



Co-operative Growth and Yield Investment Strategy

(and 2003-04 Work Plan)

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Table of Contents

	Page
1. INTRODUCTION	1
2. CHANGING BUSINESS ENVIRONMENT FOR G&Y	1
2.1 EXPANDING ROLES FOR G&Y	1
2.2 DYNAMIC POLICY AND ECONOMIC CLIMATES	2
2.3 OLD AND NEW G&Y PARADIGMS	2
3. REGIONAL G&Y STRATEGIC ISSUES	3
3.1 PROVINCIAL FOREST PRODUCTIVITY COUNCIL (FPC) LINKAGES	3
3.2 SHARED SOUTHERN INTERIOR G&Y ISSUES	4
3.2.1 SITE PRODUCTIVITY ESTIMATES FOR REGENERATED STANDS	4
3.2.2 YIELDS OF POST-HARVEST REGENERATED STAND	5
3.2.3 YIELDS FOR PARTIAL CUTTING AND COMPLEX STANDS	5
3.2.4 YIELDS OF EXISTING NATURAL STANDS	6
4. THE CONTEXT FOR SHARED PROJECTS	6
4.1 CO-OPERATIVE STRUCTURES AND SCALES	6
4.2 RELATIVE TO LOCAL G&Y STRATEGIES	7
4.3 EXAMPLES FROM OTHER G&Y CO-OPS	7
4.3.1 INLAND NORTHWEST G&Y (INGY) CO-OP	7
4.3.2 WESTERN BOREAL G&Y (WESBOGY) ASSOCIATION	7
4.3.3 FOOTHILLS G&Y ASSOCIATION	8
4.3.4 COMMONALITIES	8
4.4 CRITERIA FOR CO-OPERATIVE PROJECTS	8
4.5 FUNDING OPTIONS	9
5. CO-OPERATIVE WORKPLAN	9
5.1 2003-04 WORKPLAN	9
5.2 REGIONAL ISSUES FOR POSSIBLE FUTURE CONSIDERATION	12

Appendices

Appendix I	2003-04 FIA SIGY CORE PROJECT PROPOSAL
Appendix II	2003-04 FIA SIGY PSP PROJECT PROPOSAL
Appendix III	2003-04 FIA CFS-MoF-SIGY ARMILLARIA MODELLING PROPOSAL

1. Introduction

The Southern Interior Growth and Yield Co-operative (SIGY) was formed in 1999 as a forum to address Growth and Yield (G&Y) issues of common interest in the southern interior. The Co-op consists of 20 forest companies holding Crown forest tenure in the Southern Interior Forest Region and the Crown resource ministries. This strategy builds on Co-op activities over the last two years to identify common G&Y issues and determine investment opportunities and priorities at a regional scale. This strategy is intended to:

1. Provide input for individual licensees and management units developing their own local forest investment strategies, including Forest Investment Rationales.
2. Identifying opportunities for co-operative G&Y projects that would produce economies of scale when shared by more than one management unit. These are the types of project SIGY could help facilitate.

2. CHANGING BUSINESS ENVIRONMENT FOR G&Y

2.1 Expanding roles for G&Y

As the emphasis in forest management shifts toward sustainability, the need to accurately predict future forest conditions increases. To support our sustainability claims, we rely more and more on G&Y to help us establish realistic expectations of forest growth and future yields of both timber and non-timber values. G&Y is not just about timber anymore. Predictive models for non-timber values such as habitat, biodiversity, visual quality, etc. are usually driven by G&Y predictions of future forest structure.

G&Y plays a major supporting role in many core business areas:

1. Planning
 - a. Timber Supply Analysis
 - b. Sustainable Forest Mgmt Plans and Certification
 - c. Other landscape-, forest-level and land-use plans
 - d. Mill supply forecasts
2. Inventory & Monitoring
 - a. Predicting static inventory volumes
 - b. Growing the inventory between re-inventories
 - c. Monitoring outcomes and checking predictions
 - d. Standards development
3. Silviculture
 - a. Stand prescriptions
 - b. Evaluating alternative practices
 - c. Investment analysis
 - d. Strategic and tactical planning
 - e. Policy development
4. Valuation and Appraisal
 - a. Cruising
 - b. Scaling
 - c. Land and licensee appraisal
 - d. Standards development

2.2 Dynamic policy and economic climates

Currently, the provincial government is in the midst of major policy changes, budget cuts and workforce downsizing. Although the final outcome of these changes is still known, it is abundantly clear the old G&Y paradigm in BC is no longer viable. Direct government G&Y support (staff and operating budgets) is being cut nearly in half. Consequently, the old government-dominated G&Y program is no longer unsustainable. A new G&Y delivery model for BC would probably incorporate some re-alignment and sharing of responsibilities, but details are still unavailable.

While new government policy initiatives appear to increase the need for G&Y, these policies have yet to explicitly address changes in G&Y responsibilities. The new Results-based Code emphasizes setting goals for desired future forest conditions. Since these goals form the basis for auditable results, the reliability of G&Y models will likely become increasingly important. Government is advancing the Defined Forest Area Management (DFAM) concept to further reduce its direct involvement in forest management activities. However, the promise of cost-neutrality to licensees appears to be restricting explicit “basic” DFAM responsibilities to just TSR and basic forest health (mostly beetle management). Since it appears G&Y will not be an explicit responsibility under “basic” DFAM, G&Y investments will continue to be eligible for FIA funding. G&Y has been explicitly mentioned, along with inventory, as possible components of an “enhanced” DFAM concept, but details including incentives and funding remain unclear. Finally, there is speculation that some G&Y activities might eventually become “due diligence” for various forest management activities.

Given the emphasis on cost-neutrality to licensees, new responsibilities will have to be funded with FIA and/or stumpage adjustments. The ability of FIA to absorb these additional responsibilities has been cut by 25% for 2003-04. Stumpage adjustment systems are still being debated. The ongoing discussion around area-based AACs suggests that although they might reduce the government’s need for G&Y, they may also increase licensees’ G&Y needs for harvest and mill supply planning. Undercurrent rumours of large-scale tenure and stumpage reforms could lead to even more dramatic changes in the G&Y environment. The immediate impacts of the American softwood tariff have temporarily shortened the planning horizon within BC’s forest sector.

While all this ongoing uncertainty makes it difficult to determine long-term G&Y responsibilities, it does appear the need for G&Y will only increase. As joint public land stewards, government and licensees can still co-operate to help ensure that some of the most important G&Y building blocks survive this period of uncertainty. This will help ensure the continued viability of G&Y in BC while a new G&Y paradigm evolves over the coming decades.

2.3 Old and new G&Y paradigms

Over the last decade, licensees have focused most of their G&Y investments on short-term, quick-return projects largely intended to affect AACs in the next TSR round. Licensees have largely been willing to let government manage the long-term aspects of G&Y, including model development and improvement. Over this same period, government G&Y programs cut their base operating budgets disproportionate to staff (FTEs) and became increasingly dependent on external funding sources for their operating budgets (i.e., FRDA, FRBC and FIA). Although this affected model development, the greatest impact was on data collection

which depends solely on operating budgets for contract dollars. Virtually all the funding for long-term G&Y data collection is now dependant on either FIA or FII. Both of these annual programs provide few incentives or continuity for long-term data programs (e.g., PSPs and EPs) which are needed to support continued model improvement. Although government staff reductions will affect model development progress, government is making an effort to retain core support staff around each of its models. However, the infusion of fresh data and knowledge is crucial to on-going model improvement efforts.

Coincidentally, an emerging emphasis on monitoring paralleled the decline in funding for the traditional data programs (e.g., PSPs and EPs). Many envision a new G&Y data paradigm emerging incorporating monitoring as a new data source for G&Y modelling. While there is no question that monitoring is destined to take a lead role in checking model predictions, it is still uncertain to what extent monitoring data will contribute to initial model calibration. Short of a major shift in G&Y modelling philosophy, the traditional data sources (PSPs and EPs) will probably continue to play significant roles even with the addition of monitoring. Different models will require different balances of these three types of data. One thing is certain; the growing competition over shrinking budgets will necessitate a re-rationalization of G&Y spending, including the historic G&Y data programs. This encourages the identification of opportunities to create economies of scale through co-operative sharing of appropriate G&Y investments.

3. REGIONAL G&Y STRATEGIC ISSUES

3.1 Provincial Forest Productivity Council (FPC) Linkages

Regional co-ordination of G&Y in BC began 30 years ago with creation of the Forest Productivity Committee which established a network of G&Y plots in coastal second-growth stands. In 1986, the Chief Forester established separate coastal and interior Forest Productivity Councils (FPC) to provide strategic G&Y program guidance. The two Councils merged in 1995 and then restructured in 1997. SIGY has been affiliated with FPC since its incorporation in 1999. Due to dwindling industry participation and government financial support, the FPC has been inactive since September 2001. The Chief Forester has not ruled out Council re-vitalization once new forest policies are in place and a new G&Y business environment emerges. FIA currently links G&Y project eligibility to consistency with existing FPC-adopted strategies and standards.

This SIGY strategy is in harmony with the provincial strategies of the FPC and its various Working Groups. The regional issues identified by SIGY have provincial counterparts within the FPC strategies. This highlights the universal nature of many G&Y issues and the resulting opportunities for co-operative investments.

The FPC's current strategy (April 2001) identifies the following broad priority issues:

1. Maintenance of existing data sets and re-measurement schedules.
2. Complex stand work including:
 - developing tools for assessing and projecting stand structures,
 - modeling for forest level applications,
 - assessment of response to management practices,
 - determination of yield projections, and
 - determination of site productivity.

3. Wildlife/ Habitat/ Biodiversity - Forest Measurement Linkages
4. Forest Resources Inventory Projection Tools
5. Site Productivity Tools and Measurement
6. Forest Health

3.2 Shared Southern Interior G&Y issues

Beginning in 2001-02, SIGY undertook reviews of published documents related to Timber Supply Review (TSR) in order to identify common G&Y issues and their potential affects on Allowable Annual Cuts (AACs). The basic principles governing how different G&Y investments affect timber supply are best understood in relation to the anatomy of a typical harvest profile in BC. The SIGY strategic report entitled Overview of G&Y in TSR provides a good summary of these principles. This, and SIGY's other strategic reports, are available on SIGY's website under "Strategies".

Among information sources referenced in SIGY's GY-TSR Summaries by TSA are the standard sensitivity analyses found in each TSA Timber Supply Analysis Report. Although these provide a useful basis for comparison, potential G&Y effects may sometimes get masked by implicit harvest flow policy constraints. For instance, if G&Y improvements showed no short-term benefits (immediate AAC uplifts), it could be the underlying harvest flow policies did not allow it. The intent of such a policy might be to manage the magnitude and rate of the resulting falldown and/or to intentionally disable a short-term Allowable Cut Effect (ACE) based on risk and uncertainty assessments of the supporting information. Occasionally, an immediate uplift was explored through an alternate harvest flow. Mid- and long-term effects then flowed from these short-term harvest flow decisions, accordingly. Despite these limitations, some common G&Y issues were identified across the 14 TSAs in the southern interior:

1. Site productivity estimates for regenerated stands
2. Stand yield predictions for:
 - a. Post-harvest regenerated (managed) stands
 - b. Partial cutting and other complex stands
 - c. Existing (natural) stands

3.2.1 Site productivity estimates for regenerated stands

It is widely acknowledged that inventory-based site index estimates from existing natural stands often underestimate the site index observed in stands regenerated after harvest. The most recent TSRs all include sensitivity analyses using alternative site index estimates from the provincial Old Growth Site Index (OGSI) Project. The Chief Forester does not consider OGSI data to be sufficiently localized for inclusion in the base case. The sensitivity analyses using OGSI adjustments showed consistent potential for AAC gains in the mid- to long-term as the harvest profile shifts to regenerated stands over time. Potential short-term gains may have been masked by harvest flow policy. Obtaining better localized site index predictions for post-harvest regenerated stands continues to be the Chief Forester's most consistent G&Y recommendation within his AAC determinations. Improved site productivity estimates may also help to expand boundaries of the timber harvesting landbase and partially mitigate adjacency issues via accelerated green-up rate. TFL

experience supports the expectation of a return on investment from site index adjustments, through AAC lifts and/or mitigation of downward pressures, depending on the local situation.

To date, the Chief Forester has accepted two site index estimation methods within past TFL determinations. The Site Index Adjustment (SIA) method approaches the issue from an inventory perspective. It utilizes management unit sampling and ratio-adjustments similar to the VRI. Economies of scale are generally not available with an inventory-like approach. The Site Index Biogeoclimatic Ecological Classification (SIBEC) method takes a modelling approach to the same issue. Since SIBEC is a shared provincial database, economies of scale are possible. Historically, application of both methods in TSR requires some form of eco-mapping (PEM or TEM) to link the site index estimates to the landbase.

3.2.2 Yields of post-harvest regenerated stand

Obtaining better site productivity estimates is arguably the quickest way to improve expectations for regenerated stand yields, but other factors (both positive and negative) may be just as important depending on the situation. Like site productivity, the primary impact of regenerated stand yields on timber supply is felt in the mid- to long-term as harvest profiles shift to managed stands. Where short-term ACE effects are possible, they have probably been masked by harvest flow policy in past TSRs. Large AAC gains were made at the beginning of TSR-I by shifting regenerated stands over to managed stand yield curves (TIPSY) after harvest. Continued improvement of managed-stand G&Y models is needed to further refine yield estimates. A shortage of adequate data is one of the main impediments. The greatest outstanding issues relate to stand establishment (e.g., ingress and vegetation management), species dynamics (e.g., succession and break-up) and yield adjustments to account for local difference in landbase characteristics and forest health losses (e.g., OAFs). For example, in the Kootenays the Chief Forester identified the need to reduce uncertainty around yield adjustments for root rot. Root rot occurs throughout the southern interior, but its impact is likely greatest in the most productive ecosystems (e.g., ICH). Many of the stand establishment and species dynamics issues support the need for modelling more complex stand conditions and processes.

3.2.3 Yields for partial cutting and complex stands

While partial cutting is less common than clearcutting across the southern region, it is locally important in some management units (e.g., Invermere), ecosystems (e.g., IDF & ICH) and management zones (e.g., VQO). Compared to even-age silvicultural systems, there is greater G&Y uncertainty around complex stand conditions, whether naturally occurring or promoted by partial cutting.

Most of the current investments in modelling are focused on various aspects of complex stands. Expansion into complex stands has been the prime focus of TASS modelling efforts over the last 10+ years. Differential growth of understory trees is being addressed through modelling of canopy light penetration. While G&Y modellers agree this process-driven approach makes the most sense biologically, it also presents several technical hurdles. Incremental progress is being made on the complex version of TASS with joint ministry and industry support. Operational hopes for a (quicker) interim or alternate tool lead MoF to import the US Forest Service's Forest Vegetation Simulator (FVS) model in 1997. It was converted to metric and renamed PrognosisBC. Initial disappointment with behaviour and

application range of the original US version spawned subsequent data collection efforts to support recalibration and broader applicability. Several southern interior licensees contributed to these efforts. Version 3.0 will be released within the next 6 months. It will be the first version of PrognosisBC calibrated solely with BC data and will include an operational regen establishment module. The innovative switch from site productivity estimates tied to individual BEC Site Series to site index classes within SIBEC should make data collection more cost-effective and broaden the model's geographic applicability. Even so, PrognosisBC improvements will still require a great quantity of new growth data (PSP re-measurements, etc) than TASS, due to fundamental differences in the two models.

There are many perspectives on the pace of model development here in BC, but our experiences generally agree with experiences around the world. G&Y modelling is a speculative venture involving multiple iterations that frequently challenge initial expectations and expose new opportunities. Consequently, encouraging a variety of models produces healthy investment diversification across the forest sector. Because modelling is an on-going adaptive process, it requires a stable framework of long-term support. Sharing investments in modelling and supporting data also reduces the risk exposure of individual investors and builds common trust in the results.

3.2.4 Yields of existing natural stands

With few exceptions, inventory audits in the mid-90's found inventory yield estimates were generally acceptable at the management unit level. However, biases were occasionally identified on portions of a landbase or in particular timber types. Species composition changes continue to be a concern as the older inventories age. Along with undertaking new inventories, there are opportunities to improve loss factor estimates (e.g., decay) in certain situations where the current loss factors are weak or skewed (e.g., ICH). The current VRI standard includes optional provisions for developing localized Net Volume Adjustment Factors (NVAF). There may be opportunities for developing more regional, eco-based NVAF projects that would produce broader economies of scale.

4. THE CONTEXT FOR SHARED PROJECTS

4.1 Co-operative structures and scales

Organizational structures already exist for integrating co-operative investments at the corporate level within government ministries and forest companies. At the management unit level, several TSAs have already established formal co-operative structures (e.g., proactive TSA committees, IFPAs, etc) to facilitate shared investments among licensees within a TSA. The move to Defined Forest Area Management (DFAM) would impose co-operative structure in the remaining TSAs.

When SIGY was first envisioned 8 years ago, formal TSA co-operative structures were not as common. Consequently, SIGY's original vision focused on "helping the TSAs catch up with the TFLs" by providing the missing structure for co-operative G&Y investments at both TSA and regional scales. The emergence of new TSA-level co-operative structures means SIGY's role can focus on facilitating co-operative projects at scales larger than a single mgmt unit (regional).

4.2 Relative to local G&Y Strategies

SIGY supports the efforts of individual management units in developing their own local G&Y strategies that address their unique needs and priorities. Local G&Y strategies can be stand-alone documents or integrated within other strategies and/or manage plans. Some form of local strategic planning is now required to produce Forest Investment Rationales as a pre-requisite to FIA project funding.

SIGY strategies are intended to help management units recognise their inter-dependence on larger regional- and provincial-scale G&Y issues and to help them identify opportunities for co-operative projects that coincide with their own local priorities. Where appropriate, SIGY can also help facilitate the planning and delivery of shared projects.

Given tight funding and markets, management units must look for ways to cut costs and gain efficiencies. Going it alone continues to look less and less feasible. When considering shared projects, cost-benefit analyses must weigh the potential for economies of scale against relative gains from a more localized approach. Sometimes a localized solution is required, as in the case of inventories. In other cases, like site productivity, both local and regional options are available. In the case of G&Y models and their supporting data, shared investments have considerable cost advantages. Management units often share common species, ecology and management practices. Regional data and models can usually explain considerable local variation when they encompass the regional range of site productivity, species composition, density and common management practices. Many regional models also have additional localization capabilities (e.g., OAFs, pest modules, decay adjustments, self-calibration, etc).

4.3 Examples from other G&Y Co-ops

SIGY is one of four G&Y Co-ops active in the greater Northern Rocky Mountain region. All of these co-ops have a common focus: to collect and share G&Y data to improve G&Y models and forest management efficiencies.

4.3.1 Inland Northwest G&Y (INGY) Co-op

The Inland Northwest G&Y Co-op was founded in 1984 and is hosted by the University of Montana. Co-operating forest companies, government agencies and consultants all benefit from data sharing and the resulting model improvements. INGY maintains a large legacy database of growth plots and is currently promoting a standardized experimental design to gather data for developing G&Y models sensitive to competing vegetation effects in young stands.

4.3.2 Western Boreal G&Y (WESBOGY) Association

The Western Boreal G&Y Association was also established in the mid-1980's to address the shared boreal mixedwood G&Y issues of licensees and government agencies across northern BC, Alberta, Saskatchewan and Manitoba; it is hosted by the University of Alberta.

WESBOGY's current focus is a standardized experimental design examining density interactions within various combinations of spruce and aspen.

4.3.3 Foothills G&Y Association

The Foothills G&Y Association was formed in 2000 by 9 Alberta licensees interested in pooling resources to improve G&Y estimates for lodgepole pine. It is hosted by the Foothills Model Forest in Hinton, Alberta. The association is currently focusing on 5 projects: 1) a standardized experimental design examining pine regeneration practices, 2) improving estimates of post-harvest regenerated pine site productivity, 3) co-operative management of historic CFS research trials, 4) development of stand and stock table projection techniques and 5) field experiments to examine nutrition and density management of fire-origin pine. These projects are cost-shared in proportion to each member's pine area.

4.3.4 Commonalities

The common thread through these 3 co-ops is the collection and sharing of data that can be used to build and improve G&Y models. All three have developed their own standardized field experiments to examine common G&Y issues. INGY and Foothill Pine also provide continuity for some old data programs that have continued importance.

4.4 Criteria for co-operative projects

Only certain types of G&Y investments are capable of producing economies of scale when shared co-operatively among management units. SIGY has developed the following list of criteria to help identify the types of projects the Co-op would consider becoming actively involved with.

SIGY project criteria:

1. Economies of scale exist
2. Benefits more than one Mgmt Unit
3. FIA eligibility
4. Relevant to priority TSR issue(s);
Potential to influence next TSR preferred
5. Gov't acceptance history and/or potential
6. Attractive cost/benefit
7. Scalable scope to accommodate partial funding
8. SIGY involvement adds value

There are many types of G&Y investments that do not produce economies of scale beyond one management unit. In general, these are inventory-like projects where the focus is characterization of a specific landbase. Inventories are normally conducted at the same scale as management unit planning (TSR, etc). Consequently, sampling intensity within each management unit cannot be significantly reduced by conducting simultaneous inventories across multiple management units (i.e., no economies of scale). Examples of inventory-like projects includes VRI and TEM/PEM. Most monitoring programs can also be

considered inventories in this regard. Even site productivity adjustments using the SIA method behave like an inventory.

Economies of scale tend to exist for projects that focus on shared species, ecology and management practices, rather than unique landbase (inventory) characteristics. Within G&Y, these types of projects tend to focus on models and their supporting data. Consequently, the supporting investments can be shared by several management units with resulting economies of scale. Developing management unit-specific models is usually cost-prohibitive and further restricted by the limited range of sampling opportunities for the supporting data.

4.5 Funding options

Historically, shared G&Y projects have been funded with both direct and in-kind contributions. Direct contributions to a central co-op organization go to fund functions such as co-op administration, strategic planning, education, data management and analysis, and reporting. Centralized project funding is also a way to even-out local investment inequities. For instance, one TSA may have 70 plots and its neighbour 30. Costs can be re-distributed proportional to the value of the pooled database to both TSAs, on an area or AAC basis. Alternatively, co-ops establishing new plots may assign a proportional number of installations to each management unit or member company, which are then maintained with local in-kind contributions.

Because the existing legacy data programs (PSPs & EPs) were never intended to have proportional distribution over all management units, centralized project funding provides a way to maintain investment equity. The existing PSPs only have value in a super-regional context. There are too few PSPs within individual management units to have any value on their own. This is also true, to a lesser extent, for the EPs. While most EPs can stand on their own, their value increases with greater numbers and broader distribution.

The current FIA-LBIP process makes it increasingly difficult to integrate co-operative investments at scales larger than a single forest license. SIGY continues to help pioneer large-scale co-operative FIA projects involving consensus building among many licensees and multiple allocation transfers. SIGY can also help researchers build support for G&Y research proposals submitted through FII (the research arm of FIA).

5. CO-OPERATIVE WORKPLAN

At the moment, long-term planning is confounded by continued uncertainty around policies, responsibilities and markets. Consequently, this multi-year workplan sets out specific projects for 2003-04 and identifies general opportunities for future years. During 2003-04, continued policy clarification with further dialogue and co-operative strategy development (e.g., Long-term Data Strategy) will help refine future needs and project opportunities.

5.1 2003-04 Workplan

Project	Issue(s)	Goal(s)	Implementation
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Project	Issue(s)	Goal(s)	Implementation
Integrated Long-term Data Strategy	<ol style="list-style-type: none"> 1) Important gaps remain in our existing model suite 2) Inadequate data is a major impediment 3) The old data paradigm is no longer sustainable 4) The emerging emphasis on monitoring 	<p>Re-rationalize and integrate modelling data needs for PSPs, EPs and monitoring to ensure a cost-efficient suite of data will be available for the continued development of G&Y models (both existing and new)</p>	<p>FIA 2003-04 Included within SIGY Core Project Total Core Budget: \$115K from SIGY membership</p> <p>Strategy will be updated annually to stay current with changing policy and technical issues.</p>
G&Y Training & Extension	<ol style="list-style-type: none"> 1) Need for G&Y is increasing with SFM, etc. 2) Responsibilities and funding models are changing 3) Operational staff (esp volume-based licensees) have little G&Y experience 	<p>Increase awareness and understanding of G&Y among operational audiences to improve the operational application of G&Y and associated investment decisions (FIA, etc)</p>	<p>FIA 2003-04 Nested within SIGY Core Project Total Core Budget: \$115K from SIGY membership</p> <p>A multi-yr, on-going Co-op priority</p>
2003-04 PSP Re-measurements	<ol style="list-style-type: none"> 1) See Data Strategy above 2) Existing PSPs only have value in a super-regional context 3) Gov't stopped direct funding of data collection 5 yrs ago 4) Threat of non-strategic abandonment growing with re-measurement backlog 	<p>Re-measure priority plots and strategically abandon the rest</p> <p>Re-assess needs after development of Long-term Data Strategy. May consider new installations in the future, if warranted.</p>	<p>FIA 2003-04 SIGY-facilitated project PSP Budget: \$440K from TSAs & TFLs (voluntary)</p>

Project	Issue(s)	Goal(s)	Implementation
Modelling Armillaria's G&Y impacts	<ol style="list-style-type: none"> 1) Chief Forester has asked for better info on TSR impacts 2) Evaluation of silvicultural alternatives requires better G&Y understanding 3) Chronic growth losses are poorly understood 	<p>Produce TIPSy OAFs for TSR and an Armillaria effects submodel for TASS</p> <p>Pilot test innovative sampling and modelling techniques on ICH Fdi – with an eye to future expansion into others species and ecosystems</p>	<p>On-going CFS-lead project with MoF & SIGY support -- multi-yr FIA/FII funding</p> <p>2003-04 Combined Budget: \$180K</p>

5.2 Regional issues for possible future consideration

The following represent co-operative opportunities with potential for economies of scale, but needs and priorities remain uncertain. Continued discussions and strategy development may lead to development of future co-operative projects where shared priorities and funding coincide. This is not intended to be an exhaustive list.

Issue(s)	Co-operative Opportunities
Site Productivity of Post-harvest Regenerated (Managed) Stands	SIBEC cost-efficiencies could be improved by co-ordinating sampling across management units. Developing shared bio-physical models to bridge limited SIA/SIBEC sampling opportunities might also produce cost efficiencies.
G&Y Experimental Plots (EPs) to advance stand development knowledge and improve prediction of treatment response	Currently awaiting FII funding decisions. Depending on FII and Long-term Data Strategy, could consider co-operative adoption of threatened legacy EPs (primarily MoF) and consider new EP designs to explore shared operational issues.
Volume loss factors for decay	Examine weaknesses in existing models and possibly consider co-operative development of eco-based NVAF for problem species (e.g., ICH Cw & Hw)
Other yield adjustments E.g., OAFs, pest models, etc	Landbase-specific OAF's tend to use inventory-like methods. However, regional pest OAFs could present co-op opportunities, as would development of pest models (e.g., the current Armillaria modelling project).
Site Index Tool Development E.g., site curves, growth intercept, etc	Most of the major species have been covered recently, but there may be opportunities for improving existing tools or creating new ones for more species. FPC's Site Productivity Working Group Work Plans could provide initial guidance.
Volume (taper) Equations	Current equations are regionally eco-based and biased to natural stands. There would need to be solid justification for further localization at this time. They should be re-visited once managed stand data is available.

<p>Co-operative investments in G&Y model development and improvement</p>	<p>Currently, most development work is supported with FII and gov't salaries. If this process fails to address end-user needs, co-operative involvement might be appropriate. The potential range of co-op involvement goes from supplemental funding to model adoption. Careful consideration should precede going down either path.</p>
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Appendices

Appendix I
2003-04 FIA SIGY Core Project Proposal



2003-04 FIA-LBIP
Project Title: SIGY Core
Project Funding Request to
SIGY Members

Project Description:

Annual member assessments to support the core activities of the SIGY Co-op. Core activities for 2003-04 consist of deliverables in two sub-project areas:

- 1) Strategic support for member G&Y investment decisions:
 - a. Long-term G&Y Data Strategy for the Southern Interior (working draft): Integrating Permanent Sample Plot (PSP), Experimental Plot (EP) and monitoring strategies to enable continuous improvement of future forest predictions.
 - b. Co-op Annual Report: Documenting Co-op activities including helping members apply SIGY strategies in their own local G&Y investment planning and building partnerships to fund and deliver SIGY's operational G&Y projects (under separate projects).
- 2) G&Y Communication and Education:
 Activities to enhance awareness and understanding of G&Y, specifically: Maintenance of the SIGY website and e-mail newsgroup and a workshop.

Investment rationale (business case):

Since 1999, SIGY has been helping its members improve their own local G&Y investment decisions and realize economies of scale through co-operative investment in regional strategies and educational activities that address shared G&Y issues. SIGY's core projects also provide strategic and communication support for the Co-op's separate operational projects: root rot modelling and the collection of long-term modelling data (PSPs & EPs).

A shared co-operative approach produces economies of scale for many types of G&Y investments. Apart from management unit inventories, much of G&Y focuses on regional-scale predictive models addressing shared species, ecology and management practices. SIGY members work together to increase their awareness and knowledge of G&Y, establish strategic investment priorities at a regional scale, and form investment partnerships to address priority issues shared by members.

Social, environmental and economic pressures are increasing forest management information needs and spurring the demand for better G&Y knowledge and decision support tools. G&Y is not just about timber anymore. Predictive models for non-timber values (habitat, biodiversity, VQOs, etc) also require G&Y predictions of future forest structure. Existing G&Y tools are inadequate for the emerging tasks ahead.

Meanwhile, the G&Y business environment is undergoing significant change with a number of new government initiatives including the Results-based Code (RBC), Defined Forest Area Management (DFAM) and downsizing of the government G&Y program. RBC shifts the focus from process to attaining prescribed results (goals). G&Y is used extensively in the setting of stand- and forest-level goals for both timber and non-timber values and monitoring progress toward their attainment. DFAM is transferring responsibilities for TSR to licensees. TSR relies heavily on G&Y information.

Future AAC improvements will require better information and models to predict and monitor G&Y expectations. Although the government has not explicitly transferred G&Y responsibilities to licensees, it is already reducing its direct investments in G&Y by nearly 50%. Economic conditions continue to reduce funding available to government and licensees for G&Y activities. In this business climate, a co-operative approach is proving to be an efficient and effective method for addressing important shared G&Y needs in the southern interior.

FIA Land Base Investment Rationale Suggestions:

TSR and SIGY documents are good sources of mgmt unit-specific issues. Generically: need to reduce risk and uncertainty around G&Y estimates for existing and future stands (PSPs) including impact assessments for root rot (*Armillaria* modelling); improve G&Y investment decisions and application of existing G&Y information by increasing awareness and knowledge of G&Y and conducting regional-scale co-operative G&Y investment planning (Core). SIGY projects are eligible under Information Gathering & Mgmt and/or Training & Extension Components; all can be considered on-going, multi-year projects, at least regionally.

Project Contacts:

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<http://srmwww.gov.bc.ca/forestproductivity/regional/sigy/index.htm>

FIA Budget and Funding Path:

\$115K Total – members assessed at \$0.0105/m³ of AAC for Replaceable Forest Licenses
 See attached assessment list

Given that FIA allocations will decline by approximately 25% in 2003-04, SIGY has reduced its core budget proportionally and reduced project scope accordingly. SIGY's 2002-03 FIA budget was \$155K.

Licensee allocation transfers will be used again this year to transfer FIA funds from supporting members to the project's lead licensee, West Fraser (Quesnel). MoF and PwC have agreed to waive the \$5K transfer minimum for SIGY members if transfers are submit early. Like last year, members may elect to aggregate their individual Forest License assessments within or across TSAs. SIGY will distribute transfer forms once members determine their final contribution and aggregations.

2003-04 FIA-LBIP: SIGY Core Project -- Member Assessments

Licensee	TSA	R-FL ID	AAC (m3)	by R-FL	by Company
ADAMS LAKE LUMBER (IFP)	Kamloops	A18693	249,594	\$ 2,622.81	\$ 2,622.81
AINSWORTH LUMBER CO. LTD.	Lillooet	A18700	348,168	\$ 3,658.65	\$ 3,658.65
ATCO LUMBER LTD.	Arrow	A20193	151,627	\$ 1,593.34	
ATCO LUMBER LTD.	Kootenay	A20218	20,167	\$ 211.92	\$ 1,805.26
BELL POLE COMPANY	Arrow	A20196	11,970	\$ 125.78	
BELL POLE COMPANY	Kamloops	A18687	13,272	\$ 139.47	
BELL POLE COMPANY	Okanagan	A18666	45,286	\$ 475.88	
BELL POLE COMPANY	Revelstoke	A18992	19,290	\$ 202.70	
BELL POLE COMPANY	Robson	A17799	11,112	\$ 116.77	\$ 1,060.60
DOWNIE STREET SAWMILLS	Revelstoke	A31102	132,152	\$ 1,388.69	\$ 1,388.69
GALLOWAY LUMBER COMPANY	Cranbrook	A19042	131,100	\$ 1,377.64	\$ 1,377.64
GORMAN BROS. LUMBER LTD.	Okanagan	A18671	231,349	\$ 2,431.08	\$ 2,431.08
J.H. HUSCROFT LTD	Kootenay	A20213	78,644	\$ 826.41	\$ 826.41
KALESNIKOFF LUMBER CO.	Arrow	A20194	34,703	\$ 364.67	
KALESNIKOFF LUMBER CO.	Kootenay	A30172	55,247	\$ 580.55	\$ 945.22
LIGNUM LIMITED	100 Mile	A20003	103,446	\$ 1,087.04	
LIGNUM LIMITED	Williams Lake	A20018	331,416	\$ 3,482.62	\$ 4,569.66
LP ENGINEERED WOOD	Golden	A17645	342,466	\$ 3,598.73	
LP ENGINEERED WOOD	Okanagan	A18669	147,597	\$ 1,550.99	\$ 5,149.73
MCBRIDE FOREST INDUSTRIES	Robson	A15429	177,107	\$ 1,861.09	\$ 1,861.09
MEADOW CREEK CEDAR LTD.	Kootenay	A30171	96,513	\$ 1,014.19	\$ 1,014.19
POPE & TALBOT LTD.	Boundary	A18969	434,549	\$ 4,566.37	\$ 4,566.37
RIVERSIDE FOREST	Arrow	A20191	47,589	\$ 500.08	
RIVERSIDE FOREST	Kamloops	A18689	34,133	\$ 358.68	
RIVERSIDE FOREST	Merritt	A18697	19,340	\$ 203.23	
RIVERSIDE FOREST	Okanagan	A18667	767,413	\$ 8,064.20	
RIVERSIDE FOREST	Williams Lake	A20015	378,571	\$ 3,978.13	
RIVERSIDE FOREST	Williams Lake	A20016	114,129	\$ 1,199.30	
RIVERSIDE FOREST	Williams Lake	A20019	407,621	\$ 4,283.40	\$ 18,587.03
SLOCAN FOREST PRODUCTS	Arrow	A20192	197,841	\$ 2,078.97	
SLOCAN FOREST PRODUCTS	Invermere	A18979	231,005	\$ 2,427.47	
SLOCAN FOREST PRODUCTS	Kamloops	A18688	269,638	\$ 2,833.43	
SLOCAN FOREST PRODUCTS	Kootenay	A30176	65,155	\$ 684.67	
SLOCAN FOREST PRODUCTS	Quesnel	A20011	382,194	\$ 4,016.21	
SLOCAN FOREST PRODUCTS	Robson	A15430	175,018	\$ 1,839.14	\$ 13,879.89
TEMBEC INDUSTRIES INC.	Cranbrook	A19040	607,652	\$ 6,385.38	
TEMBEC INDUSTRIES INC.	Invermere	A18978	263,843	\$ 2,772.54	
TEMBEC INDUSTRIES INC.	Kootenay	A20212	115,216	\$ 1,210.72	\$ 10,368.65
TOLKO INDUSTRIES LTD.	Kamloops	A18686	641,088	\$ 6,736.74	
TOLKO INDUSTRIES LTD.	Merritt	A18696	268,954	\$ 2,826.25	
TOLKO INDUSTRIES LTD.	Okanagan	A18672	234,228	\$ 2,461.34	
TOLKO INDUSTRIES LTD.	Quesnel	A20010	288,704	\$ 3,033.79	\$ 15,058.11
WELDWOOD OF CANADA	100 Mile	A20001	398,426	\$ 4,186.78	
WELDWOOD OF CANADA	Quesnel	A20013	463,716	\$ 4,872.86	

WELDWOOD OF CANADA	Williams Lake	A20017	479,372	\$ 5,037.38	\$ 14,097.02
WEST FRASER MILLS LTD.	100 Mile	A20002	462,405	\$ 4,859.09	
WEST FRASER MILLS LTD.	Kamloops	A18690	198,668	\$ 2,087.66	
WEST FRASER MILLS LTD.	Quesnel	A20005	243,366	\$ 2,557.36	
WEST FRASER MILLS LTD.	Williams Lake	A20020	192,450	\$ 2,022.32	
WEST FRASER MILLS LTD.	Williams Lake	A20021	127,004	\$ 1,334.60	\$ 12,861.03
WYNDEL BOX & LUMBER	Kootenay	A20214	65,461	\$ 687.88	\$ 687.88
		Total w/ Robson	11,306,975	\$ 118,817.00	\$ 118,817.00
		Total w/o Robson	10,943,738	\$ 115,000.00	\$ 115,000.00

Notes:

1. AACs as of Feb 20, 2003, source:
<http://www.for.gov.bc.ca/RTE/apportionment/apportionment.htm>
2. \$0.0105/m³ assessment based on AACs of Replaceable Forest Licenses only.
3. On April 1, Robson Valley will become part of the new Southern Forest Region; SIGY extends an invitation to Robson licensees to participate in the Co-op.

Appendix II
2003-04 FIA SIGY PSP Project Proposal

**2003-04 FIA-LBIP****Project Title:****SIGY PSP Re-measurements****Project Funding Request to:****Southern Region TSAs & TFLs****Project Description:**

Re-measurement of 366 high priority Growth and Yield (G&Y) Permanent Sample Plots (PSPs) across the Southern Forest Region regardless of location and tenure ownership. Maintaining regional strategic priorities allows the project's scope to be scaled to accommodate partial funding.

Investment Rationale (Business Case):

SIGY's Co-operative Investment Strategy identifies three general types of G&Y investments which have potential economies of scale when shared among multiple management units. These are: 1) G&Y modelling, 2) PSPs and 3) Experimental Plots (EPs). All three represent long-term investments. Economies of scale and greater sampling opportunities occur when the focus of these investments is placed on shared species, ecosystems and management practices. These same investments are often cost-prohibitive and logistically impossible for individual management units to attempt on their own. Long-term shared G&Y investments are the focus of G&Y Co-ops world-wide. Cost-sharing enables investors to make cost-efficient, due-diligence contributions to improving predictions of future forest growth in support of sustainability claims.

In contrast, there are many inventory-like G&Y investments which focus on characterizing the unique attributes of individual management units. In general, these are short-term investments, for instance, VRI, PEM, SIA, etc. and there is little potential for economies of scale, since they are management unit-specific.

PSPs and EPs are modellers' preferred sources of growth data for calibrating G&Y models. BC's extensive PSP program, like many others around the world, is intended specifically for model building. This data is used regularly to build and continually improve both new and existing operational G&Y models for both natural and managed stands. This includes the dominant G&Y models used in the southern interior: VDYP, TASS-TIPSY, PrognosisBC, and SIBEC. These models are used extensively for timber supply analysis (a new DFAM responsibility), estimating inventory volumes, comparing silvicultural options (Results-based Code goals and prescriptions) and advancing our understanding of tree growth and stand development. These same models also provide the stand structure predictions that drive most non-timber models for habitat, biodiversity, visual quality, etc.

Historically, broad-scale, long-term G&Y investments have been carried by the Crown in BC. Recent downsizing and policy shifts have reduced the government's base-budget investments in G&Y by nearly 50%. In recent years, the Crown has shifted a large proportion of the long-term G&Y budget to external sources (FRDA, FRBC, FIA, FII). Modelling and EPs have access to FII, but PSPs are only eligible for FIA funding. This means licensees will determine the fate of the PSP Program currently at risk.

Province-wide, there are 5453 active PSPs. Of these, 3038 have been assigned priority ranking by the Forest Productivity Council. The new Southern Forest Region has 1787 of these priority PSPs. The following table indicates there are 366 priority plots due for re-measurement in 2003-04 within the Southern Region. More than half of these plots are already overdue (188 backlog plots). PSPs are on a 10 year re-measurement cycle. Delaying re-measurement more than 15 years places plot integrity in jeopardy. Continued postponement eventually leads to non-strategic abandonment. If we intervene now and impose a strategic framework, the highest priority plots can be saved (re-measured) and the low priority plots abandoned.

PSPs in the Southern Forest Region								
Total Plots	Total Active Plots		Re-measurement Schedule					
			2003-04					
	Total Active	Priority Active	Active			Priority		
			Backlog	Reg Sched	Total	Backlog	Reg Sched	Total
3178	2865	1787	356	314	670	187	179	366

Extended 4-yr Re-measurement Schedule							
2004-05		2005-06		2006-07		2007-08	
Total	Priority	Total	Priority	Total	Priority	Total	Priority
276	130	146	89	172	118	381	229

These PSPs are neither inventory nor monitoring plots. There were never intended to represent any specific landbase. Instead, they are selected to represent a wide biological range of stand conditions for modelling purposes. Regional-scale coordination makes sense, as the uneven plot distribution creates local investment inequities. Strategic and economic efficiencies would be lost if licensees undertook re-measurements individually without regard for regional priorities. Only co-operative recognition of regional priorities enables both strategic and economic efficiencies to be maintained in the face of partial funding.

FIA Land Base Investment Rationale Suggestions:

TSR and SIGY documents are good sources of mgmt unit-specific issues. Generically: need to reduce risk and uncertainty around G&Y estimates for existing and future stands (PSPs) including impact assessments for root rot (*Armillaria* modelling); improve G&Y investment decisions and application of existing G&Y information by increasing awareness and knowledge of G&Y and conducting regional-scale co-operative G&Y investment planning (Core). SIGY projects are eligible under Information Gathering & Mgmt and/or Training & Extension Components; all can be considered on-going, multi-year projects, at least regionally.

Project Contacts:

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<http://srmwww.gov.bc.ca/forestproductivity/regional/sigy/index.htm>

Budget:

Basis: 366 priority PSPs with an average plot re-measurement cost of \$1200, including 10% for QA/QC and a 10% FIA delivery allowance.

The following are suggested apportionments. Project contributions are voluntary and flexible. Final project scope will be scaled to the available funds according to regional priorities.

Cost Apportionment based on Management Unit AAC				
Mgmt Unit			AAC	MU Cost
100 Mile	TSA		1,334,000	\$24,923.53
Quesnel	TSA		3,248,000	\$60,683.38
Williams Lake	TSA		3,768,400	\$70,406.17
Kamloops	TSA		2,682,770	\$50,123.01
Lillooet	TSA		635,900	\$11,880.71
Merritt	TSA		1,508,050	\$28,175.36
Okanagan	TSA		2,655,000	\$49,604.18
Arrow	TSA		550,000	\$10,275.82
Boundary	TSA		700,000	\$13,078.31
Cranbrook	TSA		871,000	\$16,273.16
Golden	TSA		530,000	\$9,902.15
Invermere	TSA		581,570	\$10,865.65
Kootenay Lake	TSA		681,300	\$12,728.94
Revelstoke	TSA		230,000	\$4,297.16
Robson Valley	TSA		602,377	\$11,254.39
Slocan	TFL	3	80,000	\$1,494.66
Weldwood	TFL	5	300,000	\$5,604.99
Pope & Talbot	TFL	8	175,000	\$3,269.58
Tembec Industries	TFL	14	160,000	\$2,989.33
Weyerhaeuser	TFL	15	70,000	\$1,307.83
Slocan	TFL	18	177,650	\$3,319.09
Pope & Talbot	TFL	23	680,000	\$12,704.65
Federated Co-operatives	TFL	33	21,000	\$392.35
Weyerhaeuser	TFL	35	125,600	\$2,346.62
Riverside	TFL	49	380,000	\$7,099.66
West Fraser	TFL	52	570,000	\$10,649.48
LP Engineered Wood	TFL	55	90,000	\$1,681.50
Revelstoke Community	TFL	56	100,000	\$1,868.33
Totals				\$439,200.00

FIA Funding Path: After determining their contribution (if any), participating management units decide which licensees will contribute on behalf of the unit. SIGY will then help contributing licensees establish FIA Allocation Transfers with the project's lead licensee (West Fraser, Quesnel?).

Appendix III
2003-04 FIA CFS-MoF-SIGY Armillaria Modelling Proposal

Large document -- Copies available from SIGY