part C: Additional Project Information**

Information provided in Part C will be used to report out on the overall investments of the Research Program during the 2003/04 funding period.

**C1: Multi-year Projects:** If the project is part of a multi-year research initiative, indicate in the statement below where the current funding period (2003/04) lies within the longer term research program:

The 2003/04 fiscal period represents year 12 of a 20+ year research program/project.

**C2: Research Focus:** Select (by placing an X in the preceding box) the primary category that would best categorize the focus of research

<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="text-align: center;">x</td><td>Silvicultural Systems - (harvesting systems – shelterwood, clear-cut, etc.)</td></tr> <tr><td></td><td>Growth and Yield (modeling, site index work)</td></tr> <tr><td></td><td>Biodiversity/Habitat Management (SAR, habitat requirements, habitat supply modeling)</td></tr> <tr><td></td><td>Forest health (pests and pathogens)</td></tr> <tr><td></td><td>Riparian and Aquatic Management (buffers, CWD)</td></tr> </table>	x	Silvicultural Systems - (harvesting systems – shelterwood, clear-cut, etc.)		Growth and Yield (modeling, site index work)		Biodiversity/Habitat Management (SAR, habitat requirements, habitat supply modeling)		Forest health (pests and pathogens)		Riparian and Aquatic Management (buffers, CWD)	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td></td><td>Natural Disturbance Dynamics (fire, wind, etc.)</td></tr> <tr><td></td><td>Ecosystem Dynamics (classification, inventory, PEM, ecosystem research)</td></tr> <tr><td></td><td>Wood Quality (assessment, wood properties and potential applications)</td></tr> <tr><td></td><td>Soil Conservation, Health, and Productivity</td></tr> <tr><td></td><td>Integrated Resource Management (land use planning)</td></tr> </table>		Natural Disturbance Dynamics (fire, wind, etc.)		Ecosystem Dynamics (classification, inventory, PEM, ecosystem research)		Wood Quality (assessment, wood properties and potential applications)		Soil Conservation, Health, and Productivity		Integrated Resource Management (land use planning)	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td></td><td>Site Rehabilitation and Restoration</td></tr> <tr><td></td><td>Forest Genetics</td></tr> <tr><td></td><td>Other – Please specify</td></tr> </table>		Site Rehabilitation and Restoration		Forest Genetics		Other – Please specify
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**C3: Biogeoclimatic Ecosystem Classification:** Identify (by placing an X in the preceding box) the BEC zone(s) to which the research applies.

Alpine Tundra		Engelmann Spruce-Subalpine Fir		Ponderosa Pine
Boreal White and Black Spruce		Interior Cedar-Hemlock		Spruce-Willow-Birch
Bunchgrass	x	Interior Douglas-Fir	x	Sub-Boreal Spruce
Coastal Douglas-Fir		Montane Spruce	x	Sub-boreal Pine Spruce (forgotten zone)
Coastal Western Hemlock		Mountain Hemlock		Not applicable

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**C4: FII's Objectives and Strategies:** With respect to FII's objectives and strategies listed below, identify (by placing an X in the preceding box) which of the following strategies best represents the overall objective and approach of your research project.

<b>Objectives and Strategies</b>	
<b>Objective: To support more effective policies, regulations, and guidelines</b>	
x	Support policy, regulatory and guideline development, evaluation and adjustment
x	Enhance quality of decision making through improved knowledge base
x	Empowered decision makers to employ practical adaptive management approaches
	Support greater certainty in planning and decision making for all forest resources values
<b>Objective: To enhance the value of timber and forest land assets</b>	
	More effective and efficient use of forest resources
x	Reducing costs of timber production
x	Reducing forest health risks through improved management practices
	Enhancing timber quality and resulting products
x	Increasing available volume and value through productivity enhancements, increased utilisation and better realisation of inherent site potential
	Increasing available timber volume through management of access constraints
<b>Objective: To improve stewardship and market acceptability of BC forest practices and forest products</b>	
	Promoting new or adapted forest practices which give BC an edge in the world forest product marketplace
x	Improving sustainable forestry practices in terms of planning, management, monitoring, analysis, reporting and adjustment
x	Enabling and accelerating certification practices