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Foothills Growth and Yield Association

Information Package

August, 2001

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Consolidated Annual Report
April 1, 2000 – March 31, 2001

Foothills Growth and Yield Association

Consolidated Annual Report

2000 - 2001

This report is for the period from April 1, 2000 to March 31, 2001. It has been revised since presentation at the Steering Committee meeting of March 15, 2001 to include:

- expenditures consolidated to the year end (March 31, 2001);
- annual meeting and other activities occurring in March 2001;
- decisions made at the meeting on work planning and budgeting for the next fiscal year;
- a summary of accomplishments, activities and findings consistent with reporting requirements of the Foothills Model Forest.

1. Income and Expenditures

Table 1 itemizes income and expenditures for the year. The budgeted amounts shown in Table 1 are based on the *Foothills Growth and Yield Association (FGYA)* project proposal submitted by the Foothills Model Forest to the Forest Resource Improvement Association of Alberta (FRIAA) in July, 2000. The proposal was approved by all voting members of FGYA, and subsequently by FRIAA. Some variances from the budget are commented on below.

- The carry-forward of provincial environmental funds from the previous year was larger than expected, following reconciliation of accounts by the Foothills Model Forest.
- The time inputs by the Director 770 hours for the year, slightly less than the budgeted 800 hours. No additional contract services were utilized. (Inputs were donated at no charge by the University of Alberta, the Land and Forest Service, the Foothills Model Forest, and members of the Technical Committee.)
- Travel expenses were less than budgeted because (a) the Field Coordinator did not travel to the extent planned and (b) the Director's costs were reduced by discounted air travel and combining trips with other business.
- Total GST is shown under actual expenditures, and is higher than budgeted. The budget is based on non-recoverable GST (i.e. discounted 50%).

Note that the ending balance for the year is somewhat more than the carry-forward from the previous year. The costs of the Association are essentially in balance with the membership fees paid, except for the payroll costs of the Field Coordinator, which were funded separately by the Foothills Model Forest.

Table 1
Income and Expenditures for the Fiscal Year (April 1, 2000 – March 31, 2001)

Income / Expense	Budgeted for Year ¹	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total for Year	Variance
Payment							
Foothills Model Forest (PEF carry-over)	135,000.00					146,105.75	11,105.75
Membership fees - FRIAA	70,000.00					70,000.00	
Membership fees - non-FRIAA	20,000.00					20,000.00	
Total income	225,000.00					236,105.75	11,105.75
Expenses²							
Director - fees	64,800.00	11,623.50	12,879.00	15,268.50	22,599.00	62,370.00	(2,430.00)
Miscellaneous contract services	10,000.00					-	(10,000.00)
Vehicle (lease)	6,000.00		1,357.62	2,036.43		3,394.05	(2,605.95)
Computing equipment (capital)	10,000.00	6,720.99				6,720.99	(3,279.01)
Travel expenses (director & FMF staff)	19,000.00	905.47	1,961.28	2,940.09	1,982.32	7,789.16	(11,210.84)
Meeting & miscellaneous expenses	7,000.00		179.07	268.61	4,103.73	4,551.41	(2,448.59)
GST	3,178.00	1,284.14	996.57	1,257.54	1,779.71	5,317.96	2,139.96
Total expenses	119,978.00	20,534.10	17,373.54	21,771.17	30,464.76	90,143.57	(29,834.43)
Ending Balance	105,022.00					145,962.18	40,940.18

¹ Based on proposal submitted to FRIAA, July 2000

² Excludes costs for services provided directly by Foothills Model Forest:

- Field Coordinator – salary + fringe (budgeted at \$29,000 for year)
- Administration (budgeted at \$7,290 for year)

2. Activities

Activities of the Director are itemized in the appended quarterly activity reports. The most important and / or time-consuming activities throughout the year were:

- preparation for, and participation in, meetings with technical committee members;
- development of the Regeneration Project design and procedures;
- proposal development (FRIAA, nutrition and density management project, annual work plan);
- supervision, support, and assessment of the Field Coordinator's work in implementation of the Regeneration Project;
- assessment of knowledge, models and techniques available to support the Associations' program;
- preparing and holding the annual meeting, March 14-15, 2001.

3. Achievements, Shortfalls, Problems and Opportunities

3.1. *Regenerated Lodgepole Pine Project*

Following the inaugural Steering Committee meeting, the experimental design for the Project was reviewed and enhanced. Several points raised by the Committee were reviewed by the Director and the Technical Committee as follows:

- Experts were consulted over the possible use of alternative designs, and the risks of results being compromised by interacting and confounding effects. It was concluded that, given the objective to investigate vegetation management, site, and spacing effects, and the limited area of homogenous ecosites, the replicated block design should be retained, but improved to limit confounding effects of uncontrolled variables. This was done by blocking installations into groups having similar climatic, soil, and site treatment characteristics.
- Simulations using the models *GYPsy* and *TIPsy* indicated that, even though close spacing may be operationally unrealistic, not including it in the experimental design would result in a failure to assess the full range of volume production options. The upper spacing level of 1.5 m was retained.
- "Control" (unplanted) installations were confirmed as essential to provide a baseline for assessing and monitoring planting densities. The unplanted installation will be split into two vegetation control treatments: with and without weeding.
- Models and data for interim forecasting were further investigated, and the following confirmed as most promising: *GYPsy* (Alberta Land and Forest Service)), *TASS / TIPsy* (B.C. Ministry of Forests), Gregg Burn pre-commercial thinning trial (Canadian Forest Service) results and simulations, site index paired-plot data. All but the last item have been confirmed as available to the Association.

A draft field manual was prepared describing installation and measurement procedures. Procedures were developed with the pilot establishment of 6 installations.

Installation status at the end of the year is summarized in Table 2. The allocation of installations was distributed among members according to the formula agreed at the inaugural meeting (see Table 3), with some modifications to facilitate grouping, as indicated in Table 2.

*Table 2
Preliminary Establishment Report for Regeneration Trial (March, 2001)*

Ecosite	Group	Member	Number of Installations*		Installed
			Identified	Confirmed	
1	1	SLS	6	6	partial
1	2	WEY	6	6	complete
1	3	SPI	6	6	partial
2	1	WWC	6	6	partial
2	2	ANC	6	6	partial
2	3	WEY	6	6	partial
3	1	WEY	6	6	partial
3	2	SPI	6	3	partial
3	3	SDA	6	6	partial
4	1	WWC	6	6	
4	2	WWC	6	6	
4	3	CFP	6	6	
5	1	MWF	6	6	
5	2	BRL	1	6	
5	3	?	1	6	
Total			79	69	

Member	Number of Installations	
	Committed	Identified
ANC	5	6
BRL	8	1
CFP	5	6
MWF	5	6
SLS	5	6
SDA	6	6
SPI	14	12
WWC	21	18
WEY	21	18
Total	90	79

ANC=Alberta Newsprint, BRL=Blue Ridge Lumber
 CFP=Canfor, MWF=Millar Western
 SLS=Spray Lakes, SDA=Sundance
 SPI=Sunpine, WWC=Weldwood
 WEY=Weyerhaeuser

* 6 installations are required in each ecosite / group combination; total number of installations required = 90

Table 3. Allocation of Installations by Company

<i>Company</i>	<i>Net area (ha)</i>	<i>% of total</i>	<i># of installations</i>
ANC	106,870	5.5	5
BRL	180,323	9.3	8
Canfor	106,271	5.5	5
MWFP	112,406	5.8	5
Spray Lakes	114,988	5.9	5
Sundance	121,848	6.3	6
Sunpine	293,655	15.1	14
Weldwood	451,713	23.2	21
Weyerhaeuser	457,433	23.5	21
Total	1,945,507	100.0	90

The "net area" indicated in Table 3 is the confirmed estimate of net pine landbase contributing to the member's allowable cut, including quotas.

The following shortfalls / problems / opportunities were encountered during the year:

- Members experienced difficulties in identifying suitable Category 5 (Labrador tea – hygric – poor) sites.
- Blue Ridge Lumber was unable to identify the committed number of sites because the company's operations are scheduled predominantly into burned areas.
- Members anticipate cost overruns relative to the establishment costs quoted in the FRIAA proposal of July, 2000.
- The FRIAA proposal and umbrella agreement currently covers only establishment costs for the first two years of the Project. It requires updating to include measurement, treatment and maintenance costs for the first five years.
- Establishment verification reporting was not initiated.
- Protection of the installations from industrial disturbance is a serious concern. A special new reservation / notation purpose ISP code was requested and granted through the Reservations Unit of Alberta Agriculture, Food and Rural Development, Public Land Division. An information note was drafted for Alberta Land and Forest Service (LFS) field staff.
- LFS fuel abatement requirements created some difficulties because of the potential confounding of growth effects resulting from burning debris within the installations.
- Vegetation control methods require resolution, and other treatment and measurement procedures, plus a data model, require further elaboration.
- Opportunities have been identified for extending replication of the trial. Inclusion of the Weyerhaeuser Edson and Drayton Valley operations will result in Weyerhaeuser contributing 9 additional installations, and increase the total number of installations from 90 to 102.
- The main limitation on interim forecasting is uncertainty over site-index changes from fire-origin to regenerated stands. The LFS Senior Biometrician suggested the Association consider a short-term paired-plot project, in conjunction with analysis of suitable permanent sample plot data, with peer-reviewed publication of results, to provide a credible interim solution. (The Steering Committee considered this suggestion, and the resulting decisions are incorporated into the revised work plan for 2001 / 2002.)

3.2. Nutrition and Density Management Project Proposal

The Work Plan for the 2000-2001 fiscal year, and the approved *Foothills Growth and Yield Association* FRIAA project, called for the development of a project proposal to determine the potential for increasing yields of semi-mature and mature lodgepole pine. The Alberta government encouraged the Foothills Model Forest to include this project under an umbrella proposal for the Foothills Model Forest to undertake research funded by the proposed Alberta Forest Research Institute. The umbrella proposal was submitted January 6, 2001.

Meanwhile, the Association Director and members of the Technical Committee investigated the feasibility, options, and priorities for such a project. The result was a conceptual plan for a cooperative project addressing management of density and nutrition primarily in fire-origin stands of lodgepole pine. On March 15, 2001, the Steering Committee approved and identified funding for proceeding with a detailed scope assessment for the Project during the 2001/02 fiscal year, involving a situational review of the member companies, literature and expert reviews, and preliminary site selection.

3.3. Personnel Assignments

The Foothills Model Forest has retained the services of a Director since June 21, 1999. The Director's contract expires June 21, 2001. The Steering Committee instructed the Foothills Model Forest to retain the current Director for the 2001/02 fiscal year.

The Foothills Model Forest agreed to retain the services of a Field Coordinator, including covering the costs of salary and fringe costs, on a half-time equivalent basis, from April 1, 2000 to March 31, 2002. He resigned in December 2000, following repeated unsatisfactory performance reviews, and unsuccessful attempts by the General Manager of the Foothills Model Forest and the Director of the Association to encourage and support improved performance. The Foothills Model Forest issued a request for proposal for the required services in January 2001. A candidate was selected and contracted to commence work effective April 1, 2001.

Other support services provided by the Foothills Model Forest, including financial accounting, were exemplary, with no problems being experienced.

3.4. Dissemination of Information and Education of Members

The Foothills Model Forest, as Coordinating Agency for the Association, is responsible for dissemination of information to, and continuing education of, members in matters relevant to the Association.

Members were provided the following products, services and opportunities:

- draft field manual for Regeneration Trial installation and measurement procedures;
- field tour of pilot installations and related Weldwood trial;
- site index assessment procedures and related background materials;

- information and expert opinions on opportunities and threats to lodgepole pine management related to climate change, regenerated stand growth and yield, wood quality, mountain pine beetle, and fire.

The latter opportunity was provided at the Annual Meeting, March 14-15 2001, with presentations by:

- Robert Monserud, US Forest Service, Portland, Oregon;
- Shongming Huang, Alberta Land and Forest Service, Edmonton, Alberta;
- Gerry Middleton, Forintek Canada Corp., Vancouver, B.C.;
- Les Safranyik, Pacific Forestry Centre, Victoria, B.C.;
- Kelvin Hirsch, Northern Forestry Centre, Edmonton, Alberta.

A shortfall in information distribution is that no Internet web site has been developed for the Association.

3.5. *Work Planning and Budgeting*

The Foothills Growth and Yield Association proposal dated July, 2000, was accepted by FRIAA July 20, 2000. A request to amend the proposal (to reflect 7 out of 9 members directing FRIP payments to the Foothills Model Forest) was approved September 20, 2000. The proposal contained budget and payment schedules for (a) development and management of the Association and (b) Regeneration Trial establishment by the members. The Regeneration Trial schedules are subject to confirmation and amendment by supplementary applications from individual members. The proposal included payment of membership fees for 2 fiscal years (2000/01 and 2001/02) at the rate of \$10,000 per member.

A preliminary Annual Work Plan for development and management of the Association from April 1, 2001 to March 31, 2002 was submitted as required to the Foothills Model Forest on November 11, 2000. The Plan was revised based on decisions made by the Steering Committee at the meeting of March 15 2001. Table 4 shows the original "preliminary" budget for 2001/02 as submitted to the Foothills Model Forest on November 11, 2000, and the "revised" budget based on updating of the amount carried forward, and resolutions passed at the March 15 meeting.

Both budgets were based on the Foothills Model Forest incurring all field coordinator payroll or fee costs. For the revised budget, the Foothills Model Forest Board of Directors approved contracting of a field coordinator at a fee cost of \$50,000 (100 days at \$500 per day).

The revised budget includes:

- annual membership fees of \$10,000 per voting member, as approved by the Steering Committee, March 15, 2001;
- retention of the Director for 100 days at \$648 per day;
- \$45,000 for contractual assistance in development of the Nutrition and Density Management Project.

Table 4. Budget for the Fiscal Year April 1, 2001 – March 31, 2002

Income / Expense	Preliminary \$	Revised \$
Income		
Carry-forward	143,706	145,962
Membership fees - FRIAA	80,000	70,000
Membership fees - non-FRIAA	10,000	20,000
Total income	233,706	235,962
Expenses		
Director - fees	64,800	64,800
Director - expenses	9,720	9,720
Other contract services	20,000	45,000
4WD vehicle (rental)	4,358	4,358
Travel expenses (field coord.)	5,250	5,250
Meetings	7,321	7,321
Equipment & misc.	12,809	12,809
GST	3,569	9,400
Total expenses	127,827	158,658
Ending Balance	105,879	77,304

The Association currently lacks a business plan. A business plan will be consolidated in the 2001/02 fiscal year following:

- finalization of a five-year technical and financial plan for the Lodgepole Pine Regeneration Project;
- scope assessment of the Nutrition and Density Management Project;
- review by the Steering Committee.

4. Summary of Accomplishments, Activities and Findings

The Foothills Growth and Yield Association has established itself as a strong partnership of forest managers committed to the sustainable management of lodgepole pine. The membership is composed of nine companies holding large forest tenures (covering much of the species' geographic range in Alberta), the Alberta Land and Forest Service, and the Foothills Model Forest. The Foothills Model Forest was retained by the other members as the Coordinating Agency for the Association. During the year, ties and cooperation with other agencies having shared interests have also been developed and strengthened.

Effective April 1, 2000, the members of the Association entered into a formal agreement involving commitments for participation, personnel, industrial funding, project development, dissemination of information, and protection of rights and privileges. An initial \$200,000 contribution of provincial funding has already been surpassed by industrial financial commitments of more than \$650,000 (\$180,000 in membership fees plus at least \$475,000 in direct project contributions) during the first two years of operation (April 2000 – March 2002).

The fundamental purpose of the Association is the forecasting and monitoring of managed stand growth and yield, particularly of lodgepole pine. More specific performance measures are:

1. Timber yield forecasts used in forest management planning are defensible and approved.
2. Increasingly rigorous requirements for monitoring and validation of sustainable forest management practices are met.
3. Managers' knowledge, and their abilities to predict responses to management practices, are improved, facilitating management by objectives rather than by arbitrary prescription.
4. Investments in growth and yield assessment are cost effective, and there is no unnecessary duplication of effort.
5. All participants remain committed to the program, and share costs equitably.
6. Work is user-driven, results-focussed, and directly applicable to management and crop planning.

The initiation of a comprehensive Lodgepole Pine Regeneration Project during the year, evaluating response to site, competition, and spacing, is a major step towards defensible forecasting, meeting monitoring and validation requirements, and supporting management by objectives (measures 1, 2 and 3). Further project design work conducted during the year led to approval and funding for an expert review of nutrition and density management opportunities in existing lodgepole pine stands, which will further contribute to these measures. Managers knowledge (measure 3) of the response of lodgepole pine to climate change and to forest, fire and pest management was improved by the presentations of world-class experts at the Association's annual meeting. The Association's organization and activities performed well against measures 4, 5, and 6: work was focused on questions and needs defined by the members, members contributions were shared on an equitable and agreed formula, and membership commitment, participation and support increased during the year.

Development of Lodgepole Pine Growth and Yield Association

Quarterly Activity Report – Dick Dempster Consulting Ltd.

Reporting Period	April 1 – June 30, 2000	
Total reimbursable hours	143.50	(details on invoices # 27 and 31)
Major expenses incurred	\$905	(primarily travel and accommodation for technical meetings at Foothills Model Forest in Hinton, plus communications, see invoices # 27 and 31)
Activities		
<ul style="list-style-type: none"> Steering Committee Meeting minutes and follow-up Development of design for Project 2 (Regeneration Trial) Analysis and selection of candidate cut-blocks for Regeneration Trial Proposal to FRIAA for FRIP funding of Association activities Miscellaneous correspondence with technical representatives 		
Achievements		
<ul style="list-style-type: none"> Experimental design for Regeneration Trial completed Net pine areas and candidate cut block lists (required for Regeneration Trial) received from technical representatives Initial selection of candidate cut blocks completed Draft project proposal submitted to FRIAA; funding application templates prepared; eligibility and mechanism for FRIP funding confirmed 		
Shortfalls		
<ul style="list-style-type: none"> Preliminary cut block selections not verified FRIAA proposal not formally submitted and approved 		
Tasks for next quarter		
<ul style="list-style-type: none"> Obtain formal approval for FRIP funding by FRIAA; assist members in applications Assist technical representatives in verification and location of Regeneration Trial installations Finalize field procedures for Regeneration Trial (including testing and Field Manual) Technical Committee Meeting and field trip (September) 		

Development of Lodgepole Pine Growth and Yield Association

Quarterly Activity Report – Dick Dempster Consulting Ltd.

Reporting Period	July 1 – September 30, 2000	
Total reimbursable hours	159	(Details in invoices # 36 and 39)
Expenses incurred	\$1961	Travel and accommodation for meetings with technical representatives at Grande Prairie and Whitecourt, technical committee meeting at Hinton, attendance WESBOGY meeting at Edson, plus communications, (see invoices # 27 and 31 for details)
Activities		
<ul style="list-style-type: none"> Consultations FRIAA re: Association project proposal Field manual input, review and edit Regeneration Project planning with technical representatives Presentation to WESBOGY meeting Technical committee meeting and field tour, Hinton (September 19-20) 		
Achievements		
<ul style="list-style-type: none"> Association proposal approved by FRIAA and endorsed by all members, contract between FRIAA and FMF signed Draft field manual prepared for installation of Regeneration Trial Regeneration Trial installation: draft field manual prepared, 79 installation locations identified, 38 confirmed, 6 completely installed, methodology tested by pilot installations and technical committee field visit Information exchanges with WESBOGY and University of Alberta 		
Shortfalls		
<ul style="list-style-type: none"> Location and verification of Regeneration Trial installations incomplete Field measurement procedures not developed 		
Tasks for next quarter		
<ul style="list-style-type: none"> Complete location and verification of Regeneration Trial installations Amend installation procedures (based on September technical committee meeting) and develop measurement and data capture procedures for Regeneration Trial Technical committee meeting (November 29) FMF Detailed Activity Work Plan for April 1 2000 – March 31 2001 Preparation for annual meeting in March 2001 Review membership activities and research in late stage thinning and fertilization Information exchanges: BCMinFor, CFS, USDA, U of A, other Develop web site 		

Development of Lodgepole Pine Growth and Yield Association

Quarterly Activity Report – Dick Dempster Consulting Ltd.

Reporting Period	October 1 – December 31, 2000	
Total reimbursable hours	188.5	(Details in invoices # 42 and 46)
Expenses incurred	\$2055	Travel and accommodation for meetings with technical representatives, LFS, CFS, BC Min. For., and FMF
Activities		
<ul style="list-style-type: none"> Direction, work review, and performance assessment of Field Coordinator Coordination of location and verification of Regeneration Trial installations Research and development of field procedures for Regeneration Trial Meetings BC Ministry of Forests and Alberta Land and Forest Service Visits to technical representatives of MWFP, BRL, ANC, Weldwood Technical committee meeting (November 29) Meeting FMF Project Steering Committee and Communications Manager Preparation of annual work plan 		
Achievements		
<ul style="list-style-type: none"> Regeneration Trial installation procedures amended and improved FMF Detailed Activity Work Plan submitted for period April 1, 2000 – March 31, 2001 Initial arrangements completed for annual meeting Awareness improved of relevant work being undertaken by LFS, CFS, BC Min. For., USA Membership activities in late-stage thinning and fertilization reviewed 		
Shortfalls		
<ul style="list-style-type: none"> Location, verification and audit of Regeneration Trial installations incomplete Field manual incomplete Web site not developed 		
Tasks for next quarter		
<ul style="list-style-type: none"> Replace Field Coordinator Finalize schedules and procedures for Regeneration Trial; re-write field manual Prepare project proposal for nutrition and density management in fire-origin stands Prepare for and hold annual meeting (technical committee meeting, steering committee meeting, and technical session) 		

Development of Lodgepole Pine Growth and Yield Association

Quarterly Activity Report – Dick Dempster Consulting Ltd.

Reporting Period	January 1 – March 31, 2001	
Total reimbursable hours	279	(Details in invoices #50, 53 and 57)
Expenses incurred	\$3484	Travel and accommodation: Edmonton (LFS, Fertilization and Economics Conference, FGYA Annual Meeting), Hinton (FMF). Annual Meeting (see invoice # 57 for details).
Activities		
<ul style="list-style-type: none"> Preparation for Annual Meeting Scheduling and procedures development for Regeneration Trial Preparation of project proposal for nutrition and density management project Recruitment of Field Coordinator Attend Fertilization and Economics Conference and post-conference field tour Annual Meeting (technical committee meeting, technical session, and steering committee meeting) 		
Achievements		
<ul style="list-style-type: none"> Successful Annual Meeting and Technical Session with educational presentations by 5 expert scientific authorities Work plan and budget approved for 2001-02 fiscal year by Steering Committee Conceptual project plan prepared for nutrition and density management project: first phase approved for implementation by Steering Committee Field coordinator recruited Installation procedures for Regeneration Trial re-written; measurement requirements identified and reviewed by Technical Committee Commitment for Regeneration Trial increased from 90 to 102 installations 		
Shortfalls		
<ul style="list-style-type: none"> Installation schedules for Regeneration Trial not finalized (Blue Ridge Lumber and Category 5 sites) Documentation and data model for Regeneration Trial measurements incomplete 		
Tasks for next quarter		
<ul style="list-style-type: none"> Supervise and assist development and documentation of technical procedures: Regenerated LP Project data model, measurements, competition index, and treatments Briefing and supervision of field coordinator Develop terms of reference for nutrition and density management project expert review; retain expert assistance Develop proposal for site index change assessment supplement to Regenerated LP Project 		

Work Plan

April 1, 2001 – March 31, 2002

FOOTHILLS GROWTH AND YIELD ASSOCIATION – WORK PLAN

EXECUTIVE SUMMARY

1. Project Title

Development of a Lodgepole Pine Growth and Yield Cooperative Program

2. Project Location

Foothills Model Forest, with participants and research installations throughout the Eastern Slopes

3. Name of Organisation

Foothills Growth and Yield Association Coordinating Agency and Member

4. Other Organisations Involved

- | | |
|-----------------------------------|---------------|
| • Alberta Newsprint Company | Voting Member |
| • Blue Ridge Lumber | Voting Member |
| • Canadian Forest Products | Voting Member |
| • Millar Western Forest Products | Voting Member |
| • Spray Lakes Sawmills | Voting Member |
| • Sundance Forest Industries | Voting Member |
| • Sunpine Forest Products | Voting Member |
| • Weldwood of Canada | Voting Member |
| • Weyerhaeuser Canada | Voting Member |
| • Alberta Land and Forest Service | Member |

Liaison and information exchanges have been established with the Canadian Forest Service, the University of Alberta, the Alberta Research Council, the Western Boreal Growth and Yield Association (WESBOGY), the Mixedwood Management Association, and the B.C. Ministry of Forests. An agreement has been entered into with the Forest Resource Improvement Association of Alberta (FRIAA).

5. Cost of the Project Being Proposed

Costs for the period April 1, 2001, to March 31, 2002, are forecast to be \$158,658 including GST. This does not include the costs incurred by members in the installation and measurement of research plots, the fee cost for field coordination services supported by the Foothills Model Forest (\$50,000), and other overhead costs incurred by the Foothills Model Forest (estimated to be approximately \$7,500).

6. Consent of Other Organisations Involved

All Members listed in 4 above approved the program and budget at the Association Steering Committee meeting held on March 15, 2001.

7. Contact Persons for this Proposal

Dick Dempster, Dick Dempster Consulting Ltd. (telephone 604 886 0461)

DETAILED PROPOSAL

1. Proposal Prepared By

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2. Introduction

In response to interest by industry and government, the Foothills Model Forest has facilitated collaboration among a number of softwood producers to create a Foothills Growth and Yield Association for co-operative forecasting and monitoring of managed stand growth and yield, particularly of lodgepole pine. Nine companies participate in the Association as voting members. The Alberta Land and Forest Service and the Foothills Model Forest participate as non-voting members, with the Model Forest acting as the coordinating agency.

3. Background Information

The potential value of a co-operative lodgepole pine growth and yield research program was recognized in 1997 by a number of companies holding Forest Management Agreements and Timber Quotas on the Eastern Slopes.

The Foothills Model Forest appointed a part-time Director on June 21, 1999, with the mandate to develop a Growth and Yield Co-operative. A memorandum of agreement and preliminary work schedule was developed and endorsed by nine companies, the Land and Forest Service, and the Foothills Model Forest, in December 1999. The inaugural steering committee meeting was held March 23, 2000. At this time a chairman was elected, and resolutions were passed establishing the initial annual membership fee and a formula for sharing the cost of fieldwork. Fieldwork commenced in June 2000. The Project was approved by FRIAA on July 20, 2000.

A preliminary Annual Work Plan for development and management of the Association from April 1, 2001 to March 31, 2002 was submitted as required to the Foothills Model Forest on November 11, 2000. The Plan and associated budget have been revised to reflect changes since that time, including resolutions passed by the Steering Committee, at the Annual Meeting held on March 14-15, 2001, and the actual amount of funds carried forward from the previous year.

4. Objectives

The goal of the program is the quantification of yields associated with forest management practices, especially of lodgepole pine. Specific objectives and performance measures associated with achievement of this goal are:

1. *Forecasting*: timber yield forecasts used in forest management planning are defensible and approved.
2. *Monitoring and validation*: increasingly rigorous requirements for monitoring and validation of sustainable forest management practices are met.
3. *Knowledge and awareness*: managers' knowledge, and their abilities to predict responses to management practices, are improved, facilitating management by objectives rather than by arbitrary prescription.

4. *Cost effectiveness*: investments in growth and yield assessment are cost effective, and there is no unnecessary duplication of effort.
5. *Equitable participation*: all participants remain committed to the program, and share costs equitably.
6. *Applicability*: work is user-driven, results-focussed, and directly applicable to management and crop planning.

5. Potential Application of Results

The results will be directly applicable to the development of forest management plans and enhanced forest management programs in the Foothills Model Forest area and throughout the geographic range of lodgepole pine in Alberta. They will influence the selection of forest management practices, and the estimation and sustention of the allowable cut of lodgepole pine within the tenures of the participants, currently estimated at approximately 5 million cubic metres per year.

6. Deliverables

Each project of the Association will be designed to deliver yield forecasts and a validation program.

Yield forecasts will be quantitative estimates of future stand timber yields, agreed by the scientific and regulatory community as the most probable outcome of the treatment regime being applied to the range of stand and site conditions specified. *Validation programs* may involve existing trials, new trials, and / or monitoring plots. They will include a valid replicated experimental design, an installation schedule (if applicable), and a measurement schedule.

The nature of tree growth and the project deliverables requires the program to be long term and ongoing. Although forecasts and improved confidence in estimation of growth and yield will accrue from initial measurements, the full benefits of the program will be derived from growth re-measurements taken on a long-term and ongoing basis. Interim deliverables will include project establishment reports, which will include the best available scientific forecasts of the effects being investigated.

7. Methods

Methods will be specified in project plans, experimental designs, and field manuals. The technical committee and Director will develop project plans for approval by the steering committee. Project plans will include replicated experimental designs, estimates of implementation costs, and will specify input and output variables to be included in each yield forecast.

Input variables will include (a) stand and site parameters prior to treatment, and treatment parameters, and / or (b) stand and site parameters at benchmark stand development stages (e.g. performance surveys). Input variables will include, or be stratified by, a common ecological site classification system. Output variables will include timber yields from intermediate (if applicable) and final harvests, at utilization standards agreed by the members.

Members of the Association on their tenured lands will carry out installation and measurement of growth and yield trials, and provide data, in a format defined by a technical committee and the Director. The Model Forest has engaged a field coordinator responsible for the control and compilation of data consistent with approved project plans. Stand-level growth and yield models, best representing the experimental sites, practices and data, will be developed or validated.

A plan and experimental design for forecasting and monitoring growth and yield in regenerated lodgepole pine stands ("*Lodgepole Pine Regeneration Project*") were approved in 2000 (see *Foothills Growth and Yield Association* proposal submitted to FRIAA, July 2000). Modifications and elaboration of the methodology, following test installations in 2000, are included in the Project *Field Manual*.

During 2000 a conceptual project plan was developed for investigating opportunities for management of nutrition and density in (primarily) fire-origin stands of lodgepole pine ("*Nutrition and Density Management Project*"). A detailed scope assessment will be conducted in 2001, involving a situational review of the member companies, literature and scientific expert reviews, and preliminary site selection.

8. Schedule

Activities and milestones scheduled to March 31, 2002 are shown in Table 1. Note that three projects are scheduled:

- Project 1 (*Program Development*) is an ongoing project as initiated in 1999.
- Project 2 (*Lodgepole Pine Regeneration*). The project involves a total of 102 installations, each 1 ha in area. Six were planted in 2000, and the remainder will be completed during 2001, with the exception of up to 8 installations that will be deferred to the following field season. During 2001 the project plan (and FRIAA contract) will be extended to include remeasurement and maintenance schedules for 5 years (the current schedules are only for establishment over a two-year period). The project will be extended to include an assessment of site index change from fire-origin to regenerated stands. The additional sampling work for this extension is currently scheduled for completion in 2001, but design, seasonal, and contractor-availability constraints may require deferring the work until the following field season.
- Project 3 (*Nutrition and Density Management*). The situational and scientific reviews will be completed by December 31, 2001. Preliminary site selection (for further site and stand assessment, and possibly a fixed-area research trial) will follow, depending on the findings of the expert review and interest in initiating the project in 2002.

*Table 1
Activities, Milestones and Completion Dates*

Activity / Milestone	Apr - Jun 2001	July - Sep 2001	Oct - Dec 2001	Jan - Mar 2002
<i>Project 1 (Program Development)</i>				
program direction (person days)	20	30	25	25
field coordination (person days)	30	50	10	10
annual fees due	1-Apr			
5-year business plan				31-Jan
status report and meeting		29-Aug		
information exchange meetings or tours		28-31-Aug		14-Mar
steering committee meeting		?	?	15-Mar
annual report (unconsolidated)				15-Mar
<i>Project 2 (Lodgepole Pine Regeneration)</i>				
procedures documentation	30-Jun			
5-year project plan & FRIAA proposal		31-Jul		
complete field establishment		15-Sep		
establishment verification		30-Sep		
site index change extension - design		31-Jul		
(site index change extension - sampling)			(31-Oct)	
establishment report				31-Mar
<i>Project 3 (Nutrition and Density Management)</i>				
situational review		30-Sep		
literature and expert scientific review			31-Dec	
preliminary site selection				31-Mar

9. Site Information

The program will be based out of the Foothills Model Forest headquarters in Hinton. Research and monitoring sites are not limited to the Foothills Model Forest and will be distributed along the Eastern Slopes. Research trials will primarily be located in the Lower and Upper Foothills and the Subalpine Natural Sub-regions.

10. Financial Information

Income and expenses for Fiscal Year 2001-2002 are forecast in Table 2.

*Table 2
Income and Expenses*

Income / Expense	Apr - Jun 2001	July - Sep 2001	Oct - Dec 2001	Jan - Mar 2002	Total 2001 / 02
Income					
PEF funding carry-forward	145,962				145,962
Membership fees - FRIP	70,000				70,000
Membership fees - non-FRIP	20,000				20,000
Total income	235,962				235,962
Expenses					
Director - fees	12,960	19,440	16,200	16,200	64,800
Director - expenses	1,944	2,916	2,430	2,430	9,720
Literature and expert review		18,000	22,500	4,500	45,000
4WD vehicle (rental)	1,307	2,179	436	436	4,358
Travel expenses (field coordinator)	1,575	2,625	525	525	5,250
Meetings and tours		2,500		4,821	7,321
Equipment and miscellaneous	3,202	3,202	3,202	3,203	12,809
GST	1,223	3,172	2,964	2,041	9,400
Total expenses	22,211	54,034	48,257	34,156	158,658
Ending Balance	213,751	159,717	111,460	77,304	77,304

11. References

- *Memorandum of Agreement* made June 21, 1999, between the Foothills Model Forest and Dick Dempster Consulting Ltd. (pertaining to the development of a lodgepole pine growth and yield cooperative program).
- *Memorandum of Agreement among Members of the Foothills Growth and Yield Association* (December 1999).
- Minutes of the Inaugural Steering Committee Meeting of the Foothills Growth and Yield Association, March 23, 2000.
- *Foothills Growth and Yield Association*: proposal submitted to the Forest Resource Improvement Association of Alberta by the Foothills Model Forest, July 2000.
- Forest Resource Improvement Association of Alberta; Project FOOMOD-01-01 – *Foothills Growth and Yield Association*; Amendment # 1, September 12, 2000.
- Minutes of the Second Steering Committee Meeting of the Foothills Growth and Yield Association, March 15, 2001.
- *Memorandum of Agreement* made March 31, 2001, between the Foothills Model Forest and McPherson Creek Forestry Services Limited (pertaining to the provision of field coordination services).

12. Scientific Review

Recognized scientific experts in growth and yield, biometrics, and forest ecology will review project plans and results. Drs. P. Blenis, S. Titus, V. Lieffers and P. Comeau of the University of Alberta reviewed the experimental design and procedures for the *Lodgepole Pine Regeneration* Project. Drs B. White and D. McNabb of the Alberta Research Council, and Drs. S. Chang and V. Lieffers of the University of the University of Alberta, will conduct and prepare for publication the expert scientific review of the *Nutrition and Density Management* Project. Meetings will be held at least once a year, to which experts will be invited to attend and review projects. Formal peer review will be encouraged through the publication of project results.

13. Improvements to Management in Forest Ecosystems

The program will improve the management of forest ecosystems through:

- improved assessment of ecosystem productive capacity;
- improved assessment of the sustainable use levels of a biological resource;
- promotion of cooperation, partnership, and shared responsibility among forest managers and researchers;
- increased levels of knowledge and awareness of sustainable forest management;
- continual improvement of sustainable forest management practices;
- stand-level data providing the basis for assessing impacts of enhanced forest management practices on natural ecosystem processes and contributions to global ecological cycles.

14. Amount of Money and Services Requested

As a party to the Memorandum of Agreement among members of the Association, the Model Forest committed to contributing:

- \$200,000 towards initial establishment of the Association, contracting of a Director, and associated fringe, overhead, and meeting costs, commencing June 21, 1999.
- Salary and fringe costs of a contract Field Coordinator for 100 days between April 1, 2001 to March 31, 2002 (\$50,000).
- Administrative and overhead services (cost of \$7,500 for period April 1, 2001 to March 31, 2002, estimated at 5% of forecast expenses before GST).
- A member of the Foothills Model Forest Board of Directors to participate on the steering committee in a non-voting advisory capacity.

Voting members will cover their own costs incurred in the installation and measurement of growth and yield trials. They also contribute to the costs of the Association through a membership fee. The membership fee for the period April 1, 2001 to March 31, 2002, has been set at \$10,000, and approved for FRIP funding.

15. Proposed Payment Schedules

Membership fees will become due April 1, 2001.

The Director's and Field Coordinator's fees and expenses are payable monthly.

Payments to other contractors will be as specified in contracts executed by the Foothills Model Forest.

16. Subcontracted Work

The contract between the Foothills Model Forest and Dick Dempster Consulting Ltd. to provide the services of Director will be extended to March 31, 2002.

McPherson Creek Forestry Services Ltd. is contracted to provide the services of Rand McPherson as Field Coordinator until March 31, 2002.

A small contract has been entered into with MCH Forestry Ltd. to provide assistance in development of threshold competition indices and a data model for the *Lodgepole Pine Regeneration Project*.

None of the above work may be subcontracted without the written consent of the Foothills Model Forest.

The Foothills Model Forest will also enter into a contract with the Alberta Research Council (with the University of Alberta as a subcontractor) to undertake the expert scientific review of the *Nutrition and Density Management Project*.

17. Project Management

Project management and management responsibilities are described in the Memorandum of Agreement among members of the Association.

18. Organisations Requesting FRIP Monies

Funding of contributions to the Association, and the identification of sources for such funding, are the responsibilities of the individual members. Seven members have authorized FRIAA to transfer funds for membership fees directly to the Foothills Model Forest. One member is utilizing FRIP funds, but directing the fee payment itself. One member is not utilizing FRIP funds for its contributions to the Association.

19. Publication of Results for General Consumption

The members view publication of results as being in their interest. The steering committee will direct and approve the publication and dissemination of information resulting from Association projects.

It is expected that a paper based on the expert scientific review of the *Nutrition and Density Management Project* will be ready for publication in a scientific or professional forestry journal by March 31, 2002.

Consideration will be given to publication of interim forecasts (based on simulation modeling) following completion of the *Lodgepole Pine Regeneration Project's* establishment in 2002. Early crop performance results for the Project will be published within the following five years. Results of the Project extension to evaluate site index change between fire-origin and regenerated stands are hoped to be ready for publication in 2002.

20. Other Relevant Information

See Section 11 *References*.

Revised FRIAA Proposal

April 1, 2000 – March 31, 2005

Forest Resource Improvement Association of Alberta

Forest Resource Improvement Program

Foothills Growth and Yield Association

Revised Proposal Prepared by:

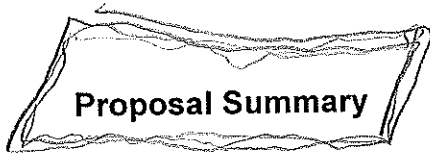
W.R. Dempster Ph.D., R.P.F.

Submitted by:

Foothills Model Forest

P.O. Box 6330
Hinton, Alberta
T7V 1X6

August, 2001



Proposal Summary

Applicant

Name: Foothills Model Forest
Mailing Address: Box 6330, Hinton, Alberta, T7V 1X6
Delivery Address: Environmental Training Centre, Hinton, Alberta
Contact Persons: Mark Storey, telephone 780 865 8332, fax 780 865 8331
Dick Dempster, telephone 604 886 0461, fax 604 886 0462

Sponsors

<i>Company</i>	<i>Contact Person</i>	<i>Telephone</i>
Alberta Newsprint Company	J. McCammon	(780) 778 7000
Blue Ridge Lumber	M. Summers	(780) 648 6325
Canfor	L. Greenhorn	(780) 538 7754
Millar Western Forest Products	J. Russell	(780) 778 2221
Spray Lakes Sawmills	G. Lehn	(403) 932 2234
Sundance Forest Industries	J. Huey	(780) 723 3977
Sunpine Forest Products	K. Branter	(403) 638 4482
Weldwood of Canada	H. Lougheed	(780) 865 8191
Weyerhaeuser Canada	P. Wearmouth	(780) 539 8500

Project Information

Type: Inventory / Planning

Term: April 1, 2000 to March 31, 2005.

Amount of funds:	\$520,000	FRIP funds to Applicant for Development and Management
	\$211,106	external funds to Applicant for Development and Management
	<u>\$807,277</u>	to Sponsors for Regeneration Project (FRIP eligible)
	\$1,538,383	total

(Actual amounts requested for Regeneration Project may vary from estimates contained in this Proposal, and will be specified in supplementary funding applications submitted directly by the Sponsors)

Attachments

1. Proposal
2. Project Schedules
3. Appendices
 1. Sub-project 2: Plan and Experimental Design
 2. Funding Application Formats for Sub-project 2

Acknowledgement by Applicant

The Applicant (jointly with the Sponsors and severally the "Signatory") acknowledges having read and agreed to the terms and conditions described on the attached schedule to which the Application under the Program is made subject. The Applicant acknowledges and agrees that by its submission of this application it shall be bound by the terms of the Program, FRIAA's policies, procedures, protocols and guidelines. It is also acknowledged and agreed that this application may be accepted by FRIAA on further terms or conditions, which shall be binding on the Signatory once the proposed project is undertaken by the Signatory.

Applicant: _____

1. Proposal

1.1. Background

In response to interest by industry and government, the Foothills Model Forest facilitated collaboration among a number of softwood producers to create a Foothills Growth and Yield Association for co-operative forecasting and monitoring of managed stand growth and yield, particularly of lodgepole pine. Nine companies are now participating in the Association as voting members. The Alberta Land and Forest Division and the Foothills Model Forest are participating as non-voting members, with the Model Forest acting as the coordinating agency.

The potential value of a co-operative lodgepole pine growth and yield research program was recognized in 1997 by a number of companies holding Forest Management Agreements and Timber Quotas on the Eastern Slopes.

The Foothills Model Forest appointed a part-time Director on June 21, 1999, with the mandate to develop a growth and yield co-operative. The Director reviewed background work and consulted with nine companies holding timber tenures in the region, as well as the Alberta Land and Forest Service (now Alberta Land and Forest Division), and the Canadian Forest Service. During the summer of 1999 a scope assessment was undertaken to assess the needs of potential program participants. This was followed by a workshop among the potential co-operators on October 22, 1999. As a result of the workshop, a memorandum of agreement and preliminary work schedule was developed and endorsed by nine companies, the Land and Forest Service, and the Foothills Model Forest.

The Foothills Model Forest, acting as applicant on behalf of the nine sponsoring members, submitted the original proposal for this Project to the Forest Resource Improvement Association of Alberta (FRIAA) in July 2000. The proposal was approved. A contract was issued (FOOMOD-01-01 – *Foothills Growth and Yield Association*) on July 25, 2000, and a requested amendment was approved effective September 12, 2000. The original proposal and contract had an initial term of two years (April 1, 2000 to March 31, 2002). The revision contained in the following pages extends the term to five years (April 1, 2000 to March 31, 2005), and describes changes and expansions to the Project developed during its first year.

1.2. Purpose

The goal of the Project and the Association is to forecast and monitor stand development and timber yields associated with enhanced forest management of lodgepole pine in the Lower and Upper Foothills and the Subalpine Natural Sub-regions of Alberta.

1.3. Methods and Deliverables

The goal of the Project and the Association will be achieved through a series of sub-projects developed cooperatively by members, in consultation with government agencies and other experts in forest growth and yield. Sub-projects of the Association will be designed to deliver yield

forecasts and establish validation programs for treatment regimes and site conditions of common interest to all members.

Yield forecasts are defined here as quantitative estimates of future stand timber yields, agreed by the scientific and regulatory community as the most probable outcome of the treatment regime being applied to the range of stand and site conditions specified. *Validation programs* will involve replicated field trials based on valid experimental designs.

The nature of tree growth requires the program to be long term and ongoing. Interim forecasts will be made of the growth and yield parameters being tested at the time of trial establishment, using the best available models and data. (These will be reported for each sub-project in a technical Establishment Report). The full benefits of the program will be derived from periodic growth re-measurements taken throughout the crop rotation. This Application details only the sub-projects, work phases and deliverables currently proposed for the next two years. It will be supplemented as new sub-projects and phases are developed.

Detailed methods are will be specified in sub-project plans and experimental designs. A Technical Committee and the Director develop project plans for approval by a Steering Committee (see Section 1.5).

Measured variables will include (a) stand and site parameters prior to or at time of treatment, and treatment parameters, and / or (b) stand and site parameters at benchmark stand development stages. These variables will include, or be stratified by, a common ecological site classification system. Forecast variables will include future stand conditions, and timber yields from intermediate (if applicable) and final harvests, at utilization standards agreed by the members.

Members of the Association on their tenured lands will carry out installation and measurement of growth and yield trials, and provide data, in a format defined by the Technical Committee and the Director. The Model Forest has engaged a Field Coordinator responsible for the control and compilation of data consistent with approved project plans.

Recognized scientific experts in growth and yield, silviculture, biometrics, tree nutrition, and forest ecology will review project plans and results, and / or participate in analyses. Meetings will be held at least once a year, to which experts will be invited to attend and participate. Formal peer review will be encouraged through the publication of project results.

Three sub-projects are currently at various phases of planning and development:

1. *Development and Management of the Foothills Growth and Yield Association.* The Foothills Model Forest initially supported this work. Commencing April 1, 2000, support has been provided through an Annual Membership Fee, which members may elect to fund from their FRIP accounts.
2. *Forecasting and Monitoring of Growth and Yield in Regenerated Lodgepole Pine Stands ("Lodgepole Pine Regeneration Project").* Planning, detailed design and pilot installation was undertaken in fiscal year 2000. Approximately 90% of the establishment and initial measurement work phase will be completed by March 31, 2002, and the remainder during 2002. An extension of the Project to compare pre-harvest and post-harvest site indices will be undertaken in the 2001 or 2002 field season.

3. *Management of Nutrition and Density in Fire-origin Stands of Lodgepole Pine* ("Nutrition and Density Management Project", referred to as "Late-stage Trial" in original proposal). A conceptual project plan, including preliminary technical and financial proposals, was completed in 2000. The first phase of the Project, a detailed evaluation and scope assessment, will be completed during 2001.

Funding is currently being applied for as follows.

1.3.1. Sub-project 1: Development and Management of the Association

The Annual Membership Fee for the period April 1, 2000 to March 31, 2002 is \$10,000 per voting member. In order to maintain a positive balance to March 31, 2005, at projected levels of expenditure and assuming no other sources of income, the annual fee will need to be increased to \$15,000 starting April 1, 2002. The fee is intended to cover the costs incurred by the Foothills Model Forest in management of the Association, and project design, coordination, quality control, and analysis. The associated deliverables will include:

1. annual reports of the activities, expenditures and achievements of the Association;
2. establishment and technical reports for Sub-project 2 (see 1.3.2 below);
3. a detailed scope assessment for Sub-project 3 and a scientific paper on knowledge gaps and the feasibility of operational fertilization and thinning of lodgepole pine in Alberta (see 1.3.3);
4. establishment and technical reports for any ensuing trials under Sub-project 3;
5. at least one technical information-exchange meeting per year, involving invited experts and providing educational value to members.

1.3.2. Sub-project 2: Lodgepole Pine Regeneration

The sponsoring partners will undertake establishment, treatment and measurement of the main field trial (see Appendix 1: *Project Plan and Experimental Design.*) plus an extension of the Project to compare pre-harvest and post-harvest site indices (see Appendix 1, Section 7). Costs are estimated and included in Section 2, but will be the subject of individual supplementary applications by the sponsors. The deliverables of the sponsors individually will be field installation, treatment, demarcation, and measurement of sample plots, verified by the Foothills Model Forest. The collective deliverables will include:

1. first preliminary establishment report (see *Foothills Growth and Yield Association – Consolidated Annual Report 2000-2001*);
2. second preliminary establishment report (to March 31, 2002);
3. final establishment report (by March 31, 2003);
4. technical report and scientific paper on comparison of pre-harvest and post-harvest site indices (by March 31, 2003);
5. technical report and scientific paper on early crop performance (by March 31, 2005).

1.3.3. Sub-project 3: Nutrition and Density Management

No funding, additional to Sub-project 1, is currently being applied against this sub-project. A scope assessment will be conducted as part of Sub-project 1. Any subsequent phases will be the subject of a new project proposal and new funding, although analytical and coordination services may continue to be provided out of Sub-project 1.

As part of the scope assessment, the Alberta Research Council (ARC) will provide under contract to the Association an expert review that will identify the knowledge gaps and feasibility of operational fertilization and thinning of lodgepole pine in the province of Alberta. Dr. Barry White of ARC will serve as principle investigator. Dr. White will collaborate with fellow scientists at the University of Alberta, namely Dr. Scott Chang and Dr. Victor Lieffers, and other experts as necessary. The ARC will sub-contract a research grant to Dr. Chang of the University of Alberta for this purpose. The final report will be re-formatted and submitted for publication in a peer-reviewed journal article, subject to approval by the Association's Steering Committee.

1.4. Rationale

This Section further describes how the Project fulfils the key proposal evaluation criteria of FRIAA.

1.4.1. Application of Results

The Project will enhance the management of forest resources by providing a continually improved, scientific, quantitative, and credible basis for:

- Evaluating and selecting silvicultural regimes and crop plans for the enhanced management of lodgepole pine;
- Forecasting the sustainable supply of timber from forest tenures containing lodgepole pine, and validating estimates of allowable cut;
- Improving the sustained yield of these forests through enhanced forest management.

Results will apply directly to over two million hectares of tenured and operable pine stands with a current allowable cut of about 5 million cubic metres per year, within the forest tenures of the 9 member companies of the Association. Information from this Project will be used to assess, develop, and approve strategies for enhanced and sustainable forest management within these forest tenures. It will be incorporated into variable regeneration standards, silvicultural prescriptions, crop plans, managed stand yield tables, and forest management plans. Because trials are stratified on an ecosystematic basis, rather than by tenure, the results will be generally applicable to much of the natural range of lodgepole pine in Alberta.

The Project will improve the integrated and sustainable management of forest ecosystems through:

- improved assessment of ecosystem productive capacity;
- improved assessment of the sustainable use levels of a biological resource;
- promotion of cooperation, partnership, and shared responsibility among forest managers and researchers;

- increased levels of knowledge and awareness of sustainable forest management;
- continual improvement of sustainable forest management practices;
- stand-level data providing the basis for assessing impacts of enhanced forest management practices on biological diversity, natural ecosystem processes, and contributions to global ecological cycles.

1.4.2. Relationship to Existing Responsibilities

The work proposed pertains to the voluntary enhancement of forest management information and practices, and is not the responsibility of the industrial sponsors under any legislation, regulation, tenure, policy or specific agreement. The Project will assist the Government of Alberta in meeting its responsibilities for sustainable resource management, by providing improved assessment of forest growth and yield through the development of scientifically rigorous data and third-party evaluations.

1.4.3. Impacts

The Project is not anticipated to have any adverse impacts on any other forest resource values or users. It has the active support of the land management agency involved (Alberta Sustainable Resource Development, Land and Forest Division), and has been reviewed and endorsed by the Board and partners of the Foothills Model Forest, representing a broad spectrum of forest stakeholders and researchers.

1.4.4. Standards

Standards of experimentation will meet those accepted by the scientific community for biometric research. This is being achieved by third-party participation in project planning, and / or review of experimental designs, by recognized experts at the University of Alberta, the Alberta Research Council and other recognized centres of excellence. Measurement standards will follow or exceed those used by the Alberta Land and Forest Division (LFD) in monitoring stand dynamics. (The LFD has assigned mensurational expertise to the Association Technical Committee). Standards for forest site classification and evaluation are based on the latest published and government-approved field guides for west central and southwestern Alberta. High standards of analysis will be ensured by use of qualified personnel, extensive networking with growth and yield analysts and modelers, and peer review of results.

1.4.5. Fair Market Value

Work will be undertaken using a combination of contractors and employees of the Foothills Model Forest and sponsors. Equipment will be leased. General benchmarks, used to ensure that fair market value is obtained for planned expenditures, will include:

- Project Manager. Prevailing consulting or salary rates for senior registered professional foresters with formal post graduate qualifications in forest science and twenty or more years relevant experience.

- Field Coordinator. Prevailing salary or contract rates for a registered professional forester with a minimum of five years leadership experience in forest field measurements.
- Other contractors and field personnel. Prevailing contract or wage rates based on the respective categories of work.
- Equipment rental. Market rates where these can be established. If equipment is leased (e.g. by the Foothills Model Forest to the Project) for which comparable market rates are not available, values will be based on an appropriate depreciation rate on capital value.

1.5. Project Management and Responsibilities

The Association is a cooperative project involving voting members (who are all FRIAA members identified as the "sponsors" in Section 1 above), the Alberta Land and Forest Division (LFD), and the Foothills Model Forest (as Coordinating Agency).

1.5.1. Sponsors

Responsibilities of the sponsors will include:

- Installation and measurement of growth and yield trials on their tenured lands;
- Provision of error-free data, in a format defined by the Coordinating Agency and the Technical Committee, from these trials to the Coordinating Agency;
- Appointment of a representative to the Steering Committee with authority to represent the Member's strategic and financial interests;
- Assignment a representative to the Technical Committee with authority to represent the Member's technical views and interests;
- Installation and periodic measurement of growth and yield trials as specified in the work plan approved by the Steering Committee;
- On or before April 1 each year, payment of a membership fee approved by the Steering Committee to support the direct costs incurred by the Coordinating Agency in the management of the Association.

Field trials and associated silvicultural activities will be conducted under authority of the sponsors' timber tenures.

Overall control of Project management is vested in the Steering Committee, which will:

- Meet at least once each year;
- Elect from among the Voting Members' representatives a chairperson who shall call and chair meetings (the current Chairperson is H. Loughheed of Weldwood Canada);
- Define, periodically review, and revise as necessary, a minimum project contribution level for Voting Members;
- Set, annually review, and revise as necessary, annual membership fees;
- Review and approve project plans, data standards, annual work plans, annual operating budgets, reports, and priorities for supporting research;
- Review and approve contracts for outside services, data sharing agreements, and other business arrangements proposed by the Director;

- Approve assignment to the Association of personnel hired or contracted by the Coordinating Agency;
- Approve the publication and dissemination of information resulting from Association projects.

The Technical Committee, supported by the Director and a Field Coordinator, will:

- Develop project plans, experimental designs and standards for approval by the Steering Committee;
- Assist the Director in the development of work plans and budgets;
- Coordinate the installation and measurement of field trials;
- Monitor program implementation, quality control, and data delivery;
- Evaluate project results.

1.5.2. Land and Forest Division

The Land and Forest Division (LFD) of the Alberta Ministry of Sustainable Resource Development has undertaken to:

- Assign the Director of Forest Management, or an equivalent senior official of the LFD, to participate on the Steering Committee in a non-voting advisory capacity;
- Assign a technical expert, or experts, knowledgeable in forest planning and yield forecasting, to the Technical Committee to provide advice on matters pertaining to project planning, experimental design, quality control, data acquisition, model development and validation, project evaluation, and regulatory requirements for yield forecasting and validation.

1.5.3. Foothills Model Forest

The Foothills Model Forest, as Coordinating Agency for the Association, will be responsible for:

- Administration of the Project;
- Ensuring that project plans, experimental designs, and data standards are developed in a timely manner;
- Data compilation;
- Control of data quality consistent with plans and standards approved by the Steering Committee;
- Selection or development (as appropriate), testing, and validation of stand-level growth and yield models which best represent the experimental sites, practices and data evaluated;
- Dissemination of information to, and continuing education of, Association members in matters relevant to the Association;
- Preparation and submission of the Project reports listed in Section 2.1.

The Foothills Model Forest will:

- Continue to retain the services of a Director to manage the Association;
- Retain or assign other staff and contract services, including the services of a Field Coordinator;

- Administer the annual operating budget of that portion of the Project for which it is directly responsible (Sub-project 1);
- Control expenditures in accordance with the approved operating budget, generally accepted Canadian accounting practices, and FRIAA requirements;
- Maintain books of account of all funds contributed and dispersed on behalf of the Project, in accordance with FRIAA requirements and generally accepted Canadian accounting practices, and subject to annual independent audit;
- Procure and maintain equipment and supplies required by the Project;
- If applicable, procure, own, and maintain equipment requiring capital expenditures, and lease such equipment to the Project at rates not exceeding fair market value
- Maintain a secure repository of all Association data.

1.5.4. Project Manager

The Project Manager will be Dr. W.R. (Dick) Dempster, who is contracted to the Foothills Model Forest as Director of the Association.

The Project Manager, subject to the approval and supervision of the Steering Committee, will:

- Prepare an annual work plan and budget;
- Act as chairperson to the Technical Committee;
- Ensure that sub-project plans, experimental designs, and data standards are developed in a timely manner;
- Supervise a field coordinator or other staff approved by the Steering Committee;
- Consult with the Technical Committee regarding the selection, establishment and measurement of field trials;
- Ensure the timely compilation of Project data consistent with approved project plans and quality standards;
- Undertake, or direct the undertaking of, analysis of data and the selection, development, testing, or validation of appropriate stand-level models;
- Report the results of sub-projects to Association members and FRIAA;
- Arrange dissemination to Association members of information on matters relevant to the Project, including a minimum of one educational meeting or field trip per year;
- Provide progress reports to the Coordinating Agency at least every three months, annual reports to the Steering Committee and FRIAA, and technical reports as required and scheduled elsewhere in this proposal;
- Act as Secretary to the Steering Committee;
- Collaborate, cooperate and confer with other agencies as appropriate and necessary to further the interests of the Association;
- Arrange the dissemination or publication of data and results as directed by the Steering Committee.

2. Project Schedules

2.1. Work and Reporting Schedule

Table 1 summarizes project phases, deliverables, and due dates for deliverables and reports.

Table 1
Work and Reporting Schedule

<i>Sub-project</i>	<i>Phase</i>	<i>Deliverable</i>	<i>Due</i>
1. Association Development and Management	Management (April 1, 2000 – March 31, 2005)	Progress reports	Quarterly
		Annual reports	March 31 each year
		Steering Committee meeting minutes	After each meeting as directed by Committee
		Information exchange meetings, tours, and / or technical sessions	At least one per year
		Sub-project reports	See Sub-projects 2 and 3
2. Lodgepole Pine Regeneration	Establishment and measurement (June 15, 2000 – March 31, 2005)	Status reports	Annually; quarterly if required
		Establishment and measurement verification reports	Prior to final payments by FRIAA to sponsors
		Preliminary establishment reports	March 31, 2001 and 2002
		Final establishment report (including yield forecast)	March 31, 2003
		Crop performance report & scientific paper	March 31, 2005
	Treatment (August 1, 2002 – March 31, 2005)	Industrial Evaluation Herbicide Project proposal	May 1, 2002
		Herbicide monitoring reports	Annually following approval herbicide project approval
	Site index extension (September 1, 2001 – October 31, 2002)	Technical report and scientific paper	March 31, 2003
3. Nutrition and Density Management	Scope Assessment (July 1, 2001 – March 31, 2002)	Draft report	December 31, 2001
		Final report and scientific paper	March 31, 2002

Members of the Association have agreed on a schedule for allocating Sub-project 2 fieldwork among members. (See Section 2.2.2 and Appendix 1.)

2.2. Budget and Payment Schedules

The following budget and payment schedules summarize the estimated costs associated with the work scheduled above (in Section 2.1). Schedules for Sub-project 2 will be confirmed by supplementary applications from sponsors (see Appendix 2).

2.2.1. Sub-project 1: Association Development and Management

Table 2 itemizes income and expenditures for the period April 1, 2000 to March 31, 2005. Those for fiscal year 2000 (i.e. April 1, 2000 to March 31, 2001) are actual; those for the remaining years are forecast. The schedule includes and differentiates all sources of direct income to the Association (i.e. not only FRIP monies). It does not include in-kind or indirect contributions (e.g. field coordinator salary / fee costs for first two years, and administrative costs incurred by the Foothills Model Forest).

Table 2
Income and Expenditures for Sub-project 1: Association Development and Management

Income / Expense	2000	2001	2002	2003	2004	Total
Income						
Foothills Model Forest (PEF contribution)	146,106					146,106
Membership fees - FRIP (FRIAA contract)	70,000	70,000	105,000	105,000	105,000	455,000
Membership fees - FRIP (member direct)	10,000	10,000	15,000	15,000	15,000	65,000
Membership fees - non-FRIP	10,000	10,000	15,000	15,000	15,000	65,000
Total income	236,106	90,000	135,000	135,000	135,000	731,106
Expenses						
Director	62,370	64,800	64,800	64,800	64,800	321,570
Field Coordinator	-	-	50,000	50,000	50,000	150,000
Other contract services	-	45,000	5,000	5,000	5,000	60,000
Vehicle (rental and / or mileage)	3,394	4,358	4,358	4,358	4,358	20,826
Expenses (contractors & FMF staff)	7,789	14,970	14,970	14,970	14,970	67,669
Meetings	4,551	7,321	7,321	7,321	7,321	33,835
Equipment & miscellaneous	6,721	12,809	3,000	3,000	3,000	28,530
GST	5,318	9,400	9,414	9,414	9,414	42,959
Total expenses	90,143	158,658	158,863	158,863	158,863	725,389
Ending Balance	145,963	77,305	53,442	29,580	5,717	5,717

2.2.2. Sub-project 2: Lodgepole Pine Regeneration Trial

Forecast costs of establishment, measurement and treatment are summarized in Table 3. These costs include the main long-term monitoring trial plus the short-term comparison of pre-harvest and post-harvest site indices. Table 4 shows total costs for the main monitoring trial (i.e. excluding the site-index comparison) broken down by member company, assuming that all companies incur the same costs for each of the operations listed in Table 3, and that only Sunpine undertakes stem-mapping. Estimated costs are indicative only. The actual amount and timing of costs will vary among the sponsors. The estimates are based on a total of 103 installations committed by members.

Table 3
Unit and Total Costs for Sub-project 2

Operation	Year	\$ per installation	Total \$
Establishment and initial measurement	2001	4,625	476,375
Stem mapping (optional)	2001	765	10,710
Mortality and competition assessment	2002	320	32,960
Full measurement	2003	1,500	154,500
Mortality and competition assessment	2004	320	32,960
Brushing (applies to 40% of installations)	2002-04	275	11,330
Comparison of pre- and post-harvest SI	2001-02	n/a	50,000
Overhead (5%)			38,442
Total			807,277

Table 4
Indicative Costs by Sponsor for Sub-project 2 Monitoring Trial

Company	# of installations	Contract cost	Overhead cost	Total cost	Av. cost / installation
ANC	6	41,250	2,063	43,313	7,219
BRL	8	55,000	2,750	57,750	7,219
Canfor	6	41,250	2,063	43,313	7,219
MWFP	6	41,250	2,063	43,313	7,219
Spray Lakes	6	41,250	2,063	43,313	7,219
Sundance	6	41,250	2,063	43,313	7,219
Sunpine	14	106,960	5,348	112,308	8,022
Weldwood	21	144,375	7,219	151,594	7,219
Weyerhaeuser	30	206,250	10,313	216,563	7,219
Total	103	718,835	35,942	754,777	7,328

Appendices

Appendix 1

Sub-project 2: Plan and Experimental Design

1. Project

Effects of Site, Competition, and Initial Density Management on Early Crop Performance and Stand Growth and Yield of Lodgepole Pine

Short title: *Lodgepole Pine Regeneration Project*

2. Objectives

The general purpose of the Project is to forecast and monitor the growth and yield of regenerated lodgepole stands in relation to site, early crop performance and stocking, vegetative competition, and density regulation.

The Project is designed to answer the following questions:

- What are the relationships between early stand conditions (stocking, height growth, density, competition) and subsequent growth and yield?
- How does stand growth and yield respond to different levels of initial spacing and pre-commercial thinning?
- How do these responses and relationships vary across sites of primary interest?

The experimental objectives are:

1. Estimate the effects of site and establishment factors on early crop performance.
2. Estimate the effects of site and establishment factors on subsequent stand growth and yield.
3. Estimate the effects of early crop performance and density regulation on subsequent stand growth and yield.

The site factor of prime interest is ecosite, including the associated soil and moisture regimes. However, other site factors are also of interest because they are expected to influence early crop performance and subsequent growth and yield. These include:

- local climate as reflected by natural sub-region, ecodistrict, elevation, latitude, and topographic position;
- edaphic factors not necessarily captured by the ecosite classification;
- biotic factors, particularly occurrence of pathogens.

The establishment factors of primary interest are:

- initial spacing (of planted stock);
- natural ingress and mortality (of lodgepole pine);
- competing vegetation (other species);
- density regulation (pre-commercial thinning).

The following attributes of early crop performance will be monitored from installation until the average height of trees on the plot exceeds 1.3 m:

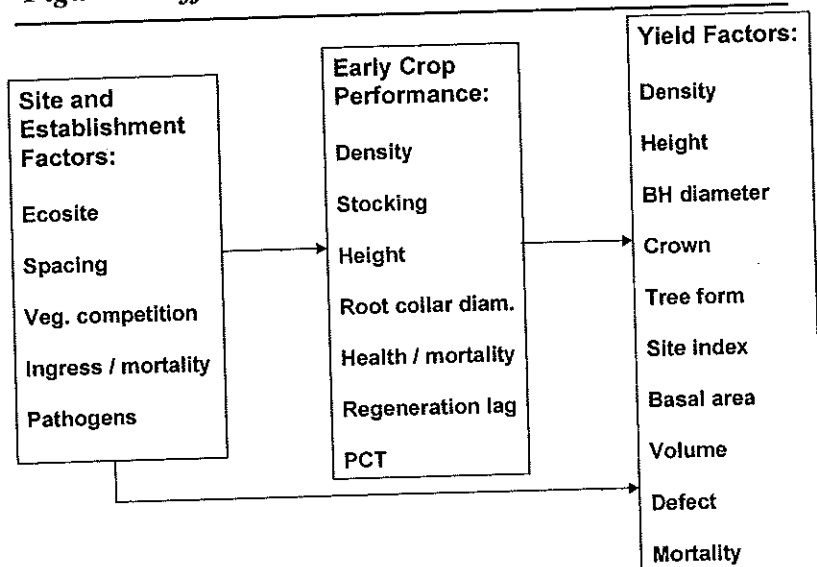
- density;
- stocking;
- height;
- root-collar diameter;
- health;
- mortality
- regeneration lag.

Monitoring of the following attributes of subsequent stand growth and yield will continue or commence when the average height of trees on the plot approaches 1.3 m:

- density;
- height;
- breast-height diameter;
- crown development;
- tree form;
- site index;
- basal area;
- volume;
- health and defect;
- mortality.

The effects to be estimated and monitored are summarized in Figure 1.

Figure 1. Effects to Be Estimated



3. Experimental Treatments

3.1. Ecosite

Table 1 shows the 5 ecosite categories that will be recognized in the experimental design, and references the associated field guides and natural sub-regions.

Table 1. Ecosite Categories

<i>Ecosite (and Edatope)</i>	<i>WC</i>	<i>SW</i>	<i>NSR</i>
1. Bearberry / lichen / h.w. rye (submesic / subxeric, medium – low)	b, c	b	any
2. Labrador tea – mesic (mesic – poor)	d	c	UF LF
3. Billberry / cranberry / sarsaparilla / rhododendron (mesic / medium)	e	d	SA/UF LF
4. Honeysuckle / fern (subhygric – rich)	f	e	UF LF
5. Labrador tea – hygric (hygric – poor)	h	f	any

WC = west-central guide
SW = southwestern guide
NSR = natural sub-region

3.2. Management Treatments

Controlled management treatments will involve initial spacing of planting stock (6 levels

Table 2. Management Treatments

<i>Treatment</i>	<i>N</i>	<i>Explanation</i>
Spacing	6	control (no planting); plant: 816, 1111, 1600, 2500, 4444 per ha
Vegetation management	4	none, weed, pre- commercially thin, weed and PCT

including no planting), and 4 vegetation management treatments (see Table 2).

Details of procedures for management treatments are contained in: *Lodgepole Pine Regeneration Project - Field Manual*, Foothills Growth and Yield Association, 2001.

4. Statistical Design

The trial is a three-level split-plot design. The basic balanced design consists of 90 field installations (5 ecosites x 6 spacings x 3 replications), with each installation split into 4 plots (vegetation management treatments). Additional replication may be added. An additional 12 installations (6 spacings x 2 replications) has so far been added in the modal category 3 ecosite, to produce a total of 102 installations. The three levels are described below for the basic balanced design.

Level A:

Installations within each of the 5 ecosites are blocked into 3 geographic "groups", to produce a total of 15 groups. Note that these groups are *blocks* in the statistical sense, but not cut-blocks. Rather, they are geographic groups of cut-blocks having the same ecosite and similar climatic, edaphic, and site preparation characteristics. The intent is to reduce the confounding influence of uncontrolled site and management variables on spacing effects and interactions. These uncontrolled variables will also be measured at each installation and may be included in the analysis of variance (see below) as co-variates.

Level B:

6 installations (one for each spacing treatment) in each of the 15 "groups".

Level C:

Each installation is split into 4 vegetation management treatment plots.

Each installation is actually a "split-plot", and will be split two ways (weeding / no weeding and eventually thinning / no thinning) to produce 4 sub-plots (see Figure 2).

Table 5 shows the design in terms of analysis of variance and degrees of freedom.

Table 3
Analysis of Variance

Analysis of Variance		Degrees of Freedom
Level A	Ecosite	4
	Error	10
Level B	Spacing	5
	Spacing * ecosite	20
	Error	50
Level C	Vegetation management	3
	Vegetation management * spacing	15
	Vegetation management * ecosite	12
	Vegetation management * spacing * ecosite	60
	Error	180
Total		359

5. Sample Selection

Initial selection was based on sampling from a list of candidate cut-blocks that were available for planting in 2000 or 2001, are to be managed for lodgepole pine, and fall within one (or more) of the 5 ecosite categories (see Table 1). Sufficient information was required to locate the centroid of the block on the UTM grid, and to identify the most probable ecosite category. Useful additional information included: pre-harvest assessment, area, natural sub-region, ecodistrict, confirmed ecosite(s), edatope, elevation, latitude, aspect, slope percent, slope position, soil classification, pre-harvest ecosite phase, pre-harvest site index, site preparation method and equipment, and proposed planting stock and season.

The preliminary selections required field checking to confirm that each cut-block within a group contained a minimum of 1 square hectare meeting the following conditions common to all other cut-blocks within the group:

1. Same ecosite category and position on edatopic grid.
2. Similar soil texture, drainage, and parent material.
3. Within 100 m elevation.
4. Slope less than 10% or, if 10% or greater, within 5%.
5. Similar slope position: upper, mid, lower (if lower slope position, take particular care to ensure similar soil drainage and nutrient regime).
6. Similar aspect. Ensure commonality with respect to N versus S, and wind exposure. Preferably within 45 degrees.
7. No evidence of differences in brush hazard.
8. Same method and time (season and calendar year) of site preparation, and preferably (but not necessarily) the same site preparation contractor.
9. Maintain a minimum buffer distance of 20 m from the treatment plots to block edges, roads, or other disturbances likely to create edge effects. No burning of slash piles should have occurred, or be scheduled, anywhere within the installation or (blue) protective buffer.

In the event that candidate locations failed to meet these criteria, that access costs were prohibitive for some blocks, and / or that some blocks were geographically distant from the rest of the group, alternative blocks were substituted for the candidate ones providing that the substitute blocks met the above criteria. Where large cut blocks were available, and difficulty was encountered in identifying 6 blocks with common criteria, more than one installation was allowed in a single cut block.

Contiguous or square installations were not always be possible due to discontinuities in ecosites or some of the conditions listed above. In such situations the installation was reconfigured so that the 4 treatment plots were in a line, staggered, or separated

Determination of whether a block is sufficiently accessible was left to the individual member. Although it is desirable to constrain allocation of plots as little as possible, it should be borne in

mind that establishment of the installation creates a commitment to continual monitoring. Plots were located only where the member is willing to pay for subsequent re-measurement.

6. Installation and Measurement

Details of procedures for installation and measurement are contained in: *Lodgepole Pine Regeneration Project - Field Manual*, Foothills Growth and Yield Association, 2001. Members committed to installations as indicated in Table 6. Table 6 also shows the number of installations planted as of July 31, 2001.

Table 6
Allocation and Current Status of Installations by Company

Company	# of installations	
	committed	planted (July 2001)
Alberta Newsprint	6	6
Blue Ridge Lumber	8	0
Canfor	6	6
Millar Western	6	6
Spray Lakes	6	6
Sundance	6	6
Sunpine	14	14
Weldwood	21	18
Weyerhaeuser	30	30
Total	103	92

Table 7 shows the measurements required during the first 5 growing seasons.

Table 7
Timing of Required Measurements

Measurement Category	Growing Season					
	0	1	2	3	4	5
Site	x					
Planting density	x					
Coniferous density		x		x		x
Coniferous stocking		x		x		
Competition – shrubs and herbs	x	x	x	x		x
Competition – deciduous trees	x	x	x	x		x
Size and growth	x	x		x	x	x
Mortality		x	x	x		x
Health	x	x		x		
Age						x

Ten categories of measurement are recognized and required during the first five years of the trial. Note that timing of measurements is expressed in growing seasons completed following planting

of the installation. Measurements should be made at the end of the growing season, following terminal bud set.

The required information for Growing Season 0 should be collected for all installations at the time of establishment (or earlier in the case of site index). If an installation is established with cold-stored stock and planted in the Spring of 2001 so that the trees flush in the 2001 growing season, the measurements indicated for Growing Season 1 should also be made in 2001, following bud set. If an installation is planted late in the season with set trees, the measurements for Growing Season 1 should be made after bud set in 2002.

7. Project Extension: Comparison of Pre-harvest and Post-harvest Site Indices

7.1. Justification and Purpose

Site index (SI) change is the most serious impediment to initial forecasting of the growth and yield responses being monitored by the Lodgepole Pine Regeneration Project. In March 2001, the Association Steering Committee decided to proceed with a cooperative extension to the current Project, involving paired-plot sampling of stands in each of the Project's five ecosite categories, preferably in combination with permanent sample plot data contributed by members.

The purpose of the Project extension will be to provide credible and reliable forecasts of post-harvest SI, for the main ecosite categories of interest to members, relative to pre-harvest SI values.

7.2. Methodology

The development by some Association members of permanent sample plot (PSP) data with pre- and post harvest measurements provides an unprecedented opportunity for evaluating changes in SI and stand height development using true time-series information.

Data for at least 80, and possibly as many as 100, permanent sample plots are expected to meet minimum criteria for site index assessment of the regenerated, as well as pre-harvest, condition. Site indices will be estimated from height and age data using available published models for young and mature lodgepole pine. Differences between pre-harvest and post-harvest values will be evaluated by paired samples t-test.

In addition to the above "vertical comparison" based on true time-series data, a contemporaneous ("horizontal") comparison will be made based on paired-plot data collected specifically for the purpose.

Fifty stands or cut blocks throughout members' tenures will be identified, in which the regeneration has reached at least five years breast-height age, and portions of the original parent stand are still standing on the same ecosite as the regeneration. If possible, 10 such stands will be located for each of the five ecosite categories recognized in the main Project.

Three pairs of plots will be located, each with one plot in the regenerated portion and one in the parent portion of the stand. Each pair will be placed in such a way that both plots occur in the same soil moisture and nutrient regimes. The plots will be installed, and site trees will be selected and measured as described below.

The plots will be circular, radius 9.77 m, with an area of 300m². In the pre-harvest parent stands, the total height and breast-height age of each of the three largest-DBH valid lodgepole pine trees on the plot will be measured. In addition, stand density and other basic mensurational variables will be measured and compiled.

The same plot size, measurements, and tree selection criteria will be applied to immature regenerated stands, in addition to which the last five annual internode lengths will be recorded. This will normally require felling the tree. Splitting of the stem may be necessary to locate pith nodes in the event that annual whorls are indistinct, or there is an inconsistency between breast-height age as measured by whorl count versus number of growth rings.

The experimental design will permit the following statistical tests and analyses:

1. Paired samples t-test: a sensitive test to evaluate the overall difference in SI between pre- and post-harvest SI.
2. One-way repeat measure analysis of variance: will determine the significance of origin (pre- and post-harvest) effects relative to between-stand and within-stand variance.
3. Two-way analysis of variance and associated range tests: will allow evaluation of site and origin effects, and assessment of site and origin mean SI values and differences.

7.3. Arrangements for Sharing Effort and Data

Costs will be distributed among members according to the formula developed for the main Project (see Table 6). Existing available PSP data may be recognized as a valid contribution, and therefore should be offset against a member's required level of contribution to the new paired plot data. This will require agreement on an equivalence ratio between PSPs and the new paired plots.

The ultimate product of the Project extension will be a published peer-reviewed scientific report. Although the intent is to make the results public (subject to Steering Committee approval), the PSP data contributed by members will remain their property. Members' rights and privileges in this regard can be protected by a data sharing agreement between the member owning the data and the Foothills Model Forest which, as Coordinating Agency for the FGYA, is charged with conducting the analysis.

Appendix 2

Application and Schedule Formats for Sub-project 2

Forest Resource Improvement Association of Alberta

P.O. Box 11094, Main Post Office, Edmonton, Alberta T5J 3K4

PROPOSAL SUMMARY – APPLICATION Forest Resource Improvement Program (the "Program")

Applicant Information

Name of Applicant:		Phone:	
Mailing Address:		Fax:	
Contact Person:			
Delivery Address:			

Sponsor Information (if applicable)

Name of Applicant:		Phone:	
Mailing Address:		Fax:	
Contact Person:			
Delivery Address:			

Project Information

Type of Project	Term of Project	Amount of Funds Applied For
Inventory/Planning Foothills Growth and Yield Association – Sub-project 2: Lodgepole Pine Regeneration	April 1, 2000 – March 31, 2005	

Attachments:

- _____ Proposal: see "*Foothills Growth and Yield Association*" submitted by Foothills Model Forest, August 2001
- _____ Proposed payment schedule (attached if different from Section 2 of Proposal)
- _____ Schedule of financial and technical reports (attached if different from Section 2 of Proposal)
- _____ Other: _____
- _____
- _____
- _____
- _____

Acknowledged by Applicant and/or Sponsor

The Applicant and/or Sponsor (jointly and severally the "Signatory") acknowledge having read and agreed to the terms and conditions described on the attached schedule to which the Application under the Program is made subject. The Signatory acknowledges and agrees that by its submission of this application it shall be bound by the terms of the Program, FRIAA's policies, procedures, protocols and guidelines. It is also acknowledged and agreed that this application may be accepted by FRIAA on further terms or conditions, which shall be binding on the Signatory once the proposed project is undertaken by the Signatory.

Applicant

Sponsor

Payment and Completion Schedule					
Operation	# of installations	Start date	End date	Requested payment	
				Amount (\$)	Date

Schedule of Financial and Technical Reports	
Date	Report

Note: these schedules are required only if the scope, cost and / or schedule of work for a Project participant differ from those in Section 2 of the main Proposal.

Lodgepole Pine Regeneration Trial – Brushing

Foothills Growth and Yield Association - Lodgepole Pine Regeneration Trial

Vegetation Management Treatments - Brushing

General

The Lodgepole Pine Regeneration Trial is being developed to estimate the effects of site and establishment factors, including vegetative competition, on early crop performance and subsequent growth and yield of lodgepole pine regenerated following harvest. The field trial involves a "split plot" experimental design whereby each of approximately 100 one-hectare installations, covering a range of sites and planting densities, will be split two ways (weeding¹ / no weeding, and eventually thinning / no thinning) into four treatment plots.

At its Annual General Meeting, March 15-16 2001, the Association decided to control brush on the relevant plots by application of glyphosate herbicide. The herbicide will be applied if and when the plots reach threshold competition index levels indicating that brush is competing, or is likely to compete, with crop trees. The Director and other members of the Technical Committee were requested to seek expert advice on (a) appropriate competition indices and thresholds and (b) a streamlined process for obtaining regulatory approval. Experts consulted included Dr. Philip Comeau of the University of Alberta, and Mr. Rob Kessler of the Alberta Land and Forest Service. As a result of these consultations, triclopyr has been added as a possible supplementary herbicide if required for control of aspen.

Experimental Objectives

The experimental objective, relative to weeding, is limited to assessing the effect of brush competition on the performance, growth and yield of the lodgepole pine crop. Only two treatment levels are specified:

1. "no weeding": actually an experimental "control" in which brush is allowed to develop naturally on the site with no management intervention following site preparation;
2. "weeding": where the intent is to maintain brush occurrence below levels that are deemed to significantly compete with the development of crop trees.

Note that the trial is not designed to evaluate the efficacy of alternative brush control methods or herbicides. However, it will shed considerable light on the need for, and effect of, brush control on different sites.

Treatment Method

The selected primary treatment method is backpack (ground) fall foliar spraying with glyphosate. Basal bark application of triclopyr ester may also or alternatively be used where aspen competition exceeds specified thresholds (see below).

Glyphosate (trade name *Vision*) is a non-selective, post emergent, systemic herbicide that is extensively used on forestry to control a wide range of annual and perennial grasses, broadleaf weeds and woody plants.

¹ The term "weeding" is used here as synonymous with "brushing" and "brush control".

Triclopyr (trade name *Release*) is a selective, post emergent, systemic herbicide that can be used for highly selective control of woody plants and broadleaf weeds in woodlands.

Fall foliar spraying of glyphosate may be undertaken August to mid-September. This is after lodgepole pine buds have formed and hardened off. Grasses and weeds are still susceptible to herbicide at this time, and there is thus little chance of any herbicide injury to conifers. Woody plants may be less susceptible to glyphosate than to triclopyr, especially with fall application.

The decision to apply herbicide will be made on plot-by-plot basis. (Each treatment plot is 0.25 ha.) Once the decision is made to spray a plot with glyphosate, normally the entire 0.25 ha will be sprayed. Triclopyr will be applied selectively to targeted woody plant species.

Application rates and concentrations will be determined by expert evaluations of site, crop and vegetation data, gathered during the two years prior to application.

Competition Index and Treatment Thresholds

Competition index (CI) will be measured and computed annually on all plots for at least the first 3 growing seasons, and thereafter periodically as required. Separate assessments are made for the shrub/herb layer and deciduous tree competition.

The measurement procedures facilitate the computation of a number of different CI systems. At least initially, the following simple static index will be used, based on the work of Comeau²:

$$CI = ((\%C_1 \times H_1) + (\%C_2 \times H_2) + (\%C_3 \times H_3) + (\%C_4 \times H_4) + (\%C_5 \times H_5)) / CTH$$

where:

CI = competition index for a single crop tree;

$\%C_n$ = percent cover for the nth competitor species within a specified radius of the crop tree (1 m for herbs and shrubs and 2 m for deciduous trees);

H_n = modal height of the nth competitor species in cm;

CTH = height of the crop tree in cm.

A maximum of 5 competitor species will be included in each calculation, and to qualify the species must have a cover of at least 5%. The average of individual crop-tree indices will be computed for each treatment plot.

Based on provisional expert opinion, validated by experimental data provided by Weldwood of Canada, the following CI values will be used as a guide to determine the need for herbicide application to a treatment plot:

shrub and herbs: 60

deciduous trees: 100

If only a portion of a treatment plot exceeds these thresholds, treatment may be considered to avoid creating variability within the plot. If the density of aspen exceeds 400 stems per ha, even if the CI is less than 100, consideration may be given to removing these trees using basal bark

² Comeau, P. 1993. *Competition indices in decision-making*. Proceedings: NIVMA AGM.

application of triclopyr. The final decision to spray a plot should be based on assessments made earlier in the same season. Installations which, based on the previous year's assessments or local knowledge of the sites, are candidates for vegetation control, should be queued first for measurement. This will provide a window for assessment, making the spray decision, and spraying if required by mid September.

Application of the above threshold values are expected to result in a maximum of about 40% of the brushing treatment plots requiring treatment. This equates to a total of 20 ha for the entire field trial. No herbicide application is expected to be required prior to the fall of 2002.

Regulatory Approval Process

For the purposes of regulatory planning and approval by the Government of Alberta, all herbicide treatments for the Regenerated Lodgepole Pine Trial will be reviewed, approved, monitored and reported as a single Industrial Evaluation Project. The Association's Coordinating Agency will prepare the industry proposal, with input from the Technical Committee and approval of the Steering Committee. The proposal will be developed according to requirements outlined in the *Forest Management Herbicide Reference Manual* (Alberta Environment, Land and Forest Services, February 2001). No public involvement or notification will be required, because the Project is expected to involve not more than 20 ha of herbicide treatment. (This may be subject to further review if annual treatments consistently exceed the 20 ha limit.) The Coordinating Agency will prepare and submit each year a single monitoring report, in conformance with provincial guidelines and a monitoring reporting plan submitted as part of the Project proposal. The monitoring plan will include monitoring and reporting obligations for individual members, consistent with their roles and responsibilities as specified in the Memorandum of Agreement among Association members.

The Project plan will cover the entire period over which herbicides are expected to be required to establish crop trees on the brushing treatment plots. However, approval will be granted on an annual basis, and subject to annual review, with revisions if justified.

Implementation

Individual members are responsible for implementation of trials on their tenured lands. All application of herbicide must be conducted by a registered pesticide applicator certified for forestry applications under the Alberta Environmental Protection and Enhancement Act. It is expected that members may wish to collaborate in the retention and contracting of applicators, because of the small areas requiring treatment on any one tenure.

Project Proposal:
Comparison of Pre-harvest and
Post-harvest Site Indices

Foothills Growth and Yield Association

Project Proposal

Comparison of Pre-harvest and Post-harvest Site Indices

1. Justification and Purpose

The *Lodgepole Pine Regeneration (LPR) Project* was designed to forecast and monitor the growth and yield of regenerated lodgepole pine stands in relation to site, early crop performance and stocking, vegetative competition and density regulation. While monitoring is a long-term undertaking, initial forecasts will be developed as part of the *Project Establishment Report*.¹

Site index (SI) change is the most serious impediment to initial forecasting of the growth and yield responses being monitored by the LPR Project field trial. In an address to the Foothills Growth and Yield Association (FGYA) March 15, 2001, Shongming Huang, Senior Biometrician of the Alberta Land and Forest Division (LFD) suggested that time-series and contemporaneous comparisons of SI between fire origin and post-harvest stands are key to the scientific credibility and reliability of lodgepole pine yield forecasts. He proposed a paired-plot "vertical" and "horizontal" comparison approach, the former based on time-series data from permanent sample plots, and the latter from contemporaneous paired plots comparing fire-origin and regenerated (post-harvest) portions of the same original stand and site.

The FGYA Steering Committee subsequently decided to proceed with a cooperative extension to the current LPR Project, involving paired-plot sampling of stands in each of the Project's five ecosite categories, preferably in combination with permanent sample plot data contributed by members. The FGYA Director was instructed to consult with members having relevant data, and develop a project proposal for implementation.

The purpose of the LPR Project extension *Comparison of Pre-harvest and Post-harvest Site Indices* will be to provide credible and reliable forecasts of post-harvest SI, for the main ecosite categories of interest to members, relative to pre-harvest SI values.

2. Available Methods and Tools

The primary models that will be used for initial growth and yield forecasting in the LPR Project are GYPSY and TASS. The model developers at the LFD (GYPSY) and the B.C. Ministry of Forests Research Branch (TASS and the associated TIPS computer program) have agreed to the models being available for this purpose. Both these models require SI as input.

¹ Originally scheduled for March 31, 2002, finalization of the establishment report will be delayed until later in 2002 because a small number of installations will not be completed until the 2002 field season.

Shongming Huang *et al* (1997)² developed reliable subregion-based SI models for lodgepole pine that are capable of forecasting SI from tree height and age, including from young trees with ages older than two years at breast-height. He also developed a series of growth-intercept models predicting SI from initial height growth based on a range of base heights and growth intervals³. These tools will be used for estimating SI from height, age and growth intercept data collected or assembled in the proposed project extension.

A large amount of sometimes-conflicting literature exists on methods for SI sampling. The Alberta government wishes to standardize the methodology used in the province. A discussion paper, *Standardization of Site Index Estimation Procedures in Alberta*, was circulated to the FGYA Technical Committee in January 2001. The procedure adopted for the LPR Project involves:

- a circular plot, radius 9.77 m, area 300m²;
- measurement of total height and breast-height age of each of the three largest-DBH valid lodgepole pine trees on the plot.

A valid tree should:

- have minimal or no discernable damage affecting height growth;
- be standing and alive, with good vigor;
- be a dominant or co-dominant;
- be accurately measurable for breast-height age;
- not be a veteran or a wolf.

The same plot size, measurements, and tree selection criteria are applicable to immature regenerated stands, in addition to which the last five annual internode lengths are recorded. This will normally require felling the tree. Splitting of the stem may be necessary to locate pith nodes in the event that annual whorls are indistinct, or there is an inconsistency between breast-height age as measured by whorl count versus number of growth rings.

3. Existing Data Available from Members

Three members of the FGYA indicated they already have data that may be relevant, and that they may be willing to contribute to the project

3.1. Millar Western Forest Products

Millar Western Forest Products (MWFP) completed a *Managed Stand Site Index* study to determine whether density control would result in an increase in the SI from the pre-harvest fire-origin stand. Sample plots were randomly located in post-harvest juvenile stands of lodgepole pine and their fire-origin parent stands. Altogether, 32 sampling pairs were measured. For each pair, three 100m² plots were randomly located within the fire-origin parent stand and the post-harvest block. In both the fire-origin and the post-harvest plots, data were collected on ecosite

² Shongming Huang, Stephen Titus and Grant Klappstein. April 1997. *Development of a subregion-based compatible height-site index-age model for young and mature lodgepole pine in Alberta*. Forest Management Research Note #T/353, Alberta Environmental Protection.

³ Anon. June 12 1996, *Growth intercept models for site quality evaluation in regenerated lodgepole pine stands*. Unpublished report available from Alberta Land and Forest Service.

and stand density. SI was measured on the fire-origin plots. Growth intercept and stem analysis data were collected on the post-harvest plots.

3.2. *Weldwood of Canada*

Weldwood of Canada pioneered growth intercept, paired plot, and PSP time series comparisons in Alberta, as reported by Udell and Dempster in 1987.⁴ More recently, the Company used Permanent Growth Sample (PGS) and other data to evaluate the relationship between pre-harvest and post harvest SI. The results were used to forecast regenerated stand SI in Weldwood's 1999 Detailed Forest Management Plan. At the time of the evaluation, 92 fixed-area PGS plots were identified which:

- occurred in pure pine stands;
- had been measured both before and after harvest;
- had reached at least 1.3 m in stand height since harvest.

Of these 92 plots, probably between 75 and 85 exceeded five years of growth above 1.3 m (breast-height). More plots meeting these criteria may have been added to the database since 1999.

Weldwood PGS plots were originally established on a systematic grid, in clusters of 4, with a plot size of 1/5 acre (0.08 ha). Plots were re-established in regenerated stands with a plot size of 1/10 acre (0.04 ha). Tree measurements include diameter, height, and crown dimensions. Top height trees are identified as the largest-diameter valid four or eight trees per plot (depending on plot size), regardless of species. Site height trees are identified as the largest-diameter valid four or eight trees of each major species. Height and breast-height age are measured on all top height and site trees. The plots used in the pre-post harvest investigation were classified ecologically.

3.3. *Weyerhaeuser Canada*

Weyerhaeuser Canada has installed a system of permanent sample plots in its Grande Prairie forest management area. The plots are 0.08 ha in area, with nested sub-plots. Twenty-one plots were identified in which the parent and / or the regenerated stand were pure pine, and measurements of both pre- and post-harvest conditions are available. Of these, 10 plots are currently sufficiently developed to provide SI estimates for the regeneration as well as the parent stand. Ecosite information has not been gathered on all of these plots, but Weyerhaeuser would be willing to make the assessments.

The Company as part of its SI quantification in 1994 also conducted a paired-plot study, involving 63 paired two-tree plots. The trees in the parent stand were destructively sampled and stem-analyzed to provide an absolute measure of SI (height at 50 years breast-height age).

⁴ R.W. Udell and W.R. Dempster. 1987. *Predicting the growth and yield of regenerated lodgepole pine.* CPPA Woodlands Section Paper presented at 67th Annual Meeting of the Woodlands Section, Canadian Pulp and Paper Association, Montreal, 1986.

4. Proposed Approach

4.1. *Time-series (Vertical) Comparison*

The development by Weldwood and Weyerhaeuser of permanent sample data with pre- and post harvest measurements provides an unprecedented opportunity for evaluating changes in SI and stand height development using true time-series information.

Data for at least 80, and possibly as many as 100, plots are expected to meet minimum criteria for site index assessment of the regenerated, as well as pre-harvest, condition. Site indices will be estimated from height and age data using the previously referenced models for young and mature lodgepole pine. Differences between pre-harvest and post-harvest values will be evaluated by t-tests of paired samples. The data are not controlled with respect to ecosite category, but evidence of differences between ecosite categories will be evaluated.

The applicability of early and late rotation SI comparisons based on the available models is dependent on the assumption that the largest-diameter trees early in the rotation survive and remain as SI / top height trees in the final crop. Time series data provide the opportunity to test this assumption. Where more than one measurement is available per plot before harvest, or more than one measurement per plot is available after harvest, change in candidate SI / top height trees over time will be investigated.

4.2. *Contemporaneous (Horizontal) Comparison*

Fifty lodgepole pine stands throughout members' tenures will be identified, in which regeneration following harvest has reached at least five years breast-height age, and portions of the original parent stand are still standing on the same ecosite as the regeneration. If possible, 10 such stands will be located for each of the five ecosite categories recognized in the main Project.

For each stand, pre- and post-harvest areas that have similar physiographic site characteristics will be identified as candidate sampling areas. Three pairs of plots will be located within these candidate sampling areas, each with one plot in the regenerated portion and one in the parent portion of the stand. The location of the initial plot in each pair will be randomized. The second plot will be located systematically, but in such a way that both plots occur in the same soil moisture and nutrient regimes. Plots will be sufficiently distant from the cut-block boundary to avoid edge effects.

The plots will be installed, and site trees will be selected and measured, as described in Section 2 above. In addition, stand density and other basic mensurational variables will be measured and compiled.

The experimental design will permit the following statistical tests and analyses:

1. Paired samples t-test: a sensitive test to evaluate the overall difference in SI between pre- and post-harvest SI.
2. One-way repeat-measure analysis of variance: will determine the significance of origin (pre- and post-harvest) effects relative to between-stand and within-stand variance.
3. Two-way analysis of variance and associated range tests: will allow evaluation of site and origin effects, and assessment of site and origin mean SI values and differences.

4.3. Validation

The FGYA is committed under its Memorandum of Agreement to validate any forecasts that it produces. The main LPR Project field trial will provide the ultimate verification of the forecasts developed by the methods proposed above, through long-term monitoring of actual versus predicted stand height development. However, the MWFP Managed Stand Site Index Study provides an excellent opportunity for short-term validation of the proposed contemporaneous study, using an independent data set. Although the methods are slightly different from those proposed in 4.2 above, the methods are valid and rigorous, therefore providing a credible basis for comparison of results. Results from 4.1 and 4.2 will also be compared to the earlier published results of Udell and Dempster.

4.4. Arrangements for Sharing Effort and Data

The FGYA Steering Committee directed that the cost of paired-plot installations should be distributed according to the formula developed for the main LPR Project (i.e. in proportion to net tenured lodgepole pine land base area). However, it also decided that existing available PSP data may be recognized as a valid contribution, and therefore should be offset against a member's required level of contribution to the new paired plot data. This will require agreement on an equivalence ratio between existing PSPs and the new paired plots. A decision will be also be required as to whether data sets used for validation may be used to offset a member's contribution to the additional paired plot component.

The ultimate product of the overall study will be a published peer-reviewed scientific report. Although the intent is to make the results public (subject to Steering Committee approval), the data contributed by members will remain their property. Members' rights and privileges in this regard can be protected by a data sharing agreement between the member owning the data and the Foothills Model Forest which, as Coordinating Agency for the FGYA, is charged with conducting the analysis.

Nutrition and Density Management Questions

Foothills Growth and Yield Association

Nutrition and Density Management Project – Scope Assessment

A. Situational Review – Questions to Members

1. What is the approximate age class distribution of lodgepole pine contributing to the allowable cut of your tenure?
2. Can you characterize predominant age classes e.g. typical or modal age, density, ecosite?
3. What is your projected average harvest age over the next 30 years (preferably by decade)?
4. How would you rate the importance of the following types of forest management objective to your overall forest management strategy (high, medium, low, not considered)?
 - Timber volume (annual allowable cut)
 - Wood value (cost of production and /or price of product)
 - Protection / risk management (e.g. fire, insects)
 - Ecological (e.g. biodiversity, habitat supply)
 - Social (e.g. aesthetics)
 - Environmental (e.g. water quality)
5. For those objectives that you rate as of high or medium importance, can you identify tree- and stand-level indicators that would tell you how well a particular stand is contributing to the objective (e.g. MAI, DBH, flammability index, HSI, VQO)?
6. Have you evaluated nutrition or density management in your timber supply analyses? If yes, what are your conclusions regarding their potential impact on achievement of each type of forest management objective? If possible, score your conclusions in the table below, as follows:
 - Negative impact -1
 - No impact 0
 - Marginally positive 1
 - Moderately positive 2
 - Highly positive 3

Stage	Intervention	Forest Management Objective				
		AAC	Value	Protection	Ecological	Social
Fire-origin early	Fertilization					
	Pre-commercial thinning					
	PCT+Fertilization					
Fire-origin mid	Fertilization					
	Commercial thinning					
	CT+Fertilization					
Fire-origin late	Commercial thinning					
	Fertilization					
	CT+Fertilization					
Harvest- origin (regen.)	Planting or seeding					
	Brushing					
	Fertilization					
	Pre-commercial thinning					
	PCT+Fertilization					

(Modify the table as necessary to reflect your situation.)

B. Literature and Expert Review – Questions to Scientists

1. *Effect of crown characteristics on response to silvicultural treatments*

- How does crown volume vary with stages of stand development and stand density?
- What constraint does crown volume impose on a tree's ability to respond to thinning and fertilization? Specific factors to be considered, with specific comparison of managed and unmanaged stands, include:
 - Leaf biomass / leaf area / LAI
 - Stand crown volume index
 - Net assimilation rate
 - Crown shyness
 - Crown biomass, response and TASS

2. *Challenges specific to fertilization of lodgepole pine in Alberta*

- What is the magnitude of response (m^3/ha) that can be realized from operational fertilization?
- How does this response vary with site and region?
- What is the effect of fertilization on size distribution?
- What nutrients should be applied, at what rate, and in what form?
- What sites and stand types (density and age considerations) offer the best absolute response?
- What are the physiological factors that limit response in repressed stands?
- To what degree is the uptake of applied N reduced in cold soils?
- What is the recovery rate of applied N with specific references to immobilization of applied N within the moss/ground vegetation layer?

3. *What is our ability to forecast response to fertilization?*

- What is our ability to distinguish stands that will respond from those that will not?
- What is our ability to forecast the magnitude of growth response following the addition of a specific fertilizer application?
- Can we rank responsive stands from most responsive to least?
- What diagnostic and predictive tools (conventional approaches versus modeling) should be used or developed?
- Can a stand's response to thinning be used to assist in the prediction of fertilization response?

4. *Challenges specific to thinning of lodgepole pine in Alberta*

- What is the magnitude of response (reduction in rotation length or extra m^3/ha) that can be realized from operational thinning?
- What is the effect of response on size distribution?
- How does this response vary with site and region?

- What sites and stand types (density and age considerations) offer the best absolute response?
5. *What is our ability to forecast response to thinning?*
- What is our ability to distinguish stands that will respond from those that will not?
 - What is our ability to forecast the magnitude of growth response following thinning?
 - Can we rank responsive stands from most responsive to least?
 - What diagnostic and predictive tools (conventional approaches versus modeling) should be used or developed?
6. *What is the benefit of combining thinning and fertilization treatments?*
- Should fertilizers be applied at time of thinning or delayed?
7. *What are the monitoring and evaluation challenges?*
- Do gains in growth adequately address forest level objectives (as indicated by situational review)?
 - What is the duration of response to thinning and fertilization and how does this affect validation or auditing of long-term response?
 - What are the implications of the above findings on the recommended standards for compliance and reporting of growth responses?
 - What is the magnitude of “risk of loss” and how should this be assessed?
 - What is the “operational fall down” effect (*i.e.* actual versus projected response)?
8. *What are the potential effects of thinning and fertilization on non-timber values?*
- Does operational fertilization adversely affect water quality?
 - Does fertilization or thinning affect fire risk?
 - Does fertilization or thinning have an affect on individual tree vigour?
 - Do potential changes in tree vigour affect susceptibility or resistance to disease or insects?
 - What are the potential effects of fertilization and thinning on habitat and forage quantity and quality?
 - How does fertilization and thinning affect biodiversity?
 - How does fertilization and thinning affect visual quality attributes?

Minutes of Steering Committee Meeting # 2

Foothills Growth and Yield Association
Minutes of Steering Committee Meeting # 2

Date: March 15, 2001

Location: Chateau Louis Conference Centre
11727 Kingsway Avenue
Edmonton, Alberta

In Attendance:

Alberta Land and Forest Service	Daryl Price
Alberta Newsprint Company	Pauline Fluet
Blue Ridge Lumber	Daryl D'Amico
Canfor	Lorne Greenhorn
Foothills Model Forest	Dick Dempster, Mark Storie
Millar Western Forest Products	Jonathon Russell
Spray Lake Sawmills	Ed Kulcsar
Sundance Forest Industries	John Huey
Sunpine Forest Products	Keith Branter
Weldwood of Canada (Hinton Division)	Bob Udell, Hugh Lougheed
Weyerhaeuser Canada (Grande Prairie)	Pat Wearmouth

Chairperson: Hugh Lougheed

Minutes:

- Meeting called to order at 1230 hrs.
 - Introduction of attendees.
 - The Director (Dick Dempster) tabled a document entitled *Second Steering Committee Meeting of the Growth and Yield Association*. This document contained the following:
 1. Annual Meeting Notice and Agenda
 2. Minutes of Steering Committee Meeting #1
 3. Director's Report
 4. Conceptual Plan – Fire Origin Lodgepole Pine
 5. Annual Work Plan
 6. Field Co-ordinator – Request for Proposals
 7. Memorandum of Agreement
- I. *Review and approval of agenda*
- Agenda reviewed and approved.

II. Minutes of Steering Committee Meeting #1

- Minutes from Steering Committee meeting #1 dated March 23, 2000 reviewed and accepted.

III. Director's Report

1. **Income and Expenditures** - Dick Dempster went through last year's budget to give an update on how income and expenditures compared to 2000/2001 budget (see director's report). No questions or concerns from the Steering Committee.
2. **Activities** – Dick reviewed his activities during the last year (see director's report). No questions or concerns from steering committee.
3. **Achievement, Shortfalls, Problems and Opportunities**
 - **3.1 - Regenerated Lodgepole Pine Project** – Dick reviewed progress and challenges related to this project over the last year (see Director's report).
 - Draft field manual has been prepared and still being revised. The manual does not include actual treatment procedures. The Technical Committee have addressed this and recommendations will be brought forward to the Steering Committee.
 - Some member companies have agreed to establish 6 plots even though their commitment was 5 (see Table 2 – Director's report). This was to meet with plot grouping objectives.
 - Blue Ridge has had problems identifying areas due to the location of their operations (mainly burn areas). (Decision/Action Item made on this topic is covered under the workplan section of these minutes.)
 - Dick discussed the umbrella FRIAA proposal. Question from Pat Wearmouth regarding methodology to be used for these proposals. Dick confirmed that FMF will submit these proposals in order to streamline the process. Companies will submit a supplementary form (2 pager to back up the FMF proposal). Companies will only have to state deviations from the umbrella proposal.
 - Dick discussed confounding effect of LFS fuel abatement policy. Greg Behuniak (Weyerhaeuser) has informed Technical Committee that this has been dealt with.
 - Vegetation Control – Technical Committee recommends establishing competitive thresholds and then making recommendations for control (i.e. herbicide (glyphosate)). LFS will be consulted regarding treatment and streamlining of approval process. (Covered in workplan section.)
 - The LFS senior biometrician has suggested the Association consider a short term Site Index (paired plot) project. It was decided to discuss this under the workplan.
 - **3.2 - Fire Origin Lodgepole Pine Project Proposal** – Dick covered this as a separate item under the workplan.

- **3.3 - Personnel Assignments** – covered under agenda item #5
- **3.4 – Dissemination of Information and Education of Members** – No discussion on this topic.
- **3.5 – Workplan and Budgeting** – there was discussion on options in Table # 4. It was decided to cover this topic as a separate item under the workplan section
- **No further questions of Director's report. Report accepted.**

IV. Conceptual Project Plan

- **Fire Origin Lodgepole Pine Project Proposal**
 - Dick went through the project proposal (see PowerPoint presentation – section 4 of meeting package). Dick highlighted the fact that the dollar amount for the proposal reflects amount requested under the funding request/preliminary business plan submitted by the Foothills Model Forest to the Alberta Forest Research Institute (AFRI).
 - Dick asked for a decision from the Steering Committee on whether to proceed.
 - Discussion around the Schedule and components of the project.
 - Question as to the feeling of the Technical Committee regarding this project. Dick stated Technical Committee felt it was a good concept. They liked the fact that the project was being broadened to include various growth stage evaluations.
 - Question about doing the scoping exercise prior to committing to the project. Discussion ensued in that a commitment beyond scoping could be made once potential AFRI funding is determined.
 - Ed Kulcsar felt that the Site Index (Paired Plot) proposal was a higher priority for his company given current FRIAA funding situation.
 - Concern was expressed on the timing and philosophy of member companies as it relates to timber supply in the future.
 - Decision covered in workplan section.

V. Workplan

- **Fire Origin Lodgepole Pine Project Proposal**

Decision - Proceed with Scope Assessment. Scope assessment includes:

- ✓ Situational Review
- ✓ Literature and expert review
- ✓ Preliminary site selection

Cost of Scoping Assessment = \$45,000. This will come out of Foothills Growth and Yield Association 2001/2002 program budget.

- **Site Index Proposal – Brought forward in page 5 of Director’s Report.**
 - Put forward for Steering Committee consideration as an addition to the Regenerated Lodgepole Pine Project. This project would fill the gap in knowledge on site index increment.
 - Project would consist of 50 paired plots. Breakdown would be as follows:
 - 5 Ecosite groupings
 - 10 stands within each ecosite group
 - 6 paired plots within each stand type. (3 fire origin , 3 regen)
 - It is felt this project would lend credence to assumptions laid out in DFMP’s.
 - Would be handled as a 3rd party “arms length” assessment.
 - Bob Udell made a suggestion to do similar work in PSP’s to contribute to the study. This would be done by companies in the association that have a well-established PSP database. This could be time step data.
 - Lorne Greenhorn asked if a 50-plot sample would be credible. Dick suggested it would be statistically adequate. His rationale was that we want good data on a few sites, rather than so-so data on a lot of sites. This initial dataset would set the parameters, then companies could decide if they wanted to expand the project.
 - It was suggested that this could be built into a modified umbrella FRIAA proposal.
 - Weyerhaeuser’s ratio for contribution to the Regeneration Trial (as computed in the currently approved FRIAA proposal), including the site index proposal, will increase due to an increase in pine landbase with the consolidation of their operations.

Action Item – Companies wishing to provide PSP data for a time step component may have this considered as their contribution. They are to provide specifications of their data to Dick Dempster.

Action Item - Dick will provide a list of what info he needs for the Site Index project by next week to committee members.

Decision – Proceed with the Site Index (paired plot) concept. Paired plots would come out of companies’ FRIAA budgets. Will use existing allocation formula, as it is an extension of the existing regenerated pine stand project. Weldwood will be allowed to offer time step (PSP) data.

- **Regen Trial – Vegetation Control**

- Vegetation control should be based on a “to be established” competition threshold.

Action Item – Dick, Murray Hubscher and Phil Comeau to establish this threshold.

- Vegetation control will potentially be carried out on ½ hectare plots. (50 metres x 100 metres).
- Recommendation to pursue a streamlined herbicide application/ approval process. The association should have a letter made up and ready to go in case a company needs to submit within an application window. This process will be triggered by a plot achieving a competition threshold.

Action Item - Daryl Price will discuss streamlining of application process with Rob Kessler (LFS) and get back to Dick.

• **Blueridge Plot Establishment ("h" Sites)**

- Some options were discussed. Options were as follows:
 1. Throw in with Millar Western and ANC and Blue Ridge pays for plots.
 2. Delay for one year until such time that sites can be identified.
 3. Some combination of both options.

Action Item – Blue Ridge will identify sites within and outside of their FMA by May 1, 2001. If the decision is to establish the plots on the Blue Ridge FMA, sites will be established in the next fiscal year (2002/2003). If the decision is to establish the plots off Blue Ridge's FMA, the sites will be established in this fiscal year (2001/2002).

• **Annual Workplan and Operating Budget**

- Several options for funding this year's program were discussed. In the end it was decided that Option "E" was the most suitable/desirable option. Option E was based on Table 4 and is as follows:

Income / Expense	Option E
Income	
Carry-forward	\$140,697
Membership fees – FRIAA	\$ 70,000
Membership fees – Non FRIAA	\$ 20,000
Total Income	\$230,697
Expenses	
Director – fees	\$ 64,800
Director – expenses	\$ 9,720
Other contract services	\$ 45,000
4WD vehicle (rental)	\$ 4,358
Travel expenses (field coord.)	\$ 5,250
Meetings	\$ 7,321
Equipment & misc.	\$ 12,809
GST	\$ 9,400
Total Expenses	\$158,658
Ending Balance	\$ 72,039

Resolution – Director to develop a revision to the workplan relevant to decisions made in this March 15 Steering Committee meeting that reflects details laid out in option ‘E’. Moved: Lorne Greenhorn; Seconded: Jonathan Russell. **Carried**

- **Annual Membership Fee**

Resolution - Membership Fee will be \$10,000.00 for the 2001/2002 Fiscal year, thus leaving program funding level (70K) consistent with Option ‘E’. Moved: Lorne Greenhorn; Seconded: John Huey. **Carried**

- **Assignments**

- **Field Co-ordinator**

- Mark Storie and Bob Udell indicated that the Foothills Model Forest would pick up the *per diem* fee for the Field Co-ordinator for the 2001/2002 fiscal year. Rationale for this decision was that under the original agreement, the Foothills Model Forest had committed to providing a field co-ordinator on a ½ time basis for the 2000/2001 and 2001/2002 fiscal years. It was felt this commitment should be honoured. The Foothills Model Forest commitment for the 2001/2002 fiscal year is to pay the per diem fee of the Foothills Growth and Yield Association field co-ordinator to a maximum of 100 days or \$50,000.00.
- Dick brought up the Request for Proposal and the assessment method used to rate candidates.

- Dick indicated that the FGYA has a preferred candidate. Rand McPherson had the best ranking in assessment.
- Concern was expressed over Rand's vehicle mileage and quad/snowmobile rate. Committee was informed that this had been discussed with Rand and he was willing to negotiate on these rates.
- Dick informed the Committee that Rand would be interviewed on March 21, 2001.
- Mark Storie/ Dick Dempster sought authorization to hire Rand if he turned out to be a suitable candidate and issues surrounding vehicle and ATV rates could be resolved.

Direction – Proceed with interviewing Rand and if issues cannot be resolved then proceed with 2nd ranking Deci-con (Harry Ullrich) pending satisfactory reference check.

- **Foothills Growth and Yield Director**
 - Current Director – Dick Dempster.
 - Dick was asked to leave meeting room while this position was discussed.
 - Strong and unanimous support for his leadership was expressed.

Resolution – Retain Dick Dempster as Foothills Growth and Yield Coordinator for the 2001/2002 fiscal year. Carried

• **Policies and Strategic Direction**

- **Business Plan**
 - Is the association looking for a more coherent strategic direction?
 - Discussion on whether the Association has identified all of the main project for the foreseeable future. If so then it is felt we already have our business plan.
 - ANC has concerns over securing long-term funds for the association that may not be obtained without a business plan.

Action Item – Dick Dempster to develop deliverables and a budget for a 5 year period. This should be extended to include maintenance, monitoring, measurement etc. over that period.

- **Natural Yield Curves**
 - Daryl Price discussed the need for transparency and a need for the group to produce deliverables in the public domain. He suggested the collective group consider the development of lodgepole pine natural yield curves for the Foothills Growth and Yield Association area (ecological scale). He inquired as to whether the member companies were prepared to provide data to the LFS for the development of these natural yield curves Alberta.

- Daryl also suggested developing a set of managed stand yield curves for Alberta.
- Daryl indicated that if member companies provide the data for these projects, the province would contribute the analysis.
- After questions and discussion as to the need and merit of this request the following action item was produced.

Action Item – Daryl Price will make a written request to the Association, clarifying the information needs and the rationale for regional yield curves. The Committee will respond within 1 month of receiving Daryl’s letter.

Meeting adjourned at 1610 hrs.