

**Forest Resource Improvement Association of Alberta
Forest Resource Improvement Program**

**Enhanced Management of Lodgepole Pine
(FRIAA Project # OF-02-16)**

Progress Report and Updated Work Plan

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September 30, 2007



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1. Introduction

This document provides a progress report and updated work plan for the Foothills Growth and Yield Association (FGYA) Project #6 *Enhanced Management of Lodgepole Pine* (FRIAA Project #OF-02-16). The project is being implemented according to a detailed project design¹ prepared in 2005, and an annually updated work plan.

The progress report includes income, expenditures, achievements and shortfalls for the project to March 31, 2007, as previously reported in the FGYA annual report for 2006-07 (*FRIAA Project #FOOMOD-01-03, Annual Report April 1, 2006 to March 31, 2007*, prepared by W.R. Dempster, May 15, 2007). Achievements and shortfalls are updated to September 30, 2007, to include progress on tasks and deliverables that were originally scheduled for the 2006-07 fiscal year, but were incomplete at the March 31 year end.

The work plan has been updated with minor changes to reflect progress since the previous version was submitted in May 2006.²

2. Progress Report

2.1. Income and Expenditures

Table 1 shows budgeted and actual income and expenditures for Project 6 during the 2006-07 fiscal year.

Table 1. Annual Income and Expenditures – April 1, 2006 to March 31, 2007

Income / Expenditures	Budget	Actual
Income		
Prior year balance forward	-	45,586
FRIAA funds	133,300	202,110
Other requested	68,810	6,066
Transfer from Project 1	40,000	40,000
Total income	242,110	293,762
Expenditures		
Sub-project 1: lodgepole pine nutrition	144,410	148,406
Sub-project 2: pine-aspen density management	83,700	108,497
Analysis	14,000	2,272
Total expenditures	242,110	259,175
Balance	-	34,587

The balance indicated in Table 1 was carried forward to 2007 to cover contract commitments pending for pine-aspen work completion (value approximately \$33,350). No additional funds were requested for 2007.

¹ FRIAA Project OF-02-16, *Enhanced Management of Lodgepole Pine, Annual Report (2004), Work Plan (2005-2008) and Detailed Project Design*, prepared by W.R. Dempster for the Foothills Growth and Yield Association, April 26, 2005.

² FRIAA Project OF-02-16, *Enhanced Management of Lodgepole Pine, Annual Report (2005) and Updated Work Plan* prepared by W.R. Dempster for the: Foothills Growth and Yield Association, May, 2006

2.2. Achievements and Shortfalls

Achievements, shortfalls and problems encountered during the 2006-07 operating year are summarized in Table 2.

Table 2. Achievements and Shortfalls - April 1, 2006 to March 31, 2007

Deliverable	Achievements / Shortfalls
Sub-project 1: lodgepole pine nutrition	<ul style="list-style-type: none"> - Installation, thinning, fertilization, pre- and post-treatment measurements completed for all 30 sites; - 1st year post-fertilization foliar sample collections completed and sent to laboratory; - Laboratory foliar mass and chemical analyses completed; - Shortfall: protection status of experimental sites not confirmed.
Sub-project 2: pine-aspen density management	<ul style="list-style-type: none"> - Cost overruns experienced by contractor because of higher densities than indicated in RFP; - Delays in locating candidate sites; - Target reduced from 30 to 18 sample stands; - Field data submitted for 18 scheduled stands. <p>Shortfalls:</p> <ul style="list-style-type: none"> - Top height and age data were missed in some plots. Deficiency is being remedied by contractor, and data will be re-submitted in 1st quarter of 2007. - Laboratory stem analysis not finished and will be completed in 1st quarter of 2007.
Analysis and reporting	<ul style="list-style-type: none"> - Screening, compilation and checking of data in progress; - Trial establishment report in preparation.

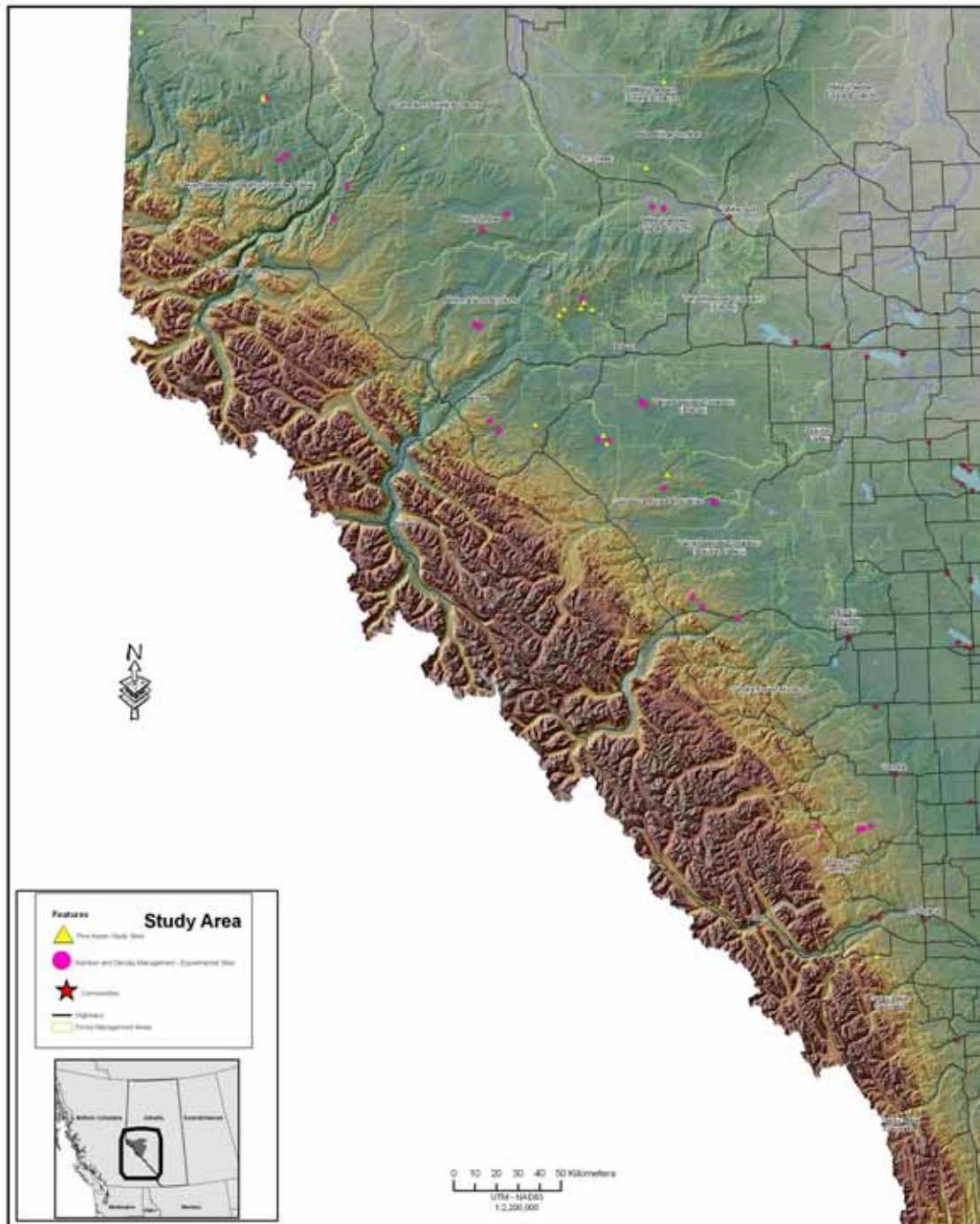
Table 3 provides an update on achievements and shortfalls to September 30, 2007.

Table 3. Update on Achievements and Shortfalls – September 30, 2007

Deliverable	Achievements / Shortfalls
Sub-project 1: lodgepole pine nutrition	<ul style="list-style-type: none"> - Protection status of experimental sites not confirmed. for all sites; - All other trial establishment work completed.
Sub-project 2: pine-aspen density management	<ul style="list-style-type: none"> - Missing data remedied by contractor; - Data re-submitted and confirmed complete; - Laboratory stem analyses satisfactorily completed.
Analysis and reporting	<ul style="list-style-type: none"> - Screening, compilation and checking of data completed for both projects; - Databases developed and documented for both sub-projects; - Technical establishment reports completed for both sub-projects.

Figure 1 shows the locations of all project field installations.

Figure 1. Map of Project Area and Experimental Sites



3. Updated Work Plan

3.1. Project Justification and Purpose

The project “*Enhanced Management of Lodgepole Pine*” ((FRIAA # OF-02-16) commenced in 2004 and runs until March 31, 2009. It is focused on filling information gaps in nutrition and density management of both fire-origin and post-harvest stands. It is complementary to the 5 projects already initiated by the FGYA to improve the assessment of lodgepole pine growth and yield in managed stands, other work being conducted in Alberta and B.C., and work planned by the FGYA to provide decision support for forest management in a mountain pine beetle environment.

The project objectives remain as originally specified to:

1. Develop techniques and yield tables to predict the growth response of stands to density and nutrition management practices with potential for enhancing timber volume, economic value, and / or forest health.
2. Produce stand assessment guidelines and interpretative criteria for selecting nutrition and density management treatments.
3. Establish a network of sample plots for demonstrating and monitoring actual versus predicted growth responses.
4. Assess impacts of enhanced forest management practices on stand composition, structure, biodiversity, susceptibility to fire and insect damage, and wood quality.

The Project is divided into 2 sub-projects aimed at addressing the main information gaps limiting achievement of the objectives. The 2 sub-projects are: (1) lodgepole pine nutrition, and (2) pine-aspen density management. Separate experimental designs have been developed for each sub-project, and are described in detail elsewhere.¹

3.2. Methodology for Sub-project 1 (EMLP1): Lodgepole Pine Nutrition

This study will provide members the ability to determine:

1. Which stands on their forest management areas are most likely to respond best to fertilization;
2. What yield increases can be expected from the stands most likely to respond.

The sub-project involves sub-sampling and selective treatment of 30 stands reconnoitered in 2004, of which 15 are young (10 - 30 years of age) post-harvest, and 15 mid-late (30 - 80 years) fire-origin. Baseline assessments were completed in May 2005.

Fixed-area treatment plots were established in the winter of 2005-2006 in 30 stands across a selected range of stand conditions). Treatments include thinning to 2500 stems per ha (in 15 harvest-origin stands only) and fertilization (300 kg per ha N plus blend) plus controls (in all 30 stands). Tree, stand and foliar variables were measured prior and after treatment, and will be measured at 3, 6, and 9 years following treatment. (Only measurements up to year 3 were included in the funding request. First-year post-fertilization foliar analyses were conducted in the winter of 2006-7.

The establishment of the trial is described in detail in the *Nutrition and Density Management Trial (EMLP1) Establishment Report* by W.R. Dempster, FGYA, October 2007.

3.3. Methodology for Sub-project 2 (EMLP2): Pine-aspen Density Management

The study will assess, on pine sites subject to hardwood competition, what density management alternatives are expected to provide the best total and coniferous timber productivity.

The sub-project establishment involved selection of 18 post-harvest pine-aspen stands between 10 and 40 years of age, and detailed measurement and tree-mapping of 6 plots in each stand. A sub-sample of plots were destructively sampled to obtain retroactive data on height and diameter increment for both pine and aspen. The remaining plots will be maintained for re-measurement. The analysis will involve assessment of competition indices and responses useful for developing or validating whole-stand, individual-tree, and/or distance-dependent growth models. The resulting models will be used to provide the required forecasts within the project term, while the maintained plots will allow for longer-term monitoring of actual versus forecast growth and yield.

The establishment of the trial is described in detail in the report *Enhanced Management of Lodgepole Pine (EMLP2) - Installation Establishment*, by Hugh Lougheed, Timberline Natural Resource Group, March 2007.

3.4. Deliverables

Table 4 shows the schedule of activities and deliverables by fiscal year (April 1 – March 31) for 2007 onwards, plus those previously scheduled for 2006.

Table 4. Delivery Schedule for *Enhanced Management of Lodgepole Pine Project*

Activity	2006	2007	2008
<i>Sub-project 1: lodgepole pine nutrition</i>			
Installation and pre-treatment measurement	done		
Thinning, fertilization and post-treatment measurements	done		
1-year post-fertilization foliage analysis	done		
3-year growth response measurements			x
3-year post-fertilization foliage analysis			x
Analysis		x	x
<i>Sub-project 2: pine-aspen density management</i>			
Stand selection	done		
Field sampling	done	done	
Analysis		x	x
<i>Analysis, synthesis of results and reporting</i>			
Database development		done	
Technical and information reports	done	x	x
Scientific paper			x

Results of the Project will be reported as follows.

- Detailed technical reports will be submitted to FRIAA and the FGYA membership at the end of the second and fifth years, including details of trial establishment, techniques applied, responses measured, responses forecast, predictive models developed, and conclusions regarding factors influencing responses.
- At least one scientific paper will be prepared for peer review and publication in a recognized scientific journal.

- At least 2 information reports, one including managed stand yield tables, and one including stand assessment guidelines and interpretative criteria for thinning and fertilization, will be prepared and published.

No further measurement or treatment activities are planned for sub-project 1 in 2007 because all reimbursable trial establishment tasks are now complete, and further re-measurements are not due until after the third post-treatment growing season. Field and laboratory work for sub-project 2, originally scheduled for completion in 2006-07, was completed in the first quarter of 2007-08. Data corrections, establishment reports and associated databases for both sub-projects were completed by the end of the second quarter. Analysis of data will be initiated in 2007 in cooperation with the University of Alberta, leading to the development of a scientific paper and technical information reports in 2008.

3.5. Income and Expenditures

The project will be supported with FRIP funding to a maximum of \$442,800, provided under FRIAA's *Open Funds* initiative. This amount was augmented by \$108,810 of supplementary funding in 2006, to increase the total budget to \$551,610. Table 5 shows costs by year. Note that this schedule applies to the whole project term, which is from April 1, 2004 to June 30, 2009. Actual amounts expended are shown for 2004, 2005 and 2006, and projected expenditures are shown for 2007 and 2008.

Table 5. Cost Schedule for *Enhanced Management of Lodgepole Pine Project*

Expenditures	2004-5 (actual)	2005-6 (actual)	2006-7 (actual)	2007-8 (planned)	2008-9 (planned)	Total (funded)
Sub-project 1 (nutrition)	44,734	120,950	148,406	0	51,572	365,662
Sub-project 2 (pine-aspen)	0	21,354	108,497	33,350	0	163,201
Design and analysis	16,197	4,278	2,272	0	0	22,747
Total expenditures	60,931	146,582	259,175	33,350	51,572	551,610

FGYA costs for analysis from 2007 onwards (primarily time inputs by the Research and Development Associate) will be covered under FGYA Project 1 (FRIAA Project # FOOMOD-01-03). The Associate will work with scientists from the University of Alberta, whose costs will be absorbed by the University.