FGC Forest Genetics Council of British Columbia

Business Plan
2013/14

National Library of Canada Cataloguing in Publication Data

Forest Genetics Council of British Columbia
Business plan. – 2000/2001

Annual.
Title from cover.
Issuing body varies.
Running title: Forest Genetics Council of BC … business plan.
ISSN 1498-1378 = Business plan – Forest Genetics Council of British Columbia

1. Forest Genetics Council of British Columbia – Periodicals. 2. Forest genetics – British Columbia – Periodicals. 3. Forests and forestry – Research – British Columbia – Periodicals. I. Forest Renewal BC. II. Title: Forest Genetics Council of BC … business plan. III. Title: Forest Genetics Council of British Columbia business plan.

SD399.5.B74 634.9'8'09711'05 C2001-800896-8

Cover figure:

Lodgepole pine pollen buds shedding

Pollen production and distribution is an important part of seed orchard management. Pollen represents the male component of the orchard and the pollination of female cones (megasporangiate strobili) is necessary for seed production. Seed orchard managers collect pollen from orchards by picking mature pollen buds and extracting the pollen in chambers designed to dry and filter it, or by vacuuming pollen from the trees at the phenological stage shown in this photo. Orchard pollen is sometimes supplemented by spraying collected and dried pollen onto receptive female cones (supplemental mass pollination).

Orchard managers monitor pollen production and timing. Most orchards in BC are placed in geographic areas that are outside the natural species range, such as the north Okanagan valley, as this limits the risk of pollination from non-orchard sources. Such contaminant pollination has no genetic gain and may risk introducing genes from a different seed zone. Pollen contamination between adjacent orchards of the same species is also a concern to orchard managers. This is controlled by the careful placement of orchards so that orchards producing seed for different and incompatible seed zones are well separated.

Photo courtesy Tolko Ltd.

Forest Genetics Council of BC

Business Plan 2013 / 14

Budgets list only funds provided by the

provincial Land-Base Investment Strategy

Tree Improvement Program

Budgets approved
by the Forest Genetics Council of BC on
March 20, 2013

Compiled and edited by

Jack Woods

FGC Program Manager

Message from the FGC Co-Chairs

We are pleased to present the Forest Genetics Council of BC's 13th consecutive annual business plan. This plan, brought together by Council's advisory committees and approved by Council, summarizes activities funded through the Land Base Investment Strategy (LBIS) and supported by various companies and agencies who contribute additional resources, time, and effort.

This business plan, as with previous plans, outlines a balanced-set of priorities and actions that contribute to enhancing the conservation, resilience, and value of BC's forest genetic resources. Activities and budgets are grouped into subprograms, including select seed production, tree breeding, genecology, genetic conservation, cone and seed pest management, decision support, and extension. Project-level performance indicators are shown for most subprograms and projects. Collectively, these projects advance provincial-level objectives reported in FGC annual reports and the Ministry of Forests, Lands and Natural Resource Operations' Service Plans.

A primary objective of the FGC is 75% select seed use by the 2014 sowing year. Select seed use during the 2013 sowing year reached just over 66%. The primary impediment to reaching the 75% target is insufficient production of lodgepole pine (Pli) seed from north Okanagan orchards. Investigations by orchard managers, university researchers, and cone and seed pest specialists over the past decade have eliminated possible causes for this short-fall but a definitive solution has not yet identified. As a result, FGC's select seed use objective will unlikely be met. Orchard managers, however, are attempting to boost Pli seed production by harvesting cones earlier and establishing new orchards in cooler climates outside Pli's natural range and away from contaminant pollen clouds. Pli orchards established in the Kettle Valley, Sorrento, Skimikin, and Quesnel are now producing good quantities of seed. Research also continues to improve seed production from Pli and other species.

Species plans, which constitute the bulk of this document, identify the current status of seed orchards and breeding programs and provide projections for orchard seed production and genetic gains for individual seed planning units. These plans are, however, subject change as we begin to incorporate climate change, modify seed transfer standards, and adjust to (in many interior zones) declining harvest levels. A new climate-based seed transfer system and the application of new genomics research (both in progress) represent new opportunities to advance our objectives and to enhance the mid- to long-term timber supply. These new developments will be taken into consideration as Council deliberates and crafts its next five-year strategic plan (2015 to 2019) and subsequent business plans.

We would like to thank all the people and organizations who contributed to this plan and the provincial forest genetics conservation and management program. In particular, we would like to thank Jack Woods, FGC Program Manager, for compiling this report and supporting Council and its various committees. We wish everyone success with their projects.

Larry Gardner, RPF
FGC Co-chair
West Fraser Timber Ltd.

Brian Barber, RPF
FGC Co-chair
Ministry of Forests Lands and Natural Resource Operations

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1.0 Introduction

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

1.1 Forest Genetics Council of BC

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

The FGC reports to the Provincial Chief Forester, and provides a forum for stakeholder representatives to set objectives and to oversee the development and delivery of a cooperative Business Plan to fulfill these objectives. The vision statement and objectives set out in the FGC Strategic Plan for the period 2009 to 2014, are:

Vision statement:

BC's forest genetic resources are diverse, resilient, and managed to provide multiple values for the benefit of present and future generations.

Objectives:

1. Adequately conserve the genetic diversity of key populations of all forest tree species native to BC by 2015, through a combination of in situ, ex situ, and inter situ conservation.
2. By 2020, high-quality genecology research information will guide operationally efficient climate-based seed transfer policy and practice for all trees planted in BC.
3. Increase the average volume gain of select seed used for Crown land reforestation to 20% by the year 2020.
4. Increase select seed use to 75% of the provincial total sown by 2014.
5. Coordinate stakeholder activities and secure the resources needed to meet Business Plan priorities.
6. Monitor and report progress in genetic resource management activities.

This Business Plan defines the annual set of activities and budgets needed to achieve these objectives.

1.2 A Co-operative Effort

Forest genetic resource management in BC is a co-operative effort. The MFLNRO leads tree breeding activities, while both private industry and the MFLNRO manage seed orchards for the operational production of select seed. Genecology research is undertaken by the MFLNRO and universities in support of seed transfer policy, climate-change response, and genetic conservation. Industry provides logistical support for field trials and input on the development of priorities. Universities contribute through research in genetic conservation, seed orchard management, and genomics, as well as the development of climate models. Policy development for Crown lands is the responsibility of the MFLNRO, with advice provided to the Provincial Chief Forester through the FGC.

1.3 Land-Base Investment Strategy Tree Improvement Program

The Land-Base Investment Strategy (LBIS) encourages investments in the forest resource that maximize productivity and value while supporting forest resilience. The Tree Improvement Program supports specific implementation priorities related to timber supply, fast-growing forests, and adaptation to climate change.

FGC objectives are aligned with MFLNRO and LBIS objectives for enhancement of provincial timber supply and forest stewardship, and are set out in the FGC Strategic Plan for 2009 to 2014. The MFLNRO administers funding through the subprogram areas identified in the FGC Strategic and Business Plans (Figure 1).

Business planning carried out through the existing FGC-led process, includes Technical Advisory Committees (TACs) undertaking specific planning activities, developing budgets, and making operational recommendations (Figure 2). The FGC reviews and makes final recommendations for subprogram budgets and activities, and ensures the overall program meets MFLNRO and LBIS objectives and administrative requirements. The program is managed and coordinated by the FGC Program Manager on behalf of the FGC, with substantial input from FGC Co-Chairs, Technical Advisory Committee (TAC) Chairs, and others.

In addition to LBIS Tree Improvement Program investments and MFLNRO direct program investments through staff and in-kind support, private companies also fund activities under Council's Business Plan. The species plans found in Appendix 3 outline general strategies, predict orchard seed production and gain, summarize conservation status, and provide key seed-use and availability statistics for individual species and seed-zone combinations known as seed planning units (SPU).

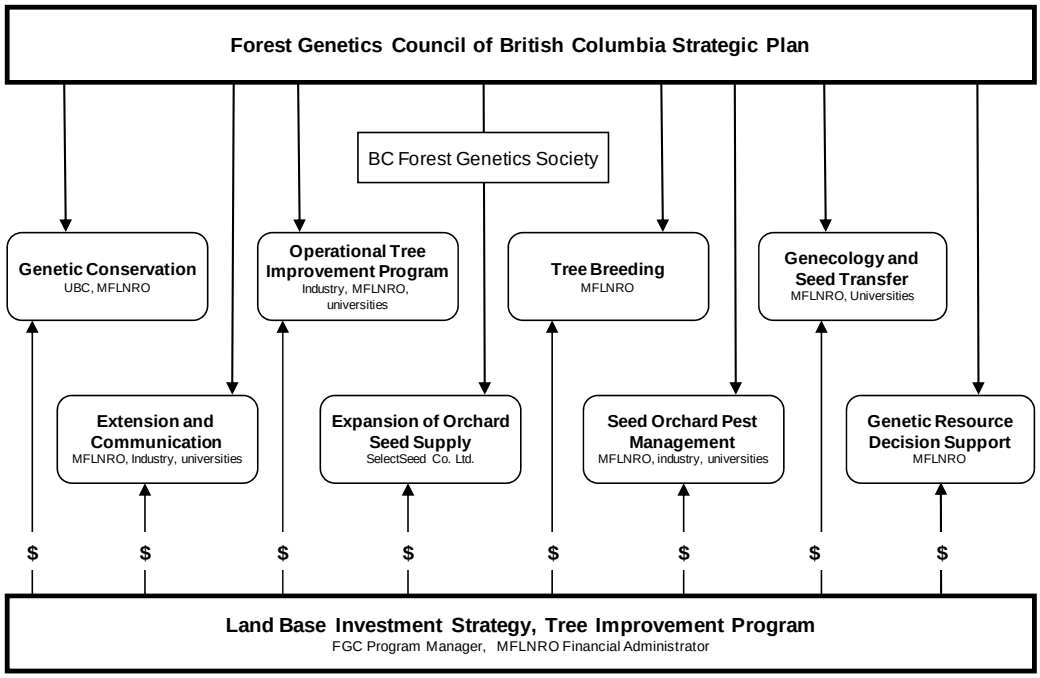

Figure 1 Relationship between the FGC Strategic Plan, Land Base Investment Strategy Tree Improvement Program, and business plan development through FGC subprograms.

2.0 Process for Business Plan Development

2.1 The Role of Council and its TACs

FGC members, representing the MFLNRO, forest companies, universities, and the Canadian Forest Service, provide strategic direction to the provincial forest genetic resource management program. FGC Technical Advisory Committees provide technical and policy information to Council and contribute to the development of FGC plans and associated budgets. The FGC Business Plan consolidates the subprogram plans and budgets into a comprehensive set of activities that address Council's objectives.

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

- The Coastal and Interior TACs review and advise on Tree Breeding and Operational Tree Improvement Program (OTIP) subprograms, and provide input to species plans that guide work done by SelectSeed Company Ltd.
- The Genetic Conservation TAC (GCTAC) advises Council on issues related to genetic conservation, and identifies required activities and budgets under the Genetic Conservation Subprogram.
- The Seed Transfer TAC develops strategy and activities for genecology research and climate-based seed transfer policy.

- The Extension TAC (ETAC) is responsible for developing a strategy and annual activity plans for the Extension and Communication Subprogram.
- The Pest Management TAC (PMTAC) identifies information and research needs, and guides both research and extension activities for the control of insect and disease pests impacting seed orchards and seed production.
- The Genetic Resources Decision Support TAC (GRDS) oversees the development of activities and budgets for the GRDS Subprogram.

In addition, Council establishes other committees as needed to advise on shorter-term projects.

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

Council reviews all strategies, plans, or recommendations from its TACs and from SelectSeed for approval (or revision) before incorporating them into the FGC Business Plan. Figure 2 illustrates this hierarchical structure and the link between FGC objectives, planning processes, and the seven subprograms through which it is implemented. The process for defining activities and budgets for each subprogram is discussed in Section 3. Subprogram leaders are authorized to reallocate funds within their subprograms as necessary throughout the fiscal year, subject to limits and review process.

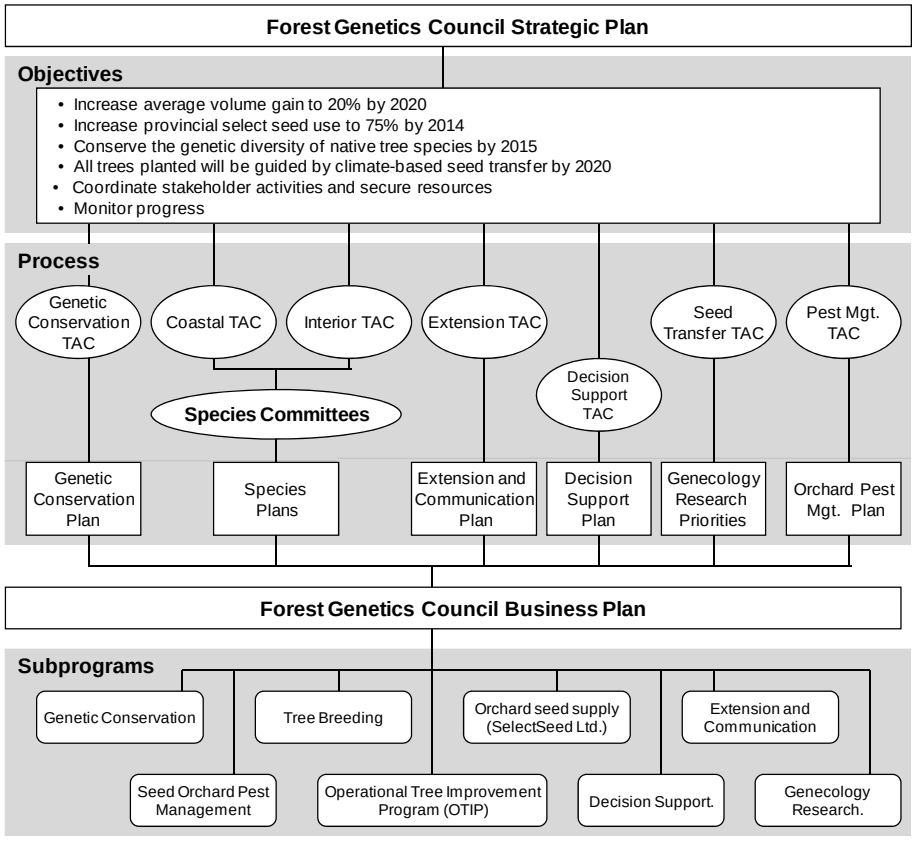

Figure 2 Link between FGC objectives, planning processes, and the subprograms of the FGC Business Plan.

3.0 Subprogram Planning and Management

3.1 Genetic Conservation Subprogram

Genetic conservation activities monitor and catalogue genetic resources for indigenous tree species, research conservation methods and needs, provide background genecology information for non-commercial species, and provide guidance to the FGC and the MFLNRO on policy development.

3.1.1 Planning

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

3.1.2 Management

Subprogram delivery is primarily shared by the Centre for Forest Conservation Genetics at the University of BC (CFCG) and the Tree Improvement Branch of the MFLNRO. The Provincial Tree Seed Center (Tree Improvement Branch) maintains an ex-situ seed inventory. The GCTAC sets broad objectives and provides budget recommendations to the FGC.

The CFCG receives funding through a the MFLNRO under the LBIS Tree Improvement Program. In addition, the Centre collaborates with other groups and agencies, and seeks funding from other sources as opportunities arise. Significant adjustments in technical objectives or budgets for projects funded through the LBIS must be approved by the GCTAC.

3.1.3 Activities and Budget

Investments through the CFCG also allow leveraging of funds with other provincial, national, and international agencies in the area of conservation genetics. The focus for 2013/14 will be climate modeling (ClimateBC and Climate WNA) in collaboration with $1.5 million of other funding for the AdapTree project, primarily through Genome Canada. Other projects include assessing the adaptive diversity of orchard seedlots relative to natural stands, developing a Big Tree web registry as part of the provincial Big Tree project, and ongoing work to understand the genetic diversity patterns of Garry oak and a literature search to summarize existing knowledge on the adaptive genetic diversity of species indigenous to BC, as well as non-BC species that will help inform policy in BC.

In the 2013/14 fiscal year, the Centre will receive $147,701 for projects listed in Table 1. In addition, the Centre will continue to provide expertise on climate change impacts, seed-transfer options, and ongoing planning and policy developments related to climate change.

A budget of $64,800 is allocated to the Forest Genetics section of the Tree Improvement Branch for projects listed in Table 1. These include conservation and research seed collections for whitebark pine and other species, the initiation of a whitebark pine screening program for rust resistance, and the maintenance of *ex situ* conservation reserves at the Cowichan Lake Research Station. developing a testing strategy for whitebark pine, trembling aspen genetic architecture, and enhancements to the genetic conservation catalogue. Projects testing conservation seed bank viability and bigleaf maple seed will be carried out by the Provincial Tree Seed Centre. In addition, a project to be done by the University of Victoria will assess genetic diversity patterns for subalpine larch, a species that is shown by climate models to be threatened by climate change. This project will be supported with a $32,439 grant.

Table 1 Conservation subprogram budget for 2013/14.

Project	2013/14 budget
UBC Centre for Forest Conservation Genetics	
Climate change	
Climate modelling and assistance with projects requiring climate modelling in BC	89,760
Communications, website, and comupting supplies	4,000
Adaptive diversity in seed orchard lots	16,000
AdapTree Project:	
Genecology of Garry oak (site maintenance, measurement and analysis)	3,000
Adaptive molecular diversity in Garry Oak	8,000
Updating literature search on adaptive diversity for all BC species	6,000
Other projects	
BC Big Tree Registry website completion	4,000
General CFCG expenses	
Extension and travel	3,000
Office, lab and computing expenses	3,000
Projects total	136,760
UBC Overhead 8%	10,941
Total for UBC Center for Forest Conservation Genetics	**147,701**
MFLNRO Tree Improvemet Branch - Prov. Tree Seed Center	
Seed bank moisture content testing / bigleaf maple seed testing	5,000
Bigleaf maple testing	2,000
MFLNRO Tree Improvemet Branch - Forest Genetics Section	**7,000**
Ex situ seed collections as per list	37,500
Field testing of whitebark pine rust resistance	13,300
Genotyping projects : Publication or Associated Miscellaneous Fundin	4,000
Fencing of ex situ reserves at Cowichan: oak and yew	10,000
Total for MFLNRO Tree Improvement Branch	**64,800**
University of Victoria	
Adaptive genetic diversity of subalpine larch	32,439
TOTAL	**251,940**

3.2 Tree Breeding Subprogram

The Tree Breeding Subprogram focuses on the continued development of parent trees selected for traits that will enhance timber supply and stand resilience. Selected parent trees are used for the production of seed and vegetative material. Tree breeding activities include selecting parents in wild stands, propagation, field-testing offspring, mating, establishing/maintaining/measuring trials, and support research. No research effort or funding is for the development of genetically modified trees. Breeding strategy and level of advancement vary among species and seed zones, but all breeding programs are well into field testing and selection at either the first, second, or third generation. This Subprogram also includes realized-gain trials that quantify area-based gains in timber production, and support research on pests and other issues that impact the achievement of genetic gains in timber supply and quality. The tree breeding subprogram is implemented by the Forest Genetics Section of the MFLNRO Tree Improvement Branch .

3.2.1 Planning

Priorities for breeding activities are set among seed planning units using value traits related to timber supply, expected future impact under climate change, and logistical considerations such as ease (cost) of operating breeding and seed orchard activities. Breeding, genecology, and genetics research strategies developed by MFLNRO tree breeders were reviewed by FGC Interior and Coastal TACs, and direction was given to ensure alignment with FGC strategic objectives and with ongoing operational needs and programs.

Tree Breeding Subprogram budgets were developed at the SPU level by the MFLNRO breeder responsible and reviewed by TAC members. These budgets were then adjusted by the Manager, Forest Genetics, MFLNRO Tree Improvement Branch to find efficiencies and to meet the total expected Subprogram budget allocation.

3.2.2 Management

The MFLNRO manages Tree Breeding Subprogram activities, with progress reported to cooperators through the FGC. The Manager of Forest Genetics, MFLNRO Tree Improvement Branch, has authority for project re-allocations in support of FGC objectives. Substantial re-allocations between seed planning units or from breeding activities to technical support activities require the agreement of the Director, Tree Improvement Branch and the FGC Program Manager.

3.2.3 Activities and Budget

The 2013/14 budget for the Tree Breeding Subprogram is $1.265 million, including support for clonebank and research-plantation maintenance at the Cowichan Lake Research Station and Skimikin Seed Orchard sites. Table 3 summarizes budgets and key performance indicators (KPI) for breeding activities by SPU and activity.

3.3 Operational Tree Improvement Program (OTIP)

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

3.3.1 Planning

OTIP investment is based on input from the Interior and Coastal TACs and on species plans that outline seed production strategies within each SPU. Based on these strategies, and on priority lists approved by the TACs, a formal call for proposals is issued.

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

3.3.2 Management

The MFLNRO Tree Improvement Branch administers OTIP in accordance with recommendations from the FGC. Requests for re-allocations or for new funding are considered MFLNRO Tree

Improvement Branch Director in consultation with the appropriate TAC Chair and the FGC Program Manager. All projects report on key performance indicators to enable tracking of planned activities.

3.3.3 Activities and Budget

The 2013/14 OTIP budget is $524,449, with allocations of $401,141 to coastal orchards and $123,309 to interior orchards. Table 4 outlines approved OTIP budgets and performance indicators for all seed planning units.

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

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

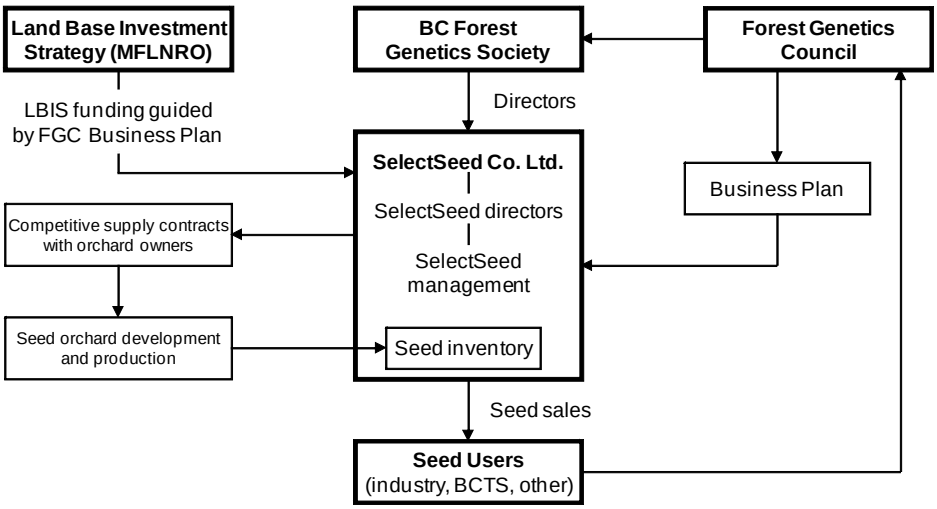

Figure 3 Organizational relationships among SelectSeed Ltd., Land Base Investment Strategy, Forest Genetics Council, and the B.C. Forest Genetics Society

3.4.1 Planning

SelectSeed's Business Plan and investments are based on the long-term Strategic Plan and annual business plans prepared by the FGC and its associated committees. Species plans (Appendix 3) contain analyses of projected orchard expansion needs that guide SelectSeed investments. Specific technical advice is sought as required from Species Committees or others.

3.4.2 Management

Management discretion for spending lies with the SelectSeed Board of Directors, and is limited by the terms of the SelectSeed Multi-Year Agreement with the MFLNRO. Investments in new orchards will be approved by the FGC and follow FGC and TAC guidance, with emphasis on both the technical quality of developments and on cost. SelectSeed's annual business plan was approved by the Forest Genetics Council on March 20, 2013.

3.4.3 Activities and Budget

In 2013/14, SelectSeed will continue to focus on the management of 11 long-term orchard agreements covering the operation of 14 orchards (Table 5). Propagation and site preparation for a new Douglas-fir orchard for higher elevations in the Thompson Okanagan zone is also underway.

Seed orchard management activities to maximize seed crop production will continue in the 14 original orchards. In addition, about 525 ramets will be planted across all orchards to replace mortality and about 1710 grafts will be made for future mortality replacement and for development of the new Douglas-fir orchard SPU. All grafting and holding work is done through contracts. Seed production for 2013 is forecast at 75 kilograms of lodgepole pine, 55 kilograms of Douglas-fir, and 35 kilograms of spruce. Expected gross revenue from seed sales are forecast at $900,000.

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

Forecast spending for 2013/14 is $967,500 (table 2), including $188,240 for FGC management and support activities. Seed production forecasts are based on long-term production estimates for similar orchards, but annual production can vary widely.

Table 2 SelectSeed Company Ltd. 2013/14 forecast income and expenses by category.

Category description	Total	Q1	Q2	Q3	Q4
SelectSeed costs					
Orchard mgt contracts and capital investments	343,000	34,300	137,200	34,300	137,200
Propagation, holding, and orchard support	33,000	-	-	19,800	13,200
Crop management, seed extraction, sales	260,000	-	13,000	221,000	26,000
Management and administration	143,260	35,815	35,815	35,815	35,815
Total SelectSeed costs	$ 779,260	$ 70,115	$ 186,015	$ 310,915	$ 212,215
FGC management and support					
Management, legal, communication	133,240	33,310	33,310	33,310	33,310
UBC NSERC-Industrial Chair	55,000	55,000	-	-	-
Total FGC costs	$ 188,240	$ 88,310	$ 33,310	$ 33,310	$ 33,310
Total program expenditures	$ 967,500	$ 158,425	$ 219,325	$ 344,225	$ 245,525
Seed sales	900,000	-	-	270,000	630,000
Interest on investments	12,000	3,000	3,000	3,000	3,000
Total income	$ 912,000	$ 3,000	$ 3,000	$ 273,000	$ 633,000
Net revenue without FGC costs	$ 132,740	$ (67,115)	$ (183,015)	$ (37,915)	$ 420,785
Net revenue with FGC costs	$ (55,500)	$ (155,425)	$ (216,325)	$ (71,225)	$ 387,475
Cash from (to) reserve	$ 55,500				
Requested MYA Support	$ -				

Table 3 2013/14 budgets ($ x 1000) and KPI by seed planning unit for tree breeding and associated technical support activities.

See Species Plans (Appendix 3) for more detail on seed planning units.

				220 Selection and Breeding						*230 Progeny testing*										*240 Technical Support*								
				211		221		222		223		231		232		233		234		235		240-1		240-2		240-3		240-4		
Seed Planning Unit				# genotypes selected		# genotypes establ. in arboreta / archives		# genotypes. maint. in breeding arboreta		# crosses made		# test sites sown		# progeny sites establ. / prepped		# progeny test sites maintained		# of progeny sites assessed		# of test sites analyzed		Projects								**Total $**
#	**Spp.**	**SPZ**	**Elev (m)**	**KPI**	**$**	**KPI**	**$**	**KPI**	**$**	**KPI**	**$**	**KPI**	**$**	**KPI**	**$**	**KPI**	**$**	**KPI**	**$**	**KPI**	**$**	**KPI**	**$**	**KPI**	**$**	**KPI**	**$**	**KPI**	**$**	**x 1000**
1	Fdc	M	1-700	80	5	17	1	78	5			1	4			12	38	1	25			1	17							94
2	Cw	M	1-600					550	2	200	10	3	10	3	35	13	50	13	40			1	25	1	25					197
3	Hw	M-S	1-600	6	1	150	2									6	16	3	15	3	1									35
4	Sx	NE	1000-1500							100	5																			5
5	Sx	NE	1500-1900																											0
6	Ss	M	1-500	100	2	100	2	400	2							4	14	5	5	1	4	1	5	1	6	1	2	1	5	47
7	Pli	NE	700-1400			500	49	1,700	5							6	22	1	1											77
8	Pwc	M/SM	1-1400	50	14	50	15					4	15	4	6			3	12	9	6	1	5	1	6	4	4			83
9	Ba	M	1-1000																											0
10	Pli	TO	700-1400													6	22	5	16											38
11	Yc	M	1-1100			400	4									3	32					1	6							42
12	Pli	PG	700-1200	100	14					90	10					6	20													44
13	Lw	NE	700-1400					2,000	20	100	5					1	8					3	30							63
14	Sx	PG	600-1200																					2	28	1	10	2	70	108
15	Pwi	KQ	500-1400			100	4	50	1	190	16					3	7	1	2											29
16	Pli	TO	1400-1600															5	10											10
17	Pli	BV	700-1200							60	8							5	24			1	17							49
18	Pli	CP	700-1100							30	4																			4
19	Fdc	SM	400-1200					30	1									2	18	2	0									19
20	Pli	NE	1400-2000																											0
21	Fdi	NE	400-1000							100	5					3	15	2	20			1	10							50
22	Fdi	NE	1000-1600							100	5																			5
23	Sx/Ss	SM/NST	all																											0
24	Hw	M	600-1100													4	8	4	16											24
25	Sx	EK	750-1700																											0
26	Pli	PG	1200-2000																											0
27	Cw	SM	200-1000													2	5	2	5											10
28	Sx	TO	1300-1900																											0
29	Pli	EK	1500-2000																											0
30	Sx	TO	700-1300									139	0	3	20															20
31	Fdc	M	700-1200																											0
32	Pli	EK	800-1500													1	5													5
33	Cw	SM	600-1500													4	7	4	7											14
34	Lw	EK	800-1500							100	5																			5
35	Sx	BV	500-1200	75	18											3	15	5	50			5	20							103
36	Bg	M	1-700																											0
37	Fdi	QL	700-1200																											0
39	Fdi	EK	700-1400																											0
40	Sx	PR	650-1200													4	25	4	15											40
41	Fdi	PG	700-1000																											0
42	Sx	PG	1200-1550																											0
43	Fdi	CT	600-1200																											0
44	Sx	NE	1-1000							35	5																			5
45	Pli	BB/CHL	all															4	11											11
46	Bl	all int.	all																											0
47	Bn	M	all																											0
48	At/Ep/Ct	interior	all																											0
49	Ct/Mb	Coast	all																											0
50	Lw	NE	1200-1800																											0
51	Yp	S. Int.	300-1200																											0
54	Dr	S. Int.	300-1200	240	0			140	1	40	0	10	27			2	2													30
	Clonebank maintenance and upgrades at the Cowichan Lake Research Station																													
	To be allocated																													
	Totals			651	54	1,317	76	4,948	37	1,145	77	157	56	10	61	83	311	69	292			15	135	5	65	6	16	3	75	**1,265**

Table 4 2013/14 budgets ($ x 1000) and KPI by seed planning unit for OTIP projects. See species plans (Appendix 3) for SPU detail.

Seed Planning Unit				*320 Quality / Quantity Boosts*														*340 Pest Management*						*350 Tech Support*		Total
				321 Grafting (# grafts)		322 Hold grafts (# ramets)		323 Replacement (# ramets)		324 Roguing (# rogued)		325 SMP/CP (# ramets)		326 Induction (# ramets)		327 Orch mgt. (# ramets)		331 Cutting donors (# cuttings)		341 Insect control (# ramets)		342 Disease control (# ramets)		343 Monitoring (# ramets)		# of reports		$x1000
#	Spp	SPZ	Elev (m)	KPI	$	KPI	$	KPI	$	KPI	$	KPI	$	KPI	$	KPI	$	KPI	$	KPI	$	KPI	$	KPI	$	KPI	$	$
1	Fdc	M	1-900	1237	5	1519	4	4546	15	127	1	1190	4	680	1					2028	4			7986	3	1	7	**44.5**
2	Cw	M	1-700			518	1	35	0			705	6	623	3					382	3			1571	1	1	10	**24.5**
3	Hw	M	1-600																									**0.0**
4	Sx	NE	1000-1700							301	6									890	0	1400	1	1400	1			**7.7**
5	Sx	NE	1700-2100							330	6											678	0	678	0			**6.9**
6	Ss	M	1-500									111	1							454	1			454	1			**2.0**
7	Pli	NE	700-1600					55	1	270	5	5573	4							6636	4	6224	4	14553	4	2	25	**47.1**
8	Pw	M/SM	1-1000	200	2	80	0	702	3			452	1											452	0			**7.1**
9	Ba	M	1-1000																									**0.0**
10	Pli	TO	700-1400					20	0	1308	33	5601	4							2001	3	4188	3	2094	1			**43.6**
11	Yc	M	1-1100															270455	13	12455	1			12455	1	2	13	**29.7**
12	Pli	PG	700-1400	1830	15	1701	4	1063	11	574	12	3005	4							3600	16	1570	1	11070	3	1	1	**66.2**
13	Lw	NE	700-1600																	1546	1	1859	1	1859	1			**2.4**
14	Sx	PG	600-1400																	4618	2			3000	1			**3.2**
15	Pw	KQ	500-1400									1303	2									1481	0	1481	1			**3.7**
16	Pli	TO	1400-1600			900	3					3504	2							3504	3	3504	1	3504	1			**9.9**
17	Pli	BV	700-1400	100	1	1798	3	702	8	574	12	3783	7							5874	13	4089	1	11443	5			**50.7**
18	Pli	CP	700-1300	610	5	2307	6			51	0	4026	6							3520	3	3005	1	8205	4			**25.2**
19	Fdc	SM	200-1000	50	0	417	2	924	3			874	3											874	1			**9.1**
20	Pli	NE	1600-2000																									**0.0**
21	Fdi	NE	400-1200									803	3	690	2					8688	15	2172	1	2172	1			**21.8**
22	Fdi	NE	1000-1800									1302	2	600	2					7654	9	2527	0	2527	1			**15.3**
23	Sx/Ss	SM/NST	all																									**0.0**
24	Hw	M	600-1100							10	0													216	0			**0.3**
25	Sx	EK	750-1900																									**0.0**
26	Pli	PG	1400-2000																									**0.0**
27	Cw	SM	200-1000																									**0.0**
28	Sx	TO	1300-2100									1059	1	643	2					1956	2	1056	0	1056	1			**5.6**
29	Pli	EK	1500-2000																									**0.0**
30	Sx	TO	700-1500									457	1	320	1					908	1	454	0	454	0			**3.2**
31	Fdc	M	900-1200	75	1	35	0	318	2	71	0	151	1							282	0			282	0			**5.0**
32	Pli	EK	800-1500					40	1	115	2	1704	3							2219	2	2219	1	2219	1	1	4	**13.7**
33	Cw	M	700-1500																									**0.0**
34	Lw	EK	800-1700																									**0.0**
35	Sx	BV	500-1400			364	1			300	1									3510	2	3166	1	2021	1			**5.4**
36	Bg	M	1-700																									**0.0**
37	Fdi	QL	700-1400									2	1	600	2					3081	6			1027	1			**10.4**
39	Fdi	EK	700-1400									501	2	300	1					2980	4	990	0	990	1			**7.2**
40	Sx	PR	650-1200					52	0					333	1					8336	3	6441	2	3789	1			**7.4**
41	Fdi	PG	700-1200									4	3	550	2					3795	8			1265	1			**13.2**
42	Sx	PG	1200-1550																	4000	1			2000	1			**2.7**
43	Fdi	CT	600-1400							300	7			400	1					2000	3			768	0			**11.8**
44	Sx	NE	1-1000																									**0.0**
45	Pli	BB/CHL	all																									**0.0**
46	Bl	all int.	all																									**0.0**
47	Bn	M	all																									**0.0**
48	At/Ep/Ct	interior	all																									**0.0**
49	Dr/**Ct**/Mb	Coast	all																									**0.0**
50	Lw	NE	1200-1800																									**0.0**
51	Py	S. Int.	300 - 1200									1001	1									1363	0	1363	1			**2.5**
			Totals	4102	30	9639	24	8457	44	4331	85	37111	62	5739	18	0	0	270455	13	96917	111	48386	19	105228	44	8	60	**508.8**
																										Contingency		**15.6**
																										Total		**$ 524.4**

3.5 Extension and Communication

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

- extension (providing client-focused training to seed users and tree improvement specialists),
- communication (developing and disseminating information on the program and its activities to all FGC target audiences),
- training.

3.5.1 Planning

Extension and communication activities are developed and guided by the FGC Extension Technical Advisory Committee (ETAC). ETAC includes representatives from the MFLNRO, forest licensees, and the private consulting community.

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

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

3.5.2 Management

ETAC identifies goals and audiences for extension, communication and education activities, and with the assistance of an Extension Coordinator from the MFLNRO Tree Improvement Branch, develops a business plan. The Coordinator is responsible for the management of ETAC activities, and the coordination of ETAC work in conjunction with Council and other committees of Council. Projects are undertaken through contracts or through direct delivery by cooperators. Budget development for LBIS funds is first done by the ETAC, with final approval by the FGC. Project spending is approved by the ETAC Chair and the FGC Program Manager, and must meet administrative guidelines set out for LBIS funds. ETAC reports to Council on activities, progress, and spending at mid-year and year end.

3.5.3 Activities and Budget

The extension and communication budget for 2013/14 is $18,000 (Table 5). In-kind, staff time and other contributions by affiliated agencies and companies are incremental to this amount.

Table 5 Extension and communication projects and budget for 2013/14.

Project	Budget ($)
Communication posters and slides	3,000
Publications	
Crop statistics for lodgepole pine orchards	
Completion of lodgepole pine reproduction note	3,000
Tree Improvement in BC brochure	
Overview of BC Seed Orchards	
Demonstrations sites to show gains from the use of select seed	4,000
Extension events and workshops	2,000
Support for the Forest Genetics 2013 conference	3,000
Administration and travel	3,000
Total	**$18,000**

3.6 Genetic Resource Decision Support Subprogram

The Genetic Resource Decision Support Subprogram (GRDS) supports FGC goals and objectives through the development of genetic information management systems. These systems assist clients in decision making, seed policy and planning, seed use, timber supply analysis, effectiveness evaluation, monitoring, and other GRM activities.

3.6.1 Planning

GRDS projects are developed and guided by a Technical Advisory Committee (TAC) comprised of ministry, industry and academic representatives.

3.6.2 Management

The GRDS TAC identifies short- and long-term goals that support the GRM information needs of clients. Significant project changes or re-allocations of funds from the approved Business Plan require approval of the TAC and the FGC Program Manager on behalf of the FGC.

3.6.3 Activities and Budget

Priorities for the 2013/14 fiscal year are to improve the ability of MFLNRO online systems to create, manage, display, and query seedlot area-of-use spatial information. Decision support information for climate-based seed transfer will also be further developed. A total of $90,000 is allocated to these projects (Table 6).

Table 6 Genetic Resource Decision Support projects and budget for 2013/14.

Project	Budget ($)
Maintenance of seedlot area-of-use infrastructure, including final delivery to production, application, database, and BCGW.	20,000
Development of queries and reports using seedlot area-of-use and seedlot deployment with spatial data.	20,000
Development of maps to show proposed future climate-based-seed-transfer units.	10,000
Analysis of “guerilla trials”, including compilation and summary of trials and plantations in BC in which seed was transferred well beyond the limits of current seed-transfer poligy (year 1 of 2) project.	15,000
Total	**$65,000**

3.7 Cone and Seed Pest Management Subprogram

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

3.7.1 Planning

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

3.7.2 Management

With direction from the PMTAC, research proposals and pest management support activities were developed by the MFLNRO cone and seed pest management specialists. These were subsequently reviewed by Pest Management TAC members, and recommendations made for project modifications. The PMTAC recommended projects and budgets to the FGC.

The MFLNRO Tree Improvement Branch manages budgets and the financial administration of projects recommended by the PMTAC and approved by the FGC. Significant priorities and changes during the fiscal year are made in consultation with the PMTAC and the FGC Program Manager.

3.7.3 Activities and budget

The total Pest Management subprogram budget for 2013/14 is $124,950. In-kind, staff time and other contributions by affiliated companies and agencies are incremental to this amount. Projects and budgets are summarized in Table 7.

Table 7 Cone and Seed Pest Management Subprogram projects for 2013/14.

Project	Species impacted	Budget ($)	Products
Operational Support for Ministry Cone & Seed Pest Biologist	All species	20,000	Extension, pest management bulletins, overall support
Ten-lined June beetle control trial	Pli, Fdi	20,000	
Support for Ministry Cone & Seed Pest Research Laboratory (Strong)	Sx, Fdi, Fdc, Lw, Pw	5,250	Ongoing trial support; progress report
Pesticide Trials in support of finding new pesticides and obtaining pesticide registration	Fdi, Sx	38,850	Progress report
Attract-and-kill trials targeting Sequoia pitch moth	Pli	14,950	Progress report
Operational-scale trials comparing efficacy of potential new pesticides to control fir coneworm with Dimethoate applied at both standard and reduced rates	Pli	14,900	Progress report
Detecting both direct and indirect feeding damage caused by Leptoglossus occidentalis on lodgepole pine seeds	Pli	11,000	Progress report
Total budget		**$ 124,950**	

3.8 Genecology and Seed Transfer Subprogram

The purpose of the Genecology and Seed Transfer Subprogram is to effectively direct funding to priority genecology and seed transfer projects in support of FGC strategic objectives and provincial seed transfer policy development.

3.8.1 Planning

The subprogram is guided by the Seed Transfer TAC (STTAC), with representation from MFLNRO, industry, and university stakeholders. Priorities for genecology and seed transfer information needs are set within the context of other work currently underway, such as in the Breeding Subprogram, existing genecology trials, and seed transfer policy needs. The STTAC reviews priorities and projects set out by MFLNRO Tree Improvement Branch (TIB) scientists, leads the development of a call for proposals for non-MFLNRO projects, and makes recommendations to the FGC regarding budgets, priorities, and delivery process.

3.8.2 Management

The STTAC developed a list of priorities for genecology and seed transfer projects by species and type of work. Based on these priorities, a business plan was compiled by TIB scientists and reviewed by the STTAC. In addition, a call for proposals was released by the TIB on behalf of the STTAC and proposals were screened by a review committee of the STTAC. Funding recommendations were made to the FGC

The MFLNRO Tree Improvement Branch manages financial administration for approved projects through either direct spending within the Branch or through contracts with successful project proponents. Project financial and progress reporting is managed through the TIB, and incorporated in annual FGC reports.

3.8.3 Activities and budget

The total budget allocated to the Genecology and Seed Transfer Subprogram for 2013/14 is $386,785. This amount falls into two primary categories:

1. Successful proposals from a proposal call open only to proponents outside the MFLNRO, totaled $66,185 (Table 8).
2. Projects led by scientists from the MFLNRO TIB, including the Assisted Migration Adaptation Trial, totaled $320,600 (Table 9),

Table 8 Genecology and Seed Transfer Subprogram projects led by non-MFLNRO proponents and approved through a call for proposals.

Species	Project title	Budget ($)	Performance indicator
Sx, Pli	Assessing the adaptive portfolio or reforestation stocks for future climates: common garden experiments. The project is leveraged by over $1 million through the Genome Canada funded AdaptTree genomics project.	$ 47,393	1 report
Fdc	Implications of ectomycorrhizal fungal maladaptation on successful seed transfer.	$ 18,792	1 report
Total budget		**$ 66,185**	

Table 9 MFLNRO Tree Improvement Branch Genecology and Seed Transfer Subprogram projects, recommended funding, and performance indicators (KPI).

Species	Genecology research priorilty	251 Seed procurement: # sources		252 Seedling production: # seedlings x 1000		253 Trial establishment: # test sites		254 Trial maintenance: # test sites		255 Trial measurement: # test sites		256 Trial Assessment: # test sites		257 Analysis of trials: # trials		Species total ($ x 1000)
		KPI	$	KPI	$	KPI	$	KPI	$	KPI	$	KPI	$	KPI	$	
Pli	High															0.0
Fdi	High							1	15.0							15.0
Cw c	High							4	5.0							5.0
Fdc	High	16	3.0	7	3.0											6.0
Sx	High							23	25.0			5	10.0			35.0
Hw	High							12	18.0			3	7.0	3	0.5	25.5
Bl	Medium							8	5.0	7	14.5					19.5
Lw	Medium															0.0
Cw i	Medium					3	10	6	11.5							21.5
Ba	Medium									5	12.5					12.5
Pw	Medium									4	5.0	4	5.0			10.0
Yc	Medium															0.0
Ss	Low							4	4.0							4.0
Dr	Low							3	10.0							10.0
Ep	Low															0.0
Bg	Low							4	1.0							1.0
At	Low															0.0
Act	Low							3	10.0							10.0
Py	Low															0.0
Mb	Low									4	25.0					25.0
Bn	Low									5	15					15.0
AMAT*								48	65	48	41					105.6
Totals		16	3	7	3	3	10	116	170	73	113	12	22	3	1	320.6

* Assisted Migration Adaptation Trial; includes multiple species.

3.9 Applied Tree Improvement and Biotechnology

The Applied Tree Improvement and Biotechnology research program accepts proposals that support the objectives of the Forest Genetics Council of BC in the area of new technologies and their application to GRM in BC.

3.9.1 Planning

Project proposals received under this funding category are developed by proponents based on their knowledge of needs and opportunities within the broad provincial GRM program or on suggestions received from others active within the program. The intent is to provide a funding mechanism in support of projects that have the potential to contribute to FGC objectives but do not fit the more specific funding requirements of other FGC subprograms.

3.9.2 Management

Project proposals were received by the FGC Program Manager and reviewed by a Steering Committee reporting to the FGC. Criteria for project evaluation included the potential to contribute to FGC objectives, probability of success, proponent ability to meet project objectives, and cost. The Steering Committee considered project costs and reserved the right to suggest modifications to project activities or scope and to modify budgets, where they felt it was appropriate.

3.9.3 Projects and budget

Four proposals were received and reviewed. The Steering Committee recommended full funding for one project and partial funding for one project. Two proposals were not funded (Table 10).

Table 10 Applied Tree Improvement and Biotechnology research projects supported for 2013/14.

Project	Species	Approved budget ($)	Products
Estimating female cone production of Pli in southeast BC	Pli	$57,973	Report
Seed shortfall in Pli and cone induction in Pli and Fdi (ongoing project)	Pli, Fdi, Fdc	$124,200	Report
Total budget		**$182,173**	

3.10 Administration

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

- the administration of LBIS funds allocated to subprograms managed by the MFLNRO, including Tree Breeding, OTIP, Genecology and Seed Transfer, Extension and Communication, Pest Management, and Genetic Resource Information Management,
- the administration of contracts with successful proponents through the OTIP, Genecology and Seed Transfer proposal calls, and with universities and SelectSeed Company Ltd.,
- support for the business of the FGC, including scheduling meetings, assistance with information distribution, and dealing with queries and planning.

3.10.1 Costs

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

3.10.2 Management

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

3.10.3 Activities and Budget

The 2013/14 budget for the Administration Subprogram is $40,000. This amount includes all program administration costs incurred by the MFLNRO Tree Improvement Branch.

3.11 Budget Summary

A Land Base Investment Strategy Tree Improvement Program budget allocation of $2.858 million is approved for the 2013/14 fiscal year, and is summarized in Table 11.

Table 11 2013/14 budget summary for LBIS Tree Improvement Program contributions to subprograms.

Subprogram	Allocation ($)
Genetic Conservation	251,940
Tree Breeding	1,265,000
Operational Tree Improvement Program (OTIP)	524,449
Expansion of Orchard Seed Supply (SelectSeed Ltd.)	0
Extension and Communication	18,000
Cone and Seed Pest Management	124,950
Genecology and Seed Transfer	386,785
Genetic Resource Decision Support	65,000
Applied Tree Improvement and Biotechnology	182,173
Administration (Tree Improvement Branch)	40,000
Total	**$ 2,858,297**

4.0 Funding and Administrative Mechanisms

4.1 Funding Agreements

The Land Base Investment Strategy Tree Improvement program is administered by the Tree Improvement Branch of the MFLNRO. FGC Business Plan activities are supported through the following administrative mechanisms:

- MFLNRO/SelectSeed Co. Ltd. Multi-Year Agreement
- MFLNRO contracts
- MFLNRO/University grants and transfers
- MFLNRO direct management and administration

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

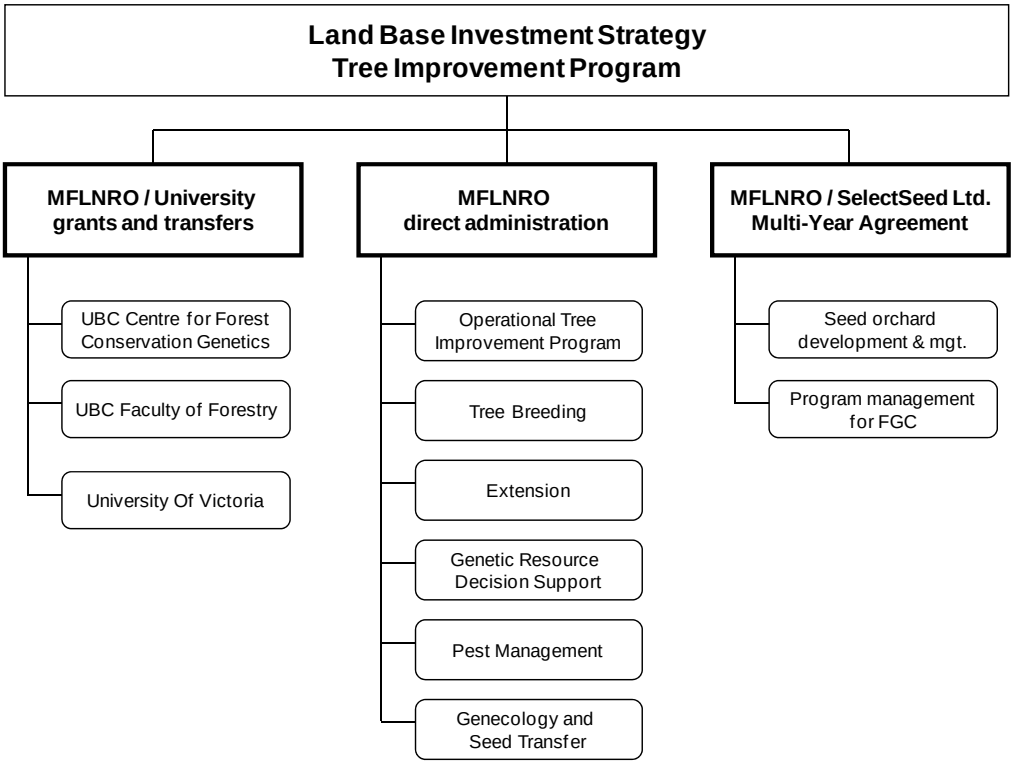

Figure 4 Administrative mechanisms for the delivery of the LBIS Tree Improvement Program funding.

4.2 Monitoring and Reporting

Monitoring progress is an important objective of the FGC program. All LBIS funded activities report on performance relative to criteria. In addition, progress towards long-term objectives is measured at the provincial level for all FGC activities.

Project-Level Reporting

Projects from each subprogram provide reports to be published in the annual Tree Improvement Program Projects Report for 2013/14. Work quality will be periodically audited through Review Committees and site visits. Reports will be received and reviewed by Technical Advisory Committees or project steering committees, as appropriate, as well as by the MFLNRO Program Administrator and the FGC Program Manager. Reporting to the MFLNRO Program Administrator on spending and progress is required for all OTIP projects and for SelectSeed Ltd.

Provincial-Level Reporting

Progress towards FGC provincial objectives (see section 1.1) for increasing genetic worth of seedlots used, increasing the use of orchard seed, and climate-based seed transfer will be reported using provincial summaries of performance indicators. SelectSeed Company Ltd. will produce an annual report showing performance indicators, financial statements, and audit reports. Reporting requirements are identified in Table 12.

Table 12 List of reports, responsibilities, distribution, and preparation dates for LBIS-supported projects.

Type of report	Prepared by	Prepared for	Distribution	Dates due
Interim project status	Project leader	MFLNRO program administrators for early FY reallocations	On request	Aug 1
Project level	Project proponent	MFLNRO Program Administrator	On request	Oct 30 April 30
Annual reports and progress summary	FGC Program Manager, Program Administrator MFLNRO; project leader contributions	FGC; MFLNRO Chief Forester; TACs; general distribution	FGC members; TACs; FIA administrators; MFLNRO; general distribution; FGC website	April 30

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

Appendix 1: Seed Planning Units and Categories

The following table lists seed planning units (SPU) and activity categories. All provincial SPUs are grouped to one of four categories using a protocol developed by the FGC Strategic Planning Committee. The protocol evaluates SPUs based on the net present value of tree improvement investments, feasibility criteria, zone changes due to climate change, opportunities, and seed transfer information needs. Listed SPUs in categories 1 to 3 have a Species Plan in Appendix 3. Categorization for SPUs # 6, 8 and 15, are based on an expectation of increased planting with pest resistant material. SPU 54 is new this year and reflect a decision to proceed with breeding for red alder on the coast.

Program categories include;

1. Advanced-generation program,
2. First-generation program only,
3. Genecology research only, and
4. No genetics program (SPUs in this category are not listed here).

Seed planning unit (SPU)				Program
#	Species	SPZ	Elev. band (m)	category
1	Fdc	M	1-900	1
2	Cw	M	1-700	1
3	Hw	M	1-600	2
4	Sx	NE	1000-1700	1
5	Sx	NE	1700-2100	2
6	Ss	M	1-500	2
7	Pli	NE	700-1600	1
8	Pw	M/SM	1-1000	1
9	Ba	M	1-1000	3
10	Pli	TO	700-1400	1
11	Yc	M	1-1100	2
12	Pli	PG	700-1400	1
13	Lw	NE	700-1600	1
14	Sx	PG	600-1400	1
15	Pw	KQ	500-1400	1
16	Pli	TO	1400-1600	2
17	Pli	BV	700-1400	1
18	Pli	CP	700-1300	1
19	Fdc	SM	400-1200	2
20	Pli	NE	1600-2000	2
21	Fdi	NE	400-1200	1
22	Fdi	NE	1000-1800	2
23	Sx/Ss	SM/NST	all	3
24	Hw	M	600-1100	2
25	Sx	EK	750-1900	2
26	Pli	PG	1400-2000	3
27	Cw	SM	200-1000	2

Seed planning unit (SPU)				Program
#	Species	SPZ	Elev. Band (m)	category
28	Sx	TO	1300-2100	2
29	Pli	EK	1500-2000	2
30	Sx	TO	700-1500	1
31	Fdc	M	900-1200	2
32	Pli	EK	800-1500	2
33	Cw	M	700-1500	2
34	Lw	EK	800-1700	1
35	Sx	BV	700-1400	2
36	Bg	M	1-700	3
37	Fdi	QL	700-1400	2
38	Hw	M north	1-600 (part of SPU 3)	2
39	Fdi	EK	700-1400	2
40L	Sx	PR low	<650	2
40M	Sx	PR mid	650-1200	2
41	Fdi	PG	700-1200	2
42	Sx	PG	1200-1550	2
43	Fdi	CT	600-1400	2
44	Sx	NE	1-1000	1
45	Pli	BB/CHL	All	3
46	Bl	all int.	all	3
47	Bn	M	all	3
48	Broadleaves	Interior	-	3
49	Broadleaves	Coast	-	3
50	Lw	NE	1200-1800	2
51	Py	S. Interior	300-1200	2
52	Fdi	TO	600-1100	2
53	Fdi	TO	1100-1600	2
54	Alder	M	1-700	2

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

Appendix 2: Forest Genetics Council and Technical Advisory Committee Members

Forest Genetics Council of BC

Name	Affiliation	Representing
Brian Barber (Co-Chair)	MFLNRO Tree Improvement. Branch	MFLNRO Co-Chair
Larry Gardner (Co-Chair)	West Fraser Timber Ltd.	Industry Co-Chair
Dr. Rob Guy	University of BC	Universities
Domenico Iannidinardo	TimberWest Forests ltd.	Coast industry orchard owners
Patti Kagawa	BC Timber Sales	BC Timber Sales Ltd.
Scott King	Lousiana Pacific	Southern interior industry
Joe Leblanc	Interfor Ltd.	Coast industry
Dan Peterson	MFLNRO, Southern Int. Region	MFLNRO
Barrie Phillips	MFLNRO Tree Improvement. Branch	MFLNRO
Mark Tamas	Tolko Ltd.	Interior industry orchard owners
Annette van Niejenhuis	Western Forest Products Inc.	Coastal Technical Advisory Committee
Raoul Wiart	Canadian Forest Service	Canadian Forest Service
Gernot Zemanek	Roserim Forest Nursery	Woodlots and nurseries
Vacant		Interior Technical Advisory Committee

Coastal Technical Advisory Committee

Name	Affiliation	Name	Affiliation
Annette van Niejenhuis (Chair)	Western Forest Products Inc.	Bob Merrell	BC Timber Sales Ltd.
Dr. Sally Aitken	University of BC	Dr. John Russell	MFLNRO Tree Imp. Branch
Charlie Cartwright	MFLNRO Tree Imp. Branch		
Tim Crowder	TimberWest Forests Company Ltd.	Dr. Michael Stoehr	MFLNRO Tree Imp. Branch
Diane Douglas	MFLNRO Tree Imp. Branch	Dr. Joe Webber	ProSeed Consulting
Jimmy Hodgson	Island Timber Ltd.	Dr. Chang-yi Xie	MFLNRO Tree Imp. Branch
Dr. John King	Independent	Bevin Wigmore	Arbutus Grove Nursery
Dave Kolotelo	MFLNRO Tree Imp. Branch	Dr. Alvin Yanchuk	MFLNRO Tree Imp. Branch

Interior Technical Advisory Committee

Name	Affiliation	Name	Affiliation
Vacant (Chair)		Stephan Joyce	MFLNRO Tree Imp. Branch
Guy Burdikin	West Fraser Timber Ltd.	Dave Kolotelo	MFLNRO TIB / Tree Seed Center
Dr. Michael Carlson	MFLNRO Tree Imp. Branch (emeritus)	Dan Livingstone	PRT Growing Services Ltd.
Krista Copeland	Tolko Ltd.	Mike Madill	MFLNRO, SI Region
Vince Day	Canadian Forest Products Ltd.	Anna Monetta	MFLNRO, NI Region
Diane Douglas	MFLNRO Tree Imp. Branch	Wayne Nuyens	West Fraser Timber Ltd.
Dan Gaudet	Vernon Seed Orchard Company	Greg O'Neill	MFLNRO Tree Imp. Branch
Gary Giampa	MFLNRO Tree Imp. Branch	Roger Painter	SelectSeed Ltd.
Hilary Graham	MFLNRO Tree Imp. Branch	Doug Perdue	Dunkley Lumber
Barry Jaquish	MFLNRO Tree Imp. Branch		

Genetic Conservation Technical Advisory Committee

Name	Affiliation	Name	Affiliation
Dave Kolotelo (Chair)	MFLNRO Tree Imp. Branch	Dr. Jun-Jun Lui	Canadian Forest Service
Dr. Sally Aitken	University of BC	Dr. Michael Murray	MFLNRO SI Region
Charlie Cartwright	MFLNRO Tree Imp. Branch	Tory Stevens	Ministry of Environment
Lee Charleson	MFLNRO Tree Imp. Branch	Alan Vyse	Independent
Dr. Andreas Hamann	University of Alberta	Dr. Tongli Wang	University of BC
Jodie Krakowski	MFLNRO Squamish District	Dr. Alvin Yanchuk	MFLNRO Tree Imp. Branch

Extension Technical Advisory Committee

Name	Affiliation	Name	Affiliation
Diane Douglas (Chair)	MFLNRO Tree Imp. Branch	Roger Painter	SelectSeed Ltd.
Dr. Sally Aitken	University of BC	Kathie Swift	FORREX
Charlie Cartwright	MFLNRO Tree Imp. Branch	Dave Trotter	Min. of Agriculture and Lands
Tim Crowder	TimberWest Ltd.	Nick Ukrainetz	MFLNRO Tree Imp. Branch
Hilary Graham	MFLNRO Tree Imp. Branch	Tia Wagner	Tolko Ltd.

Pest Management Technical Advisory Committee

Name	Affiliation	Name	Affiliation
Jim Corrigan (Chair)	MFLNRO, Tree Imp. Branch	Dr. Ward Strong	MFLNRO Tree Imp. Branch
Tim Crowder	TimberWest Forests Ltd.	Dr. Jean Turgeon	Canadian Forest Service
Hilary Graham	MFLNRO Tree Imp. Branch	Gary Giampa	MFLNRO, Tree Imp. Branch
Dr. Michael Stoehr	MFLNRO Tree Imp. Branch		

Decision Support Advisory Committee

Name	Affiliation	Name	Affiliation
Guy Burdikin (Chair)	West Fraser Timber Ltd.	Matt LeRoy	MFLNRO Harvesting and Silv. Practices Branch
Lee Charleson	MFLNRO Tree Imp. Branch	Michael Postma	MFLNRO Tree Imp. Branch
Cathy Cook	Western Forest Products Inc.	Kori Vernier	Canadian Forest Products Ltd.
Dan Gaudet	Vernon Seed Orchard Company	Susan Zedel	MFLNRO Tree Imp. Branch

Seed Transfer Technical Advisory Committee

Name	Affiliation	Name	Affiliation
Lee Charleson (Chair)	MFLNRO Tree Imp. Branch	Leslie McAuley	MFLNRO Tree Imp. Branch
Dr. Sally Aitken	University of BC	Dr. Greg O'Neill	MFLNRO Tree Imp. Branch
Guy Burdikin	West Fraser Timber Ltd.	Dr. John Russell	MFLNRO Tree Imp. Branch
Diane Douglas	MFLNRO Tree Imp. Branch	Nick Ukrainetz	MFLNRO Tree Imp. Branch
Scott King	Louisiana Pacific Ltd.	Annette van Niejenhuis	Western Forest Products Inc.
Jodie Krakowski	MFLNRO Squamish District	Craig Wickland	MFLNRO Coast Region

Appendix 3: Species Plans

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