



**Forest Genetics Council of BC
Business Plan 2007 – 2008**

**Compiled and edited by
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FGC Program Manager**

Message from the FGC Co-Chairs

We are pleased to present the 2007/08 Business Plan of the Forest Investment Account Tree Improvement Program. This is the seventh consecutive Business Plan of the Forest Genetics Council of BC, and it represents a substantial co-operative effort by many people in government, industry, and universities throughout the province.

This Business Plan outlines a balanced set of activities, including genetic conservation, tree breeding, seed production, pest management, technical support, and extension. Forest Investment Account Tree Improvement Program planned budgets are presented. These funds leverage other investments by industry, government and universities, and are a key part of integrated planning. In addition to subprogram budgets and activities, this document contains overview plans for 50 important seed planning units (SPU). These plans outline breeding and seed orchard programs, expected orchard-seed supply and gain over the next 20 years, historic seed use, seed in storage, and key genetic conservation statistics. The SPU plans have become valuable reference documents for seed planning purposes, and for facilitating better communication and understanding of all aspects of seed and genetic conservation planning.

The 2007/08 fiscal year presents a number of new challenges and opportunities. Increased seed demand brought about by planting mountain-pine-beetle-impacted areas has resulted in plans being laid for the development of several new seed orchards. In addition, advancing breeding programs are creating opportunities for including higher-gain materials in both new and existing orchards. The Future Forest Ecosystems Initiative (FFEI) of the provincial Chief Forester continues to develop and will formulate climate-change response scenarios. Activities outlined in this plan, including bio-climatic mapping, genetic conservation, facilitated migration, and associated research, will make important contributions to FFEI.

The Genetic Resource Management Challenge Dialogue initiated under the leadership of Provincial Chief Forester, Jim Snetsinger, will be completed in 2007. This initiative will lead to the updating of the FGC strategic plan and business planning process in subsequent years. Forestry in BC is constantly changing due to economic pressures, policy developments, and public expectations. These must be reflected in a provincial genetic resource management program that is scientifically sound and supports Crown land policy, while also investing in areas with the greatest economic potential.

Provincial seed orchard production continues to increase, but provincial planting remains high due to mountain pine beetle response. This is placing more demand on seed orchards, and the production of lodgepole pine seed continues to be the largest challenge facing Council with respect to seed use and gain objectives. Council support for cone induction and pest management research continues to assist in this area, and maturing pine orchards are producing more seed each year.

The cooperative work associated with this program is dependant upon the hard work of members of Council and affiliated committees. This effort is greatly appreciated, and we would like to thank everyone involved for their co-operation over the last year.

John Elmslie, RPF
FGC Co-chair
Winton Global Ltd.

Dr. Dale Draper
FGC Co-chair
Ministry of Forests and Range



**Budgets list allocations of funds provided by the
Forest Investment Account**

Budgets in this Business Plan were approved
by the Forest Genetics Council of BC on
March 14, 2007

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1.0 Introduction

This section overviews the relationship between the multi-stakeholder Forest Genetics Council and its co-operators in the planning and implementation of forest genetic resource management activities in British Columbia, and for the management and allocation of funds under the Forest Investment Account (FIA) Tree Improvement Program.

1.1 Forest Genetics Council of BC

The Forest Genetics Council of BC (FGC) is a multi-stakeholder group representing the forest industry, Ministry of Forests and Range (MFR), and universities. Council's mandate is to lead a provincial forest genetic resource management (GRM) program that encompasses the conservation, controlled use, and enhancement of the genetic resources of forest tree species, and to advise the Provincial Chief Forester on forest genetic resource management policies.

The FGC provides a forum for stakeholder representatives to set goals and objectives and to oversee the development and delivery of a Business Plan to fulfill these goals. Council's goal and objectives, as stated in the FGC Strategic Plan for the period 2004 to 2008, are:

To lead the cooperative management of tree genetic resources in British Columbia consistent with scientific and conservation principles, by:

1. Increasing the average volume gain of select seed¹ used for Crown land reforestation to 20% by the year 2020.
2. Increasing select seed use to 75% of the provincial total sown by 2013.
3. Supporting genetic conservation research and the cataloguing of indigenous-tree genetic resources.
4. Coordinating stakeholder activities and securing resources to meet Business Plan priorities.
5. Monitoring progress in genetic resource management activities.

The FGC Business Plan defines the annual set of activities and associated budgets to achieve these objectives.

1.2 A Co-operative Effort

Forest genetic resource management in BC is a co-operative effort. The MFR leads tree breeding activities, while private industry and the MFR manage seed orchards for the operational production of reforestation materials. Universities, MFR Research Branch, and the Canadian Forest Service undertake research supporting genetic resource management, while private industry focuses on applied research related to operational production.

¹ "Select" describes seed and vegetative material having a level of genetic gain ($GW > 0$). Seed and vegetative lots derived from orchards and production facilities (genetic Class A) and superior provenances (genetic Class B+) are generally considered to be select.

1.3 Forest Investment Account Tree Improvement Program

Beginning in fiscal year 2003/04 the provincial government introduced the Forest Investment Account (FIA) as a mechanism for promoting sustainable forest management in British Columbia. FIA is founded on a Vote of the Legislature and includes three major objectives:

- Support sustainable forest management practices;
- Improve the public forest asset base;
- Promote greater returns from the utilization of public timber.

FIA is delivered through five programs; including the FIA Tree Improvement Program (TIP).

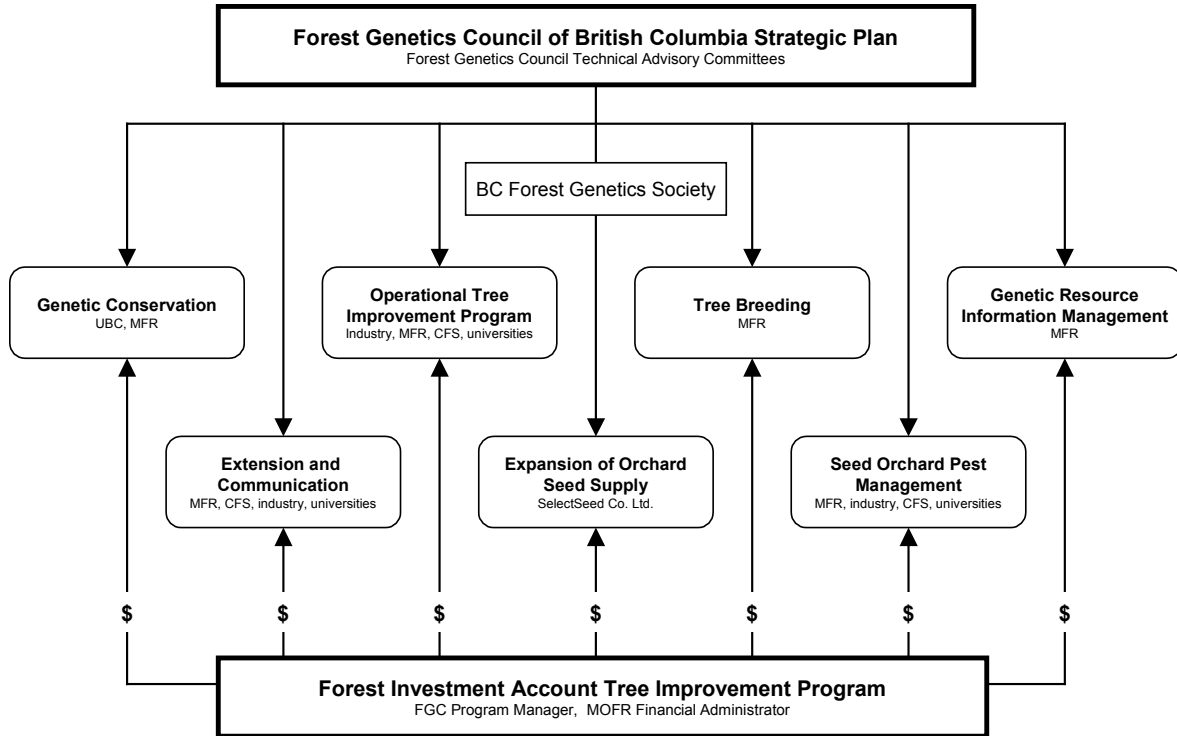
FIA investments are guided by the Forest Investment Council, and administered by the MFR. The MFR has decision-making authority with respect to FIA expenditures, and with assistance from other provincial government ministries, establishes objectives and delivery standards.

FIA investments in genetic resource management are made under the provincial Tree Improvement Program. The Forest Genetics Council has responsibility for setting priorities and developing an annual business plan to meet provincial objectives. The MFR administers funding through the subprogram areas identified in the FGC Strategic and Business Plans (Figure 1).

Business planning is carried out through the existing FGC-led process, with Technical Advisory Committees (TACs) undertaking specific planning activities, developing budgets, and making operational recommendations (Figure 2). The FGC reviews and makes final recommendations for subprogram budgets and activities, and ensures the overall program meets FIA objectives and administrative requirements. The program is managed and coordinated by the FGC Program Manager on behalf of the FGC, and by the Tree Improvement Program Administrator on behalf of the Ministry of Forests and Range .

In addition to FIA investments in genetic resource management, the MFR and private companies also fund activities under Council's Business Plan. The species plans found in Appendix 4 outline general strategy, predict seed orchard seed production and gain, summarize conservation status, and provide key seed use and availability statistics.

Figure 1 Relationship between the FGC Strategic Plan, Forest Investment Account TIP, and participants in the TIP subprograms.



2.0 Process for Business Plan Development

2.1 The Role of Council and its TACs

FGC members, representing the MFR, forest companies, universities, and the Canadian Forest Service provide strategic direction to the provincial forest genetic resource management program. FGC Technical Advisory Committees (TACs) provide technical and policy information to Council and contribute to the development of FGC plans and associated budgets. The FGC Business Plan consolidates the subprogram plans and budgets into a comprehensive package that addresses Council's objectives and maximizes the economic benefits from tree improvement.

Council's six TACs lay the groundwork for the FGC Business Plan:

- The Genetic Conservation TAC (GCTAC) advises Council on issues related to genetic conservation and genetic diversity, and identifies required activities and budgets under the Genetic Conservation Subprogram.
- The Coastal and Interior TACs, through their Species Committees, prepare Species Plans (Appendix 4) that outline strategy and activities for the Tree Breeding, Operational Tree Improvement Program (OTIP), and the Expansion of Orchard Seed Supply (SelectSeed Company Ltd.) subprograms.
- The Extension TAC (ETAC) is responsible for developing a strategy and annual activity plans for the Extension and Communication Subprogram.
- The Genetic Resources Information Management Steering Committee oversees the development of activities and budgets for the Genetic Resource Information Management Subprogram.
- The Seed Orchard Pest Management TAC identifies information and research needs, and guides both research and extension activities needed to develop control strategies for seed orchard insect and disease pests.

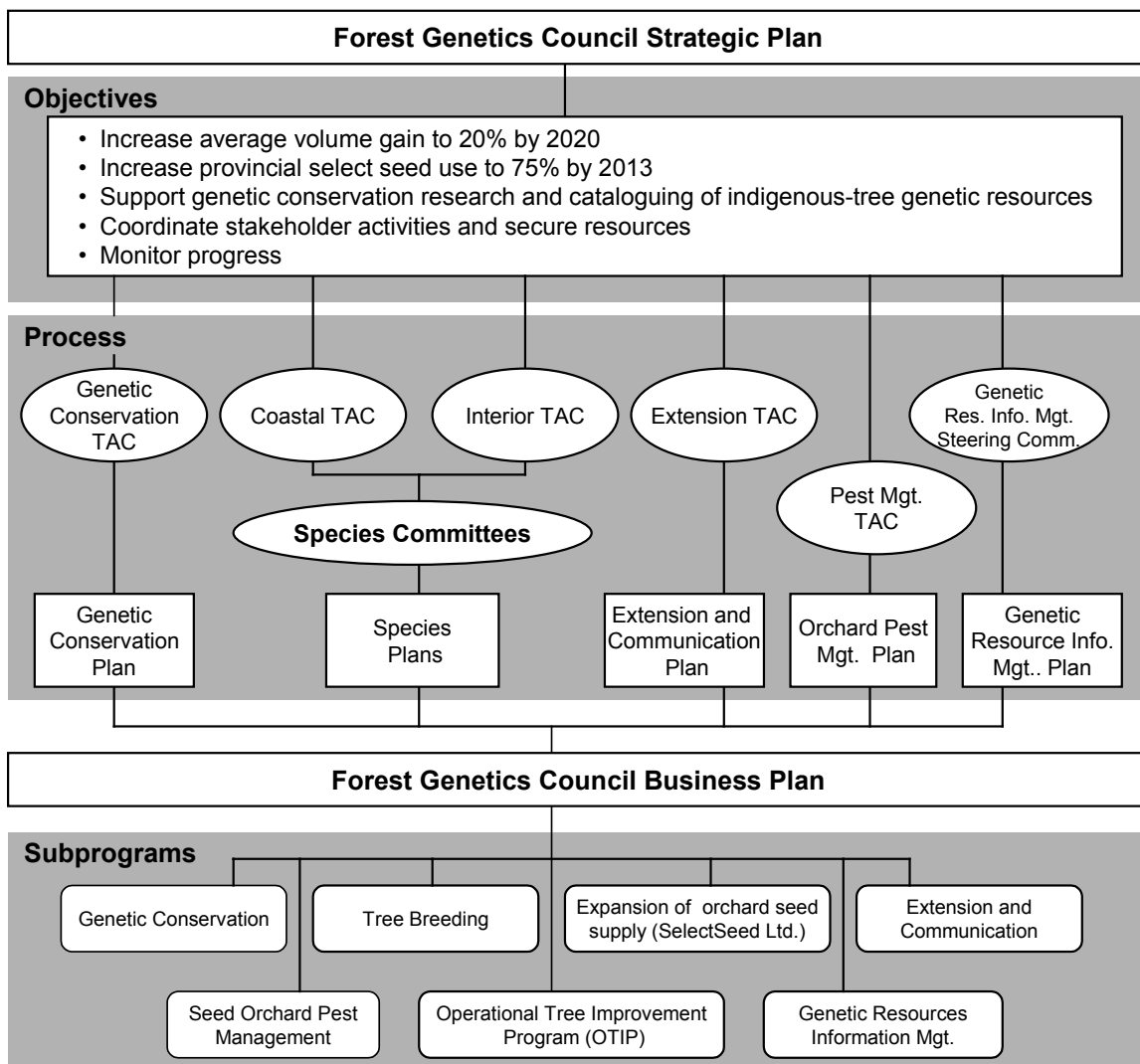
In addition to the six advisory committees, Council establishes other committees as needed. Starting in April 2006, incremental FIA funds directed at programs to mitigate losses associated with the mountain pine beetle infestation have resulted in an expected 3-year expansion of the FGC-led program. To meet planning needs for some of the incremental projects, Council established two new steering committees to advise on cone induction research (University of Victoria), and applied forest genetics and biotechnology research (University of BC). Both projects are supported through FGC-directed funds.

Program financial administration is led by the MFR Tree Improvement Branch. Program management, including business plan and annual report compilation, is led by SelectSeed Company Ltd. (SelectSeed), on the behalf of Council.

Council reviews all strategies, plans, or recommendations from the TACs and from SelectSeed for approval (or revision) before incorporating them into the FGC Business Plan. Figure 2 illustrates this hierarchical structure and the link between FGC objectives, planning processes, and the seven subprograms through which it is implemented.

The process by which the Council Subcommittees or other agencies define activities and budgets for each subprogram is discussed in Section 3. Since it is difficult to accurately predict project spending, subprogram leaders are authorized to reallocate funds within their subprograms as necessary throughout the fiscal year, subject to limits and review process.

Figure 2 The link between FGC objectives, planning processes, and the subprograms of the FGC Business Plan



3.0 Subprogram Planning and Management

3.1 Genetic Conservation Subprogram

Genetic conservation activities monitor and catalogue indigenous tree genetic resources, research conservation methods and needs, and provide guidance on policy development.

3.1.1 Planning

Genetic conservation activities are developed through the FGC Genetic Conservation TAC (GCTAC), with programs and spending approved by the FGC.

3.1.2 Management

Subprogram delivery is primarily through the Centre for Forest Genetic Conservation at the University of BC (UBC) in the Faculty of Forestry, with the GCTAC setting broad objectives. The Centre provides expertise, research, and strategic planning related to genetic conservation, and evaluates levels of protection of genetic diversity.

The Centre receives funding through a Transfer Agreement with the Ministry of Forests and Range Tree Improvement Branch under the FIA Tree Improvement Program. In addition, the Centre collaborates with other groups and agencies, and seeks funding from other sources as opportunities arise. Significant adjustments in technical objectives or budgets must be approved by the GCTAC.

Beginning in the 2007/08 fiscal year, *ex situ* seed collections will be led by MFR Tree Seed Centre staff, under the planning guidance of the CFGC.

3.1.3 Activities and Budget

The Centre for Forest Genetic Conservation will help identify specific *in situ* and *ex situ* conservation needs and strategies, and will assist with forest certification and climate change issues as they relate to genetic conservation and management. It will also allow the leveraging of funds with other national and international agencies.

In the 2007/08 fiscal year, the Centre will receive \$250,000 for continuing with the cataloguing of tree genetic resources, investigating the genetic structure of minor- and non-commercial tree species, modeling climate change impacts on species ranges, development of a theoretical conservation framework, and other conservation projects. These funds will also support ex-situ seed collections of whitebark pine; a species threatened by mountain pine beetle and changing climates. Table 1 contains a Centre budget for 2007/08 FIA-funded activities. In-kind contributions from UBC will include staff time, lab and office space, computing facilities and IT support. Industry and MFR contributions will include staff time and logistical support for specific projects. Other funding is leveraged through NSERC and other research grants.

A project, supported by incremental FIA funds, is directed at mountain pine beetle (MPB) management and mitigation and uses growth chambers to estimate seedling response to temperature and carbon dioxide levels. Orchard and wild seed from different seed zones for two conifer species are being used. The objectives of this project are to determine the relative role of temperature means versus temperature extremes in determining growth-response curves, and to evaluate the impact of mild to moderate drought stress on temperature response curves.

Table 1 Centre for Forest genetic Conservation budgets for 2007/08, by project. Budgets include only activities funded by the Forest Investment Account.

Project	Budget (\$)	Products
Cataloguing and documenting in situ protection	32,990	Updated report on the conservation status of 49 indigenous tree species
Genetic structure of non-commercial species	49,500	1 progress report on Pacific dogwood 1 progress report on Garry oak
Climate change and genetic conservation	32,320	1 progress reports; 1 final report
Ex-situ conservation seed collections	30,000	Collections of whitebark pine seed from 10 locations
Other expenses		
Research associate	73,532	Activities coordinated; Climate BC model upgraded
Extension	6,598	100 clients serves / 1 website maintained
CFGC Expenses (office, lab, computer)	8,764	
Subtotal	233,704	
Incremental FIA Project *		
Seedlot response to climate variables	41,400	1 progress report
5% UBC overhead	19,896	
Total approved budget	295,000	

* Total incremental funding amount \$45,000, including UBC overhead.

3.2 Tree Breeding Subprogram

The Tree Breeding Subprogram focuses on the continued development of improved of seed and vegetative materials for reforestation. Tree breeding activities include selecting parents in wild stands, propagation, testing offspring, mating, establishing/maintaining/measuring trials, and technical support. Selections from wild populations are largely complete, as all breeding programs are in advanced generation breeding and testing. The Subprogram also includes genecology trials and research to support the information needs of seed planning unit² (SPU) programs as described in Species Plans. Tree breeding and genecology work is led by the MFR Research Branch.

3.2.1 Planning

FGC Interior and Coastal TACs and their associated Species Committees assisted with planning and strategy development for the Tree Breeding Subprogram. Through the development of species plans (Appendix 4), Committees estimated seed demand, orchard seed production, and program needs for each SPU. Breeding, genecology, and genetics research strategies developed by MFR tree breeders were reviewed, and direction was given to ensure alignment with FGC strategic objectives and with ongoing operational needs and programs. Species Committees also review proposed budgets and progress reports for each SPU.

The budget for the Tree Breeding Subprogram was developed for individual SPU by Species Committees in the fall of 2006. It was then adjusted by the Manager, Forest Genetics, MFR Research Branch to find efficiencies and to meet the total expected Subprogram budget allocation,

² Seed planning units – groupings by species, seed zone, and elevation band – form the basis for tree breeding and seed production planning.

with input from MFR tree breeders, the FGC Program Manager, and the MFR Tree Improvement Branch Director. Final programs and budgets were reviewed and approved by the FGC on March 14, 2007.

3.2.2 Management

The MFR manages Tree Breeding Subprogram activities, and reports to the FGC. The Manager of Forest Genetics, MFR Research Branch, has authority for project re-allocations in support of FGC objectives. Substantial re-allocations between seed planning units or from breeding activities to technical support activities require the approval of the Director, Tree Improvement Branch and the FGC Program Manager.

3.2.3 Activities and Budget

The 2007/08 budget for the Tree Breeding Subprogram is approved at \$2.4036 million, including \$2.038 million from the ongoing FIA allocation, and \$365,600 from the incremental FIA budget. The incremental funding supports maintenance and measurements on long-term progeny and provenance trials in the interior. Additional information generated will aid with programs associated with MPB mitigation. Table 2 contains approved budgets and key performance indicators (KPI) for breeding activities by SPU. Approximately of \$1,080,000 of the total budget will cover MFR Research Branch salary costs, and an additional \$75,000 worth of projects will be risk-managed by the Research Branch.

About 70% the effort and funding will go towards the establishment, maintenance, and measurement of progeny and provenance tests. This work will include, for example, progeny test measurements in West Kootenay and Quesnel Lakes Douglas-fir, Nelson larch tests, maritime red cedar and yellowcedar, and Nelson lodgepole pine, the establishment of big-leaf maple genecology trials, assessments of interior Douglas-fir genecology trials, and the measurement of lodgepole pine genetic realized-gain trials.

3.3 Operational Tree Improvement Program (OTIP)

The OTIP supports FGC objectives to increase the quality and quantity of select seed produced from existing private and MFR seed orchards. It also provides technical support for orchard production and management.

3.3.1 Planning

OTIP investment is based on input from SPU (species) plans developed by species committees reporting to the Interior and Coastal TACs (see Appendix 4). Species plans outline seed and cutting production strategies within each SPU. Based on these strategies, and on priority lists approved by the TACs, a formal call for proposals is issued.

FGC committees review and rank all proposals against FGC objectives and SPU priorities, based on technical merit, impact, value, and cost. OTIP projects are selected to increase the genetic gain in seed made available for reforestation and to increase the quantity of seed produced from existing orchards. They support FGC short-term objectives for gains in the growth rate, pest resistance, and wood quality of reforestation materials. They also support FGC long-term objectives through the replacement of trees in existing seed orchards with trees of higher genetic value. The total budget allocation for OTIP is recommended by the FGC to FIA administrators in the Ministry of Forests and Range .

3.3.2 Management

The MFR Tree Improvement Branch administers OTIP in accordance with recommendations from the FGC. Requests for re-allocations or for new funding are handled by the MFR Tree Improvement Financial Administrator in consultation with the appropriate TAC and the FGC Program Manager. All projects report on key performance indicators to enable tracking of planned activities.

3.3.3 Activities and Budget

The 2007/08 OTIP budget is \$732,000, with a further \$44,763 in approved projects to be funded through risk management (expected project under-spending during the year). In addition, a further \$93,000 is approved from the incremental FIA appropriation. The total value of approved projects is \$869,763. This latter money will be directed at activities associated with interior seed planning units and MPB mitigation. Table 3 contains approved OTIP budgets and KPI for all seed planning units.



Table 3 2007/08 budgets and KPI by seed planning unit for OTIP projects. Budgets and KPI include projects from an incremental call. Category numbers relate to Work Breakdown Structure (Figure 5). See species plans (Appendix 4) for more detail.

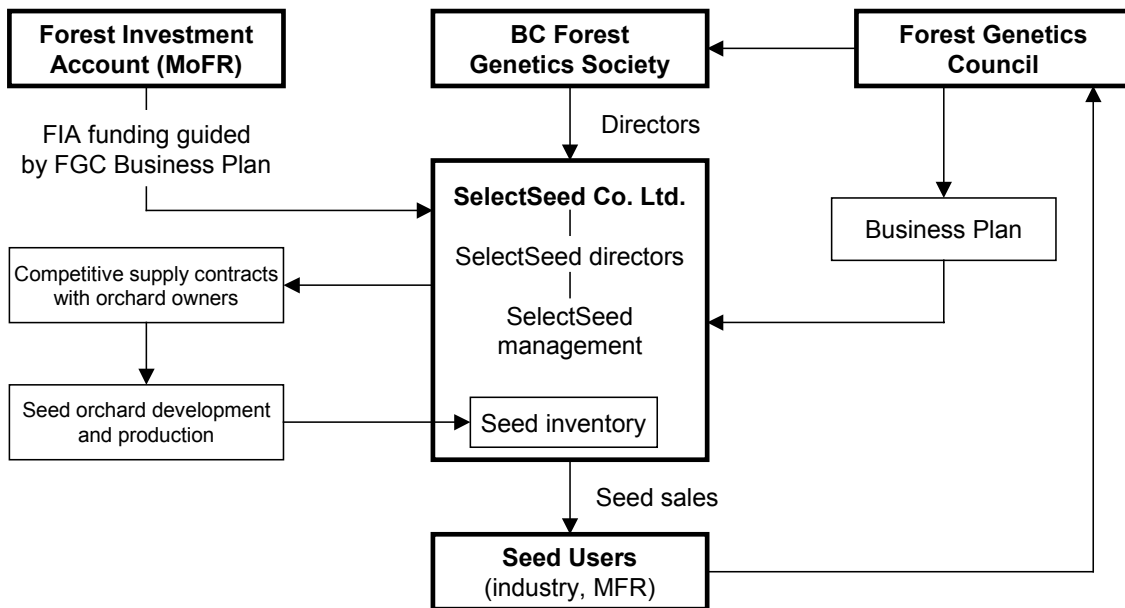
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3.4 Expansion of Orchard Seed Supply Subprogram (SelectSeed Co. Ltd.)

This subprogram was established in 1999 to address a need for seed orchard capital investment to meet FGC objectives. For seed planning units (SPU) with insufficient orchard capacity, as determined by the ITAC and CTAC at the time, orchard-expansion investments were initiated through SelectSeed Company Ltd. using competitive bids and long-term contracts.

SelectSeed is wholly owned by stakeholders through the B.C. Forest Genetics Society. All Society members are on Council. The SelectSeed Board of Directors is elected by Society members (Figure 3). SelectSeed’s mission is to “support Forest Genetics Council objectives for the development of seed orchard facilities to meet the provincial demand for high quality, ecologically adapted tree seed through investments, cooperative work with FGC members and effective program management.”

Figure 3 Organizational relationships among SelectSeed Ltd., Forest Investment Account, Forest Genetics Council, and the B.C. Forest Genetics Society



3.4.1 Planning

SelectSeed’s Business Plan and investments are based on the long-term and annual business plans prepared by the FGC and its associated committees. Species plans (Appendix 4) contain analyses of projected orchard expansion needs that guide SelectSeed investments. Specific technical advice is sought as required from Species Committees or others with the needed expertise.

3.4.2 Management

Management discretion for spending lies with the SelectSeed Board of Directors,³ and is limited by the terms of the SelectSeed Multi-Year Agreement with the MFR. Investments in new orchards followed a request for proposal (RFP) process, with emphasis on both the technical quality of developments and on cost. SelectSeed's annual business plan was approved by the Forest Genetics Council on March 14, 2007.

3.4.3 Activities and Budget

In 2007/08, SelectSeed will continue to focus on the management of 11 long-term orchard agreements covering the development and operation of 14 orchards (Table 5). No new orchard agreements are anticipated during the year.

Activities for the fiscal year include planting 1,235 ramets in orchards, and the propagation and holding of 4,902 ramets. Ramets currently planted in the 14 seed orchards, combined with new planting during 2007/08, will result in approximately 34,900 ramets under management by year end. The total completed size for SelectSeed contract orchards is 35,328 ramets. All grafting and holding work is done through contracts.

Other activities will include program management on behalf of the Forest Genetics Council, including Business Plan and budget development, committee support, managing program development and subprogram interactions, and preparation of mid-term and annual reports.

Spending for 2007/08 is projected at \$932,000, of which \$869,000 will be FIA supported (Table 4). This is up from an forecast total spending of \$890,000 in 2006/07. The increase is the result of cone crop production and seed extraction costs and higher orchard development contract costs. Management and administration costs are slightly down from the previous fiscal year. Budget increases are offset by higher anticipated revenues from seed sales. FIA costs for this subprogram are up \$2,000 from 2006/07, and are expected to drop in future years as seed production increases and seed-sale revenue displaces costs associated with the SelectSeed Multi-Year Agreement.

Table 4 SelectSeed Company Ltd. 2007/08 budget by category

Category	expenses / income
Expenses	
Existing orchard development contracts	646,165
Propagation and holding	48,835
Management and administration (FGC and SelectSeed)	210,000
NSERC Industrial Chair support	10,000
Crop production / seed extraction	17,000
Total Expenditures	932,000
Income	
Seed sales	45,000
Interest from investments	18,000
Total Income	\$63,000
Total MYA support	\$869,000

³ The Board is comprised of representatives from the private sector.

Table 5 Orchards under contract to SelectSeed Company Ltd.

<i>Seed planning unit</i>					
SPU#	Species	Seed zone	Planned # ramets	# ramets currently established	Location
21	Fdi	NE low	2187	2187	Armstrong - Grandview
37	Fdi	QL	975	832	Vernon
41	Fdi	PG	786	776	Vernon
28	Sx	TO high	1056	1056	Armstrong - Eaglerock
30	Sx	TO low	454	454	Armstrong - Eaglerock
7	Pli	NE low	1000	992	Armstrong - Grandview
10	Pli	TO low	4796	4509	Armstrong - Grandview
12	Pli	PG low	4871	4689	Kettle Valley
12	Pli	PG low	4500	4326	Vernon
16	Pli	TO high	3503	3389	Armstrong - Eaglerock
17	Pli	BV low	3000	2931	Vernon
17	Pli	BV low	3100	2994	Sorrento
18	Pli	CP low	2000	1917	Sorrento
18	Pli	CP low	3100	3070	Kettle Valley
TOTALS			35,328	34,122	

3.5 Extension and Communication Subprogram

The Extension and Communication Subprogram supports FGC goals and objectives through:

- extension (providing client focused solutions and training to seed users and tree improvement specialists)
- communication (developing and disseminating information on the program and its activities to all FGC target audiences)
- training (fostering support for the education of tree improvement specialists and technologists, including continuing education)

3.5.1 Planning

Extension and communication activities are developed and guided by the FGC Extension Technical Advisory Committee (ETAC). ETAC includes representatives from operations (MFR and industry), MFR research, and the private consulting community. Members are involved with forest genetic resource management and the use of improved reforestation materials.

The ETAC extension and communication strategy is based on three broad goals:

1. To work closely with Council and its TACs to coordinate and manage extension efforts in support of Council's provincial forest genetic resource management program.
2. To provide information and policy advice to Council on issues related to extension
3. To act as a forum for user feedback.

3.5.2 Management

ETAC identifies goals and audiences for extension, communication and education activities, and, with the assistance of an Extension Coordinator from the MFR – Tree Improvement Branch, develops a business plan. The Coordinator is responsible for the management of ETAC activities, and the coordination of ETAC work in conjunction with Council and other committees of Council. Project ideas or proposals from any interested party are considered.

Projects are undertaken through contract delivery, or through direct delivery by cooperators. Budget development for FIA funds is first done by the ETAC, with final approval by the FGC. Project spending is approved by the ETAC Chair and the FGC Program Manager, and must meet administrative guidelines set out for FIA funds. ETAC reports to Council on activities, progress, and spending at mid-year and year end.

3.5.3 Activities and Budget

The extension and communication budget for 2007/08 is \$37,000, plus Ministry of Forests and Range salary support for a communication specialist. In-kind, staff time and other contributions by affiliated companies and agencies are incremental to this amount and are not listed. Projects and budgets are summarized in Table 6.

Table 6 Extension and communication projects and budgets for 2007/08

Project	Budget (\$)
ETAC meetings	500
TicTalk newsletter	3,000
Extension notes	2,000
Coastal crown-management workshop	4,500
Print Extension Note; <i>The Reproductive Biology of Western Larch</i>	3,000
Forest Genetics Council display update	1,000
Genetic conservation poster	1,000
Whitebark pine workshop	5,000
Forest genetics field tours on Vancouver Island	1,000
Spruce manual for seed orchardists (2 nd production stage)	5,000
Opportunities arising through the year	4,500
Administrative costs	\$1,500
Subtotal	\$37,000
Salary for extension specialist (MFR – Tree Improvement Branch)	\$85,000
Total FIA Tree Improvement Program Contribution	122,000

3.6 Gene Resource Information Management Subprogram

The Genetic Resource Information Management Subprogram (GRIM) supports FGC goals and objectives through the development of genetic resource conservation and management (GRM) decision support and information management systems to assist clients in decision making, seed policy and planning, seed use (registration, (collection), storage, selection & use, and transfer), timber supply analysis, effectiveness evaluation and monitoring and other GRM activities. Projects include strategic planning and analysis, resource information management, decision support system planning, design and tool development, effectiveness evaluation and monitoring, and training and extension.

3.6.1 Planning

The primary objective of the GRIM Subprogram is to develop a provincial genetic resource information management system and decision support framework for the delivery of an effective GRM program. GRIM projects are developed and guided by the Genetic Resource Information Management steering committee comprised of ministry, industry and academic representatives, and the FGC Program Manager, from research, policy and planning, information management, and seed operations.

3.6.2 Management

The GRIM Steering Committee, led by the Ministry of Forests and Range, Tree Improvement Branch, identifies short and long term goals that support clients with GRM decisions, information management, and activities. GRIM information management (IM/IT) business case and annual subprogram project plans and budgets are developed by the GRIM Steering Committee. Significant project changes or re-allocations of funds from the approved Business Plan require approval of the Steering Committee and the FGC Program Manager on behalf of the FGC.

3.6.3 Activities and Budget

Funding is shared between FIA and the Ministry of Forests and Range. Total funding allocated from the FIA Tree Improvement Program will be \$50,000 for 2007/08, plus \$80,000 from the FIA incremental funding program in support of MPB initiatives. Specific projects are listed in Table 7.

Table 7 Genetic Resource Information Management subprogram projects and budget for 2007/08

Project	Budget (\$) *
1. Strategic Planning and Analysis Information in support of the development of a provincial forest-tree genetic resource management strategy Development will be informed by the Genetic Resource Management Challenge Dialogue process.	20,000
2. Resource Information Management Assessments of existing data systems, client impacts, and information needs for the development of a climate-based seed transfer system.	20,000
3. Effectiveness Evaluation and Monitoring Benchmarking seed transfer practices pre-and post- Forest and Range Practices Act (FRPA) implementation and for guidance in the development of a climate-based seed transfer system.	15,000
4. Training and Extension Development of a GRM decision-support reference guide that will be available to users on the web.	25,000
5. Genetic Resource Information Management Systems Enhancements to the linkages between SPAR and SeedMap to assist users with seed registration and selection.	20,000
6. Genetic Resource Management Challenge Dialogue Completion of the Challenge Dialogue process started in 2006 to receive input from a broad range of stakeholders on GRM in BC. This will support the development of a new Strategic Plan for the FGC.	30,000
Total FIA Tree Improvement Program Contribution	130,000

* Actual budgeted project amounts may shift during the fiscal year due to new information and changing priorities. Input from the GRIM Steering Committee will be sought for any changes.

3.7 Pest Management Subprogram

The Pest Management Subprogram supports FGC objectives by reducing orchard seed losses to insect and disease pests through research, technical support, and the development of integrated pest management strategies in conjunction with orchard managers and pest management research and extension specialists.

3.7.1 Planning

The Subprogram is guided by a Pest Management Technical Advisory Committee, with membership from industry and government orchards, the Canadian Forest Service, universities, and the Provincial Tree Seed Centre. Issues are identified and ranked by the TAC based on the perceived impact on seed losses, and the effect of these seed losses on FGC objectives. The TAC also makes recommendations to Council regarding subprogram organization and management.

3.7.2 Management

Following general direction from the PMTAC, research proposals were developed by the pest management scientist and pest management specialists supported through the subprogram. These were subsequently reviewed by Pest Management TAC members, and recommendations

made for project modifications. Some projects were also rejected due to funding and timing issues.

The MFR Tree Improvement Branch manages the financial administration of projects approved by the Pest Management TAC through in-branch allocations, or through allocations to the MFR Research Branch. Significant priorities and changes during the fiscal year will be dealt with through consultation with the TAC and approvals by the FGC Program Manager and the MFR Tree Improvement Financial Administrator. All projects will report quarterly on spending and at mid-year and year-end on progress.

As set out in a pest management plan approved by the FGC in 2005, FIA funds will also support salaries for two positions in the MFR; a Pest Management Research Scientist reporting through the Research Branch, and a Cone and Seed Pest Management Biologist reporting through the Tree Improvement Branch.

3.7.3 Activities and budget

The total Pest Management subprogram budget for 2007/08 is \$401,000. In-kind, staff time and other contributions by affiliated companies and agencies are incremental to this amount. Projects and budgets are summarized in Table 8.

Table 8 Pest Management Subprogram projects for 2007/08, including both ongoing and incremental projects. Incremental FIA funding support is \$101,000.

Project	Species impacted	Budget (\$)	Products
<i>Adelgid</i> species composition (in conjunction with the University of British Columbia)	Sx, Fdi, Fdc	44,120	Report
Tests of systemic insecticides for cone and seed insect control	all	17,850	Progress report
<i>Leptoglossus occidentalis</i> (western conifer seedbug); projects carried out in conjunction with Simon Fraser University	Pli, Fdi, Fdc, Sx, Lw, Pw		
- Host finding mechanisms		31,920	
- Infra-red detection capabilities		35,000	
<i>Dioryctria</i> (Douglas-fir cone moth) pheromone studies	Fdi, Fdc	33,590	Progress report
<i>Dioryctria</i> pheromones bulk production for operations	Fdi, Fdc	10,000	Progress report: pheromones
Development of a cone and seed pest field guide		30,000	
Technical support for research scientist		26,520	
Research scientist lab operation costs		18,000	
MFR salary support for applied pest management specialist and pest research scientist	All	154,000	
Total budget		401,000	

3.8 Administration

Administration of the FIA Tree Improvement Program is provided by the Tree Improvement Branch of the MFR. There are three components to this work:

- the administration of FIA funds allocated to subprograms managed by the Ministry of Forests and Range, including Tree Breeding, OTIP, Extension and Communication, Pest Management, and Genetic Resource Information Management,
- the administration of contracts with the University of BC, the University of Victoria, and SelectSeed Company Ltd.,
- support for the business of the FGC, including scheduling meetings, assistance with information distribution, and dealing with queries and planning.

3.8.1 Costs

The costs for MFR administration are reviewed by the FGC, and a recommendation is made for support under FIA. The administration budget is approved by the FGC in conjunction with other FIA Tree Improvement Program budget items.

3.8.2 Management

Overall program management is carried out on behalf of the Forest Genetics Council by the FGC Program Manager working for SelectSeed Company Ltd. This work includes planning, coordination of committees, Business Plan development, reporting, correspondence, and representing the FGC in daily business. The MFR Tree Improvement Branch provides administrative support, overall financial management, and assistance with the coordination of FGC business.

3.8.3 Activities and Budget

The 2007/08 budget for the Administration Subprogram is \$55,000. This amount includes all program administration costs incurred by the MFR Tree Improvement Branch. Funding will be split between the ongoing FIA allocation (\$43,000) and the incremental FIA allocation (\$12,000). The incremental amount will cover additional costs associated with administering incremental FIA projects.

3.9 Incremental projects

Projects listed in Table 9 were approved by the FGC, and are supported through FIA incremental funds allocated to the Tree Improvement Program. Only projects not directly managed through an existing subprogram (listed above) are set out in Table 9. Each project received review through existing FGC advisory committees, or through new steering committees set up to advise on the specific project.



Table 9 Incremental FIA projects for 2007/08. Projects and budgets managed through existing subprograms are also listed under subprograms in sections 3.1 to 3.7.

Project category	Project description	Project budget (\$ x 1000)	Delivery mechanism	Project development and reporting process
Enhanced seed production and genetic gain	Enhancing seed orchard production for MPB impacted seed planning units	93	Same as OTIP subprogram	Same as OTIP subprogram
	Progeny and provenance assessments to support long-term genetic gain	365.6	Same as Breeding subprogram	Same as Breeding subprogram
Strategic policy and support information for MPB and genetic resource management activities	Orchard development for MPB mitigation	34	SelectSeed Co. Ltd.	Same as Expansion of Class A Seed Supply subprogram
	Genetic resource information management	50	TIB administration	Same as GRIM subprogram
	Strategic planning – Challenge Dialogue	30	TIB administration	Same as GRIM subprogram
Research and information in support of MPB mitigation	Maximizing orchard seedlot inputs and recoveries; parental contributions and sowing efficiencies	257	MFR / UBC Transfer Letter	Subcommittee planning and review; reports
	Capacity building in genetic resource management at UNBC	150	MFR / UNBC Transfer Letter	Chief Forester facilitation; Subcommittee planning and review; reports
	Seedlot response to climate variables; support for seed transfer policy	45	MFR / UBC Transfer Letter	Same as Genetic Conservation subprogram
	Responding to climate change; designing a multi-species trial to facilitate species migration through seed deployment	19	MFR Research Br. Administration	Subcommittee review; seedlot procurement
	Improving applied cone and seed pest management practices	101	TIB administration	Same as Pest Management subprogram
	Improving orchard flower induction techniques for lodgepole pine and Douglas-fir	143.4	MFR / Uvic Transfer Letter	Subcommittee planning; reports
Administration	Incremental administration costs	12		
Total		\$1,300		

3.10 Budget Summary

A Forest Investment Account Tree Improvement Program budget allocation of \$5.67 million, including \$4.37 million in ongoing support, and 1.3 million incremental support is approved for the 2007/08 fiscal year (Table 10).

Table 10 2007/08 budget summary for Forest Investment Account contributions to subprograms (\$ x 1000).

Subprogram	Ongoing	Incremental	Total
Genetic Conservation	250	45	295
Tree Breeding	2,038	365.6	2,403.6
Operational Tree Improvement Program (OTIP)	732	93	825
Extension and Communication	122	0	122
Gene Resource Information Management	50	80	130
Seed Orchard Pest Management	300	101	401
Expansion of Orchard Seed Supply (SelectSeed Ltd.)	835	34	869
Administration (Tree Improvement Branch)	43	12	55
Incremental projects (see table 9)		569.4	569.4
Total FIA Tree Improvement Program Contributions	4,370	1,300	5,670

4.0 Funding and Administrative Mechanisms

This section outlines the agreements through which the Forest Investment Account Tree Improvement Program funds the FGC Business Plan.

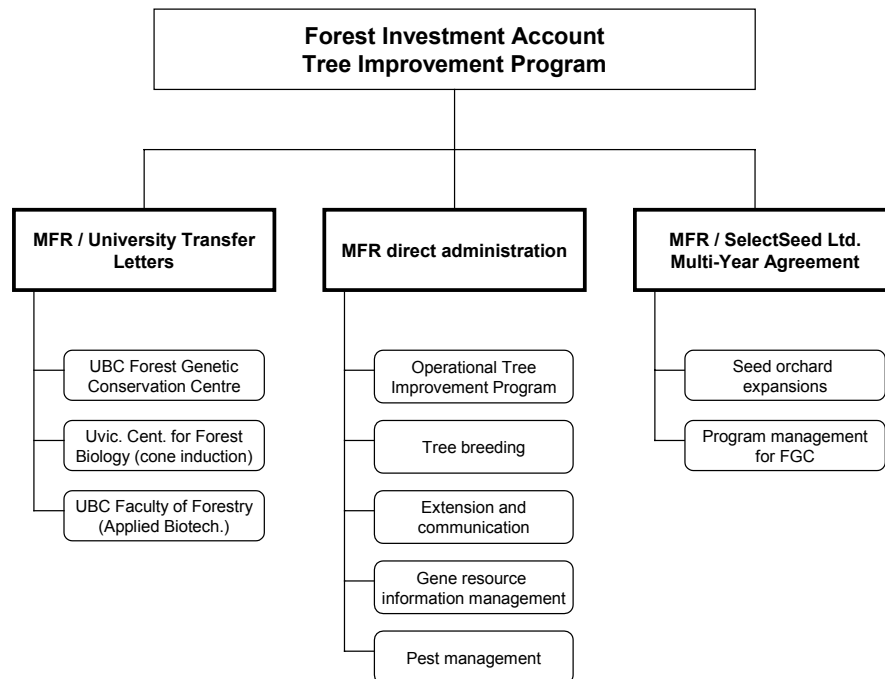
4.1 Funding Agreements

The Forest Investment Account Tree Improvement Program is administered by the Tree Improvement Branch of the Ministry of Forests and Range. FGC Business Plan activities are supported through the following administrative mechanisms:

- MFR/University of BC Transfer Letter
- MFR/University of Victoria Transfer Letter
- MFR/SelectSeed Co. Multi-Year Agreement and Transfer Letter
- MFR contract
- MFR direct management and administration

The subprograms associated with each of the mechanisms are shown in Figure 4. Resources from other agencies include in-kind facilities, staff and direct funds. Seed sales from orchards also provide revenue to support seed production. Only Forest Investment Account funding is detailed in this Business Plan.

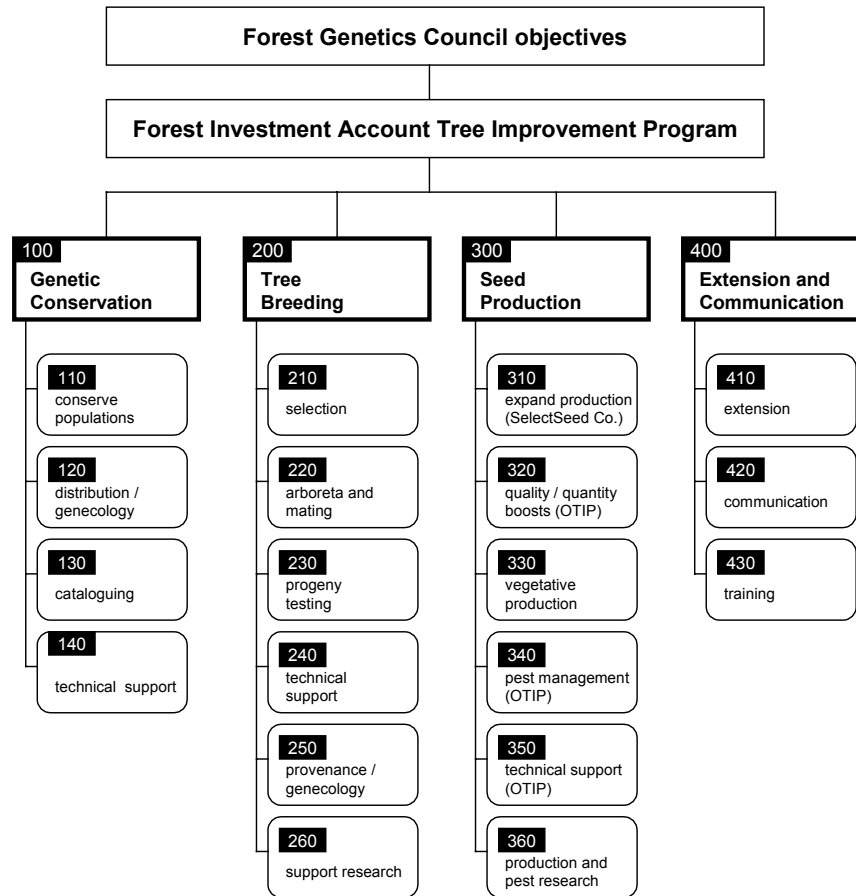
Figure 4 Administrative mechanisms for the delivery of the FIA Tree Improvement Program.



4.2 Monitoring and Reporting

Monitoring progress is an important objective of the FGC program. All FIA funded activities are monitored and report on performance relative to criteria. Progress at the provincial level for all FGC activities is measured to determine progress towards long-term objectives. To facilitate monitoring, activities are categorized using a work breakdown structure (Figure 5).

Figure 5 Work breakdown structure for program administration, monitoring and management.



4.2.1 Reporting for the genetic Conservation, Extension and Communication, and Genetic Resource Information Management Subprograms

For the Genetic Conservation, Extension, and Genetic Resource Information Management subprograms, the TAC chair or subprogram leader will submit written reports on activities and spending to the MFR Tree Improvement Program Administrator on or before October 30, 2007 and April 30, 2008.

4.2.2 Reporting for the Tree Breeding, OTIP, and SelectSeed Subprograms

Progress for the Tree Breeding, OTIP, and Expansion of Orchard Seed Supply (SelectSeed) subprograms will be reported by spending and key performance indicators (KPI). Progress

towards FGC objectives 1 and 2 (increasing genetic gain, increasing use of orchard seed) will be reported using provincial summaries of orchard seed use and genetic worth.

4.2.3 Reporting for FIA incrementally-funded projects

Progress for projects funded through incremental FIA funds that are managed through existing subprogram processes (Table 10 and Section 3) will report using criteria established for the subprogram. For incrementally funded projects that are not part of an existing subprogram, project leaders will report using criteria established for each project.

4.2.4 Project-Level Reporting

Project activities are organized into the categories identified in the work breakdown structure (Figure 5) (e.g., 320 Quality/Quantity Boosts). Individual projects (e.g., 321 grafting for ramet replacement) will report on KPIs (e.g., number of grafts made) and spending for each year of implementation. Tree Breeding and OTIP project reports will be summarized to formats shown in Tables 2 and 3. Reporting for technical support projects, which are more variable in nature, will use indicators designed for each project. Where actual work or spending differs substantially from that planned, variance reports explaining the reasons will be required of project proponents. Work quality will be periodically audited through Review Committees and site visits.

4.2.5 Provincial-Level Reporting

At the provincial level, total activities and spending will be summarized using KPI and budgets from project-level reports. In addition, actual progress towards FGC objectives 1 and 2 will be summarized across all SPUs using SPU-level reports.

Table 8 identifies the reporting requirements for Tree Breeding and OTIP subprograms.

Table 11 List of reports, responsibilities, distribution and preparation dates for FIA-supported Tree Breeding and OTIP projects.

Type of report	Prepared by	Prepared for	Distribution	Dates due
Interim project status (breeding and OTIP)	Breeder or OTIP project proponent	MFR program administrators for early FY reallocations	On request	Aug 1
Project level - Breeding	Breeder	MFR Program Administrator	On request	Oct 30 April 30
Project level - OTIP	Project proponent	MFR Program Administrator	On request	Oct 30 April 30
Mid-Year Progress Report	Program Admin. MFR; FGC Program Manager	FGC; MFR	FGC; TACs; FGC website	Nov 30
Annual report and progress summary	FGC Program Manager, Program Administrator MFR; project leader contributions	FGC; MFR Chief Forester; TACs; general distribution	FGC members; TACs; FIA administrators; MFR; general distribution; FGC website	Oct 15/08

* Note: The Interim Project Status report is an informal report intended only to identify those projects that are not progressing as planned, and for which funds may be re-allocated.

Appendix 1: Seed Planning Units and Categories

The following table lists seed planning units and their activity category. All provincial SPUs are grouped to one of four categories using a protocol developed by the FGC Strategic Planning Committee. The protocol evaluates SPUs based on the net present value of tree improvement investments, feasibility criteria, uncertainty, opportunities, and seed transfer information needs. Listed SPUs have a Species Plan in Appendix 4, and only include SPUs falling into categories 1 to 3. Annual planting is the 5-year mean of 2003–2007 seedling requests to SPAR. Categorization for SPUs # 6, 8 and 15, are based on an expectation of increased planting with pest resistant material.

Program categories include;

1. Advanced-generation program,
2. First-generation program,
3. Genecology, and
4. No genetics program.

#	Seed planning unit (SPU)			Annual planting (millions)	Program category	Value rank
	Species	SPZ	Elev. band (m)			
1	Fdc	M	1-700	119	1	1
2	Cw	M	1-600	7.3	1	4
3	Hw	M	1-600	1.3	1	10
4	Sx	NE	1000-1500	4.6	1	11
5	Sx	NE	1500-1900	5.3	1	7
6	Ss	M	1-500	1.0	1	3
7	Pli	NE	700-1400	3.5	1	5
8	Pw	M/SM	1-1400	0.3	1	13
9	Ba	M	1-1000	0.9	3	41
10	Pli	TO	700-1400	14.6	1	12
11	Yc	M	1-1100	1.4	1	17
12	Pli	PG	700-1200	38.6	1	2
13	Lw	NE	700-1400	3.1	1	14
14	Sx	PG	600-1200	30.6	1	6
15	Pw	KQ	500-1400	0.9	1	16
16	Pli	TO	1400-1600	8.0	2	25
17	Pli	BV	700-1200	17.2	1	9
18	Pli	CP	700-1100	6.8	1	8
19	Fdc	SM	400-1200	1.4	2	29
20	Pli	NE	1400-2000	2.8	3	38
21	Fdi	NE	400-1000	2.4	1	18
22	Fdi	NE	1000-1600	3.4	2	35
23	Sx/Ss	SM/NST	all	0.6	3	44
24	Hw	M	600-1100	0.9	2	23
25	Sx	EK	750-1700	1.9	1	20
26	Pli	PG	1200-2000	5.1	3	40
27	Cw	SM	200-1000	0.6	3	42
28	Sx	TO	1300-1900	3.9	1	19
29	Pli	EK	1500-2000	2.0	3	39
30	Sx	TO	700-1300	1.4	2	36
31	Fdc	M	700-1200	1.4	2	31

Seed planning unit (SPU)				Annual planting (millions)	Program category	Value rank
#	Species	SPZ	Elev. band (m)			
32	Pli	EK	800-1500	3.0	2	30
33	Cw	M	600-1500	1.3	2	27
34	Lw	EK	800-1500	2.0	1	21
35	Sx	BV	500-1200	10.4	1	15
36	Bg	M	1-700	0.1	3	45
37	Fdi	QL	700-1200	0.7	2	34
38	Hw	M north	1-600		Part of SPU 3 Hw M low	
39	Fdi	EK	700-1400	1.1	2	33
40	Sx	PR	650-1200	5.1	2	22
41	Fdi	PG	700-1000	2.8	2	32
42	Sx	PG	1200-1550	2.3	2	26
43	Fdi	CT	600-1200	1.1	2	37
44	Sx	NE	1-1000	1.1	2	28
45	Pli	BB/CHL	All	10.9	3	43
46	Bl	all int.	all	1.7	3	46
47	Bn	M	all	0.1	3	47
48	Aspen/birch/poplar	Interior	-	NA	3	48
49	Alder/poplar/maple	Coast	-	NA	3	49
50	Lw	NE	1200-1800	1.3	2	
51	Py	S. Interior	300-1200	1.1	2	NA

Note regarding pending Seed Zones

Seed zones are adjusted from time to time based on new research information, or on administrative needs. For information updates on seed zones, please contact Leslie McAuley of the Ministry of Forests and Range Tree Improvement Branch (leslie.mcauley@gov.bc.ca)

Appendix 2: Forest Genetics Council and Technical Advisory Committee Members

Forest Genetics Council of BC

Name	Affiliation	Representing
John Elmslie (Co-Chair)	Winton Global Ltd.	Industry Co-Chair
Dr. Dale Draper (Co-Chair)	MFR, Tree Imp. Br.	Ministry of Forests and Range Co-Chair
Dr. Annette van Niejenhuis	Western Forest Products Ltd.	Coastal Technical Advisory Committee
John Phillips	TimberWest Forests Ltd.	Coast industry orchard owners
Dr. Michael Carlson	MFR, Research Br.	Interior Technical Advisory Committee
Frank Gundersen	Abitibi Consolidated	Northern interior industry
Dr. Chris Hawkins	University of Northern BC	University
Dr. Gary Hogan	Canadian Forest Service	Canadian Forest Service
Scott King	Lousiana Pacific	Southern interior industry
Bruce McNicol	West Fraser Timber Ltd.	Interior industry orchard owners
Joe Leblanc	Interfor Ltd.	Coast industry
Al McDonald	BC Timber Sales	Ministry of Forests and Range and BCTS
Mike Madill	MFR, SI Region	Ministry of Forests and Range
Dr. Alvin Yanchuk	MFR, Research Br.	Ministry of Forests and Range
Henry Benskin (non-voting rep)	MFR	Forest Investment Account

Gene Conservation Technical Advisory Committee

Name	Affiliation	Name	Affiliation
Dave Kolotelo (Chair)	Ministry of Forests and Range	Dr. Greg O'Neill	Ministry of Forests and Range
Dr. Sally Aitken	UBC	Dr. Tongli Wang	UBC
Brian Barber	Ministry of Forests and Range	Jack Woods	SelectSeed Ltd. / FGC
Dr. Scott Green	UNBC	Alex Woods	Ministry of Forests and Range
Dr. Andreas Hamann	UBC	Dr. Alvin Yanchuk	Ministry of Forests and Range

Coastal Technical Advisory Committee

Name	Affiliation	Name	Affiliation
Annette van Niejenhuis (Chair)	Western Forest Products	David Reid	Ministry of Forests and Range
Dr. Sally Aitken (Chair)	University of BC	Dr. John Russell	Ministry of Forests and Range
Patti Brown	Canadian Forest Products	Brian Saunders	Island Timber Ltd.
Charlie Cartwright	Ministry of Forests and Range	Dr. Michael Stoehr	Ministry of Forests and Range
Tim Crowder	TimberWest Forests	Dr. Joe Webber	ProSeed Consulting
Dr. John King	Ministry of Forests and Range	Dr. Chang-yi Xie	Ministry of Forests and Range
Dave Kolotelo	Ministry of Forests and Range	Dr. Alvin Yanchuk	Ministry of Forests and Range

Interior Technical Advisory Committee

Name	Affiliation	Name	Affiliation
Dr. Michael Carlson (Chair)	MFR, Research Branch	Al McDonald	BC Timber Sales Ltd.
Dave Basaraba	Tembec Ltd.	Anna Monetta	MFR, NI Region
Keith Cox	MFR, Tree Imp. Branch	George Nicholson	Riverside Forest Products
Hilary Graham	Pacific Regeneration Technologies	Greg O'Neill	MFR, Research Branch
Dr. Chris Hawkins	University of Northern BC	Doug Perdue	Dunkley Lumber
Barry Jaquish	MFR, Research Branch	David Reid	MFR, Tree Imp. Branch
Dave Kolotelo	MFR, Tree Imp. Branch	Alistair Schroff	Burns Lk. Community Forest
Tim Lee	Vernon Seed Orchard Co.	Chris Walsh	MFR, Tree Imp. Branch
Dale Likes	Canadian Forest Products	Bob Johnson	Tolko Industries
Mike Madill	MFR, SI Region		

Extension Technical Advisory Committee

Name	Affiliation	Name	Affiliation
Dr. Chris Hawkins (Chair)	UNBC	Hilary Graham	Pacific Regeneration Technology
Dr. Michael Carlson	MFR, Research Branch	Tia Heeley	Vernon Seed Orchard Co. Ltd.
Charlie Cartwright	MFR, Research Branch	Jill Peterson	MFR, Research Branch
Keith Cox	MFR, Tree Imp. Branch	Don Summers	DWSummers & Co
Tim Crowder	TimberWest	Kathie Swift	FORREX
Diane Douglas	MFR, Tree Imp. Branch	Keith Thomas	MFR, Tree Imp. Branch
Peter Forsythe	Winton Global	Dave Trotter	Ministry of Agriculture and Lands
Lauchlan Glen	Glenviron Consulting	Jack Woods	Forest Genetics Council

Pest Management Technical Advisory Committee

Name	Affiliation	Name	Affiliation
Dr. Robb Bennett (Chair)	MFR, Tree Imp. Branch	Dave Kolotelo	MFR, Tree Imp. Branch
Jim Corrigan	MFR, Tree Imp. Branch	Dr. Staffan Lindgren	University of Northern BC
Tim Crowder	TimberWest Forest Ltd.	David Reid	MFR, Tree Imp. Branch
Dan Gaudet	Vernon Seed Orchard Company	Dr. Ward Strong	MFR, Research Branch
Peter de Groot	Canadian Forest Service	Jack Woods	Forest Genetics Council

Appendix 4: Species Plans

Species plans present information for seed planning units with active or planned breeding programs, seed orchards, or genecology work, including SPUs that are not supported through FIA Tree Improvement Program funding. Information presented includes breeding strategy (where applicable), seed orchard production forecasts, gain forecasts, historic seed use, seed in storage, genetic conservation status, and genecology/seed transfer projects. The plans are organized by species.