

# Challenge Paper The Challenge Dialogue System™

## Forest Tree Genetic Resource Conservation and Management (GRM) in British Columbia:

### A Challenge Dialogue with the Public and Stakeholders



Tree Improvement Branch

Research Branch

FGC 

Forest Genetics Council  
of British Columbia

**Sponsor:**

Jim Snetsinger, Chief Forester, BC Ministry of Forests and Range

**Co-Champions:**

Dale Draper, Tree Improvement Branch, Ministry of Forests and Range

John Elmslie, Co-Chair, Forest Genetics Council of British Columbia

Alvin Yanchuk, Research Branch, Ministry of Forests and Range

**Champions' Support:**

Brian Barber, Tree Improvement Branch, Ministry of Forests and Range

Michael Stoehr, Research Branch, Ministry of Forests and Range

Jack Woods; Program Manager, Forest Genetics Council of British Columbia

May 1, 2007

# Table of Contents

<b>1. AN INVITATION TO JOIN THE DIALOGUE .....</b>	<b>1</b>
WHAT DO WE SEEK TO ACCOMPLISH? .....	1
<b>2. SCOPE OF CHALLENGE AND GOALS .....</b>	<b>2</b>
<b>3. BACKGROUND .....</b>	<b>3</b>
GRM BUSINESS OBJECTIVES AND BENEFITS.....	3
GRM IN BC .....	6
THE BC CHIEF FORESTER'S STEWARDSHIP VISION AND FRAMEWORK .....	7
<b>4. ASSUMPTIONS .....</b>	<b>8</b>
<b>5. PROPOSED LINKAGES.....</b>	<b>9</b>
SUSTAINABLE FOREST MANAGEMENT .....	9
FUTURE FOREST ECOSYSTEMS INITIATIVE .....	10
<b>6. QUESTIONS.....</b>	<b>11</b>
<b>7. NEXT STEPS .....</b>	<b>18</b>
<b>APPENDIX A: REFERENCES .....</b>	<b>19</b>
<b>APPENDIX B: ORGANIZING TEAM .....</b>	<b>20</b>

## Acronyms

AAC	Allowable Annual Cut	LRMP	Land & Resource Management Plan
BCTS	BC Timber Sales	MOFR	Ministry of Forests and Range
CF	Chief Forester	MPB	Mountain Pine Beetle
COP	(GRM) Community of practice	SFM	Sustainable Forest Management
FFEI	Future Forest Ecosystems Initiative	SFMP	Sustainable Forest Management Plans
FFS	Future Forests Strategies	SOF	State of BC's Forests
FFT	Forests For Tomorrow		
FGC	Forest Genetics Council		
FRPA	Forest and Range Practices Act		
FSP	Forest Stewardship Plan		
GRM	Forest Tree Genetic Resource Conservation and Management		

# 1. An Invitation to Join the Dialogue

British Columbia's forest genetic resources are the foundation for maintaining healthy, productive forest ecosystems and a globally competitive forest industry. A number of environmental, economic, and social factors – among them climate change and large-scale ecosystem disturbances such as the Mountain Pine Beetle epidemic, wildfires, and extreme weather events – have triggered a widespread re-examination of how BC's forest resources are managed.

In this context, those charged with managing Forest Tree Genetic Resource Conservation and Management in BC (GRM for short) are revisiting current assumptions, objectives, activities, and desired outcomes. The aim of GRM is to conserve and manage forests that are better adapted and resilient to future forest ecosystem conditions, while continuing to provide social and economic benefits.

## What Do We Seek to Accomplish?

As part of this review, Provincial Chief Forester Jim Snetsinger is sponsoring a “Challenge Dialogue,” using a structured approach to achieving alignment among diverse groups.<sup>1</sup> The Challenge for this Dialogue is:

**Through a focused dialogue open to interested stakeholders/members of the public, create a collective vision and strategy for GRM in BC that supports sustainable forest management (SFM)**

With this paper, the three Dialogue “Champions” — Dale Draper, Tree Improvement Branch, Ministry of Forests and Range; John Elmslie, Co-Chair, Forest Genetics Council of British Columbia; Alvin Yanchuk, Research Branch, Ministry of Forests and Range — invite interested citizens and representatives of government (federal, provincial, communities, and First Nations) to join this Dialogue. We especially wish to engage government agencies, industry, private sector firms, non-government organizations, and members of academia that are involved in SFM and have links with GRM. A first round of Dialogue has already taken place among some members of the GRM community of practice. This has shaped the commentary and questions you'll find in this paper.

The paper is not meant to serve as any kind of definitive or complete document on our Challenge or GRM in general. **Rather, it is to serve as a catalyst for initiating an open discussion.** At various points in the paper you will be asked for your reaction and further input. Concentrate on those items of greatest interest to you. Don't feel obliged to respond to all the input requests. A separate Feedback Form document (MS Word) contains all the input requests and invites you to e-mail your contribution to [officelink@shaw.ca](mailto:officelink@shaw.ca) by May 30, 2007.

---

<sup>1</sup> For more information on the Challenge Dialogue System™ developed by the Innovation Expedition Inc, see [www.innovationexpedition.com](http://www.innovationexpedition.com).

This electronic Dialogue is expected to lead to a face-to-face Workshop with a cross-section of stakeholders, public groups, and those involved in GRM, tentatively scheduled for June 12, 2007 in Vancouver.

## 2. Scope of Challenge and Goals

The Challenge Dialogue will be looking specifically at:

- Tree species, with a focus on those of commercial importance.
- Crown land that is part of the timber harvesting land base and subject to the *Forest and Range Practices Act* (FRPA).

Our intent is to create a vision and strategy that:

- Tells a compelling story about the importance of understanding, conserving and managing BC's forest tree genetic resources.
- Reflects the large degree of uncertainty regarding climate change and its impacts into the future.
- Is aligned with the Chief Forester's framework for SFM (see Figure 3).
- Is consistent with other government strategic initiatives and stakeholder (including industry) goals – including:
  - Mountain Pine Beetle Action Plan and Forests for Tomorrow
  - the Future Forest Ecosystems Initiative (FFEI)
  - efforts to improve industry cost competitiveness
  - the move to results-based forest practices legislation (e.g., FRPA)
  - Increasing SFM reporting requirements (BC, national, international)
- Results in forests that are better adapted and resilient to future forest ecosystem conditions, while continuing to provide social and economic benefits.

As Dialogue Champions, we anticipate that the current Dialogue process will result in:

1. Alignment and shared ownership of a vision and strategy for GRM in BC through better understanding of the role and importance of GRM in SFM among the community of practice, the public and stakeholders.
2. Identification of gaps and opportunities in the GRM system with respect to its ability to respond to new issues and support current and future SFM initiatives.
3. Improved partnerships and strengthened leadership within and among MOFR, industry, universities and other key GRM stakeholders and public groups through the FGC – all leading to more effective conservation and management of the forest tree genetic resources of BC.
4. Revision of the FGC Strategic Plan and objectives to incorporate public and stakeholder input received through the Challenge Dialogue.

#### INPUT REQUEST 1

Please use the separate Feedback Form to provide your reactions to our Challenge and our goals:

- What additional clarification would help you better understand the Challenge?
- What ideas did the Challenge statement spark in your mind?
- Are we missing any important considerations?
- What other outcomes or expectations do you have for this Challenge Dialogue (as in “I would consider this Dialogue a success if...”)?

### 3. Background

To begin this Dialogue, we put forward what we consider to be some important facts about GRM: its business objectives and how they support SFM, how GRM is managed in BC, and the Provincial Chief Forester’s stewardship vision and framework for SFM.

#### GRM Business Objectives and Benefits

The three key business objectives of GRM are genetic conservation, genetic resilience, and genetic gain. This section expands on those objectives and describes some key benefits.

##### Genetic Conservation:

Genetic conservation consists of maintaining genetic material of populations and species. Strategies include *in situ* (maintaining wild populations in parks and reserves) and *ex situ* (storing material in genetic archives and seed banks).

- Conserving the genetic diversity of populations ensures access to this genetic material to provide future human and ecosystem benefits.
- Genetic diversity allows plants to adapt to changes in their environment. Species and populations with low levels of genetic diversity can be more at risk.
- Genecology research and forest cover inventory maps can be used to catalogue the status of genetic resources, and develop conservation plans.

##### Genetic Resilience:

In this context, genetic resilience is the proper matching of genotypes to sites, such that the trees in plantations are well adapted to the climate and local environment in which they are planted, and the risk of plantation failure due to inappropriate choice of seed source is minimized. Genetic diversity of reforestation materials is also a component of resilience.

##### *Seed Transfer*

- Genecology research is used to determine appropriate seed transfer limits for a species.
- Adjustments to seed transfer are necessary to ensure adaptation in a changing climate.
- An adequate supply of high quality seed is necessary to grow seedlings for reforestation harvested areas. This seed must be appropriately collected, processed, tested, and stored in a secure facility.

### Genetic diversity

- Planted seedlings must contain adequate levels of genetic diversity so the forest is resilient to changes in the environment and pests. Seed orchards are designed to produce genetically diverse seed by including many parent trees, selected across a broad geographic area that will meet minimum standards for diversity as measured by effective population size.

### Genetic Volume/ Value Gain:

Gain is about increasing the economic value of the Crown timber resource over time. Generally this means increasing wood volume production per hectare within the context of SFM and GRM goals, and/or reducing pest impacts and increasing wood quality.

#### Increased Timber Supply

- Timber supply is often increased by the use of selected reforestation materials. Trees grown from select seed achieve faster growth than those grown from wild seeds. The faster growth of select planting stock affects timber supply directly by increasing future timber volume.
- Growth and yield models incorporate the use of select seed and its genetic gain to project their effects on future timber supply.
- The use of select seed in the “genetic gain” harvest forecast decreases the mid-term decline in timber supply and increases the long-term timber supply compared with the “no genetic gain” harvest forecast.

#### Seed Supply Security

- Seed orchards are established and managed to produce select seed from parent identified through traditional breeding programs (see Figure 1.) They also provide a secure supply of seed, which is especially important for species that have irregular seed crops, or have low seed yields due to inadequate pollination and insect damage

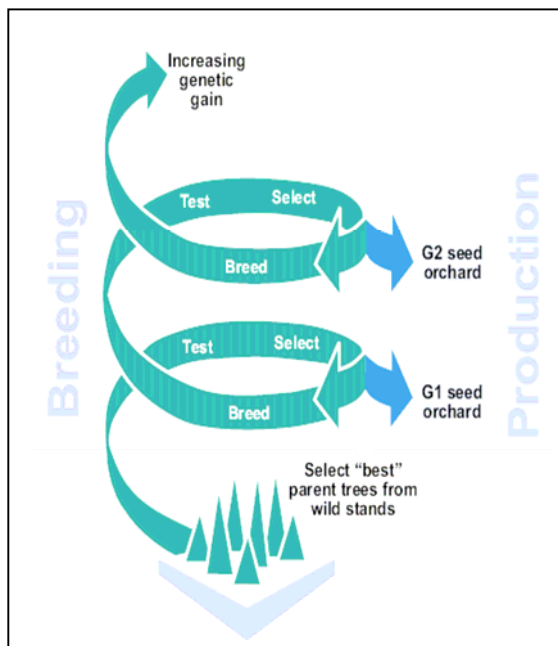


Figure 1: Tree breeding and seed production processes (Hadley et al., 2001).

#### Pest Resistance

- Pest resistance is often a goal in selective breeding. Field trials help tree breeders identify which parent trees produce offspring that are more resistant to a given insect or disease. Progeny from the resistant families can then be used in pest-prone areas and in selecting and breeding the next generation of resistant stock. Tree improvement programs in

British Columbia are selectively breeding western white pine for resistance to white pine blister rust and spruce for resistance to terminal weevil.

*Improved Wood Quality*

- Tree selection and breeding can also be used to increase wood quality, or the suitability of wood for a particular end use. Tree improvement programs can select for wood properties such as relative density, strength and stiffness, and fibre length.

*Reduced Pressure on Land Base*

- The use of select seed allows timber supply needs to be met from a smaller land base by making certain stands available for harvest earlier, and producing more timber volume per unit area. In this way, it allows timber supply to be maintained or increased, and reduces harvest pressure on lands with high value for non-timber resources (e.g., wildlife habitat, recreation).

*Genomics and other biotechnologies*

- New biotechnologies are emerging, including genomics (the study of genes and their function), and proteomics (the study of proteins encoded by a genome). Advances in these fields will begin to offer solutions to forest management issues, and may provide means to more efficiently meet GRM objectives. Over the coming decade, it is expected that biotechnologies will play an increasing role in GRM.

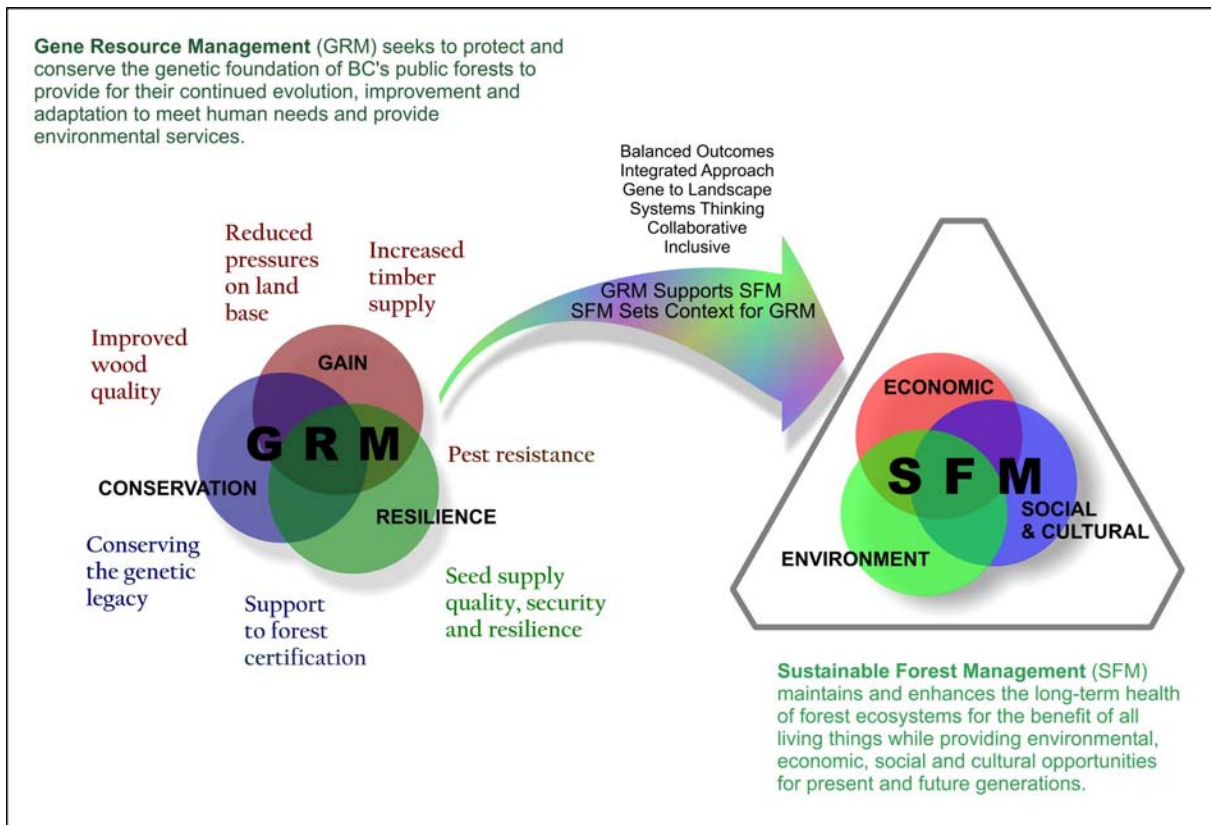


Figure 2: GRM in relation to SFM

## GRM in BC

Under current international treaty obligations for biodiversity and sustainability, the genetic resource is recognized as a basic element that allows all processes at the ecosystem and landscape levels to exist. The genetic resource is, therefore, beyond commercial value and an essential element of biodiversity.

Forest genetic conservation efforts in BC consist of protecting and managing genetic material, primarily in parks and ecological reserves (*in situ*), and in genetic archives and seed collections (*ex situ*).

Goals that guide GRM management in BC include:

- Enhancing timber supply through the breeding, testing, selection, and orchard seed production of selected genotypes for growth, quality, and pest or disease resistance.
- Retaining sufficient forest genetic diversity to allow for species and population adaptation to changing environments.
- Avoiding the indiscriminate movement of seed (resulting in plantation failure or poor performance), as well as addressing seed movement under climate change scenarios.
- Ensuring sufficient amounts of high quality seed are available to meet reforestation needs through strategic planning, seed production and pest management, and seed processing storage and testing.
- Enabling effectiveness evaluation and monitoring of genetic resource management practices (including ties to *BC Forest and Range Practices Act* objectives).
- Ensuring forest genetic conservation in future forest ecosystems.

Tree improvement is the application of knowledge of genetic variation in native species, coupled with appropriate application of genetic principles, reproductive physiology and seed-orchard management, to produce trees with traits such as faster growth, lower or higher wood density, and pest resistance. (For further information see the Tree Improvement Diagram; <http://www.fgcouncil.bc.ca/brochure-tree-improve-05.pdf>.)

GRM is very much a co-operative effort in BC. The Ministry of Forests and Range (MOFR) leads policy development and tree breeding activities, while private industry and the MOFR manage seed orchards. Universities, MOFR Research Branch, and the Canadian Forest Service undertake supporting research, while private industry focuses on applied research related to operational seed production.

The Forest Genetics Council of British Columbia (FGC) is appointed by the Chief Forester to provide advice on GRM in the province, and develop a business plan for Forest Investment Account (FIA) Tree Improvement Program investments. Council provides a forum for stakeholder representatives to set goals and objectives, and to oversee the development and delivery of business plans to fulfill them. See [www.fgcouncil.bc.ca](http://www.fgcouncil.bc.ca).

## The BC Chief Forester's Stewardship Vision and Framework

The Provincial government has set a Great Goal for natural resource management in British Columbia:

**To lead the world in sustainable environmental management, with the best air and water quality, and the best fisheries management, bar none.**

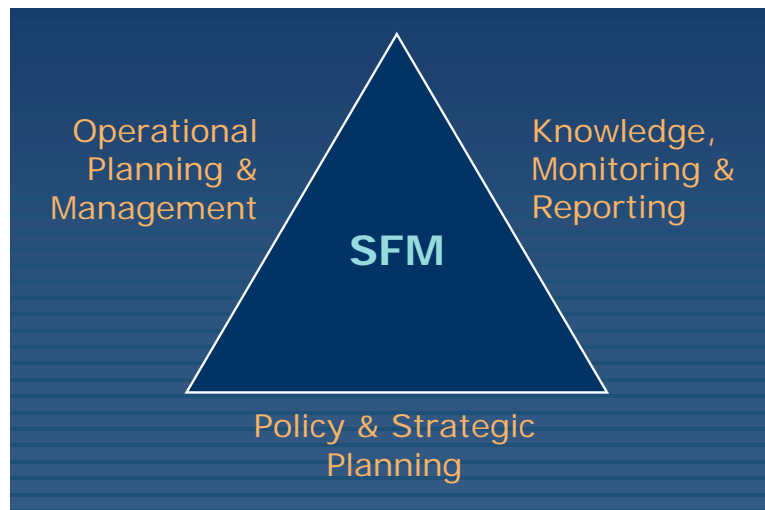
The Chief Forester's role in British Columbia is to:

1. Provide leadership, vision, and oversight of key decisions governing SFM on Crown lands.
2. Facilitate the integration of elements within and outside the MOFR mandate that contribute to SFM.

The current Chief Forester, Jim Snetsinger, has recently developed a stewardship vision and framework for SFM in BC in fulfilment of this role. His stewardship vision is:

***BC is widely respected as a leader in the management of natural forest and range landscapes to maintain diverse values and provide an array of products that are valued in the marketplace.***

Figure 3 shows the three components of the Chief Forester's SFM framework.



**Figure 3: Chief Forester's Stewardship Framework**

The Chief Forester intends to work across government agencies, with First Nations, industry, communities, non-government organisations and the general public to ensure that components of the framework are complete and effectively working together to achieve Sustainable Forest Management in B.C.

#### **INPUT REQUEST 2**

**Please use the separate Feedback Form to provide your feedback on the background provided:**

- Is there anything in this background section that you find confusing, inaccurate, or surprising?
- What questions does this background material raise for you?
- In your view, are there other key background topics or points that should be explored?

## **4. Assumptions**

We have laid out our view of some important facts about GRM in BC and what we hope to accomplish with this Dialogue. We now turn to proposing some assumptions – things we believe to be true and fundamental to a GRM strategy. We would like to test that belief with you and get your views.

1. GRM is recognized as an integral and important component of SFM.
2. The public supports the need for protection and investment in the conservation and sustainable management of the province's genetic resource asset.
3. The "state of the forest," and hence its genetic composition and gene pools, is constantly changing and needs thoughtful management – particularly given climate change and recent disturbance events such as the Mountain Pine Beetle infestation.
4. Climate change is one of the key emerging issues that a GRM strategy must address. Seed transfer rules need to be reviewed so that they are responsive to expected climate change and provide genetic resilience in future forests (a key FFEI desired outcome).
5. There is a need for an encompassing and cohesive GRM strategy that enables GRM stakeholders (government, industry, NGOs, private firms, and universities) to work more closely together to address complex SFM challenges with GRM. This is a challenge that no single organization can address on its own.
6. To be effective and to secure broad-based commitment, the GRM Strategy must reflect the collective needs of key GRM stakeholders and public bodies, some of whom may not currently be connected with existing GRM advisory bodies such as FGC.
7. An effective GRM Strategy should be broad enough in scope to:
  - Encompass the MOFR's stewardship responsibilities on Crown land.
  - Establish goals and objectives for FGC.
  - Support government objectives; include those for climate change, results-based forest practices legislation, and other strategic initiatives.

- Serve decision support needs of government, licensees, professionals and others, including provision of seed planning, analysis and modeling, information management, communication, extension and training.
- Ensure adequate monitoring and reporting requirement of GRM activities including effectiveness of policy and standards, and SFM criteria and indicators.
- Allow for the development and use of new biotechnologies, such as genomics, when these technologies provide efficiencies and products that advance GRM objectives.

### **INPUT REQUEST 3**

**Please use the separate Feedback Form to provide your reactions to these Assumptions, noting:**

- Assumptions that require more clarification for you to understand
- Assumptions with which you strongly disagree
- Additional assumptions that you would like to add

## **5. Proposed Linkages**

Of the key initiatives that have explicit linkages to GRM, two stand out as being of particular importance: the Provincial Chief Forester's Stewardship Vision and Framework, and the Future Forest Ecosystems Initiative.

### **Sustainable Forest Management**

Sustainable Forest Management maintains and enhances the long-term health of forest ecosystems for the benefit of all living things while providing environmental, economic, social and cultural opportunities for present and future generations.

In Section 3, we described how the business objectives of GRM lead to environmental benefits (e.g., conservation of genetic diversity, resistance to disease and insects, improving seed supply), economic benefits (e.g., more wood of higher quality becomes available for harvesting sooner) and social benefits (e.g., greater range of products and services, increasing quantity and quality of timber supply, reduced pressure on the forest land base).

Figure 4 proposes a way of looking at the linkages between key components of GRM and the three facets of the Chief Forester's Stewardship Framework for SFM.

## GRM Components to Support CF Stewardship / SFM Framework

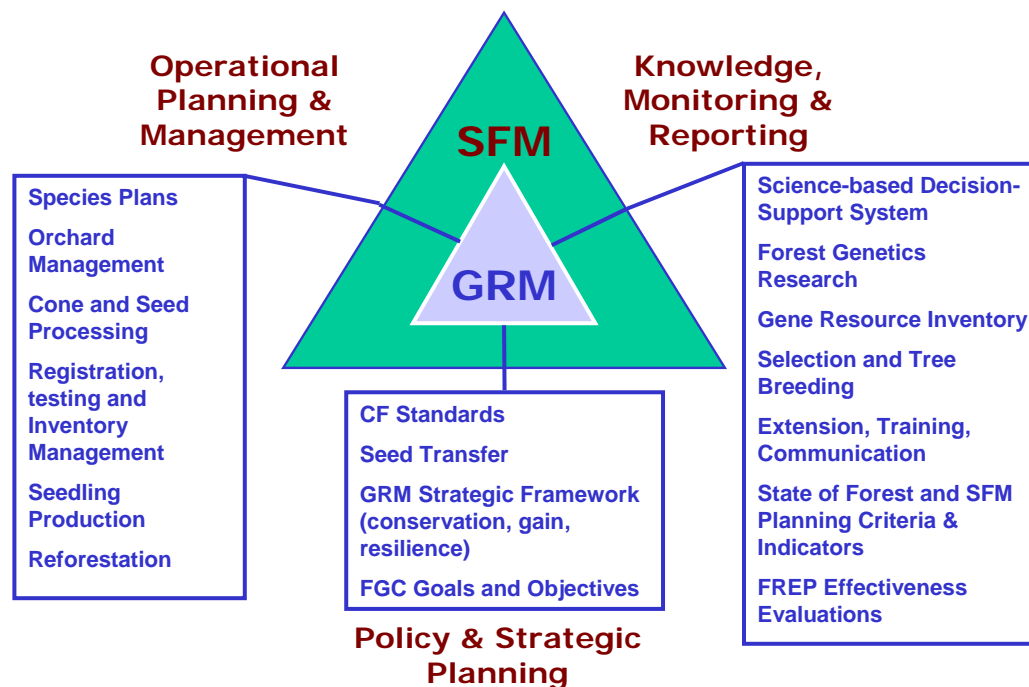


Figure 4: Linkages between GRM and SFM.

## Future Forest Ecosystems Initiative

The Ministry of Forests and Range is addressing the impacts of climate change on forest and range ecosystems through the Future Forest Ecosystems Initiative (FFEI). The purpose of FFEI is to adapt B.C.'s forest and range management framework to effectively respond to the effects of climate change, wildfire events, bark beetle infestations, and other rapidly changing conditions in BC's forest ecosystems.

Projects under FFEI are being designed to ensure BC's forest and rangeland ecosystems remain resilient to stress, and continue to provide the sustainable benefits British Columbians depend on and value. Genetic diversity was identified as an important component of ecosystem resilience through the FFEI public consultation process in 2006. Resilience is considered one of the three major business outcomes for GRM.

FFEI is linked with the GRM Challenge Dialogue, with the intent that a comprehensive GRM strategy will facilitate implementation of FFEI projects related to genetic resources. For more information see: [www.for.gov.bc.ca/hts/Future\\_Forests/](http://www.for.gov.bc.ca/hts/Future_Forests/).

#### INPUT REQUEST 4

Please use the separate Feedback Form to provide your feedback on the linkages with key initiatives:

- Does this way of thinking about how GRM supports the Chief Forester's strategic framework make sense to you? How could it be improved?
- What opportunities do you see in the links with FFEI?
- Are there other key initiatives with which the GRM strategy should be linked?

## 6. Questions

The intent of this section is to put forward some key questions for your reaction. These questions are intentionally broad to encourage thought on the “big picture.”

**Please focus on those questions in which you have a strong interest. Don't feel compelled to respond to all questions.**

### 1. Genetic conservation

#### Background Statements

- The genetic resource is fundamental to all forest values, and cannot be recovered if lost.
- The MoFR maintains a number of clonebanks, field tests, and a seedbank, which serve as important *ex situ* genetic conservation reserves. Parks and other protected areas serve as *in situ* genetic reserves.
- The UBC Centre for Gene Conservation is conducting research and various support activities related to the genetic conservation of native tree species. It receives support from FGC to (a) study the population genetic structure of forest trees, (b) develop and maintain a catalogue of the genetic conservation status of native tree species (both *in situ* and *ex situ*), which considers the need for additional protection, and (c) develop strategies for conservation. (See: <http://genetics.forestry.ubc.ca/cfgc/>).
- The MOFR and FGC currently set no measurable targets for the genetic conservation of native tree species, but are working to develop science-based criteria for conservation status, with indicators that can be reported on an annual basis.

#### Assumptions:

- With a few exceptions (e.g., whitebark pine threatened by an introduced blister rust), BC's native tree species are generally not at risk.
- Climate change could result in increased risk to other tree species and populations, and careful monitoring and management is needed.

## **Questions:**

- 1.1 *Do you believe that forest tree genetic resources are adequately conserved through parks, reserves, forest management practices, and existing in situ and ex situ gene conservation efforts?*
- 1.2 *What priorities and improvements can be made to better conserve BC's forest tree genetic resources?*

## **2. Genetic Resilience - Climate change**

### **Background Statements:**

- In BC, all harvested lands must be reforested after logging through natural regeneration and/or planting. When natural regeneration is the chosen reforestation method, residual seed trees are selected to maintain or enhance the genetic quality of the new forest. Local seed sources, however, are not always ideally adapted to their environment, especially in a rapidly changing climate.
- Tree species selection guidelines have been in place in BC since 1990. The guidelines provide information and advice about the appropriateness of planting particular species on different forest sites. Today's foresters are confronted with making tree species selection decisions for environments that are rapidly changing due to climate, pests and wildfires, with site conditions becoming generally drier and warmer.
- The Chief Forester's Stewardship Framework identifies "climate change adaptation projects and strategies" as a key *gap/opportunity* area.
- MOFR's *Preparing for Climate Change* report also recommends examining opportunities and barriers for increasing species and genetic diversity in plantations ([www.for.gov.bc.ca/mof/Climate\\_Change/](http://www.for.gov.bc.ca/mof/Climate_Change/))
- The impacts of the MPB epidemic on young plantations and future uncertainty regarding climate change underscore the importance of better understanding how decisions to deploy seed and seedlings on-the-ground will result in young forests that are adapted and resilient to future forest ecosystem conditions.
- A key means of increasing the resilience of forests in response to climate change is through matching seedling (species and genotypes) planted with the projected climate for the planting site; a process known as *facilitated migration*. In BC, this might mean extending the transfer of some seedlots further north, or higher in elevation, than is presently allowed.

### **Assumptions:**

- Forest managers and the public are anxious to implement changes in forest management practices in response to climate change. However, what, how much, and when such practices should change is still uncertain.

- A GRM strategy should include revising seed transfer rules over time to account for a changing climate, to mitigate potential risks, and to take advantage of opportunities.
- Developing a science-based seed transfer system that accounts for future climate will likely take 3-5 years, but some incremental changes to the existing seed transfer rules may be possible in the interim. These options need to be examined thoroughly before implementing.

**Questions:**

*2.1 Are we taking the correct approach in dealing with climate change?*

*2.2 Is there some aspect of GRM that we should be paying more attention to?*

*2.3 Are we missing anything?*

**3. Genetic Gain - Tree Improvement**

Background Statements

- FGC objectives and business planning guide tree improvement activities. See FGC Business Plan 2006/07 at: [www.fgcouncil.bc.ca](http://www.fgcouncil.bc.ca).
- Tree breeding is currently conducted by MOFR Research Branch forest geneticists, while orchard management and seed production is carried out by both the MOFR and private companies.
- Tree breeding populations and seed orchards contain a large number of genotypes. Seedlots collected from these programs and orchards must contain a minimum level of genetic diversity (e.g., minimum population size of 10) to be used for Crown land reforestation.
- The term “select seed” refers to seed and vegetative material having a level of gain for some trait of interest. Generally, lots registered as select are assigned a Genetic Worth.
- SelectSeed Co. Ltd. was initiated by the FGC in 1999 to address then critical orchard expansion needs, particularly for lodgepole pine. SelectSeed is owned by the FGC, and sells seed to licensees, BCTS, and other small tenure holders.
- FGC goals and objectives for select seed use are: (1) increase the average volume gain of select seed used for Crown reforestation to 20% by the year 2020; and (2) increase select seed use to 75% of the provincial total sown by 2013. In 2006, 46% of provincial seed-use came from select seed, with an average genetic gain of 12%.
- Select seed use, including seed production and genetic gain forecasts derived from FGC species plans, are considered in AAC determinations and used to inform the development of silviculture strategies.

- The use of genetically modified (GM) trees is prohibited under the Chief Forester's Standards for Seed Use. The standards also limit the use of plants derived through biotechnology to those methods which have been adequately tested in long-term field trials. There are also few provisions for using species not found in BC (exotics).

**Questions:**

- 3.1 *Do you believe that current tree improvement practices are compatible with your view of SFM? If not, why not?*
- 3.2 *Are FGC goals and objectives for select seed use consistent with your view of SFM?*
- 3.3 *Should seed-use policies allow for the use of GM trees and greater use of exotics species to improve gains and/or as a strategy in response to climate change?*

**4. GRM criteria and indicators**

Background statements:

- The Canadian Council of Forest Ministers' criteria and indicators for GRM focus on Genetic Diversity (but also clearly relate also to economic and social benefits). The two core indicators are (1) genetic diversity of reforestation seed-lots; and (2) status of *in situ* and *ex situ* conservation efforts for native species within each ecozone. See [www.ccfm.org/current/ccitf\\_e.php](http://www.ccfm.org/current/ccitf_e.php) for BC's report on these two indicators.
- Provincially, criteria and indicators are reported in the (BC) *State of the Forest Report*. Many indicators for GRM are in development: Genetic Diversity (Indicator 6), Silviculture (Indicator 14), Ecosystem Dynamics (Indicator 3), Species Diversity (Indicator 4), and Greenhouse Gases (Indicator 10). ([www.for.gov.bc.ca/hfp/sof/sof.htm](http://www.for.gov.bc.ca/hfp/sof/sof.htm)).
- The FGC is currently working to develop comprehensive indicators to track the conservation status of genetic resources for 50 native tree species.
- Although BC has targets for the minimum genetic diversity of individual seedlots and the amount and quality of select seed, at present there are no criteria and indicators or objectives for genetic conservation or genetic resilience.

**Questions:**

- 4.1 *What improvements can be made to the monitoring and reporting of GRM activities?*
- 4.2 *What values or aspects of GRM do you feel should be tracked and monitored?*
- 4.3 *Should the Ministry of Forests or FGC develop measurable objectives for Genetic Conservation and Resilience to augment FGC objectives for genetic gain?*

## 5. GRM policy framework

### Background statements

- The GRM policy framework, based on “best-science”, provides for the stewardship and wise management of forest genetic resources.
- The Chief Forester, under the *Forest and Range Practices Act* (FRPA) and its regulations, has developed a set of legal standards to regulate tree seed used to establish a free growing stand. These standards include requirements for registering, storing, testing, selecting and transferring tree seed. Regulations also require people to maintain records and report where seed is planted (see <http://www.for.gov.bc.ca/code/cfstandards/>).
- The standards are intended to ensure that seed used for reforestation is adapted to its planted environment and results in no more risk to biotic and abiotic events than naturally regenerated trees.
- There are currently no regulations to protect or limit access to cone and seed collections (with the exception of those prohibiting damage to Crown timber); the current regime is one of unencumbered access.
- The Chief Forester is authorized to dispose of the province’s forest genetic resources including its associated intellectual property. Select genetic material is transferred from the MOFR to private seed orchards and research facilities under agreements.

### Assumptions

- Standards established by the Chief Forester are the most appropriate means to regulate the use of seed, and can be used to facilitate changes in reforestation activities in response to climate change.
- The use of non-indigenous species (exotics), with the exception of moving species and populations north in response to climate change, is not consistent with SFM or the CF’s Stewardship vision. The use of genetically modified trees is also not consistent with SFM.
- It is impractical to regulate and control access to genetic materials on Crown lands, but access to select genetic materials is adequately protected through existing agreements.

### Questions:

5.1 *How can the current GRM framework of legislation, CF standards and related government policy, products, and services be improved to more adequately serve the needs and expectations of your organization (supporting SFM)?*

5.2 *Is the current framework for GRM adequate or constraining?*

## 6. Seed planning and seed procurement

### Background Statements:

- Current standards are meant to both limit risk and ensure a reasonable level of genetic diversity. Monitoring of genetic diversity is important to ensure that certain seedlots or parent trees aren't over-represented in reforestation efforts.
- Licensees and BCTS managers are responsible for ensuring that they have adequate amounts of suitable seed to meet their reforestation obligations under FRPA. This entails adequate seed planning and procurement.
- MOFR is expected to assume increased reforestation obligations in the future (from the FFT program and from licensees who turn-back their reforestation obligations to government, in accordance with FRPA provisions).
- Despite the Mountain Pine Beetle epidemic, there does not appear to be a shortage of lodgepole pine seed to reforest Mountain Pine Beetle impacted areas (see [www.for.gov.bc.ca/hti/pinebeetle/index.htm](http://www.for.gov.bc.ca/hti/pinebeetle/index.htm)). Seed supplies for other major commercial species collected from wild stands and seed orchards also appear to be adequate for foreseeable future, with some local exceptions.

### Assumptions

- Collecting seeds in advance of potential catastrophic losses of species and areas due to a changing climate, fire or pest outbreak, could avert potential seed supply shortages. However, licensees are not obligated to do this.
- The Crown may be at risk if there is insufficient seed to fulfil reforestation obligations, or if there's not enough seed available from wild stands or seed orchards to meet required needs.

### Questions:

*6.1 Should the FGC or MOFR plans include provisions for seed planning and procurement for operational reforestation purposes?*

*6.2 If so, how would these plans and activities influence the rights, obligations and activities of others?*

## 7. GRM management framework

### Background statements

- GRM is a co-operative effort among MOFR (policy, tree breeding, seed production, pest management, seed testing and storage, information management), private industry (seed orchards and supporting MOFR breeding and research), universities, and the Canadian Forest Service. The groups are represented in the Forest Genetics Council of British Columbia (FGC), which is appointed by the Chief Forester to provide advice on GRM in the province. See [www.fgcouncil.bc.ca](http://www.fgcouncil.bc.ca).

- Public groups and stakeholders with an expressed interest in GRM include forest licensees, private seed collectors and processors, seedling nurseries, seed users including MOFR's BCTS and Field Services (both represented on FGC), Ministry of Environment, and the Ministry of Agriculture and Lands – as well as other academic and non-government groups.

**Questions:**

*7.1 How can the current GRM management framework be improved? Is the framework adequate or constraining?*

*7.2 Do you think that the current management of GRM in the province is in good hands? If not, why not?*

*7.3 How can the respective roles of the Forest Genetics Council, the Ministry of Forests and Range, the forest industry, government and public agencies, academia and others be improved or linked to better deliver GRM?*

**8. Linking GRM with other key programs and initiatives**

**Background Statements**

- FFEI aims to provide a framework to maintain and enhance the resilience of BC's future forest ecosystems.
- The Forests For Tomorrow (FFT) program aims to improve long-term timber supply in Mountain Pine Beetle- and fire-impacted areas. The program emphasizes surveying, site preparation and planting. These treatments are guided by strategic level program planning, seed supply planning, silvicultural strategies, and timber supply analyses. See [www.for.gov.bc.ca/hfp/fft/](http://www.for.gov.bc.ca/hfp/fft/).
- FFT and federal Mountain Pine Beetle initiatives support the delivery of the MPB Action Plan.
- Genetic resources normally need to be addressed in Sustainable Forest Management Plans that licensees prepare in support of forest certification.

**Question:**

*8.1 Are there further opportunities for improving linkages between GRM and other programs and initiatives? If so, which ones?*

**INPUT REQUEST 5**

**Please use the separate Feedback Form to provide your reactions to any of the above key questions that interest you. Please refer to the question number so we know which one you are responding to. Are there any other questions that you think should be asked?**

## 7. Next Steps

This is a starting point for our Dialogue. Please consider everything you've read here a work-in-progress to be shaped further by your reactions and input. **We would very much like to have your feedback by May 30, 2007, so that it can be used in the next steps of the Dialogue – described below:**

1. All GRM Challenge Dialogue documents are being posted on the MOFR GRM website at [http://www.for.gov.bc.ca/hti/grm\\_dialogue.htm](http://www.for.gov.bc.ca/hti/grm_dialogue.htm).
2. The closing date for responses is May 30, 2007. Please send your responses using the Feedback Form directly to [officelink@shaw.ca](mailto:officelink@shaw.ca).
3. Responses will be compiled “as-is” and will not be attributed to any individual. They will be posted to the Dialogue website in early June 2007.
4. Collation and analysis of all the responses will occur in June 2007.
5. A synthesis of responses, key learnings, and reactions of Champions will be brought together to inform a face-to-face Workshop — involving members of FGC, Tree Improvement Branch and Research Branch, a few public and stakeholder representatives of the GRM community of practice — tentatively scheduled for June 12, 2007 in Vancouver.
6. A Progress report, including key outputs from the Workshop(s) will be posted by July 2007.

### **INPUT REQUEST 6**

**Please use the separate Feedback Form to provide your reactions to the Next Steps:**

- What other suggestions do you have to make this Dialogue and its proposed outcomes effective?
- Would you be interested in participating in the Workshop on June 12, 2007?
- What expectations would you have for the Workshop ( “I would consider the Workshop a success if...”)?
- Do you have any other comments or questions you would like to raise?

## Appendix A: References

British Columbia State of the Forest Report  
[www.for.gov.bc.ca/hfp/sof/sof.htm](http://www.for.gov.bc.ca/hfp/sof/sof.htm)

Canadian Council of Forest Minister's criteria and indicators for GRM  
[www.ccfm.org/current/ccif\\_e.php](http://www.ccfm.org/current/ccif_e.php)

Chief Foresters Standards for Seed Use  
<http://www.for.gov.bc.ca/code/cfstandards/>

Forest Genetics Council of BC  
<http://www.fgcouncil.bc.ca/>

Future Forests Ecosystem Initiative  
[www.for.gov.bc.ca/hts/Future\\_Forests/](http://www.for.gov.bc.ca/hts/Future_Forests/)

GRM Challenge Dialogue website  
[www.for.gov.bc.ca/hti/grm\\_dialogue.htm](http://www.for.gov.bc.ca/hti/grm_dialogue.htm)

Hadley, M.J., J. Tanz, and J. Fraser. 2001. *Biotechnology: Potential applications in tree improvement*. Forest Genetics Council of B.C., Victoria, B.C. Extension Note 02. 12 p.

Ministry of Forest and Range – Forest Genetics Section, Research Branch  
<http://www.for.gov.bc.ca/hre/forgen/>

Ministry of Forests and Range – *Preparing for Climate Change* report  
[www.for.gov.bc.ca/mof/Climate\\_Change](http://www.for.gov.bc.ca/mof/Climate_Change)

Ministry of Forests and Range – Tree Improvement Branch  
<http://www.for.gov.bc.ca/hti/index.htm>

UBC Centre for Gene Conservation  
<http://genetics.forestry.ubc.ca/cfgc/>

### **Note:**

Definitions for technical terms are available on the FGC Glossary website at:  
<http://www.fgcouncil.bc.ca/doc-glos.html>, and,

On the Forestry Glossary website at:  
<http://www.for.gov.bc.ca/hfd/library/documents/glossary/index.htm>

## Appendix B: Organizing Team

### ***Sponsor:***

- Jim Snetsinger, Chief Forester, BC Ministry of Forests and Range

### ***Co-Champions:***

- Dale Draper, Tree Improvement Branch, Ministry of Forests and Range
- John Elmslie, Co-Chair, Forest Genetics Council of British Columbia
- Alvin Yanchuk, Research Branch, Ministry of Forests and Range

### ***Champions' Support:***

- Michael Stoehr, Research Branch, Ministry of Forests and Range
- Jack Woods; Program Manager, Forest Genetics Council of British Columbia

### ***Strategic Advice and Support:***

- Henry Benskin, Deputy Chief Forester
- Scott King, Forest Genetics Council of British Columbia

### ***Process Mentor and Facilitation±:***

- Keith Jones, R. Keith Jones & Associates and Innovation Expedition Affiliate

### ***Global Mentor±:***

- Don Simpson, Innovation Expedition Inc.

### ***Project Manager:***

- Brian Barber, Tree Improvement Branch, BC MOFR

### ***Facilitation±:***

- George Sranko, Quantum Communications (working with R. Keith Jones & Associates)

### ***Reporter±:***

- Terje Vold, Terje Vold & Associates Consulting (working with R. Keith Jones & Associates)

### ***Recorder±:***

- Michele Baker, Officelink (working with R. Keith Jones & Associates)

---

± Consulting resources

***Integrators:***

- Jack Woods – Program Manager, Forest Genetics Council (representing John Elmslie)
- Keith Thomas (TIB Business Plan)

***Event and Communication Coordinator:***

- Diane Douglas (e.g., assistance with communications and Workshop logistics)

***Project Team:***

The following persons reviewed draft products, provided specific inputs and feedback related to the Challenge, and provided guidance and advice in developing this Dialogue.

- Tree Improvement Branch—Dale Draper, Brian Barber, Leslie McAuley, Heather Rooke, David Reid, Dave Kolotelo, Susan Zedel, Diane Douglas and Keith Thomas
- Research Branch—Alvin Yanchuk
- Forest Genetics Council—Jack Woods
- Support consultants—Keith Jones, George Sranko, Terje Vold and Michele Baker