

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

**Foothills Growth and Yield Association
Second Five-Year Program**

April 2005 - March 2010

Proposal Prepared by:

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Proposal Summary

Applicant

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Delivery Address: Hinton Training Centre, Hinton, Alberta
Contact Persons: Don Podlubny, telephone 780 865 8332, fax 780 865 8331
Dick Dempster, telephone 780 424 5980, fax 604 886 0462

Sponsors

<i>Company / Division</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	D. Weeks	(780) 538 7754
Millar Western Forest Products	J. Russell	(780) 778 2221
Spray Lake Sawmills	G. Lehn	(403) 932 2234
Sundance Forest Industries	J. Huey	(780) 723 3977
Sundre Forest Products	K. Branter	(403) 638 4482
Hinton Wood Products	H. Loughheed	(780) 865 8191
Weyerhaeuser Canada	R. Watson	(780) 539 8251

Project Information

Type: Inventory / Planning
Term: April 1, 2005 to March 31, 2010.

Amount of funds:	107,732	Balance forward from original PEF contribution
	721,000	FRIP funds to Applicant for Development and Management
	206,000	External funds to Applicant for Development and Management
	<u>632,700</u>	Funds to Sponsors for Regeneration Project (FRIP eligible)
	1,667,432	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 and Project Schedules
2. Appendix – Letters from Sponsors

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. Background

The Foothills Model Forest (FtMF), responding to interest by industry and government, in 1999 facilitated collaboration among 9 companies holding Forest Management Agreements on the Eastern Slopes to create the Foothills Growth and Yield Association (FGYA) for co-operative forecasting and monitoring of managed stand growth and yield.

The FtMF appointed a part-time Director in June 1999, with the mandate to develop a growth and yield co-operative. A memorandum of agreement was developed and endorsed by 9 companies, the Land and Forest Service, and the FtMF. Nine companies presently participate in the FGYA as voting members. The Alberta Department of Sustainable Resource Development (ASRD) and the FtMF participate as non-voting members, with the FtMF acting as the Coordinating Agency.

The FtMF, acting as applicant on behalf of the 9 sponsoring members, submitted a proposal to the Forest Resource Improvement Association of Alberta (FRIAA) in July 2000. A contract was issued (FOOMOD-01-01 – *Foothills Growth and Yield Association*) on July 25, 2000, facilitating use of FRIP (Forest Resource Improvement Program) funds to cover membership costs and project activities. The original contract had an initial term of 2 years, and was amended in September 2001, extending the term to 5 years (April 1, 2000 to March 31, 2005).

The FGYA is governed by a Steering Committee, consisting of representatives from each of the 9 voting member companies. At its meeting on March 16, 2005¹ the Committee passed a motion to approve the submission of a proposal to FRIAA for renewing Project FOOMOD-01-01 consistent with the Business Plan amended and approved at the same meeting. The members signed individual authorizations:

- Confirming their desire to sponsor the project;
- Stating their intent as voting members of the FGYA to support the continued development and management of the Association during the period April 1, 2005 to March 31, 2010 by payment of an annual membership fee, consistent with the Business Plan and as provided for in the Memorandum of Agreement among Members;
- Agreeing that the membership fee for the first one-year period (April 1, 2005 – March 31, 2006) should be set at \$15,000;
- Confirming that the FtMF, as Coordinating Agency for the Association, will administer the Project on their behalf;
- Either authorizing FRIAA to transfer the membership fee for the first year from FRIP funds to the Foothills Model Forest (7 members), or arranging to pay the amount directly (2 members).

The authorizations are appended to this proposal (see Appendix).

2. Purpose

The interests of the parties constituting the FGYA are stated in the Memorandum of Agreement among members as follows:

- The companies that are signatories of the Agreement wish to participate in a cooperative program for the forecasting and validation of managed stand growth and yield, particularly of lodgepole pine;

¹ Minutes for the meeting are included in the 2004-5 Annual Report for Project FOOMOD-01-01, submitted to FRIAA April 26, 2005.

- The Alberta government wishes to promote the scientific development and validation of yield forecasts used by tenure holders in the development of forest management plans;
- 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 FGYA, and the objectives of the Project, are 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 FGYA 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. General Project Information

3.1. Project Development

The goals of the FGYA 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 FGYA 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.

The nature of tree growth requires the program to be long-term and ongoing. Continually improved forecasts will be made of the growth and yield parameters being tested, using the best models and data available when the project is initiated and each time it is re-measured.

Detailed methods will be specified in project plans and experimental designs. 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.

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. Use of field trials for demonstration and ancillary research purposes will be promoted.

3.2. Project Priorities

A review of voting members' opinions conducted in 2001 indicated that responses to planting, vegetation management and density regulation treatments in harvest-origin stands was the highest priority for investigation, followed by density and nutrition management in fire-origin stands. All members agreed to proceed with investigations of spacing, tending and pre-commercial thinning in harvest-origin stands, but there were variable opinions on the importance of commercial thinning and fertilization. The primary focus has remained on forecasting the development of post-harvest managed stands, and has been emphasized and re-affirmed by current interests and urgency for the development of regeneration standards linked to growth and yield.

Although post-harvest stand development is the first priority for growth and yield assessment, the Association recognizes that (a) much can be learned from experimentation and assessment in fire-origin stands that is relevant and necessary for yield forecasting and sound silvicultural decision-making in post-harvest stands, and (b) strategic management of existing fire-origin stands requires an ability to predict responses to potential interventions such as thinning and fertilization.

The above priorities are reflected in the identification and development of projects as described in Section 4.

As a basis for determining what stand variables should be measured and forecast, the members were also asked to rate the importance (high, medium, low) of various forest management objectives, with the following results:

1. Timber volume (annual allowable cut) was rated high by all members;
2. Wood value (related to cost of production and / or price of product) was rated high by a majority of members;
3. Ecological (primarily biodiversity and habitat), protection, and risk management objectives were rated medium to high by a majority;
4. A majority rated social objectives (e.g. aesthetics) low.

3.3. Roles, Responsibilities and Assigned Tasks

The FGYA is a cooperative initiative involving voting members (industrial sponsors), ASRD and the FtMF (as Coordinating Agency).

3.3.1. Voting Members

Voting members are corporations or corporate divisions holding forest management tenures in Alberta. Responsibilities of the voting members will include:

- Installation and measurement of growth and yield trials (either directly or by financial and other support of work undertaken by contractors administered through the FtMF) as specified in work and project plans approved by the Steering Committee;
- Provision of error-free data, in a format defined by the Coordinating Agency and the Technical Committee, from those measured under direct supervision of the member;
- Appointment of a representative to the Steering Committee with authority to vote and 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;
- Payment of an annual 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 FGYA 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 FGYA of personnel hired or contracted by the Coordinating Agency;
- Approve the publication and dissemination of information resulting from FGYA 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, and data delivery, and evaluate results.

3.3.2. *Alberta Sustainable Resource Development*

The Land and Forest Division (LFD) of ASRD has undertaken to:

- Assign the Executive Director of Forest Management, or other authorized senior official, 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.

3.3.3. *Foothills Model Forest*

The FtMF, as Coordinating Agency for the FGYA, will be responsible for:

- Administration of the Association;
- Appointment of a representative of the Foothills Model Forest Board of Directors to the Steering Committee in a non-voting capacity;
- 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, FGYA members in matters relevant to the Association;
- Preparation and submission of the reports.

The Foothills Model Forest will also:

- Retain the services of a Director to manage the Association;
- Retain or assign other staff and contract services, including those required to coordinate and ensure quality control of field services undertaken by contractors;
- Administer the annual operating budget of that portion of the Association's program for which it is directly responsible;
- 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 Association, in accordance with generally accepted Canadian accounting practices, and subject to annual independent audit;
- Procure and maintain equipment and supplies required by the Association;
- If applicable, procure, own, and maintain equipment requiring capital expenditures, and lease such equipment to the Association at rates not exceeding fair market value
- Maintain a secure repository of all FGYA data.

3.3.4. *Director*

This is a part-time position administered by the Coordinating Agency and reporting to the Steering Committee. The Director, 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 project plans, experimental designs, and data standards are developed in a timely manner;
- Supervise field coordination, research and development staff positions approved by the Steering Committee;
- 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 FGYA members;
- Arrange dissemination to FGYA 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.

3.3.5. *Research and Development Associate*

The Research and Development (R&D) Associate will assist the Director in the:

- Selection and development of modeling techniques for predicting the regeneration establishment, performance, growth and yield of lodgepole pine in managed stands;
- Planning, supervision and quality control of field measurements and research activities, including training, orientation and coordination of contractors and technical representatives;
- Development and testing of prototype models and other decision-support tools for application and scale-up by Association members;
- Preparation and authorship of technical reports and publications;
- Liaison and communication with Association timber supply planners and silvicultural practitioners, and with researchers in collaborating agencies.

The Associate will report to the Director of the FGYA on program, scientific and technical matters. Administrative arrangements and reports for employment, salary, benefits, and expense compensation have yet to be determined, and will depend on funding arrangements for the position (see below).

This is a new full-time position proposed to commence between July 1, 2005 and January 31, 2006. Filling the position at this time is based on the following considerations:

- The need to replace the current part-time Field Coordinator who is resigning effective March 31, 2005 is accompanied by a growing requirement and opportunity for research and development of decision-support tools using the Association's rapidly accumulating data base. The part-time Director cannot fulfill this expanding role without support.
- Reliance on external and non-dedicated personnel for research and development tasks is problematic owing to conflicting demands and limited accountability. An appropriately qualified staff person, accountable to the Director and Steering Committee, is preferable.
- The organization is currently highly dependent on the present part-time Director for all research, development and program delivery. Succession planning, involving the sharing of tasks, experience and knowledge with a competent assistant and potential successor or successors, is necessary to ensure long-term success.

3.3.6. *Field Services Contractors*

A roster of suitably qualified field contractors will be maintained to assist in project implementation and quality assurance. These services are required in 2 main areas:

1. Field coordination and quality control: The R&D Associate will require occasional assistance from experienced professionally registered field foresters or forest technologists for project management and auditing assignments
2. Installation and measurement of research trials: Planned project implementation will require the services of qualified contractors with proven experience in forestry field measurements, sample plot layout, and / or experimental silviculture.

Only contractors recommended or endorsed by FGYA member companies will be listed. Selection for projects will be competitively bid, or may be sole-sourced in situations where only one contractor is available with the required skills and experience. In the latter case, financial proposals will be evaluated by at least 2 technical representatives in addition to the Director.

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 4, but will be subject to Steering Committee review and approval each year.

Unless otherwise provided for under special agreements with external sponsors and cooperators, 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. 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.

Situations have arisen where members have already collected growth data from permanent sample plots (PSPs), potentially contributing to an FGYA project with considerable timesaving. Such contributions may be recognized and encouraged by crediting and offsetting the value of the data against the contribution that the member would otherwise make to the project under the allocation formula. The Technical Committee will assess the value of such contributions relative

to the cost of new data collection, and make recommendations to the Steering Committee regarding what value should be credited to the member contributing data. The Steering Committee will make the final determination of the value to be credited. The FGYA will not normally reimburse the member directly, or allow credits to be accumulated from one project to another, so the maximum value that can be recognized is the project cost that would otherwise be allocated to the member for collecting new data. In the event that such an offset is made, the cost of new data collection will be shared among the other members, in proportion to their net areas.

Table 1. Work Allocation Based on Pine-leading Area

Member	Net area (ha)	% of total
Alberta Newsprint Company	106,870	5.2
Blue Ridge Lumber	180,323	8.8
Canadian Forest Products	106,271	5.2
Millar Western Forest Products	112,406	5.5
Spray Lake Sawmills	114,988	5.6
Sundance Forest Products	121,848	6.0
Sundre Forest Products	293,655	14.4
Hinton Wood Products	451,713	22.1
Weyerhaeuser Canada	557,433	27.3
Total	2,045,507	100.0

3.5. Collaboration with External Institutions

Cooperation with external agencies (i.e. non-FGYA members) is desirable and necessary for meeting the mandate and mission of the FGYA. However, a clear collaboration strategy is necessary to ensure that such cooperation is beneficial to the Association and its members, equitable, and an efficient expenditure of the Association’s time and resources.

The FGYA may collaborate with other agencies in order to:

- Obtain expert advice on the design, analysis and interpretation of projects;
- Obtain assistance in the analysis of data and publication of results;
- Encourage independently funded supplementary research supporting and building on FGYA projects;
- Access relevant information sources, including through sharing and exchange of data where clearly in the FGYA’s interest and approved by the Steering Committee;
- Improve communication between researchers and practitioners where such communication will benefit members and enhance the assessment of lodgepole pine growth and yield in managed stands.

Where collaboration involves data sharing, significant costs, publication of FGYA information, and / or formal commitment to deliverables, the Director will obtain the approval of the Steering Committee before proceeding. If deemed necessary and appropriate by the Steering Committee, the FGYA will enter into a formal memorandum of cooperation and / or collaborative research signed by the FGYA’s chairperson. Such an agreement between the FGYA and cooperator will specify:

- Purpose and scope of the cooperation;
- Administrative roles and responsibilities;
- Contributions (financial and / or in-kind);
- Data ownership and access;
- Appropriate provisions and clarifications regarding liability, indemnification, amendment, notice, and dispute settlement;
- Term of agreement and time schedule for work commencement and completion;
- Schedule of committed deliverables.

No provisions in any such agreement may conflict with, encumber or supersede provisions contained in the Memorandum of Agreement between FGYA members or this Proposal.

The FGYA, the Northern Forestry Centre of the CFS, and the Land and Forest Division (LFD) of Alberta Sustainable Resource Development entered into such an agreement in July 2002 for the cooperative management of historic lodgepole pine research trials.

Other collaborative arrangements proposed include:

- *Inter-disciplinary Conference on Post-harvest Stand Development*: The FGYA and FtMF, in conjunction with the Alberta Forest Genetic Resources Council (AFGRC) submitted a successful proposal to the FRIAA Open Funds Program for a conference on post-harvest stand development to be held in January 2006 (see Section 4.3). The FGYA will cooperate with the FtMF, AFGRC, and other sponsors in the planning and development of the conference program.
- *University of Alberta*: The University has expressed interest in a collaborative agreement to participate in implementation of the *Enhanced Management of Lodgepole Pine* Project (see Section 4.6). It has informally provided advice on project design and has offered to participate in analysis and publication of results.
- *British Columbia*: Informal dialogue with the B.C. Ministry of Forests Research Branch, and other researchers in B.C., has proven extremely helpful without requiring specific or formal commitments on the part of the FGYA. This dialogue will be continued.

3.6. Data Sharing

New data collected and / or funded by a member specifically as part of an approved cooperative project will be provided to the FGYA and made available to all Association members. The Association's use of the data will be limited to that specified in project and work plans approved by the Steering Committee (unless otherwise directed by the Steering Committee). Digital files and data bases funded through FRIAA may be subject to access through provincial freedom of information legislation. Otherwise data will not be distributed outside the FGYA without the agreement of the contributing member or members. Section 8 of the Memorandum of Agreement among members imposes restrictions on the use of cooperative project data by individual members, including that no member shall disseminate data collected by other members, or information derived from such data, to non-members without the approval of the Steering Committee. Dissemination of information within a member's organization, including other divisions and the parent corporation, is permitted.

If individual members or external agencies contribute data not collected directly as part of a cooperative project, such data will not be released to third parties, including individual members of the Association, without the agreement of the owner. Such data would not be accessible through provincial freedom of information legislation unless directly funded through FRIAA.

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 External Funding

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

- Alignment with provincial forest management and research priorities;
- Alignment with federal and provincial 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 other sources are summarized as follows.

3.7.1. Application of Results

The FGYA's activities are enhancing the management of forest resources by providing a continually improved, scientific, quantitative, and credible basis for:

- Linking regeneration standards and practices to timber yield objectives;
- 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 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 FGYA. Information gathered is being 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 ecosystem basis, rather than just by tenure, the results will be generally applicable to the natural range of lodgepole pine in Alberta.

The FGYA is enhancing 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;

- Stand-level data providing the basis for assessing impacts of enhanced forest management practices on biological diversity, natural ecosystem processes, fire spread, and contributions to global ecological cycles;
- Bridging basic research to market-driven applications such as prototype forestry practices and decision-support tools, demonstration, and feasibility investigation

3.7.2. *Relationship to Existing Responsibilities*

The work undertaken by the FGYA 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 program 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.

3.7.3. *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 Canadian Forest Service, University of Alberta, or other recognized centres of excellence. Measurement standards will follow or exceed those used by the Canadian Forest Service (CFS) and ASRD for assessing stand dynamics. 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.

The FGYA's activities will not have any adverse impacts on any other forest resource values or users.

3.7.4. *Fair Market Value*

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

- Director: 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.
- Research and Development Associate: salary, benefits and other allowances consistent with remuneration levels established by FGYA members and collaborating agencies for comparable positions.
- Field co-ordination and quality control: Prevailing contract rates for a registered professional forester or technologist with a minimum of five years experience in forest field measurements.
- Other contractors and field personnel: Prevailing contract or wage rates based on the respective categories of work. Work will normally be competitively bid. Where competitive bidding is not practical (e.g. because of specialized requirements for uniquely held skills), assignments may be sole sourced. Proposals for services to be sole sourced will be scrutinized by at least 2 FGYA member organizations, in addition to the Director, for fair value.

4. Detailed Project Information and Delivery Schedules

The activities of the FGYA during the term of this Project will focus on the following 6 sub-projects or linked projects:

1. Development and management of the Association (covered under this Proposal);
2. Lodgepole pine regeneration (covered under this Proposal);
3. Comparison of pre-harvest and post-harvest stand development (FGYA contributions covered under this proposal);
4. Cooperative management of historic research trial (covered under FRIAA Project # FOOMOD-01-02: *Measurement and Maintenance of Historic Research Trials*);
5. Regional yield estimators (FGYA contributions covered under this proposal);
6. Enhanced management of lodgepole pine (covered under FRIAA Project # OF-02-16: *Enhanced Management of Lodgepole Pine*).

Justification, purpose, methods, work schedules and deliverables are described below. Budget and payment schedules 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 FGYA 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

Section 3.3 describes the methodology adopted for developing and managing the Association, including the assigned roles, responsibilities and tasks.

4.1.3. Deliverables

- Annually updated 5-year business plan and annual work plan, with budgets by year for each project;
- Project plans, designs, reports and publications (as specified in Sections 4.2 – 4.6 below);
- Information exchange meetings, field tours and technical sessions (minimum of 1 meeting per year), cooperative arrangements with collaborating agencies (see Section 3.5);
- Active publicly-accessible web site;
- Quarterly and annual progress reports;
- Financial statements (annually and / or as required);
- Documented recommendations of the technical committee;
- 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.

Since the Project's inception, the linking of early crop condition and treatment to subsequent growth and yield has assumed a high priority among FGYA members who are seeking to develop stratum-specific reforestation standards based on the yield objectives contained in their forest management plans. This requires linking crop performance (e.g. as measured in performance surveys 8-14 year performance surveys) to growth and yield predictions, and forecasting crop performance from site and treatment variables and from early crop attributes (e.g. as measured by 4-8 year establishment surveys). The project over the next 5 years will contribute substantially to meeting these requirements through the development of regeneration models. These decision support tools will allow managers to predict establishment and performance results based on site, stand, site preparation, planting, and vegetation management factors.

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 each installation split 2 ways into 4 treatment plots (weeding, thinning, weeding and thinning, no weeding or thinning). Twelve additional installations (6 spacings x 2 replications) have been added in the modal ecosite category, to produce a total of 102 installations. Details of the design, installations and procedures are provided in an *Establishment Report* (April 2003) and a periodically updated field manual.

4.2.3. Deliverables

Deliverables of the Project for the period April 1, 2005 to March 31, 2010 are shown in Table 2.

Note that installation status checks and measurements are the responsibilities of individual members, whereas other deliverables are the responsibility of the FGYA (i.e. Director, R&D Associate). Consistent with the Memorandum of Agreement, the project database is managed by the FtMF.

Annual status (mortality) checks and bi-annual full measurements will be continued as previously scheduled for at least the first 5 growing seasons (the oldest installations will have their 5th growing season in 2005). The measurement protocol is tentatively scheduled to be continued for the next 5 year period.

Table 2. Delivery Schedule for Lodgepole Pine Regeneration Project

Deliverable	Responsibility	Due
Status checks	Member	Annually (data submission by October 31)
Full measurements	Member	Annually to 5 th growing season, thereafter bi-annually (data submission by October 31)
Summary status and verification reports	FGYA	Annually (January 31) and prior to final payments by FRIAA to sponsors
Digital database	FtMF / FGYA	Annually updated (December 31)
Crop performance report and regeneration establishment model (5-6 growing seasons)	FGYA	December 31, 2007
Crop performance report, regeneration performance model (8-9 growing seasons), final technical report	FGYA	March 31, 2010

Table 3 shows a breakdown of scheduled measurements for the 102 installations by year, number of growing seasons elapsed since planting, and forest management area (FMA). The schedule will be reviewed once the initial crop performance assessment is completed (June 2005). No significant changes are expected for the 2005 field season. Consideration will be given to rescheduling in the later years so as to provide full measurements for all installations in 2009, for inclusion in the regeneration performance model and final report for the 5-year project term.

Table 3. Lodgepole Pine Regeneration Project – Elapsed Growing Seasons and Scheduled Measurement Type by Year and FMA

FMA	# of installations	2005	2006	2007	2008	2009
Alberta Newsprint	6	4 (SC)	5 (FM)	6 (SC)	7 (FM)	8 (SC)
Blue Ridge Lumber	6	4 (SC)	5 (FM)	6 (SC)	7 (FM)	8 (SC)
Canfor	6	4 (SC)	5 (FM)	6 (SC)	7 (FM)	8 (SC)
Hinton	12	5 (FM)	6 (SC)	7 (FM)	8 (SC)	9 (FM)
	10	4 (SC)	5 (FM)	6 (SC)	7 (FM)	8 (SC)
Millar Western	6	4 (SC)	5 (FM)	6 (SC)	7 (FM)	8 (SC)
Spray Lakes	6	4 (SC)	5 (FM)	6 (SC)	7 (FM)	8 (SC)
Sundance	6	4 (SC)	5 (FM)	6 (SC)	7 (FM)	8 (SC)
Sundre	14	5 (FM)	6 (SC)	7 (FM)	8 (SC)	9 (FM)
Weyerhaeuser D.V.	6	4 (SC)	5 (FM)	6 (SC)	7 (FM)	8 (SC)
Weyerhaeuser Edson	6	4 (SC)	5 (FM)	6 (SC)	7 (FM)	8 (SC)
Weyerhaeuser G.P.	2	5 (FM)	6 (SC)	7 (FM)	8 (SC)	9 (FM)
	16	4 (SC)	5 (FM)	6 (SC)	7 (FM)	8 (SC)

FM = full measurement, SC = status check

No further fill-planting will be undertaken unless installations fail completely. The requirement for continued brushing to maintain competition below planned thresholds is expected to be low.

A contingency budget is recommended to cover any remedial treatments required. Pre-commercial thinning is not currently scheduled within the next 5 year period.

The initial crop performance report, which will cover the first 3 to 4 growing seasons of the trial, will report:

- Growth, ingress and mortality statistics by various ecosite, treatment, FM area and growing season;
- Analyses to assess how much of the observed variation growth variables can be explained by controlled factors (ecosite, initial density, brushing);
- Preliminary exploratory analyses to develop model structure.

The regeneration establishment model will predict stocking, density, ingress, mortality and height and diameter growth over the first 5 years. It will be applicable to forecasting results of establishment surveys. The regeneration performance model will extend prediction of these variables to beyond 8 years, and will be linked to full-rotation growth and yield models. It will be applicable to forecasting the outcome of performance surveys, and placing stands on forecast long-term growth trajectories. The variables and factors evaluated for making predictions will include: ecosite, planting density, vegetation control, various competition indices, time since planting, elevation and natural sub-region, pre-harvest site index, physiographic site, planting season, site preparation and cone count.

4.3. Comparison of Pre-harvest and Post-harvest Stand Development

4.3.1. Justification and Purpose

The FGYA has completed a comparison of pre-harvest and post-harvest site indices. In 2004 results were presented at a major international forestry conference and published in the conference proceedings.² The specific purpose of the comparison was to provide credible and reliable forecasts of post-harvest site index, for the main site types of interest to members, relative to pre-harvest values. The study demonstrated that regeneration practices following harvesting are capable of increasing site index and fibre production relative to that of fire-origin stands, most likely because of differences in initial stand densities relative to those of fire-origin stands. However, these shifts are not without associated risks and residual uncertainties. Priorities were identified for enhancing productivity, managing risks, and reducing uncertainties. Although the original objectives of the project have been met, the FGYA will undertake or encourage further work to:

1. Validate the initial results;
2. Confirm the role of stand density management in the observed differences;
3. Explore the implications to yield forecasting of post-harvest stands having different stocking-density relationships to fire-origin stands;
4. Integrate knowledge from the disciplines of genetics, silviculture and forest health into the prediction of yield following harvesting.

² CIF/SAF Joint 2004 annual general meeting and convention., October 2-6, Edmonton, Alberta, Canada

4.3.2. Methodology

1. *Validation.* The Senior Biometrician of ASRD will collaborate with the FGYA Director in comparing site index changes observed in the FGYA study with trends observed in other datasets.
2. *Effect of stand density.* Stand height development at different densities in CFS spacing trials (re-measured by the FGYA - see Section 4.4) will be compared with the observed shifts in site index between fire-origin and managed stands to assess whether the latter shifts can be explained in terms of managed densities. This analysis will be carried out by the Director and R&D Associate in cooperation with the CFS.
3. *Stocking-density relationships.* Initial densities in post-harvest stands may not need to be as high as indicated by models based on fire-origin stands if regeneration is better distributed over the site as a result of reforestation treatments. A comparison involving various measures of stocking in fire-origin versus post-harvest stands would shed light on the magnitude of the effect, and possibly allow for the introduction of stocking as an independent variable in stand-level growth models. An FGYA member is developing a proposal to undertake this assessment. Since the intent is to use FRIP funds, the results would be in the public domain. The FGYA will therefore not duplicate this effort, but will monitor it and assist where possible.
4. *Integration of interdisciplinary knowledge.* The FGYA and FtMF, in conjunction with the Alberta Forest Genetic Resources Council (AFGRC) submitted a successful proposal to the FRIAA Open Funds Program for an inter-disciplinary conference on post-harvest stand development to be held in January 2006. The conference theme will be integration of knowledge from the disciplines of genetics, silviculture and forest health into the prediction of stand development, growth and yield following harvesting. The conference will share and integrate information relevant to the effective management of forest stands regenerated after harvesting in Alberta; identify how to integrate genetic, growth and yield, silvicultural, and forest health information; achieve understanding by forest managers of how this information can be applied in policy and practice; and identify information gaps and associated research requirements.

4.3.3. Deliverables

Deliverables will be in the form of a technical report, at least 1 publishable scientific paper, and conference proceedings (the latter covered under the separately funded interdisciplinary conference project). Results will be incorporated into the models and yield forecasts developed under the *Lodgepole Pine Regeneration* and *Enhanced Management of Lodgepole Pine* projects.

4.4. Cooperative Management of Historic Research Trials

The rationale, methods and deliverables for this project are described in the *Annual Report and Amended Work Plan* submitted to FRIAA April 2005 for Project FOOMOD-01-02: *Measurement and Maintenance of Historic Research Trials*. The term of the current project is from July 1, 2002 – June 30, 2007. It will be renewed subject to the agreement of all parties.

4.5. Regional Yield Estimators

4.5.1 Justification and Purpose

This is a collaborative project based on data submitted by FGYA members to ASRD for analysis during the first 5-year FGYA term. ASRD wishes to produce generalized stock, stand volume,

and yield tables for each natural region, differentiated by broad AVI (Alberta Vegetation Inventory) cover groupings, enabling the Department to report credibly on both the current state of provincial timber resources, and their rate of growth. The FGYA is interested in developing stratum-based stock and stand table generators for lodgepole pine with compatible forward and retrospective projection capability. These would provide an improved basis for crop planning, evaluation of regeneration standards, sensitivity analysis, and rationalization of stratification and SFM monitoring systems.

4.5.2 Methodology

The role of the FGYA will be limited to testing by members of prototype applications developed by ASRD.

4.5.3 Deliverables

The project is intended to provide:

- Prototype stratum-based stock and stand table estimators for lodgepole pine ecosystems, compatible with stratification, and with forward and retrospective projection capability.
- Associated estimates of the precision of forecasts and the variability within strata.
- A report describing the estimation system and including technical recommendations for application of the system.

ASRD has experienced a series of difficulties in undertaking the analysis, and as a result the deliverables have been rescheduled. The analysis and report are now scheduled for completion by December 31, 2005. Reported results will be reviewed and evaluated prior to a decision on any required further work.

4.6. Enhanced Management of Lodgepole Pine

The rationale, methods and deliverables for this project are described in the *Annual Report (2004)*, *Work Plan (2005-2008)* and *Detailed Project Design* of FRIAA Project OF-02-16 *Enhanced Management of Lodgepole Pine*. The project commenced in 2004 and runs until March 31, 2009. It is focused on filling information gaps in nutrition and density management of both fire-origin and post-harvest stands.

5. Budget and Payment Schedules

5.1. Development and Management of the Association

The development and management of the Association, including direction and field coordination, will be funded centrally and supported through a membership fee approved each year by the Steering Committee.

Table 4 shows membership fee requirements to maintain a positive balance over the next 5 years. The table assumes that the number of voting members (9) will remain as for the previous 5 years.

Table 4. Financial Projections for Development and Management of the Association

(a) By Fiscal Year

Income / Expenditure	2005-6	2006-7	2007-8	2008-9	2009-10
Membership fee (per voting member)	15,000	22,000	22,000	22,000	22,000
Income					
Prior year balance forward	107,732	54,572	34,802	15,032	17,312
Membership fees - FRIP (FRIAA contract)	105,000	154,000	154,000	154,000	154,000
Membership fees - FRIP (member direct)	15,000	22,000	22,000	22,000	22,000
Membership fees - non-FRIP	15,000	22,000	22,000	22,000	22,000
Total income	242,732	252,572	232,802	213,032	215,312
Expenditures					
Director (including GST + expenses)	84,000	84,000	84,000	63,000	63,000
Field coordination (incl. GST + expenses)	45,000	30,000	30,000	30,000	30,000
R&D Associate (salary + overhead)	35,200	70,400	70,400	70,400	70,400
Research allowance (supplies, travel)	8,000	16,000	16,000	16,000	16,000
Meetings and tours	7,000	7,000	7,000	7,000	7,000
Contingency (5%)	8,960	10,370	10,370	9,320	9,320
Total expenses	188,160	217,770	217,770	195,720	195,720
Ending Balance	54,572	34,802	15,032	17,312	19,592

(b) Totals for 5 years

Income / Expenditure	Total \$
Membership fee (per voting member)	103,000
Income	
Balance forward	107,732
Membership fees - FRIP (FRIAA contract)	721,000
Membership fees - FRIP (member direct)	103,000
Membership fees - non-FRIP	103,000
Total income	1,034,732
Expenditures	
Director (including GST + expenses)	378,000
Field coordination (including GST + expenses)	165,000
R&D Associate (salary + overhead)	316,800
Research allowance (computer, supplies, travel)	72,000
Meetings and tours	35,000
Contingency (5%)	48,340
Total expenses	1,015,140
Ending Balance	19,592

Note that maintaining a positive balance over the 5-year period will require increasing the membership fee in the second year from \$15,000 to \$22,000.

Table 4 does not include the following contributions by members and collaborating agencies:

- FtMF administrative and financial services;
- FtMF provision of office space for the R&D Associate;
- Data management services provided by the FtMF GIS Coordinator (estimated for 2005 at 27 days per year);
- Participation on technical, steering and project committees;
- Attendance of meetings;
- Review of minutes, reports, proposals, experimental designs and scientific papers;
- Identification of candidate sampling and experimental sites;
- Contribution of existing information and data;
- Provision and support of models (e.g. use of ASRD's GYPSY and the B.C. Ministry of Forests' TASS and TIPSY);
- Protection of research installations;
- Analysis and interpretation of data;
- \$10,000 grant made by ASRD towards the publication of results from historic research trials.

5.2. Lodgepole Pine Regeneration

Costs of fieldwork will be incurred directly by each member for those installations (clusters of experimental plots) located on their forest management area. Work is administered directly by the members, with the FGYA playing a coordination and quality control role.

Members wishing to use FRIP funds to cover their inputs will submit to FRIAA:

- A supplementary proposal summary application referencing the umbrella proposal;
- A proposed payment schedule;
- Annual financial and work verification reports.

Estimated costs shown in Table 5 for Project 2 are approximate expectations based on the work schedule shown in Table 3, and should be regarded as only indicative orders-of-magnitude of the actual costs to be incurred by members. Measurement costs per installation (cluster of 4 plots) are assumed at \$2000 and \$400 for full measurements and status checks respectively.

Table 5. Estimate of Total Costs to be Incurred by Members for Lodgepole Pine Regeneration Project

Cost item	2005	2006	2007	2008	2009	Total
Status checks	29,600	11,200	29,600	11,200	29,600	111,200
Full measurements	56,000	148,000	56,000	148,000	56,000	464,000
Total measurements	85,600	159,200	85,600	159,200	85,600	575,200
Contingency	11,500	11,500	11,500	11,500	11,500	57,500
Total	97,100	170,700	97,100	170,700	97,100	632,700

FGYA costs of administration, quality control, field coordination, and inputs by the Director and R&D Associate will be covered under Project 1 (*Development and Management of the Association*).

5.3. Comparison of Pre-harvest and Post-harvest Stand Development

With the exception of the conference on post-harvest stand development, no further special revenues or expenditures are currently scheduled for this project. Inputs by the Director and R&D Associate will be covered out of Project 1 (*Development and Management of the Association*).

The January 2006 conference on post-harvest stand development will be supported through a separate project by \$55,000 of FRIP funding obtained by the FtMF through the FRIAA Open Funds Program, plus approximately \$18,500 forecast to be recovered from conference registration fees. The Director's inputs to the conference, primarily co-chairing of the program committee, will be covered under Project 1.

5.4. Cooperative Management of Historic Research Trials

The financial schedules for this project are described in the *Annual Report and Amended Work Plan* submitted to FRIAA April 2005 for Project FOOMOD-01-02: *Measurement and Maintenance of Historic Research Trials*. Inputs by the Director and R&D Associate will be covered under Project 1 (*Development and Management of the Association*).

5.5. Regional Yield Estimators

No direct revenues or expenditures are scheduled for this project. Inputs by the Director and R&D Associate will be covered under Project 1 (*Development and Management of the Association*).

5.6. Enhanced Management of Lodgepole Pine

The financial schedules and arrangements for this separate project are described in the *Annual Report (2004)*, *Work Plan (2005-2008)* and *Detailed Project Design* of FRIAA Project OF-02-16 *Enhanced Management of Lodgepole Pine*. The project will be supported with FRIP funding to a maximum of \$442,800, provided under FRIAA's *Open Funds* initiative. The project term is from April 1, 2004 to June 30, 2009.

APPENDIX. LETTERS FROM SPONSORS