

The Rural Technology Initiative

– “Better technology in rural areas for managing forests for increased product and environmental values in support of local communities”

www.ruraltech.org



University of Washington
College of Forest Resources



USDA Forest Service
State & Private Forestry



The New User-Friendly Landscape Management System

13th Annual Family Foresters Workshop

Friday, January 21st, 2005

Coeur d'Alene, Idaho

Rural Technology Initiative

<http://www.ruraltech.org/>

Landscape Management Project

<http://lms.cfr.washington.edu/>



<http://www.cfr.washington.edu/>



<http://www.fs.fed.us/spf/>



<http://ext.wsu.edu/>



Yale School of Forestry
& Environmental Studies

<http://www.yale.edu/forestry/>

Introduction

- Any modeling system needs data
- Getting the required data and formatting it correctly is often difficult
- LMS has been limited in use because of the difficulty in users getting their data into the software.

LMS uses Inventory and Spatial information

LMS uses the aggregate of multiple stands to represent a landscape. The landscape may be a contiguous area or may be scattered stands that represent a larger area.

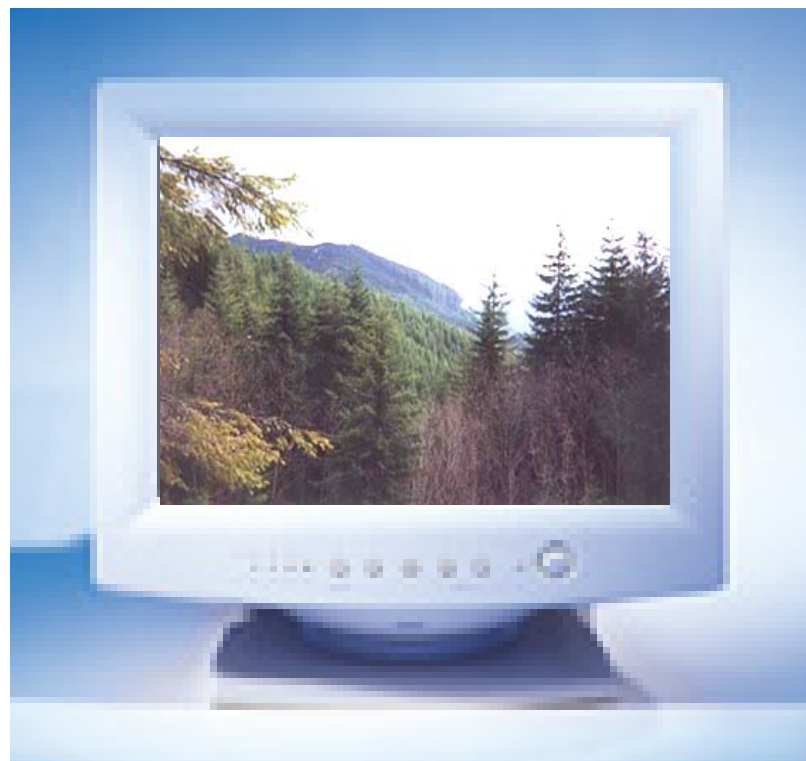
LMS uses several types of information to represent the stands:

- Stand Attributes

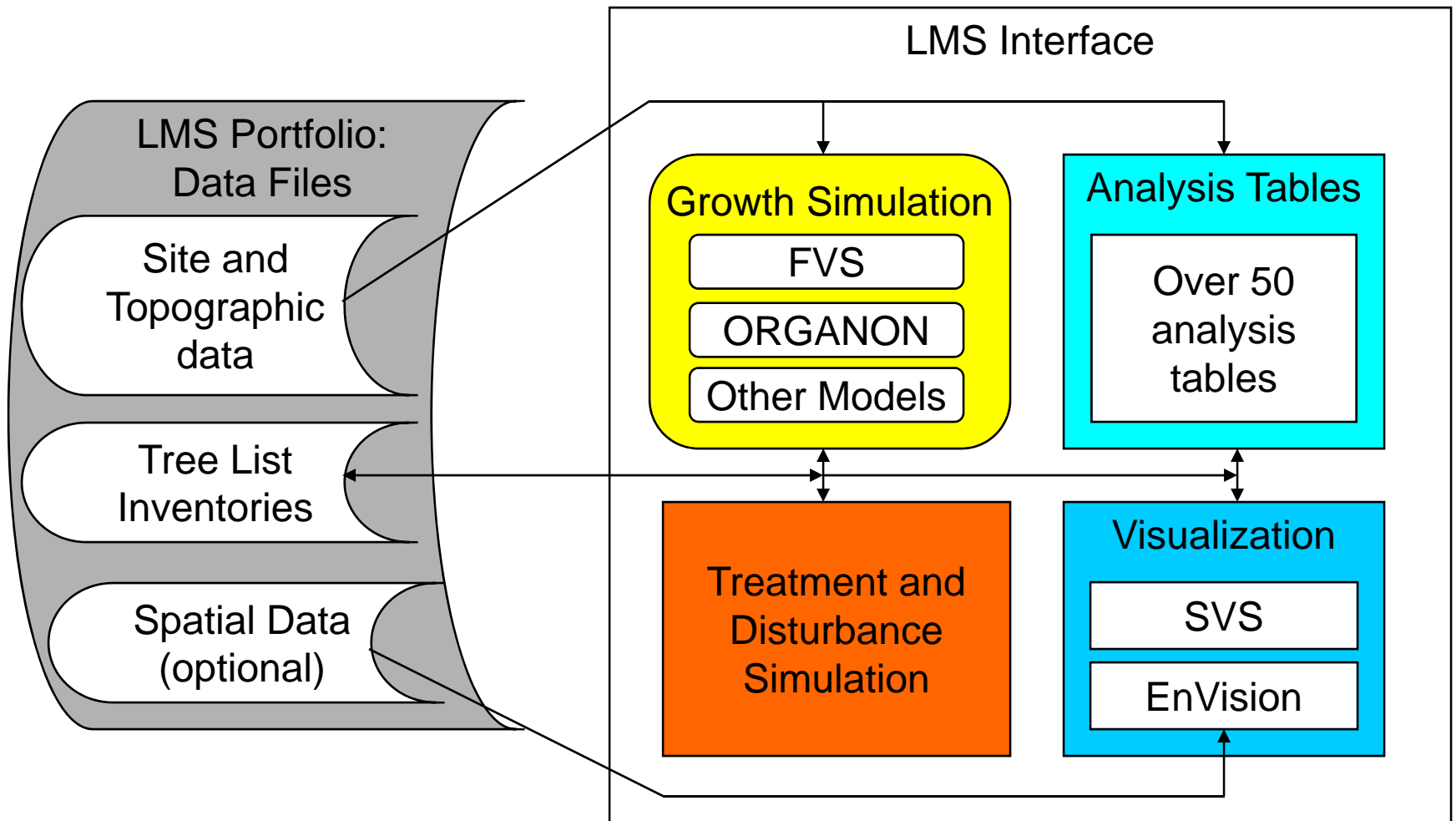
- Tree Inventory Information

- Digital Elevation Information

- Spatial Characteristics

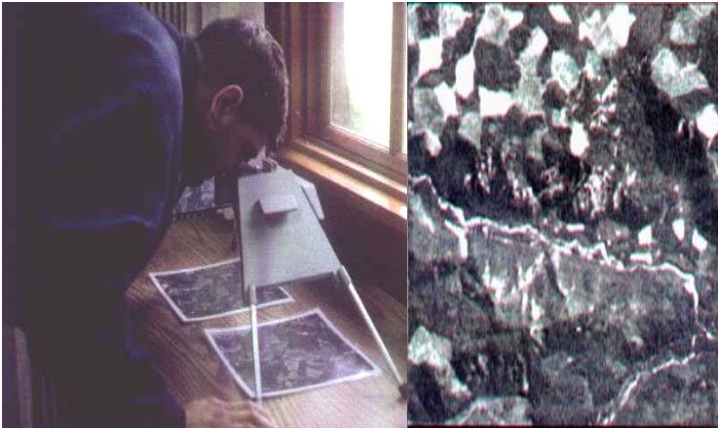


LMS Components



Stand Level Information

Stands, also referred to as polygons in GIS, are management units created from historical or anticipated use patterns.



Stand attribute information can be taken from a combination of field data, aerial and ortho photographs, and Geographical Information System (GIS) outputs. Stand data is assembled in a formatted MS Excel spread sheet that is easily imported into LMS. Needed is stand name, site index, age, slope, aspect, elevation, and acres. The location column is for use with the Forest Vegetation Simulator (FVS) growth model. A 0 is entered here as a default value. Habitat Code and Lat may be entered as 0 in most cases. Plot is entered as 1.

Stand Name	Location	Site Index	Habitat Code	Age	Slope	Aspect	Elevation	Latitude	Acres	...
Stand1	602	120	0	9	28.1	249.1	1509	0	15.2	...
Stand2	602	115	0	45	15.6	180	1300	0	22.6	...
...

Tree Inventory Information

USDA - Forest Service
R6 STAND EXAM PLOT DATA Flat N

STAND ID FOREST DISTRICT EXAM TYPE STAN

SAMPLE P N S A T P S P N S A T P A
PLOT l u b o p s i a i p l u b o p s i a s
DATA i b p e o i l o c p e i b p e o i l o c

COVER P N S A T P S P N S A T P A
TYPE l u b o p s i a i p l u b o p s i a s
DATA i b p e o i l o c p e i b p e o i l o c

COVER Type Percent Veg Height
DATA

Column 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51

PN C S Cuv
l u b o p s i a i p l u b o p s i a s
DATA i b p e o i l o c p e i b p e o i l o c

Tree DATA
A B DBH Growth Age Height Crown Ratio Damage Sev

File #	27	40	41	42	43	44	45	46	47	48	49	50	51
1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	1	1	1	1	1	1	1	1	1	1	1	1	1
3	1	1	1	1	1	1	1	1	1	1	1	1	1
4	1	1	1	1	1	1	1	1	1	1	1	1	1
5	1	1	1	1	1	1	1	1	1	1	1	1	1
6	1	1	1	1	1	1	1	1	1	1	1	1	1
7	1	1	1	1	1	1	1	1	1	1	1	1	1
8	1	1	1	1	1	1	1	1	1	1	1	1	1
9	1	1	1	1	1	1	1	1	1	1	1	1	1
10	1	1	1	1	1	1	1	1	1	1	1	1	1
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12	1	1	1	1	1	1	1	1	1	1	1	1	1
13	1	1	1	1	1	1	1	1	1	1	1	1	1
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15	1	1	1	1	1	1	1	1	1	1	1	1	1
16	1	1	1	1	1	1	1	1	1	1	1	1	1
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21	1	1	1	1	1	1	1	1	1	1	1	1	1
22	1	1	1	1	1	1	1	1	1	1	1	1	1
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24	1	1	1	1	1	1	1	1	1	1	1	1	1
25	1	1	1	1	1	1	1	1	1	1	1	1	1
26	1	1	1	1	1	1	1	1	1	1	1	1	1
27	1	1	1	1	1	1	1	1	1	1	1	1	1

Inventory information originates with a field sample or cruise of the trees for each stand within the landscape area. A minimum of 20 tree records per stand is necessary for the growth model to operate correctly. These tree records when combined with the appropriate expansion factor (sampling multiplier) and entered into a formatted MS Excel spread sheet become the tree inventory data.

Tree data is used to create an inventory file containing the initial year of the portfolio, the stand name, the tree record number, species, DBH, height, crown ratio, expansion factor, volume per tree, and maximum crown width. Height, volume per tree, and maximum crown width will be calculated by the growth model if unavailable from field sampling information.

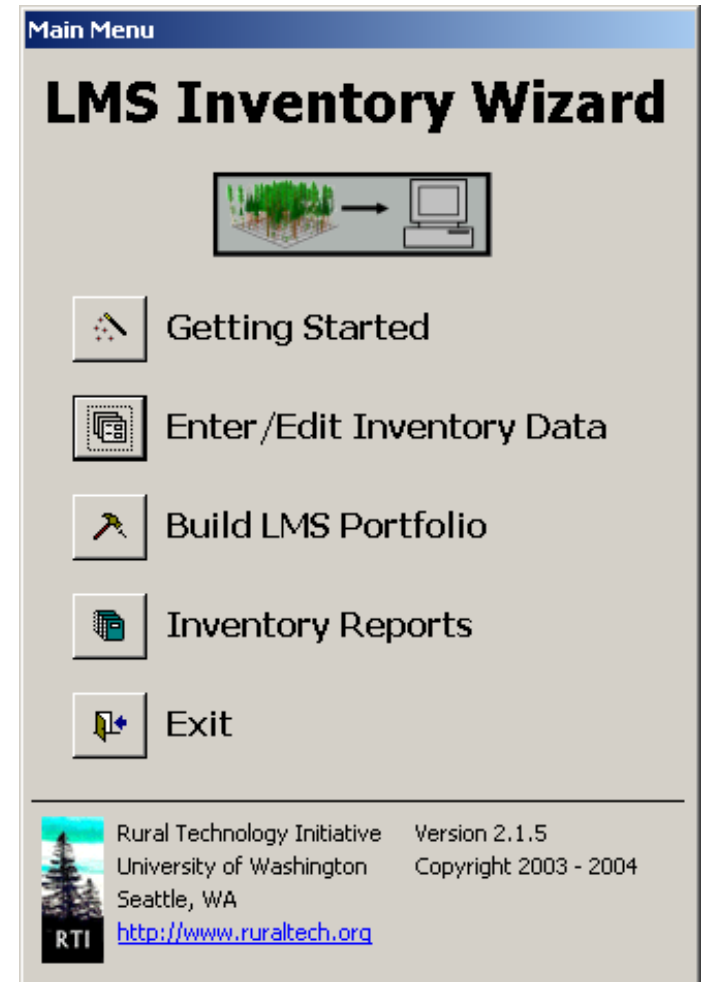
Year	Stand	Species	Diameter	Height	Crown Ratio	TPA	...
2000	Stand1	PSME	18.1	126.0	0.54	2.5	...
2000	Stand1	PSME	16.7	125.0	0.53	2.5	...
2000	Stand1	PSME	19.8	131.7	0.58	2.5	...
2000	Stand1	ALRU2	9.9	61.0	0.25	2.5	...
...



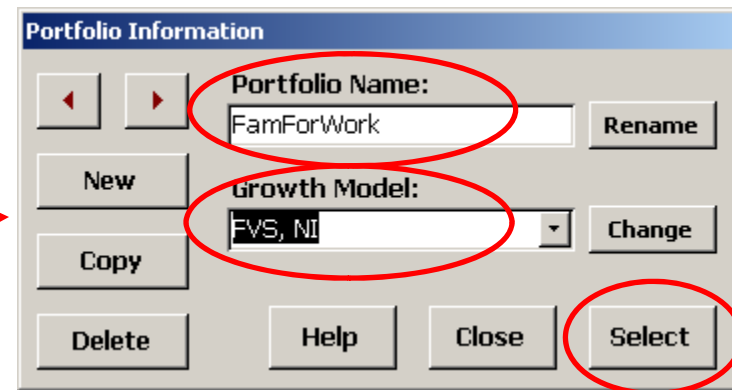
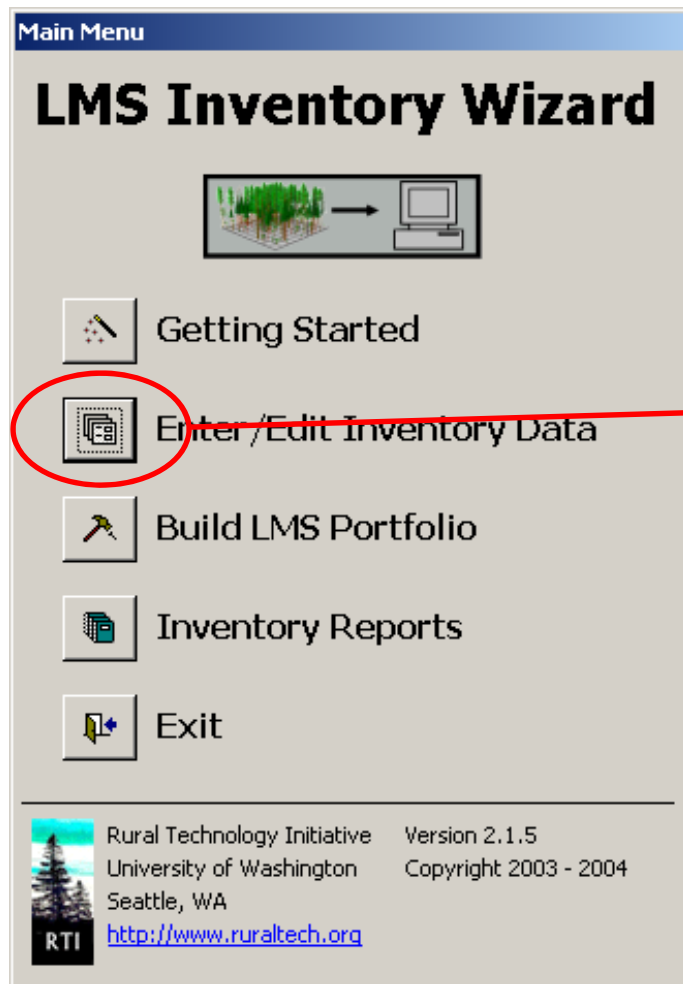
LMS Inventory Wizard

The LMS Inventory Wizard provides a simple interface to enter plot level tree inventory data for use with LMS.

- Microsoft Access database
- Includes growth model specific codes
- Context sensitive help and tutorial
- Includes field data forms
- Creates LMS portfolios directly from the database



Enter/Edit Inventory Data



Enter Stand1

FVS, NI

Stand Name: Plot Number: Sampling Type: Variable Fixed Transect

Plot Type: Basal Area Factor (BAF):

Required Data:
Inventory Year:
Stand acreage:

Recommended Data:
Location:
Habitat Type/Plant Association:
Elevation: Slope:

Optional Data:
Age: Aspect:

Tree Records

	Species	DBH	Height	Crown	Age	Snag	Downed	Decay	Count
	DF: Douglas-fir	10.0				<input type="checkbox"/>	<input type="checkbox"/>		1
	DF: Douglas-fir	8.0				<input type="checkbox"/>	<input type="checkbox"/>		1
	DF: Douglas-fir	14.0				<input type="checkbox"/>	<input type="checkbox"/>		1
	DF: Douglas-fir	12.0				<input type="checkbox"/>	<input type="checkbox"/>		1
	GF: Grand fir	7.0				<input type="checkbox"/>	<input type="checkbox"/>		1
	GF: Grand fir	7.5				<input type="checkbox"/>	<input type="checkbox"/>		1
	GF: Grand fir	9.2				<input type="checkbox"/>	<input type="checkbox"/>		1
	W/P: Western white pin	11.0				<input type="checkbox"/>	<input type="checkbox"/>		1
	L: Western larch	9.5				<input type="checkbox"/>	<input type="checkbox"/>		1
	W/H: Western hemlock	7.2				<input type="checkbox"/>	<input type="checkbox"/>		1
*						<input type="checkbox"/>	<input type="checkbox"/>		1

Current Portfolio:

Enter Stand2

FVS, NI

Stand Name:

◀ ▶ New Copy Delete

Plot Number: ◀ ▶ New Delete

Sampling Type: Variable Fixed Transect

Required Data:

Inventory Year:

Stand acreage:

Plot Type:

Basal Area Factor (BAF):

Recommended Data:

Location:

Habitat Type/Plant Association:

Elevation: Slope:

Optional Data:

Age: Aspect:

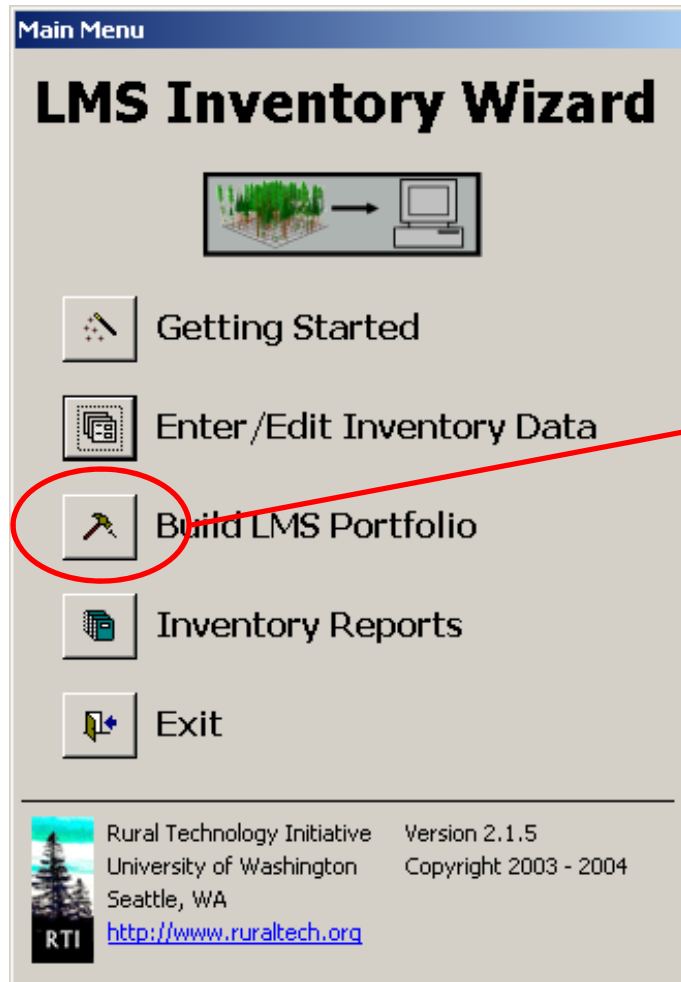
Tree Records

	Species	DBH	Height	Crown	Age	Snag	Downed	Decay	Count
	PP: Ponderosa pine	24.0				<input type="checkbox"/>	<input type="checkbox"/>		1
	PP: Ponderosa pine	14.0				<input type="checkbox"/>	<input type="checkbox"/>		1
	PP: Ponderosa pine	18.0				<input type="checkbox"/>	<input type="checkbox"/>		1
	GF: Grand fir	5.0				<input type="checkbox"/>	<input type="checkbox"/>		1
	GF: Grand fir	4.0				<input type="checkbox"/>	<input type="checkbox"/>		1
	GF: Grand fir	4.5				<input type="checkbox"/>	<input type="checkbox"/>		1
	GF: Grand fir	3.0				<input type="checkbox"/>	<input type="checkbox"/>		1
	GF: Grand fir	2.0				<input type="checkbox"/>	<input type="checkbox"/>		2
▶	GF: Grand fir	1.8				<input type="checkbox"/>	<input type="checkbox"/>		3
*						<input type="checkbox"/>	<input type="checkbox"/>		1

Current Portfolio:

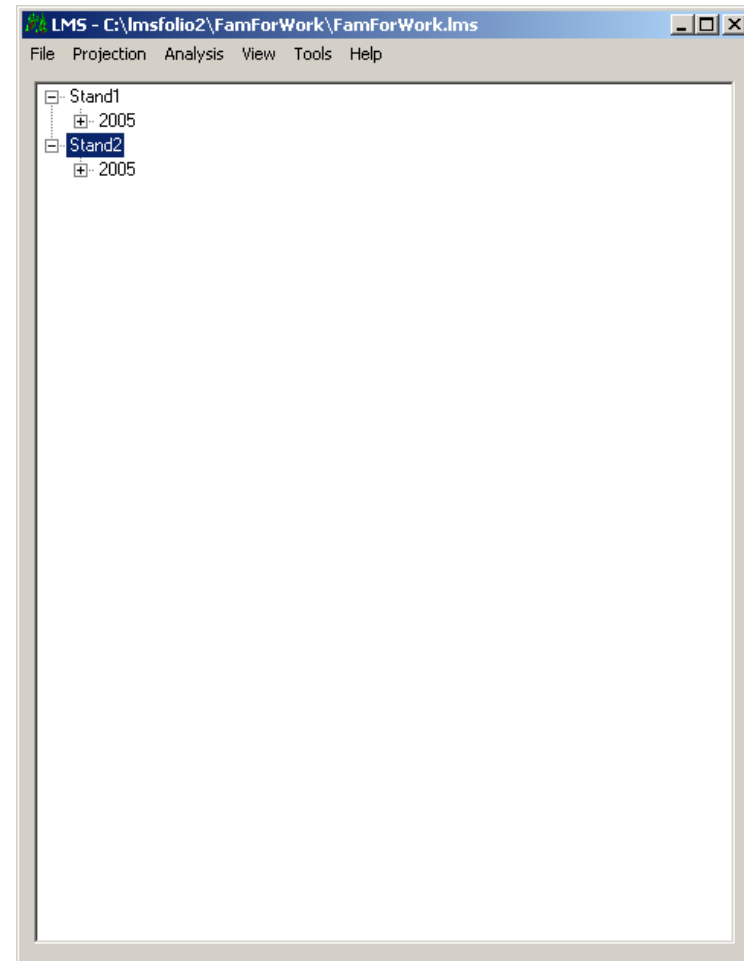
Help Done

Build LMS Portfolio



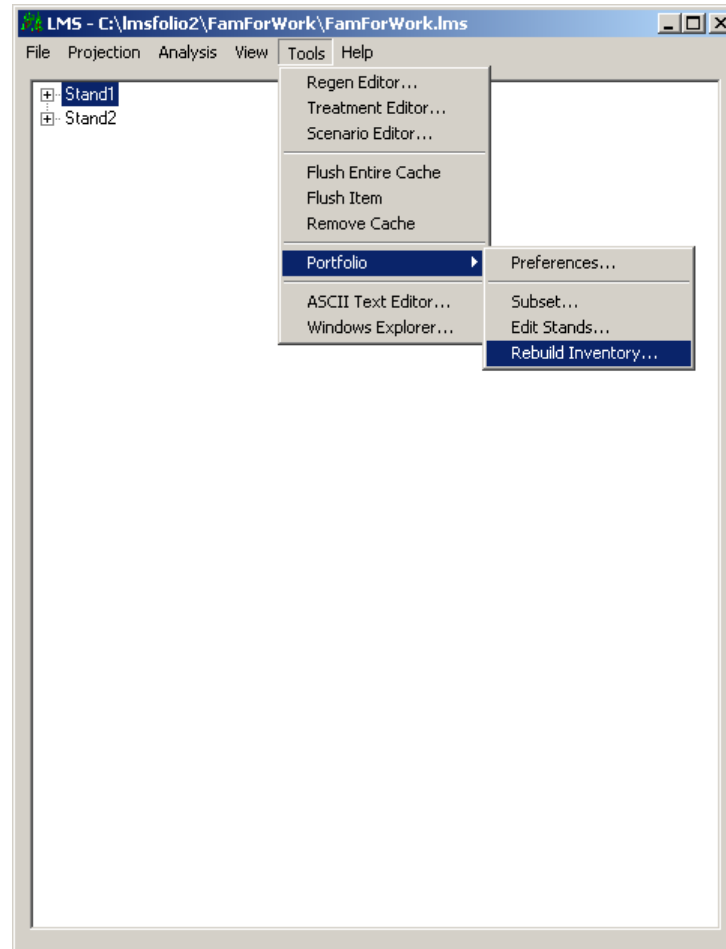
Open LMS Portfolio

The portfolio is now open with the two stands that were entered in the Inventory Wizard.

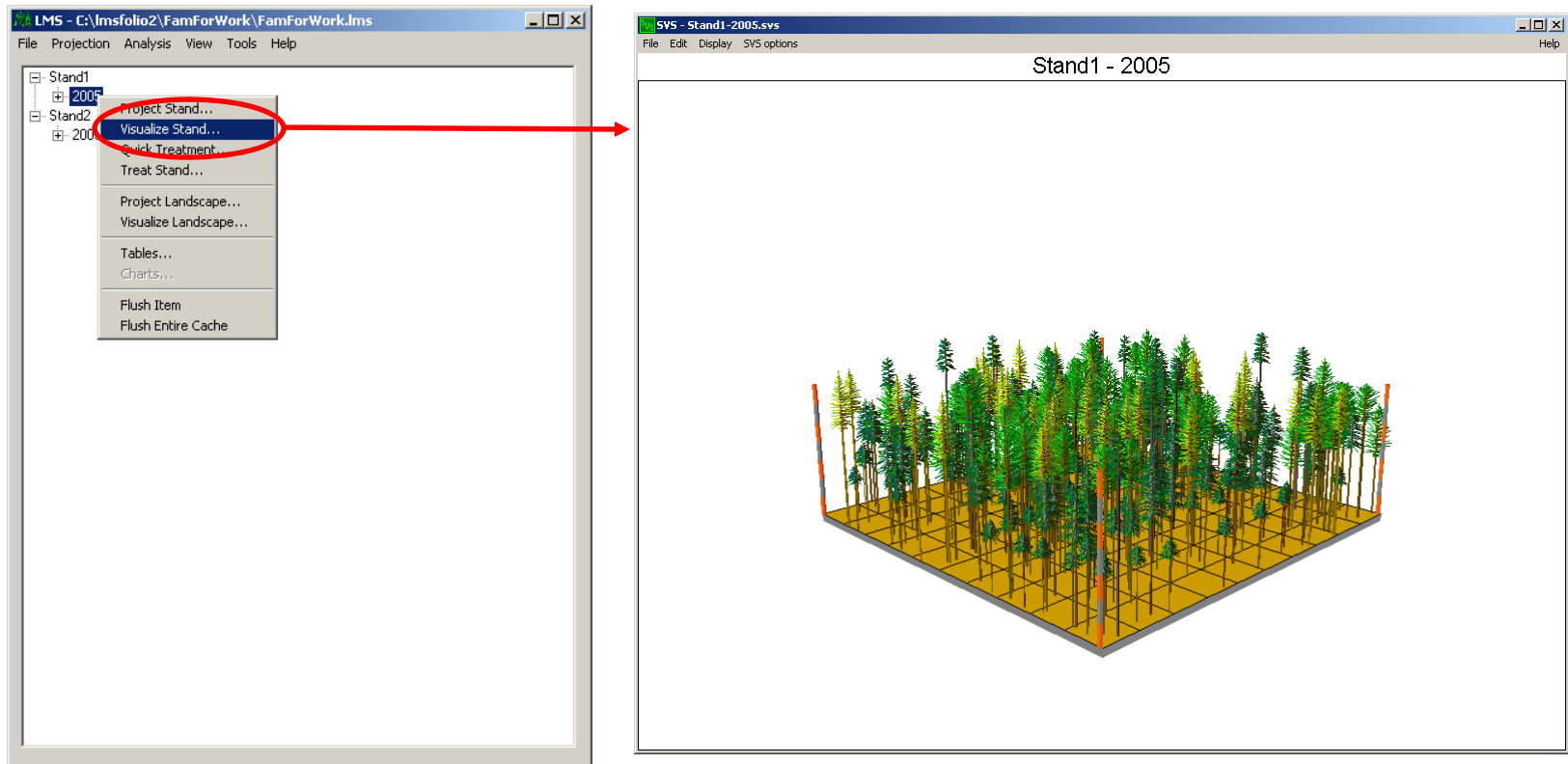


Rebuild portfolio

LMS needs to run a special simulation to fill in the missing height and crown information since we did not enter any of the information in the Inventory Wizard.

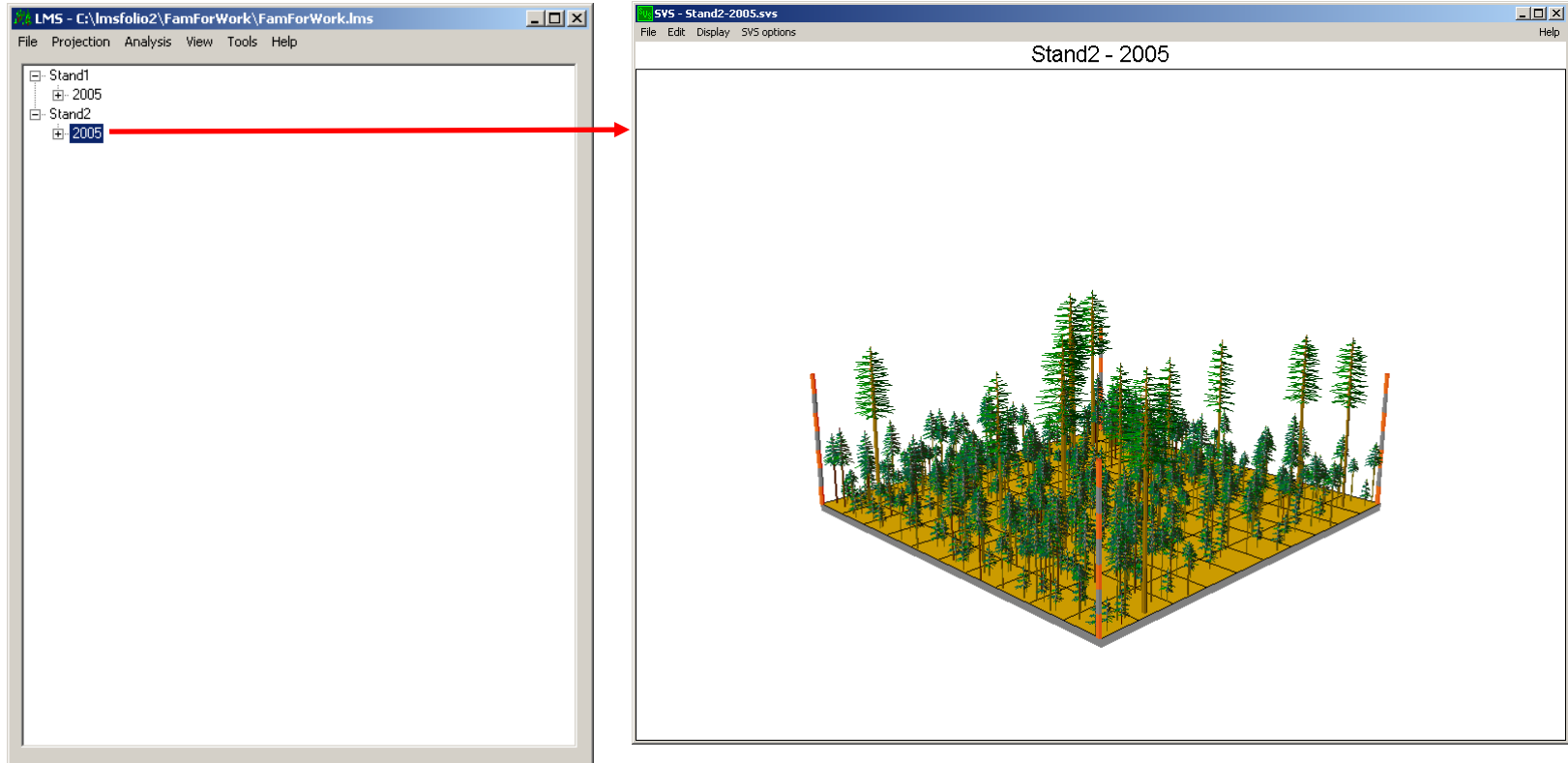


Visualize Stand1



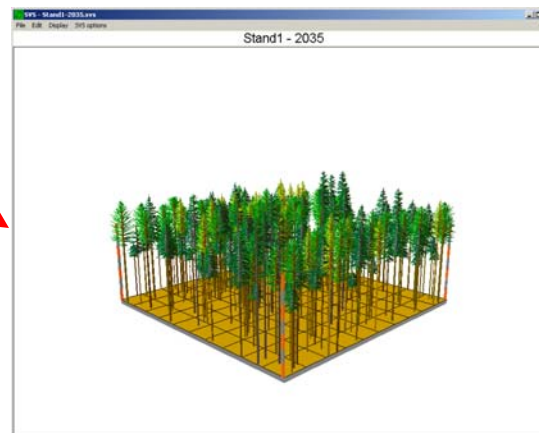
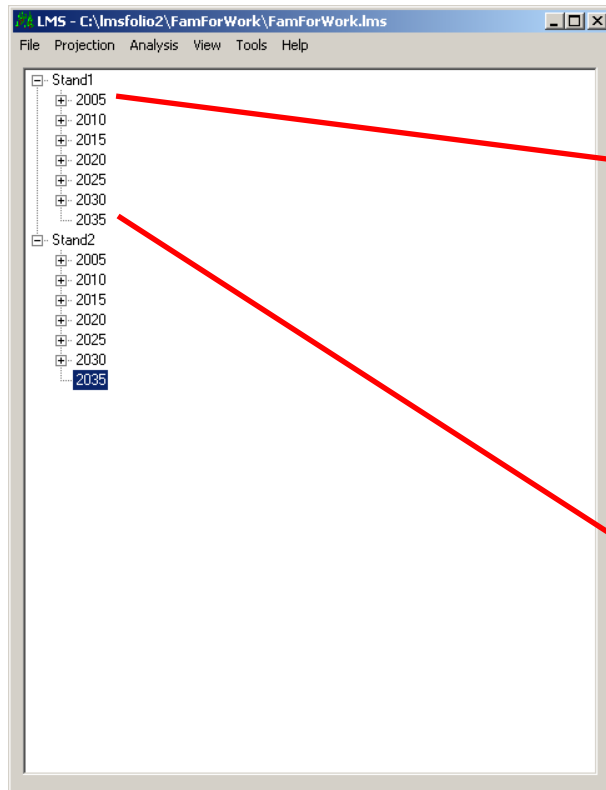
Stand1 is a mixed Douglas-fir, grand fir, larch, hemlock, white pine stand

Visualize Stand2

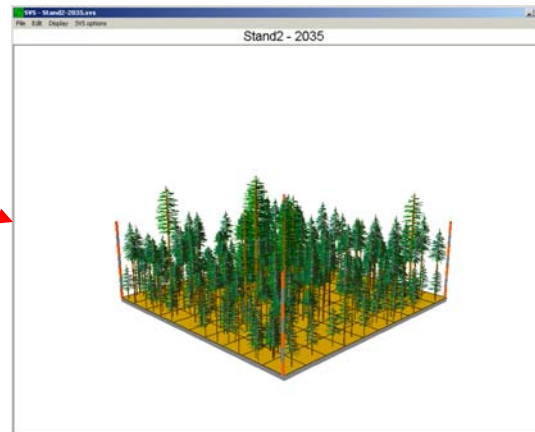
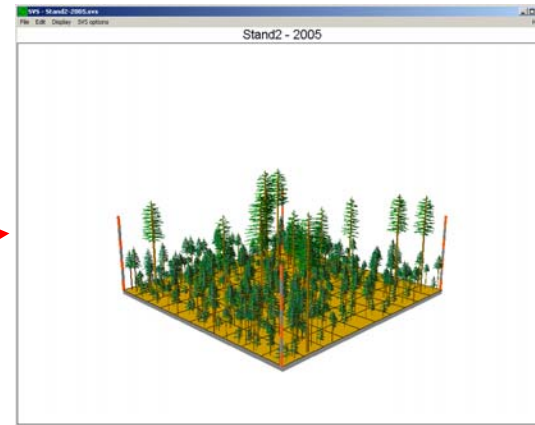
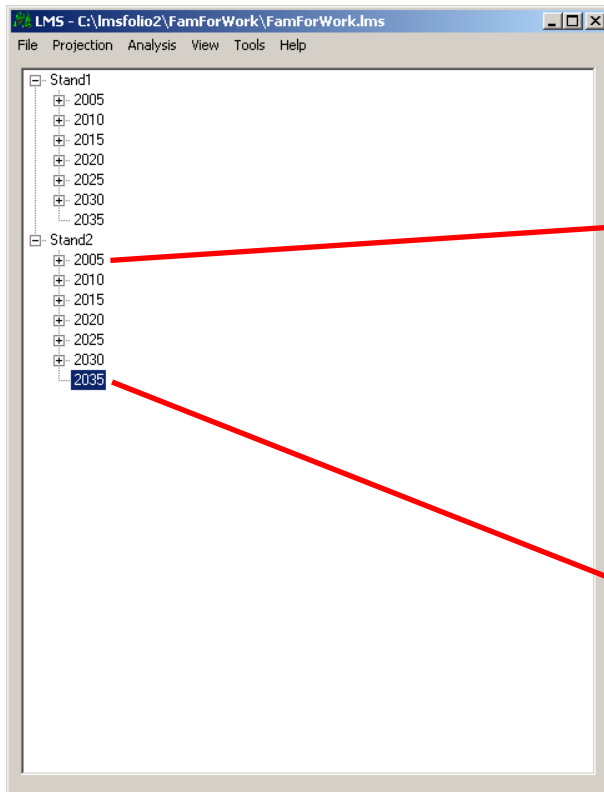


Stand2 is a Ponderosa pine, grand fir stand.

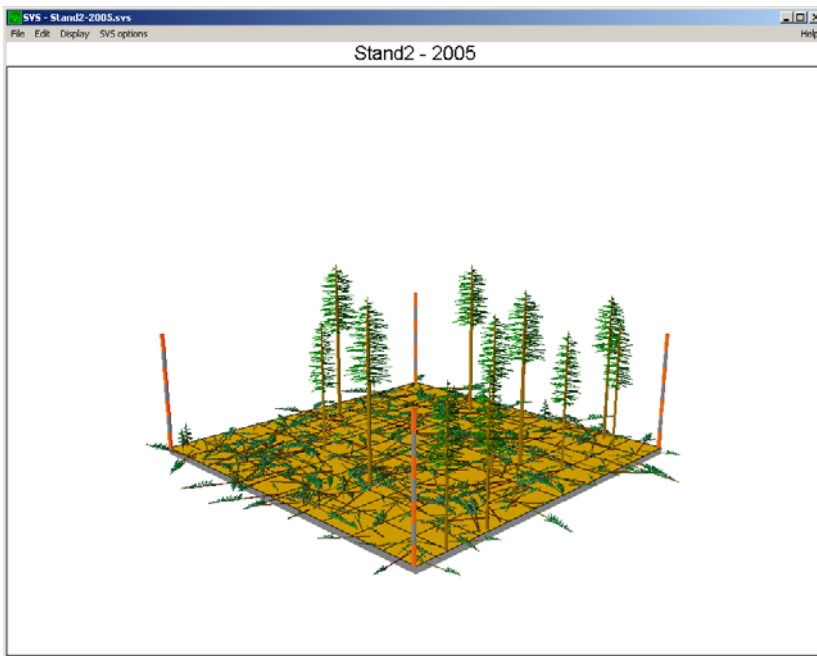
Grow Stand1 for 30 years



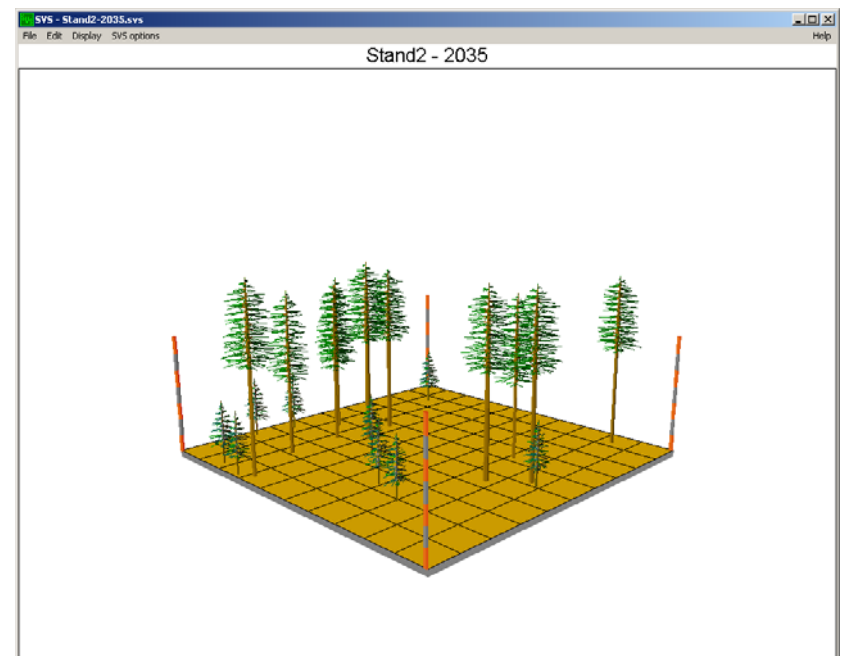
Grow Stand2 for 30 years



Investigate Treatments for Stand2



Stand2 in 2005 after a treatment to remove Grand fir.



Stand2 in 2035 after a treatment to remove Grand fir.

Plot data to Portfolio

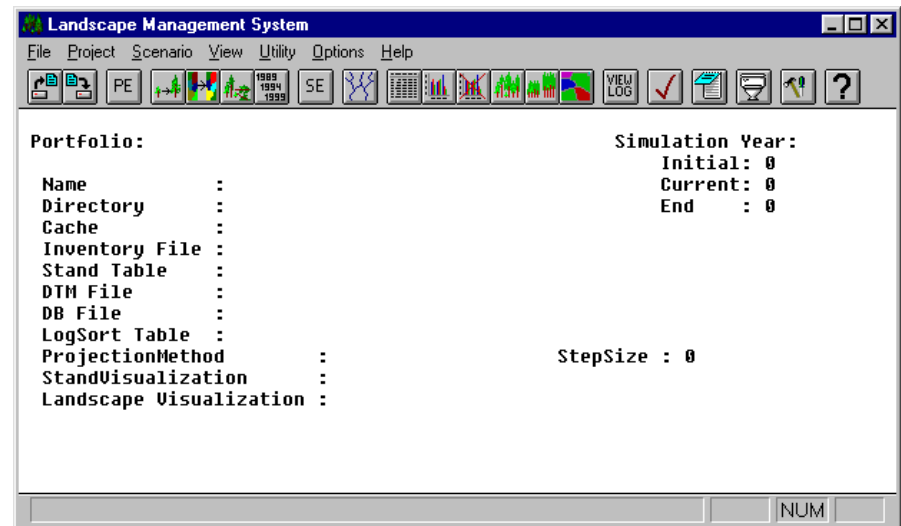
- With Inventory Wizard and LMS you can go from plot data to visualization, growth, and treatments in a matter of minutes...

LMS Versions

- LMS 1.x – 1994-2000
- LMS 2.x – 2000-2004
 - LMS 2.0 – Released August 2000
 - LMS 2.0.42 – Released Feb 2001
 - LMS 2.0.45 – Released Jun 2002
 - LMS 2.0.45 Release 9 – Nov/Dec 2004
- LMS 3.0 – 2005-?
 - LMS 3.0 – Pre-release Jan 2005

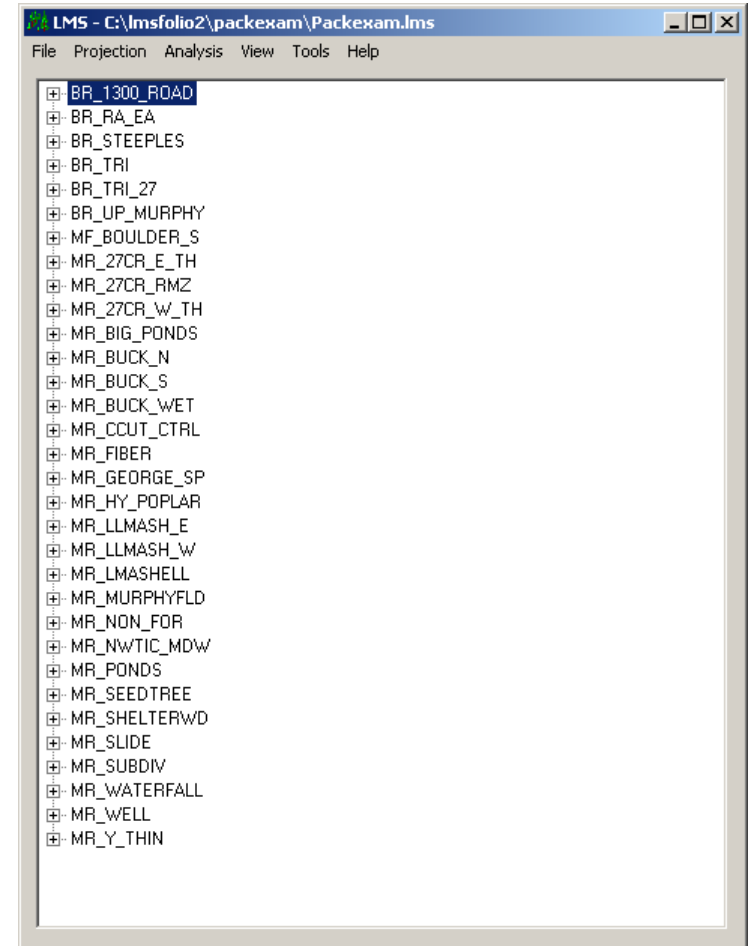
LMS 1.x

- No longer available
- No longer supported
- People still like the icons



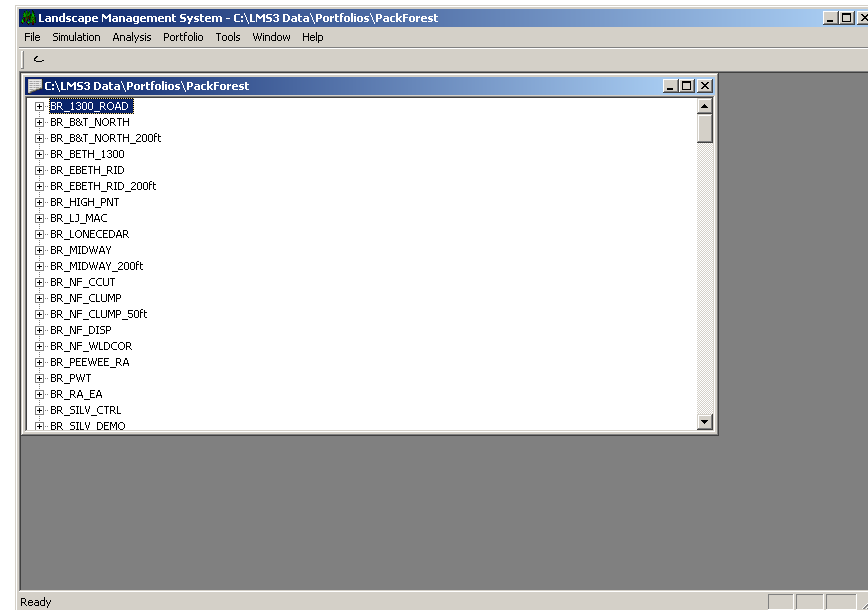
LMS 2.x

- Available/Supported
- Includes FVS, Organon, SVS, EnVision
- Interface to Excel
- Inventory Wizard, Economatic, Carbon, Wildfile habitat, etc
- Limited size of portfolios



LMS 3.0

- Available soon
- Enhanced treatment capability
- Enhanced modeling capabilities
- Includes Organon, FVS, SVS, EnVision
- Interface to Excel, Access
- Larger portfolios
- Greater speed (~5 times faster)
- Inventory Wizard, etc soon



Comparing LMS 2.0 to 3.0

- Speed (Pack Forest portfolio, 197 stands, 30 year simulation)
 - LMS 2.x: 5 min 47 seconds
 - LMS 3.0: 1 min 13 seconds

LMS available via Internet

Landscape Management Project

Home University of Washington, College of Forest Resources Yale School of Forestry & Environmental Studies, Global Institute of Sustainable Forestry

WELCOME TO THE LANDSCAPE MANAGEMENT PROJECT WEBSITE

The Landscape Management Project is a cooperative project between the University of Washington College of Forest Resources Silviculture Laboratory, Yale University School of Forestry and Environmental Studies, and the USDA Forest Service. Its purpose is to develop the concepts and tools needed to help forests provide the wide range of values people want -- including commodities, wildlife habitat, fire safety, employment, and carbon sequestration. These values are best provided by coordinating the dynamic changes of forests across a landscape, rather than by trying to provide each or all values continuously on a single area.

Last Updated: Monday, June 10, 2002 11:37 AM

<http://lms.cfr.washington.edu/>

Landscape Management System

Home University of Washington, College of Forest Resources Yale School of Forestry & Environmental Studies, Global Institute of Sustainable Forestry

Landscape Management System - Download

The following are available for downloading:

LMS install files are distributed as self-extracting or regular zip files. Use either [WinZip](#) or [PKZIP](#) to unarchive zip files or inspect exe files. Store the downloaded files in a temporary directory and then run the installation program (lms2*setup.exe) to install LMS.

Note: The updated Economic and Inventory Wizard mentioned in the RTI Newsletter are now available below!

- [LMS 2.0.457](#) - This is the latest release of LMS 2.x. This release includes updates to tables, updates to the Evison interface, ScenarioEditor update, new copy of Evison (2.10), and updated FVS variants. NOTE: The tutorials have been removed from the downloadable install. The are available from the Tutorial page and will become available as a separate install.
Last Update: 03/09/2004 (37,726KB, download time ~3 hours 8 minutes @ 28,800 baud)
- [LMS 2.0.45 CD-ROM Image](#) - This is a CD-ROM image that you need to create the LMS Installation CD. This file was created using Easy CD Creator. You can create a CD-ROM using the File - Record CD from CD Image command. You can also request a CD-ROM to be mailed to you by sending email to lmsrequest@silvax.cfr.washington.edu.
- [LMS-FFE Addon Install](#) - This installation adds the FVS growth model variants that include the FFE extension, additional tables for displaying fire and fuel effects, and a fire scoring tool which displays landscape level fire risk and stand structure information summarized into graphic outputs. See the [LMS-FFE Addon Page](#) for additional information.
Last Update: 11/21/2003 (15,333KB, download time ~1 hour 10 minutes @ 28,800 baud)
- [Inventory Wizard 2.1](#) - The LMS Inventory Wizard is a Microsoft Access tool to help people get inventory data in the Landscape Management System. See the [LMS Inventory Wizard page](#) for additional information.
Last Update: 7/27/2004 (4.76 MB, download time ~ 28 minutes @ 28,800)
- [Economic 1.1 Update](#) - The Economic 1.1 Update provides and updated version of the LMS economic analysis released after LMS 2.0.457. See the [LMS Economic page](#) for additional information.
Last Update: 7/27/2004 (4.33 MB, download time ~ 25 minutes @ 28,800)
- [LMS Analyst for ArcView 3.x](#) - This update to LMS_Analyst fixes a major computation error in long-term analysis. Please download this version and replace your previous LMS_Analyst over file. See the [LMS_Analyst Home Page](#) for additional information and versions for ArcView 3.2 and 9.0. This version of LMS_Analyst for ArcView 3.x is included in the LMS 2.0.458 and later installs.
Last Update: 08/05/2004 (18KB, download time ~ 5 seconds @ 28,800 baud)

Decision Analysis Tools:

The Decision Analysis companion tools (Scope&Group and Toggle) can be obtained from the [Decision Analysis Tools](#) page.

LMS Tutorials:

The LMS Tutorials have been moved to the [Tutorial Page](#)

Last Updated: Wednesday, July 28, 2004 9:31 AM

LMS Credits

- Silviculture Laboratory, College of Forest Resources, University of Washington
- Rural Technology Initiative, University of Washington and Washington State University
- Program on Landscape Management, Global Institute of Sustainable Forestry, Yale School of Forestry & Environmental Studies
- Cooperative for Forest Systems Engineering, Pacific Northwest Research Station, USDA Forest Service
- Forest Vegetation Simulator (FVS), Forest Management Service Center, USDA Forest Service
- ORGANON Growth & Yield Project, Department of Forest Resources, College of Forestry, Oregon State University
- Bureau of Land Management, US Department of Interior
- Washington State Department of Natural Resources