

# **Foothills Growth and Yield Association**

## **BUSINESS AND WORK PLAN**

**Business Plan Updated Effective April 1, 2007  
with Annual Work Plan for April 2007 – March 2008**

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## 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). In 2005 a second 5-year term was approved (April 1, 2005 to March 31, 2010) under FRIAA Project # FOOMOD-01-03.

During the 2001-02 fiscal year, the FGYA established a major project to forecast and monitor development of lodgepole pine regenerated after harvesting, and assessed opportunities and requirements for other cooperative projects. At the FGYA's March 2002 Annual Steering Committee Meeting the Committee reviewed and accepted a business plan that rationalized the Association's mission, strategies, projects and financial requirements for the next 5 years. The plan identified a total of 6 projects, all of which have been implemented and are now in various stages of completion. The plan was updated in 2004, 2005 and 2006.

This version of the plan covers the period commencing April 1, 2007, with projections 2-5 years ahead depending on project plans and expected durations. Costs, revenues, activities and deliverables are scheduled by year. Work is scheduled in detail for the coming year (April 1, 2007 – March 31, 2008).

## 2. Mission

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;
- 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 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. Strategies**

#### **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.

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.

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 must be 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 Program Manager;
- 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.

Effective April 1, 2006, the term for the elected chairperson will be 2 years i.e. the current Chairman's position will expire March 31, 2008.

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

- Develop project plans, experimental designs and standards for approval by the Steering Committee;
- Assist the Program Manager 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 Program Manager to manage the Association and to coordinate and ensure quality control of field services undertaken by contractors;
- Retain or assign other required staff and contract services;
- 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. *Program Manager (Director of Operations and Field Coordinator)*

The Program Manager will be a firm or one or more individuals retained to undertake the following duties:

- Preparation of annual work plans and budgets, and annual updating of a 5-year business plan;
- Chairing of a Technical Committee consisting of representatives from 11 member organizations, and consultation with the members regarding the development and management of projects;
- Ensuring that projects are implemented in a timely manner consistent with approved program and project plans and quality standards;
- Planning, supervision and quality control of field research and measurements, including the overseeing and auditing of contracts and the coordination of inputs by technical representatives;
- Dissemination to FGYA members of relevant information, including a minimum of one educational meeting or field trip per year;
- Preparation of progress reports every six months or as otherwise requested by the Steering Committee, and of annual program and project reports;
- Collaboration and cooperation with other agencies as appropriate and necessary to further the interests of the Association.

The Program Manager will:

Enter into a one-year renewable employment agreement or services contract with the Foothills Model Forest to undertake the above duties;

Retain or sub-contract any additional personnel required to fulfill the list of duties specified above;

Report to the FGYA Steering Committee and the General Manager of the Foothills Model Forest;

Work closely with the FGYA Research and Development Associate;

Be provided data management and financial accounting support by the Foothills Model Forest.

The required level of input is expected to be between 0.5 and 1.0 person years per year, and to be split fairly evenly between professional program direction and technical field coordination by one or more registered forestry professional(s). Funding, implementation and extent of the services are subject to initial and annual approval by the Steering Committee.

3.3.5. *Research and Development Associate (Technical Director)*

A Research and Development Associate will be retained on a part-time basis under contract by the Foothills Model Forest to provide analytical and technical direction services to the members and the Program Manager. He / she will be a registered professional forester holding an advanced forestry degree with extensive research and operational experience in growth and yield, and will undertake the following duties:

Selection and development of analytical and modeling techniques for predicting the establishment, performance, growth and yield of lodgepole pine in managed stands;

Analysis of data from FGYA field trials;

Reporting of technical results of projects to FGYA members;

Development and testing of decision-support tools for application by Association members;

Preparation of technical reports and papers for dissemination or publication;

Liaison and communication with Association timber supply planners and silvicultural practitioners, and with researchers in collaborating agencies, as required for effective exchange of knowledge and ideas.

The required level of input is expected to be approximately 100 days per year for the next 2 years (as required to establish the research and development program and catch-up with the backlog of data analysis accumulated over the last 2 years) and to eventually equilibrate to 60-70 days per year. The Associate will report to the Program Manager on program responsibilities and administration, and directly to the Steering and Technical Committees on technical results and products.

### 3.3.6. *Field Services Contractors*

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

1. Fieldwork quality control: Independent experienced professionally registered field foresters or forest technologists may be required for auditing assignments, particularly if the Program Manager is in any way directly engaged in providing other field services to the Association;
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 and engaged. 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 Program Manager.

### **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 7, 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 as calculated in 2002. 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. Members will submit during 2006 information on any significant changes since 2002 for allocation re-calculation by the Technical Committee and review by the Steering Committee not later than March 2007.

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**

<b>Member</b>	<b>Net area (ha)</b>	<b>% of total</b>
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 Program Manager 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 Business Plan.

Collaborative arrangements in existence or planned include:

- *Canadian Forest Service*: The FGYA, the Northern Forestry Centre of the CFS, and the Land and Forest Division (LFD) of Alberta Sustainable Resource Development entered into an agreement in July 2002 for the cooperative management of historic lodgepole pine research trials. Informal dialogue is also taking place with the CFS on assessment of climatic factors and climate change on growth and yield.
- *University of Alberta*: In 2005 the University and FGYA entered into a collaborative agreement to participate in implementation of the *Enhanced Management of Lodgepole Pine Project*.
- *British Columbia*: Informal dialogue with the B.C. Ministry of Forests Research Branch has proven extremely helpful without requiring specific or formal commitments on the part of the FGYA. This dialogue will be continued and extended to regional Ministry staff such as those knowledgeable and involved in the management of regeneration following mountain pine beetle infestations.
- *Loblolly Pine Growth and Yield Research Cooperative*: The FGYA visited the Virginia-based Cooperative in 2006 to learn about its research, operation and structure. Members concluded that maintaining and building on the link established was desirable. The application of loblolly pine models and thinning practices to lodgepole pine, based on "scaling" and "similarity analysis" approaches discussed and demonstrated during the tour, is of particular interest. The FGYA will consult with the Cooperative to investigate the application of these approaches.
- *Mixedwood Management Association (MWMA)*: The FGYA will continue to support the efforts of the MWMA to promote collaboration among Alberta forestry co-operatives. (In 2006 we provided information on our objectives and structure, and participated in formal consultations with representatives from the MWMA and other agencies.)

### **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;

- Providing decision-support tools for the management of stands attacked by mountain pine beetle.

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:

- Technical and operations directors: 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 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. Projects and Deliverables**

The activities of the FGYA during the term of this Plan will focus on 6 of the following 7 projects:

1. Development and management of the Association;
  2. Lodgepole pine regeneration;
  3. Comparison of pre-harvest and post-harvest stand development;
  4. Cooperative management of historic research trials;
  5. (Regional yield estimators;)
  6. Enhanced management of lodgepole pine;
  7. Regeneration management in a MPB environment
- (No further activity is planned for Project 5.)

Justification, purpose, methods and deliverables are 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 FGYA requires a Coordinating Agency to administer the Association and a Director (program manager) 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;
- Information exchange meetings, field tours and technical sessions (minimum of 1 meeting per year), cooperative arrangements with collaborating agencies;
- Active publicly-accessible web site;
- Mid-year 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. FRIP funding for the Project was approved by FRIAA for the period April 1, 2000 to March 31, 2005 (FRIAA Project FOOMOD-01-01). Continued funding to March 31, 2010 is provided for under FRIAA Project FOOMOD-01-03).



#### 4.2.3. Deliverables

Deliverables of the Project for the period April 1, 2007 to March 31, 2010 are shown in Table 2.

Note that installation status and measurements are the responsibilities of individual members, whereas other deliverables are the responsibility of the FGYA. 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 the first 10 growing seasons. 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). A more detailed schedule will be developed each year before commencement of fieldwork, and reviewed with technical representatives and contractors at a pre-season meeting. Consideration will be given to rescheduling of 2008, 2009 measurements 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.

No further fill-planting will be undertaken unless installations fail completely. Continued tending is expected to be necessary only where treatments prior to 2007 were missed or failed.

**Table 2. Delivery Schedule for Lodgepole Pine Regeneration Project**

<b>Deliverable</b>	<b>Responsibility</b>	<b>Due</b>
Status checks	Member	Annually (data submission by October 31)
Full measurements	Member	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)
Initial crop performance report (3-4 growing seasons)	FGYA	Delivered December 2005 for performance up to March 31, 2005
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

The crop performance reports will include:

- Growth, ingress, competition and mortality statistics by treatment plot and growing season (or time since planting), with summaries by ecosite, treatment, FM area and growing season;
- Preliminary analyses to assess how much of the observed variation can be explained by controlled factors (ecosite, initial density, brushing);
- Preliminary exploratory analyses and strategy to develop regeneration models.

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.

In view of combination of growing interest in the effects of climate change on regeneration survival and growth, and observed variation in crop performance likely to be linked to local climate, during 2007 the feasibility of linking growth and mortality during the first 5 years of the trial to regional and locally-interpolated climate records will be explored.

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

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

FM = full measurement, SC = status check

### 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.<sup>1</sup> 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

<sup>1</sup> CIF/SAF Joint 2004 annual general meeting and convention., October 2-6, Edmonton, Alberta, Canada

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.

#### 4.3.2. *Methodology*

1. *Validation.* ASRD will collaborate with the FGYA in comparing site index changes observed in the FGYA study with trends observed in other datasets, and computed with later improved site index models.
2. *Effect of stand density.* Stand height development at different densities in CFS spacing trials 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.
3. *Stocking-density relationships and spatial effects.* 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. The GYPSY program of ASRD is making excellent progress in modeling these effects. The FGYA will therefore not duplicate this effort, but will monitor closely and assist where possible.
4. *Integration of interdisciplinary knowledge.* The FGYA and FtMF, in conjunction with the Alberta Forest Genetic Resources Council (AFGRC) hosted a conference on post-harvest stand development in January 2006. The FGYA will continue to cooperate with the AFGRC and other participants in following through on recommendations developed by the conference.

#### 4.3.3. *Deliverables*

A scientific paper covering item 1 above is in preparation under the direction of the ASRD Senior Biometrician, who has invited the FGYA Research and Development Associate to participate as a co-author. Work covering item 2 will be scheduled and reported under Project 4 (see 4.4. below) Results from items 1,2 and 3 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**

#### 4.4.1. *Justification and Purpose*

In August 2001, representatives of the FGYA, 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. In 2002 the Director General of the Northern Forestry Centre, the Executive Director of the ASRD Forest Management Branch, and the Chairman of the FGYA, signed a Letter of Agreement facilitating the collaborative arrangements necessary to provide forest managers in Alberta with the full and continued benefit of relevant long-term field trials established to assess the responses of lodgepole pine to nutrition and density management. The

initial term of the agreement is from July 1, 2002 – June 30, 2007. It will be renewed subject to the agreement of all parties.

4.4.2. *Methodology*

The Project involves 3 main tasks:

1. Maintenance and protection of the field installations;
2. Analysis of historic data and synthesis of results;
3. Ongoing measurement.

This is a cooperative effort shared between the FGYA, CFS and ASRD. Details of proposed objectives, data sharing arrangements, activities, level of effort, and contributions are contained in the Letter of Agreement. The FGYA’s main role is re-measurement and maintenance of the trials on a prioritized schedule agreed by the 3 parties. Methods, schedules and sponsorship for this component of the project are specified in the approved FRIAA proposal: *Measurement and Maintenance of Historic Research Trials* (April 2003, FRIAA Project # FOOMOD-01-02). The work to be undertaken each year will be included in an annual work plan for approval by the Steering Committee and Project partners.

Table 4 shows a measurement schedule for the 5-year period 2007 – 2011. The trials indicated for measurement from 2007 onwards, plus the 2 not measured in 2006, have been rescheduled (August, 2007) based on a priority assessment of plots, and discussion surrounding the renewal of the Letter of Agreement (FGYA, CFS, SRD). Table 4a shows FGYA measurements on the plots during the period 2003-2006.

**Table 4. Re-measurement Schedule for Historic Research Trials**

Trial	2007	2008	2009	2010	2011
MacKay thinning 1954		x			
Swan Lake thinning 1977		x			
Teepee Pole Creek spacing (flat, north) sites 1967		x (low)			
Gregg spacing 1963					x
McCardle fertilization& thinning 1984			x		x
Kananaskis heavy thinning (K-57) 1941					x (low)
Gregg spacing 1984 medium site			x		
Gregg Spacing 1984 low/high sites			x (low)		
Clearwater fertilization & thinning 1968				x	
Ricinus fertilization after thinning 1975				none	
Strachan thinning				x (low)	
Teepee Pole Creek strip thinning	defer				
Kananaskis European thinning (K-3) 1938	x				
Kananaskis economic thinning (K-58) 1950	x				

**Table 4a. Re-measurements during first Letter of Agreement 2003-07**

Trial	2002	2003	2004	2005	2006
MacKay thinning 1954		x			
Swan Lake thinning 1977		x			
Teepee Pole Creek spacing 1967		x			
Gregg spacing 1963					x
McCardle fertilization&thinning 1984			x		
Kananaskis heavy thinning (K-57) 1941					x
Gregg spacing 1984			x		
Clearwater fertilization & thinning				x	
Ricinus fertilization after thinning				x	
Strachan thinning				x	
Teepee Pole Creek strip thinning	defer				
Kananaskis European thinning (K-3) 1938					
Kananaskis economic thinning (K-58) 1950					

#### 4.4.3. Deliverables

Deliverables originally scheduled for the period April 1, 2002 – March 31, 2007 are listed in Table 5.

Subject to review and approval by the Technical and Steering Committees and the CFS, analysis of measurements completed in 2006 for the Gregg spacing trials will be conducted to compare effects of controlled density on stand development with differences previously reported between post-harvest and fire-origin stands. The intent is to obtain and report an improved understanding of the cause and implications of developmental differences between stands of harvest versus fire origin. Results will be reported to the membership, and a paper will be prepared by the Research and Development Associate in cooperation with the CFS if results merit publication.

A project originally begun by the CFS will be completed by the FGYA in 2007/08<sup>2</sup>, i.e.: A performance evaluation of Alberta and British Columbia growth-and-yield models against growth data from historical research trials. Models to be evaluated include GYPSY, MGM, TADAM and potentially TASS. The intent of this examination is to evaluate the performances of various models against actual growth as reflected in the long-term trials.

<sup>2</sup> New, August 2007. This was a high priority project for FGYA, and the CFS has advised it will not complete it. The analysis and report will be done under contract by Andria Dawson, who initiated the project under the CFS but was diverted to other tasks before completing it. Funds originally identified for the Teepee Pole Creek thinning remeasurement in 2007 – now deferred indefinitely – are adequate for this work.

**Table 5. Delivery Schedule for Cooperative Management of Historic Research Trials**

<b>Activity</b>	<b>Deliverable</b>	<b>Dates</b>
Maintenance and protection of trials (shared responsibility)	All trials marked and signed; Registration updated; Descriptions posted on internet; regional managers briefed; Prompt response to inquiries and trespass	Ongoing
Analysis and publication of results (CFS)	2 publishable synthesis papers including management interpretations	2 manuscripts drafted - publication schedule uncertain
	Compendium information report describing all trials and results	Published 2006
Ongoing measurements (FGYA)	Compiled data from scheduled measurements	See table 4.

#### **4.5. Regional Yield Estimators**

##### *4.5.1 Justification and Purpose*

ASRD wished 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 Executive Director of Timber Management requested the FGYA's support.<sup>3</sup> The FGYA was interested in an improved basis for crop planning, evaluation of regeneration standards, sensitivity analysis, timber supply analysis and monitoring.

##### *4.5.2 Methodology*

The approach taken was to develop prototype compatible yield and growth estimation techniques for lodgepole pine cover types in a pilot study involving:

1. Assignment of ASRD analytical staff to the Project, with ASRD's Senior Biometrician, Shongming Huang, taking the lead role in conducting the analyses;
2. FGYA (Director and technical sub-committee) participation in project design, identification of suitable data sources, progress review, assessment of results and prototypes;
3. Provision of data through direct bilateral arrangements between FGYA member companies and LFD;
4. Analyses quantifying the relationships between mapped AVI (Alberta Vegetation Inventory) attributes, input variables for ASRD's *GYPSEY* growth and yield projection system, and direct estimates of stand yield;
5. Development by ASRD of prototype applications for testing by FGYA members.

<sup>3</sup> D. Sklar, Executive Director, Forest Management Branch, personal communication to H. Loughheed, January 23, 2002

#### 4.5.3 Deliverables

The project is intended to provide, and has provided:

- 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.

An *Interim Report on the Development of Yield Estimators for Pure Lodgepole Pine Stands in Alberta* was prepared by Yuqing Yang and Shongming Huang of the Forest Management Branch, ASRD, and edited and amended with input from the FGYA Director. It was circulated to members and included suggestions for further analysis and testing. The document will be published as is on the FGYA website as a technical information report. No further work is envisioned under the auspices of the FGYA (SRD will solicit support directly from FMA holders in the event it undertakes further work and requires further inputs).

## 4.6. Enhanced Management of Lodgepole Pine

### 4.6.1. Justification and Purpose

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

The project objectives are to:

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

The Project is divided into 2 sub-projects aimed at addressing the main information gaps limiting achievement of the objectives. The 2 sub-projects are: (1) lodgepole pine nutrition and (2) pine-aspen density management. Separate experimental designs have been developed for each sub-project, and are described in detail elsewhere.<sup>4</sup>

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<sup>4</sup> Project OF-02-16 Annual Report (2004), Work Plan (2005-2008), and Detailed Project Design

#### 4.6.2. *Methodology for Sub-project 1: Lodgepole Pine Nutrition*

This study will focus on providing members the ability to determine:

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

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

Fixed-area treatment plots were established in the Fall and winter of 2005 in 15 stands across a selected range of stand conditions (16 stands were budgeted but one delayed). Treatments include thinning to 2500 stems per ha (in 8 post-harvest stands only) and fertilization (300 kg per ha N plus blend) plus controls (scheduled for May 2006). Tree, stand and foliar variables were measured prior and after treatment, and will be measured at 3, 6, and 9 years following treatment. (Only measurements up to year 3 were included in the funding request.) In February 2006 the Steering Committee approved additional funding to extend the above experimental treatments to a total of 30 sites. The additional sites were established, and all fertilization treatments applied, by the end of May 2006. First-year post-fertilization foliar analyses were conducted in the winter of 2006-7.

#### 4.6.3. *Methodology for Sub-project 2: Pine-aspen Density Management*

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

The sub-project involves selection of 18 post-harvest pine-aspen stands between 10 and 40 years of age, partitioning the stands into areas of high, medium and low aspen density, and measuring 6 plots in each stand. Plots will be tree-mapped and measured in detail. A sub-sample of 3 plots in each of 9 of the stands will be destructively sampled to obtain retroactive data on height and diameter increment for both pine and aspen. The remaining plots will be maintained for re-measurement. The analysis will involve assessment of competition indices and responses useful for developing or validating whole-stand, individual-tree, and/or distance-dependent growth models. The resulting models will be used to provide the required forecasts within the project term, while the maintained plots will allow for longer-term monitoring of actual versus forecast growth and yield.

#### 4.6.4. *Deliverables*

Table 6 shows the schedule of activities and deliverables by fiscal year (April 1 – March 31) for the 2007 onwards, plus those previously scheduled for 2006. Activities are shown as “done” if completed, “not completed”, or as “x” if scheduled for 2007 or 2008.

Results of the Project will be reported as follows.

- Detailed technical reports will be submitted to FRIAA and the FGYA membership at the end of the second and fifth years, including details of trial establishment, techniques applied, responses measured, responses forecast, predictive models developed, and conclusions regarding factors influencing responses.



- At least one scientific paper will be prepared for peer review and publication in a recognized scientific journal.
- At least 2 information reports, one including managed stand yield tables, and one including stand assessment guidelines and interpretative criteria for thinning and fertilization, will be prepared and published.

**Table 6. Delivery Schedule for *Enhanced Management of Lodgepole Pine Project***

<b>Activity</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>
<b><i>Sub-project 1: lodgepole pine nutrition</i></b>			
Installation and pre-treatment measurement	done		
Thinning, fertilization and post-treatment measurements	done		
1-year post-fertilization foliage analysis	done		
3-year growth response measurements			x
3-year post-fertilization foliage analysis			x
Analysis		x	x
<b><i>Sub-project 2: pine-aspen density management</i></b>			
Stand selection	done		
Field sampling	not completed	x	
Analysis		x	
<b><i>Analysis, synthesis of results and reporting</i></b>			
Scientific paper (pine-aspen results)		x	
Technical and information reports	not completed	x	x

#### **4.7. Regeneration Management in a Mountain Pine Beetle Environment**

##### *4.7.1. Justification and Purpose*

The objective of this project will be to provide tools for assessing treatment options (e.g. salvage, partial-cutting, site preparation, re-planting, fertilization, density management) and their growth and yield implications, for pure and mixed-species lodgepole pine stands attacked by mountain pine beetle.

The development of the project is predicated on the expectations that:

- High levels of infestation and mortality in member’s forest management areas are probable and imminent;
- Knowledge of regenerated stand dynamics and growth performance will be critical to mitigation / amelioration;
- Regeneration and stand development pathways and options will be more complex than those so far studied by the FGYA;
- Maintenance of forest values and a viable forest enterprise may be enhanced by appropriately selected, and in some cases intensified, silvicultural practices;
- Urgency and the required scope of data capture and analysis in threatened stands and research installations are increased;
- Members will urgently need expert system / decision-support tools incorporating disparate information and knowledge;
- The FGYA is positioned to significantly contribute.

#### 4.7.2. *Methodology*

##### Stage 1:

- Assess experience, research and data from B.C. and the U.S.A, and from stands in southern Alberta regenerated after earlier MPB infestations;
- Identify and profile susceptible stand types most important to member's timber supplies.

##### Stage 2:

- Assemble and develop relevant data and growth and yield models (e.g. for mixed species, short rotation, variable density, nutrition options) for projecting post-attack development of the most important stand types;
- Consolidate these into an expert system / decision-support tools, linked to landscape, timber-supply, regeneration and cost factors, that can be used to forecast the results and effectiveness of treatment options.

If / when and where major attacks occur, the project may involve a third phase to:

- Assess susceptibility factors and post-attack stand conditions;
- Monitor actual versus forecast outcomes.

#### 4.7.3. *Deliverables*

Initial Stage 1 deliverables (to be developed in the 2007-2008 operating year) will be:

- An assessment report of BC and US experience and research (based in part on tour of areas subjected to attack in BC);  
An identification and quantitative inventory profile of the most important susceptible stand types (based on available data);
- A detailed project design;
- Procurement of project funding.

Methods and deliverables for subsequent stages will be confirmed and identified during Stage 1.

## 5. Finance

### 5.1. Development and Management of the Association

The development and management of the Association, including direction, field coordination and research and development tasks will be funded centrally and supported through a membership fee approved each year by the Steering Committee. FRIP funding for membership fees was approved by FRIAA for the periods April 1, 2000 to March 31, 2005 (FRIAA Project FOOMOD-01-01) and April 1, 2005 to March 31, 2010 (Project FOOMOD-01-03).

Table 7 shows financial projections for 5 years from April 1, 2007. The projection assumes that the carry-forward from 2006 will be utilized over the next 2-4 years to develop the analytical program and catch-up with the backlog of data analysis accumulated over the last 2 years. In the projection the annual membership fee (approved at \$15,000 per member for 2007) has been incremented in 2009 and 2010 in order to maintain a positive balance forward.

Table 7 does not include the following contributions by members and collaborating agencies:

- FtMF administrative and financial services;
- Data management services provided by the FtMF GIS Coordinator (estimated at approximately 24 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 existing models;
- Protection of research installations;
- Analysis and interpretation of data.

**Table 7. Financial Projections for Project 1 - Development and Management of the Association**

<b>Income / Expenditure</b>	<b>2007-8</b>	<b>2008-9</b>	<b>2009-10</b>	<b>2010-11</b>	<b>2011-12</b>
Membership fee (per voting member)	15,000	15,000	18,500	21,000	21,000
<b>Income</b>					
Prior year balance forward	156,392	77,129	24,263	2,897	4,031
Membership fees - FRIP (FRIAA contract)	120,000	120,000	148,000	168,000	168,000
Membership fees - non-FRIP	15,000	15,000	18,500	21,000	21,000
Total income	291,392	212,129	190,763	191,897	193,031
<b>Expenditures</b>					
Director and Field Coordinator	86,500	86,500	86,500	86,500	86,500
Research and Development Associate	85,560	65,420	65,420	65,420	65,420
GIS and misc. services	15,000	15,000	15,000	15,000	15,000
Office and field supplies	10,000	5,000	5,000	5,000	5,000
Meetings and tours	7,000	7,000	7,000	7,000	7,000
Contingency (5%)	10,203	8,946	8,946	8,946	8,946
Total expenses	214,263	187,866	187,866	187,866	187,866
<b>Ending Balance</b>	<b>77,129</b>	<b>24,263</b>	<b>2,897</b>	<b>4,031</b>	<b>5,165</b>

## 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 member, with the FGYA playing a coordination and quality control role. FRIP funding for continuation of the Project was approved by FRIAA for the period April 1, 2005 to March 31, 2010 (FRIAA Project FOOMOD-01-03).

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 measurement costs shown in Table 8 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. Assumed measurement costs per installation (cluster of 4 plots) are assumed at \$2000 and \$400 for full measurements and status checks respectively. Costs for continued tending are not specifically included, but may be covered by the assumed contingency allowance.

**Table 8. Estimate of Total Costs to be Incurred by Members for the *Lodgepole Pine Regeneration Project***

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

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

Costs for this project are expected to be confined to the time inputs of the Research and Development Associate, and these are covered under Project 1.

### 5.4. Cooperative Management of Historic Research Trials

Table 9 shows estimated costs for the next 3 years, following the re-measurement schedule indicated in Table 4 and assuming that the 2 trials not measured in 2006 will be measured in 2007.

Costs incurred by the FGYA in implementing the project will continue to be allocated among voting members as per Section 3.4 and Table 1 of this plan. The original agreement approved by FRIAA: *Measurement and Maintenance of Historic Research Trials* (April 2003, FRIAA Project # FOOMOD-01-02) specified FRIP payments for the first year (2003), but provided for multi-year extensions upon receipt and approval of amended work plans, budgets, reporting and payment schedules. The funding of measurements is subject to annual review of priorities by all 3 parties (FGYA, ASRD and the CFS), approval each year by the FGYA Steering Committee, and acceptance by FRIAA.

**Table 9. Cost Schedule for FGYA Contribution to Cooperative Management of Historic Research Trials Project<sup>5</sup>**

<b>Trial</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>Total</b>
McCardle fertilization & thinning			18,000	18,000
MacKay thinning (A34)		20,000		20,000
Swan Lake thinning		5,000		5,000
Teepee Pole Creek spacing (NOR-008)		20,000		20,000
Gregg spacing 1984 (NOR-4-02)			16,000	16,000
Teepee Pole Creek strip thinning	15,000			15,000
Kananaskis European thinning (K-3)	9,000			9,000
Kananaskis economic thinning (K-58)	2,000			2,000
Evaluation of G&Y Models against HRT measurements (New, Aug 2007)	7,000			7,000
Contingency, signage and maintenance	10,000	10,000	10,000	30,000
<b>Total</b>	<b>28,000</b>	<b>55,000</b>	<b>44,000</b>	<b>127,000</b>

**5.5. Regional Yield Estimators**

Cost incurred in the provision of sample plot data (FGYA members) and analyses of data (ASRD) are not included in the FGYA budget. No direct revenues or expenditures are currently scheduled for this project.

**5.6. Enhanced Management of Lodgepole Pine**

The project (FRIAA # OF-02-16) will be supported with FRIP funding to a maximum of \$442,800, provided under FRIAA's *Open Funds* initiative. This amount was augmented by \$108,810 of supplementary funding in 2006, to increase the total budget to \$551,610. Table 10 shows costs by year. Note that this schedule applies to the whole project term, which is from April 1, 2004 to June 30, 2009. Actual amounts expended are shown for 2004, 2005 and 2006, and projected expenditures are shown for 2007 and 2008.

**Table 10. Cost Schedule for Enhanced Management of Lodgepole Pine Project**

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

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

<sup>5</sup> Revised August, 2007

## **5.7. Regeneration Management in an MPB Environment**

Costs for Stage 1 will be absorbed under Project 1, pending the development of a detailed project design and procurement of funding.

## **6. Annual Work Plan (April 1, 2007 – March 31, 2008)**

This work plan follows the general format specified for all FtMF annual work plans by the FtMF Board and Executive, but is cross-referenced to the main Business Plan to reduce duplication.

### **6.1. Objectives and Deliverables**

The mission and mandate of the FGYA are described in Business Plan Section 2.

Objectives and deliverables for each FGYA project, all of which have multi-year terms, are detailed in Business Plan Section 4. The following is a list and description by project of deliverables for 2007.

#### *6.1.1. Project 1 - Development and Management of the Association*

- Annually updated 5-year business plan and annual work plan, with budgets by year for each project (April 1 2007 for approved 2007 plan; February 2008 for draft 2008 plan);
- Project plans, designs, reports and publications (see under individual technical projects);
- Meetings, field tours and technical sessions:
  - Pre-season meeting of technical representatives and contractors (1<sup>st</sup> week in June);
  - Field tour: regeneration management of stands attacked by MPB in the Prince George area of B.C. (2-day tour in first two weeks of July);
  - Steering Committee and annual meeting (February 2008)
- Active publicly-accessible web site (throughout year);
- Mid-year (October) and annual (year-end) progress and financial reports;
- Steering committee meeting minutes (March 31, 2008 latest).

(See also Business Plan Section 4.1.)

#### *6.1.2. Project 2 - Lodgepole Pine Regeneration*

- Detailed fieldwork schedule (June 15 latest);
- Data from scheduled status checks or full measurements (102 installations) – October 31, 2007;
- Audit and work verification reports – January 31, 2008;
- Updated digital database – December 31, 2007;
- 5-year crop performance report and regeneration establishment model – December 31, 2007.

(See also Business Plan Section 4.2.)

#### *6.1.3. Project 3 - Comparison of Pre-harvest and Post-harvest Stand Development*

A scientific paper aimed at extending and validating the previous analysis is in preparation under the direction of the ASRD Senior Biometrician, with the FGYA Research and Development Associate identified as a co-author (see Business Plan Section 4.3.2.2). No other specific deliverables are confirmed for 2007. However, the FGYA will participate in the *Dialogues* initiative led by FtMF Communications and Extension Program as an outcome of the *Post-harvest Stand Development Conference* held in 2006. Also, consideration is being given to further investigation of pre- and post-harvest density effects under Project 4 (see below).

6.1.4. *Project 4 - Cooperative Management of Historic Research Trials*

Under the current agreement between the FGYA, SRD and CFS, the defined FGYA deliverables are the re-measurement data. Re-measurements are tentatively scheduled for the following CFS trials:

~~Teepee Pole Creek strip thinning;~~  
Kananaskis European thinning;  
Kananaskis economic thinning.

The trials indicated for measurement from 2007 onwards, plus the 2 Kananaskis trials not measured in 2006, have been renewed and assessed for utility as part of the discussion around renewal of the Letter of Agreement. A system for evaluating priority re-measurement has been developed, and all trials rated accordingly. Fieldwork will continue on trials rated as “medium” priority, and some “low” priority trials may be re-measured if at risk from Mountain Pine Beetle mortality. Fieldwork will continue in 2007 only if re-measurement of the trials is determined to be useful for the development of analytical products, and the inter-agency agreement is renewed (see Business Plan Section 4.4).

Analysis of measurements completed in 2006 for the Gregg spacing trials will be conducted to compare effects of controlled density on stand development with differences reported between post-harvest and fire-origin stands under Project 3. (See Business Plan Sections 4.3.2.2 and 4.4.3.)

A project originally begun by the CFS will be completed by the FGYA in 2007/08<sup>6</sup>, i.e.: A performance evaluation of Alberta and British Columbia growth-and-yield models against growth data from historical research trials. Models to be evaluated include GYPSY, MGM, TADAM and potentially TASS. The intent of this examination is to evaluate the performances of various models against actual growth as reflected in the long-term trials, in order to assess their relevance to growth and yield forecasts for Alberta conditions. (See Business Plan Section 4.4.1 and 4.4.3)

6.1.5. *Project 5 - Regional Yield Estimators*

No deliverables are currently scheduled for 2007.

6.1.6. *Project 6 - Enhanced Management of Lodgepole Pine*

Other than some field verification to support data compilation and analysis, no measurement or treatment activities are planned for sub-project 1 in 2007 because all trial establishment tasks were completed by March 31, 2007, and further re-measurements are not due until after the third post-treatment growing season. Field and laboratory work for sub-project 2, originally scheduled for completion in 2006-07, will be completed in the first quarter of 2007-08. Compilation and analysis of data from sub-project 2 (pine-aspen density management) will be conducted in 2007 in cooperation with the University of Alberta, leading to the development of a draft scientific paper. An establishment report for both sub-projects will be completed by the end of the second quarter i.e. September 30, 2007. (See also Business Plan Section 4.6.4).

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<sup>6</sup> New, August 2007. This was a high priority project for FGYA, and the CFS has indicated does not plan complete it, suggesting that FGYA should do so if it wants the information. Analysis and report will be prepared by Andria Dawson, who initiated the project under the CFS but was diverted to other tasks before completing it. Funds originally identified for the Teepee Pole Creek thinning re-measurement in 2007 – now deferred indefinitely – are adequate for this work.

#### 6.1.7. *Project 7 – Regeneration Management in a Mountain Pine Beetle Environment*

- An assessment report of BC and US experience and research (based in part on tour of areas subjected to attack in BC);

An identification and quantitative inventory profile of the most important susceptible stand types (based on available data);

- A detailed project design;
- Procurement of project funding.

(See Business Plan Section 4.7.)

### 6.2. **Extension and Communication**

Deliverables currently scheduled for 2007 that have extension or communication aspects include:

- Field tour: regeneration management of stands attacked by Mountain Pine Beetle;
- Website updates;
- Technical information reports or papers for Projects 2, 3, 4, 6 and 7;
- Bulletins: minimum of 2 *Quicknotes* or equivalent bulletins providing non-technical summaries of project results and / or program activities.

The Model Forest requires all programs to complete a Communications and Extension Plan during 2007, and this will be done for FGYA. ~~The need for a distinct Program Communication and Extension Plan will be reviewed during 2007.~~

### 6.3. **Inter-program Links**

During 2007 the following activities or projects will be undertaken in collaboration with other FtMF and external programs:

- **Database management:** The FtMF Data, Information and Knowledge Management Program is responsible for management and safe storage of the Association's data. The GIS Coordinator has prepared a business case for purchasing an MS SQL Server and transferring FGYA data from MS Access to SQL during 2007.
- **Website management:** The FGYA, as a FtMF program, has a dedicated section of the FtMF website, and depends on the FtMF Communications and Extension Program for management of the website.
- **Inter-agency dialogues on post-harvest stand development:** the FGYA will actively participate in this initiative led by FtMF Communications and Extension Program
- **Climate change:** The FGYA provided input to design of the FtMF Climate Change sub-program and project and has expressed particular interest in the following areas:
  - Relationship of regeneration success to variation in local climate, and application of results to predicting impact of future climate change (see Section 5.2);
  - Separation of climatic and other factors that have led to local and hemispherical changes in tree and stand growth rates (see Section 5.4);
  - Improved linkage of MPB risks to local climatic trends.
- **Historic research trials:** this project will continue to be conducted cooperatively subject to renewal of an inter-agency agreement with the Canadian Forest Service and Alberta Sustainable Resource Development.
- **Enhanced management of lodgepole pine:** the University of Alberta has participated in the design, and will participate on the analysis, of this project under a research collaboration agreement with the FGYA.



- **Mountain pine beetle:** The input of other FtMF programs will be sought in the detailed design of Project 7.

(See also Business Plan Section 3.5.)

**6.4. Funding Sources**

The following organizations are sponsoring members of the FGYA:

- Alberta Newsprint Company
- Blue Ridge Lumber
- Canadian Forest Products
- Millar Western Forest Products
- Spray Lake Sawmills
- Sundance Forest Products
- Sundre Forest Products
- Hinton Wood Products
- Weyerhaeuser Canada

All are companies or corporate divisions holding Forest Management Area tenures in the Foothills Natural Sub-regions of Alberta.

Each member will contribute in 2007:

- An annual membership fee of \$15,000;
- In kind services, including measurement, treatment and maintenance of the *Regenerated Lodgepole Pine (RLP) Trial* (Project 2 - see Table 8);
- Funding for Project 4 (subject to renewal of the project agreement between the FGYA, CFS and ASRD), pro-rated by pine-leading managed area according to the formula specified in the Business Plan Section 3.4.

Table 11 summarizes funding sources for 2007. Appendix 1 contains details and allocations of cash contributions from sponsoring members.

**Table 11. Scheduled income for 2007**

Project (Accounting Code)	Contributing Organization	Carry Forward	Cash Committed	Total Funding	In-kind Support	Comments
Project 1 FGYA (235)	Members	156,392	135,000	291,392		Membership fees
	FtMF				6,000	12 days data management
Project 2 - RLP	Members				97,100	Fieldwork
Project 4 - HRT (235.1)	Members	6,989	21,011	28,000		Historic research trials
Project 6 - EMLP (235.2)	FRIAA/ members	34,587		34,587		Enhanced management of lodgepole pine
Total FGYA		197,968	156,011	353,979	103,100	

Table 7 shows in further detail income and expenditures for Project 1 projected for 2007 and the following 4 years. Table 9 shows the funding for Project 4 broken down by research trial. The

balance forward from 2006 for Project 6 will be used to cover contract commitments pending for pine-aspen work completion (value approximately \$33,350). Project 6 costs for analysis incurred by the FGYA in 2007 (e.g. time inputs by the Research and Development Associate) will be covered under Project 1.

#### **6.5. Program Key Members and Responsibilities**

Roles and responsibilities for the FGYA program are described in Business Plan Section 3.3. Note that effective 2007 responsibilities for project management, field coordination, and analytical research and development have been re-allocated (see Sections 3.3.4 and 3.3.5).

Management staff and corporate representatives are identified with their contact information in Table 12.

#### **6.6. Environmental and Occupational Health and Safety Permits**

With the exception of supervision, administration and data management tasks conducted directly by FtMF staff, the FGYA program and projects are implemented by contractors. Contracts are administered by the FtMF and stipulate statutory compliance of the contractor with the laws of Alberta, explicitly including the Occupational Health and Safety Act.

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

**Table 12. Foothills Growth and Yield Association Representatives and Contacts (2007)**

<b>Role / Affiliation</b>	<b>First Name</b>	<b>Last Name</b>	<b>Telephone</b>
<b><i>Chairman</i></b>	Greg	Behuniak	(780) 539-8207
<b><i>Management:</i></b>			
FtMF General Manager	Don	Podlobny	(780) 865-8332
FGYA Director	Bob	Udell	(780) 865-4532
Field Coordinator	Harry	Ullrich	(780) 865-4499
Research and Development Associate	Dick	Dempster	(780) 424-5980
<b><i>Steering Committee:</i></b>			
ANC Timber	Greg	Branton	(780) 778-7012
Alberta Sustainable Resource Development	Doug	Sklar	(780) 422-4590
Blue Ridge Lumber	Murray	Summers	(780) 648-6325
Canfor	Dwight	Weeks	(780) 538-7745
Foothills Model Forest Board	Murray	Summers	(780) 648-6325
Millar Western Forest Products	Tim	McCready	(780) 778-2221
Spray Lakes Sawmills	Ed	Kulcsar	(403) 932-2234
Sundance Forest Industries	John	Huey	(780) 723-3977
Sundre Forest Products	Bob	Held	(403) 638-4482
Hinton Wood Products	Richard	Briand	(780) 865 8181
Weyerhaeuser Canada	Greg	Behuniak	(780) 539-8207
<b><i>Technical Committee:</i></b>			
ANC Timber	Jason	Kennedy	(780) 778-7920
Alberta Sustainable Resource Development	Daryl	Price	(780) 422-0329
Blue Ridge Lumber	Colin	Scott	(780) 648-6200
Canfor	Jill	Ashley	(780) 538-7793
Foothills Model Forest	Debbie	Mucha	(780) 865-8290
Millar Western Forest Products	Tim	McCready	(780) 778-2221
Spray Lakes Sawmills	Elsa	Dahlie	(403) 932-2234
Sundance Forest Industries	Pat	Golec	(780) 723-3977
Sundre Forest Products	Bob	Held	(403) 638-4482
Hinton Wood Products	Glenn	Buckmaster	(780) 490-2307
Weyerhaeuser Canada	Greg	Behuniak	(780) 539-8207

**Appendix 1. Financial Allocations and Authorizations for the Period April 1, 2007 – March 31, 2008**

**Appendix 1.1. Project FOOMOD-01-03 – Foothills Growth and Yield Association Membership Fees**

The 9 voting members are requested to provide the following authorization in writing to the Foothills Model Forest:

*This is confirmation of our intent as a voting member of the Foothills Growth and Yield Association (“the Association”) to support the continued development and management of the Association by payment of an annual membership fee.*

*We agree that the membership fee for the period April 1, 2007 – March 31, 2008 be set at \$15,000 and made payable to the Foothills Model Forest who as Coordinating Agency for the Association will administer the project on our behalf.*

- We authorize FRIAA to transfer the above amount from FRIP funds to the Foothills Model Forest.<sup>7</sup>*
- We will pay the amount directly, on receipt of an invoice from the Foothills Model Forest.<sup>8</sup>*

**Appendix 1.2. Project FOOMOD-01-02 – Measurement and Maintenance of Historic Research Trials**

The following funds will be contributed subject to review and renewal of the July 2002 agreement between the FGYA, CFS and ASRD.

Company	Area (ha)	% of total	Computed allocation	Method of payment
Alberta Newsprint Company	106,870	5.22	1,097	FRIAA transfer
Blue Ridge Lumber	180,323	8.82	1,853	Other
Canfor	106,271	5.20	1,093	FRIAA transfer
Millar Western Forest Products	112,406	5.50	1,155	FRIAA transfer
Spray Lakes Sawmills	114,988	5.62	1,181	FRIAA transfer
Sundance Forest Industries	121,848	5.96	1,252	FRIAA transfer
Sundre Forest Products	293,655	14.36	3,017	FRIAA transfer
Hinton Wood Products	451,713	22.08	4,639	FRIAA transfer
Weyerhaeuser Canada	557,433	27.25	5,724	FRIAA transfer
Total	2,045,507	100.00	21,011 <sup>9</sup>	

<sup>7</sup> All voting members except Blue Ridge Lumber

<sup>8</sup> Blue Ridge Lumber

<sup>9</sup> Revised August. Equals revised budgeted amount of \$28,000 less projected balance forward from 2006 of \$6,989.

