

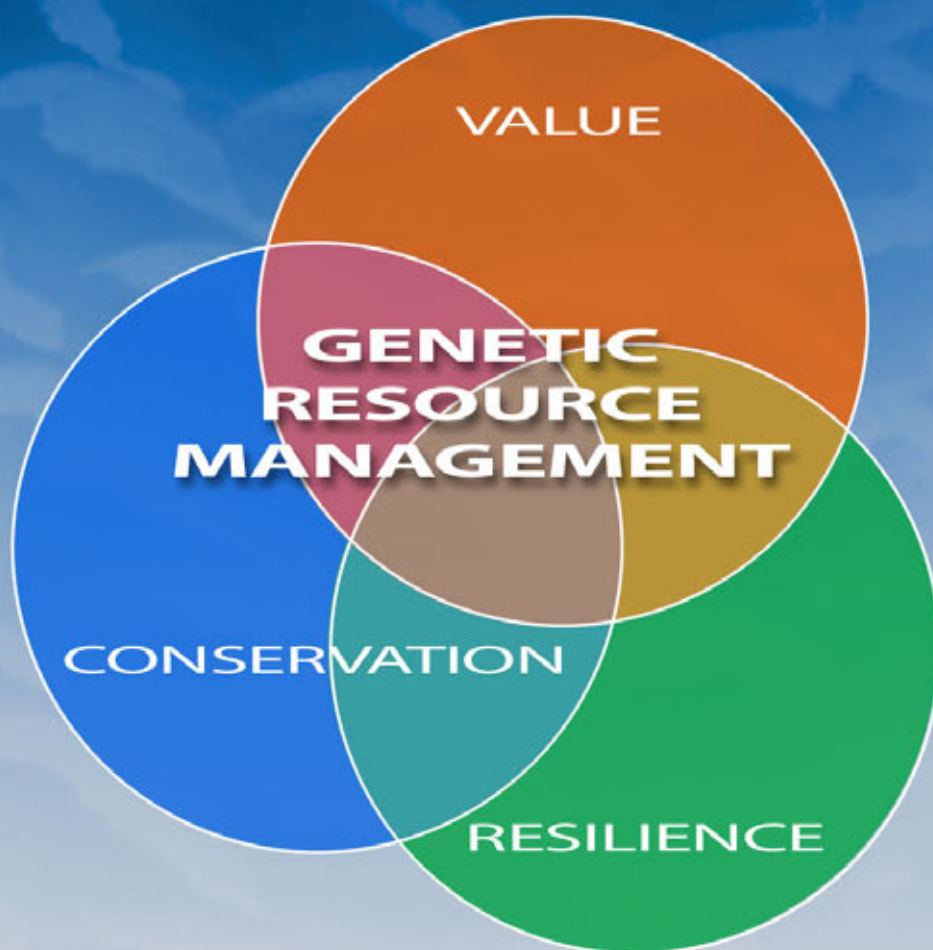


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Forest Genetics Council
of British Columbia

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The cover illustration was developed through a *Challenge Dialogue* process entered into with genetic resource management (GRM) stakeholders and completed early in 2008. This figure illustrates the three primary components of GRM, Conservation, Value, and Resilience. The elements of genetic conservation are a fundamental component of the genetic management of forest-tree populations, as significant losses of genetic diversity are irreplaceable. Conservation monitoring and activities are given substantial attention in the FGC program. Value refers to the classic process of tree improvement and includes breeding programs, selection of best parents, the production of seed (or cuttings) in orchards, and the use of the select seed in operational planting programs. Resilience refers to the appropriate matching of tree populations to environments in operational planting through careful seed zone development and seed transfer. Climate change is adding substantial complexity to this matching and is the subject of increasing attention. Genecological research and the interpretation of data with bioclimatic models will lead to new seed transfer standards in BC.

Thanks to Rich Rawling for image preparation.

References

Final Dialogue Report: Forest Tree Genetic Resource Conservation and Management (GRM) in British Columbia. March 11, 2008 Report, Forest Genetics Council of BC and the Ministry of Forests and Range. 25p.

Acknowledgements

This Annual Report presents the 2007/08 financial information and performance indicators for activities planned and delivered under the Business Plan of the Forest Genetics Council of BC, and for the Forest Investment Account Forest Genetics Conservation and Management Program (FGCM; previously FIA Tree Improvement Program). For more program detail, readers are directed to the FGC Business Plan for 2007/08, and the Tree Improvement Program Projects Report for 2007/08.

JACK WOODS
PROGRAM MANAGER
FOREST GENETICS COUNCIL
OF BRITISH COLUMBIA

This provincial program is noteworthy for the enthusiasm of all participants from the Ministry of Forests and Range, the forest industry, universities, and from others in the private sector. I would like to thank everyone involved for their support and work during the year, in particular FGC Co-Chairs Brian Barber and John Elmslie, Coast and Interior TAC chairs Annette Van Niejenhuis and Michael Carlson, Genetic Conservation TAC chair, Dave Kolotelo, Pest Management TAC chair Robb Bennett, Extension TAC chair Chris Hawkins, and Genetic Resource Information Management Chair, Leslie McAuley.

All members of the Forest Genetics Council and Technical Advisory Committees are thanked for their careful deliberations, contributions, and support. They are listed on the back page of this Annual Report.

My appreciation also goes to Keith Thomas (FIA FGCM Program Administrator) for his effort and cooperation.

Finally, Provincial Chief Forester, Jim Snetsinger, and Deputy Chief Forester, Craig Sutherland, are thanked for their important contribution and guidance.

Photo credits:
S Curtis-McLane, C. Walsh,
J. Woods.



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Message from the Chief Forester

Completion of the comprehensive genetic resource management (GRM) Challenge Dialogue with stakeholders was a significant accomplishment during the term of this report. Input received has allowed all involved to better understand and articulate GRM objectives, relate to each others concerns and needs, and begin the process of program adjustments, where needed. I appreciate the effort that went into this dialogue and its final report, and I look forward to Council completing a new Strategic Plan for the period 2009 to 2014 based on this work.

Climate change effects on forests are a growing concern. One of the responses to climate change is the deployment of genotypes in a way that matches future climates. It is noteworthy that Council established and supported the UBC Centre for Forest Conservation Genetics starting in 2000, and that the Centre has led bioclimatic modeling and the creation of the ClimateBC model; a significant tool in climate-change response efforts and in forest and range management. In addition, I anticipate that work recently initiated, such as the Assisted Migration Adaptation Trial, will also serve to support the objectives of the Future Forest Ecosystem Initiative and provide long-term information in support of species selection and seed transfer decisions under changing climates.

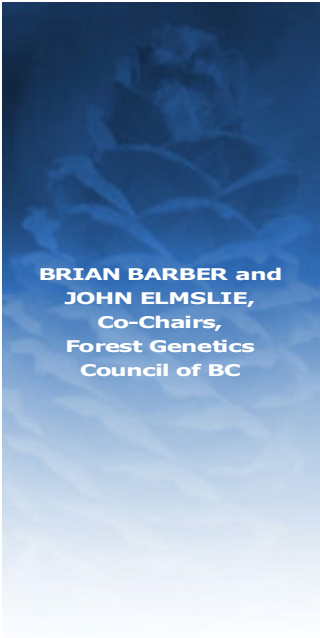
During the past year, mountain pine beetle (MPB) has continued it's relentless march across BC's interior forests. This, combined with poor wood market conditions, has resulted in uncertain and difficult times for forest managers. From the perspective of seed use and demand, sowing requests for the year ended in June 2008 were down to 214 million seedlings from 270 million the previous year. Looking forward, the combination of timber supply changes, industry economic shifts, potential new industries such as bioenergy, and climate change make seed planning uncertain. This creates both challenges and opportunities for the provincial seed production programs. I'm confident, however, that the planning processes developed through the Forest Genetics Council and within the Ministry of Forests and Range (MFR) will allow us to meet targets and to supply the select seed needed to add value and to improve resilience in provincial forests.

I would like to thank Dr. Dale Draper for his service to Council and to GRM over the past decade. Dale led Council as MFR Co-Chair during the period of re-organization in the late nineties, through to 2007, and was instrumental to the success of the provincial program. Brian Barber has been appointed to replace Dale as MFR Co-Chair.

Craig Sutherland, Deputy Chief Forester, and I look forward to working with Council in 2008/09, and beyond, and to meeting the renewed long-term objectives. I would like to thank Council members and the members of all the technical committees of Council for their efforts and cooperation during the past year.

A portrait of Jim Snetsinger, Chief Forester of the B.C. Ministry of Forests. The image is a blue-toned photograph of a man with dark hair, wearing a suit and tie, looking slightly to the side. The text is overlaid on the right side of the image.

**JIM SNETSINGER,
CHIEF FORESTER,
B.C. MINISTRY
OF FORESTS**



**BRIAN BARBER and
JOHN ELMSLIE,**
Co-Chairs,
Forest Genetics
Council of BC

Message from Forest Genetics Council Co-Chairs

All organizations face the continuous challenge of adjusting objectives, process, and work to meet the needs of customers. In a cooperative such as the Forest Genetics Council of BC, understanding and articulating needs far in advance is a difficult and ongoing task. Completion of the Genetic Resource Management Challenge Dialogue was a significant step in this process, and will lead to the development of a new Strategic Plan during the 2008/09 fiscal year. Also in keeping with this process of continuous improvement, the Genetic Conservation Technical Advisory Committee completed a Genetic Conservation Plan for indigenous forest tree species. This plan was subsequently approved by Council and will begin implementation during the coming fiscal year. We would like to thank the principle authors of this report; Dave Kolotelo, Dr. Sally Aitken, and Jack Woods.

Another initiative, started in late 2007, was a review of the breeding subprogram. A committee of Council was established to increase the efficiency of delivery and implementation in support of FGC objectives by seeking improvements in the processes for setting priorities, delivering funding, and reporting. Also important is streamlining the process of seeking funds and reporting to allow the scientists and technicians involved to focus on their work rather than on administrative details. This type of continuous improvement is an ongoing feature of Council activities and renews and strengthens the overall program.

Changes in planting and seed use due to mountain pine beetle (MPB) and to very poor economic conditions remain a challenge for seed and orchard planning. Despite the uncertainty, however, we're pleased to note that 2007 was an excellent year for seed production in provincial orchards, with seed crops sufficient to grow over 250 million seedlings across 28 seed planning units and eight species. In particular, younger orchards of interior Douglas-fir are now producing substantial crops, and lodgepole pine crops continue to increase. We are confident that, given the ups and downs of annual cone production, FGC objectives for seed supply will generally be met. FIA funds and the Operational Tree Improvement Subprogram of Council have strongly supported work linked to increasing orchard production and genetic gain.

Finally, we would like to thank all members of Council and technical committees for their contributions during the year. We would also like to recognize the important financial support received from the Forest Investment Account Tree Improvement Program; funding that is key to the success of forest genetic resource management province-wide.

1.0 Forest Genetic Resource Management in British Columbia

Forest genetic resource management (GRM) in British Columbia includes conservation of the genetic resource of indigenous forest tree species, increasing value through tree breeding and seed production, and enhancing forest resilience through scientifically-based seed transfer standards and the maintenance of genetic diversity.

This Annual Report describes progress on work outlined in the Forest Genetics Council of BC (FGC) Business Plan for 2007/08. The Business Plan and this Annual Report focus on Forest Investment Account (FIA) funding, although performance indicators used at both the project and provincial levels represent the combined effort and investment of all cooperators.

1.1 About the Forest Genetics Council of British Columbia

The FGC is a multi-stakeholder group representing government agencies (Ministry of Forests and Range, Canadian Forest Service), the forest industry, universities, and non-industrial private companies. The mandate of the FGC is to champion forest GRM, to oversee strategic and business planning for a cooperative provincial GRM program, and to advise the province's Chief Forester on policies related to GRM.

The FGC acts as a forum through which stakeholders can cooperate in program development, seek efficiencies in implementation, and lead business planning for provincial investments through the FIA Forest Genetics Conservation and Management Program (FGCM). During the term of this report, the provincial FGCM was a major funding source for GRM in British Columbia. Industry, MFR, and university cooperators also contributed substantial resources.

Council set the following goals and objectives in its five-year Strategic Plan (2004-2008), and annually develops a Business Plan outlining activities to meet the goals and objectives.¹

¹ For more information on the Forest Genetics Council, see <http://www.fgcouncil.ca>.



“
Forest genetic resource management includes conservation, value gain, and forest resilience.

”

“
The Forest Genetics Council leads business planning for the FIA Forest Genetics Conservation and Management Program.

”

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

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

“

TAC's and Species Committees provide the forum for stakeholder focus on technical, operational, and budget needs.

”

Technical Committee Support

FGC Technical Advisory Committees (TACs) provide technical and policy information to Council and contribute to the development of annual plans and associated budgets to achieve FGC goals and objectives. TAC's and Species Committees provide the forum for stakeholder focus on technical, operational, and budget needs. Council reviews all strategies, plans, or recommendations from the TACs. A full description of Council's support committees is contained in the FGC Business Plan for 2007/08.



Roger Painter

Roger retired from the Ministry of Forests and Range in November, 2007 after 33 years. His career started with the coastal Douglas-fir breeding program, and he later became a research technician working on cone induction and pollen management. In 1995 he began administering Forest Renewal BC funds directed to GRM activities. Roger finished his career as Manager, Business and Corporate Services with the Forest Practices Branch. Roger's integrity, hard work, and team play are missed. Council formally recognized his contributions as Program Administrator in September, 2007.

2.0 Budget Summary and Provincial Progress Indicators

2.1 Budgets and Expenditures

Forest Investment Account Forest Genetics Conservation and Management program allocations and expenditures for the 2007/08 fiscal year are shown in Table 1. The table does not include in-kind, staff, and other substantial inputs by industry, MFR, and university cooperators who contribute to the success of GRM activities in B.C.

Subprogram	Budget (\$)	Expenditures (\$)
Genetic Conservation	295	295
Tree Breeding	2,403.6	2,403.6
Operational Tree Improvement Program (OTIP)	825	787
Extension and Communication	122	120
Genetic Resource Decision Support	130	123
Seed Orchard Pest Management	401	389
Administration	55	55
Incremental projects	569.4	569.4
SelectSeed Ltd. orchards and FGC program management	869	869*
Forest Investment Account Tree Improvement Program Contribution	5,670	5,611

* SelectSeed FIA allocation shown. Total SelectSeed expenditure \$917,108; difference supported through seed sale revenue and investment income.

Table 1

Summary of Forest Investment Account FGCM budgets and expenditures for the period April 1, 2007 through March 31, 2008 (\$ × 1000).

2.2 Provincial Performance Indicators

Two of the principal objectives in the FGC Strategic Plan are to increase select seed use to 75% of total provincial sowing by 2013 and to increase the average volume gain (genetic worth for stem-volume growth, or GWg) of select seed to 20% by 2020. Figures 1 and 2 show, respectively, actual and forecast values for select seed use and GWg for the period 2000–2020.

Sowing spiked to a high of about roughly 280 million in the 2006 sowing year (ending June 30, 2006) and 270 million in 2007² due to harvest level increases driven by mountain pine beetle (MPB) and subsequent replanting. In 2008, sowing dropped to 221 million; close to the long-term average. These

² Includes private land sowing.

sowing spikes caused the apparent leveling off of select seed use when expressed as a percentage of the provincial total. Select seed use in the 2008 sowing year returned close to expected levels, although it is below forecast. Further reductions in provincial sowing are anticipated in the 2009 and 2010 sowing years.

Figure 1

Actual and Species-Plan forecasts of select-seed production as a percentage of provincial seed use.

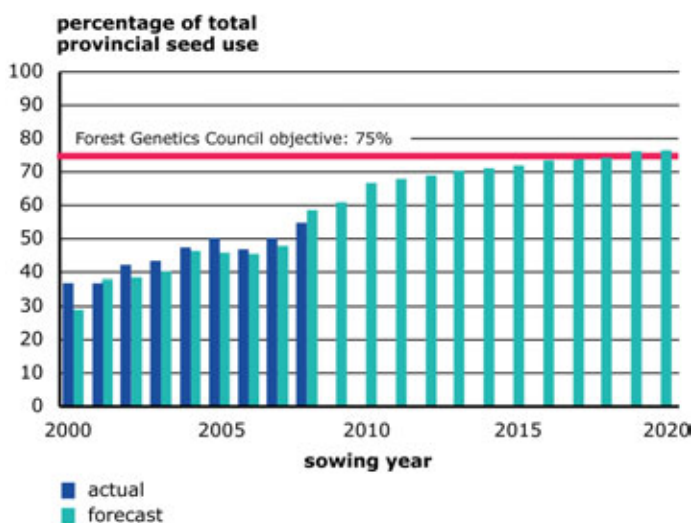
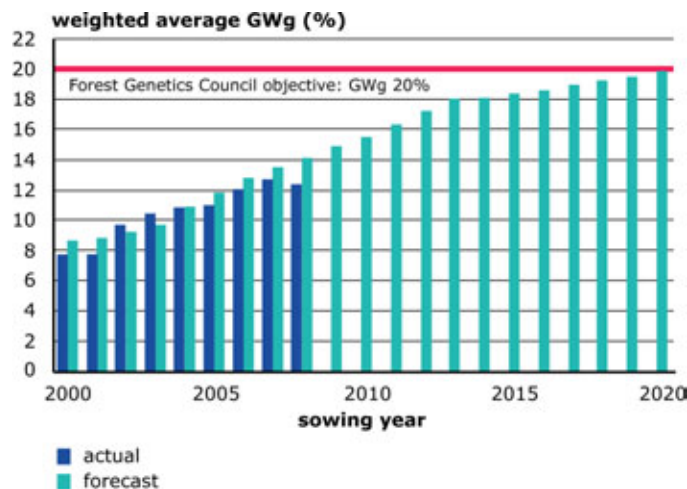


Figure 2

Actual and Species-Plan forecasts of the average genetic worth for stem-volume growth (GWg) of select seed sown in B.C.

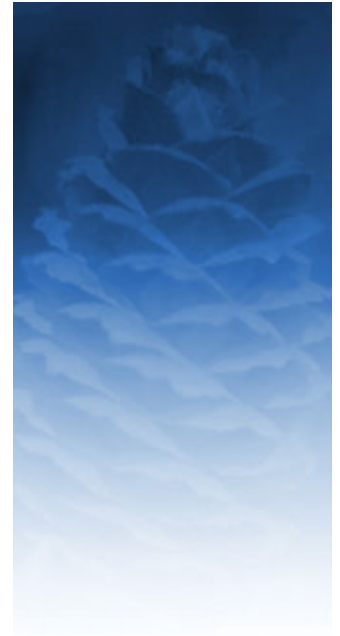


The average genetic worth (GWg) of orchard seed used in the 2008 sowing year (Figure 2) dropped slightly due primarily to the use of lower-gain lodgepole pine seed to help meet seed demands for this species. The average GWg will continue to rise in future years due to increasing production from higher gain orchards of interior Douglas-fir, lodgepole pine, and redcedar.

3.0 Forest Genetics Council and Committee Activity 2007/08

During the period of this report, the Forest Genetics Council met quarterly. In addition to subprogram progress reported below, the primary issues and activities included:

- developing a Business Plan and a Forest Investment Account Tree Improvement Program budget recommendation for the 2008/09 fiscal year, including planning and project development for Incremental FIA support;
- completing a comprehensive review of GRM activities and direction through a Challenge Dialogue with stakeholders;
- preparing and implementing a comprehensive plan for a genetic conservation program;
- Implementing reviews of the Tree Breeding subprogram and the delivery of genecology research and seed transfer standards;
- managing committee mandates, structures, and activities in support of objectives.



3.1 Interior and Coastal Technical Advisory Committees (CTAC and ITAC)

The Interior Technical Advisory Committee (ITAC) and affiliated interior Species Committees met in Prince George and Vernon in January 2008. The Coastal Technical Advisory Committee (CTAC) and affiliated Species Committees met in February 2008. Principal activities for both committees included:

- reviewing species plan strategies and Species Committee reports;
- reviewing breeding program activities, progress, and budgets;
- coordinating breeding and orchard strategies;
- providing input to the FGC;
- developing the Operational Tree Improvement Program (OTIP) project eligibility list;
- reviewing GRM issues on behalf of the FGC.

3.2 SelectSeed Company Ltd. Board of Directors

SelectSeed is a registered company that is wholly owned by the FGC through the BC Forest Genetics Society. The SelectSeed Board met in June and October 2007, and March, 2008. Principal activities included:

- business planning for orchard development activities, and approval of a SelectSeed Business Plan for the 2008/09 fiscal year;
- receiving and approving audited financial statements for the 2006/07 fiscal year, and addressing business items related to annual reporting requirements of the *Business Corporations Act*;
- reviewing progress in SelectSeed orchard developments, and receiving reports on activities; and
- coordinating and updating the principal contracts guiding orchard development and management.

3.3 Other Standing Committees

- The **Extension TAC** met in January, 2008. Activities included review of projects and business planning for 2008/09.
- The **Genetic Conservation TAC** met in November, 2007. Activities included development of a comprehensive plan for a forest-tree genetic conservation program. This plan was approved by the FGC and is now being implemented. In addition, projects and budget recommendations for the 2008/09 fiscal year were developed.
- The **Pest Management Technical Advisory Committee** met in October, 2007, and in February and March of 2008. Existing projects were reviewed, and activities and budgets were developed for 2008/09.
- The **Genetic Resource Decision Support Steering Committee** met in December, 2007 and March, 2008. Activities included the presentation of project updates, and the development of a business plan framework for 2008/09.
- The **Cone Induction Steering Committee** met in February 2008 to receive a project report from the principle researchers and to develop project plans for the 08/09 fiscal year.
- The **Applied Biotechnology Steering Committee** met in February, 2008 to receive reports and to develop projects and budgets for the 08/09 fiscal year.

4.0 Subprogram Summaries - 2007/08

4.1 Genetic Conservation Subprogram

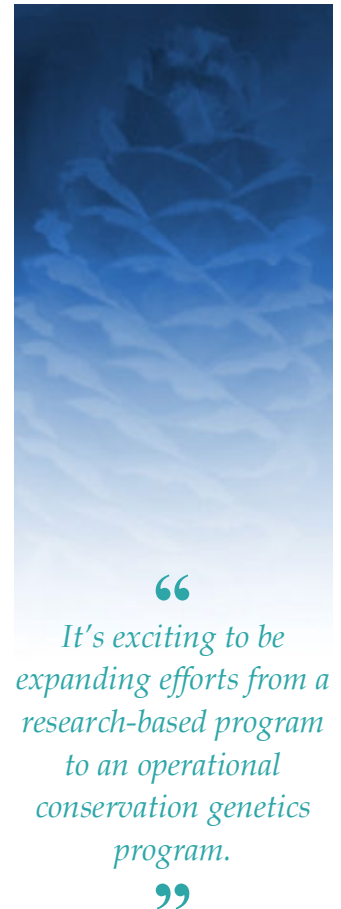
British Columbia is fortunate to have a rich diversity of native tree species, and extensive genetic diversity within many of these species. The Genetic Conservation Subprogram's objectives are designed to support the maintenance of genetic diversity for all fifty of BC's native tree species for adaptation to new environmental conditions, establishment of healthy, resilient forests, and new breeding objectives in the future. Since this subprogram was established in 2000, Council's genetic conservation objectives have been met primarily through the Centre for Forest Conservation Genetics (CFCG) in the Faculty of Forestry at UBC³. It's exciting to now be expanding efforts from a research-based program focused on developing strategies and identifying conservation needs, to an operational genetic conservation program focused on meeting those needs. This transition was supported by the development of the FGC Genetic Conservation Plan in 2007/08.

CFCG research activities fall into four categories: 1) cataloguing the current protection of genetic diversity for all indigenous tree species in British Columbia in protected areas (*in situ* conservation in parks and ecological reserves), through seed storage (*ex situ* conservation), and in the provincial tree breeding program (*inter situ* conservation); 2) developing an overall genetic-conservation strategy for BC; 3) predicting the response of forest-tree populations to climate change; and 4) gaining knowledge about the genetics and conservation needs of non-commercial tree species.

CFCG accomplishments in 2007/08 include:

- Completion of a technical report detailing the *in situ* conservation status of 50 indigenous forest-tree species by BEC zone, and development of a framework for a second technical report describing the *in situ*, *inter situ*, and *ex situ* genetic resources for commercial species. Gaps identified in these reports will form the basis of applied genetic conservation activities in 2008-09 and beyond.
- Establishment of seedling common garden experiments containing range-wide collections for Pacific dogwood (*Cornus nuttallii*) and Garry oak (*Quercus garryana*). Understanding the genecology of these species will help predict their ability to adapt to climate change.

³ Web site: <http://www.genetics.forestry.ubc.ca/cfcg>.



- Estimation of levels of genetic diversity in Pacific dogwood using both nuclear and chloroplast genetic markers.
- Establishment of 18 seed-based common-garden experiments for whitebark pine (*Pinus albicaulis*), distributed from Whistler to the BC-Yukon border, testing species distribution models that predict the occurrence of suitable habitat for this blue-listed species both within and outside of the current range.
- Completion of the first of two phases of a seedling growth chamber experiment characterizing lodgepole pine and interior spruce population response to temperature, moisture, and carbon dioxide.
- Initiation of improvements to the ClimateBC model using a modeling approach called Random Forest.
- Participation in extension-related workshops, conferences, and courses, and development and maintenance of online resources relating to the biology, genetics, and conservation of our native tree species.
- Publication of seven peer-reviewed articles in scientific journals, including:
 - A review of factors determining whether tree populations can adapt or migrate quickly enough to avoid climate-change extirpation.
 - Mating system, genecology and seed transfer recommendations for whitebark pine.
 - Genetic differences in mating system, diversity and adaptation between central and peripheral populations, and optimal sampling strategies for ex situ conservation of such populations.

Total spending under this subprogram was \$295,000, and followed the budget breakdown shown in Table 1 of the FGC Business Plan for 2007/08.

Table 2

Summary of Genetic Conservation projects, planned achieved for the period April 1, 2007 through March 31, 2008.

Project	Planned products	Products achieved
Cataloguing <i>in situ</i> protection	Conservation status report on 49 species	Report completed
Genetic structure of non-commercial species	Progress reports for Pacific dogwood and Garry oak	2 reports presented to the GCTAC
Climate change and genetic conservation	2 progress reports: 2 scientific papers	2 progress reports; 2 scientific papers completed
Ex-situ conservation seed collections	Collection of whitebark pine seed from 10 locations	Collections made from 11 locations
Seedlot response to climate variables (growth chamber experiments)	1 progress report on lodgepole pine and interior spruce	Progress report presented to the GCTAC

4.2 Tree Breeding Subprogram

The Tree Breeding Subprogram seeks to understand and use the genetic variation of commercially and ecologically important tree species in B.C. This work includes genecology⁴ research to develop information for seed transfer limits, and the continual improvement of the genetic worth (GW)⁵ of vegetative materials transferred to seed orchards. Tree breeding activities include selecting parents in wild stands, propagating, testing offspring, controlled breeding, establishing/maintaining/measuring trials, and associated research. The MFR Research Branch manages and carries out Tree Breeding Subprogram activities. FGC Interior and Coastal TACs, and their associated Species Committees, assist MFR tree breeders with planning, priorities, and budgets for the subprogram.

Figure 3 shows the allocation of effort to Tree Breeding Subprogram activities in 2007/08. Figure 4 compares the work completed under each activity to work planned for the fiscal year.

“
Tree breeding programs develop, test, and select trees with high genetic value for use in seed orchards.
”

Interior Breeding Program Highlights

- Identified, selected, and grafted 65 forward selections of interior spruce, from first- and second-generation genetic tests in the Prince George Series, for seed orchard and breeding populations.
- Raised and released a population of terminal weevils for the resistance screening of two interior spruce genetic tests.
- Selected western-gall-rust resistant parent trees of lodgepole pine for Prince George and Nelson Planning Units.



John Murphy

John retired in November, 2008 following 35 ½ year with the Research Branch of the MFR. John Started his career at the Red Rock Research Station in Prince George and was involved with parent-tree selections and the lodgepole pine breeding program. John moved to Vernon and the Kalamalka Research Station in 1984, where he continued to provide technical support to the lodgepole pine program. John is well known for his Irish humour, quick wit, pragmatic work, and friendly demeanor.

⁴ Genecology is the study of relationships between genetic diversity and environments.

⁵ Genetic worth is an estimate of the expected percentage difference between a selected seed or vegetative lot relative to a wild stand seedlot for a specific trait (e.g., growth, wood density, pest resistance) at a reference stand age of 60 years (80 years for interior spruce).

Figure 3
Tree Breeding Subprogram
budget allocations for
2007/08.

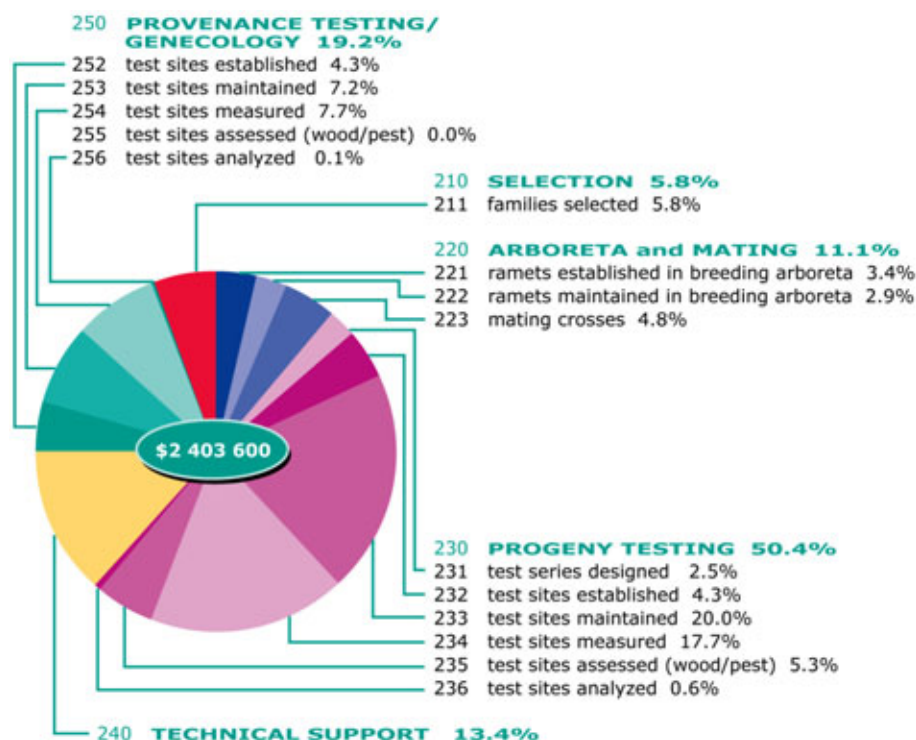
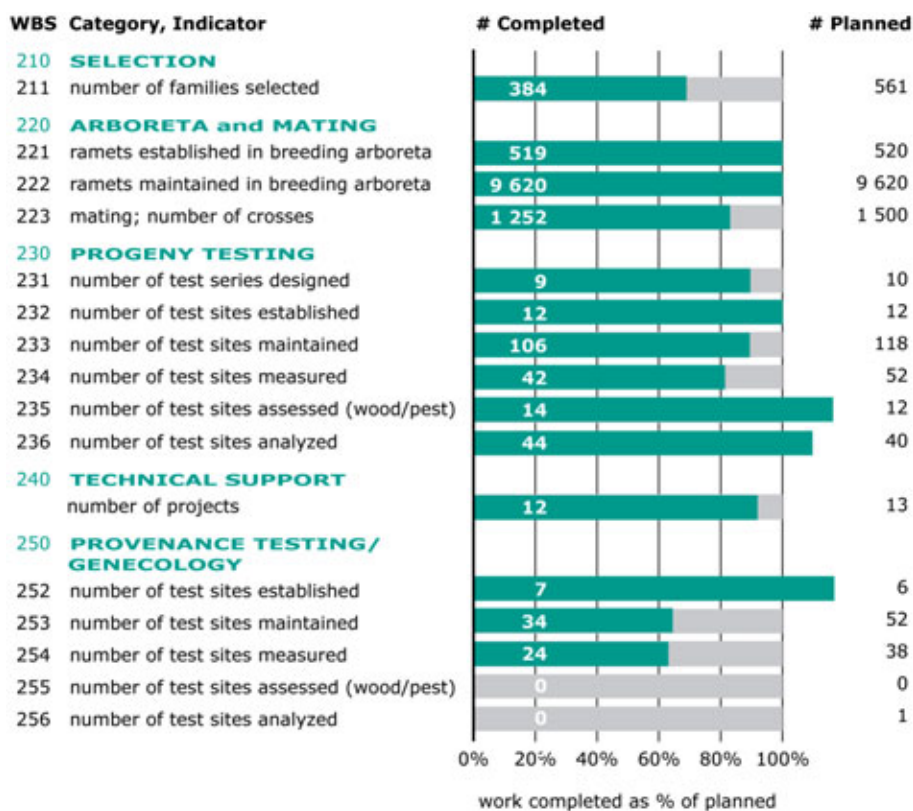


Figure 4
Tree Breeding Subprogram
performance indicators for
the period April 1, 2007 to
March 31, 2008.



Coastal Breeding Program Highlights

- Completed early selection, utilizing new optimum-selection approaches, for advanced seed orchard materials and for the second phase of the advanced-generation coastal Douglas-fir breeding program.
- Calculated western redcedar parental breeding values from 10-year progeny test data. Breeding values for the top five parents from Series 1 vary from 26 to 38%. Also, started the third-generation deer browse resistance breeding with parental selections based on total needle monoterpenes.
- Estimated yellow-cedar clonal breeding values using 10- to 12-year progeny-test data.

“

Third-generation deer-browse resistance breeding was initiated for western redcedar.

”

Provenance Testing and Genecology

Provenance testing and genecology work guide seed transfer, and provide an information base for decisions related to the deployment of genotypes in provincial reforestation programs. Increasingly, genecology data are linked to climate-change modeling and response. Highlights include:

- Measured 3-year height of interior spruce on 18 sites in the B.C./ Alberta Assisted Migration Adaptation Trial (climate change) project.
- Collected western redcedar seed and scions from 16 interior populations.
- Established four big leaf maple provenance /progeny test trials on Vancouver Island and the coastal mainland.
- Measured the drought and frost response, and described patterns of genetic variation, for 150 BC seed sources of interior spruce.

“

Genecology research provides an information base for seed transfer standards

”



Dan Rudolph

Dan retired in September, 2007 after 35 years with the Ministry of Forests and Range. He started his career at the Cowichan Lake Research Station, but soon moved to seed orchard management. Dan managed orchards at Koksilah, Cobble Hill, Saanich, and Bowser. Always a capable manager, Dan's organization and efficiency are missed

4.3 Operational Tree Improvement (OTIP) Subprogram

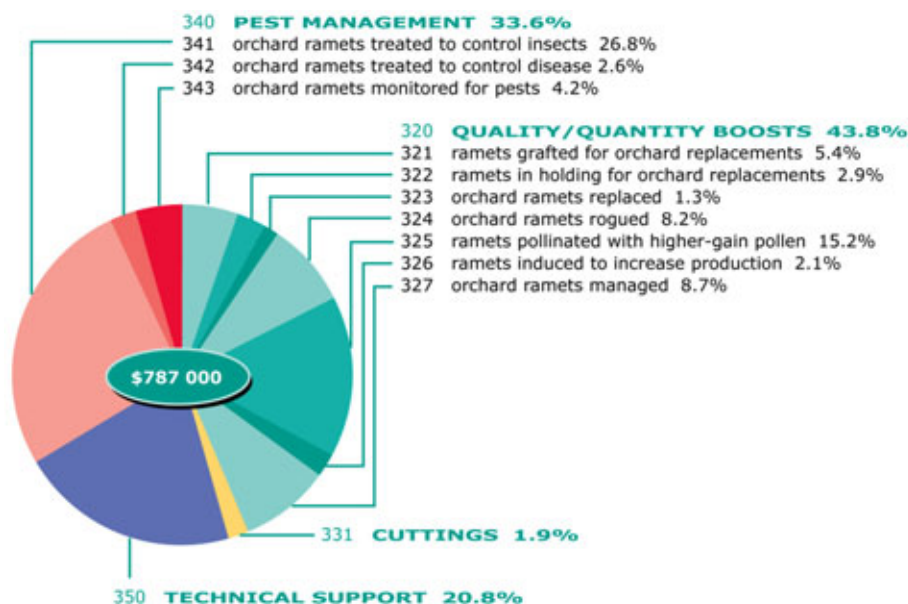
The OTIP Subprogram focuses on increasing the quality and quantity of seed produced from provincial seed orchards. It also provides technical support to improve orchard production and management.

“OTIP focuses on increasing the quality and quantity of seed produced from existing seed orchards.”

OTIP projects are developed through a call-for-proposals that is based on Species Plan priorities. FGC Review Committees rank all proposals against FGC objectives and SPU priorities, based on technical merit, impact, value, and cost. The MFR Tree Improvement Branch administers OTIP on behalf of the Forest Investment Account and the FGC.

Figure 5 shows 2007/08 funding allocations by category. Figure 6 compares the work completed under each category to work planned for the fiscal year.

Figure 5
OTIP Subprogram budget allocations for 2007/08.



Activities

A total of 89 projects were supported through the OTIP subprogram in 2007/08. As 2007 was a good cone-production year in most BC orchards, most OTIP projects proceeded as planned and met expectations⁶. The greatest proportion of subprogram expenditures were directed to projects that increased seed quantity and genetic quality, although pest control projects continued to increase in scope and number. It is noteworthy that technical support projects are diminishing as a percentage of OTIP subprogram expenditures; the result of successful problem solving through past projects. There remains, however, significant work to be done to

⁶ For specific project details see the *Tree Improvement Program Project Report for 2007/08*

increase lodgepole pine seed set. This problem remains elusive and is the focus of a number of technical support projects.

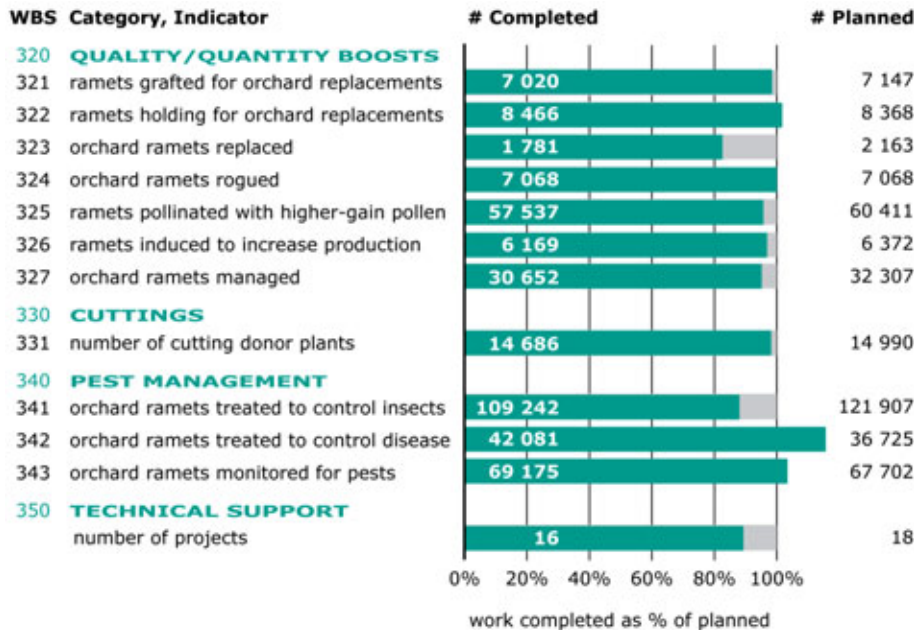


Figure 6
OTIP Subprogram
progress, 2007/08.

4.4 Expansion of Orchard Seed Supply Subprogram (SelectSeed Company Ltd.)

SelectSeed Company Ltd. is wholly owned by the FGC through the B.C. Forest Genetics Society. SelectSeed's mandate is to develop and manage orchard expansions needed to meet FGC objectives, and to produce seed of high genetic quality for use in provincial reforestation programs. SelectSeed also provides program management services to the FGC.

SelectSeed's Business Plan and investments are a component of the long-term FGC business planning process. The SelectSeed Business Plan is reviewed and approved annually by the FGC. Selectseed has entered into contracts with private orchard companies to develop and manage needed seed orchards.

SelectSeed spending is summarized in Figure 7 for 2007/08. Figure 8 compares the work completed under each activity to work planned for the fiscal year.

Figure 7
SelectSeed Ltd. budget allocations for 2007/08. FIA FGCM program contributions were \$869,000, with the remainder supported through revenues from seed sales and investments.

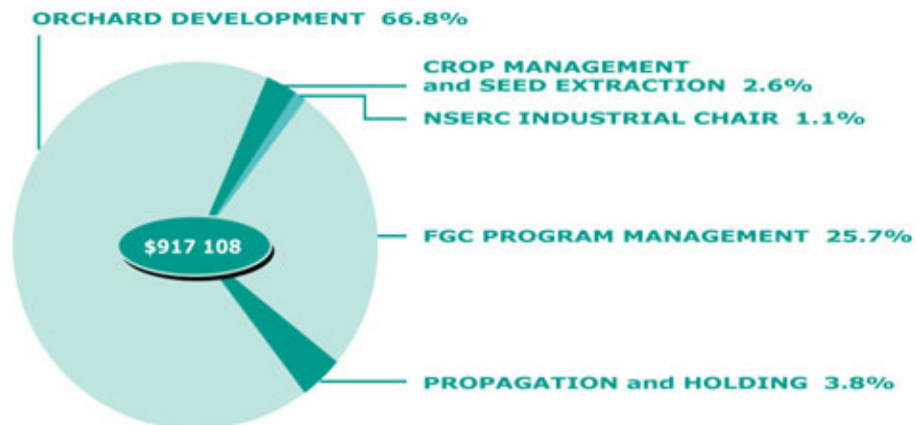
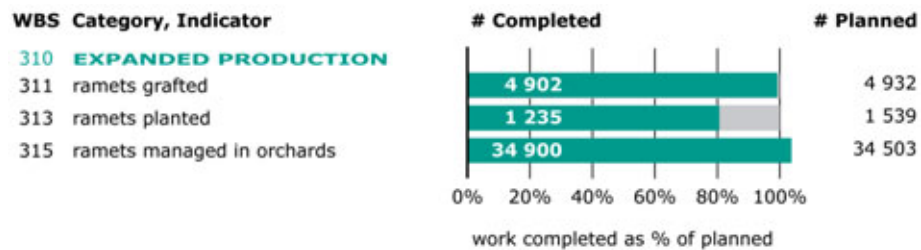


Figure 8
SelectSeed Ltd. performance indicators for 2007/08.



“
SelectSeed orchards produced a total of 50 kg of seed in 2007; the first significant year of production from these young orchards.
”

Orchard Development and Production

In its eighth year, SelectSeed’s focus continues to shift from orchard establishment to production. Harvest from nine lodgepole pine orchards totaled 47.2 hectoliters (hl) of cones, totaling 7.9 kilograms (kg) of seed. A substantial cone crop of 45.6 hl, yielding 42.1 kg of seed, was harvested from the Douglas-fir Nelson low-elevation orchard. The SelectSeed-owned proportion of these crops was 50 kg of seed. These yields were substantially above Business Plan forecasts. Supplemental pollination was carried out in all lodgepole pine orchards for the harvest of crops in 2008.

SelectSeed Ltd. Management

SelectSeed activities in 2007/08 included:

- managing orchard and propagation contracts, orchard planning and support, scion collection, stock allocations, workplan development, and records maintenance;
- preparing a Business Plan and Annual Report covering business procedures, budgets, activities, and accomplishments;
- maintaining books of account and corporate records; managing audits and Board of Director procedures; and
- reporting on operations and finance to the FGC and FIA administrators.

FGC Program Management

FGC program management activities included developing the FGC Annual Report for 2006/07; organizing committee work for development of the 2008/09 FGC Business Plan; policy, committee, issue management, and reporting for the FGC; updating species plans; and coordinating FGC activities. During the reporting period, significant effort was put towards completion of a genetic conservation plan, supporting a review of the Breeding Subprogram, and completion of the Genetic Resource Management Challenge Dialogue project.

4.5 Extension and Communication Subprogram

The Extension and Communication Subprogram supports FGC goals and objectives through extension, communication, and education activities. These activities are developed and guided by the FGC Extension Technical Advisory Committee (ETAC), which includes representatives from government, industry, seed dealers, academia, and consultants.

Figure 9 shows funding allocations to the Extension and Communication Subprogram activities in 2007/08.

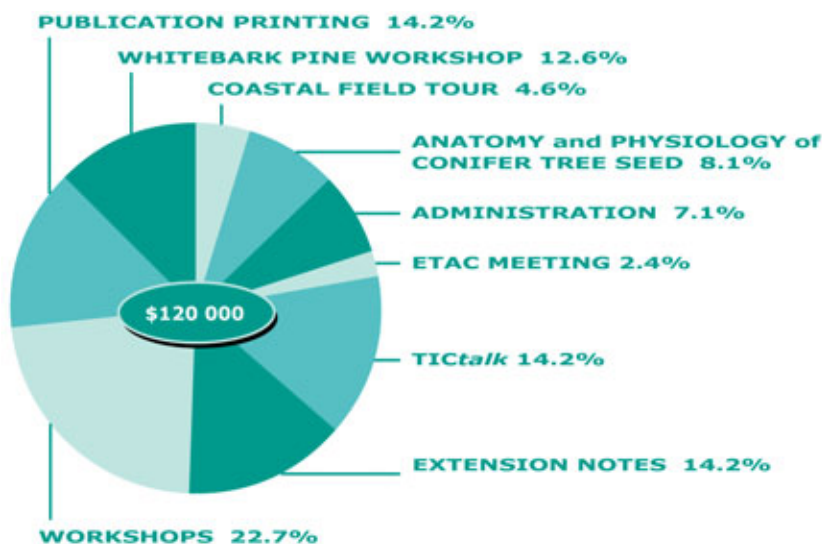


Figure 9
Extension and Communication Subprogram budget allocations for 2007/08.

FGC Program Extension

The primary extension activities undertaken during the year include the following:

- Tree improvement field tour held in conjunction with the Coastal Silviculture Committee meeting (Courtenay, June 2007).
- Coastal Crown Management workshop for seed orchard managers (Saanichton, October, 2007).

“
The Extension and Communication Subprogram activities serve public, technical, and decision-making audiences.
”

- Conference on Whitebark Pine genetics and management (Whistler, August 2007).
- GRM extension presentations at five Tree Seed Workshops held throughout BC (November and December, 2007).
- FGC Extension Note 8, entitled “*The Reproductive Biology of Western Larch*” by John Owens, was published in conjunction with the Inland Empire Tree Improvement Cooperative.
- An article entitled “*Forest Genetics: The Seed for Reforestation*” by Kathie Swift, Barry Jaquish, and Diane Douglas was published in the *BC Forest Professional* (January, 2008).
- TICtalk Volume 8 was prepared and made available on the web and in a print version.

4.6 Genetic Resource Decision Support Subprogram

The Genetic Resource Decision Support Subprogram (previously known as the Genetic Resource Information Management subprogram) supports FGC goals and objectives through the development of registries and other tools to aid a broad range of GRM activities. GRM decision support systems provide clients with the ability to register, catalogue, and order seed and seedlings for reforestation, provide improved decision support to forest stewardship managers, incorporate genetic gain assumptions into timber supply analyses and future forest strategies, develop seed deployment and genetic conservation strategies, track status and trends, and monitor performance.

The Genetic Resource Decision Support Steering Committee guides the development of decision support investments and activities. Funding allocations in the 2007/08 fiscal year are summarized in Figure 10



Bruce McPherson

Bruce retired in March of 2008 after 30 years with the Ministry of Forests and Range. Bruce's career started at the Koksilah Seed Orchard site and eventually moved to Cobble Hill and then Saanich, where he retired as site manager. Bruce's quick wit and friendly smile are missed.

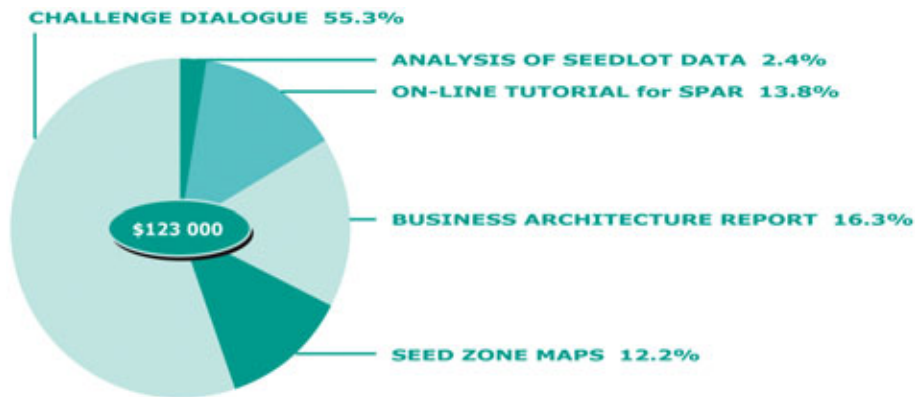


Figure 10
Genetic Resource
Decision Support
Subprogram budget
allocations for
2007/08.

Accomplishments

- Completion of the GRM Challenge Dialogue with extensive stakeholder input. Three key GRM components were identified: Value, Resilience and Conservation.
- Completion of a GRM Decision Support - Business Architecture report that identifies seven key recommendations, including developing capacity, monitoring genetic resources, increasing data access, and modeling and decision support tools to support a climate-based seed deployment system.
- Creation of new Seed Zone maps for use in publications and presentations. (see MFR Tree Improvement Branch website).
- Development of on-line “help” module for the Seed Planning and Registry system (SPAR) and materials for three SPAR training modules.

“
*The Genetic Resource
Management Challenge
Dialogue process
provides extensive
stakeholder input to
GRM objectives.*
”

4.7 Seed Orchard Pest Management Subprogram

The Seed Orchard Pest Management Subprogram supports research, extension activities, and pest management operations to increase orchard yields of high quality seed. The Pest Management Technical Advisory Committee (PMTAC) guides investments and activities. Research is led by MFR scientist Dr. Ward Strong, while extension services are delivered to interior and coastal orchards by Jim Corrigan and Dr. Robb Bennett. Seed orchard personnel handle operational activities. The PM-TAC is comprised of members from MFR Research and Tree Improvement Branches, the Canadian Forest Service, private seed orchards, universities, and the FGC.

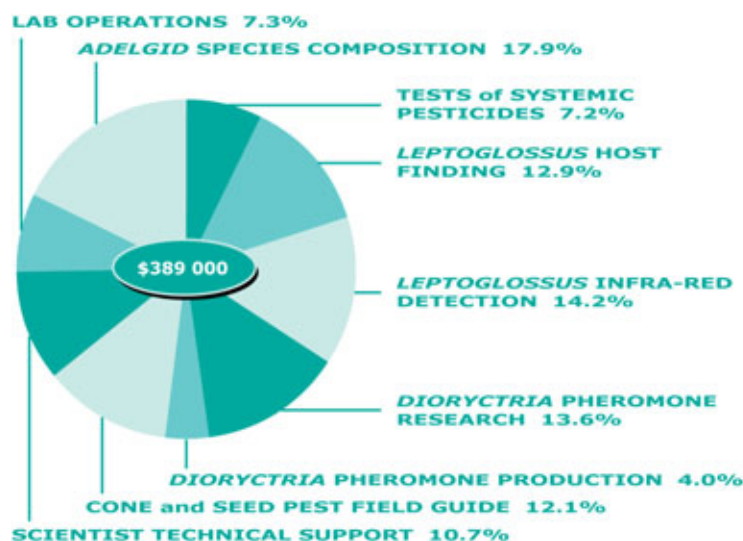
Research plans and budgets are established through prioritization by the PMTAC, followed by proposal development by project leaders, and project approval by the PMTAC. Final budget approval rests with the FGC. Projects in the 2007/08 fiscal year are summarized in Table 3, below.

“
*The seed and cone pest
management
subprogram coordinates
research, extension of
information, and
operational controls*
”

Table 3
Seed and cone pest
research projects and
progress for 2007/08.

Project	Species primarily impacted	Progress
Conifer seed bug (<i>Leptoglossus occidentalis</i>): host finding mechanisms	All <i>Pinaceae</i>	A new trap that exploits infrared host-finding mechanisms was successfully tested.
Conifer seed bug (<i>Leptoglossus occidentalis</i>): infrared detection	All <i>Pinaceae</i>	Infrared detection equipment purchased to support host-finding project.
Fir coneworm (<i>Dioryctia abietivorella</i>): Production of attractant pheromone	Fd, Sx, Lw, Pw	Pheromone produced for life history / reproductive biology project and annual flight data collection.
<i>Fusarium</i> fungi: Reducing seed loss and determining infection mechanisms	All species	Research completed; summary report produced.
Douglas-fir cone gall midge (<i>Contarinia oregonensis</i>):	Fd	Distribution and phenology studies initiated.
Pine pitch moth (<i>Synanthedon sequoiae</i>): Damage and control	Pli, Sx	Sample plots established to measure multi-year impact. Pesticide control demonstrated.
(<i>Adelges</i> & <i>Pineus</i> spp.): Species composition, gall formation, and life history	Pw	Analysis of species composition and population parameters completed. Seasonal flight patterns and life stages determined for various species.
Cone and seed pest control: systemic insecticide trials	All species	New trial initiated for the 2008/09 seasons.
Cone and seed insect field guide	All species	Images made; seven fact sheets produced.

Figure 11
Seed and Cone Pest
Management subprogram
budget allocations for
2007/08.



4.8 Administration

Administration of Forest Investment Account Forest Genetics Conservation and Management Program funding is carried out by the MFR Tree Improvement Branch, and includes financial, monitoring, and reporting services. Administrative infrastructure for the Tree Breeding, OTIP, Extension and Communication, and Genetic Resource Decision Support Subprograms is provided by the MFR. Administration of the Genetic Conservation and Orchard Expansion Subprograms is provided by the University of British Columbia and SelectSeed Co. Ltd., respectively.

5.0 2007 Orchard Seed Crops

Cone and seed production in 2007 was one of the best on record, with a total crop from all provincial orchards of 2,463 kilograms of seed, sufficient to grow approximately 248 million seedlings (Table 4). Noteworthy are large crops of coastal Douglas-fir, interior spruce and western redcedar. Interior Douglas-fir and lodgepole pine crops also continue to increase.

Species	Seed produced (kg)	Seedling equivalents (million)
Interior spruce	1,103.1	143.6
Lodgepole pine	277.0	34.8
Western larch	106.5	9.6
Interior Douglas-fir	123.4	5.1
White pine	88.8	1.7
Western redcedar	81.5	18.8
Sitka spruce	3.0	0.5
Coastal Douglas-fir	651.3	27.5
Western hemlock	28.8	5.9
	2,463.4	247.6

“
Provincial seed orchards
produced sufficient seed
in 2007 for about 2482
million seedlings.

”

Table 4

Summary of 2007 seed crops from all provincial orchards.



Leslie McKnight

Leslie retired in January, 2008 after 22 years with the Research Branch of the Ministry of Forests and Range. Leslie provided data management and logistical support to the provenance testing program. Her work was later extended to other program areas. Her attention to detail, willingness to contribute, and pleasant way with others made her a valuable team member.

Appendix 1. Seed planning units

Seed planning unit (SPU)				Annual planting ⁷ (millions)	Program ⁸ category
#	Species	SPZ	Elev. band (m)		
1	Fdc	M	1-700	11.9	1
2	Cw	M	1-600	7.3	1
3	Hw	M	1-600	1.3	1
4	Sx	NE	1000-1500	4.6	1
5	Sx	NE	1500-1900	5.3	1
6	Ss	M	1-500	1.0	1
7	Pli	NE	700-1400	3.5	1
8	Pw	M/SM	1-1400	0.3	1
9	Ba	M	1-1000	0.9	3
10	Pli	TO	700-1400	14.6	1
11	Yc	M	1-1100	1.4	1
12	Pli	PG	700-1200	38.6	1
13	Lw	NE	700-1200	3.1	1
14	Sx	PG	600-1200	30.6	1
15	Pw	KQ	500-1400	0.9	1
16	Pli	TO	1400-1600	8.0	2
17	Pli	BV	700-1200	17.2	1
18	Pli	CP	700-1100	6.8	1
19	Fdc	SM	200-1000	1.4	2
20	Pli	NE	1400-2000	2.8	3
21	Fdi	NE	400-1000	2.4	1
22	Fdi	NE	1000-1600	3.4	2
23	Sx/Ss	SM/NST	all	0.6	3
24	Hw	M	600-1100	0.9	2
25	Sx	EK	750-1700	1.9	1
26	Pli	PG	1200-2000	5.1	3
27	Cw	SM	200-1000	0.6	3
28	Sx	TO	1300-1900	3.9	1
29	Pli	EK	1500-2000	2.0	3
30	Sx	TO	700-1300	1.4	2
31	Fdc	M	700-1200	1.4	2
32	Pli	EK	800-1500	3.0	2
33	Cw	M	600-1500	1.3	2
34	Lw	EK	800-1500	2.0	1
35	Sx	BV	500-1200	10.4	1
36	Bg	M	1-700	0.1	3
37	Fdi	QL	700-1200	0.7	2
39	Fdi	EK	700-1400	1.1	2
40	Sx	PR	650-1200	5.1	2
41	Fdi	PG	700-1000	2.8	2
42	Sx	PG	1200-1500	2.3	2
43	Fdi	CT	600-1200	1.1	2
44	Sx	NE	1-1000	1.1	2
45	Pli	BB/CHL	all	10.9	3
46	Bl	all int.	all	1.7	3
47	Bn	M	all	0.1	3
48	Aspen/birch/ poplar	Interior	-	NA	3
49	Alder/poplar/ maple	Coast	-	NA	3
50	Lw	NE	1200-1800	1.3	2
51	Py	S. Int.	300-1200	1.1	NA

⁷ Annual planting based on 5-year average sowing (2002-2006 sowing years)

⁸ Program categories: 1. Advanced-generation program, 2. First-generation program, 3. genecology only, 4. no genetics program.

Forest Genetics Council of BC⁹

Name	Affiliation	Representing	Name	Affiliation	Representing
John Elmslie	Winton Global	Industry Co-Chair	Joe Leblanc	Interfor Ltd.	Coast Industry
Brian Barber	MFR	MFR Co-Chair	Bruce MacNicol	West Fraser Timber Ltd.	Interior industry
Dr. Michael Carlson	MFR	Interior TAC	Al McDonald	BC Timber Sales	BCTS
Frank Gundersen	Abitibi Consolidated	N. interior industry	Mike Madill	MFR	Min. of Forests and Range
Dr. Chris Hawkins	Univ. of Northern BC	University	Annette van Niejenhuis	Western Forest Products	Coast TAC
Dr. Gary Hogan	Can. Forest Serv.	Can. Forest Serv.	Larry Promnitz	TimberWest Forests Ltd	Coast industry
Scott King	Louisiana Pacific	S. interior industry	Dr. Alvin Yanchuk	MFR	Min. of Forests and Range

Coastal Technical Advisory Committee

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

Interior Technical Advisory Committee

Name	Affiliation	Name	Affiliation
Dr. Michael Carlson (Chair)	Min. of Forests and Range	Dale Likes	Canadian Forest Products Ltd.
Dave Basaraba	Tembec Ltd.	Mike Madill	MFR, S. Interior Region
Keith Cox	Min. of Forests and Range	Al McDonald	BC Timber Sales Ltd.
Diane Douglas	Min. of Forests and Range	Anna Monetta	Min. of Forests and Range
Hilary Graham	Pacific Regeneration Tech.	Greg O'Neill	Min. of Forests and Range
Dr. Chris Hawkins	University of Northern BC	Doug Perdue	Dunkley Lumber
Barry Jaquish	Min. of Forests and Range	David Reid	Min. of Forests and Range
Bob Johnson	Tolko Industries Ltd.	Alistair Schroff	Burns Lake Community Forest
Dave Kolotelo	Min. of Forests and Range	Chris Walsh	Min. of Forests and Range
Tim Lee	Vernon Seed Orchard Co.		

Extension Technical Advisory Committee

Name	Affiliation	Name	Affiliation
Dr. Chris Hawkins (Chair)	UNBC	Tia Wagner	Vernon Seed Orchard Co.
Dr. Michael Carlson	Min. of Forests and Range	Roger Painter	Mr. GreenGenes Consulting
Charlie Cartwright	Min. of Forests and Range	Jill Peterson	Min. of Forests and Range
Keith Cox	Min. of Forests and Range	Doug Stables	Trust for Sustainable Forestry
Tim Crowder	TimberWest Forests Ltd.	Kathie Swift	FORREX
Diane Douglas	Min. of Forests and Range	Dave Trotter	Min. of Agric. And Lands
Peter Forsythe	Huckleberry Forestry Ltd.	Nicholas Ukrainetz	Ministry of Forests and Range
Lauchlan Glen	Glenviron Consulting	Jack Woods	Forest Genetics Council
Hilary Graham	Pacific Regeneration Tech.		

Genetic Conservation Technical Advisory Committee

Name	Affiliation	Name	Affiliation
Dr. Sally Aitken	University of BC	Dr. Greg O'Neill	Min. of Forests and Range
Lee Charleson	Min. of Forests and Range	Dr. Tongli Wang	University of BC
Dr. Scott Green	University of Northern BC	Alex Woods	Min. of Forests and Range
Dr. Andreas Hamann	Univ. of Alberta	Jack Woods	Forest Genetics Council
Dave Kolotelo (Chair)	Min. of Forests and Range	Dr. Alvin Yanchuk	Min. of Forests and Range

Pest Management Technical Advisory Committee

Name	Affiliation	Name	Affiliation
Dr. Robb Bennett (Chair)	Min. of Forests and Range	Dr. Staffan Lindgren	University of Northern BC
Jim Corrigan	Min. of Forests and Range	Dr. Ward Strong	Min. of Forests and Range
Tim Crowder	TimberWest Forests Ltd.	Chris Walsh	Min. of Forests and Range
Dan Gaudet	Vernon Seed Orchard	Jack Woods	Forest Genetics Council
Dr. Peter deGroot	Canadian Forest Service		

⁹ Committee memberships lists represent membership during the period of this report.

