Provincial Growth and Yield Initiative

September 12, 2012

Introduction

Growth and yield programs across Alberta are in a period of transition. Several years of poor markets have made it necessary to look for new efficiencies to ensure that companies' growth and yield sampling programs provide the information needed. More significantly, the increased prominence of growth models as a forest management planning tool has the potential to dramatically alter growth and yield programs in Alberta. Growth models are now critical to the Reforestation Standard of Alberta (RSA) process and will be used to develop approved Forest Management Plan (FMP) yield curves, especially for managed stands where no long-term data are available.

In light of these developments, recent discussions by the Provincial Growth and Yield Initiative (PGYI) Technical Committee have resulted in a more focused objective of the PGYI:

The objective of the PGYI is to collectively obtain data on tree growth through repeated measurements of Permanent Sample Plots to develop/calibrate/validate growth models for FMP yield curve development and the RSA assessment process.

PGYI Proposal and Rationale

The PGYI will consist of four components:

- Provide data required for managed stand growth model development ;
- Collect new, or pool existing, Permanent Sample Plot (PSP) data to fill gaps for natural stands;
- Develop a centralized database to house the PSP information in a standardized format and to provide quality control for data standards;
- Develop a document that provides:
    - Minimum standards for data collection and submission
    - Best practises to assist companies with developing or enhancing their PSP programs.

The need for the PGYI is based on two main tenets. First is the recognition that growth models will have an increased future role in both the RSA process and the development of FMP yield curves, especially for managed stands. This program facilitates improvements in Alberta's

growth models. The second tenet is the recognition that cost savings are critical for all participating organizations.

In addition to providing key data for the development/calibration/validation of growth models, the provincial growth and yield initiative will:

- Standardize data collection, storage and compilation;
- Facilitate data sharing between companies and Alberta Environment and Sustainable Resource Development (ESRD);
- Decrease the number of Permanent Sample Plots required by individual companies;
- Provide a dataset that will meet the Provincial Growth and Yield model improvement objectives in the long term;
- Streamline data for model development and ensure that all the right parameters are collected; and
- Accelerate model development, especially for managed stands, making credible and defensible growth models available earlier for yield curve development.

Participation in this program will:

- Give companies a PSP database that can be used for developing and/or enhancing growth models required for yield curve development and evaluation of performance survey results.
- Partially or wholly fulfill the Forest Management Agreement requirement for the PSP component of a growth and yield program.
- Allow participants to measure fewer PSPs than in a stand-alone program through pooling of data.
- Provide a robust provincial data set for use by members.

Companies' Responsibilities

In addition to the PGYI data collection and submission, individual companies are still responsible for:

- FMA specific data for model initialization (e.g. RSA, TSP and/or PSP).

- Data on special stand conditions and/or silviculture treatments not common to the program, i.e. post Mountain Pine Beetle silviculture, understory protection, Enhanced Forest Management, Tree Improvement, etc.

- A performance monitoring program to validate yield assumptions of individual companies' Forest Management Plans. For more information refer to the *Framework for Alberta Growth and Yield Plans.*

PGYI Implementation

Both Alberta growth models, GYPSY and MGM, have been developed with primarily natural stand PSP data from ESRD and a subset of companies. It is generally expected that the models perform well for natural stands and may only need slight adjustments/improvements. However, only limited managed stand data have been used in the development process and further enhancements will improve model performance for managed stands. Therefore, the PGYI will focus primarily on managed stand data collection.

- Plot allocation

    - Both natural and managed stand plots will be allocated to participants based on Long Run Sustained Yield Average (LRSYA) (Appendix 1). See Appendix 2 for total annual measurement responsibility by LRSYA class.

    - Gap analyses of existing plots will be used to guide submission of existing plots and establishment of new plots.

    - The program will be reviewed periodically, although the need for additional plot commitments will not be considered until 2032.

- Natural Stand PSPs

    - The target is 1800 natural stand PSPs to be submitted to the database.

    - At a minimum, 900 natural stand PSPs and will be submitted to the database.

    - To reach the target of 1800 natural stand PSPs, companies can submit, on a voluntary basis, more than the minimum required number of allocated PSPs.

    - 300 of the 900 PSPs can be "retired" or harvested after 3 measurements have been obtained. A full description of the criteria for plot retirement is located in the Minimum Protocols and suggested Guidelines document. Plot retirement will not exceed one third of a company's commitment.

    - 600 natural stand PSPs will be maintained provincially to fill data gaps and monitor stand decadence and break-up as well as climate change. The 'proportional' allocations of the natural stand plots following retirement are provided in Appendix 1, Table 2.

- Managed Stand PSPs

    - 1200 managed stand PSPs will be established and/or submitted over the next 20 years.

    - Distribution of these 1200 PSPs to participants will be proportional based on LRSYA classes (Appendix 1, Table 3).

    - Establish and submit 600 PSPs in the first 5 years, then 600 PSPs between years 10 and 15.

- Data Storage and Access

    - Participating companies will submit available PSP data that are compliant with the minimum standard.

    - The database will be structured with at least two levels of accessibility: Model developers will have access to all the data in the database, including voluntarily submitted 'additional' data. Participants will have access to the minimum 900 natural stand and 1200 managed stand PSPs that were allocated and submitted.

Appendix 1:

Table 1: Natural stand PSP submission (900 required), all Alberta FMA holders and ESRD

LRSYA Range	Companies	# of plots/company	Total
0.1 M – 1 M (Low)	Sundance Millar Western ANC Buchanan Canfor MDFP Spray Lakes Tolko High Prairie	25	200
1.1 M – 2 M (Medium)	Blue Ridge Slave Lake Pulp Sundre Slave Lake Joint FMA Weyco Pembina	50	250
2.1 M + (High)	Hinton DMI ESRD Weyco Grand Prairie Tolko Al-Pac	75	450
	Total		900

Table 2: Natural stand PSPs maintained (600 required), all Alberta FMA holders and ESRD

LRSYA Range	Companies	# of plots/company	Total
0.1 M – 1 M (Low)	Sundance Millar Western ANC Buchanan Canfor MDFP Spray Lakes Tolko High Prairie	17	136
• M – 2 M (Medium)	Blue Ridge Slave Lake Pulp Sundre Slave Lake Joint FMA Weyco Pembina	33	165

2.1 M + (High)	Hinton DMI ESRD Weyco Grand Prairie Tolko Al-Pac	50	300
	Total		601

Table 3: Managed stand PSPs established (1200 plots), all Alberta FMA holders and ESRD

LRSYA Range	Companies	# of plots/company	Total
• M – 1 M (Low)	Sundance Millar Western ANC Buchanan Canfor MDFP Spray Lakes Tolko High Prairie	38	304
• M – 2 M (Medium)	Blue Ridge Slave Lake Pulp Sundre Slave Lake Joint FMA Weyco Pembina	60	300
2.1 M + (High)	Hinton DMI ESRD Weyco Grand Prairie Tolko Al-Pac	100	600
	Total		1204

Appendix 2:

Implementation and Measurement Schedule

Table 1 shows annual plot measurements including both plot establishment and plot re-measurement for the sole purpose of illustrating measurement effort through time. The actual measurement intensity may vary depending on the rate of natural stand plot retirement, age of companies' natural and managed stand plots and the associated re-measurement interval (i.e. 5 or 10 years depending on age).

The numbers in Table 1 are based on the following assumptions:
1) Final program consists of 1200 managed stand plots (150 per each of 8 strata) and 900 natural stand plots (150 for each of 6 strata)
2) 600 managed stand plots are established between year 1 and 5, 600 plots between year 10 and 15
3) Only young managed stands are available - all plots are established in ~10 year old stands
4) Managed stand PSPs are re-measured initially every 5 years and will move to a 10-year re-measurement schedule when stands have reached 40 years of age
5) Assume all natural stand PSPs have been established, re-measure on usually every 10 years
6) Plot measurement schedule will be re-assessed periodically to ensure that it meets program needs

Table 1. Per decade and annual establishment and re-measurement requirements by LRSYA category for managed and natural stands.

	Decades	2013 - 2022	2023 - 2032	2033 - 2042	2043 - 2052	After 2052
High LRSYA	Managed	100	200	200	150	100
	Natural	75	75	75	50	50
	Total	175	275	275	200	150
	Annual	***18***	***28***	***28***	***20***	***15***
Medium LRSYA	Managed	60	120	120	90	60
	Natural	50	50	50	33	33
	Total	110	170	170	123	93
	Annual	***11***	***17***	***17***	***12***	***9***
Low LRSYA	Managed	38	75	75	56	38
	Natural	25	25	25	17	17
	Total	63	100	100	73	55
	Annual	***6***	***10***	***10***	***7***	***6***
Program Total	Managed	1200	2400	2400	1798	1204
	Natural	900	900	900	601	601

Program Total	Managed	1200	2400	2400	1798	1204
	Natural	900	900	900	601	601
	Total	2100	3300	3300	2399	1805
	Annual	***210***	***330***	***330***	***240***	***181***

Figure 1 provides an example of the plot establishment and re-measurement requirements over time for an "average" Medium LRSYA company with no currently established managed stand plots.

Figure 1. Plot establishment and re-measurement requirements by decade for a Medium LRSYA company.