

# Fundamental Training and Applications of the Landscape Management System

For NRCS and Conservation District Forestry Personnel

February 10<sup>th</sup>, 2009 – Pack Forest, Eatonville, WA

February 12<sup>th</sup>, 2009 – Spokane, WA



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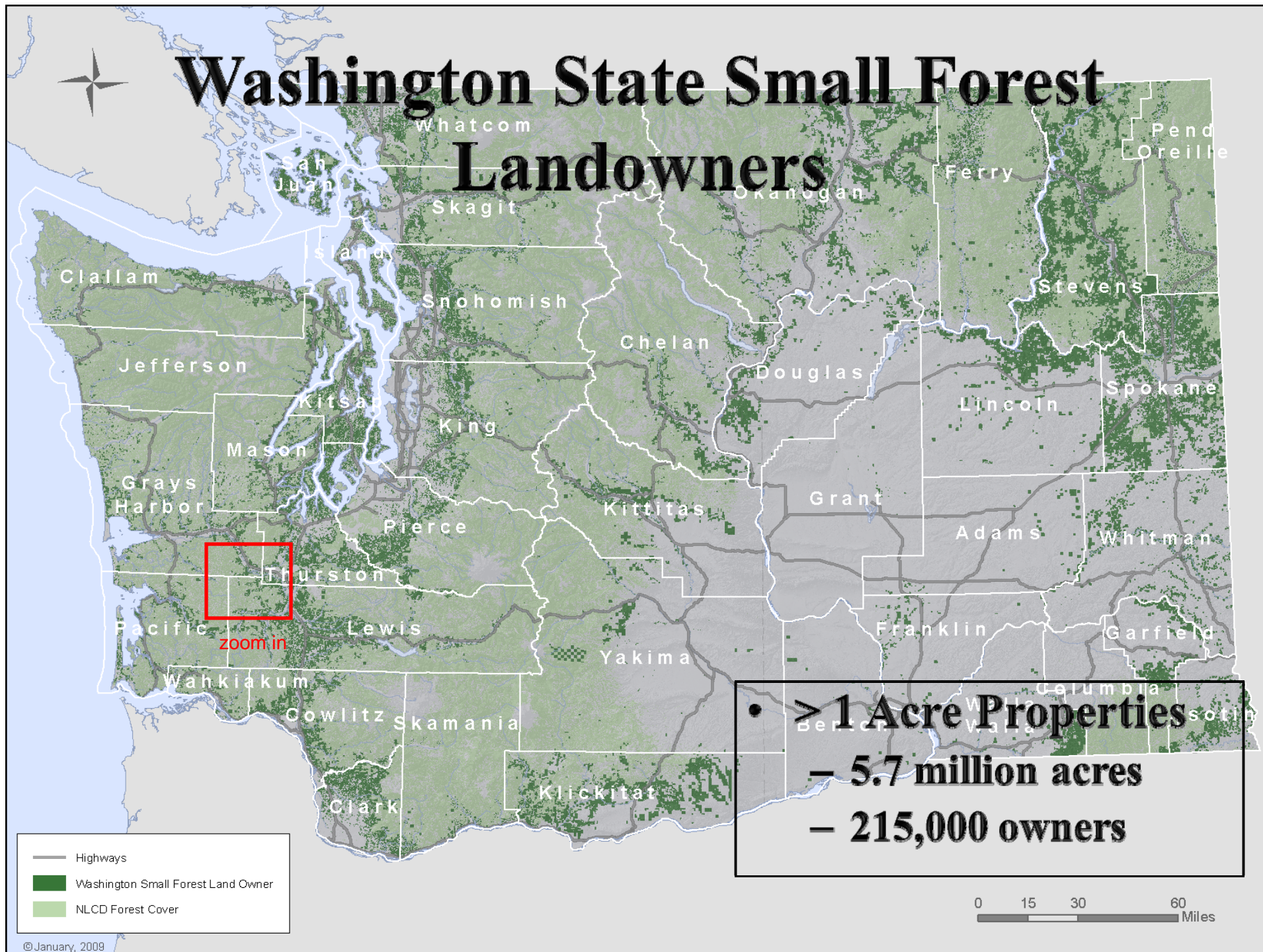
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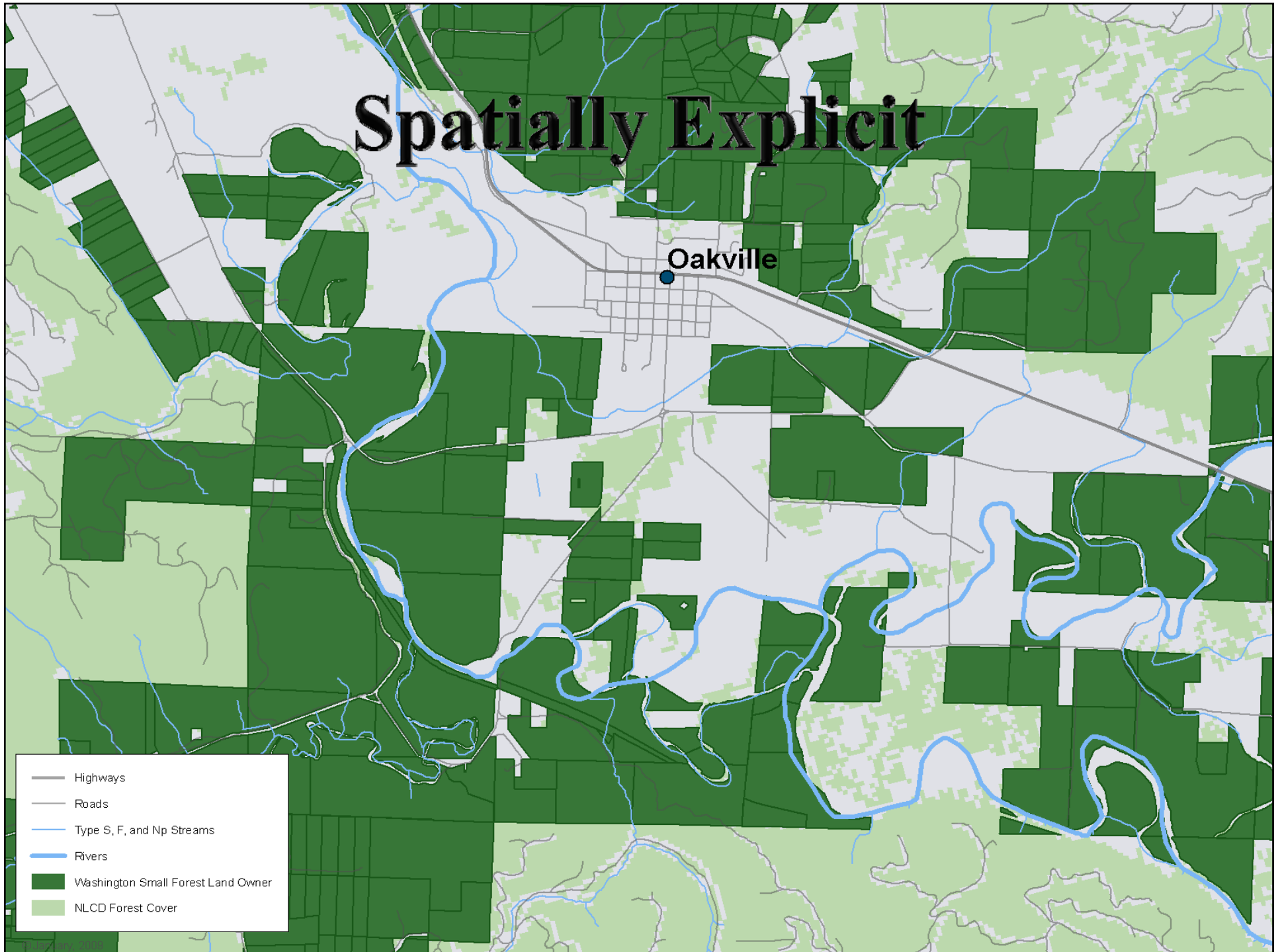
- Highways
- Roads
- Type S, F, and Np Streams
- Rivers
- Washington Small Forest Land Owner
- NLCD Forest Cover



# Spatially Explicit

Oakville

- Highways
- Roads
- Type S, F, and Np Streams
- Rivers
- Washington Small Forest Land Owner
- NLCD Forest Cover





# Spatially Explicit

Oakville





# Introduction to the Landscape Management System Version 3.1

- What is the Landscape Management System?
- LMS Portfolios
- LMS Outputs:
  - Stand Visualization
  - LMS Tables

# Introduction to LMS 3.1



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



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



# Introduction

Welcome to the Landscape Management System (LMS) Version 3.1

The objective of this tutorial is to provide an introduction to the newest version of the Landscape Management System. LMS 3.1 introduces a new approach to the integration of the forestry applications into a simulation and analytical platform.



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# What is the Landscape Management System?

The Landscape Management System is an evolving set of software tools designed to aid in landscape level management of forest resources. LMS is being developed as part of the Landscape Management Project, a cooperative effort between the Silviculture Laboratory, College of Forest Resources, University of Washington; Yale School of Forestry and Environmental Studies; and the USDA Forest Service, State and Private Forestry.



# Description of the Landscape Management System

- The Landscape Management System integrates forest inventory information, geographic information, computerized growth models, visualization software, and analytical software to facilitate landscape, ecosystem, and watershed management. LMS simulates changes in individual stands and landscapes up to 100,000 acres.
  - **Modular** – LMS can incorporate many forms of inventory information, geographic information, growth models, and decision support software. Components of the system can be easily improved or even replaced to provide improved and expanded capabilities.
  - **Flexible** – LMS operates on representative tree lists allowing for the incorporation of new management objectives and measures by relating the objectives to the information in the tree list.
  - **Easy to Use** – LMS is a Microsoft Windows ® application that operates using menus, dialogs, mouse, and keyboard.
  - **Provides Simulations** – LMS provides stand level simulations using growth and yield models to assess different management scenarios. Landscapes are the aggregate of individual stand simulations.
  - **Presents Visualizations** – LMS, in concert with the Stand Visualization System (SVS) and EnVision, provides stand and landscape level visualizations, which can be used to evaluate different management objectives.
  - **Facilitates Additional Analysis** – LMS supports additional analytical capabilities by providing tabular outputs (individual inventory information or summarized results) in Microsoft Excel ® or Microsoft Access ®.



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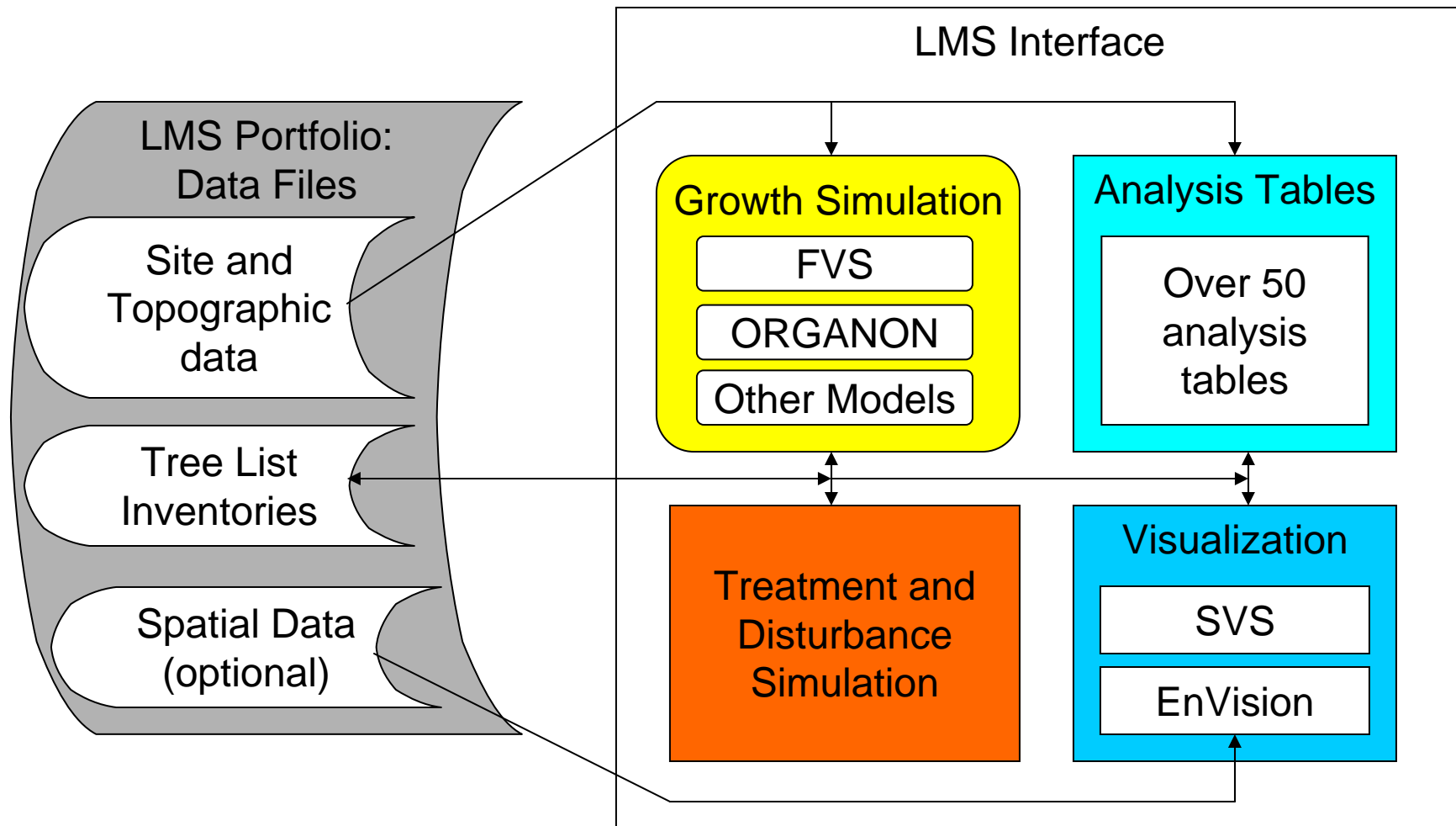


# System Requirements for LMS

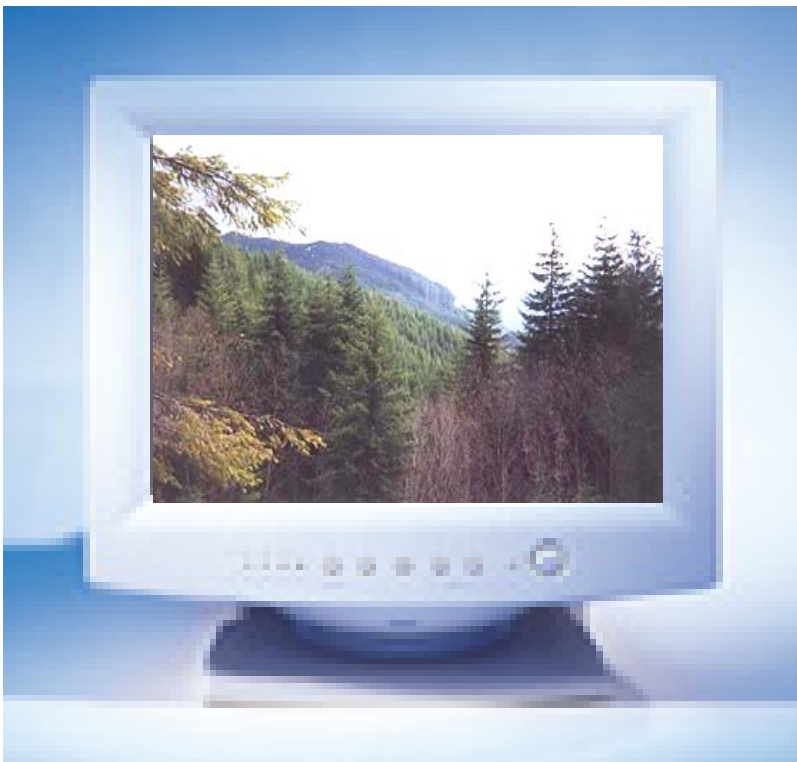
- The Landscape Management System runs on most recent Microsoft Windows computers. Specific requirements are:
  - Pentium PC running Windows 2000 or later. Pentium III (or higher) 800Mhz (or higher) is recommended.
  - SVGA video required, 32MB or more preferred.
    - 2D hardware acceleration useful for stand visualization.
    - 3D OpenGL hardware acceleration useful for landscape visualization
  - 128MB RAM.
  - 80MB hard disk space required.



# LMS Components



# 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

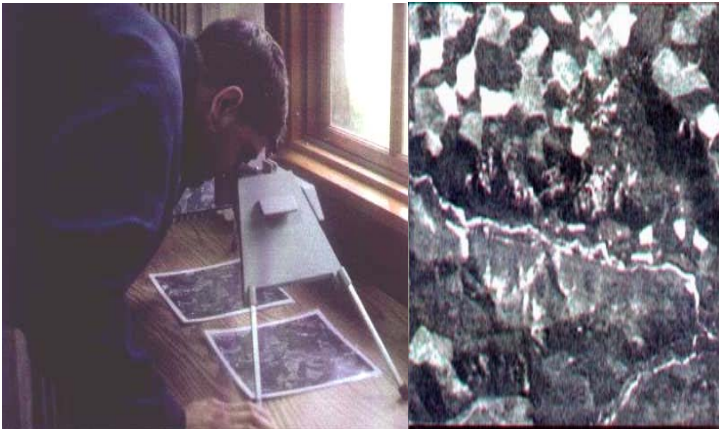
- Tree Inventory Information

- Digital Elevation Information

- Spatial Characteristics

# Stand Attribute 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 can be assembled in a table (Excel or Access) that is easily imported into LMS. Information needed includes stand name, site index, age, slope, aspect, elevation, and acres. The location column indicates the nearest national forest and is used by the Forest Vegetation Simulator (FVS) growth model, a 0 is entered here as a default value. Habitat Code and Latitude may be entered as 0 in most cases, resulting in a default value picked by the growth model.

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

**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 table (Excel or Access), 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	...
...	...	...	...	...	...	...	...

NOTE: Species codes are NRCS Plants species codes, which provide a unique species identifier.



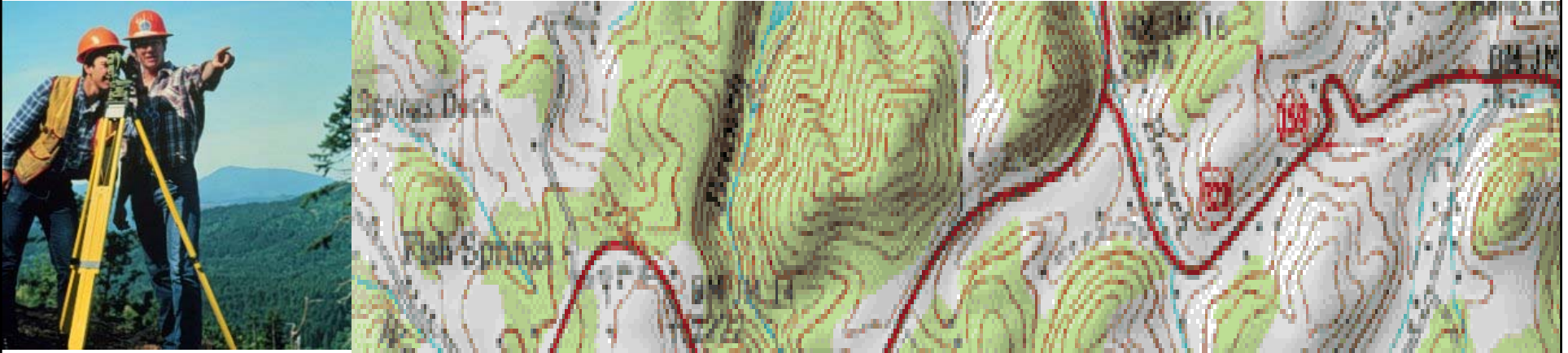
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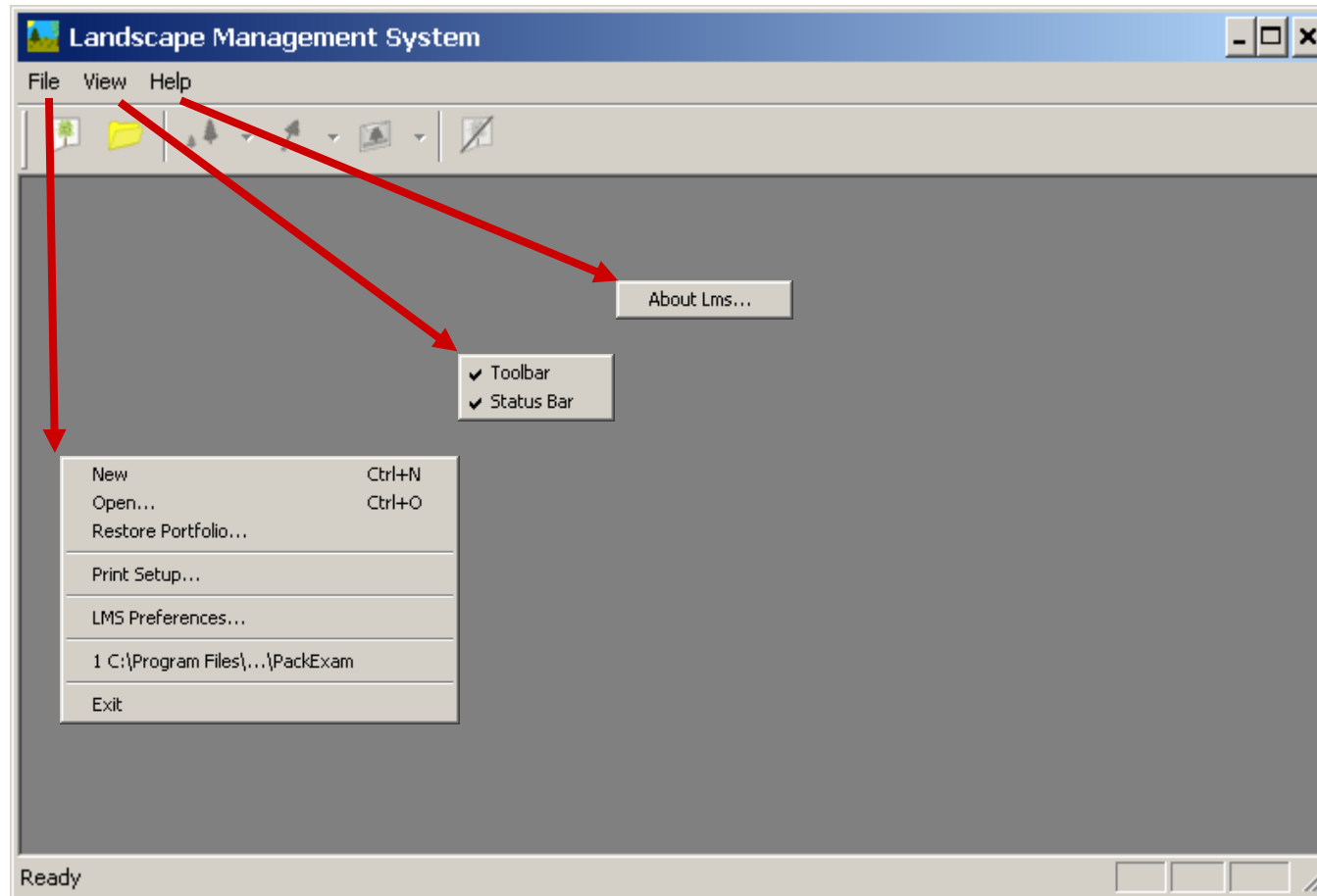
# Elevation and Spatial Information



**Digital elevation** information is an electronically available topographic map. Digital elevation maps can be downloaded from the United States Geological Service (USGS) web site. In the GIS programs, Arc View and Arc Info, map layers such as roads, streams, and stand boundaries are created to make up the **Spatial characteristics** of the landscape. When the spatial characteristics and the digital elevation information are aligned in GIS to the same coordinate system and selected for the area of the landscape, this data is ready to be used with LMS.

It should be noted that GIS data is only necessary for the landscape visualization capability of LMS. All other capabilities including stand visualization are available with only inventory and stand data. More discussion of these files is included in the **Creating a New Portfolio** section at the end of this tutorial.

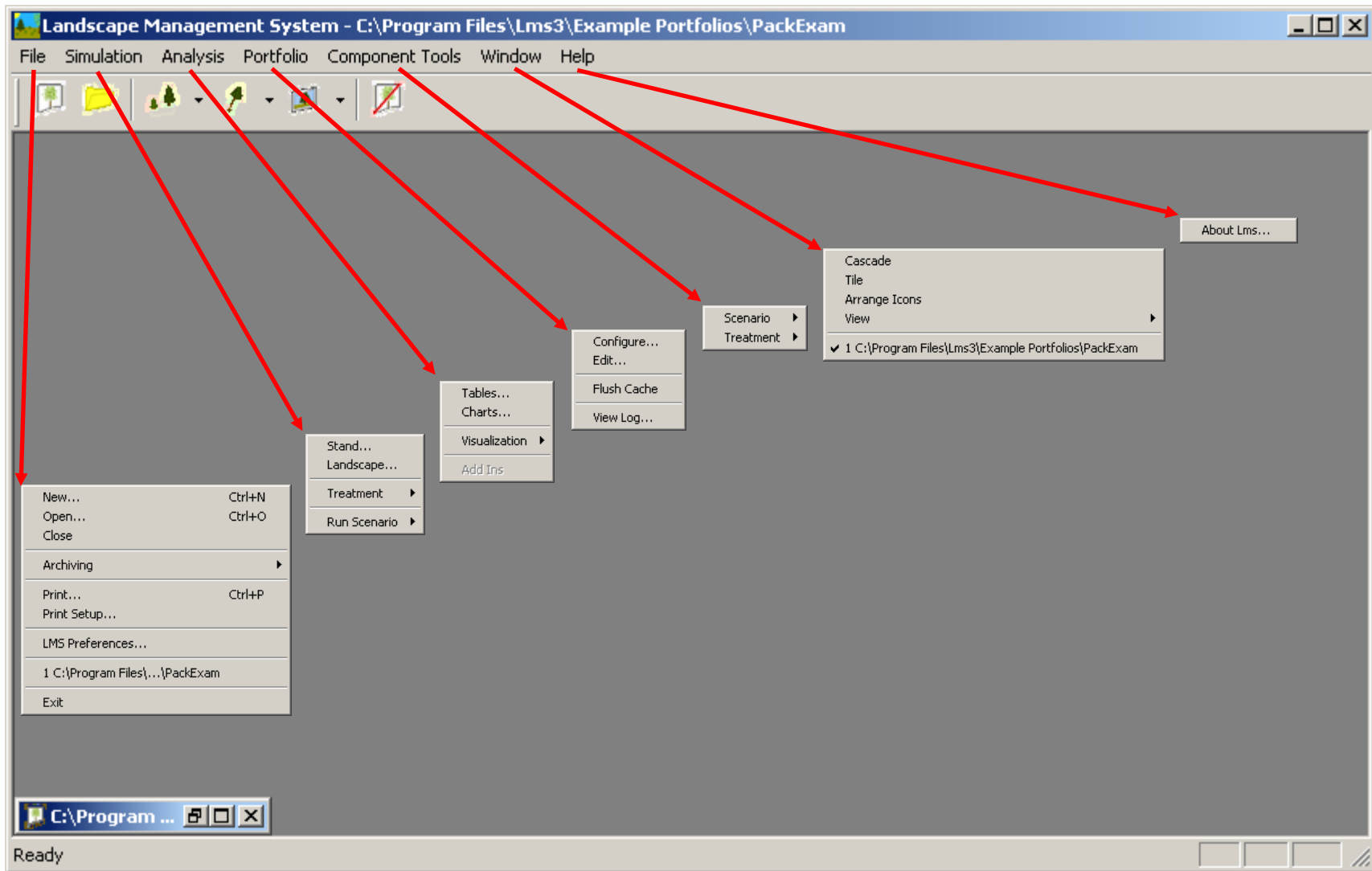
# LMS Menus



LMS 3.1 is a typical Windows program that operates using a series of menus and dialogs



# LMS Menus – Portfolio Open

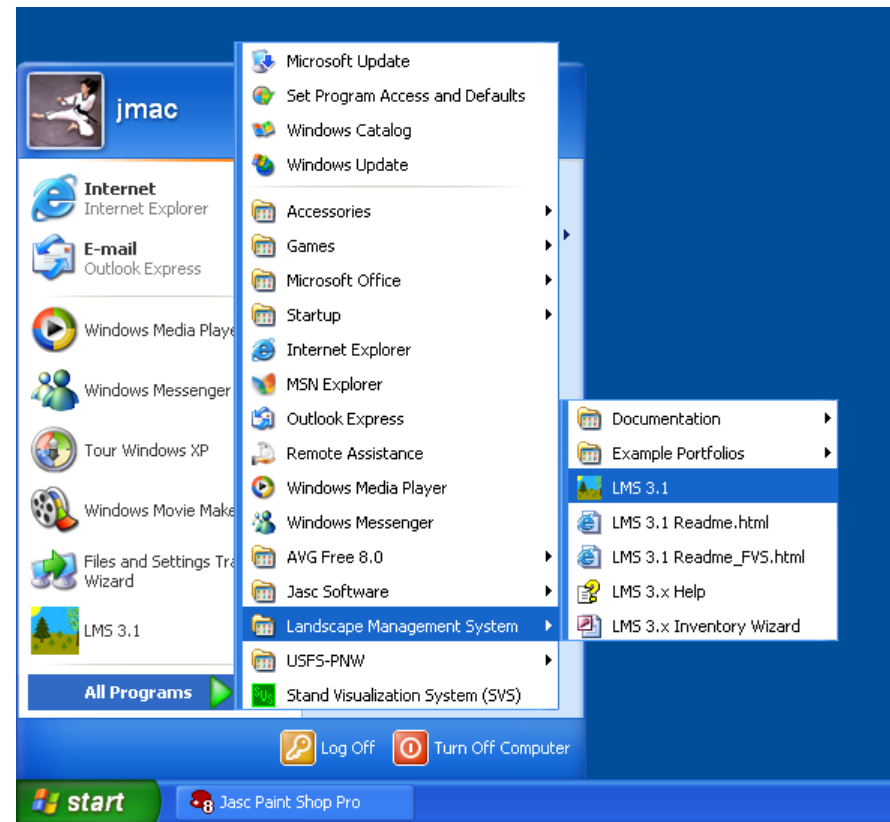


LMS 3.1 is a typical Windows program that operates using a series of menus and dialogs

# Starting LMS 3.1

The Landscape Management System should already be installed on your computer.

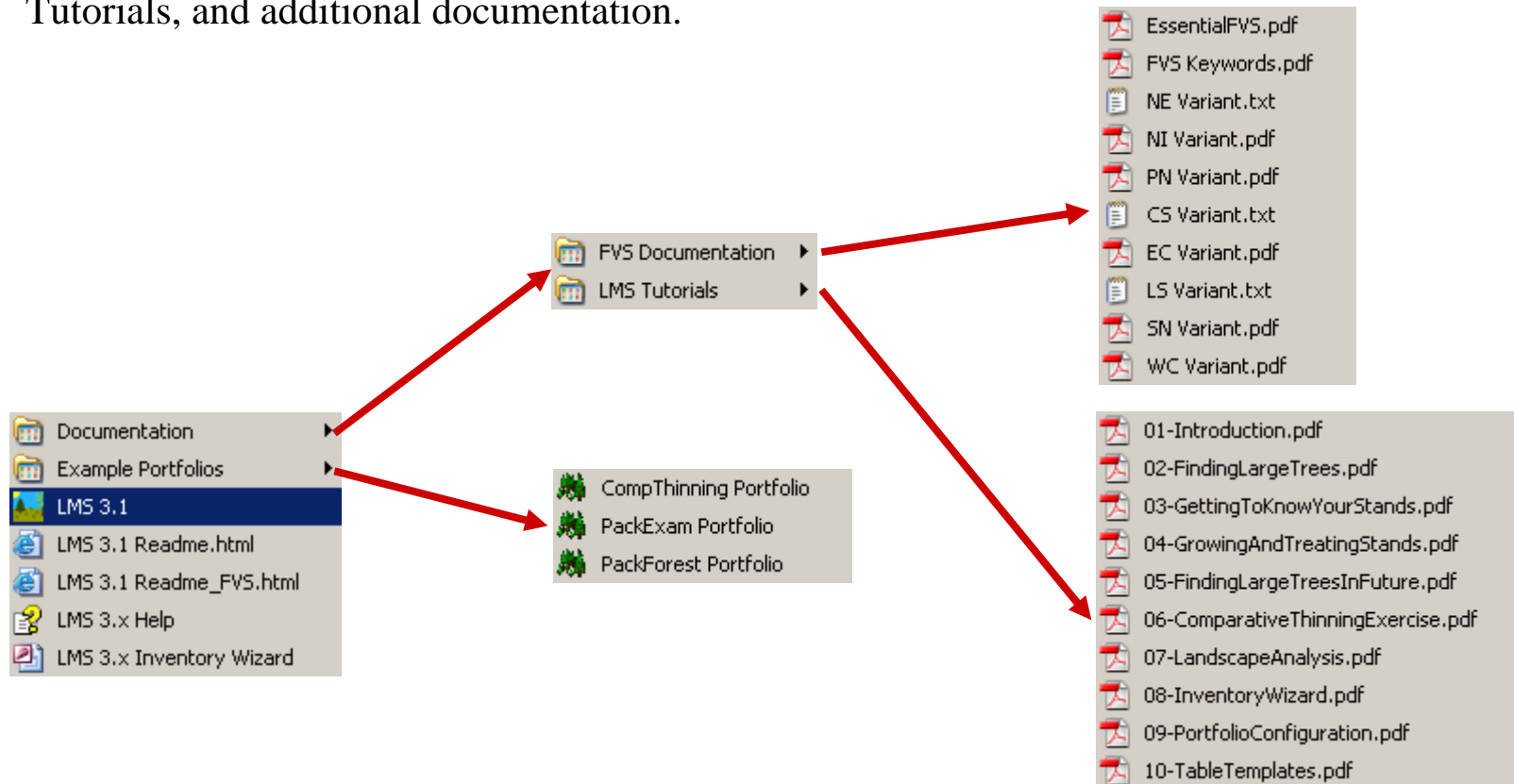
If not already installed, it can be installed from CD-ROM or by downloading the program from the web site of the Silviculture Laboratory, College of Forest Resources, University of Washington:  
<http://lms.cfr.washington.edu/>.



Once LMS has been installed, the program may be opened by clicking Start/All Programs/Landscape Management System/LMS 3.1 (or use the LMS 3.1 Desktop icon).

# Landscape Management System Program Group

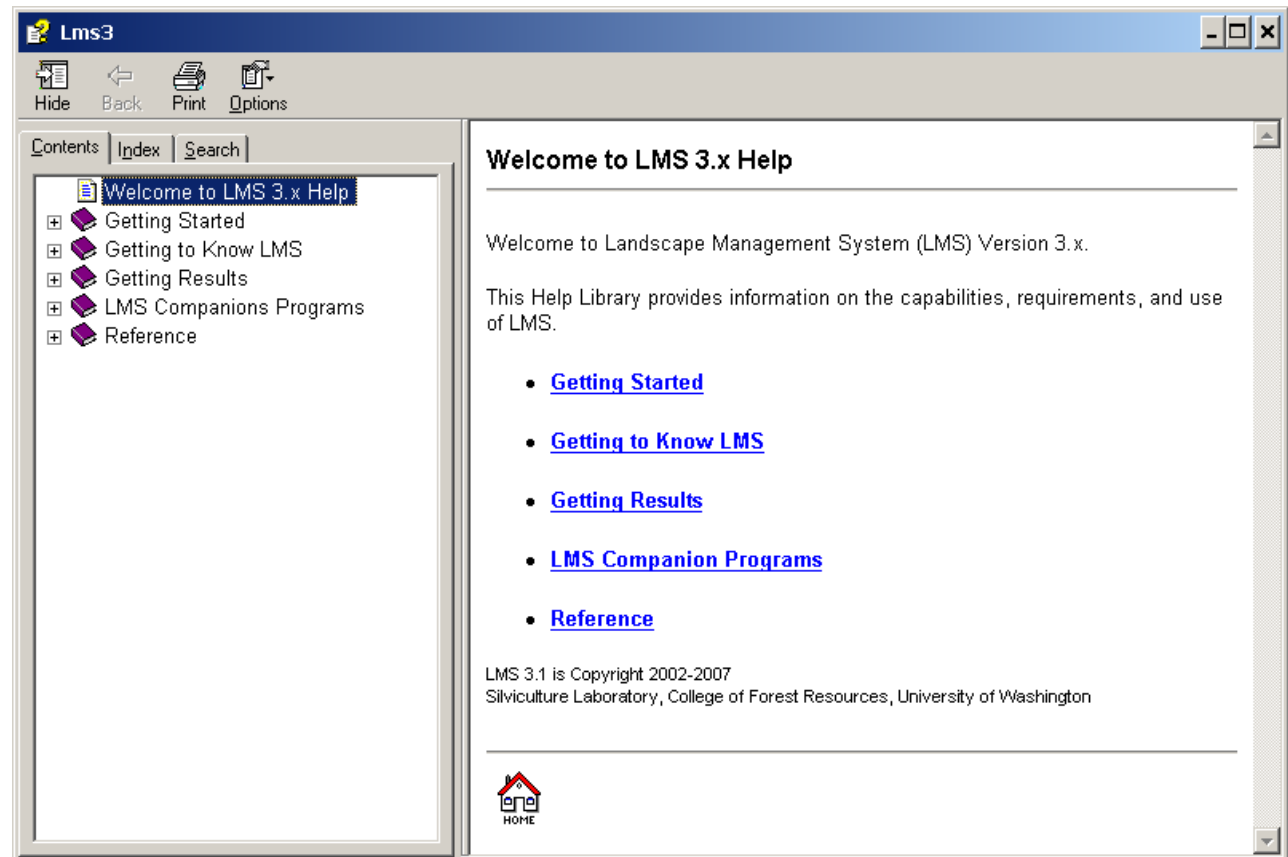
Use the Landscape Management System Program Group to access the LMS 3.1 program, LMS 3.1 Help File, LMS 3.1 Inventory Wizard, Example portfolios, LMS Tutorials, and additional documentation.





# LMS 3.1 Help File

The LMS 3.1 Help File contains a considerable amount of information about the software. It should be considered the first stop for getting information about LMS.



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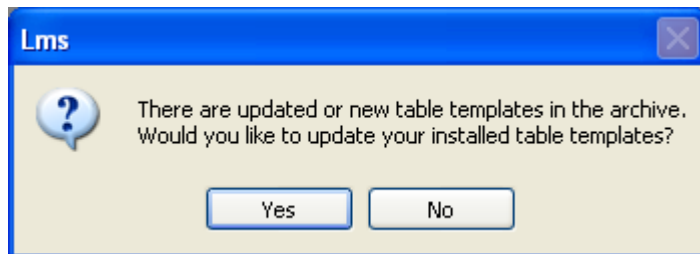


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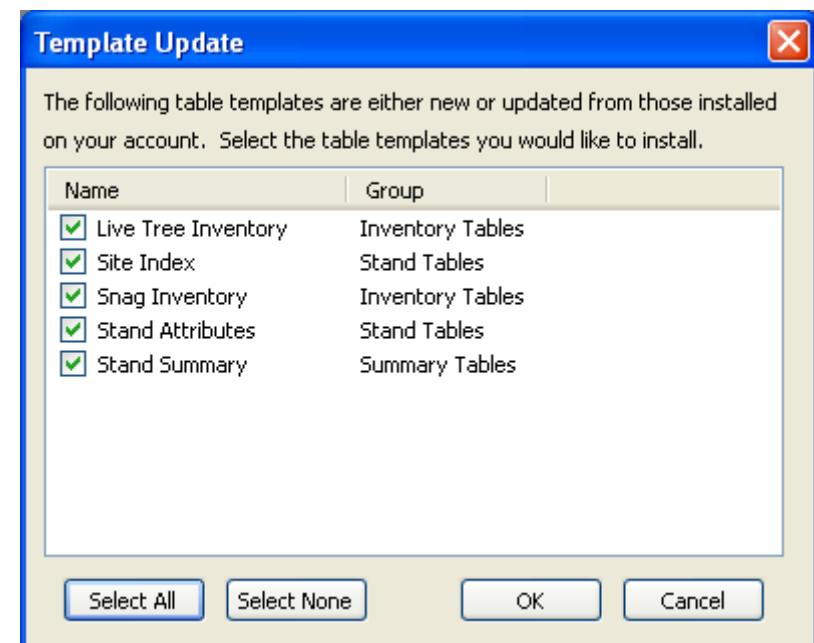


# Starting LMS 3.1

The first time LMS 3.1 is started on a computer it needs to copy table templates and basic analysis tables to your user specific directory. You will be prompted asking if you would like to update your installed table templates.

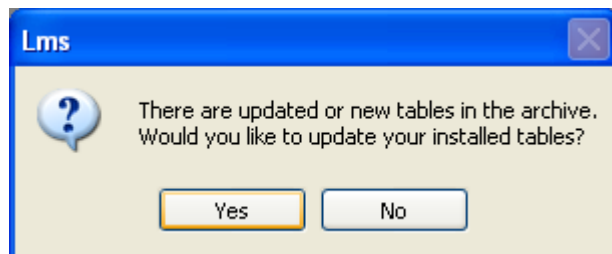


Click Yes. When the Table Update dialog apperas, click Select All and the click OK.

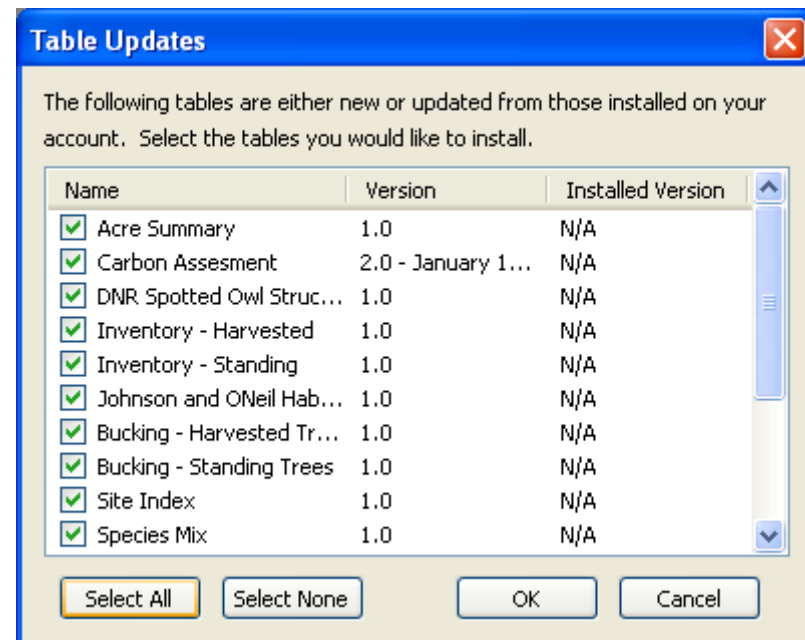


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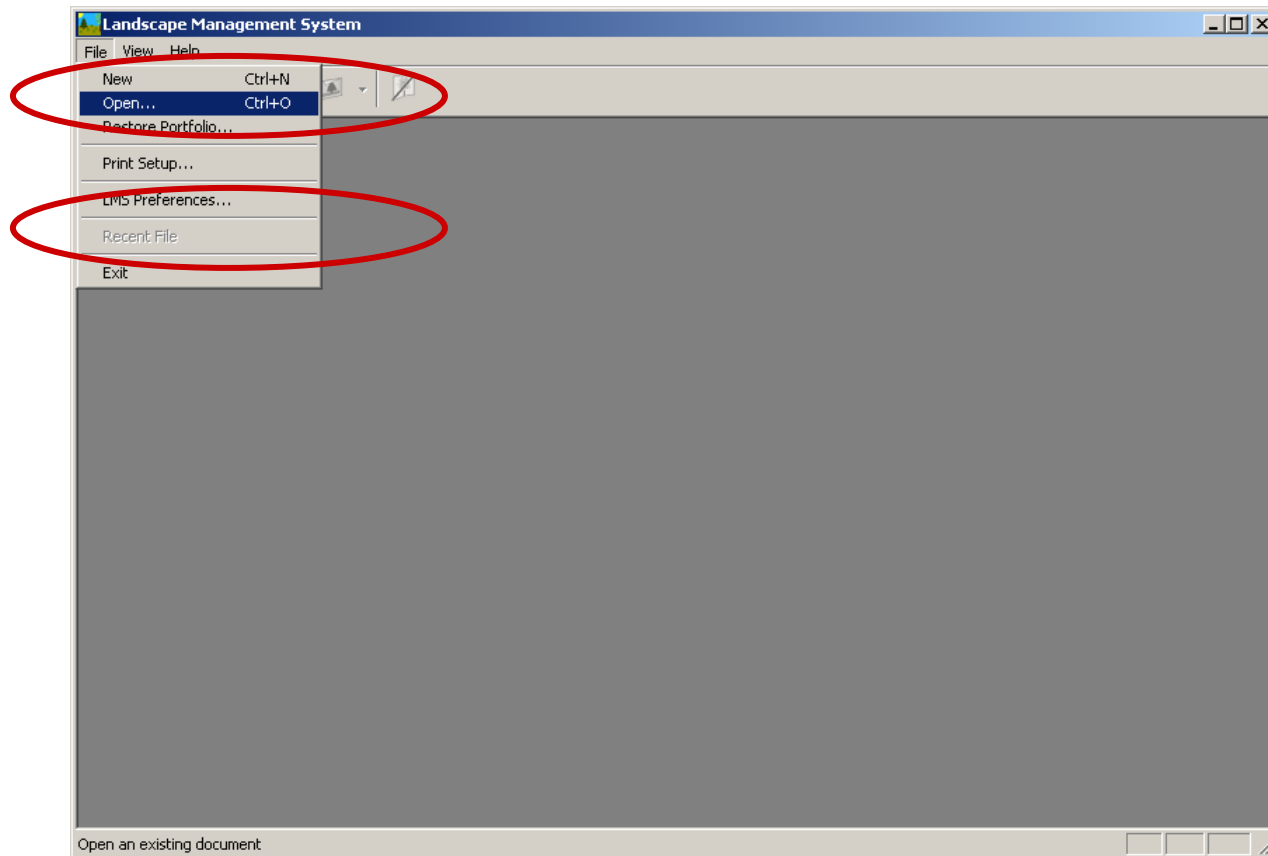


Click Yes. When the Tables Update dialog appears click Select All and the click OK.





# Open Portfolio



To open a portfolio select the File/Open menu command to access the Open Portfolio Dialog. Alternatively you can select from the recent file list to re-open a portfolio that was used recently.



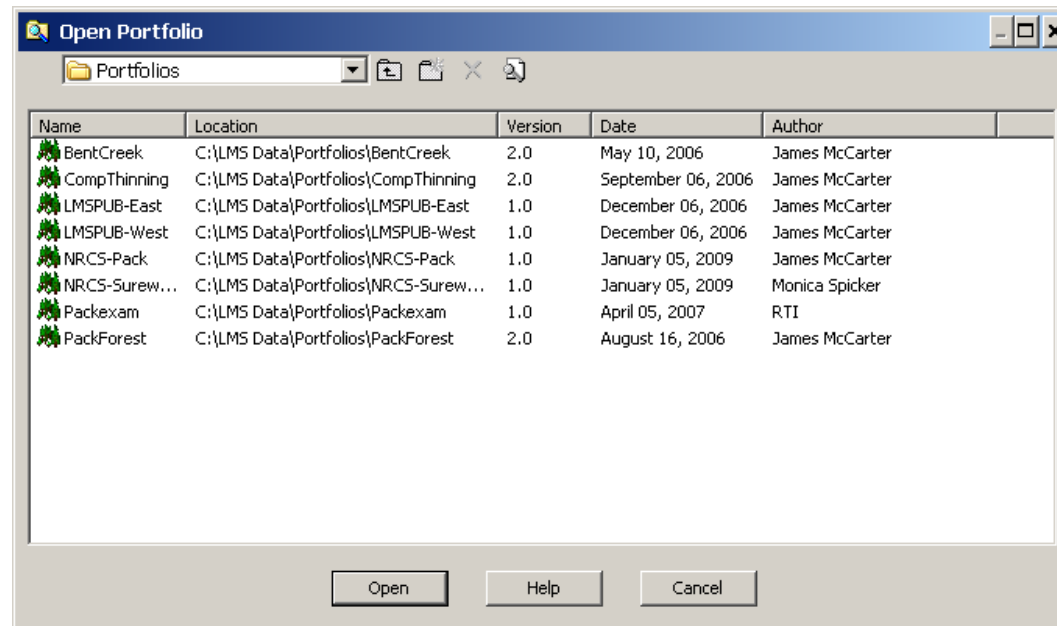
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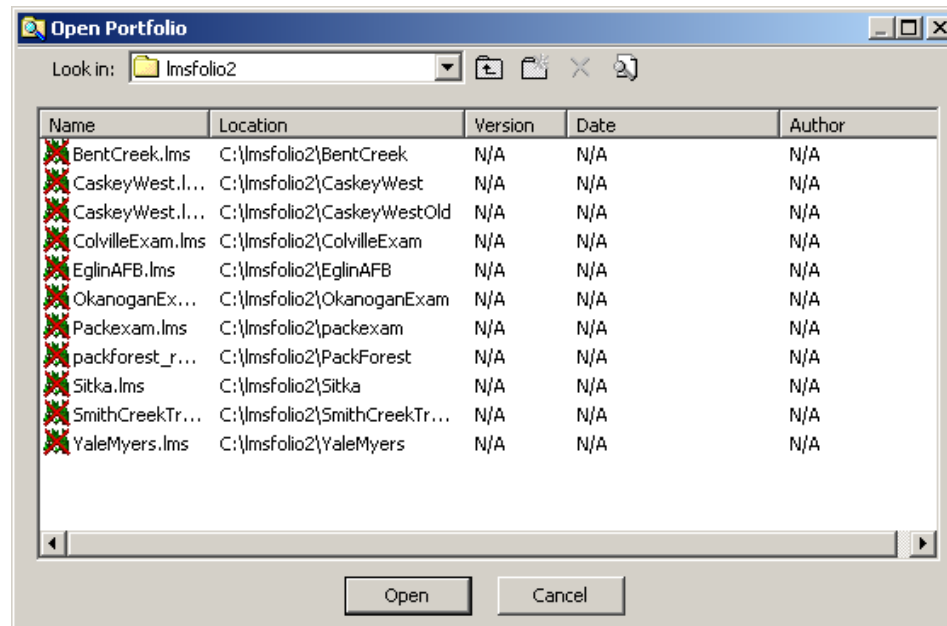
# Open Portfolio Dialog



The Open Portfolio Dialog presents a list of valid LMS 3.1 portfolios. Select a portfolio, then click Open (or Double click on the Portfolio Name) to open the portfolio.

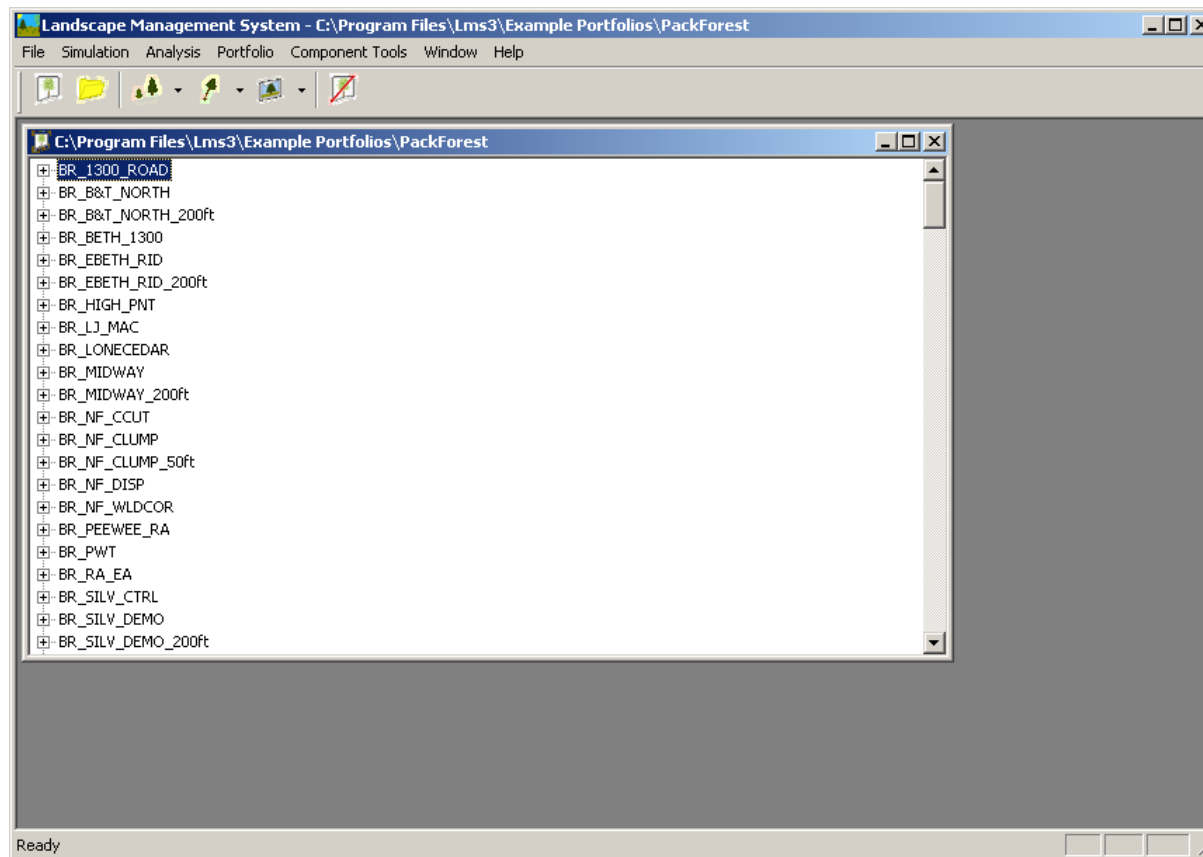
NOTE: Example portfolios are now distributed in the C:\Program Folders\Lms3\Example Portfolios directory. You will need to browse to that directory to open the example portfolios. Alternatively you can use the Example Portfolio icons in the Landscape Management System\Example Portfolios program group.

# Open Portfolio Dialog



The Open Portfolio Dialog will display the Portfolio Name with a red X over the icon if the portfolio is not a valid LMS 3.1 portfolio. In the example above, LMS 3.1 is indicating that LMS 2.x portfolios are not in the correct format for LMS 3.1.

# Pack Forest Portfolio



After a few moments, LMS will display the Portfolio Window containing the list of stands in the portfolio. LMS 3.1 is a multiple document application, meaning that multiple portfolios can be open in LMS 3.1 at the same time, each in its own window.



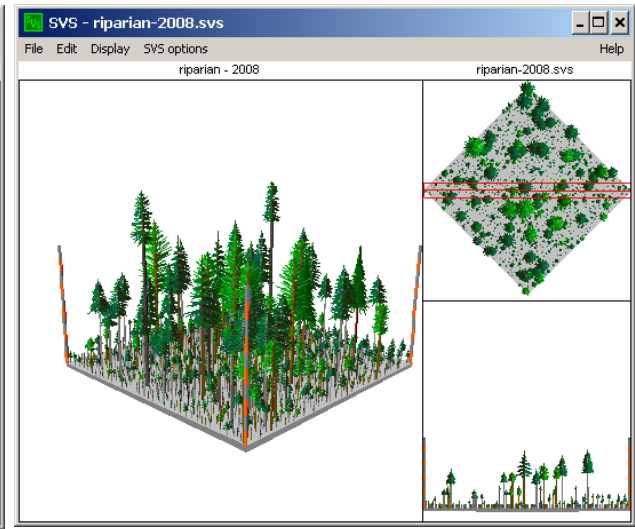
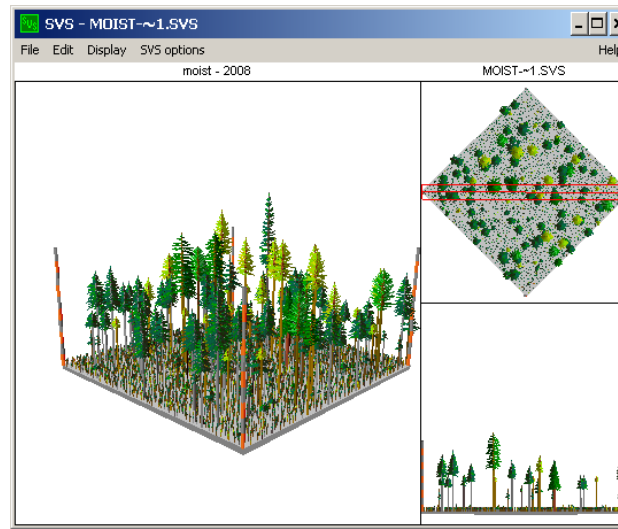
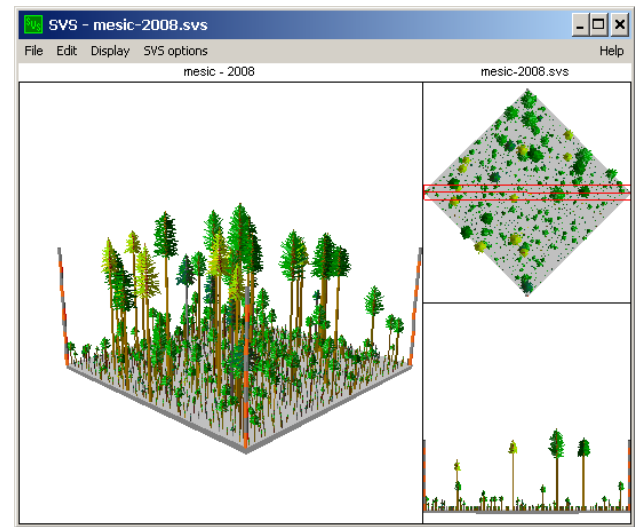
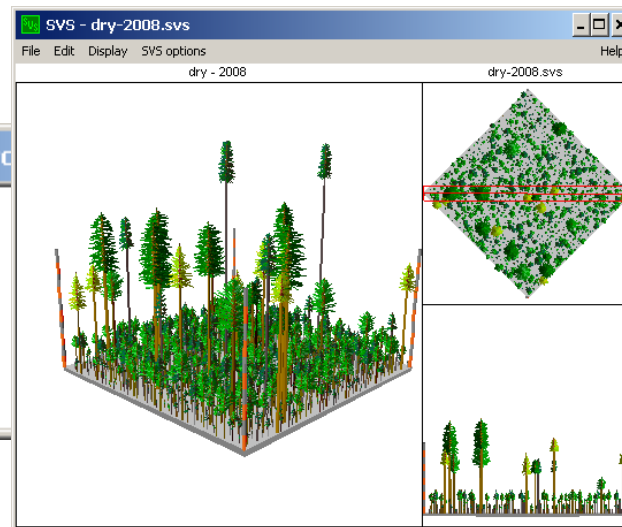
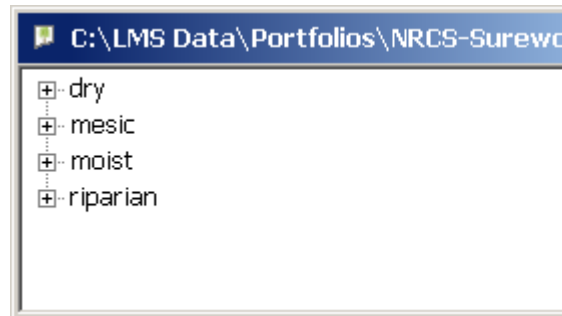
[illegible]

LMS 3.1 comes with an example dataset for the entire school forest – stand information, tree inventory information, elevation data, and spatial characteristics.

# NRCS Example Portfolios

- Two example portfolios were created for this training session:
  - Eastside Washington:
    - Four stands were provided by Monica Spicker, Spokane CC.
  - Westside Washington:
    - Four stands were selected from Pack Forest from around the campus area.

# NRCS Eastside – Surewood



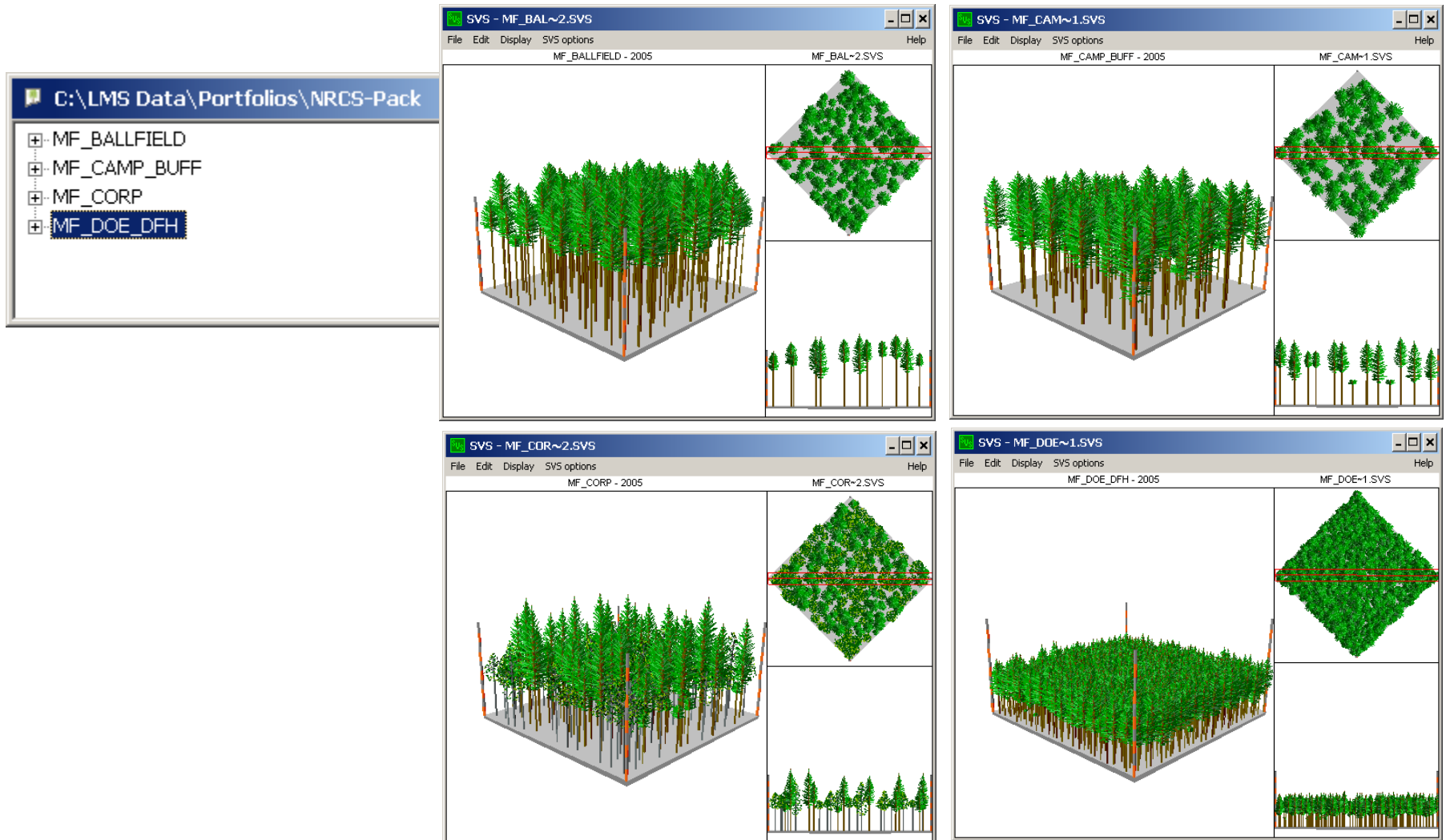
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# NRCS Westside – NRCS-Pack



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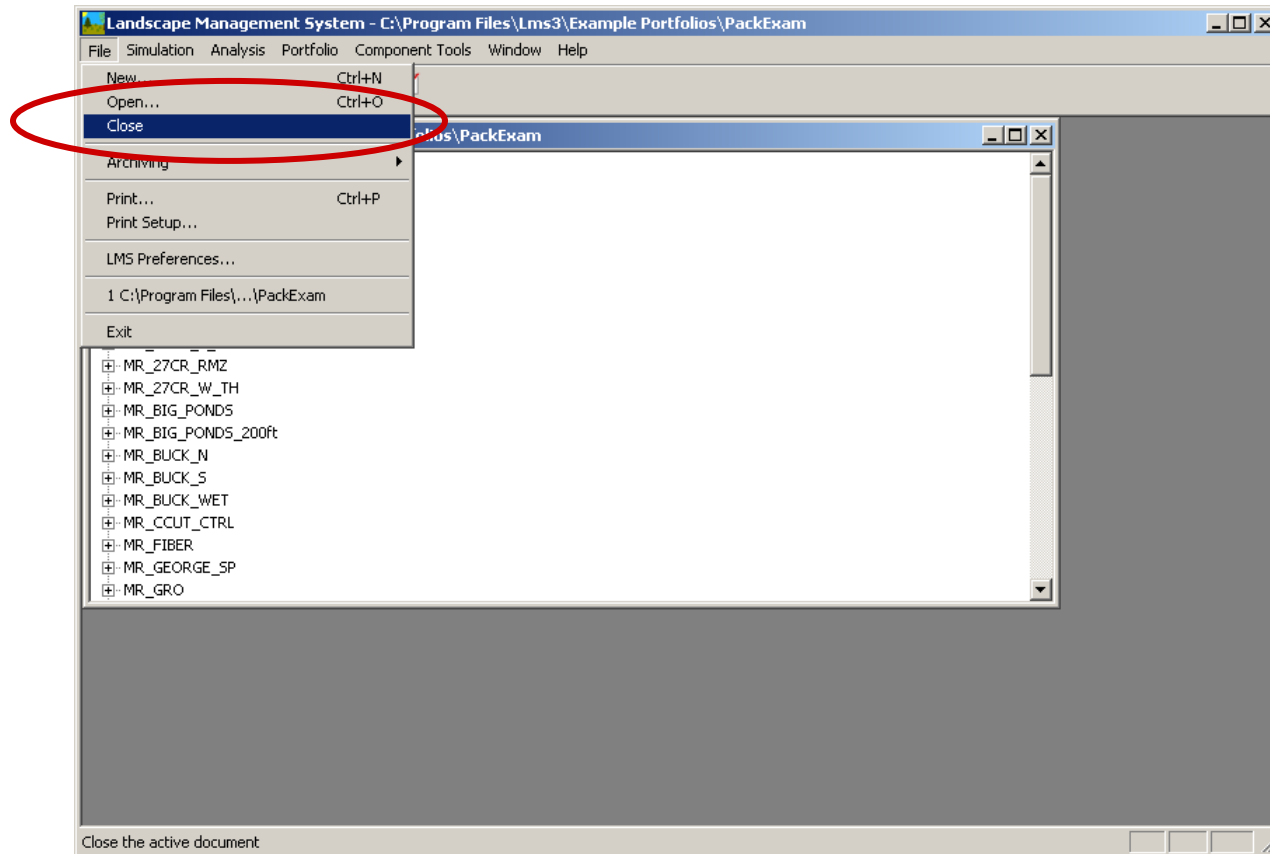


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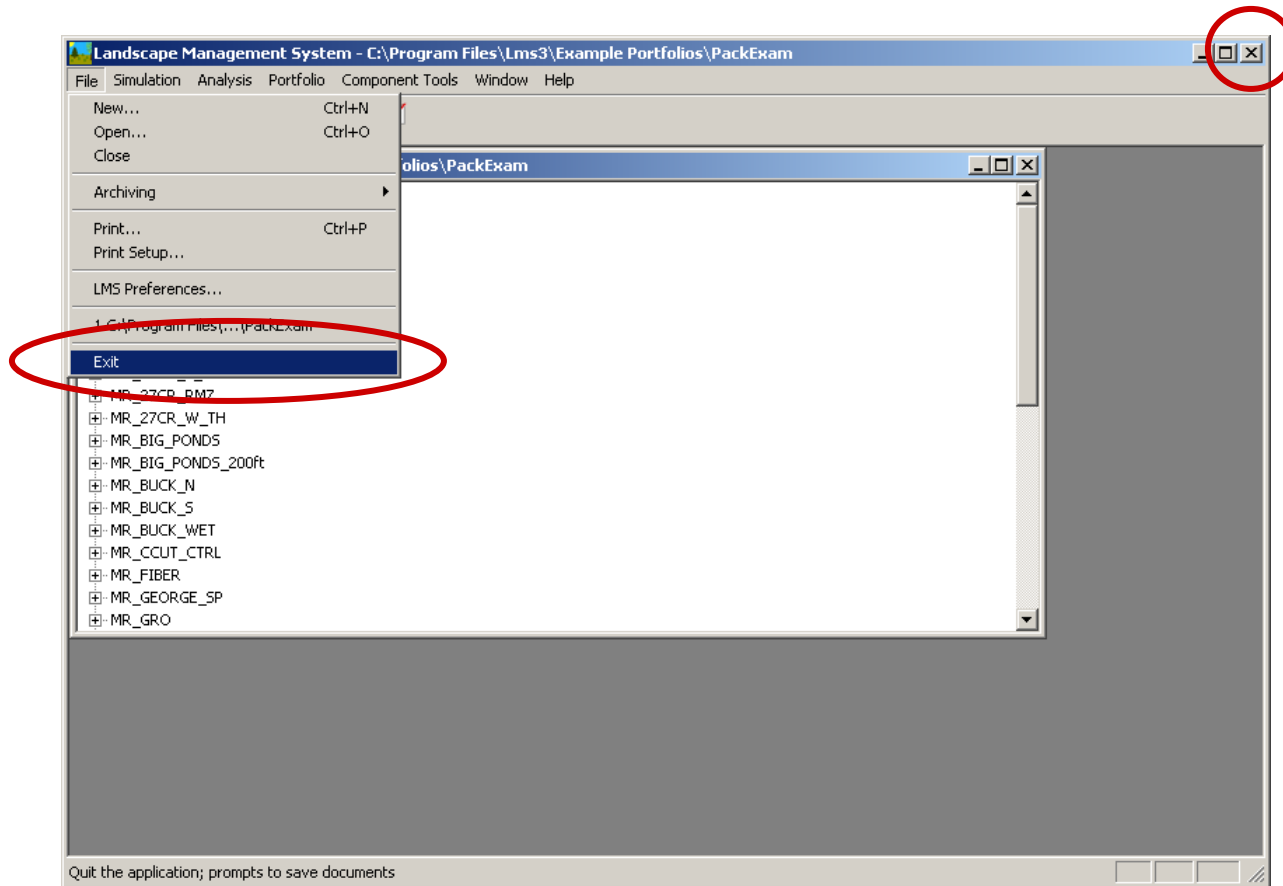


# Close Portfolio



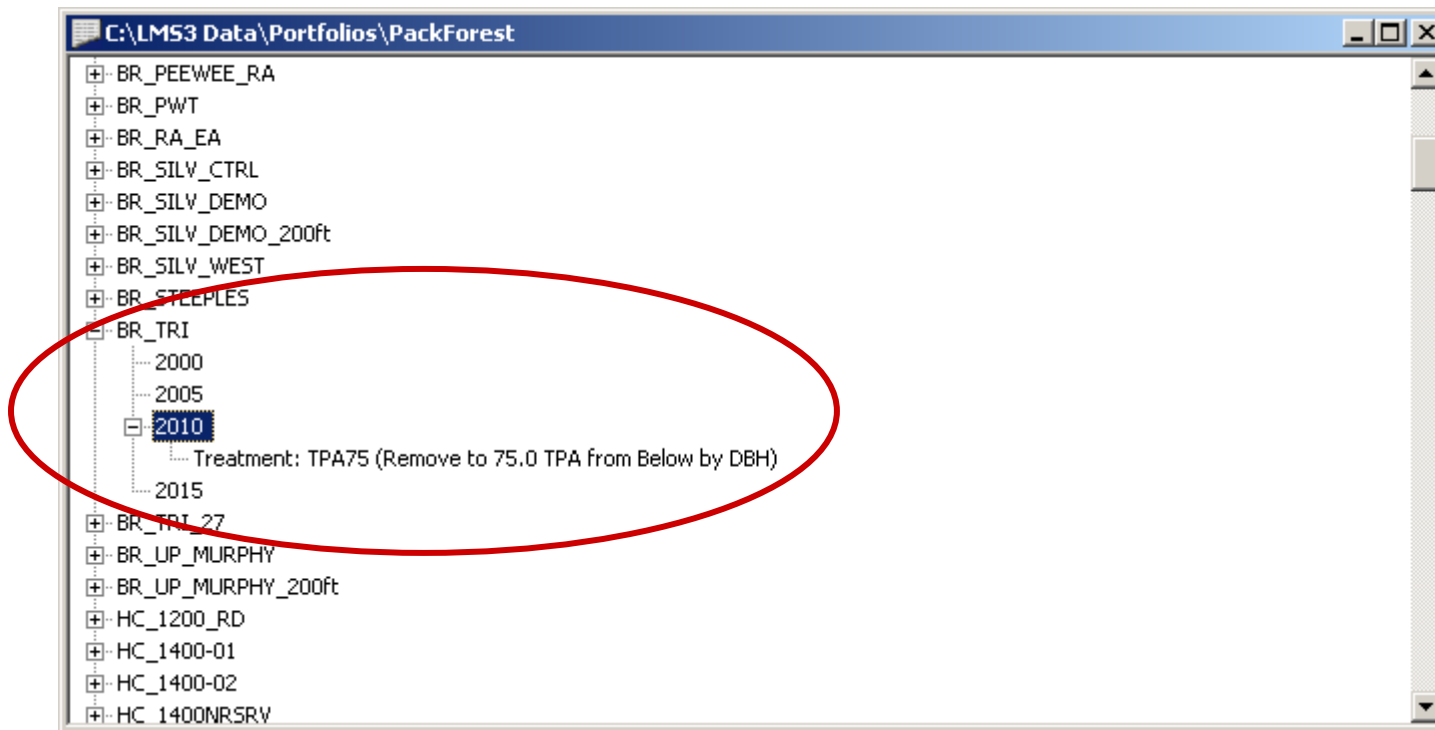
Use the File/Close menu command to close the current portfolio.

# Exit LMS



Exit LMS using the File/Exit menu command or by using the X on the upper right of the application window.

# Portfolio Windows



The Portfolio Window contains a list of stand names for the portfolio along with a list of years that inventory information is available for each stand. This tree view will display any treatments that have been applied to the stand. Click the Plus (+) inside the square next to a stand name to open the tree view for that stand.



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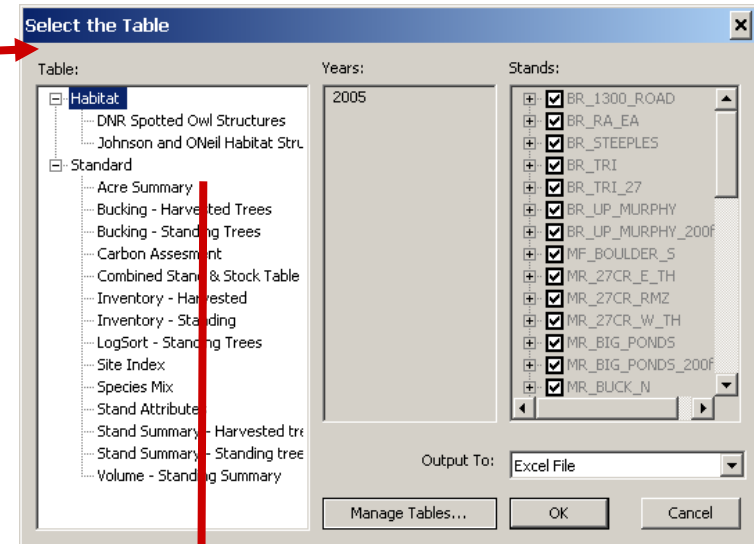
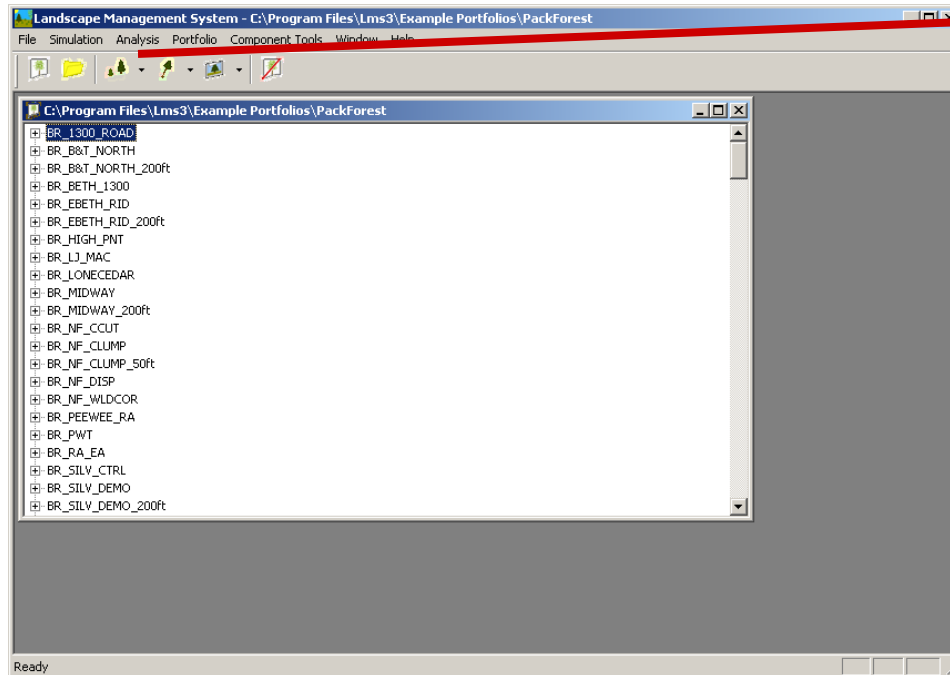


# LMS Tables

- Basic Table Interface
  - Pre-define tables implemented in the Python scripting language
    - Requires programming capability to add tables. Tables can be added by users.
- Advanced Table Interface
  - User's can create their own tables from LMS variables using GUI.
    - No programming required. Limited to variables known by LMS (additional variables can be added by developing an LMS component).



# LMS Basic Tables



Year	Stand	DBH	Out DBH	Ave Height	Al Height	Out Trees per Acre	Stand Area	Stand Area Relative	Volume	Volume - Volume	Total March Cubic	P
2000	BR_1300	6.188267	5.921762	29.08368	63.07102	378.27	79.0051	175.1776	31.75928	1015.92	0	0
2000	BR_B&T_NORTH	9.28556	7.576981	46.77567	80.81795	460.97	216.7724	409.2954	71.13772	34412.91	0	0
2000	BR_B&T_NORTH_200ft	9.28556	7.576981	46.77567	80.81795	460.97	216.7724	409.2954	71.13772	34412.91	0	0
2000	BR_BETH_1300	16.57932	15.55791	92.54713	76.62415	174.52	291.6338	392.6724	64.25553	53849.67	0	0
2000	BR_EBETH_RID	3.747014	3.409201	21.79736	66.0698	382.78	29.31129	79.27576	15.14231	133.2	0	0
2000	BR_EBETH_RID_200ft	3.747014	3.409201	21.79736	66.0698	382.78	29.31129	79.27576	15.14231	133.2	0	0
2000	BR_HIGH_PNT	3.895880	3.728828	23.67328	79.76572	245.68	20.35396	54.20844	10.71204	55.93	0	0
2000	BR_LJ_MAC	5.601583	5.200662	30.35174	75.94961	457.64	79.31783	180.6402	33.90055	2669.28	0	0
2000	BR_LONECEDAR	6.648131	6.342894	31.61307	64.68132	536.52	129.3303	278.7379	50.15918	3399.48	0	0
2000	BR_MIDWAY	0	0	0	0	0	0	0	0	0	0	0
2000	BR_MIDWAY_200ft	0	0	0	0	0	0	0	0	0	0	0
2000	BR_NF_CCUIT	0	0	0	0	0	0	0	0	0	0	0
2000	BR_NF_CLUMP	0	0	0	0	0	0	0	0	0	0	0
2000	BR_NF_CLUMP_50ft	0	0	0	0	0	0	0	0	0	0	0
2000	BR_NF_DISP	0	0	0	0	0	0	0	0	0	0	0
2000	BR_NF_WILDCOR	0	0	0	0	0	0	0	0	0	0	0
2000	BR_PEEWEE_RA	0	0	0	0	0	0	0	0	0	0	0
2000	BR_PWT	0	0	0	0	0	0	0	0	0	0	0
2000	BR_RA_EA	0	0	0	0	0	0	0	0	0	0	0
2000	BR_SILV_CTRL	0	0	0	0	0	0	0	0	0	0	0
2000	BR_SILV_DEMO	0	0	0	0	0	0	0	0	0	0	0
2000	BR_SILV_DEMO_200ft	0	0	0	0	0	0	0	0	0	0	0

Select Analysis/Basic... to open the Select the Table dialog. Select the table, years, and stands, and output to you want and then Click OK to send the requested information to Microsoft Access, Microsoft Excel, or a text editor.



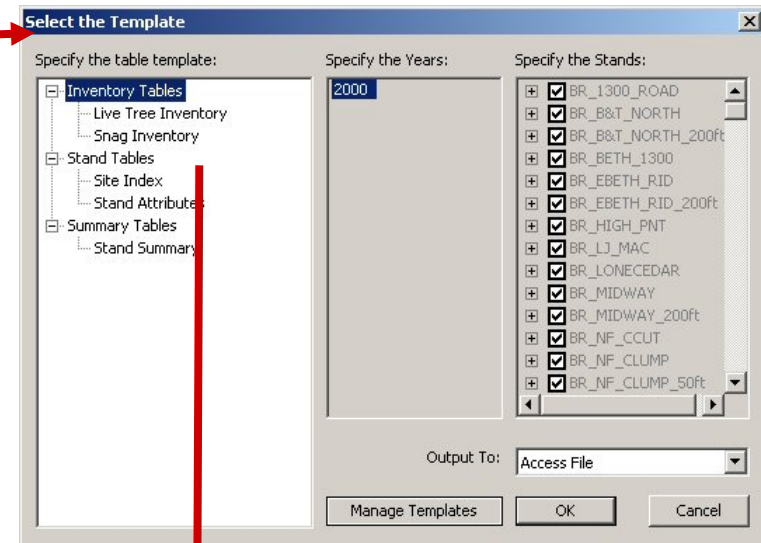
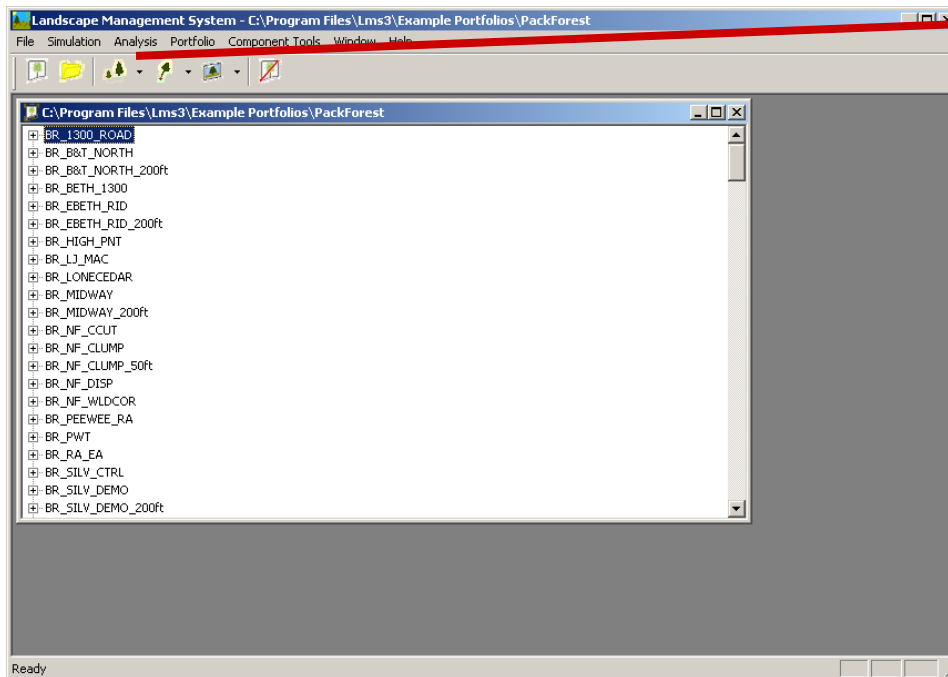
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# LMS Advanced Tables



PackForest.xls																			
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
1	Year	Stand	DBH - Out	DBH - Ave	Height - Ave	Height - Out	Tree per Acre	Base Area	Stand Area	Relative C/Vol	Volume - 1	Volume - 2	Total Merch	Cubic					
2	2000	BR_1300	6.188267	5.921762	29.08368	63.07102	378.27	79.0051	175.1776	31.75928	1015.92	0	0	0					
3	2000	BR_B&T	9.28556	7.576981	46.77567	80.81795	460.97	216.7724	409.2954	71.13772	34412.91	0	0	0					
4	2000	BR_B&T	9.28556	7.576981	46.77567	80.81795	460.97	216.7724	409.2954	71.13772	34412.91	0	0	0					
5	2000	BR_BETH	16.57932	15.55791	92.54713	76.62415	174.52	291.6338	392.6724	64.25553	53849.67	0	0	0					
6	2000	BR_EBETH	3.747014	3.409201	21.79736	66.0698	382.78	29.31129	79.27576	15.14231	133.2	0	0	0					
7	2000	BR_EBETH	3.747014	3.409201	21.79736	66.0698	382.78	29.31129	79.27576	15.14231	133.2	0	0	0					
8	2000	BR_HIGH	3.895880	3.728828	23.67328	79.76572	246.68	20.35396	54.20864	10.31204	55.93	0	0	0					
9	2000	BR_LJ_MAC	5.601583	5.200662	30.35174	75.94961	457.64	79.31783	180.6402	33.90055	2669.28	0	0	0					
10	2000	BR_LONE	6.648131	6.342894	31.61307	64.68132	536.52	129.3303	278.7379	50.15918	3399.48	0	0	0					
11	2000	BR_MIDWA	0	0	0	0	0	0	0	0	0	0	0	0					
12	2000	BR_MIDWA	0	0	0	0	0	0	0	0	0	0	0	0					
13	2000	BR_NF_C	3.109493	2.907345	18.46422	81.1935	565.93	29.844	66.90341	16.92436	0	0	0	0					
14	2000	BR_NF_C	3.588981	3.450632	21.11216	76.3195	407.48	28.6289	78.75727	15.11095	0	0	0	0					
15	2000	BR_NF_C	3.588981	3.450632	21.11216	76.3195	407.48	28.6289	78.75727	15.11095	0	0	0	0					
16	2000	BR_NF_C	4.708823	3.633251	22.19787	77.8070	451.98	58.57419	138.8251	25.84773	7196.1	0	0	0					
17	2000	BR_NF_VI	15.12932	13.94777	87.50348	78.08148	147.08	183.6148	285.7495	47.20608	36275.37	0	0	0					
18	2000	BR_PEEV	10.00146	9.698794	63.22099	78.00445	313.32	170.9346	313.3933	54.05032	18289.19	0	0	0					
19	2000	BR_PWT	16.26374	14.97162	92.48334	76.29882	126.56	182.5797	276.1176	45.27331	36531.52	0	0	0					
20	2000	BR_PA_E	15.33144	14.23715	83.16536	74.85725	127.21	183.2099	292.6807	41.88025	30375.38	0	0	0					
21	2000	BR_SILV	10.31071	17.81654	110.1247	80.03775	174.25	318.6305	459.782	74.46389	69456.2	0	0	0					
22	2000	BR_SILV	10.37414	17.49105	108.6359	76.53331	123.59	227.5688	327.9227	53.08956	48111.4	0	0	0					
23	2000	BR_SILV	10.37414	17.49105	108.6359	76.53331	123.59	227.5688	327.9227	53.08956	48111.4	0	0	0					
24	2000	BR_SILV	10.46501	18.32912	124.921	82.20825	107.9	200.6454	288.5666	46.93368	40870.04	0	0	0					
25	2000	BR_STEE	12.75666	11.54345	69.30295	73.52839	220.77	195.9408	326.2412	54.88022	20810.08	0	0	0					
26	2000	BR_TRI	12.93589	12.25059	78.68372	78.21841	230.96	210.7874	349.0263	58.60958	34325.4	0	0	0					
27	2000	BR_TRL	17.33883	16.14227	105.3175	78.89595	165.15	270.7905	394.2688	65.03146	60123.45	0	0	0					
28	2000	BR_UP_M	15.43471	14.01497	86.77114	79.94786	180.66	234.7329	362.421	59.74818	46952.77	0	0	0					
29	2000	BR_UP_M	15.43471	14.01497	86.77114	79.94786	180.66	234.7329	362.421	59.74818	46952.77	0	0	0					
30	2000	HC_1200	14.23549	13.11927	80.65781	76.58041	180.47	199.4641	317.9906	52.88827	34363.08	0	0	0					
31	2000	HC_1400	5.61201	5.13747	36.9818	100.6330	347.1	59.62032	137.4171	25.16793	3226.02	0	0	0					
32	2000	HC_1400	7.203014	7.082299	42.36075	75.1363	277.55	80.29318	166.9123	29.75247	4760.68	0	0	0					
33	2000	HC_1400	3.303708	3.224918	21.1553	81.34231	778.55	46.34522	131.7544	25.49788	0	0	0	0					
34	2000	HC_1400	3.171171	3.106714	20.01278	79.01341	623.59	34.20216	88.82241	19.2063	0	0	0	0					
35	2000	HC_2000	3.565502	3.297004	20.34203	79.4628	419.26	29.08967	80.1851	15.395	0	0	0	0					
36	2000	HC_2000	11.18967	6.129919	37.32297	218.3346	312.29	212.8891	373.4607	63.86714	45345.62	0	0	0					
37	2000	HC_27_C	8.4584	7.739497	53.60586	89.7039	458.11	178.6718	350.0885	61.4417	17683.19	0	0	0					
38	2000	HC_CAN	15.40139	14.8082	84.4462	70.38649	137.28	177.5999	274.4438	45.25456	30310.75	0	0	0					
39	2000	HC_CENT	17.78431	16.10791	93.45547	72.83138	131.56	226.941	331.2708	53.8139	30029.59	0	0	0					

Select Analysis/Advanced... to open the Select Template dialog. Select the table template, years, and stands, and output to you want and then Click OK to send the requested information to Microsoft Access, Microsoft Excel, or a text editor.



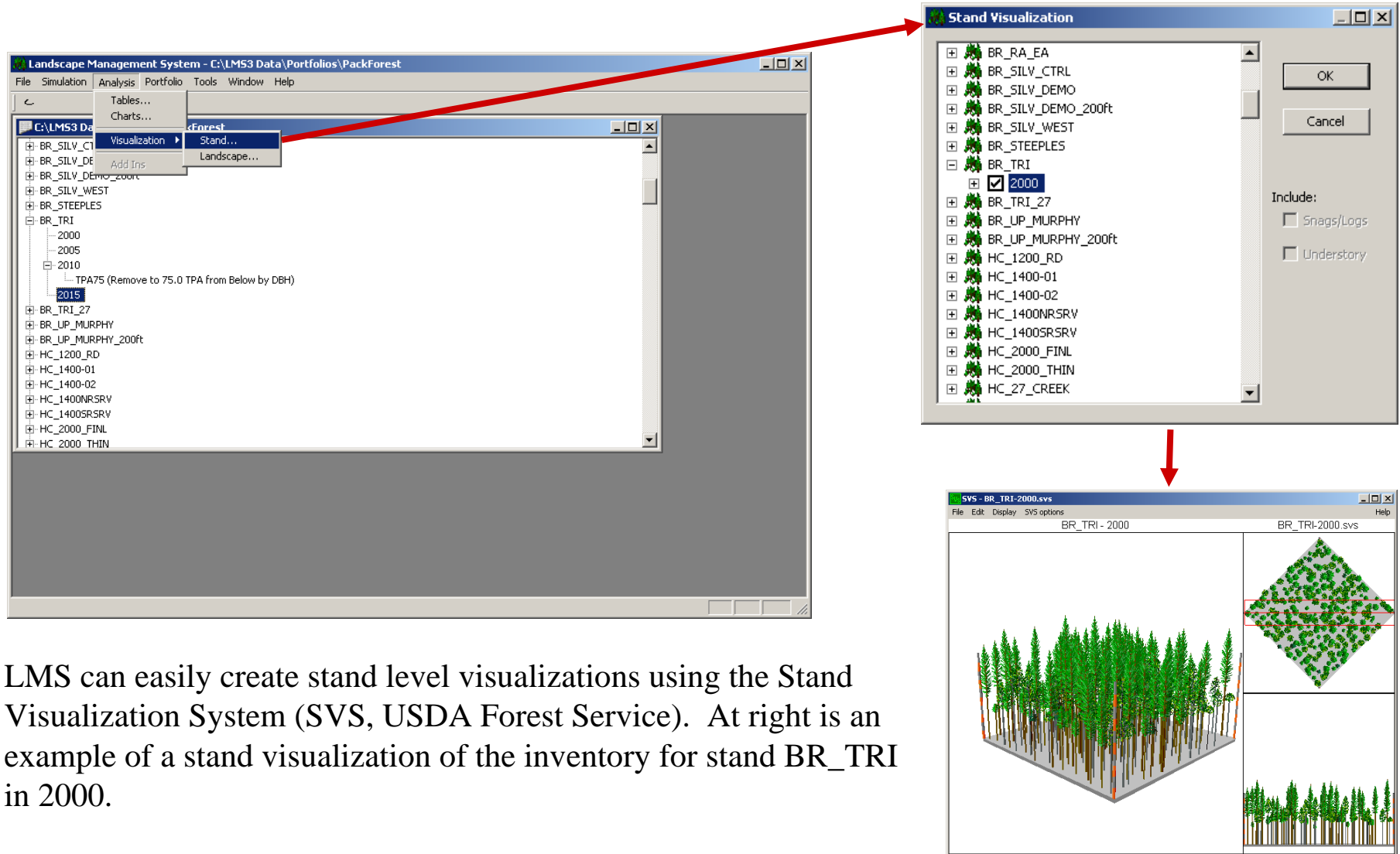
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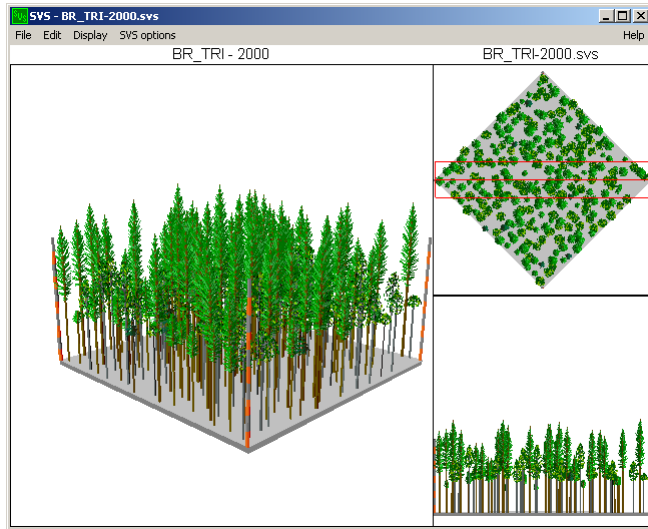


# Stand Visualization

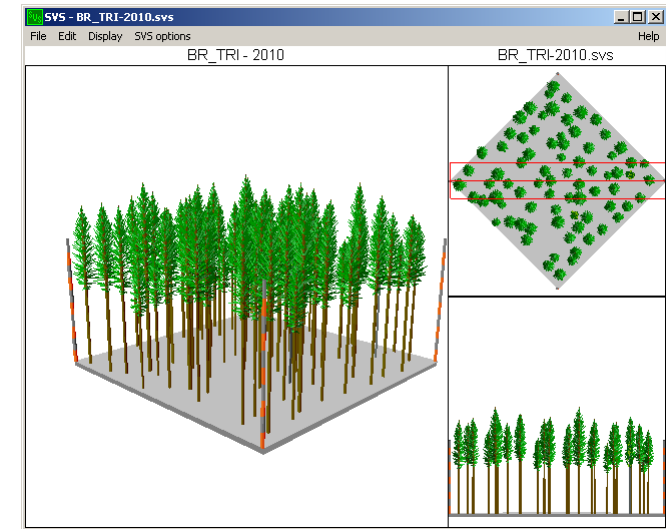
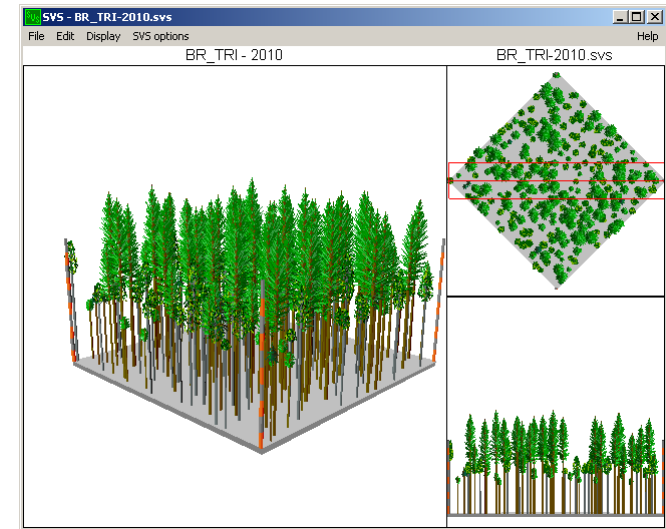


LMS can easily create stand level visualizations using the Stand Visualization System (SVS, USDA Forest Service). At right is an example of a stand visualization of the inventory for stand BR\_TRI in 2000.

# Stand Visualization Over Time

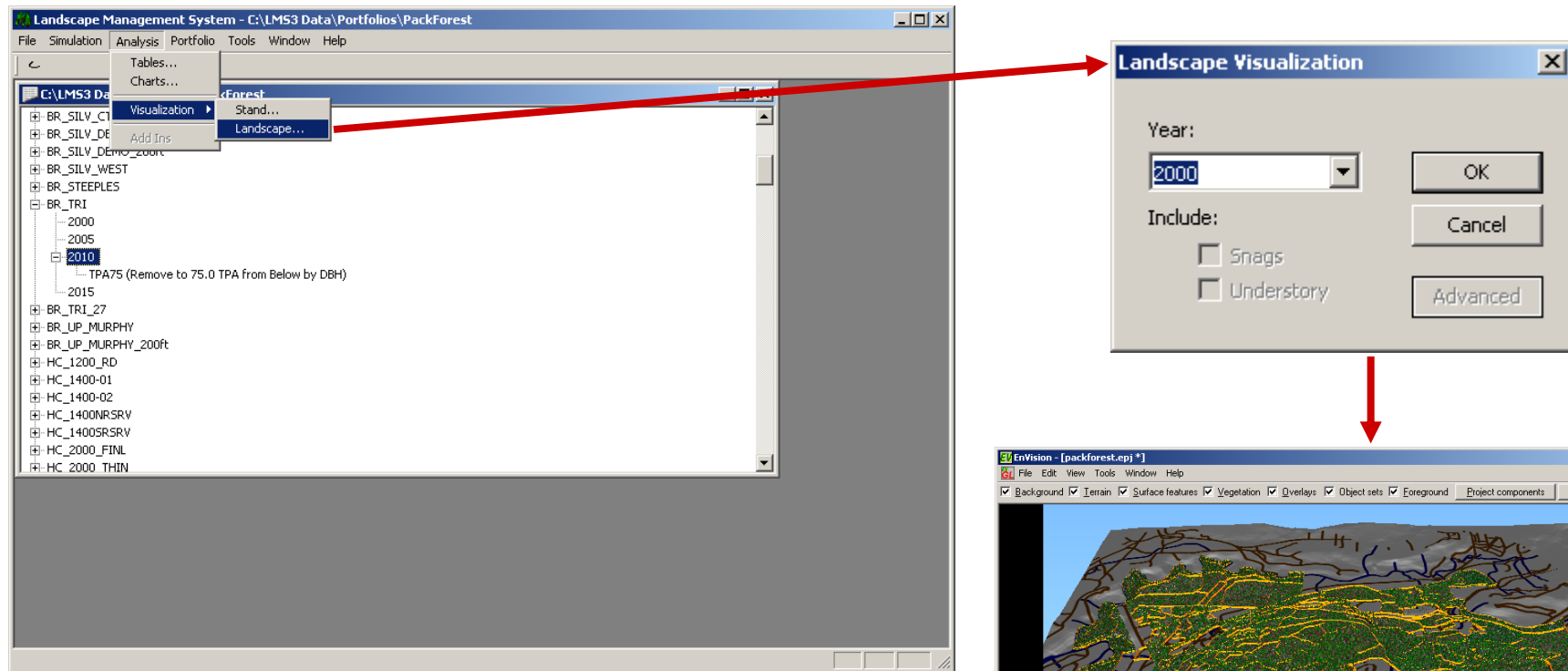


Visualizations can be displayed for different years and showing treatments. Above is the BR\_TRI stand in 2000. Above right is the BR\_TRI stand growth out to 2010. Below on right is the BR\_TRI stand in 2010 after a treatment has removed all but the largest 75 trees per acre.

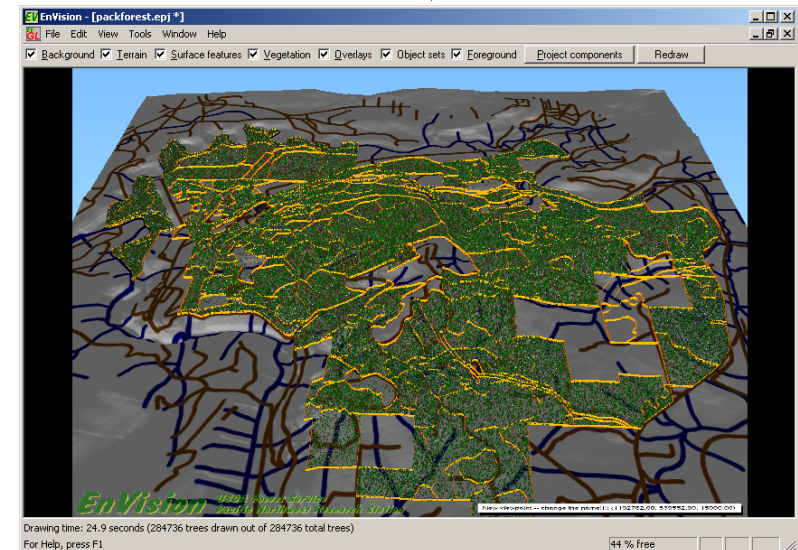




# Landscape Visualization



LMS can present landscape level visualization using EnVision (USDA Forest Service). At right is an example visualization for the Pack Forest portfolio showing trees, stand boundaries (orange), roads (brown), and streams (blue).



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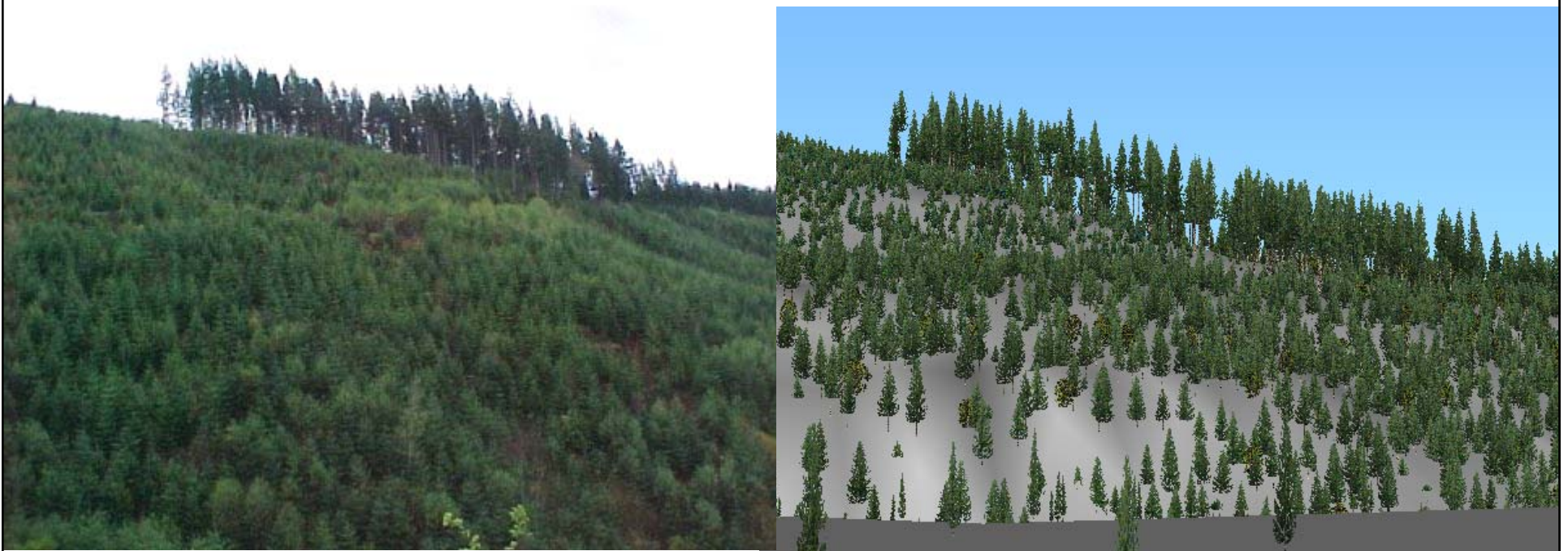


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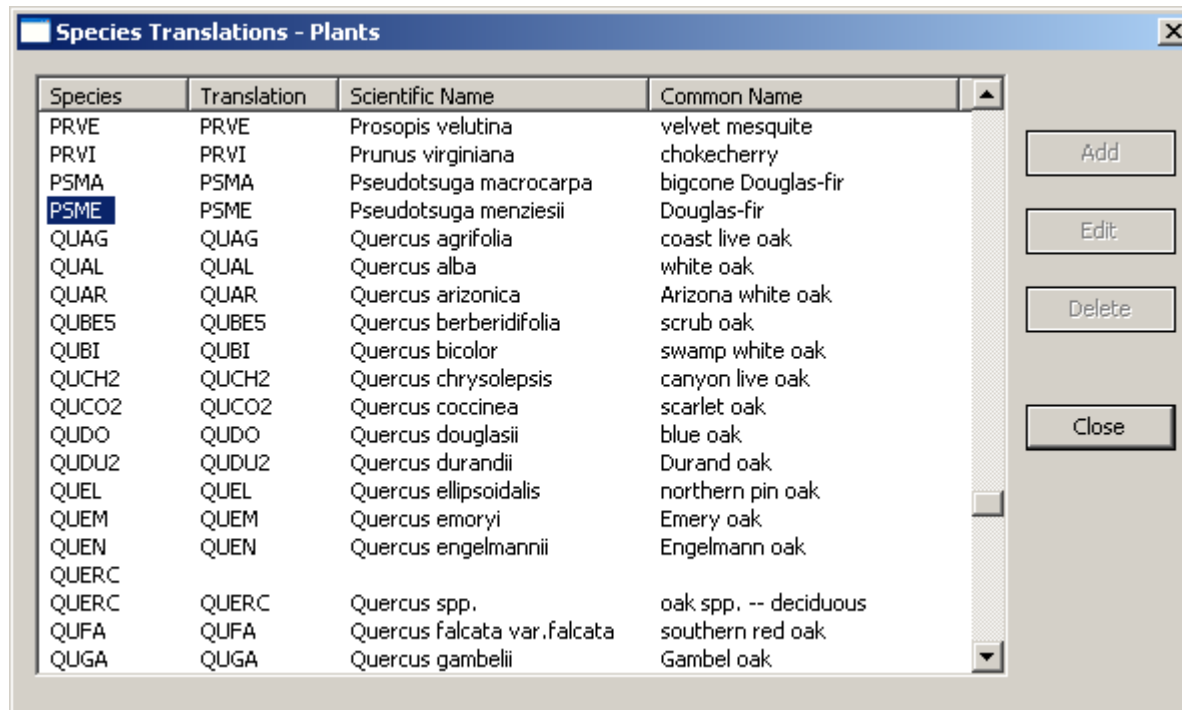
# Visualization Compared to Photo

The landscape visualization tool, EnVision, used in LMS can create realistic visualizations. Below is a photograph compared to landscape visualization from LMS. In many cases this visualization can be used for monitoring and may highlight inventory data issues.



Visualization and photo courtesy of Duane Emmons, Pack Forest

# Species Codes in LMS 3.1



Species	Translation	Scientific Name	Common Name
PRVE	PRVE	Prosopis velutina	velvet mesquite
PRVI	PRVI	Prunus virginiana	chokecherry
PSMA	PSMA	Pseudotsuga macrocarpa	bigcone Douglas-fir
<b>PSME</b>	<b>PSME</b>	Pseudotsuga menziesii	Douglas-fir
QUAG	QUAG	Quercus agrifolia	coast live oak
QUAL	QUAL	Quercus alba	white oak
QUAR	QUAR	Quercus arizonica	Arizona white oak
QUBE5	QUBE5	Quercus berberidifolia	scrub oak
QUBI	QUBI	Quercus bicolor	swamp white oak
QUCH2	QUCH2	Quercus chrysolepsis	canyon live oak
QUCO2	QUCO2	Quercus coccinea	scarlet oak
QUDO	QUDO	Quercus douglasii	blue oak
QUDU2	QUDU2	Quercus durandii	Durand oak
QUEL	QUEL	Quercus ellipsoidalis	northern pin oak
QUEM	QUEM	Quercus emoryi	Emery oak
QUEN	QUEN	Quercus engelmannii	Engelmann oak
QUERC	QUERC	Quercus spp.	oak spp. -- deciduous
QUFA	QUFA	Quercus falcata var. falcata	southern red oak
QUGA	QUGA	Quercus gambelii	Gambel oak

LMS 3.1 uses the Natural Resources Conservation Service (NRCS) National Plants\* database species codes. This provides consistent species codes for the entire country regardless of growth model or analytical tool being used.

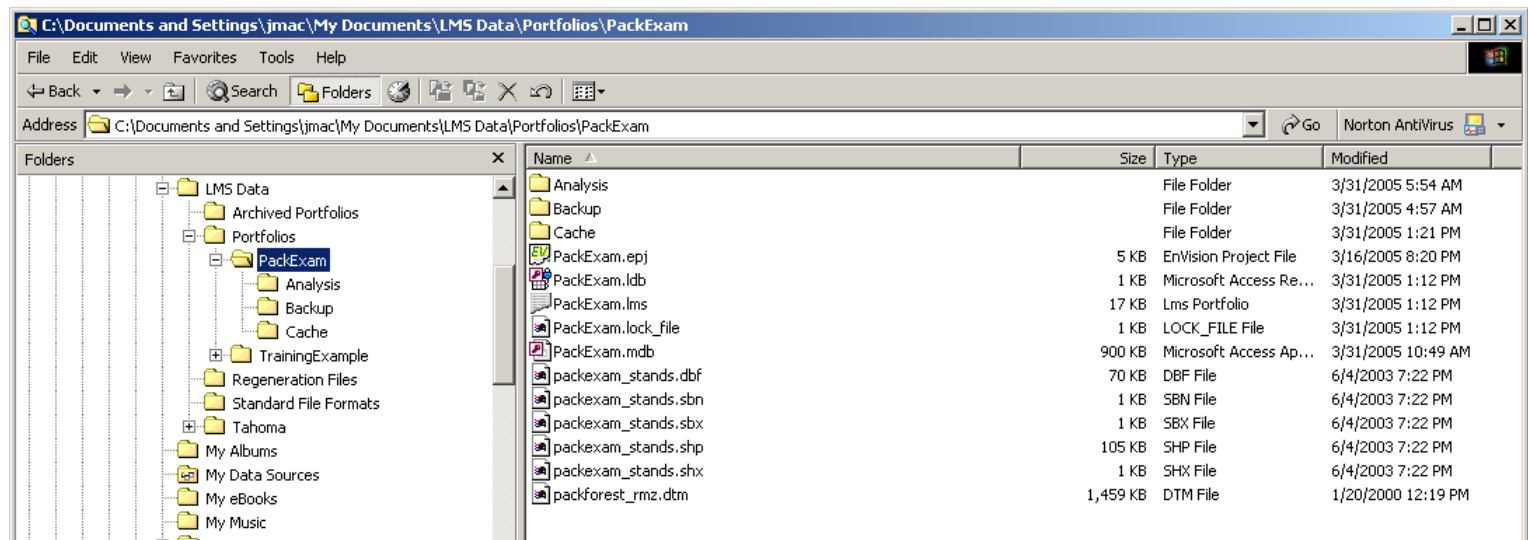
The species codes that LMS 3.1 knows can be viewed using the File/LMS Preferences/Edit Known Species.

\* USDA, NRCS. 2004. The PLANTS Database, Version 3.5 (<http://plants.usda.gov>). National Plant Data Center, Baton Rouge, LA 70874-4490, USA.



# LMS Portfolios

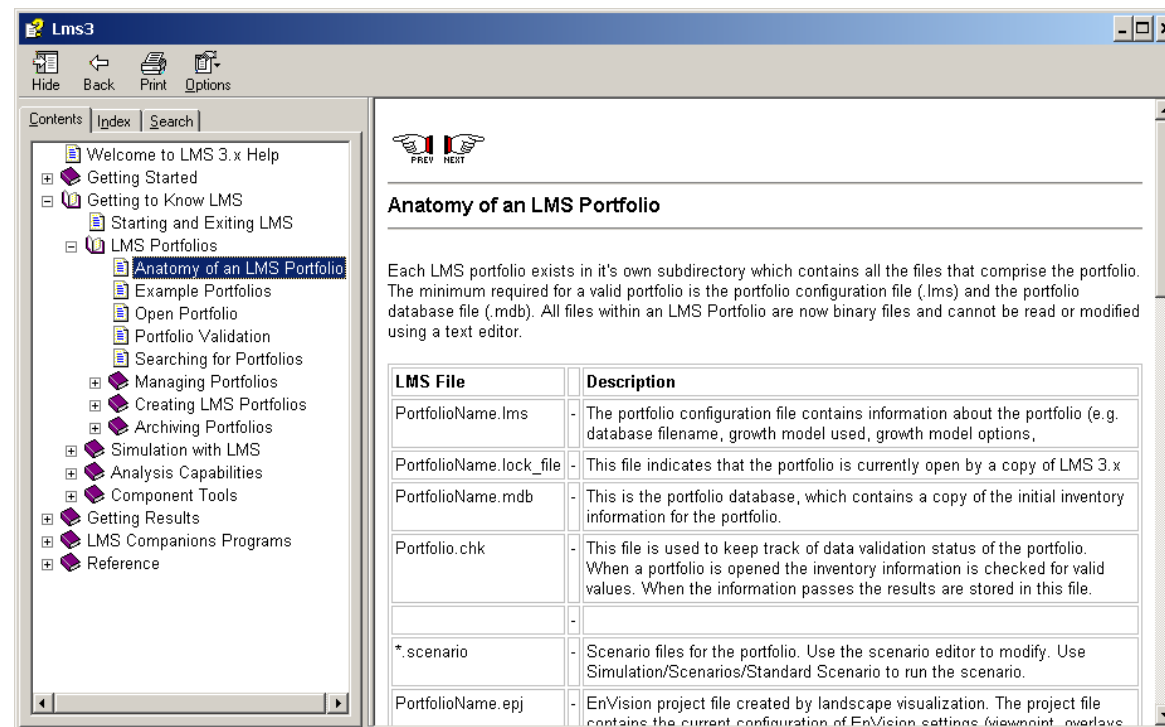
Each LMS portfolio exists in its own subdirectory that contains all the files that comprise the portfolio. The minimum required for a valid portfolio is the portfolio configuration file (.lms) and the portfolio database file (.mdb). All files within an LMS Portfolio are now binary files and cannot be read or modified using a text editor.





# Anatomy of an LMS 3.x Portfolio

- Open LMS 3.x help file ([Help/Contents](#))



# Anatomy of an LMS 3.x Portfolio

The following files are found in the Portfolio directory:

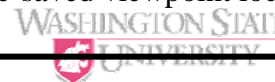
LMS File	Description
PortfolioName.lms	The portfolio configuration file contains information about the portfolio (e.g. database filename, growth model used, growth model options)
PortfolioName.lock_file	This file indicates that the portfolio is currently open by a copy of LMS 3.0.
PortfolioName.mdb	This is the portfolio database, which contains a copy of the initial inventory information for the portfolio.
*.scenario	Scenario files for the portfolio. Use the scenario editor to modify. Use Simulation/Scenarios/Standard Scenario to run the scenario.
PortfolioName.epj	EnVision project file created by landscape visualization. The project file contains the current configuration of EnVision settings (viewpoint, overlays, etc).
*.shp	ESRI shapefiles used by EnVision for stand boundaries and other spatial features. Shapefiles are actually composed of up to 7 pieces (.dbf, .prj, .sbn, .sbx, .shp, .shp.xlm, .shx). A minimum of the .shp, .sbn, and .dbf are required for use by EnVision.
*.dtm	PC Plans Binary DTM files. These files contain the elevation information used by EnVision for landscape visualization. These files are created using converter programs included with EnVision. The original format may be a USGS DEM file, a USGS SDTS file, or an ASCII grid (.asc).
*.vpt	Viewpoint files used by EnVision. These files contain pre-saved viewpoint locations so that the user can return to a specific location in landscape visualization.



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# Anatomy of an LMS 3.x Portfolio

In addition to the individual files contained in the portfolio directory, there are several subdirectories that are important to the portfolio:

Directory	Description
Analysis	Temporary output files from visualization and tables are stored here.
Backup	Backup information is stored here when you "edit" the portfolio to add, remove, or rename stands.
Cache	The current and projected inventory (trees, snag and logs, and understory) and projection information.

Each of these directories are managed by LMS. Modifying or deleting any files in these directories may break your portfolio and prevent LMS from running.



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# Anatomy of an LMS 3.1 Portfolio

The default location for LMS 3.1 portfolios is in C:\LMS Data\Portfolios. This value can be modified by making Windows Registry changes to point to a directory of your choosing. See the example registry file (C:\Program Files\Lms3\Lms3-WorkingDir.reg for an example. This registry file includes the settings for two LMS 3.1 registry entries: LMS Data Directory and Portfolio Directory. You can edit this file using a text editor to change the location of the LMS Data Directory by replacing the string. After making changes you can make these changes to the registry by double clicking the .reg file, or importing the registry file using the registry editor. *Note: Making improper entries may cause LMS 3.1 to function incorrectly.*



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# NRCS-Pack Portfolio

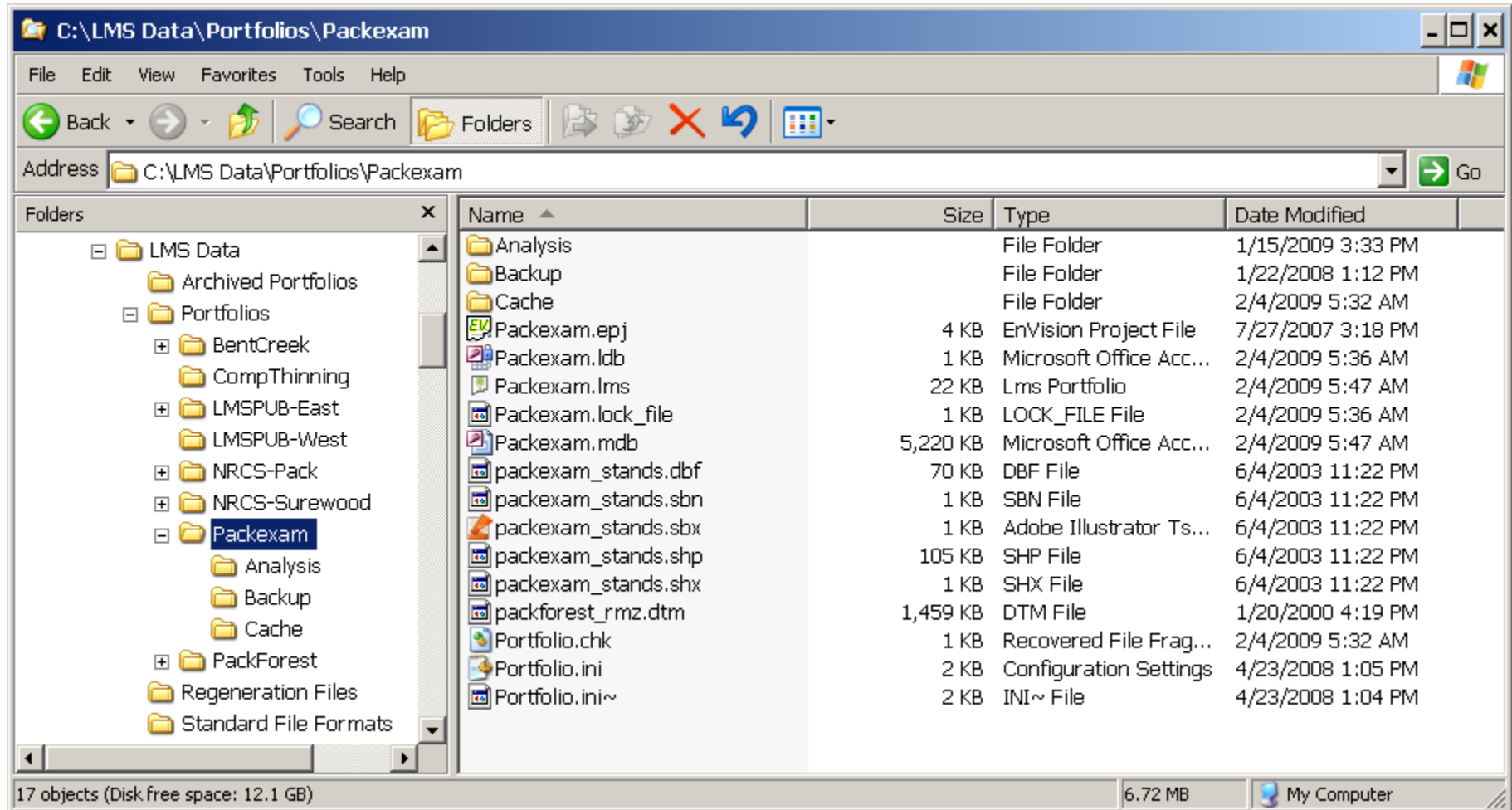
The screenshot shows a Windows Explorer window titled "C:\LMS Data\Portfolios\NRCS-Pack". The address bar shows the path "C:\LMS Data\Portfolios\NRCS-Pack". The left pane shows a tree view of folders, with "NRCS-Pack" selected. The right pane shows a list of files and folders with columns for Name, Size, Type, and Date Modified.

Name	Size	Type	Date Modified
Analysis		File Folder	2/4/2009 5:25 AM
Backup		File Folder	1/12/2009 7:39 PM
Cache		File Folder	2/4/2009 5:24 AM
NRCS-Pack.lms	14 KB	Lms Portfolio	2/4/2009 5:32 AM
NRCS-Pack.mdb	316 KB	Microsoft Office Acc...	2/4/2009 5:32 AM
Portfolio.chk	1 KB	Recovered File Frag...	2/4/2009 5:32 AM

6 objects (Disk free space: 12.1 GB) 329 KB My Computer



# Packexam Portfolio



Windows Explorer window showing the Packexam Portfolio directory. The address bar indicates the path: C:\LMS Data\Portfolios\Packexam.

Name	Size	Type	Date Modified
Analysis		File Folder	1/15/2009 3:33 PM
Backup		File Folder	1/22/2008 1:12 PM
Cache		File Folder	2/4/2009 5:32 AM
Packexam.epj	4 KB	EnVision Project File	7/27/2007 3:18 PM
Packexam.ldb	1 KB	Microsoft Office Acc...	2/4/2009 5:36 AM
Packexam.lms	22 KB	Lms Portfolio	2/4/2009 5:47 AM
Packexam.lock_file	1 KB	LOCK_FILE File	2/4/2009 5:36 AM
Packexam.mdb	5,220 KB	Microsoft Office Acc...	2/4/2009 5:47 AM
packexam_stands.dbf	70 KB	DBF File	6/4/2003 11:22 PM
packexam_stands.sbn	1 KB	SBN File	6/4/2003 11:22 PM
packexam_stands.sbx	1 KB	Adobe Illustrator Ts...	6/4/2003 11:22 PM
packexam_stands.shp	105 KB	SHP File	6/4/2003 11:22 PM
packexam_stands.shx	1 KB	SHX File	6/4/2003 11:22 PM
packforest_rmz.dtm	1,459 KB	DTM File	1/20/2000 4:19 PM
Portfolio.chk	1 KB	Recovered File Frag...	2/4/2009 5:32 AM
Portfolio.ini	2 KB	Configuration Settings	4/23/2008 1:05 PM
Portfolio.ini~	2 KB	INI~ File	4/23/2008 1:04 PM

17 objects (Disk free space: 12.1 GB) 6.72 MB My Computer



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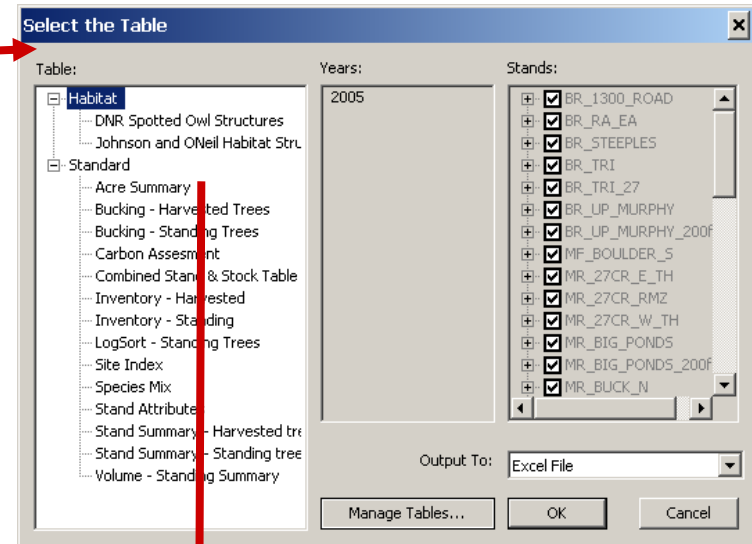
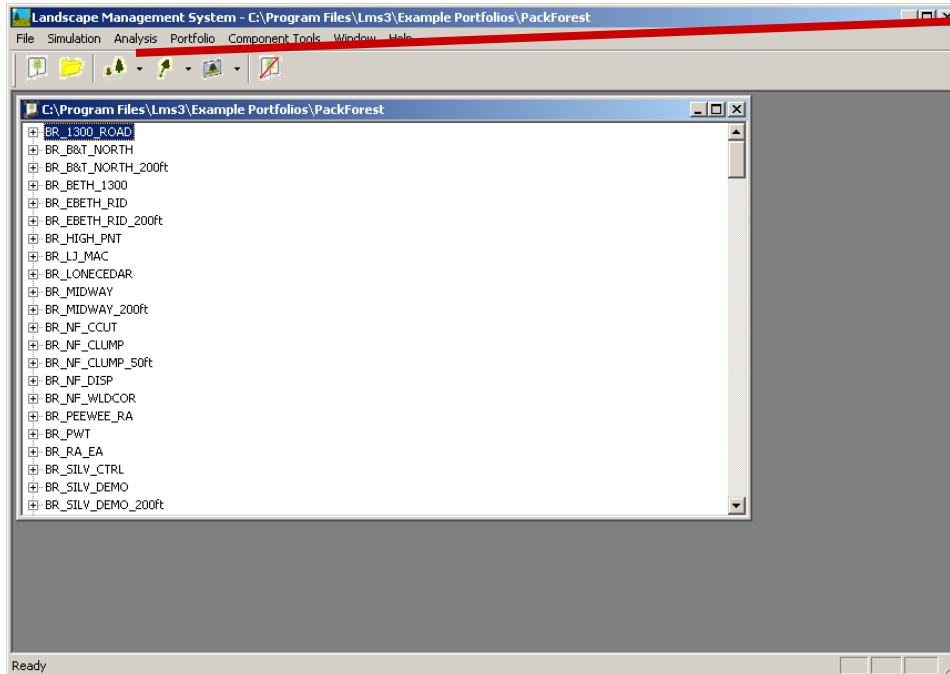
# LMS Outputs

- Users interact with the results of simulation and treatments by using a variety of tools to interpret the results of their simulated management actions. This is done primarily through tabular output and visualization:
  - LMS Tables
  - LMS Visualizations

# LMS Tables

- Basic Table Interface
  - Pre-define tables implemented in the Python scripting language
    - Requires programming capability to add tables. Tables can be added by users.
- Advanced Table Interface
  - User's can create their own tables from LMS variables using GUI.
    - No programming required. Limited to variables known by LMS (additional variables can be added by developing an LMS component).
- Over 20 tables are distributed with LMS 3.x

# LMS Basic Tables



Year	Stand	DBH	Out DBH	Ave Height	Al Height	Out Trees per Acre	Stand Area	Stand Area Relative	Volume	Volume - Volume	Total March Cubic	P
2000	BR_1300	6.188267	5.921762	29.08368	63.07102	378.27	79.0051	175.1776	31.75928	1015.92	0	0
2000	BR_B&T_NORTH	9.28556	7.576981	46.77567	80.81795	460.97	216.7724	409.2954	71.13772	34412.91	0	0
2000	BR_B&T_NORTH_200ft	9.28556	7.576981	46.77567	80.81795	460.97	216.7724	409.2954	71.13772	34412.91	0	0
2000	BR_BETH_1300	16.57932	15.55791	92.54713	76.62415	174.52	291.6338	392.6724	64.25553	53849.67	0	0
2000	BR_EBETH_RID	3.747014	3.409201	21.79736	66.0698	382.78	29.31129	79.27576	15.14231	133.2	0	0
2000	BR_EBETH_RID_200ft	3.747014	3.409201	21.79736	66.0698	382.78	29.31129	79.27576	15.14231	133.2	0	0
2000	BR_HIGH_PNT	3.895880	3.728828	23.67328	79.76572	245.68	20.35396	54.20864	10.71204	55.93	0	0
2000	BR_LJ_MAC	5.601583	5.200662	30.35174	75.94961	457.64	79.31783	180.6402	33.90055	2669.28	0	0
2000	BR_LONECEDAR	6.648131	6.342894	31.61307	64.68132	536.52	129.3303	278.7379	50.15918	3399.48	0	0
2000	BR_MIDWAY	0	0	0	0	0	0	0	0	0	0	0
2000	BR_MIDWAY_200ft	0	0	0	0	0	0	0	0	0	0	0
2000	BR_NF_CCUT	0	0	0	0	0	0	0	0	0	0	0
2000	BR_NF_CLUMP	0	0	0	0	0	0	0	0	0	0	0
2000	BR_NF_CLUMP_50ft	0	0	0	0	0	0	0	0	0	0	0
2000	BR_NF_DISP	0	0	0	0	0	0	0	0	0	0	0
2000	BR_NF_WILDCOR	0	0	0	0	0	0	0	0	0	0	0
2000	BR_PEEWEE_RA	0	0	0	0	0	0	0	0	0	0	0
2000	BR_PWT	0	0	0	0	0	0	0	0	0	0	0
2000	BR_RA_EA	0	0	0	0	0	0	0	0	0	0	0
2000	BR_SILV_CTRL	0	0	0	0	0	0	0	0	0	0	0
2000	BR_SILV_DEMO	0	0	0	0	0	0	0	0	0	0	0
2000	BR_SILV_DEMO_200ft	0	0	0	0	0	0	0	0	0	0	0

Select Analysis/Basic... to open the Select the Table dialog. Select the table, years, and stands, and output to you want and then Click OK to send the requested information to Microsoft Access, Microsoft Excel, or a text editor.



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# LMS 3.x – Example Tables

Year	Stand	Tree	Species	DBH	Height	CR	TPA	VolPerTreeBF	VolPerTreeCU	VolPerTreeMC	MCW
2000	BR_TRI	1	DF	18.1	126	0.55	2.44	340	67.7	67.7	20.7
2000	BR_TRI	2	DF	16.7	125	0.55	2.44	298	58.3	58.3	19.8
2000	BR_TRI	3	DF	16.3	103	0.55	2.44	236	50.4	50.4	19.6
2000	BR_TRI	4	DF	19.8	132	0.55	2.45	424	84.7	84.7	21.7
2000	BR_TRI	5	DF	22.1	127	0.55	2.45	623	118.9	118.9	23
2000	BR_TRI	6	DF	11.5	77	0.45	2.44	80	18.4	18.4	16.2
2000	BR_TRI	7	RA	9.9	61	0.25	2.42	75	14.9	14.9	21.1
2000	BR_TRI	8	DF	10.4	69	0.45	2.44	67	12.3	12.3	15.4
2000	BR_TRI	9	DF	13.3	87	0.55	2.44	154	31	31	17.6
2000	BR_TRI	10	DF	18.4	123	0.55	2.44	340	68.3	68.3	20.9
2000	BR_TRI	11	DF	13.1	85	0.55	2.44	143	28.4	28.4	17.4
2000	BR_TRI	12	DF	10.9	73	0.45	2.44	80	17.5	17.5	15.8
2000	BR_TRI	13	DF	19.6	119	0.55	2.45	398	79.7	79.7	21.6
2000	BR_TRI	14	DF	18.3	114	0.55	2.44	313	65.3	65.3	20.8
2000	BR_TRI	15	DF	11.9	77	0.45	2.44	92	22.2	22.2	16.5
2000	BR_TRI	16	DF	16.4	104	0.55	2.44	236	50.5	50.5	19.6
2000	BR_TRI	17	DF	19.4	116	0.55	2.45	365	73.5	73.5	21.5
2000	BR_TRI	18	DF	13.3	87	0.55	2.44	154	31	31	17.6
2000	BR_TRI	19	DF	21.3	128	0.55	2.45	564	108.5	108.5	22.6
2000	BR_TRI	20	RA	11.3	87	0.35	2.42	104	22.4	22.4	22.5
2000	BR_TRI	21	RA	7.6	52	0.15	2.41	34	6.7	6.7	18.6
2000	BR_TRI	22	DF	17.9	126	0.55	2.44	340	67.3	67.3	20.6
2000	BR_TRI	23	DF	8.4	56	0.35	2.44	45	8.3	8.3	13.7
2000	BR_TRI	24	DF	11.3	76	0.45	2.44	80	18.2	18.2	16.1
2000	BR_TRI	25	DF	10.6	70	0.45	2.44	80	16.2	16.2	15.6
2000	BR_TRI	26	DF	15.9	113	0.55	2.44	214	45.1	45.1	19.3
2000	BR_TRI	27	RA	9	59	0.25	2.42	61	10.9	10.9	20.2
2000	BR_TRI	28	DF	17.8	120	0.55	2.44	340	67.1	67.1	20.5
2000	BR_TRI	29	DF	24.3	136	0.65	2.45	741	144.6	144.6	24.2
2000	BR_TRI	30	RA	8.8	56	0.25	2.42	61	11.4	11.4	20
2000	BR_TRI	31	RA	8.5	55	0.15	2.41	61	11.1	11.1	19.7
2000	BR_TRI	32	DF	11.1	72	0.45	2.44	80	17.9	17.9	15.9

The Inventory table (left) provides the raw inventory information: Species, DBH, Height, Crown Ratio, TPA, Volumes, and Max Crown Width.

Stand	Species	DBHq	AveDBH	TPA	AveHt	TBA	SDI	CurtisRD	TVolPerAcre
00 BR_1300_ROAD	DF	6.41	6.24	348.57	30.1	78.23	171	30.9	1100.6
00 BR_1300_ROAD	RA	2.19	2.13	29.7	18	0.78	2.6	0.5	0
00 BR_1300_ROAD	TOTAL	6.19	5.92	378.27	29.1	79.01	175.2	31.8	1100.6
00 BR_RA_EA	BM	14.12	13.95	19.58	76.8	21.28	34	5.7	2801
00 BR_RA_EA	CH	18.25	17.22	14.71	78.7	26.72	38.6	6.3	4029.2
00 BR_RA_EA	DF	20.41	19.54	34.54	116.8	78.47	108.5	17.4	18280.4
00 BR_RA_EA	RA	10.71	10.43	58.49	66.8	36.6	65.3	11.2	5401.4
00 BR_RA_EA	TOTAL	15.32	14.23	127.32	83.3	163.07	252.5	41.7	30512
00 BR_STEEPLES	BM	9.28	9.1	6.8	64.8	3.19	6	1	379.4
00 BR_STEEPLES	CH	13.9	12.93	6.81	74.8	7.17	11.5	1.9	936.7
00 BR_STEEPLES	DF	16.1	14.69	60.29	89.8	85.28	129.5	21.3	17145.5
00 BR_STEEPLES	GF	13.14	12.05	4.09	79.8	3.85	6.3	1.1	730.8
00 BR_STEEPLES	RA	10.18	9.85	77.46	63.5	43.82	79.8	13.7	5859.6
00 BR_STEEPLES	RC	12.19	11.11	29.91	60.8	24.26	41.1	6.9	2435.6
00 BR_STEEPLES	WH	18.6	16.78	10.94	95.4	20.65	29.6	4.8	5012.8
2000 BR_STEEPLES	YC	7.57	7.51	24.47	34.5	7.65	15.7	2.8	225.8
00 BR_STEEPLES	TOTAL	12.75	11.54	220.77	69.4	195.88	326.2	54.8	32726.2
2000 BR_TRI	DF	14.78	13.99	126.96	91.6	151.26	237.6	39.3	26320.7
2000 BR_TRI	RA	10.3	10.19	96.75	65.4	55.97	101.4	17.4	7685.9
2000 BR_TRI	WH	9.49	9.27	7.25	62.7	3.56	6.7	1.2	387.4
2000 BR_TRI	TOTAL	12.94	12.25	230.96	79.7	210.79	349	58.6	34394
2000 BR_TRI_27	BM	11.4	11.4	9.67	72	6.85	11.9	2	889.6
2000 BR_TRI_27	DF	19.03	18.16	126.56	118.9	249.96	355.2	57.3	58251.5
2000 BR_TRI_27	RA	13.2	13.2	9.66	73	9.18	15.1	2.5	1110.9
2000 BR_TRI_27	WH	6.75	6.75	19.26	49.5	4.79	10.3	1.8	212.1
2000 BR_TRI_27	TOTAL	17.34	16.14	165.15	105.4	270.79	399.3	65	60464.1

The Summary table provides typical statistics for forest stands: Species, Quadratic Mean Diameter, Ave DBH, TPA, Ave Height, Total Basal Area, SDI, CurtisRD, and Volumes.



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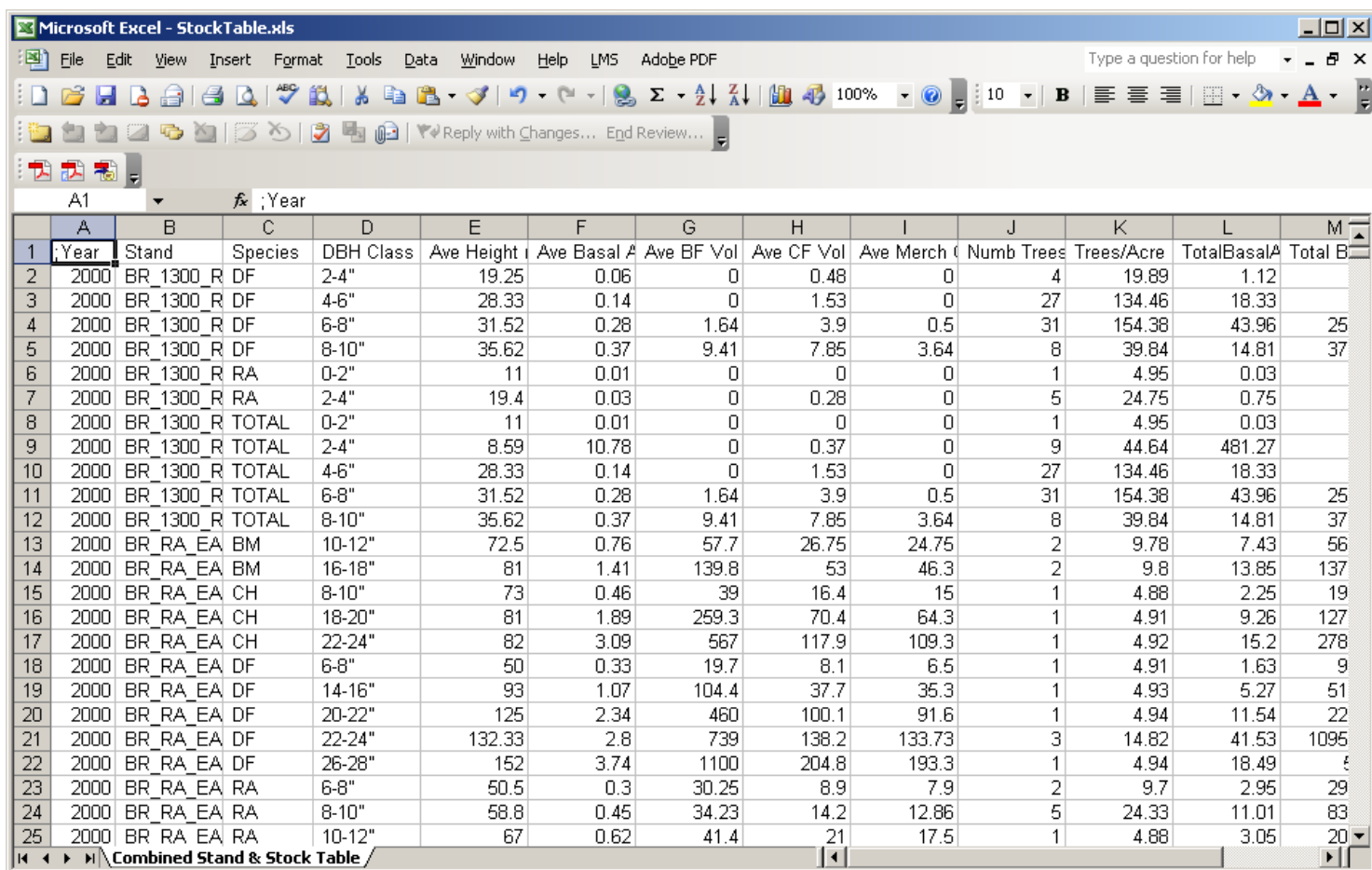




# LMS 3.x – Example Table

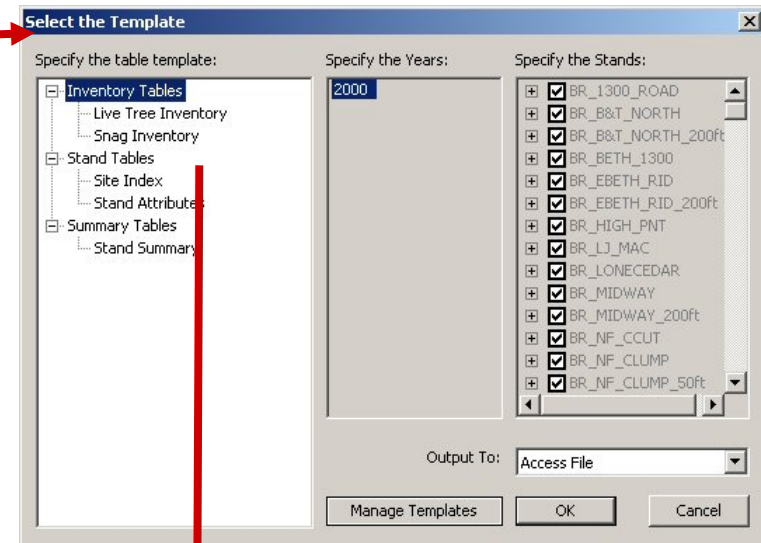
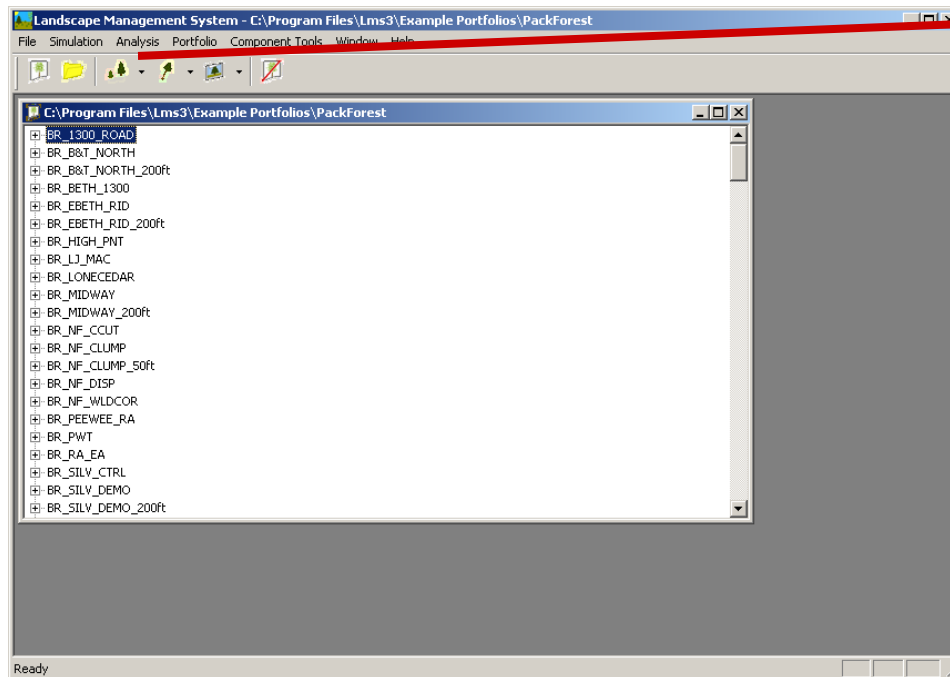
## Combined Stand & Stock Table

The Combined Stand & Stock table displays summary statistics by diameter class and species. It includes Ave Height, Ave Basal Area, Ave Board Foot Volume, Ave Cubic Foot Volume, Trees/Acre, Total Basal Area, Total Board Foot Volume, and Total Cubic Foot Volume by species and diameter class.



	A	B	C	D	E	F	G	H	I	J	K	L	M
1	Year	Stand	Species	DBH Class	Ave Height	Ave Basal A	Ave BF Vol	Ave CF Vol	Ave Merch	Numb Trees	Trees/Acre	Total Basal A	Total B
2	2000	BR_1300_R	DF	2-4"	19.25	0.06	0	0.48	0	4	19.89	1.12	
3	2000	BR_1300_R	DF	4-6"	28.33	0.14	0	1.53	0	27	134.46	18.33	
4	2000	BR_1300_R	DF	6-8"	31.52	0.28	1.64	3.9	0.5	31	154.38	43.96	25
5	2000	BR_1300_R	DF	8-10"	35.62	0.37	9.41	7.85	3.64	8	39.84	14.81	37
6	2000	BR_1300_R	RA	0-2"	11	0.01	0	0	0	1	4.95	0.03	
7	2000	BR_1300_R	RA	2-4"	19.4	0.03	0	0.28	0	5	24.75	0.75	
8	2000	BR_1300_R	TOTAL	0-2"	11	0.01	0	0	0	1	4.95	0.03	
9	2000	BR_1300_R	TOTAL	2-4"	8.59	10.78	0	0.37	0	9	44.64	481.27	
10	2000	BR_1300_R	TOTAL	4-6"	28.33	0.14	0	1.53	0	27	134.46	18.33	
11	2000	BR_1300_R	TOTAL	6-8"	31.52	0.28	1.64	3.9	0.5	31	154.38	43.96	25
12	2000	BR_1300_R	TOTAL	8-10"	35.62	0.37	9.41	7.85	3.64	8	39.84	14.81	37
13	2000	BR_RA_EA	BM	10-12"	72.5	0.76	57.7	26.75	24.75	2	9.78	7.43	56
14	2000	BR_RA_EA	BM	16-18"	81	1.41	139.8	53	46.3	2	9.8	13.85	137
15	2000	BR_RA_EA	CH	8-10"	73	0.46	39	16.4	15	1	4.88	2.25	19
16	2000	BR_RA_EA	CH	18-20"	81	1.89	259.3	70.4	64.3	1	4.91	9.26	127
17	2000	BR_RA_EA	CH	22-24"	82	3.09	567	117.9	109.3	1	4.92	15.2	278
18	2000	BR_RA_EA	DF	6-8"	50	0.33	19.7	8.1	6.5	1	4.91	1.63	9
19	2000	BR_RA_EA	DF	14-16"	93	1.07	104.4	37.7	35.3	1	4.93	5.27	51
20	2000	BR_RA_EA	DF	20-22"	125	2.34	460	100.1	91.6	1	4.94	11.54	22
21	2000	BR_RA_EA	DF	22-24"	132.33	2.8	739	138.2	133.73	3	14.82	41.53	1095
22	2000	BR_RA_EA	DF	26-28"	152	3.74	1100	204.8	193.3	1	4.94	18.49	5
23	2000	BR_RA_EA	RA	6-8"	50.5	0.3	30.25	8.9	7.9	2	9.7	2.95	29
24	2000	BR_RA_EA	RA	8-10"	58.8	0.45	34.23	14.2	12.86	5	24.33	11.01	83
25	2000	BR_RA_EA	RA	10-12"	67	0.62	41.4	21	17.5	1	4.88	3.05	20

# LMS Advanced Tables



Year	Stand	DBH	Out DBH	Ave Height	Al Height	Out Trees per Acre	Stand Area	Stand Area Relative	Volume	Volume - Volume	Total March Cubic	P
2000	BR_1300	6.188267	5.921762	29.08368	63.07102	378.27	79.0051	175.1776	31.75928	1015.92	0	0
2000	BR_B&T	9.28556	7.576981	46.77567	80.81795	460.97	216.7724	409.2954	71.13772	34412.91	0	0
2000	BR_BETH	16.57932	15.55791	92.54713	76.62415	174.52	291.6338	392.6724	64.25553	53849.67	0	0
2000	BR_EBETH	3.747014	3.409201	21.79736	66.0698	382.78	29.31129	79.27576	15.14231	133.2	0	0
2000	BR_EBETH	3.747014	3.409201	21.79736	66.0698	382.78	29.31129	79.27576	15.14231	133.2	0	0
2000	BR_HIGH	3.895880	3.728828	23.67328	79.76572	246.08	20.35396	54.20644	10.31204	55.93	0	0
2000	BR_LJ_MAC	5.601583	5.200662	30.35174	75.94961	457.64	79.31783	180.6402	33.90055	2669.28	0	0
2000	BR_LONE	6.648131	6.342894	31.61307	64.68132	536.52	129.3303	278.7379	50.15918	3399.48	0	0
2000	BR_MIDW	0	0	0	0	0	0	0	0	0	0	0
2000	BR_MIDW	0	0	0	0	0	0	0	0	0	0	0
2000	BR_NF_C	3.109493	2.907345	18.46422	81.1935	565.93	29.944	66.90341	16.92436	0	0	0
2000	BR_NF_C	3.588981	3.450632	21.11216	76.3195	407.48	28.6269	78.75727	15.11095	0	0	0
2000	BR_NF_C	3.588981	3.450632	21.11216	76.3195	407.48	28.6269	78.75727	15.11095	0	0	0
2000	BR_NF_C	4.708823	3.633251	22.19787	77.8070	451.98	58.57419	138.8251	25.84773	7196.1	0	0
2000	BR_NF_V	15.12932	13.94777	87.50348	78.08148	147.08	183.6148	285.7495	47.20608	35275.37	0	0
2000	BR_PEEV	10.00146	9.698794	63.22099	78.00445	313.32	170.9346	313.3933	54.05032	18298.19	0	0
2000	BR_PWT	16.26374	14.97162	92.48334	76.29882	126.56	182.5797	276.1176	45.27331	36531.52	0	0
2000	BR_PA_E	15.33144	14.23715	83.16536	74.85725	127.21	183.2099	252.8807	41.88025	30375.38	0	0
2000	BR_SILV	10.31071	17.81654	110.1247	80.03775	174.25	318.6305	459.782	74.46389	69456.2	0	0
2000	BR_SILV	10.37414	17.49105	108.6359	76.53331	123.59	227.5688	327.9227	53.08956	48111.4	0	0
2000	BR_SILV	10.37414	17.49105	108.6359	76.53331	123.59	227.5688	327.9227	53.08956	48111.4	0	0
2000	BR_SILV	10.45011	18.32912	124.921	82.20025	107.9	200.6454	288.5666	46.93368	40870.04	0	0
2000	BR_STEE	12.7566	11.54345	69.30295	73.52039	220.77	195.9408	326.2412	54.88022	20810.08	0	0
2000	BR_TRI	12.93589	12.25059	78.68372	78.21841	230.96	210.7874	349.0263	58.60958	34325.4	0	0
2000	BR_TRL	17.33883	16.14227	105.3175	78.89595	165.15	270.7905	394.2688	65.03146	60123.45	0	0
2000	BR_UP_M	15.43471	14.01497	86.77114	79.94786	180.66	234.7329	362.421	59.74818	46952.77	0	0
2000	BR_UP_M	15.43471	14.01497	86.77114	79.94786	180.66	234.7329	362.421	59.74818	46952.77	0	0
2000	HC_1200	14.23549	13.11927	80.65781	76.58041	180.47	199.4641	317.9906	52.88827	34363.08	0	0
2000	HC_1400	5.61201	5.13747	36.9818	100.6339	347.1	59.62032	137.4111	25.16793	3226.02	0	0
2000	HC_1400	7.203014	7.082299	42.36075	75.1363	277.55	60.29318	166.9123	29.75247	4760.68	0	0
2000	HC_1400	3.303708	3.224918	21.1553	81.34231	778.55	46.34522	131.7544	25.49788	0	0	0
2000	HC_1400	3.171171	3.106714	20.01278	79.01341	623.59	34.20216	88.82241	19.2063	0	0	0
2000	HC_2000	3.565502	3.297004	20.34203	79.4628	419.26	29.08967	80.1851	15.395	0	0	0
2000	HC_27_C	8.4584	7.739497	53.60586	89.7039	312.29	212.8891	373.4607	63.86714	45345.62	0	0
2000	HC_27_C	8.4584	7.739497	53.60586	89.7039	312.29	212.8891	373.4607	63.86714	45345.62	0	0
2000	HC_CAN	15.40139	14.8092	84.4462	70.38649	137.28	177.5999	274.4438	45.25456	30310.75	0	0
2000	HC_CENT	17.78431	16.10791	93.45547	72.83138	131.56	226.941	331.2708	53.8139	30029.59	0	0

Select Analysis/Advanced... to open the Select Template dialog. Select the table template, years, and stands, and output to you want and then Click OK to send the requested information to Microsoft Access, Microsoft Excel, or a text editor.



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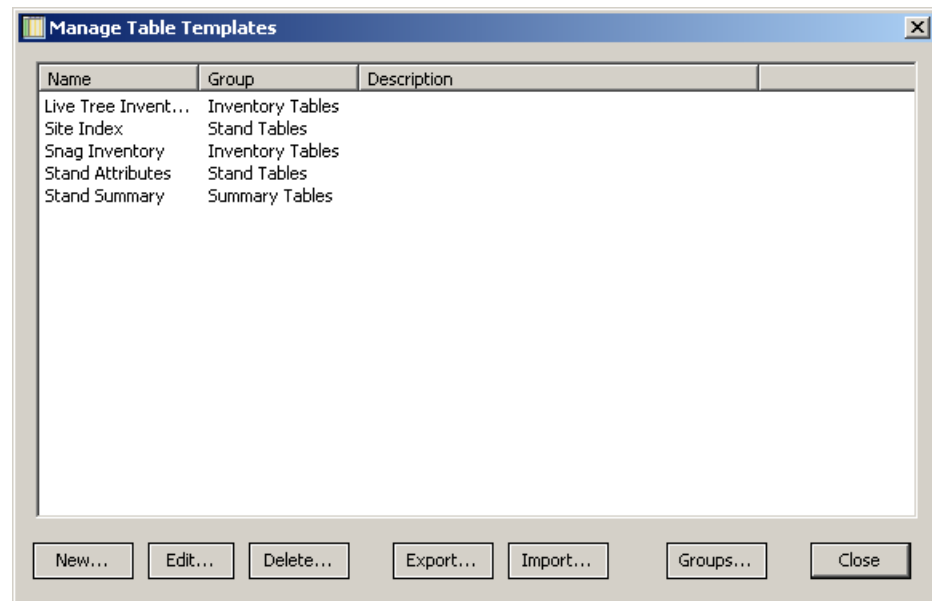


# Manage Table Templates

Templates are divided into Template Groups. This dialog shows two Template Groups: Live Tree and Stand Data.

You can Create, Load, Edit, and Delete existing Table Templates.

*NOTE: Load and Delete are not implemented yet.*



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# Edit Template Values

Existing Table Templates can also be modified.

You can change the Template Name, Template Group, Template Description, and the order of the variables in the Template.

Future enhancements will allow you to add and remove variables from the template.

**Edit Template Values**

Template Name:

Template Group:

Template Description:

Sort Variables:

Name	Summarize	Restrictions
------	-----------	--------------

Data Variables:

Name	Type	Restrictions
Year	Generic	No
Stand	Generic	No
Tree #	Tree	No
Species	Tree	No
Age	Tree	No
DBH	Tree	No
Height	Tree	No
Crown Ratio	Tree	No
Crown Width	Tree	No
Board-foot Volume	Tree	No
Total Cubic Volume	Tree	No



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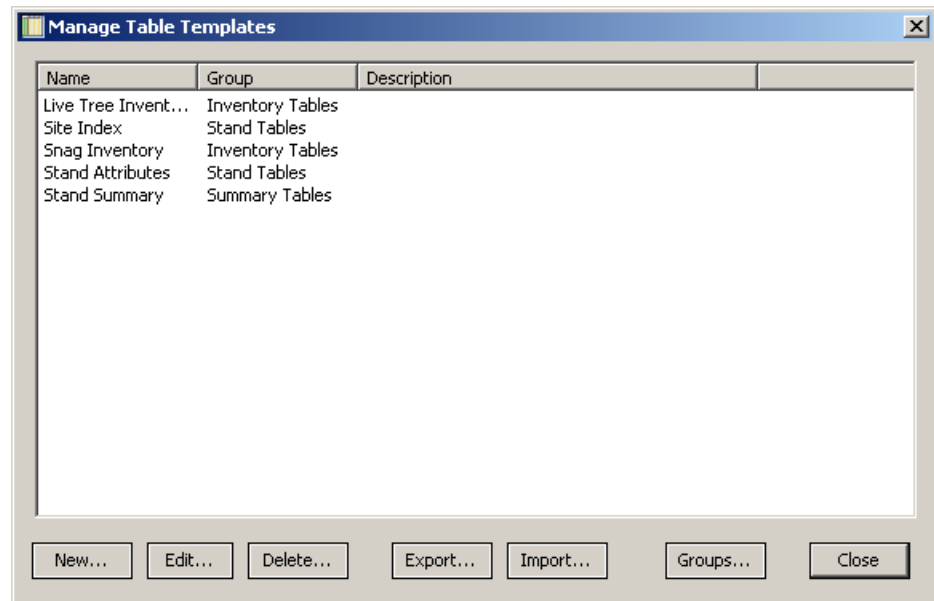


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# Create Table Templates

To create a new advanced table click the New button.



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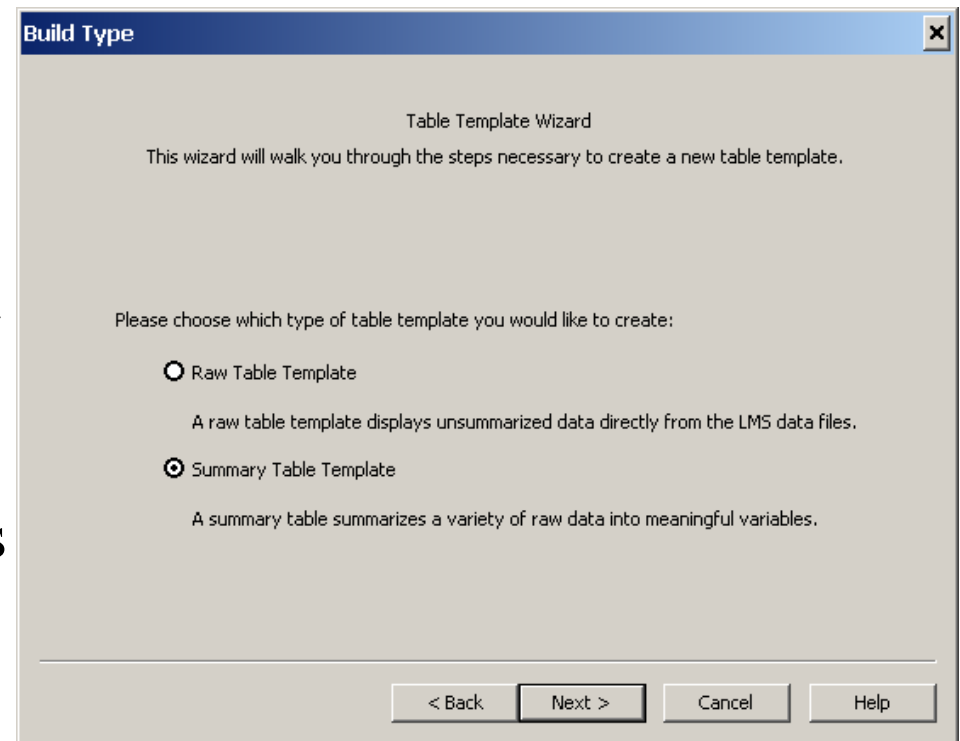




# Create Table Template

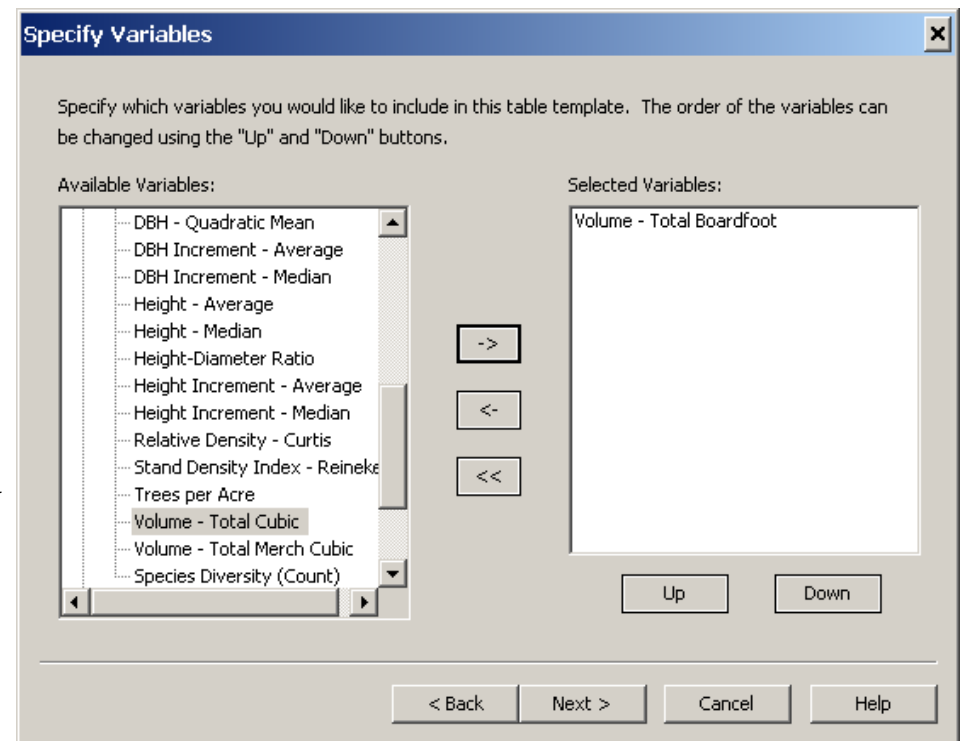
You can select between “Raw Tables Templates” and “Summary Tables Templates”. Raw tables just report the underlying information out of the databases of inventory in the portfolio. Summary tables compute typical forestry statistics on the inventory information.

We are going to create a Summary table.



# Create Table Template

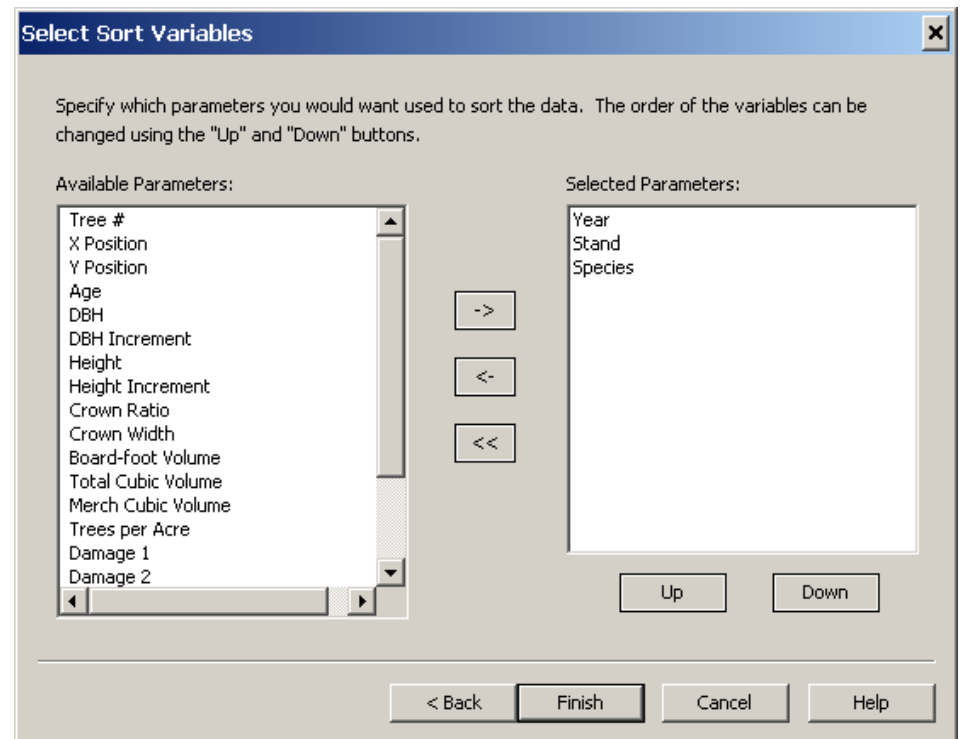
Select between the kinds of information available (Tree, Snags, Understory, Site Index, or Stand). In this case we want to make a board foot volume summary table by species and stand. Open the Tree section and scroll down to find the Volume – Total BoardFoot item and move it to selected variables (highlight and click or double-click).



# Create Table Template

Sort variables are those that the summary will be computed over. In our case we want the board foot volume for each species in a stand for all years that we have inventory information.

Move Year, Stand, and Species to Selected variables.



# Create Table Template

The final dialog show a summary of the Sort and Data variables and prompts for the Template Name and a group to store the template under.

Template Name:  
<<Choose A Template Name>>

Template Group:  
New

Template Description:

Sort Variables:

Name	Summarize	Restrictions
Year	No	No
Stand	No	No
Species	No	No

Data Variables:

Name	Type	Restrictions
Volume - Total Boardfoot	Tree	No

Modify Template Variables OK Cancel

# LMS Visualization

- LMS contains tools for Stand and Landscape level visualization:
  - Stand Visualization System (SVS) for stand level (flat acre representation of single stands)
  - EnVision for landscape level (combines spatial and inventory information to produce images of stands on landscape groups surface)



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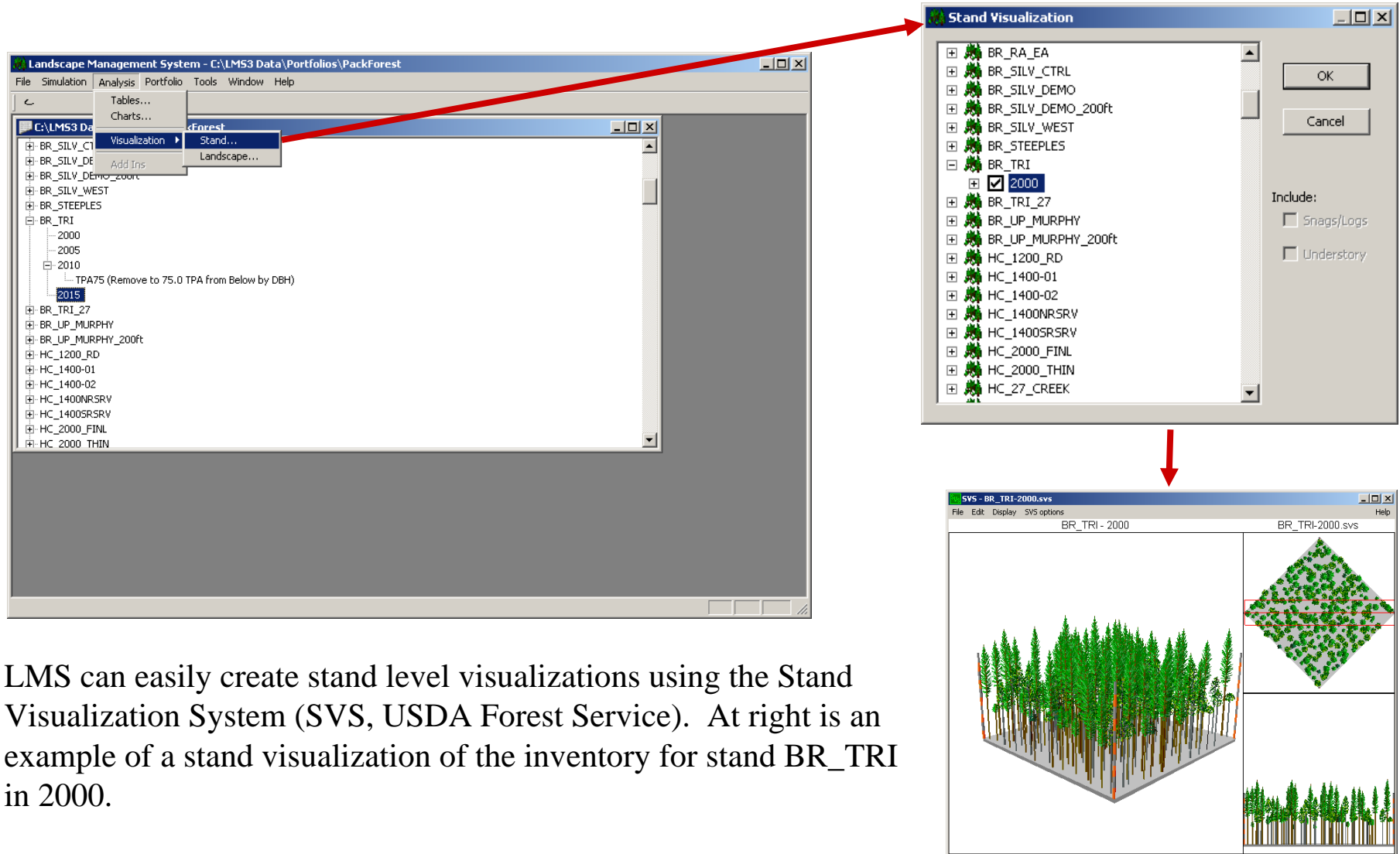


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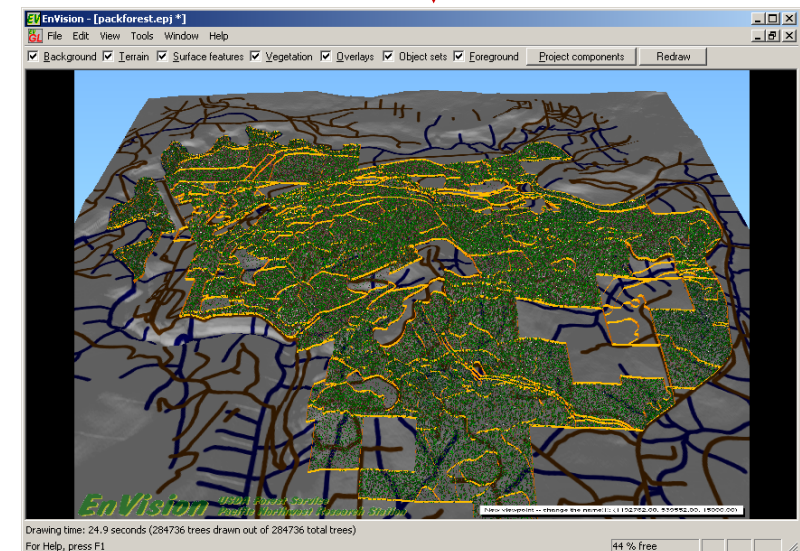
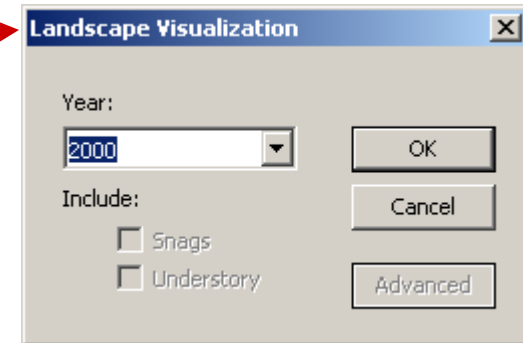
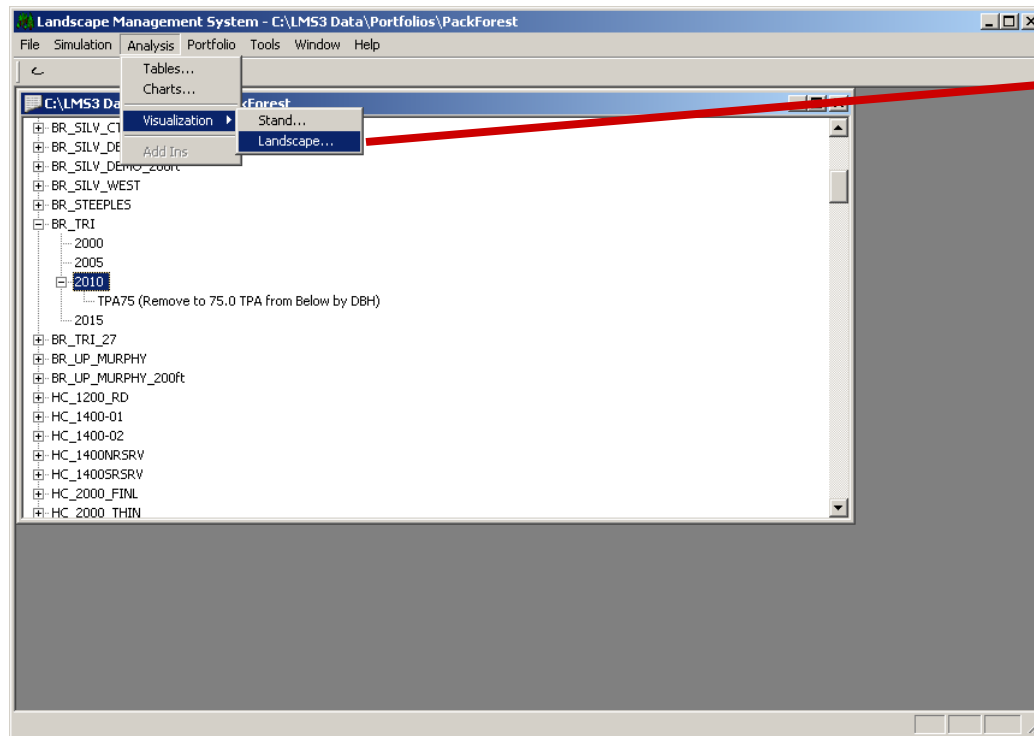


# Stand Visualization



LMS can easily create stand level visualizations using the Stand Visualization System (SVS, USDA Forest Service). At right is an example of a stand visualization of the inventory for stand BR\_TRI in 2000.

# Landscape Visualization



LMS can present landscape level visualization using EnVision (USDA Forest Service). At right is an example visualization for the Pack Forest portfolio showing trees, stand boundaries (orange), roads (brown), and streams (blue).



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