

Status Report to the Forestry Research Partnership

Project Title: Forest Vegetation Simulator Ontario (FVS^{Ontario})

FRP Project No. 130-107 (6317-00)

Project Leader: John Parton, Inventory, Monitoring and Assessment Section, OMNR
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Project Start Date: *April 1, 2001*

Project Reporting Period: *April 1, 2009 - March 31, 2010*

Report Date: *July 8, 2010*

1. Project Description and Activities:

The focus of the 2009-10 FVS^{Ontario} project initiative was to improve the software through:

1.1 Model Development and Calibration (\$9,999)

1.1.1 Refit the small tree height and diameter models to ensure reasonable behaviour

1.1.2 Assign reasonable small tree height and diameter models for all species covered by FVS^{Ontario}

1.1.3 Document the results from 1.1 and 1.2 above in a technical report listing data sources, model forms, model assumptions, and recommendations for future work

1.1.4 Revise the mortality models and link all species covered by FVS^{Ontario} to an appropriate mortality function

1.1.5 Develop a flowchart describing how mortality is handled within FVS^{Ontario} and produce a technical report listing data sources used for the new mortality equations, model forms developed, modelling assumptions, and recommendations for future work

1.2 Model Coding (\$15,000)

1.2.1 Incorporate the Morawski cull values to generate net merchantable volumes

1.2.2 Correct some observed modelling bugs related to gross merchantable volume estimates

1.2.3 Introduce Carbon Accounting through the Fuel and Fire Effects Extension

1.2.4 Change maximum number of trees handled by the model

1.2.5 Export results from model runs to an external database

1.2.6 Create a new install pack compatible with current and legacy Windows operating systems (at least to Windows XP SP2)

1.2.7 Test and correct the implemented model code from the associated model development and calibration work

2. Project Results vs. Objectives:

All project results have been achieved as planned. Two contractors were engaged in the 2009-10 effort; Forest Analysis Ltd. and ESSA Ltd. Due to an unforeseen delay in the development and approval of the MOU governing this project, work was started later than expected (original target was the fall of 2009), and thus much of the coding work by ESSA was extended into 2010, past April 1. This was agreed upon by the project team.

Forest Analysis Ltd. provided a flowchart describing how mortality is handled within FVS^{Ontario}, and successfully undertook the calibration and development of the small tree and mortality models. Full technical reports were prepared and made available to the project team.

ESSA Ltd provided software development support for this year's program, and addressed the deliverables associated with their component of the project. ESSA is recognized as a key player in FVS development in North America, and has been instrumental in the development of the coding and GUI (graphical user interface) for FVS^{Ontario}.

3. Financial Report: 2009/2010 Planned and Actual Partner Expenditures (130-107).

Expenditures	Tembec				MNR				CFS				Total FRP Only			
	Planned		Actual		Planned		Actual		Planned		Actual		Planned		Actual	
	Cash	In-kind	Cash	In-kind	Cash	In-kind	Cash	In-kind	Cash	In-kind	Cash	In-kind	Cash	In-kind	Cash	In-kind
Salaries						5,000		5,000						5,000		5,000
Travel																
Equipment																
Supplies																
Support Services		5,000		5,000	24,999		24,999						24,999	5,000	24,999	5,000
Other																
Total		5,000		5,000	24,999	5,000	24,999	5,000					24,999	10,000	24,999	10,000

Expenditures	Legacy Trust		FRP Partners				Other Partners				Total All					
	Planned	Actual	Planned		Actual		Planned		Actual		Planned		Actual		Combined	
	Cash	Cash	Cash	In-kind	Cash	In-kind	Cash	In-kind	Cash	In-kind	Cash	In-kind	Cash	In-kind	Planned	Actual
Salaries												5,000		5,000	5,000	5,000
Travel																
Equipment																
Supplies																
Support Services											24,999	5,000	24,999	5,000	29,999	29,999
Other																
Sub Total																
Holdback																
Total											24,999	10,000	24,999	10,000	34,999	34,999

4. Next Year's Work Plan: Describe the next year's activities; anticipated results; milestones and deliverables and provide the budget estimate. The budget estimate should be the budget detail table, with footnotes, that was part of the approved project's financial plan. Therefore, please complete the Table below.

Expenditures	2010-11	LLT Request	Tembec		MNR		CFS		Other	
			Cash	In-kind	Cash	In-kind	Cash	In-kind	Cash	In-kind
Salaries						5,000				
Travel										
Equipment										
Supplies										
Support Services				5,000	20,000					
Other										
Sub total										
Holdback										

2010-2011 will focus on the following:

- Test and evaluate model performance and prediction accuracy following the major updates made in 2009/10
- Explore and evaluate model outputs relative to other G&Y models currently used in Ontario (MIST)
- Evaluate, enhance, expand and improve the model's capabilities with respect to partial harvest systems (cedar, boreal mixedwoods, white pine shelterwood)
- Explore the model's handling of live crown ratio and the impact of treatments that increase light penetration into the forest canopy and understorey
- Modify the FVS user interface and associated software packages (e.g., SVS) to handle a broader range of silvicultural inputs that better implement partial harvest systems
- Update model coefficients, where possible, using remeasurement data from Ontario
- Continue exploring the CARBON extension in FVS, and explore data availability for providing local calibration data to this sub-model

5. Information and Publications: *List produced project database(s), information and publications to date as applicable; where and when the information can be accessed; describe how this information was transferred to practitioners.*

- Revised FVS^{Ontario} Mortality and small tree models. Internal reports for FVS Project team. Completed by Forest Analysis Ltd.
- Revised FVS^{Ontario} exe and help documentation will continue to be made available on the FRP website

6. Project Synopsis:

Growth and yield is a complex science that seeks to explore and describe forest growth processes and develop tools and models to help forest managers predict future stand development. Successful forest management is predicated on a proper understanding of these processes, and an ability to measure and quantify forest response to management intervention. Since management of Ontario's forests is a shared responsibility, and numerous parties contribute to the knowledge and information base underpinning the province's management system, it is in the best interest of the Ministry of Natural Resources to work in partnership with the FRP to facilitate continued development of the forest model—FVS^{Ontario}. This model has a well known pedigree, is appropriate for Ontario's forests and silvicultural systems, and is capable of supporting silvicultural decision making through the model's ability to predict stand response to a wide variety of management interventions. However, FVS^{Ontario} requires local calibration and validation prior to introduction into Ontario's forest management process. Implementing FVS^{Ontario} is challenging and time consuming, and requires both broad participation and open and unrestricted access to a range of disparate data and skill sets. This project requires access to modelers, programmers, tech transfer experts, experienced silvicultural decision makers and subject matter experts in order to produce a usable and effective product. Data must also be assembled from a number of sources, as no single organization possesses all the data resources necessary to build FVS^{Ontario}. The FRP makes this breadth of skills and data resources available to the project. Developing FVS^{Ontario} requires a process of successive refinement in which individual components of the model are critically evaluated, locally calibrated and validated against local experience.

The FRP has been active in the development of FVS^{Ontario} for several years, and the model has been progressively modified by using data and information local to Ontario. The 2009-10 segment of the project focused on two major aspects of the model—its mathematical functions (the inner guts of the model) and its user interface (the external expression of the model experienced by the user including its software shell and user documentation). Considerable progress was made in evaluating and improving the performance of the model, enhancing the ability of FVS^{Ontario} to predict

future stand growth. An updated version of the model is expected to be available for download in the summer of 2010.