

Foothills Growth and Yield Association  
**BUSINESS PLAN**

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Prepared by:

W.R. (Dick) Dempster, Ph.D., R.P.F.

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- The Foothills Model Forest wishes to promote cooperation and shared responsibility in the improvement of sustainable forest management practices.

The mission and mandate of the Association is to:

**Continually improve the assessment of lodgepole pine growth and yield in managed stands by:**

- **Forecasting and monitoring responses to silvicultural treatments;**
- **Facilitating the scientific development and validation of yield forecasts used by members in managing their tenures;**
- **Promoting knowledge, shared responsibility and cost-effective cooperation.**

The following indicators will measure success in performing the mandate, and may be used as criteria for evaluating and prioritizing project proposals and other Association activities.

1. **Forecasts:** stand-level timber yield forecasts are defensible and accepted by the scientific and regulatory communities.
2. **Validation:** recognized scientific, regulatory and certification standards for validation and monitoring of sustainable forest management practices are met.
3. **Knowledge:** managers' knowledge, and their abilities to predict responses to management practices, are improved, facilitating management by objectives rather than by arbitrary prescription.
4. **Awareness:** stakeholders influencing forest management decisions understand the probable effects of management interventions on stand development.
5. **Cost effectiveness:** investments in growth and yield assessment are cost effective, and there is no unnecessary duplication of effort.
6. **Equitable participation:** participants remain committed to the program, and share costs equitably.
7. **Relevance:** work is user-driven, results-focussed, and directly applicable to management and crop planning.

### **3. Strategies**

#### **3.1. Project Development**

The goals of the Association will be achieved through a series of projects developed cooperatively by members, in consultation with government agencies and other experts in growth and yield. Projects of the Association will be designed to forecast and validate yields for treatment regimes and site conditions of interest to all members, in order to provide a credible and reliable basis for supporting and defending timber supply analyses and assumptions. *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* will involve the establishment or adoption of well-designed and replicated field trials, and their periodic re-measurement to compare actual results against forecasts.

Quantitatively, the benefit of a project to each member will vary, and will be determinable only by the individual member. It is expected that each member will bring to the table during project definition those questions, issues and priorities that relate to their particular interests, and will participate actively in design, approval, implementation, and evaluation of the project. By these means, the qualitative value of projects will be assured.

### 3.3.1. *Voting Members*

Responsibilities of the voting members will include:

- Installation and measurement of growth and yield trials;
- 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 of 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 management of the Association is vested in the Steering Committee, which will:

- Meet at least once each year;
- Elect from among the voting members' representatives a chairperson who calls and chairs meetings;
- 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 appointed 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 project implementation, quality control, data delivery, and evaluate results.

### 3.3.2. *Land and Forest Division*

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

- Consult with the Technical Committee regarding the selection, establishment and measurement of field trials;
- Ensure the timely compilation of 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 projects to Association members;
- Arrange dissemination to Association members of relevant information, including a minimum of one educational meeting or field trip per year;
- Provide progress reports to the Coordinating Agency every three months, annual reports to the Steering Committee and FRIAA, and technical reports as required and scheduled elsewhere in this Plan;
- 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 scheduled elsewhere in this Plan and as directed by the Steering Committee.

**3.4. Allocation of Effort and Costs**

Each voting member will be charged an equal annual membership fee. The total amount levied will be sufficient to cover costs incurred by the Coordinating Agency in carrying out its responsibilities as defined in Section 3.3.3 above. Requirements are discussed in Section 5.1 and projected in Table 5, but will be subject to Steering Committee review and approval each year.

Unless otherwise provided for under special agreements with external cooperators (see Section 3.5 below), the costs or direct effort for installing, maintaining, treating and measuring field trials will be shared among voting members. Costs and effort will be allocated according to the net operable pine-leading land area in the members' tenures. Where the member shares annual allowable cut (AAC) for a management unit, the contributing land base for that unit will be calculated as the total AAC land base multiplied by the member's portion of the AAC. Table 1 shows areas and percentage allocations as currently calculated. The allocation will be updated when significant changes occur to any member's net area. The re-allocation will take effect in the fiscal year following the change being reported, and will not be applied retroactively.

**Table 1. Work Allocation Based on Pine-leading Area**

<i>Member</i>	<i>Net area (ha)</i>	<i>% of total</i>
Alberta Newsprint	106,870	5.2
Blue Ridge Lumber	180,323	8.8
Canfor	106,271	5.2
Millar Western	112,406	5.5
Spray Lakes	114,988	5.6
Sundance	121,848	6.0
Sunpine	293,655	14.4
Weldwood	451,713	22.1
Weyerhaeuser	557,433	27.3
Total	2,045,507	100.0

Analytical results, including crop performance reports and yield forecasts, will be shared among members. The data and results obtained will not be further distributed or published without the approval of the Steering Committee. This consent will not be unreasonably withheld. Reports and scientific manuscripts for projects funded through FRIAA will ultimately be accessible to the public.

### **3.7. Justifications for FRIP and External Funding**

Members may elect to sponsor their contributions to the Association from FRIP (Forest Resource Improvement Program). The Association's program fulfils the proposal evaluation criteria of FRIAA. Funding and collaboration will also be sought from other sources, given the program's:

- Alignment with provincial forest management and research priorities;
- Alignment with federal priorities for science and technology transfer and sustainable forest management;
- Opportunities for research and demonstration provided by field trials.

Justifications and qualifications for funding through FRIAA, and possibly from other sources, are summarized as follows.

#### *3.7.1. Application of Results*

The Association's activities 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 gathered will be used to assess, develop, and approve strategies for enhanced and sustainable forest management within these forest tenures. It will be incorporated into 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 the natural range of lodgepole pine in Alberta.

The Association will enhance the integrated and sustainable management of forest ecosystems through:

- Improved assessment of ecosystem productive capacity;
- Improved assessment capability 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;

4. Cooperative management of historic research trials;
5. Regional yield estimates;
6. New nutrition and density management trials.

Justification, purpose, methods and deliverables are briefly described below. Required levels of effort and cost are addressed in Section 5.

#### **4.1. Development and Management of the Association**

##### *4.1.1. Justification and Purpose*

The Memorandum of Agreement among members of the Association requires a Coordinating Agency to administer the Association and a Director to plan, develop and manage the Association's program, as directed by the Steering Committee and with the assistance of the Technical Committee.

##### *4.1.2. Methodology*

The roles, responsibilities, and activities for developing and managing the Association are described in Section 3.3 above, and in the Memorandum of Agreement.

##### *4.1.3. Deliverables*

- Project plans and experimental designs;
- Annual work plans and budgets;
- Project reports and publications;
- Information exchange meetings, field tours and technical sessions (minimum of 1 major meeting per year);
- Active publicly-accessible web site;
- Quarterly and annual progress reports;
- Financial statements (annually and/or as required);
- Steering committee meeting minutes.

#### **4.2. Lodgepole Pine Regeneration**

##### *4.2.1. Justification and Purpose*

The purpose of the Project is to forecast and monitor the growth and yield of lodgepole pine, regenerated after harvesting, in relation to site, initial spacing of planted stock, natural ingress and mortality, competing vegetation (brush), and density regulation (pre-commercial thinning). These effects and factors were considered by all members of the Association to be the highest priority for project development, given their implications for silvicultural prescriptions, crop planning, regeneration standards, and allowable cut, and the lack of controlled data currently available for assessing alternative practices.

##### *4.2.2. Methodology*

The Project consists of a long-term field trial, established in 2001, and interim forecasting of effects using available models and data. 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

Weldwood and Weyerhaeuser will provide the PSP data. The paired-plot fieldwork will be undertaken by a single contractor, funded by the other voting members, and administered by the Field Coordinator.

4.3.3. *Deliverables*

- Technical report and scientific paper (by March 31, 2003);
- Results will be incorporated into the yield forecasts developed as part of the Lodgepole Pine Regeneration Project.

**4.4. Cooperative Management of Historic Research Trials**

4.4.1. *Justification and Purpose*

In August 2001, representatives of the Association, the CFS, and ASRD (Alberta Sustainable Resource Development) visited historic CFS lodgepole pine trials. They concluded that these trials were invaluable resources for forecasting, monitoring and demonstrating the effects of nutrition and density management, and that links should be forged to ensure their ongoing protection, measurement and interpretation.

The purpose of the Project is to provide forest managers the full and continued benefit of relevant established long-term field trials assessing responses of fire-origin lodgepole pine to nutrition and density management. The Project applies primarily to the 13 research trials listed in Table 3, of which 7 (bolded in the Table) are judged to have highest priority based on relevance and / or quality of the experimental design.

**Table 3. Historic Lodgepole Pine Field Trials**

<i>Owner/ #</i>	<i>Title / Location</i>	<i>Established</i>
CFS / A34	<b>Lodgepole pine pre-commercial thinning, Mackay</b>	1954
CFS/A100	<b>Spacing trials – 7 year old fire origin stand of lodgepole pine, Gregg River</b>	1963/64
CFS/NOR-402	Spacing trials – 28 year old fire origin stand of lodgepole pine, Gregg River	1984
CFS/NOR-405	<b>Thinning and fertilization of 40-year-old semi-mature lodgepole pine, McCardle Creek</b>	1984-85
CFS	<b>Early development of lodgepole pine after three different mechanical thinning treatments, Swan Lake</b>	1977
CFS	Fertilizing after thinning 70-year-old lodgepole pine, Clearwater	1968
CFS/NOR-008	<b>Juvenile spacing of 25-year-old lodgepole pine, Teepee Pole Creek</b>	1967
CFA	Strip thinning of lodgepole pine, Teepee Pole Creek	1966
CFS/K-57	<b>Development of a 77-year-old lodgepole pine stand following heavy thinning, Kananaskis</b>	1941
CFS/K-3	Various thinnings based on European practices, Kananaskis	1938-39
CFS/K-58	Economic possibilities of commercial thinning in an 88-year-old lodgepole pine, Kananaskis	1950
CFS	Commercial thinning in 85-year-old lodgepole pine, Strachan	1952
ASRD	<b>Fertilization and thinning of 26-year-old lodgepole pine, Edson</b>	1980



capability. These will provide an improved basis for crop planning, evaluation of regeneration standards, sensitivity analysis, and rationalization of stratification and SFM monitoring systems.

The LFD is prepared to assign highly competent analytical staff to the Project, including ASRD's Senior Biometrician, Shongming Huang. This, in combination with the capability for modeling lodgepole pine recently developed by LFD under the GYPSY program, provides an excellent and timely opportunity for the Association at minimal cost.

The Project will take the form of a pilot study to develop compatible yield and growth estimation techniques for lodgepole pine cover types. This will best serve the Association's interests, while providing the best assistance that the Association can offer to the LFD.

#### 4.5.2 Methodology

No project plan or design has been developed yet, but logical steps for the pilot study will likely be:

1. Assess availability of suitable data and develop analytical design.
2. Procure and screen at least one suitable initial data set.
3. Utilizing the initial data, apply a combination of mathematical tools (cluster and/or categorical analysis) and expert assessment to develop an optimum stratification scheme. The scheme should be based on Alberta Vegetation Inventory and Natural Sub-region classifications, and be suitable for both forecasting and validation of timber productivity.
4. Utilize GYPSY (or selected base and auxiliary sub-models) to develop current estimates and forward and retrospective projections from the inventory data by stratum (or appropriate groups of strata).
5. Identify any major data gaps and rectify with supplementary data.
6. Enhance initial trend estimators.

The Association Director, and interested members of the Steering and/or Technical Committees, will participate in:

- Review of available data and development of the analytical design;
- Selection of preferred stratification options;
- Assessment of intermediate and final results, products and recommendations.

The LFD will take the lead role in conducting the analyses.

The individual Association members will deal directly with the LFD regarding the provision of existing data.

Implementation of the project is subject to finalization of a collaborative agreement between the Association and LFD, currently under discussion.

#### 4.5.3 Deliverables

- Stratum-based stock and stand table estimators for lodgepole pine ecosystems with compatible forward and retrospective projection capability. Projected variables will include volume and stem numbers by diameter class at variable utilization standards, mean annual increment, and selected stand variables with potential for crop performance monitoring (e.g. height, basal area, initial densities, and mortality).

White report, and submit recommendations to the Steering Committee by March, 2003 on how and whether to proceed.

Because the magnitude of response is expected to vary with the stage of stand development, the trial ideally should be replicated within different stages of stand development. However, if available resources limit replication, priority will be given to pre-commercial stands subjected to density-related height repression.

#### 4.6.3. Deliverables

Deliverables for the proposed regional trial would include reports and scientific publications on techniques applied, responses measured, and conclusions regarding factors influencing response, at:

- Establishment (2002 or 2003);
- 1 year after treatment: foliage response and nutrient uptake (2003 or 2004);
- 3 years after treatment: identification of initially responsive and non-responsive stands (2005 or 2006);
- Approximately 6 years after treatment: magnitude and ranking of responses (2008 or 2009).

## 5. Finance

Financing of the Association and its activities falls into 3 main categories:

1. **Development and Management of the Association.** This is Project 1 as described in Section 4.1. It involves technical direction, field coordination, administrative, analytical, and information exchange activities conducted by the Coordinating Agency as defined in Section 3.3.3. It is funded centrally, and supported through a membership fee approved each year by the Steering Committee. It has received start-up assistance from provincial sources through the Foothills Model Forest, and will continue to do so during the 2002-03 fiscal year.
2. **Project Contributions by Voting Members.** This category applies primarily to fieldwork for other projects listed in Section 4. Costs are distributed among voting members by agreement of the Steering Committee and an allocation formula (see Section 3.4). Work and funds may be administered directly by the member (as in the *Lodgepole Pine Regeneration Project*) or by the Coordinating Agency (as proposed for smaller projects like the *Comparison of Pre-harvest and Post-harvest Site Indices*).
3. **Project Contributions by Collaborating Agencies.** Contributions may be sought through collaborative agreements (see Section 3.5) with other agencies for the implementation of Project 4 (*Cooperative Management of Historic Research Trials*), Project 5 (*Regional Yield Estimates*), and Project 6 (*New Nutrition and Density Management Trials*), pending the outcome of previously mentioned discussions and reviews. Contributions may be financial or in-kind services.

### 5.1. Development and Management of the Association

Table 5 contains estimated costs and expenditures for development and management of the Association over the next 5 years (Project 1, as described in Section 4).

other maintenance twice during the 5-year period. Timing of these activities is not known, so the costs have been equally distributed over the period.)

General indications of the project costs that would be incurred by an individual voting member may be obtained by multiplying the values in Table 6 by the percentages in Table 1. Possible exceptions are Project 2 (where the costs of fieldwork may be shared among members other than Weldwood and Weyerhaeuser, who instead would contribute PSP data) and Project 4 (where members who have already incurred costs in recent measurements may be credited for them).

**Table 6. Indicative Costs of Project Contributions by Voting Members**

#	Project	Component	2002	2003	2004	2005	2006	Total
2	Regeneration	measurement	166650	35350	166650	35350	166650	570650
		treatments	6060	6060	6060	6060	6060	30300
		unallocated	1710	410	1710	410	1710	5950
		overhead	8721	2091	8721	2091	8721	30345
		total Project 2	183141	43911	183141	43911	183141	637245
3	Site Index Comparison	fieldwork	70000	0	0	0	0	70000
		overhead	3500	0	0	0	0	3500
		total Project 3	73500	0	0	0	0	73500
4	Historic Trials	fieldwork (high priority)	18400	18400	18400	18400	18400	92000
		fieldwork (medium priority)	0	36250	36250	36250	36250	145000
		overhead	920	2733	2733	2733	2733	11850
		total project 4	19320	57383	57383	57383	57383	248850
5	Regional Yield Estimators	(no costs currently identified)	0	0	0	0	0	0
6	New Nutrition & Density Trials	pre-assess	0	75000	0	0	0	75000
		installation	0	270000	0	0	0	270000
		measurement	0	0	45000	0	80000	125000
		special trials	0	0	50000	50000	50000	150000
		overhead	0	17250	4750	2500	6500	31000
		total Project 6	0	362250	99750	52500	136500	651000
Total all projects			275961	463544	340274	153794	377024	1610595

Table 6 does not include costs of the following contributions by members that will be essential for proper and successful functioning of the Association:

- Participation on Technical and Steering Committees;
- Attendance of meetings;
- Review of minutes, reports, and scientific papers;
- Contribution of existing information and data;
- Provision and support of models (e.g. use of LFD's GYPSY for yield forecasting in Project 2);
- Protection of trials, and restoration in event of damage or loss;
- Direct participation in analysis and interpretation of data and publication of results (see specific requirements in Section 5.3).