2021-2025

Strategic Plan

FGC

Forest Genetics Council of British Columbia



Conservation



Adaptation



Health & Productivity

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Cover: Lodgepole pine seedlings. Credit: B. Barber.

Conservation Photo: Ward Strong with cones on Whitebark pine seedling. Credit: C. Cartwright.

Adaptation Photo: Keith Bird and Dr. Greg O'Neill collecting climate-data at provenance trail near Port Alberni, 2016. Credit: G. O'Neill.

Health and Productivity Photo: Spruce seed orchard cone harvest. Credit: K. Spencer.

Photos on pages 2–9 by B. Barber, unless otherwise noted.

INTRODUCTION

Over the past 60 years, British Columbia (BC) has developed the infrastructure and expertise to manage and improve the Province's forest genetic resources. This impressive legacy is the result of ongoing collaboration and investment by governments, forest companies and academia under the auspices of the Forest Genetics Council of BC (FGC) and its predecessors.

FGC provides i) a forum for the many organizations involved in tree improvement and forest genetics to collaborate and coordinate their activities, ii) oversight of the Select Seed Company Ltd, and iii) advice to the Crown on the stewardship of BC's forest genetics resources.

The durability of FGC demonstrates its continued relevance to sustainable forest management in BC. I am pleased to introduce FGC's fifth 5-year strategic plan, which outlines its mission, goals, activities, and performance measures for the period 2021-2025.



Diane Nicholls, RPF ADM & Chief Forester Ministry of Forests, Lands, Natural Resource Operations and Rural Development



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Whitebark pine forest impacted by blister rust and fire, Yalacom Valley. Photo: D. Pigott



Logging second-growth Douglas-fir, Vancouver Island. Photo: Grant Eldridge



Jarrett Columbo and lodgepole pine grafts at the Kalamalka Forestry Centre

PROVIDING SOLUTIONS FOR FOREST MANAGEMENT CHALLENGES

Climate change, forest health, biodiversity, and timber supply are pressing challenges that forest genetics research and operations can help address.

Rising atmospheric CO₂ levels and temperatures threaten BC's forests. Trees may become maladapted to their environment and become more susceptible to insects and disease. BC's tree improvement program can help sustain healthy forests by producing seed for reforestation which is selected for growth and pest resistance, and matched to present and future climate. These new climate-resilient forests will be better able to capture and sequester carbon.

Globally, the loss of genetic diversity is a significant issue. The rich genetic heritage of BC's trees are actively conserved through applied research, seed collections, clone banks, and robust seedlot registration standards. BC's genetics program supports recovery strategies for whitebark pine *(Pinus albicaulis)*, BC's only tree designated as a species-at-risk.

Declining timber supply may adversely impact employment and economic activities in many regions of the Province. These impacts can be reduced through tree improvement activities that increase the health, productivity and value of BC's forests. A prosperous forest sector depends on a strong forest genetics program.

FOREST GENETICS COUNCIL OF BC

The Forest Genetics Council of British Columbia (FGC) is a multistakeholder advisory body whose members are appointed by the Provincial Chief Forester from the provincial and federal governments, forest-sector companies, and universities. FGC's website lists current FGC members.

FGC's mission is to enhance the conservation, adaptation, productivity and health of BC's forests so current and future generations continue to enjoy the benefits derived from them. FGC accomplishes its mission by planning and coordinating research and operational activities,

FGC's mission is to enhance the conservation, adaptation, health and productivity of BC's forests

and by advising the Ministry on related

policies and funding priorities. FGC is supported by three technical advisory committees: Conservation, Coast and Interior.

FGC owns Select Seed Company Ltd., which contributes to FGC's goals by producing and selling improved tree seed for reforestation. Select Seed also provides services to FGC and supports the Ministry's breeding program.



FGC Field Tour near Golden, BC. Sept. 2018

Scope

FGC's scope includes BC's 43 native tree species with emphasis on commercial tree species planted on Crown and private forest land. Activities include forest genetics research, conservation, conventional tree breeding, seed production, seed supply management, seed deployment, silviculture, and their related policies and practices.

Guiding Principles

- Encourage equity, diversity, inclusivity and collaboration
- Respect participants' independence.
- Respond to environmental, social, economic, and technological changes.
- Incorporate science, health & safety, operational feasibility, and traditional knowledge into policies and practice.
- Measure, evaluate, and improve activities and performance.

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Activities:

- Deliver adequate genetic diversity in high-quality seedlots.
- Maintain and improve the Genetic Conservation Status Catalogue.
- Assess the impact of climate change on species' ranges and protection status
- Collect and store seed from representative populations of each species.
- Develop strategies to conserve the genetic diversity of species at risk.
- Investigate and develop reforestation and restoration recommendations to manage genetic diversity across the landscape.
- Support research and conservation measures for species and populations of concern, and make recommendations to other agencies, as appropriate.

Measures:

- Annually update the genetic conservation status of BC's tree species by BEC zone.
- Number of *ex situ* seed collections conserved in the Provincial seed bank.



The late Dr. Michael Carlson and whitebark pine (Pinus albicaulis), a species a risk, near Whistler, BC. Photo: Dr. A. Yanchuk, 2007

GOAL 1. CONSERVATION

CONSERVE THE GENETIC DIVERSITY OF BC'S NATIVE TREE SPECIES

Genetic diversity is the foundation of all biodiversity. Conserving species' genetic diversity allows for their continued evolution and survival in response to environmental changes including global warming.

BC's forests contain 43 tree species

Seedlots used for reforestation in BC must contain a minimum level of genetic diversity. Other conservation strategies, including *in situ, ex situ* and *inter situ*¹ activities, require knowledge of the species' distribution, protection status, biology and genetics.

Whitebark pine *(Pinus albicaulis)* is the only federal-listed tree species at risk due to an introduced blister-rust and climate change. The majority of BC's other native tree species are well-protected in parks and reserves. Nonetheless, conserving genetic diversity within plantations and across the landscape is necessary for BC's forests to sustain ecological, social and economic services.

¹ *In situ* genetic conservation is the maintenance of genetic diversity within naturally occurring tree populations. *Ex situ* refers to the long-term storage of germplasm, typically by seeds and clone banks. *Inter situ* is the maintenance of localized tree populations in field tests for which genetic information is available.





Dr. Greg O'Neill, RPF, Assisted Migration and Adaptation Trial. Golden, BC, 2018

GOAL 2. ADAPTATION

BC'S PLANTED FORESTS ARE WELL-ADAPTED TO CURRENT AND FUTURE CLIMATES

The climate is changing faster than forests can adapt. Consequently, BC's forests may become more susceptible to drought, fire, insects and diseases.

A viable strategy to increase the resilience of BC's regenerated forests is to plant seed from populations whose climate compares well to that of the modelled early rotation climate of the plantation sites. This strategy is also known as assisted migration.

In April 2018, the *Chief Forester's Standards for Seed Use* were modified to implement the use of climate-based seed transfer (CBST). CBST employs sophisticated modelling to identify tree seed sources that are genetically adapted to present and future climates of their proposed planting sites.

The transition period to full CBST implementation is drawing to a close. Only 56% of the 297 million seedlings requested in 2020 were selected using CBST.

The impacts of CBST on reforestation practices, seed supply and orchard capacity are still being assessed. Practitioners will continue to evaluate and adjust their operations accordingly. FGC will also develop plans and tools for seed producers and users and provide feedback to the Ministry.

Activities:

- Conduct climate-modeling and provenance field trials to better understand the impacts of climate change on BC's forests and to inform CBST.
- Evaluate CBST implementation on reforestation practices and seed supply and adjust as required.
- Align tree breeding programs and seed orchards with CBST.

Measures:

- CBST-based tree breeding and seed orchard plans for all species by 2023
- 95% of all seedlings requested annually adhere to CBST standards by 2023.

Assisted gene migration can increase the resilience of BC's new forests to climate change

Activities:

- Maintain tree breeding programs and seed orchards to produce improved seed for reforestation.
- Advise government on the allocation of new breeding materials to maintain adequate seed orchard capacity and fair market access to quality seed.
- Develop CBST tools and plans for seed producers and seed users, and facilitate information sharing between them.

Measures:

- Annual seed orchard statistics including # orchards and cone crops by species.
- Additional volume of timber available for harvest attributed to select seed used annually.
- By 2025, >30% of pesttolerant seed is directed to moderate- and high-hazard sites.
- By 2023, report describing the costs and benefits of tree improvement in BC.



The late Dr. John Russell examining western redcedar (Thuja plicata) seedlings at the Cowichan Lake Research Station. Photo: Chad Hipolito © Genome Canada, 2017

GOAL 3. HEALTH AND PRODUCTIVITY

BC'S FUTURE FORESTS ARE HEALTHY AND PRODUCTIVE

Healthy and productive trees are required to maintain the ecological, social and economic benefits derived from BC's forests.

Trees with faster growth, improved wood quality, and resistance to insects and diseases are developed through conventional tree breeding methods and genomic selection. No genetic engineering is involved.

Trees with desired traits identified by scientists are included in public and private seed orchards. Approximately 70% of the seedlings planted annually in BC originate from seed produced in these orchards.

The Chief Forester's Standards for Seed Use require that quality orchard seed be used if available for reforestation. All seed is registered, tested and stored at the Tree Seed Centre. Seedlings are grown at nurseries and planted under the supervision of forest professionals.



Picking lodgepole pine cones at PRT Armstrong

SUPPORTING ACTIVITIES

Achieving FGC's primary goals requires coordination, funding, business planning, extension, and monitoring and reporting.

COORDINATION

Provincial forest genetics activities will be coordinated by FGC and its technical advisory committees (TACs), through business plans and meetings. Program management services will be provided by Select Seed.

FUNDING

Funding and in-kind support will be obtained from variety of sources including the provincial and federal governments, forest companies, universities, and other agencies. Seed orchards will be supported through seed sales. SelectSeed will also contribute funding as per its agreements with the Ministry.

BUSINESS PLANNING

Project proposals will be reviewed by FGC and its TACs. Priorities and budget recommendations for Land-based investment strategy (LBIS) funded projects will be provided to the Ministry annually.

EXTENSION

FGC and TACs will organize workshops to provide updates on forest genetics research and operations. Information will be shared with forest practitioners, students and the public through these workshops, FGC's website, newsletters and other outreach activities.

MONITORING AND REPORTING

FGC's performance measures will be monitored and reported annually along with other accomplishments and program statistics.



FGC facilitates collaboration between scientists, tree seed producers and users

ITAC meeting, Vernon, Jan 23, 2020

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SelectSeed's new lodgepole pine seed orchard, Quesnel Photo: R. Jarrett

SELECTSEED COMPANY LTD.

Select Seed Company Ltd. (SelectSeed) was established in 1999 to assist FGC with achieving its goals to increase the production and use of select seed. The company is owned by FGC through the BC Forest Genetics Society.

SelectSeed manages 13 seed orchards in partnership with 5 companies: 4 interior Douglas-fir (Fdi); 2 interior spruce (Sx); and 7 lodgepole pine (Pli). SelectSeed is also establishing a new Pli orchard on a property acquired near Quesnel to supply seed for north-central BC.

During the term of this plan, SelectSeed will identify new opportunities in consultation with its partners, the Ministry and others. Maintaining a viable orchard portfolio will allow SelectSeed to continue supporting FGC, the Society, and the Ministry.



Cone harvest at SelectSeed's Pli Orchards at Kettle River



Select Seed Board visit to Quesnel Property Nov 2019 (L to R): Brian Barber (CEO), Henry Benskin (President), Jim Burbee (Director), Roland Jarrett (Site Manager), Jack Woods (Director and Technical Advisor), Kerry McGourlick (Secretary), and Rod Willis (Director)













Top-left: Rust screening of whitebark pine seedlings at Kalamalka Forestry Centre, Vernon. Photo: M. Murray Top-right: Dr. Michael Stoehr pollinating Douglas-fir flowers. Saanich Seed Orchards. Photo: J. Degner Bottom-left: Dr. Barry Jaquish at Michael Carlson Demonstration Plantation, Vernon Middle-right: FGC Fall Field Tour near Cowichan Lake Middle-bottom: Bill Laing describing AMAT Trial near Mackenzie during N. Silviculture Committee tour Bottom-right: Seeds of BC confiers. Samples courtesy Provincial Tree Seed Centre



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