

Users Manual for Teachers and Students

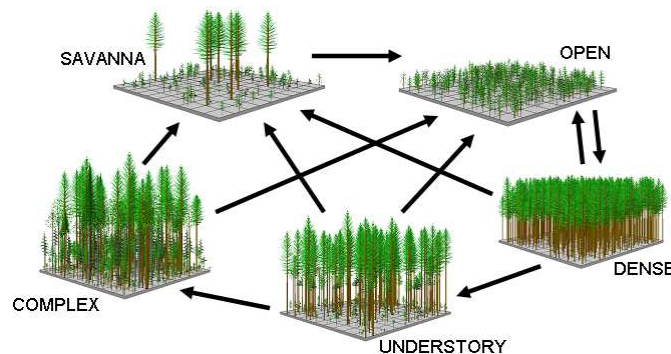
The Dynamic Forest LMS-Lite

A K-12 Learning Tool for Understanding Forests

(For Windows PC Use)

LMS-Lite is a computer tool adapted from LMS [Landscape Management System] tool used in forests throughout the United States.

LMS-Lite is free of charge. It is available as a disk and can also be downloaded from: <http://landscapemanagementsystem.org/>



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LMS design and User's Manual developed by James McCarter, Jeanne Braha Troy, Mary McGrath, Zachary Parisa, Chad Oliver

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- **Global Institute of Sustainable Forestry, School of Forestry and Environmental Studies, Yale University**
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Using LMS-Lite

Introduction

A forest is a wonderfully complex world. Thousands of different species interact with each other, and with non-living systems such as water cycles and patterns of air movement. All the species and non-living systems interact to make up what we observe as a forest.

The Landscape Management System (LMS) is an interactive tool that allows you to see the ways in which changes in a species' life or in a non-living system affect the growth of a forest. With LMS, you can *manipulate variables* (make a change to a species or system) and *generate models* (produce images, tables, and charts showing how the forest will respond to that change).

LMS was developed for forest scientists. It gives them a way to keep track of what is going on in real forests around the world, and to see what the forests might look like in the future. They can use LMS to make decisions about what we can do to keep forests healthy, while providing benefits for all of the species that depend on those forests – including the species *homo sapiens*!

This version of LMS is designed especially for young forest scientists – you! LMS provides you with data on real forests around the world – the same data that US Forest Service scientists use to study forests. You can manipulate variables to make decisions about how to manage the forest, or to simulate natural changes that occur in a forest. By comparing the models you generate, you will be able to see how *each* change you make results in a slightly different future for the forest.

Think:

What are the benefits that forests provide to different species, including us? Which are services? Which are products?

What is a variable you might manipulate to change how a forest grows? How could you manipulate it and what might happen to the forest in response?

Getting Started with LMS-Lite

LMS-Lite performs the same functions as LMS 3.x, but provides a more user-friendly interface and easy-to-use preset levels of treatment for forest regeneration, thinning, and disturbance.

More Information on LMS-Lite

For more information regarding LMS-Lite and LMSLearn education materials contact Barbara Ruth (Barbara.ruth@yale.edu), Jim McCarter (jmac@u.washington.edu), or Chad Oliver (chad.oliver@yale.edu). For technical support on use of the software visit the website at <http://landscapemanagementsystem.org/> or send email to help@landscapemanagementsystem.org

Starting LMS-Lite

(For instructions on how to install LMS-Lite, please see Appendix A.)

To open LMS-Lite once it is installed, click on the desktop icon (Figure 1) or, from the Start Menu , go to Programs > Landscape Management System > LMS-Lite (Figure 2).¹



Figure 1. LMS-Lite desktop icon.

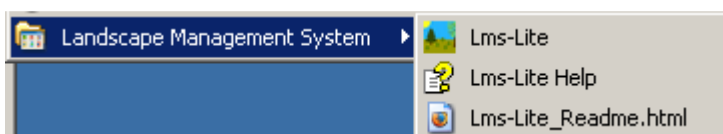


Figure 2. Landscape Management System program group showing LMS-Lite icons.

First Time Running LMS-Lite

The first time you run LMS-Lite on a new computer, a dialog box will ask if you want to update your installed tables (Figure 3). You should select “Yes” to allow the programs to be copied to your computer.²

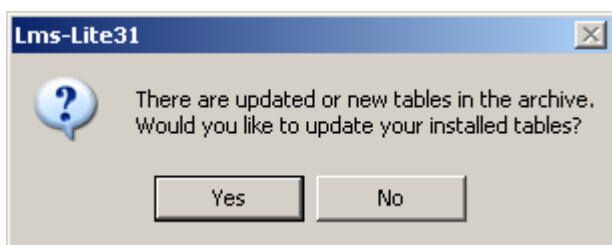


Figure 3. LMS-Lite prompting user to update their installed tables.

When the Table Updates dialog appears (Figure 4), Click the Select All button and then click OK to complete the installation of the tables.

¹ In this manual, a series of commands or steps to click through will be indicated by [step 1] > [step 2] > [step3]... etc.

² The basic analysis tables in LMS-Lite are implemented as per user Python scripts. These are installed into the C:\Documents and Settings\username\Application Data\LMS31\Python directory.

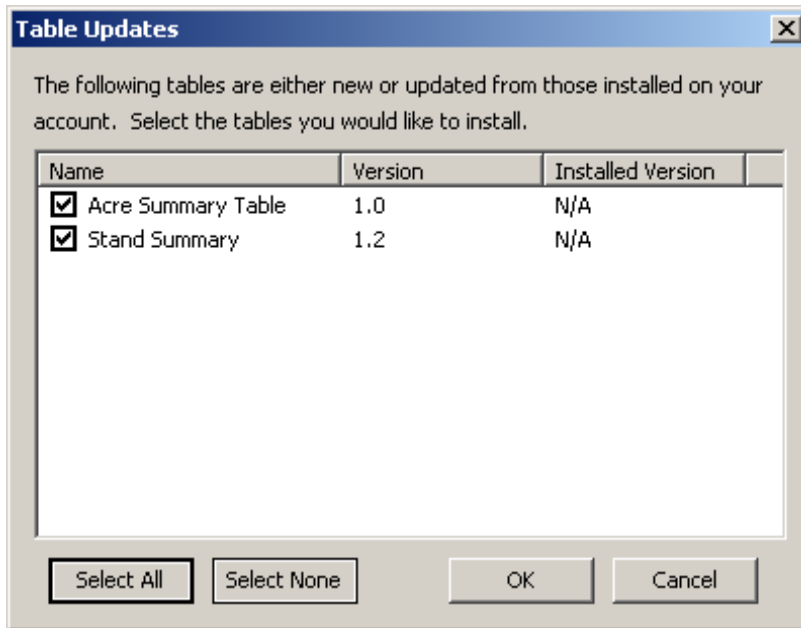


Figure 4. Table updates dialog allowing user to select which table they want updated.

Shortly the LMS-Lite interface will appear (Figure 5) with an empty background .
Congratulations, you are ready to use LMS-Lite!

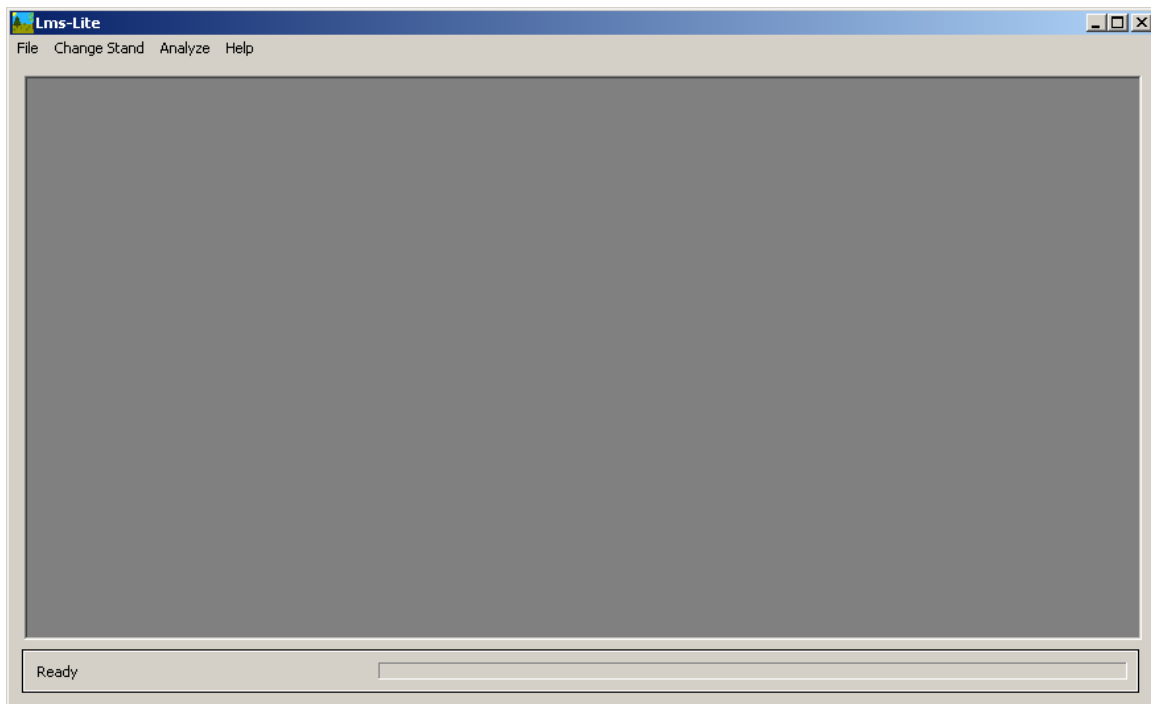


Figure 5. LMS-Lite interface with empty background showing no data is loaded.

Practice Run

Let's run through an example with the Pacific portfolio to see all the features LMS-Lite offers.

In the upper left corner of the interface, click on File > Open... > Pacific > OK

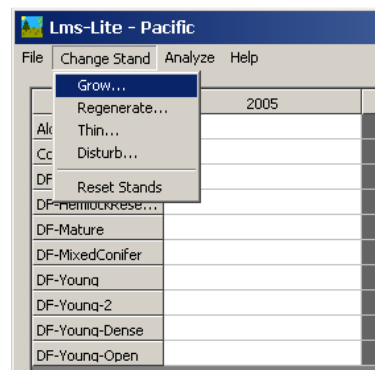
Ten different Pacific stands are listed in the first column. We will look at how the **ConiferMix** stand grows over fifty years.

A. Make a Stand Grow

1. Click on Change Stand > Grow... > **ConiferMix**
2. Under "Years to project:" use the arrows to get to 50 (or type in 50) and then hit OK.

In the interface, the white cells for the years between 2005-2055 show that you've modeled the stand's growth over fifty years.

But, we don't know what the stand looks like yet.

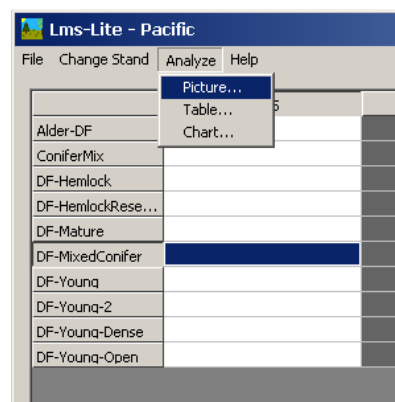


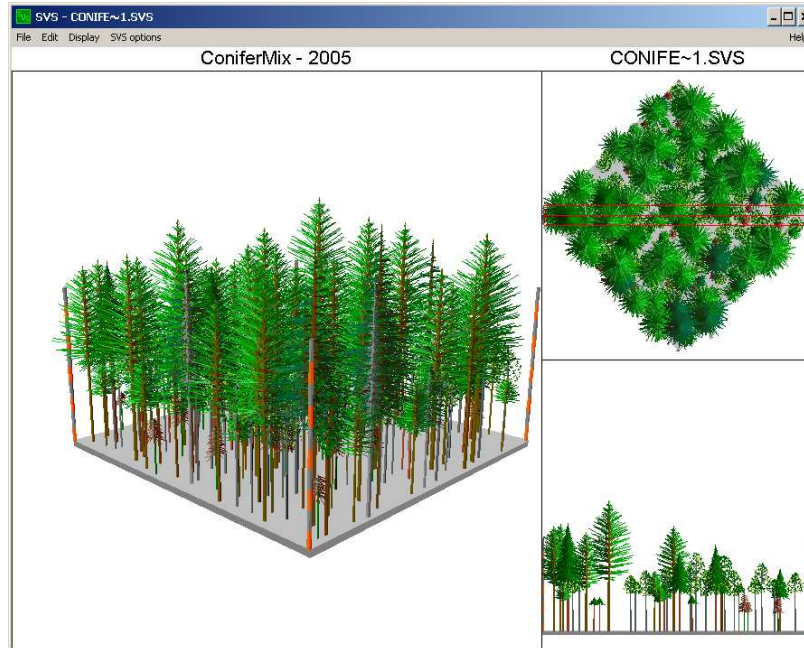
B. Create Pictures of the Stand as it Grows

Let's see what **ConiferMix** looks like at the start year (2005) and after twenty years of growth (2025), and after fifty years of growth (2055).

1. Using your right mouse button, right click on the white cell under 2005 to get the context menu. Go to Picture... > OK.

Below is the image of what the stand looks like to start. The window gives you three different views of the same stand: one large view from an angle, one small view from the top, and one small view from the side.





2. To get your twenty year growth image, right click on the white cell under 2025. Just like before, in the context menu go to Picture... > OK.

3. Use the same method with the 2055 white cell to get your fifty year growth image.

One good way to compare the images is to maximize each with the button in the top right corner of its window. The windows will expand directly on top of one another. You can use your bottom tool bar to click back and forth between the windows to see how the stand changes over fifty years.

Think:

What can you learn from the angled view that you can't learn from the top view? What can you learn from the top view that you can't learn from the side view? What can you learn from the side view that you can't learn from either the top or the angled view?

See how many changes you can find between the stand in 2005 and the stand twenty years later, in 2025. What about between 2005 and 2055?

Imagine:

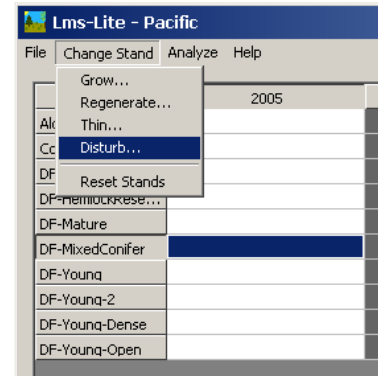
How will you be different twenty years from now? Fifty years from now?

C. Change the Forest Conditions

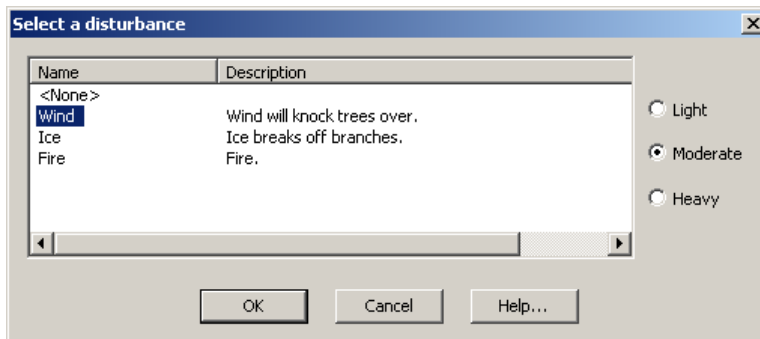
Now we know what the stand will look like if it grows for twenty years with no alteration to the forest conditions. Let's look at how we can manipulate variables to change how the forest grows over those twenty years.

Forest Fire

1. Right click in the white **ConiferMix** cell for 2010, and then click on Disturb... in the context menu.
2. In the Name column, click on Fire, and on the right side select Moderate. Hit OK.
3. Using the steps described in Section B “Create an image of stand growth” above, create an image of what the stand will look like in 2015 and in 2025 after it has been disturbed by a fire in 2010.



4. Leaving the Fire disturbed stand pictures open, reset all the stands by going to Change Stand > Reset Stands in the interface menu. Grow the **ConiferMix** stand for twenty years again.
5. Using the same method as in steps 1 & 2 above, create a wind disturbance in 2010. This time, select Wind in the name column, instead of Fire.



6. Create images of the stand in 2015 and 2025 after it has been disturbed by wind in 2010.

Think:

Compare the images of the fire disturbed stands with the wind disturbed stands. What differences do you see?

List some ways the forest growth might change if you select Light instead of Moderate. What about if you select Heavy instead of Moderate?

Cut some Trees and Plant new Ones (Silviculture shelterwood)

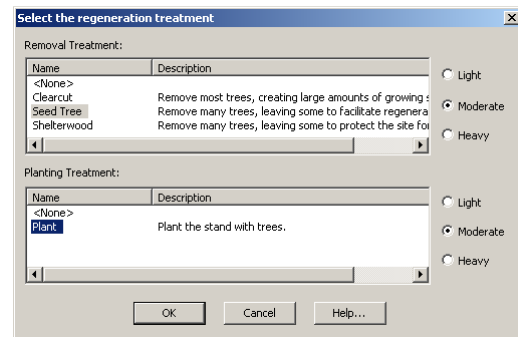
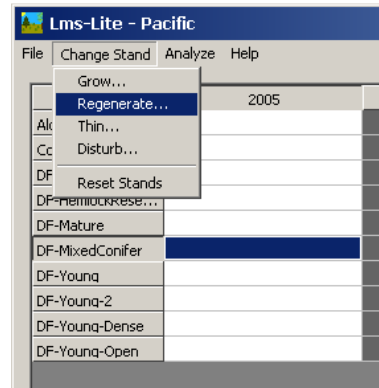
1. Right click in the 2025 cell and select Regenerate...

Under Removal Treatment: click on Shelterwood, then on the right side select Heavy.

2. Right click in the 2040 cell and select Regenerate...

Under Planting Treatment: click on Plant, then on the right side select Light.

3. Generate images for 2020, 2030, and 2045 using the steps described in Section B “Create an image of stand growth” above.

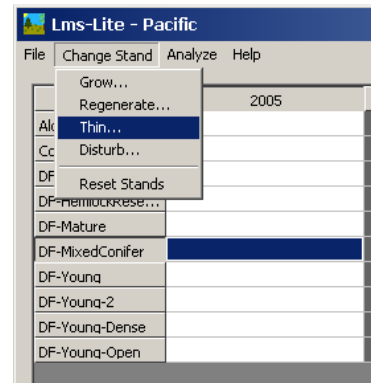


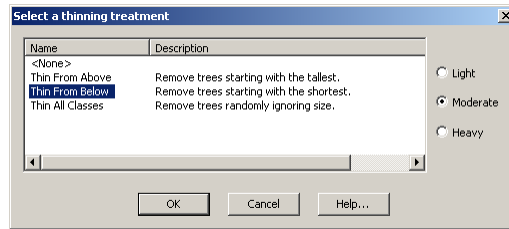
Remove some Trees (Silviculture thinning)

1. Reset the stand by going to Change Stand > Reset Stands, then re-grow the Steeples Stand for fifty years using the steps described in Section A “Model stand growth” above.

2. Generate an image of the stand in the year 2010 using the steps described in Section B “Create an image of stand growth” above.

3. Right click in the 2010 cell and choose Thin > Thin From Below and select Heavy on the right side.





4. Now generate an image and the stand in 2010 after it has been thinned, and compare with the image you generated of the stand before it was thinned.

Think:

What happens to a stand when it is disturbed? What happens to a stand when it is regenerated? What happens to a stand when it is thinned?

List some similarities and differences between a disturbance, regeneration, and thinning.

D. Analyze the stand as it grows

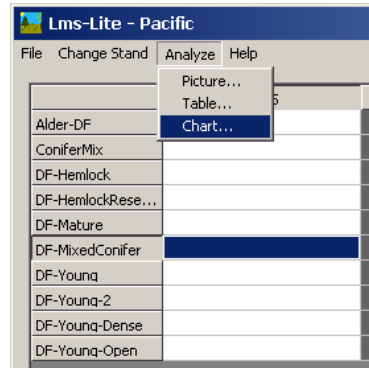
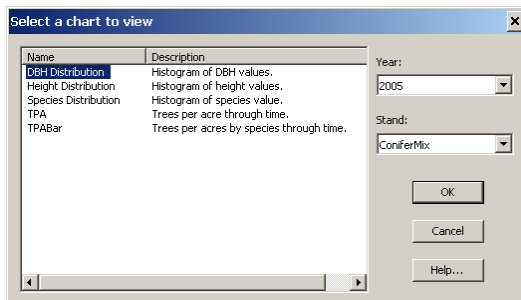
We have been able to see how our stand will *look* different over time. Now let's try a more quantitative way of analyzing our stand, using numbers instead of images.

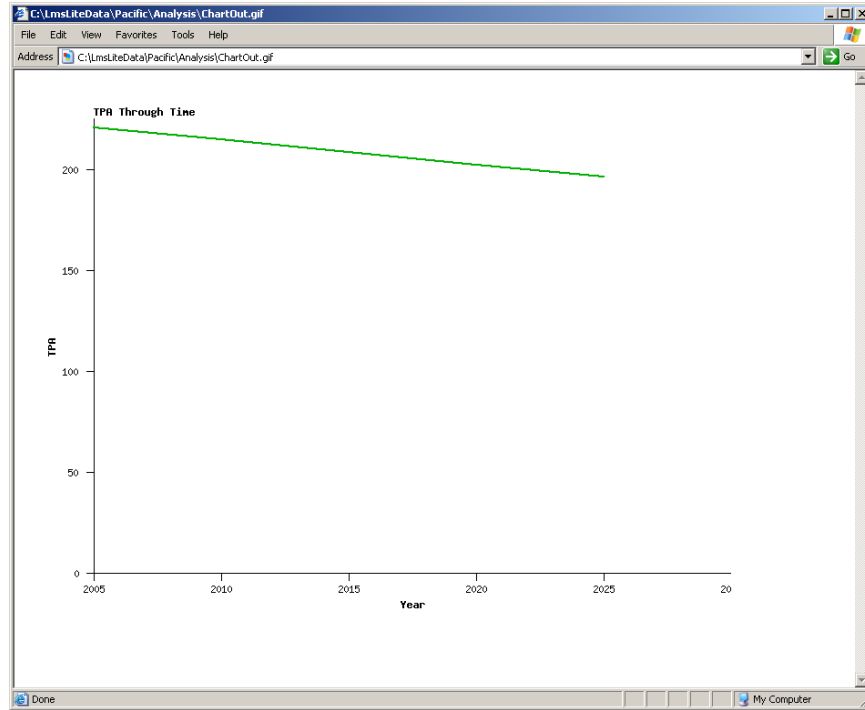
Charts

Charts are a good way to visualize quantitative information, and to look for patterns.

1. Right click on the 2005 cell and go to Chart...> TPA > OK.

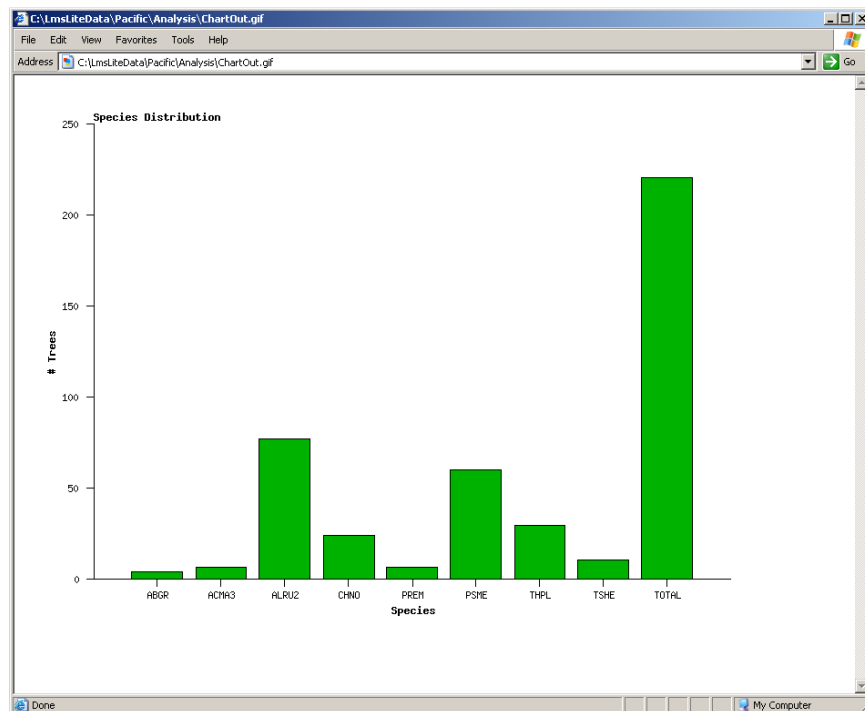
This shows you a graph of how many trees are in your acre (Trees Per Acre) over the fifty years you have grown the stand.





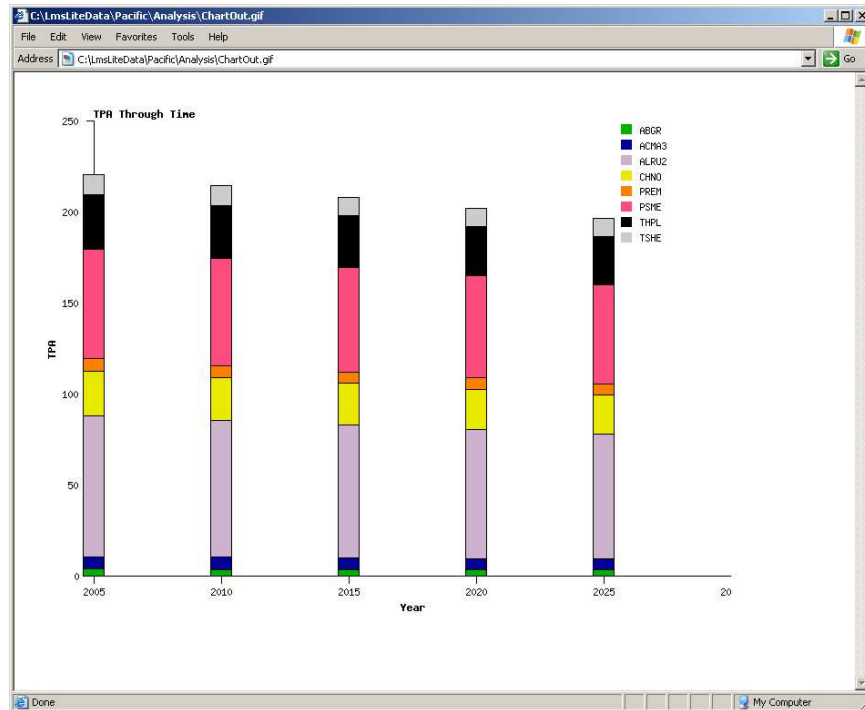
2. Now you would like to learn what species are present in your stand.

Right click on the 2020 cell and go to Chart...> Species Distribution > OK. This graph shows how many of each species are in your stand.



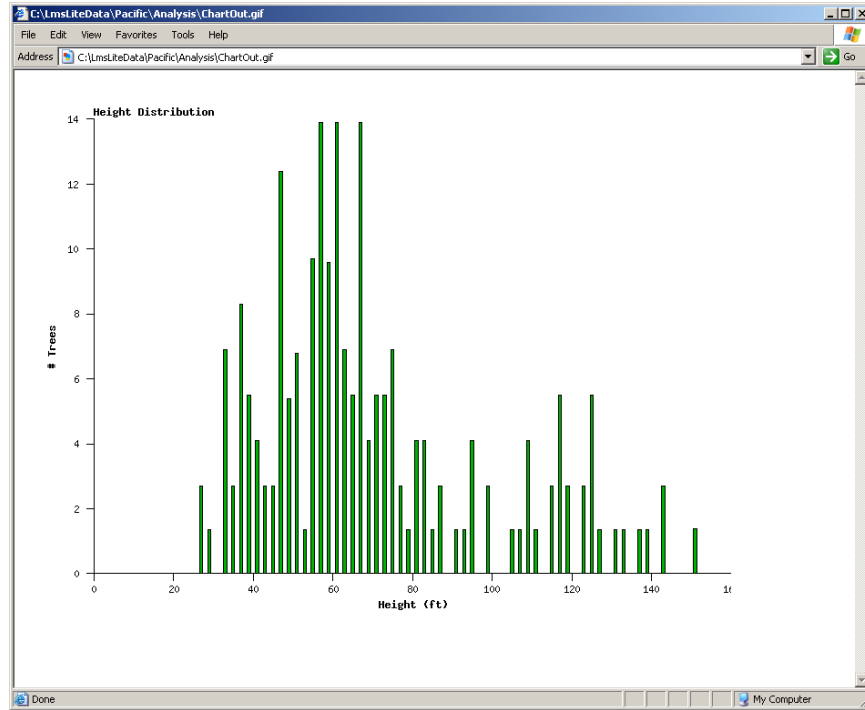
3. You want to learn how each population (the number of each species of trees) has changed over time.

Right click on the 2030 cell and go to Chart...> TPA Bar > OK. Each color on this graph represents a different tree species. The graph shows you how many of each species are in your stand for each year.



4. Let's say you want to find out how many of the trees in your stand are over sixty feet tall in the year 2045, but you've accidentally right clicked in the year 2040.

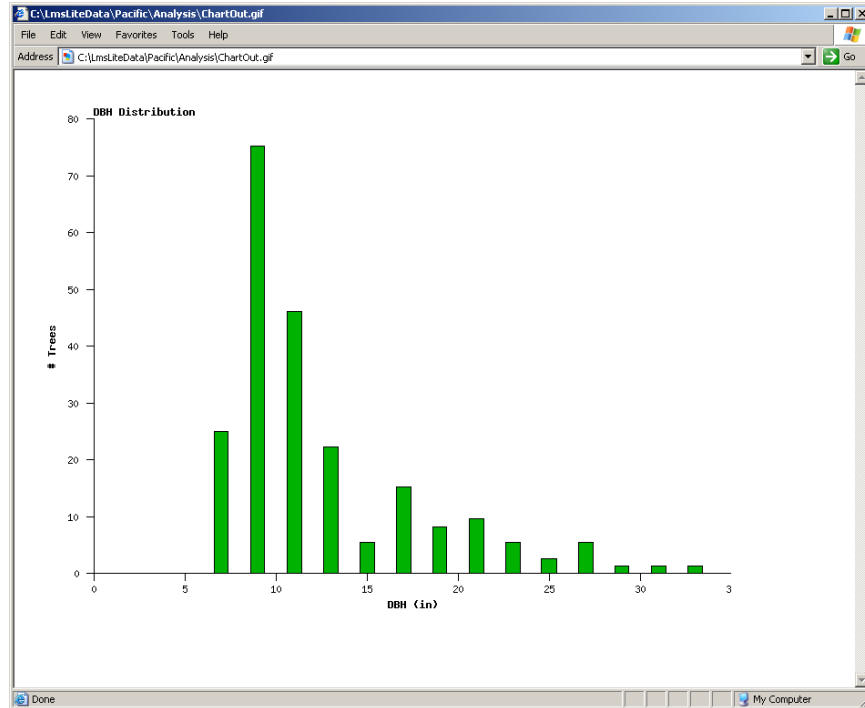
Right click on the 2040 cell and go to Chart... On the right side under Year:, select 2045 from the drop down menu. Then select Height Distribution and hit OK.



How many trees are over sixty feet tall? Use the y-axis on the left side to estimate the height of each bar that is past the 60 dash on the x-axis, then add up the number of trees from each bar.

5. DBH measures the diameter of a tree's trunk. You want to see how many trees are larger than 25 inches in 2055, but you have accidentally right clicked on the 2055 cell for the **DF-Mature** stand.

Right click on the 2055 cell for the **DF-Mature** stand (the gray cell one row below **ConiferMix**) and go to Chart... On the right side under Stand: select **ConiferMix**, and then under Year: select 2055. Hit OK.



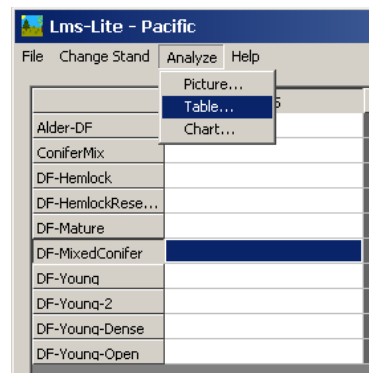
How many of your trees have a diameter that is over 25 inches?

Tables

In order to get more precise numbers, you can create tables that display quantitative information about your stands.

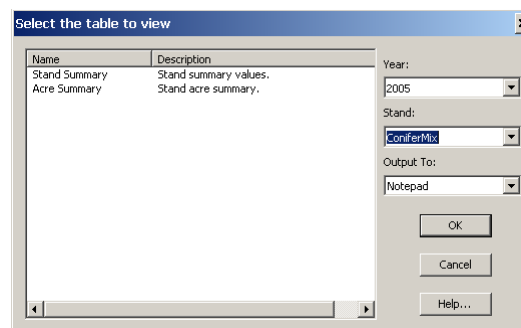
1. Let's generate a table that shows precise quantitative information about each species in the stand, as well as precise quantitative information about all of the species together.

Right click in a cell and go to Table... On the right side, choose **ConiferMix** as the stand, and 2030 for the year. Under Output To:, choose Notepad.³



³ If you have Excel on your computer, you can change Output To: Excel.

Select Stand Summary under Name and hit OK.



Each row of this table shows quantitative information about a different species in the stand. The bottom row shows quantitative information for all of the trees as a stand.

DBHq – average diameter: quadratic (in inches)

AveDHB – average diameter: arithmetic (in inches)

TPA - trees per acre

AveHt – average height (in feet)

TBA – total basal average (average area of tree base in inches)

SDI – stand density index (amount of crowding in the stand)

CurtisRD – Curtis' relative density (crowding compared to maximum possible crowding)

TVol(Per Acre) - total volume per acre (in board feet)

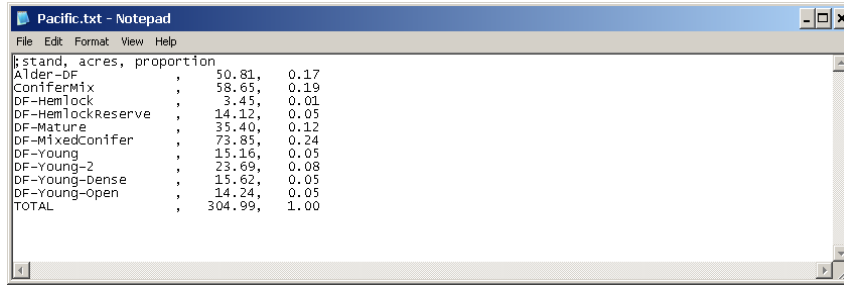
year	stand	species	DBHq	AveDBH	TPA	AveHt	TBA	SDI	CurtisRD	TVol(PerAcre)
2005	ConiferMix	ABGR	13.14	12.05	4.09	79.5	3.85	6.3	1.1	0.0
2005	ConiferMix	ACMA3	9.28	9.10	6.80	64.9	3.19	6.0	1.0	0.0
2005	ConiferMix	ALRU2	10.18	9.85	77.46	63.6	43.82	79.8	13.7	0.0
2005	ConiferMix	CHNO	7.57	7.51	24.47	34.3	7.65	15.7	2.8	0.0
2005	ConiferMix	PREM	13.96	12.99	6.81	74.0	7.24	11.6	1.9	0.0
2005	ConiferMix	PSME	16.10	14.69	60.29	89.7	85.28	129.5	21.3	0.0
2005	ConiferMix	THPL	12.19	11.11	29.91	60.8	24.26	41.1	6.9	0.0
2005	ConiferMix	TSHE	18.60	16.78	10.94	95.4	20.65	29.6	4.8	0.0
2005	ConiferMix	TOTAL	12.76	11.54	220.77	69.3	195.94	326.2	54.9	0.0

2. You can generate a table that displays how many acres are in your stand and how big a stand is in relation to all other stands.

Right click on a cell and go to Table...>Acre Summary. On the right side, make sure that <All> is selected for stand, and choose Notepad under Output To:

The table will show you how large your stand is (in acres) in the acres column.

The size of each stand in acres is listed in the acres column. The proportion column shows what fraction of the whole each individual stand makes up.



stand	acres	proportion
Alder-DF	50.81	0.17
ConiferMix	58.65	0.19
DF-Hemlock	3.45	0.01
DF-HemlockReserve	14.12	0.05
DF-Mature	35.40	0.12
DF-MixedConifer	73.85	0.24
DF-Young	15.16	0.05
DF-Young-2	23.69	0.08
DF-Young-Dense	15.62	0.05
DF-Young-Open	14.24	0.05
TOTAL	304.99	1.00

Think:

What are some advantages of using charts? What are some disadvantages?

What are some advantages of using tables? What are some disadvantages?

Getting Help

LMS-Lite contains context sensitive help provided by help buttons on all dialogs.

Help/Contents...

Use Help/Contents... (Figure 6) to open the help file to LMS-Lite - Introduction help topic. This topic provides a brief introduction and a list of the menu commands in the LMS-Lite interface.

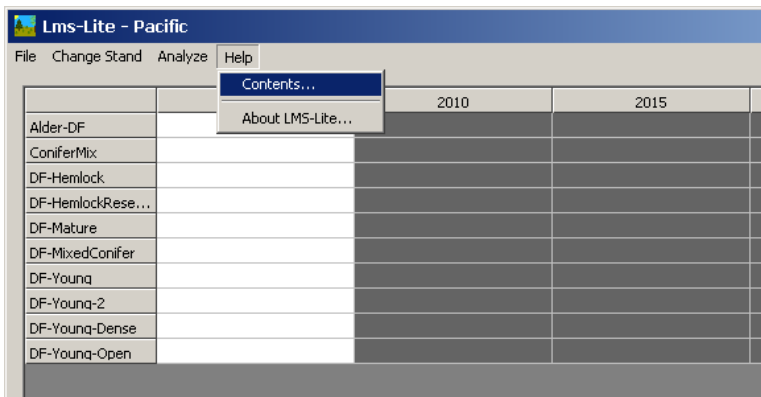


Figure 6. Opening help file to contents page.

Help/About LMS-Lite...

Use the Help/About LMS- Lite... menu command (Figure 7) to display the About LMS-Lite dialog (Figure 8). The About dialog contains version, copyright, and developer information.

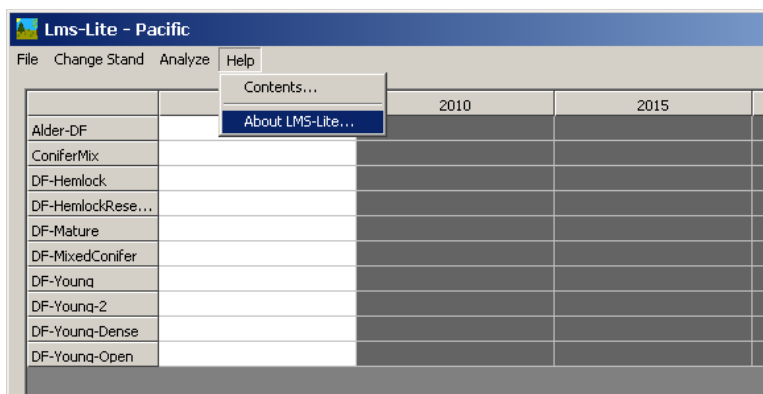


Figure 7. Opening help about dialog.

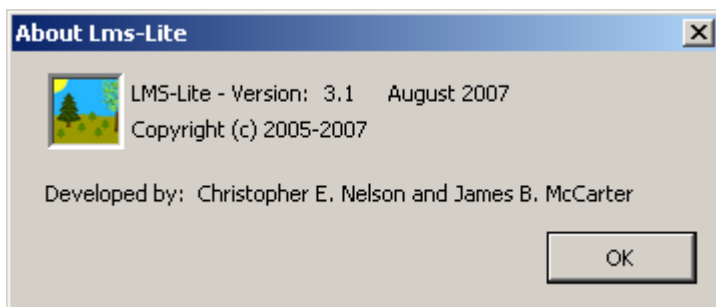


Figure 8. LMS-Lite About dialog box showing version number.

For additional assistance with the use of LMS-Lite contact help@landscapemanagementsystem.org.

Examples of Using LMS-Lite

In the first example the **ConiferMix** stand is grown from 2005 to 2025. The resulting stand pictures are shown below for 2005 and 2025.

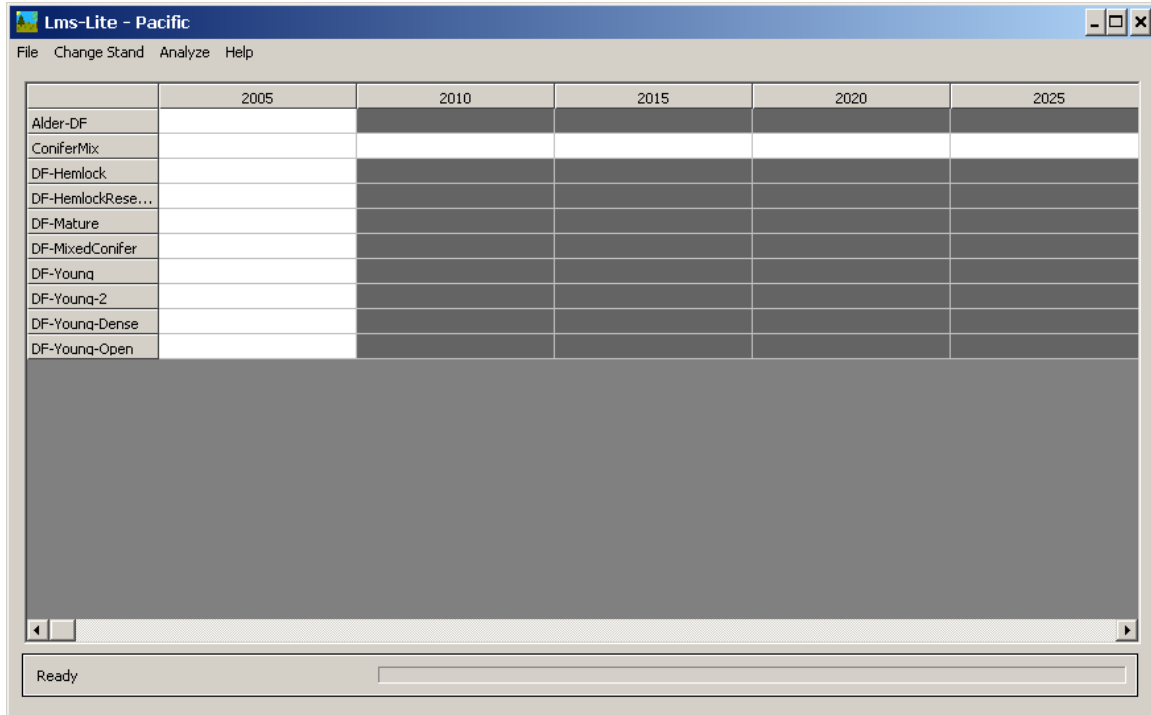


Figure 9. LMS-Lite interface showing the ConiferMix stand grown out to the year 2025.

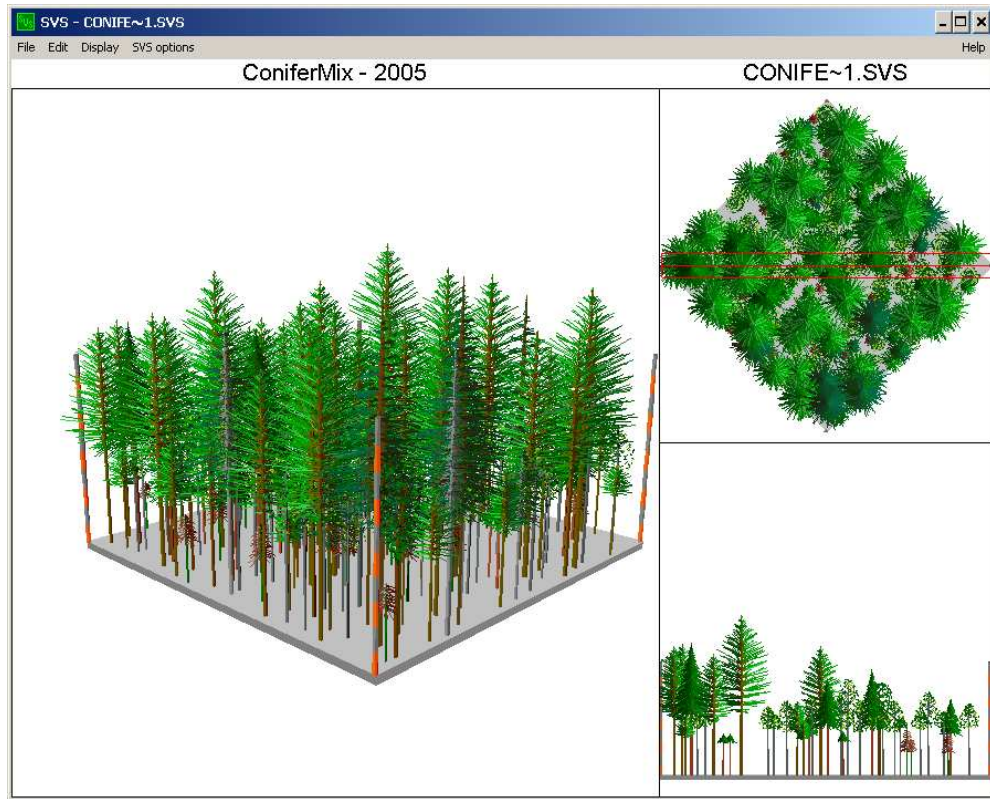


Figure 10. Picture of ConiferMix stand shown in 2005.

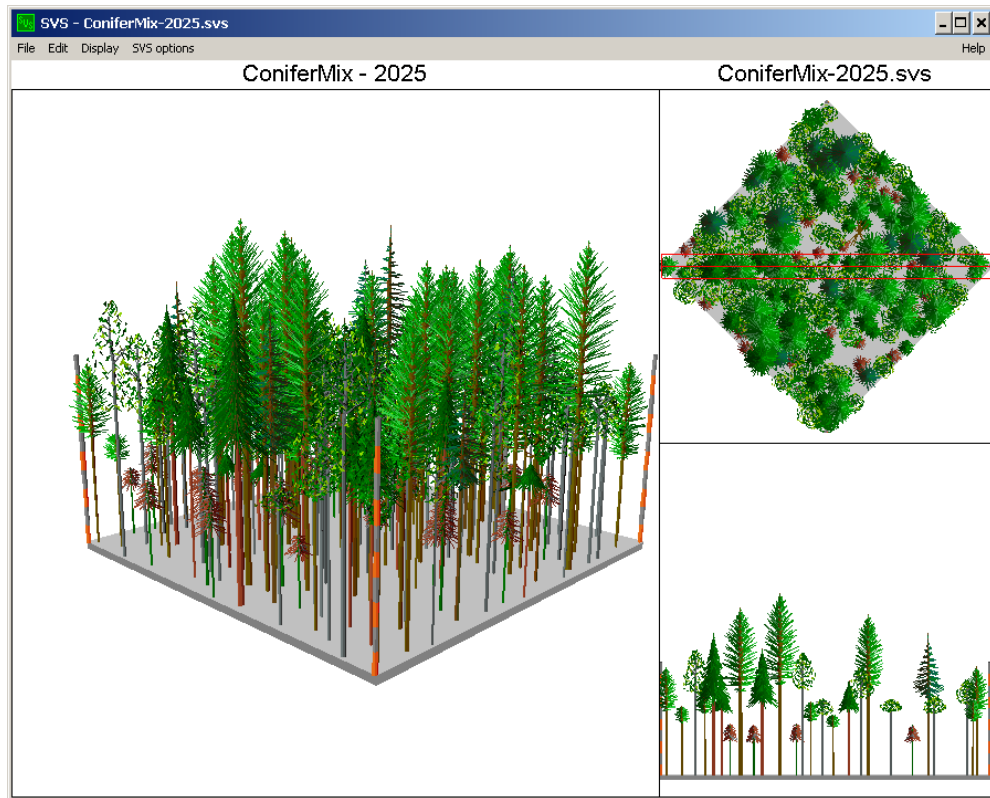
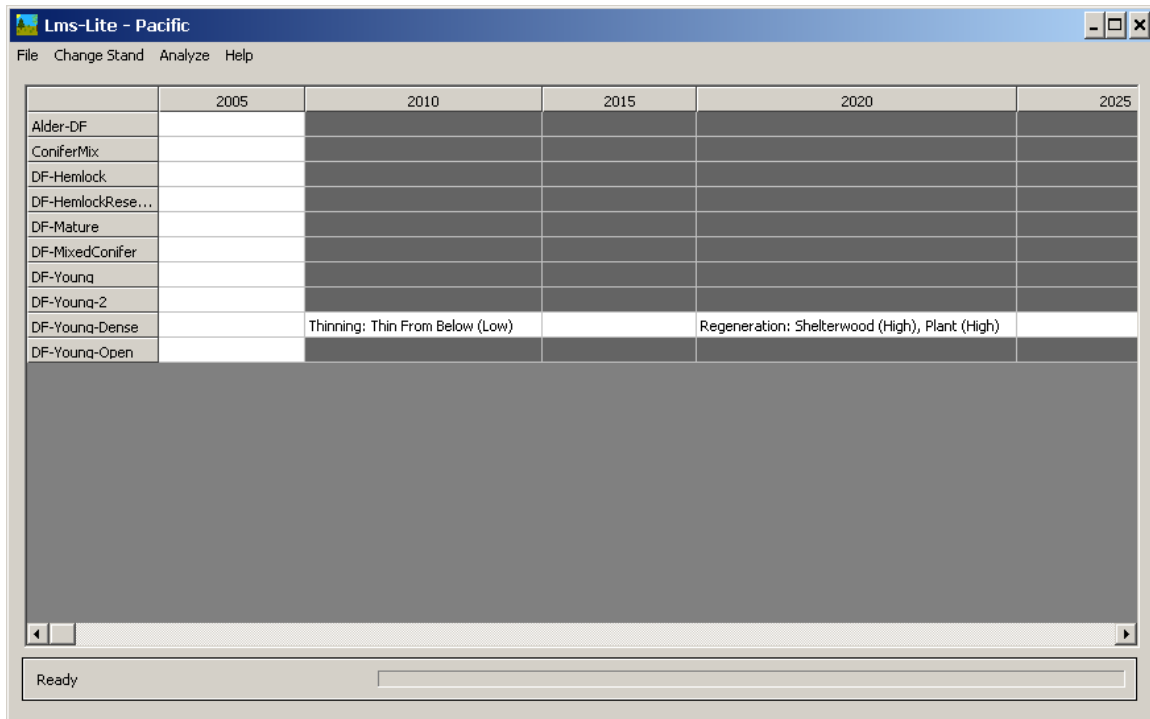


Figure 11. Picture of ConiferMix stand after it has been grown to 2025.

The second example shows the **DF-Young-Dense** stand growth from 2005 to 2010, then thinned from below, growth to 2020, then regeneration harvested using a shelterwood with heavy regeneration.



	2005	2010	2015	2020	2025
Alder-DF					
ConiferMix					
DF-Hemlock					
DF-HemlockRese...					
DF-Mature					
DF-MixedConifer					
DF-Young					
DF-Young-2					
DF-Young-Dense		Thinning: Thin From Below (Low)		Regeneration: Shelterwood (High), Plant (High)	
DF-Young-Open					

Figure 12. Treatment scenario for DF-Young-Dense stand including a thinning and regeneration harvest. NOTE: The year columns have been adjusted so that treatments are fully visible.

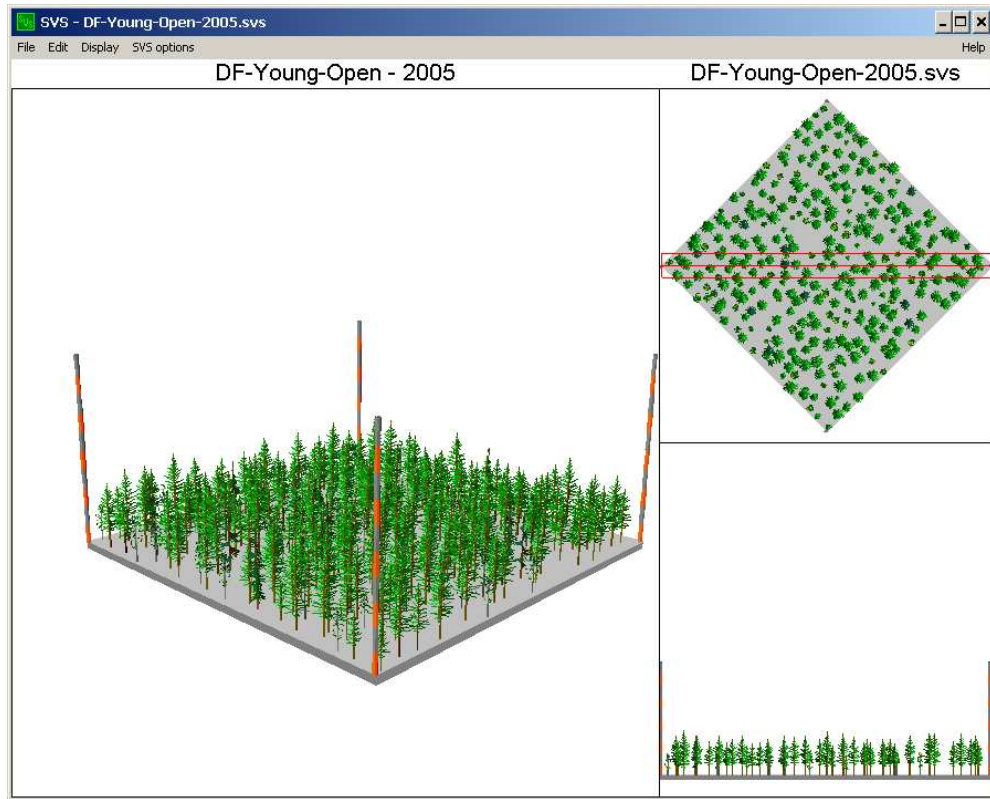


Figure 13. DF-Young-Dense stand in 2005.

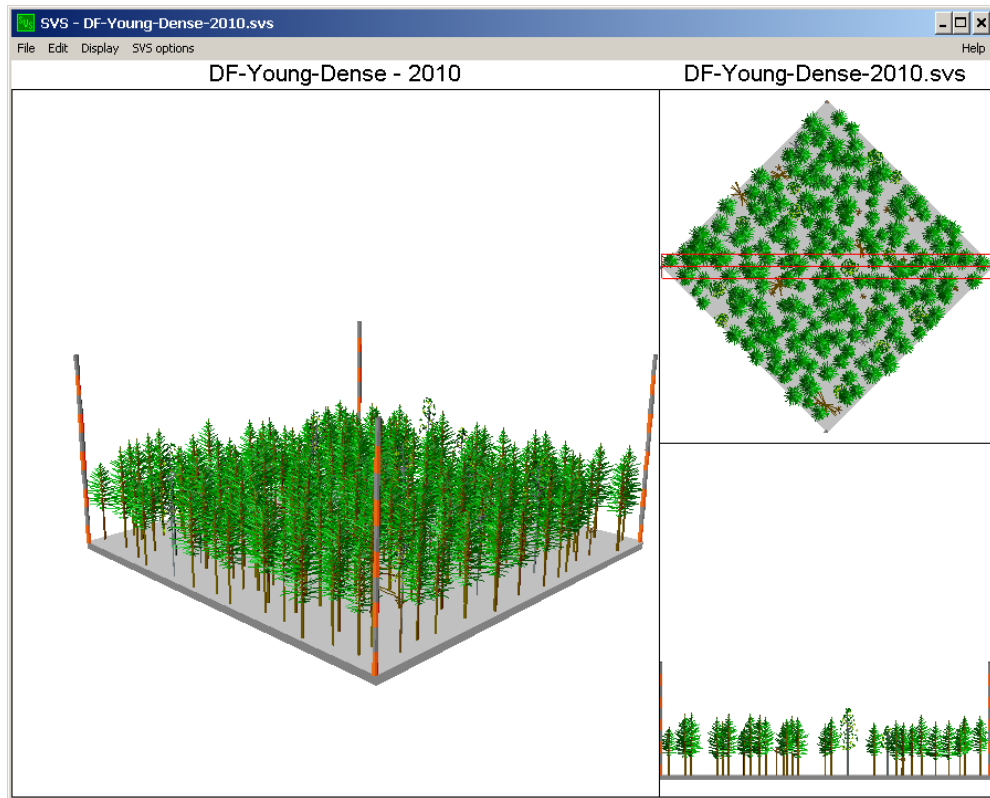


Figure 14. DF-Young-Dense stand in 2010.

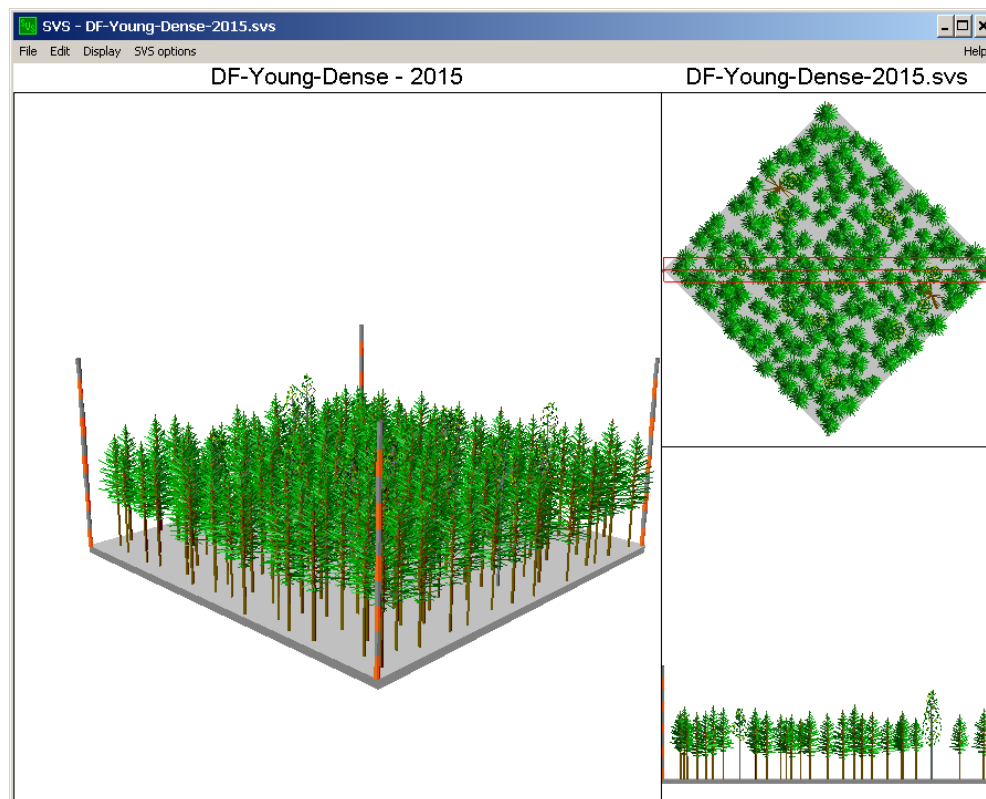


Figure 15. DF-Young-Dense stand in 2015.

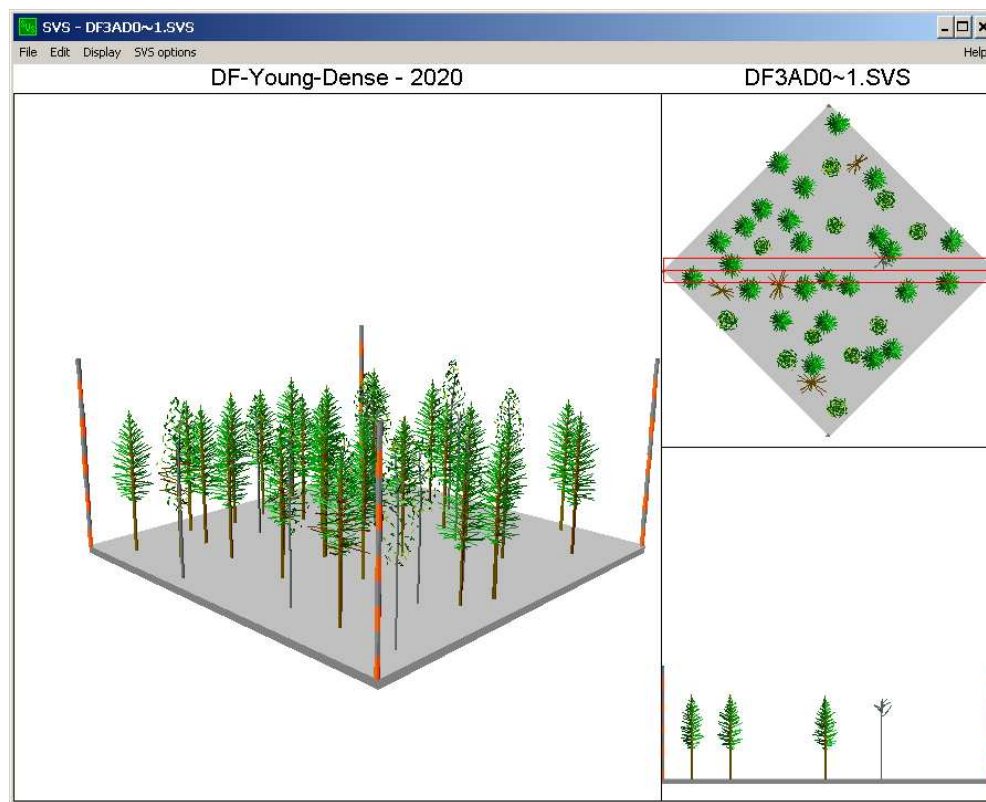


Figure 16. DF-Young-Dense stand in 2020.

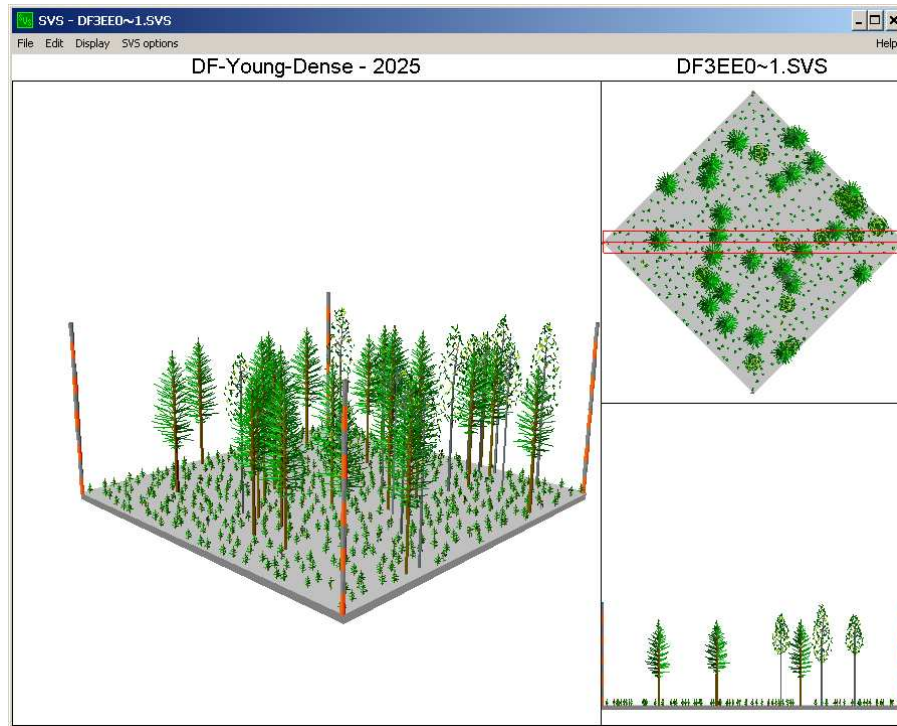


Figure 17. DF-Young-Dense stand in 2025 after shelterwood and heavy regeneration.

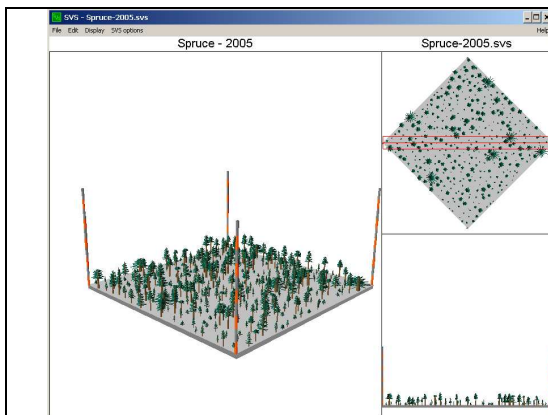
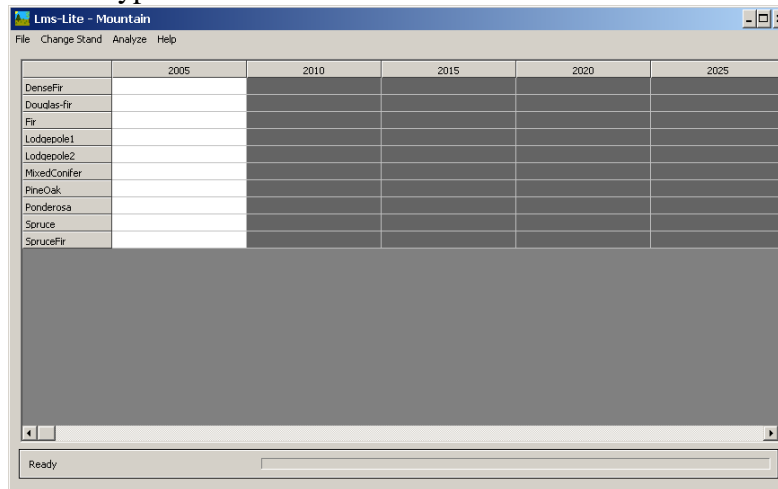
LMS-Lite Portfolios

LMS-Lite comes with several example portfolios. These portfolios represent different kinds of stands located in different parts of the United States.

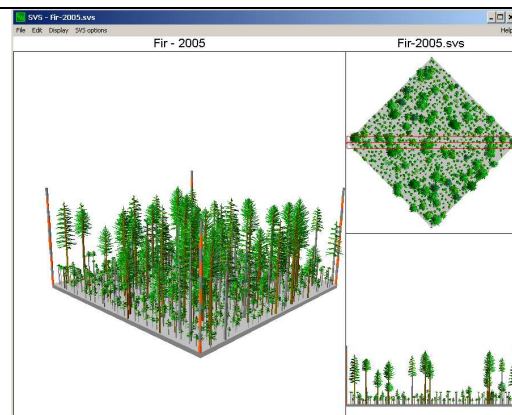
Portfolio	Description	Source
Mountain	10 stands selected from Forest Inventory and Analysis data from Colorado	USDA Forest Service, FIADB Version 2.1
NewEngland	10 stands selected from Yale-Myers Forest, Windham and Tolland Counties, Connecticut.	Yale University, Yale School of Forestry and Environmental Studies.
Pacific	10 stands selected from Charles Lathrop Pack Experimental Forest, Eatonville, WA	University of Washington, College of Forest Resources
SouthAtlantic	10 stands selected from Forest Inventory and Analysis data for Wake County, North Carolina.	USDA Forest Service, FIADB Version 2.1

Rocky Mountain Forest

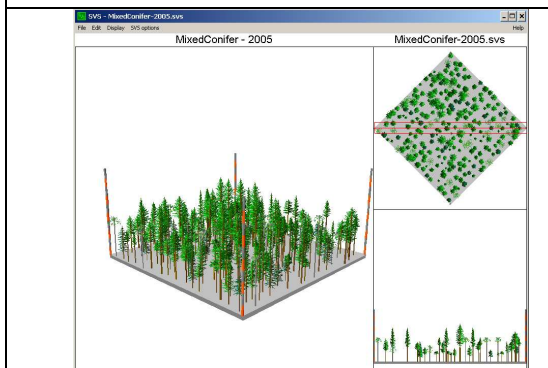
The Mountain portfolio includes 10 stands selected from the USDA Forest Service Forest Inventory and Analysis data from the state of Colorado. These stands provide a mixture of densities and stand types from across the state.



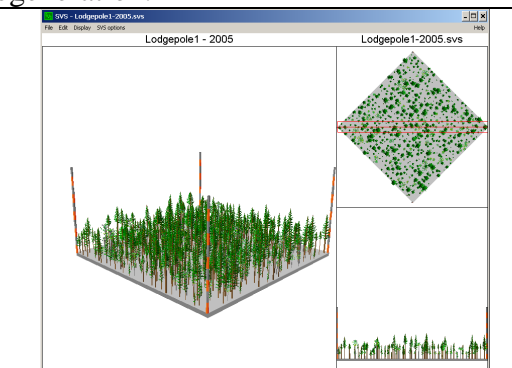
Spruce – Mixed Pinyon pine Rocky Mountain Juniper stand.



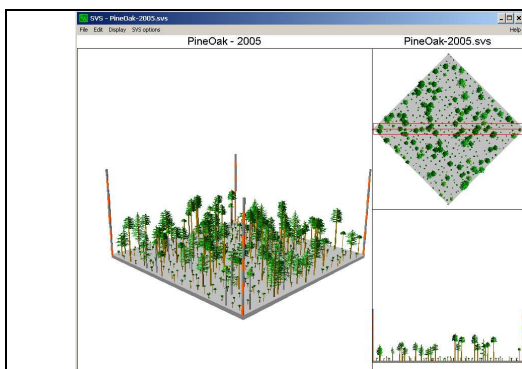
Fir – Mixed conifer stand with Douglas-fir and White fir overstory and White fir regeneration.



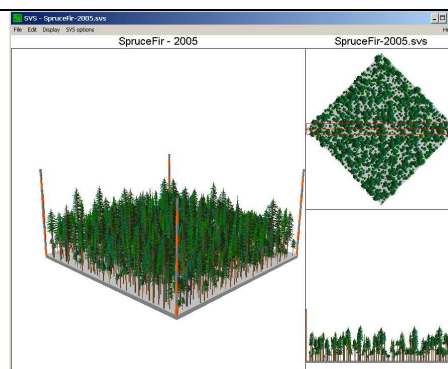
MixedConifer – Mixed conifer stand with Douglas-fir Lodgepole pine overstory.



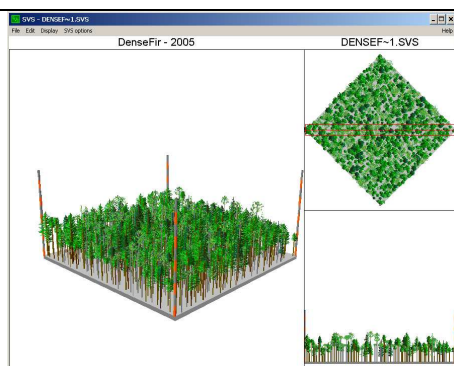
Lodgepole1 – Lodgepole pine stand.



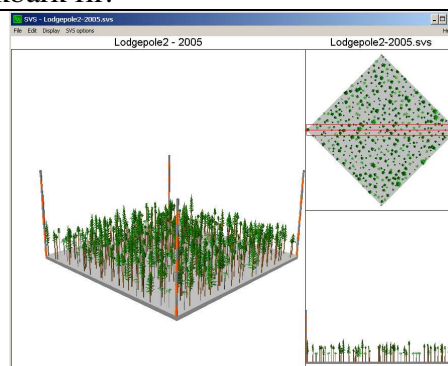
PineOak – Mixed conifer stand with oak regeneration.



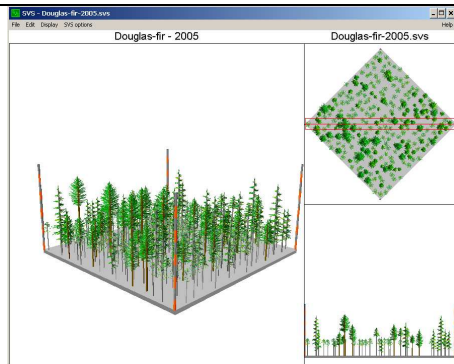
SpruceFir – Dense mixed conifer stand of Engelmann spruce, logpole pine, and corkbark fir.



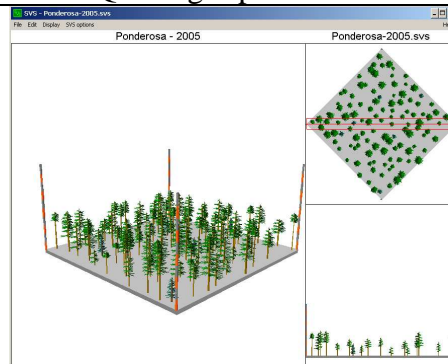
DenseFir – Mixed Douglas-fir/Quaking Aspen stands.



Lodgepole2 – Young Lodgepole pine stand with some Quaking aspen.



Douglas-fir – Open Douglas-fir/White fir stands.

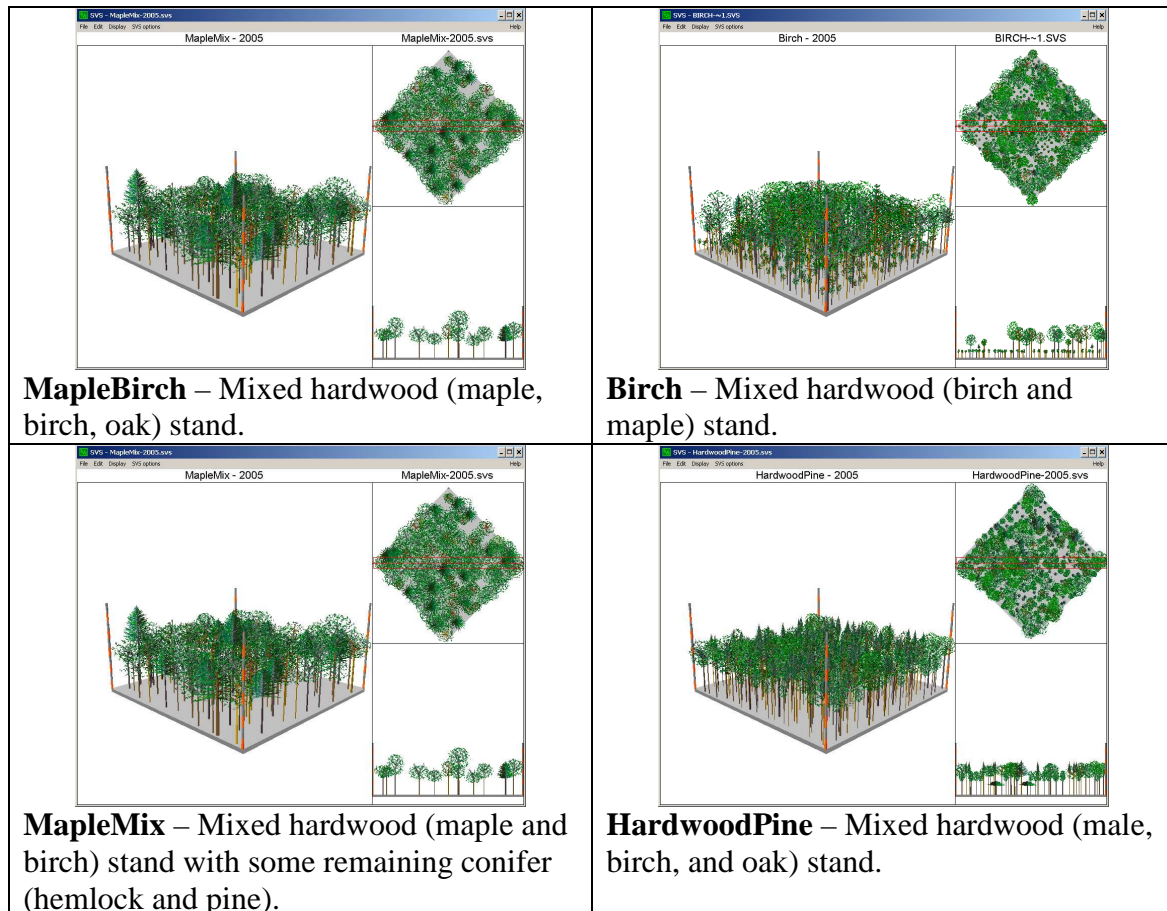


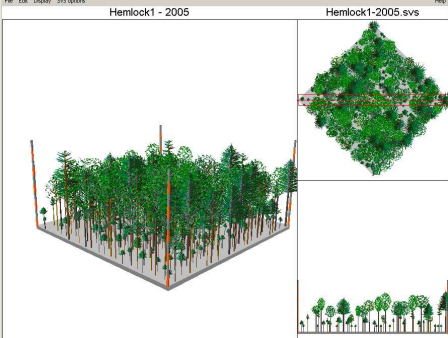
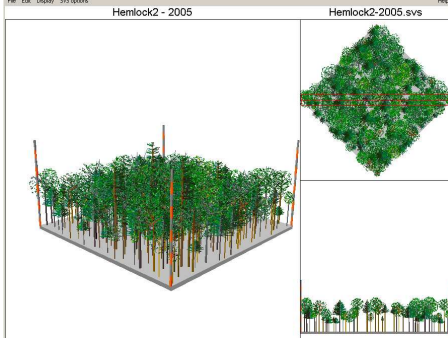
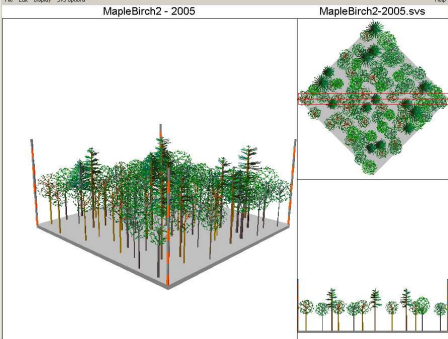
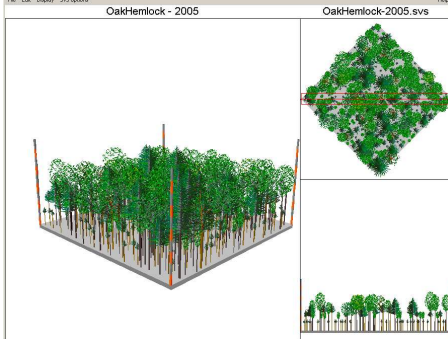
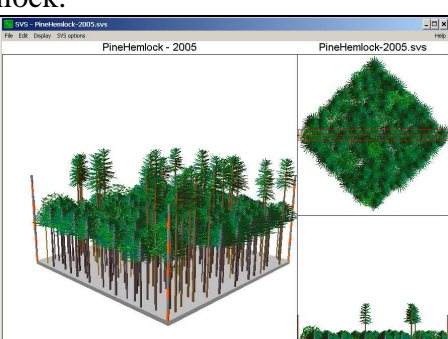
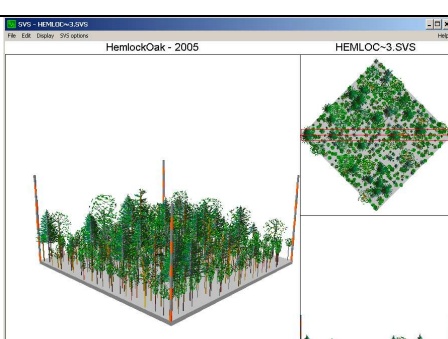
Ponderosa – Open Ponderosa pine stand with Juniper.

New England Forest

The New England portfolio includes 10 stands selected from the Yale Myers Forest owned and managed by the School of Forestry and Environmental Studies, Yale University. The Yale Myers Forest covers 7800 acres in Windham and Tolland Counties, Connecticut.

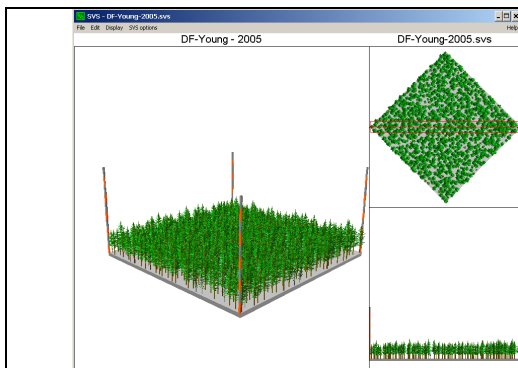
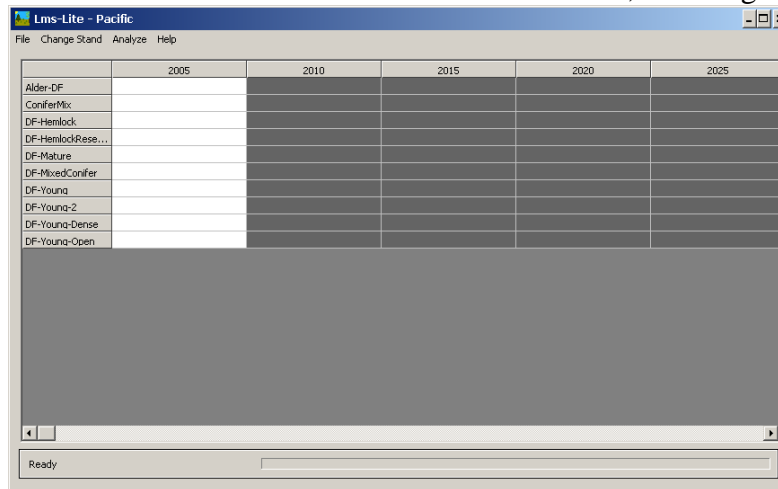
	2005	2010	2015	2020	2025
Birch					
HardwoodPine					
Hemlock1					
Hemlock2					
HemlockOak					
MapleBirch1					
MapleBirch2					
MapleMix					
OakHemlock					
PineHemlock					



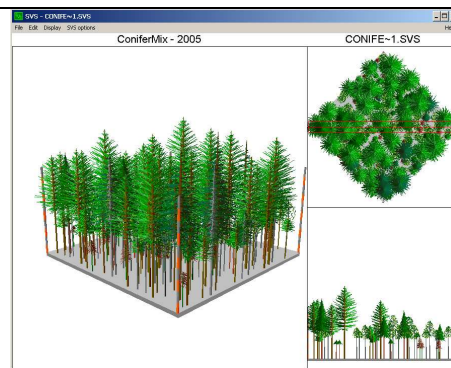
	
<p>Hemlock1 – Hardwood stand (maple, oak) will older pine and hemlock regeneration.</p>	<p>Hemlock2 – Hardwood stand (hickory, maple, oak) with hemlock and pine.</p>
	
<p>MapleBirch2 – Open hardwood (maple, birch, oak) stand with emergent pine and hemlock.</p>	<p>OakHemlock – Hardwood stand with some hemlock.</p>
	
<p>PineHemlock – Mixed conifer (pine, hemlock) stand.</p>	<p>HemlockOak – Mixed hardwood (oak, birch, other) stand.</p>

Pacific Northwest Forest

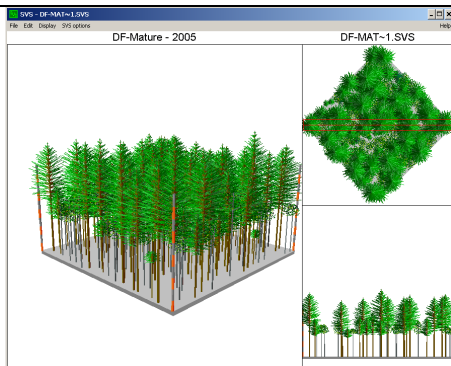
The Pacific portfolios includes 10 stands selected from the Charles Lathrop Pack Experimental Forest owned and managed by the College of Forest Resources, University of Washington. Pack Forest covers 3400 acres near Eatonville, Washington.



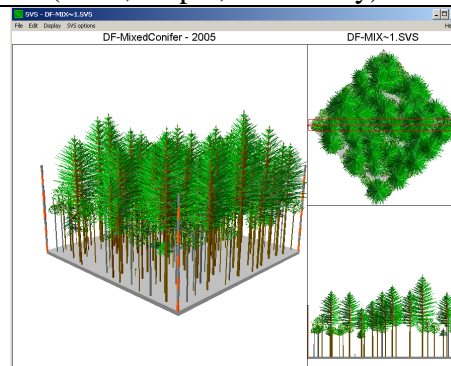
DF-Young – Young Douglas-fir stand.



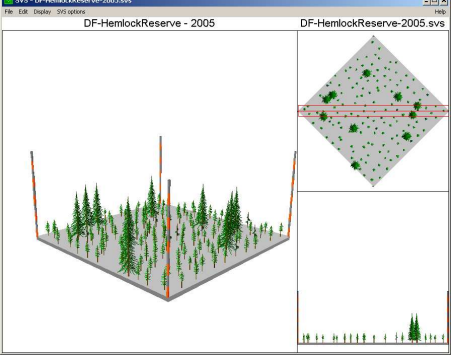
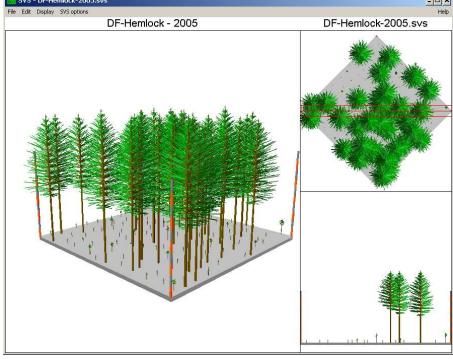
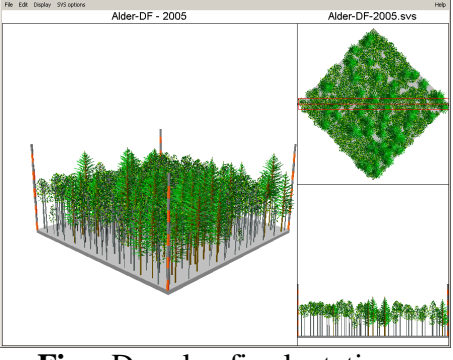
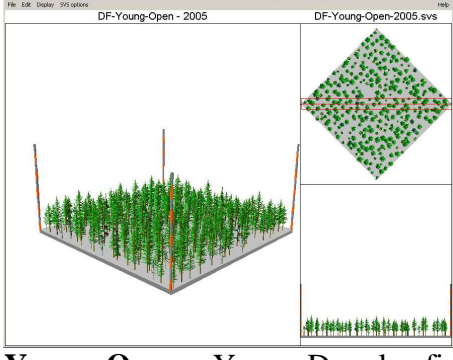
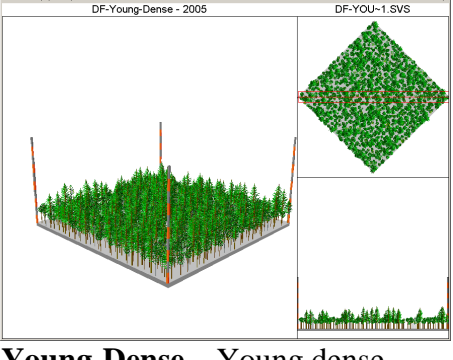
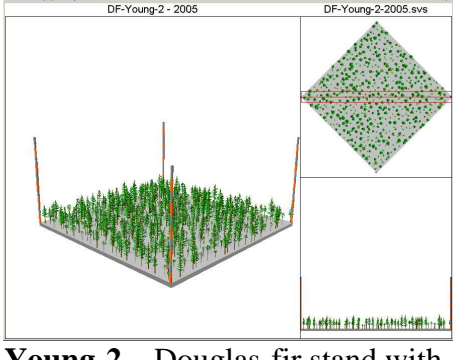
ConiferMix – Mixed conifer (Douglas-fir, hemlock, and redcedar) stand with a hard woods (alder, maple, and cherry).



DF-Mature – Douglas-fir stand with alder and hemlock.

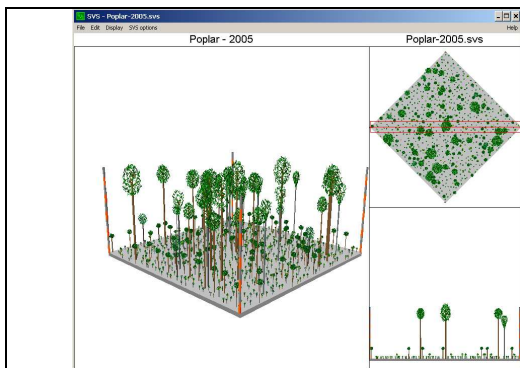
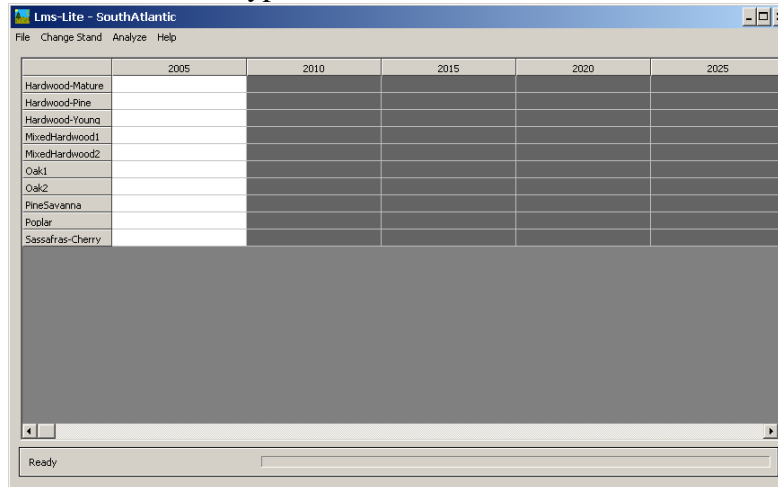


DF-MixConifer – Mixed conifer (Douglas-fir and hemlock) with hardwood (maple, alder, cherry).

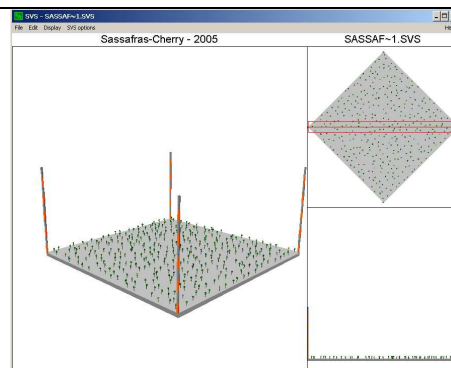
 <p>DF-HemlockReserve – Young Douglas-fir stand with redcedar and hemlock from previous stand.</p>	 <p>DF-Hemlock – Thinned Douglas-fir stand with regeneration.</p>
 <p>Alder-Fir – Douglas-fir plantation.</p>	 <p>DF-Young-Open – Young Douglas-fir plantation.</p>
 <p>DF-Young-Dense – Young dense Douglas-fir and chinquapin stand.</p>	 <p>DF-Young-2 – Douglas-fir stand with hardwoods (aspen, maple, alder).</p>

South Atlantic Forest

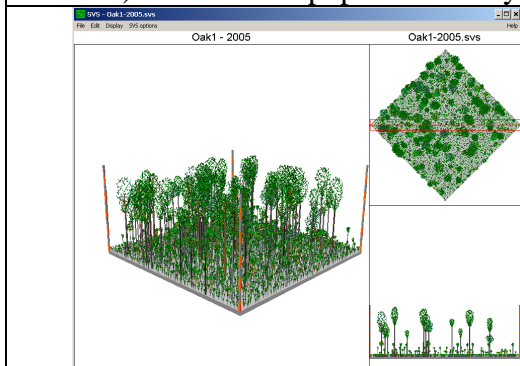
The South Atlantic portfolio include 10 stands selected from the USDA Forest Service Forest Inventory and Analysis data Wake County, North Carolina. These stands provide a mixture of densities and stand types from in the area.



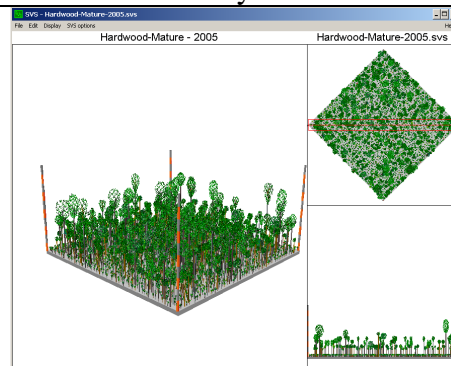
Poplar – Young hardwood stand (maple and elm) with Yellow poplar overstory.



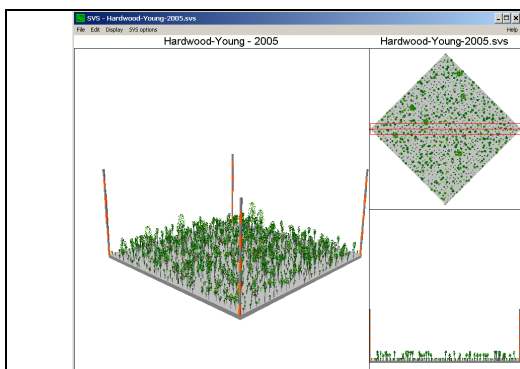
SassafrasCherry – Young sassafras/black cherry stands.



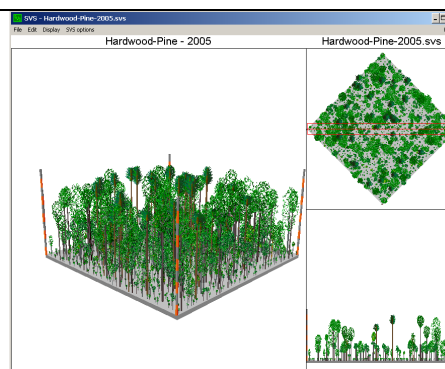
Oak1 – Maple overstory with mixed hardwood understory.



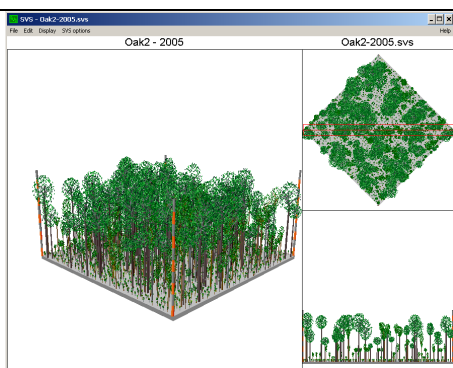
HardwoodMature – Oak stand with mixed hardwood understory.



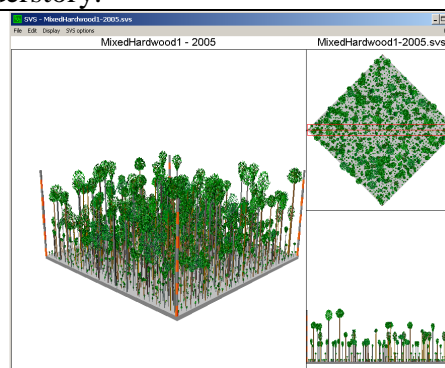
HardwoodYoung – Young mixed hardwood stand.



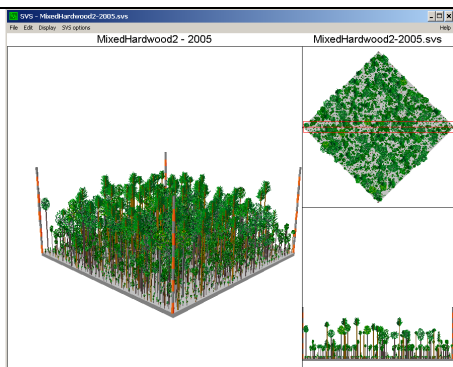
HardwoodPine – Mixed oak/shortleaf pine overstory with mixed hardwood understory.



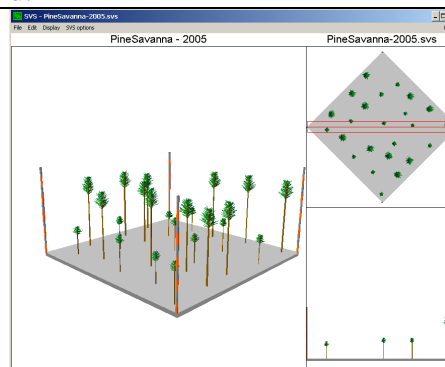
Oak2 – Mixed hardwood stand.



MixedHardwood1 – Mixed hardwood stand.



MixedHardwood2 – Mixed hardwood stand.



PineSavanna – Sparse loblolly pine overstory stand.

Species Codes

The following species codes are used on LMS-Lite.

Species Code	Common Name	Scientific Name
ABCO	White fir	<i>Abies concolor</i>
ABGR	Grand fir	<i>Abies grandis</i>
ABLA	Subalpine fir	<i>Abies lasiocarpa</i>
ABLAA	Corkbark fir	<i>Abies lasiocarpa</i> var. <i>arizonica</i>
ACMA3	Bigleaf maple	<i>Acer macrophyllum</i>
ACRU	Red maple	<i>Acer rubrum</i>
ACSA3	Sugar maple	<i>Acer saccharum</i>
AEFL	Yellow buckeye	<i>Aesculus flava</i>
ALRU2	Red alder	<i>Alnus rubra</i>
BEAL2	Yellow birch	<i>Betula alleghaniensis</i>
BELE	Sweet birch	<i>Betula lenta</i>
BENI	River birch	<i>Betula nigra</i>
BEPA	Paper birch	<i>Betula papyifera</i>
BEPO	Gray birch	<i>Betula populifolia</i>
CAAL27	Mockernut hickory	<i>Carya alba</i>
CACA18	American hornbeam	<i>Carpinus caroliniana</i>
CAGL8	Pignut hickory	<i>Carya glabra</i>
CAOV2	Shagbark hickory	<i>Carya ovata</i>
CARYA	Hickory species	<i>Carya</i> spp.
CHCH7	Giant chinkapin	<i>Chrysolepis chrysophylla</i>
CHNO	Yellow-cedar	<i>Chamaecyparis nootkatensis</i>
CHTH2	Atlantic white cedar	<i>Chamaecyparis thyoides</i>
COFL2	Flowering dogwood	<i>Cornus florida</i>
FAGR	American beech	<i>Fagus grandifolia</i>
FRAM2	White ash	<i>Fraxinus Americana</i>
FRPE	Green ash	<i>Fraxinus pennsylvanica</i>
ILOP	American holly	<i>Ilex opaca</i>
JUSC2	Rocky Mountain juniper	<i>Juniperus scopulorum</i>
JUVI	Eastern redcedar	<i>Juniperus virginiana</i>
LIST2	Sweetgum	<i>Liquidambar styraciflua</i>
LITU	Yellow poplar	<i>Liriodendron tuliperfia</i>
NYSY	Blackgum	<i>Nyssa sylvatia</i>
OTHER	Other species	
OXAR	Sourwood	<i>Oxydendrum arboretum</i>
PICO	Lodgepole pine	<i>Pinus contorta</i>
PIEC2	Shortleaf pine	<i>Pinus echinata</i>
PIED	Pinyon pine	<i>Pinus edulis</i>
PIEN	Engelmann spruce	<i>Picea engelmanni</i>

PIPO	Ponderosa pine	<i>Pinus ponderosa</i>
PIST	Eastern white pine	<i>Pinus strobes</i>
PITA	Loblolly pine	<i>Pinus taeda</i>
POTR5	Quaking aspen	<i>Populus tremuloides</i>
PREM	Bitter cherry	<i>Prunus emarginata</i>
PRSE2	Black cherry	<i>Prunus serotina</i>
PSME	Douglas-fir	<i>Pseudotsuga menziesii</i>
QUAL	White oak	<i>Quercus alba</i>
QUCO2	Scarlet oak	<i>Quercus coccinea</i>
QUFA	Southern red oak	<i>Quercus falcate</i>
QUGA	Gamble oak	<i>Quercus gambelii</i>
QULA3	Laurel oak	<i>Quercus laurifolia</i>
QUNI	Water oak	<i>Quercus nigra</i>
QUPA5	Pin oak	<i>Quercus palustris</i>
QUPH	Willow oak	<i>Quercus phellos</i>
QUPR2	Chestnut oak	<i>Quercus prinus</i>
QURU	Northern red oak	<i>Quercus rubra</i>
QUST	Post oak	<i>Quercus stellata</i>
QUVE	Black oak	<i>Quercus velutina</i>
SAAL5	Sassafras	<i>Sassafras albidum</i>
SALIX	Willow species	<i>Salix</i> spp.
THPL	Western redcedar	<i>Thuja plicata</i>
TSCA	Eastern hemlock	<i>Tsuga canadensis</i>
TSHE	Western hemlock	<i>Tsuga heterophylla</i>
TSME	Mountain hemlock	<i>Tsuga mertensiana</i>
ULAL	Winged elm	<i>Ulmus alata</i>
ULAM	American elm	<i>Ulmus americana</i>

Appendix A: Installing LMS-Lite

LMS-Lite can be installed by downloading the LMS31-Lite-R3-Setup.exe file from the LMS website (<http://landscapemanagementsystem.org>) or installing from the LMS-Lite CD-ROM. LMS-Lite must be installed with an account that has Administrative privileges. The LMS-Lite InstallShield Wizard will guide the user through the install of the program. The following figures show the steps of the installation process.

Requirements: Windows 2000 or newer, .NET Framework 2.0 (can be installed from CD-ROM, downloaded from LMS website, or downloaded from Microsoft)

The LMS-Lite InstallShield Wizard will install all necessary components for running LMS-Lite, including example datasets and the Stand Visualization System for creating stand pictures. If the Stand Visualization System is already installed on your computer that part of the installation will be skipped.

Installing LMS-Lite

Run the LMS31-Lite-R3-Setup.exe file from your download location or the LMS-Lite CD-ROM. The LMS-Lite InstallShield Wizard will prompt the user through the install process. This process begins with the Welcome screen (Figure 18).

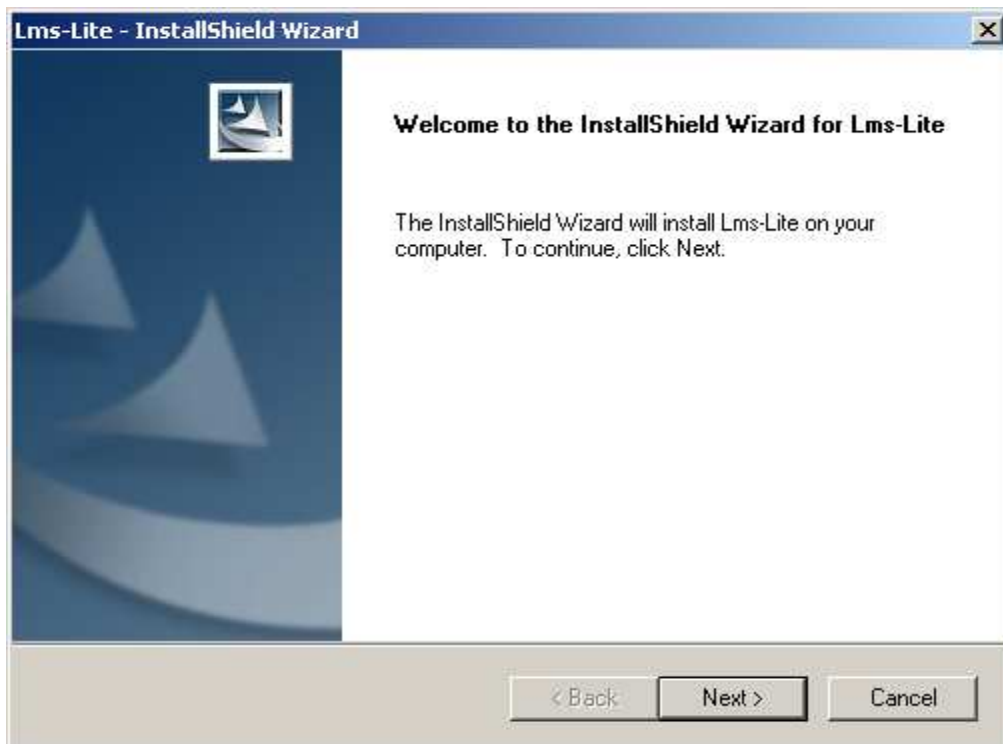


Figure 18. Initial welcome screen for LMS-Lite InstallShield Wizard.

The InstallShield Wizard then prompts the user for a Complete or Custom installation (Figure 19). In most cases the default of Complete is sufficient. The Custom installation can be used to skip installation of some components or force the installation of the Stand Visualization System even when it is already installed.

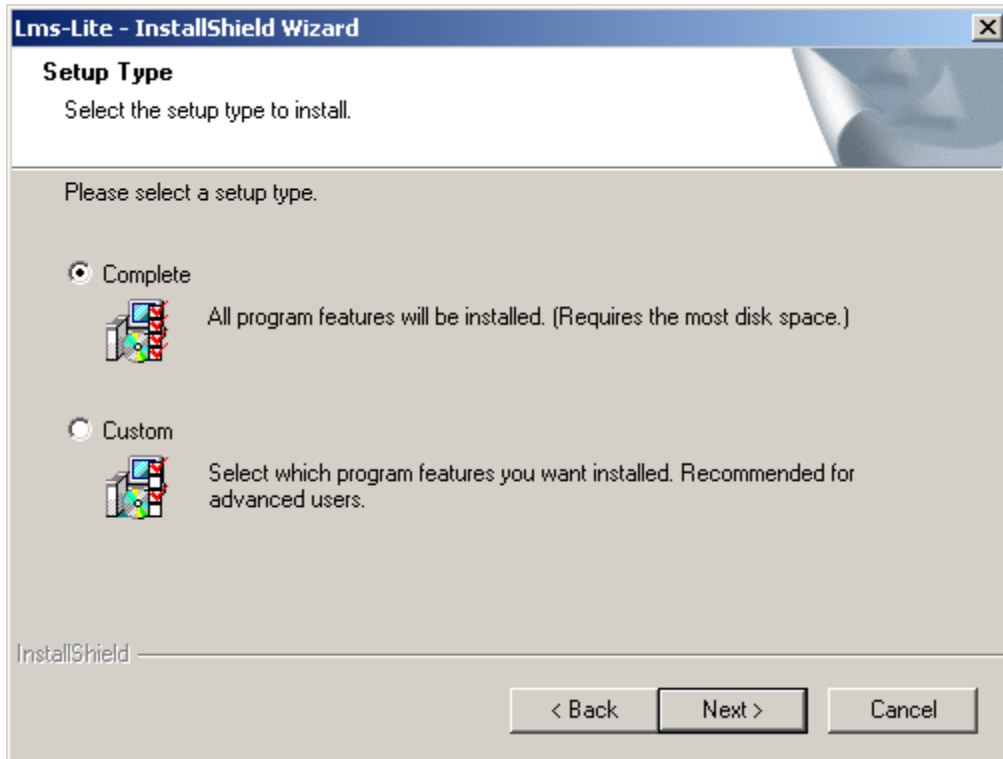


Figure 19. LMS-Lite InstallShield Wizard allowing selection of setup type. In most cases Complete should be selected.

The LMS-Lite InstallShield Wizard is now ready to begin the installation process (Figure 20).

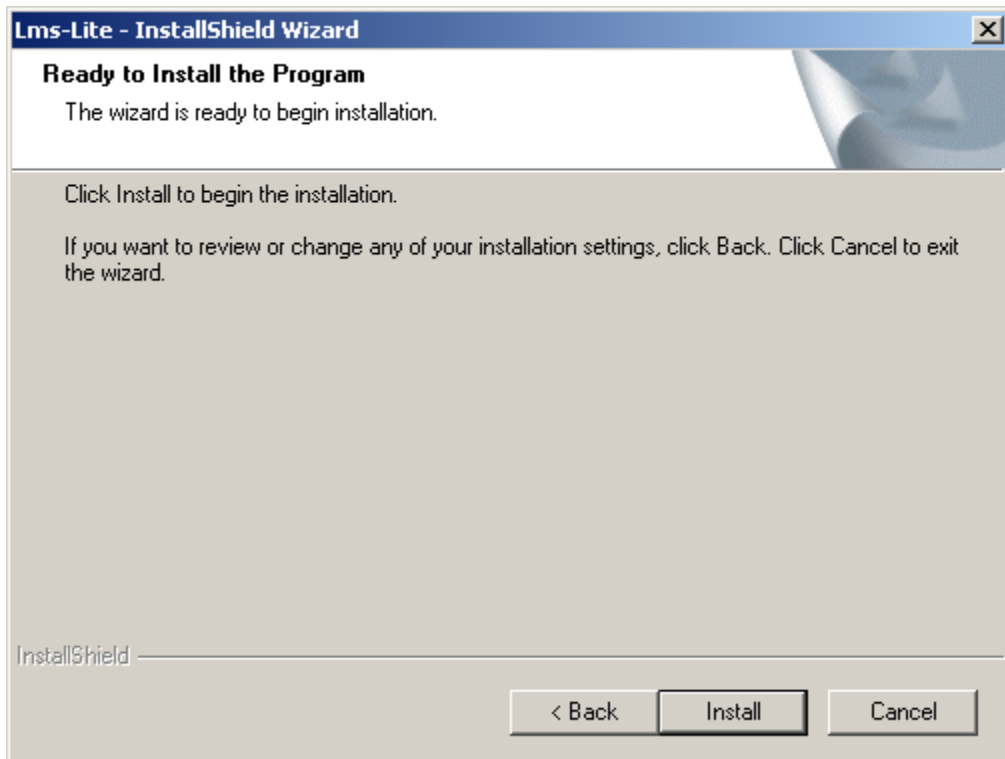


Figure 20. LMS-Lite Installshield Wizard is now ready to begin installing the program.

After clicking the Install button the LMS-Lite InstallShield Wizard will begin copying files (Figure 21).

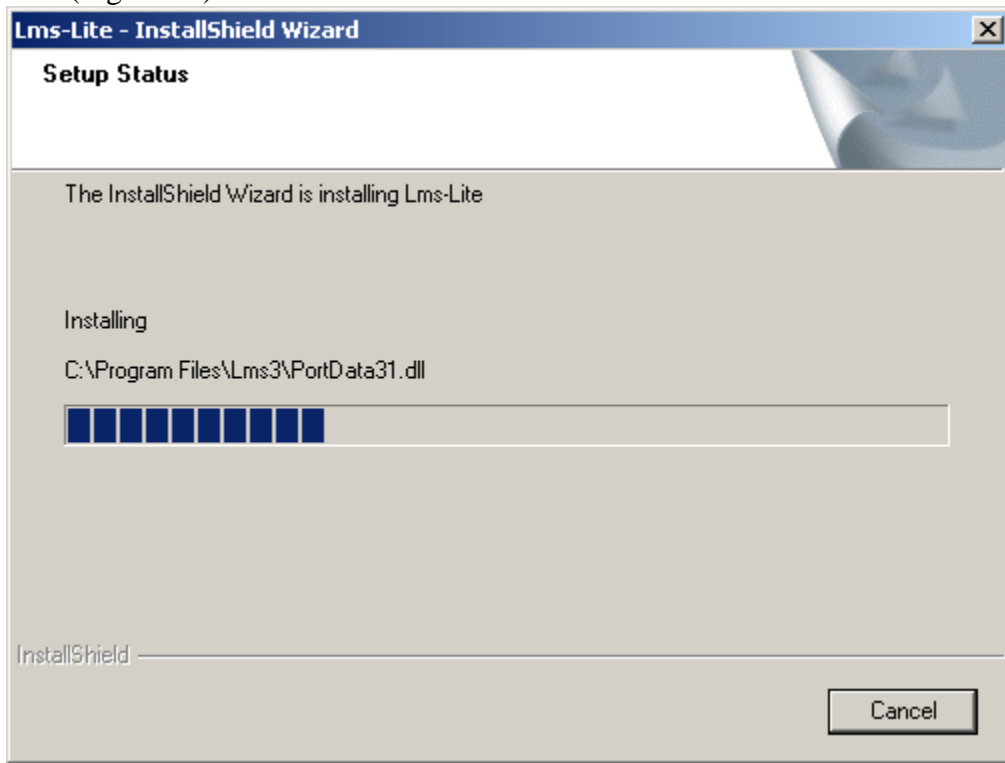


Figure 21. LMS-Lite InstallShield Wizard shown copying files.

After most of the LMS-Lite program files have been copied the InstallShield Wizard will install the Visual C++ 8.0 MFC and Runtime files (Figure 22).

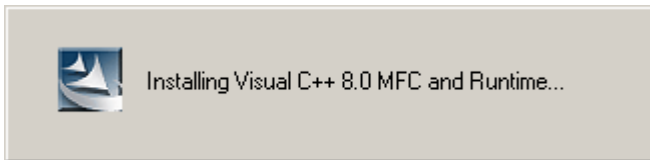


Figure 22. LMS-Lite InstallShield Wizard shown installing required runtime files.

If the Stand Visualization System has not been installed on your computer you will be prompted before the installation begins (Figure 23). The Stand Visualization System installation can be run silently (the LMS-Lite InstallShield Wizard provides the answers) or can be run Normal (the user will need to provide the answers to the SVS install program).

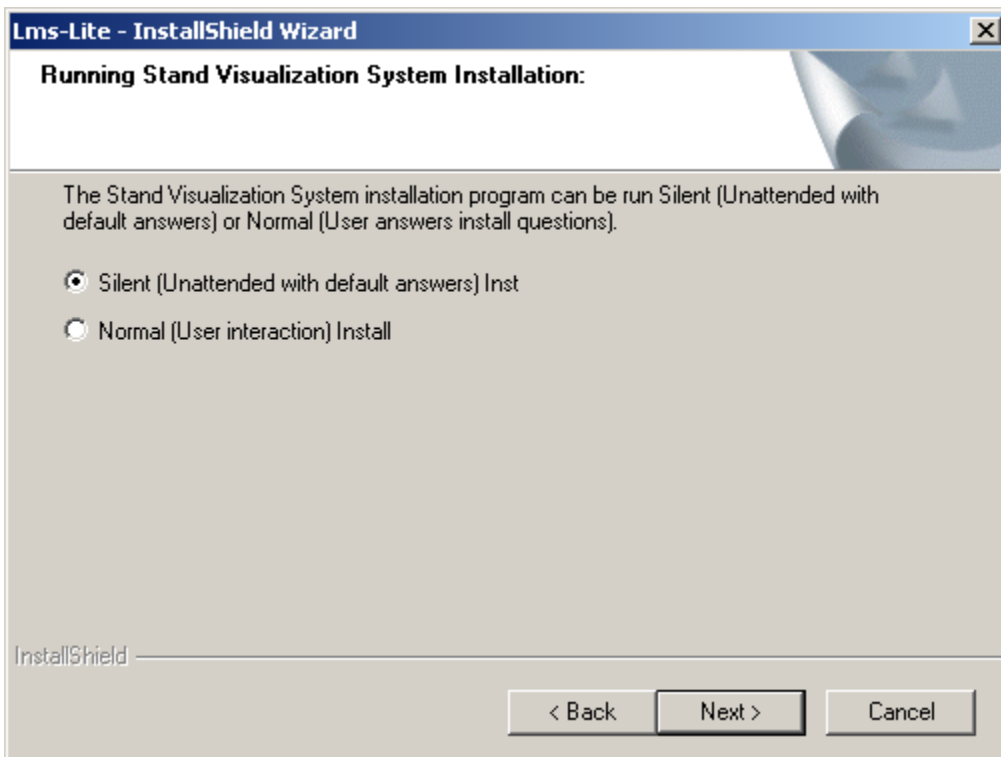


Figure 23. LMS-Lite InstallShield Wizard prompting for Stand Visualization System install.

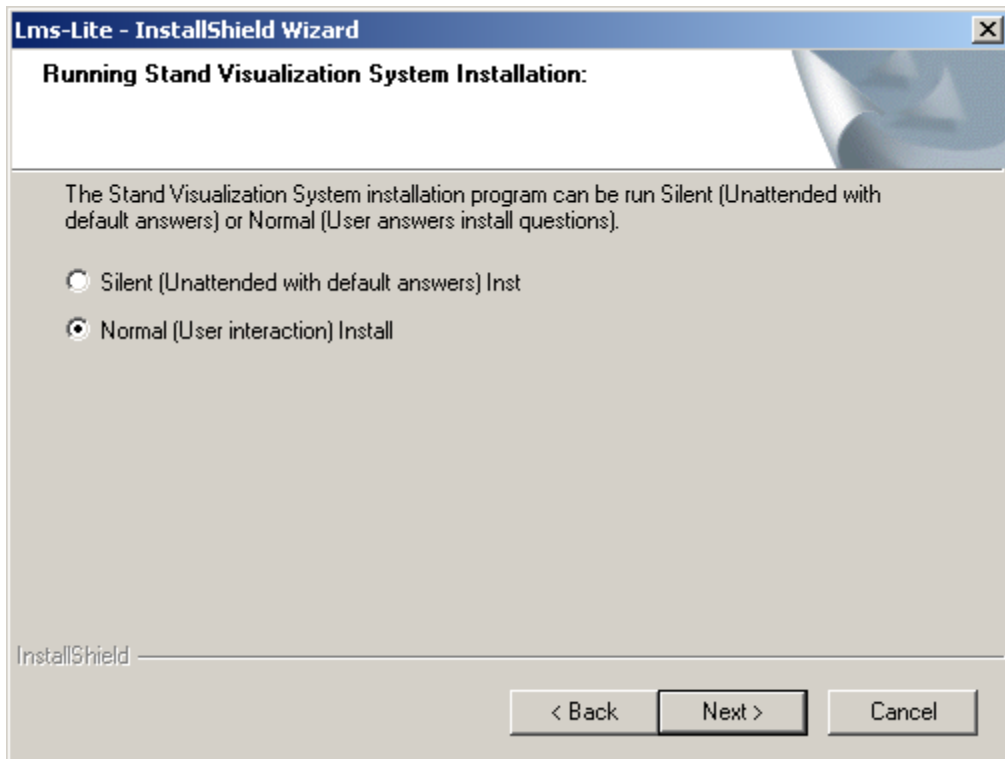


Figure 24. LMS-Lite InstallShield Wizard preparing to run Stand Visualization Systems install program

Installing the Stand Visualization System

If Normal installation of the Stand Visualization System is requested you will see the following steps during the SVS installation.

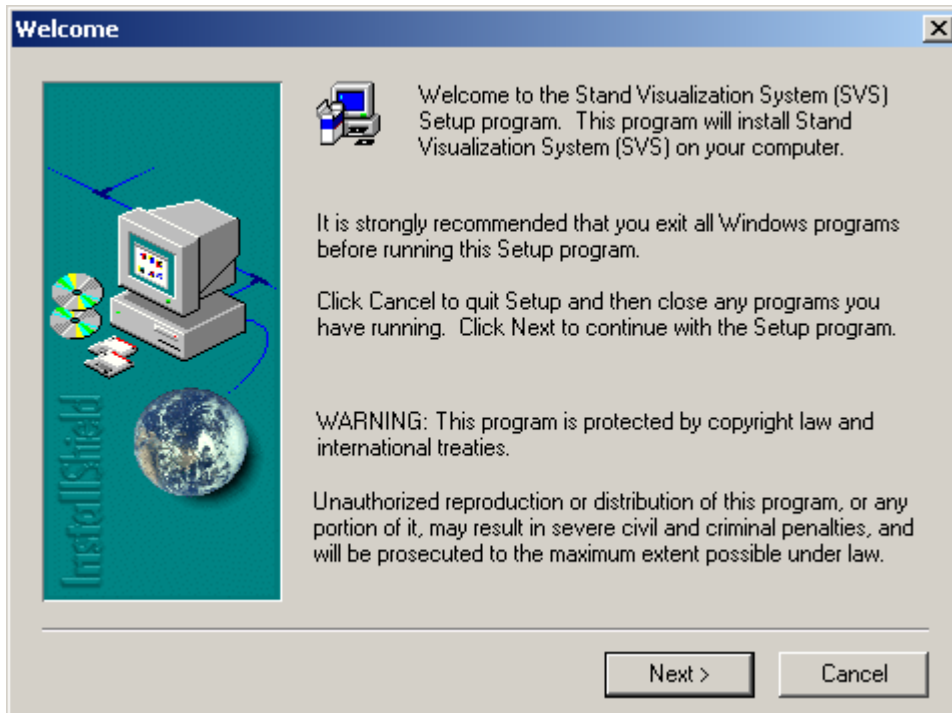


Figure 25. Stand Visualization System install program Welcome screen.

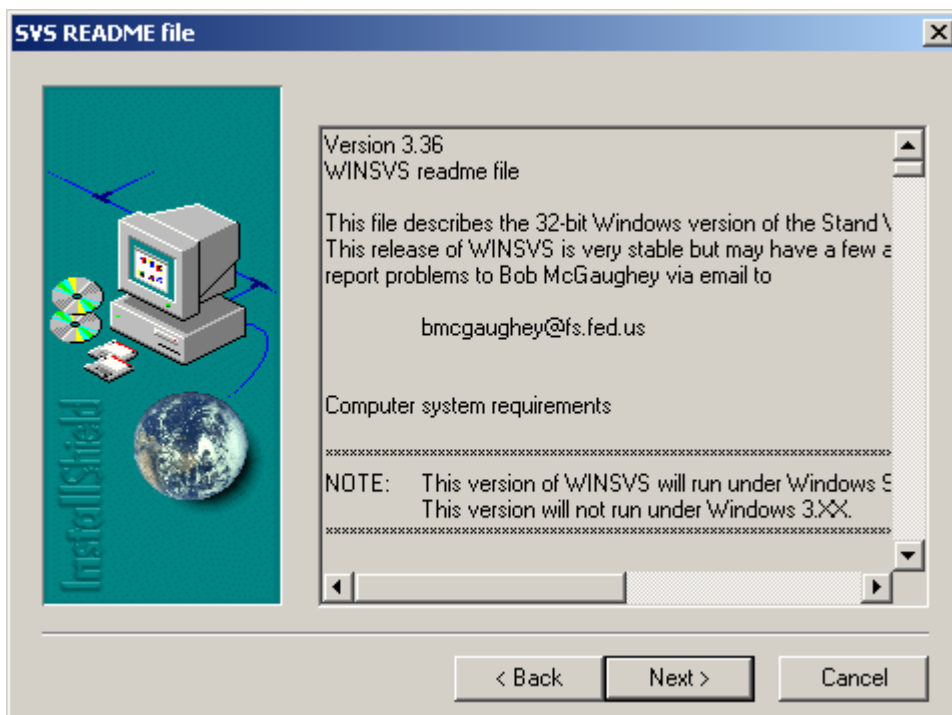


Figure 26. Stand Visualization System install Readme file.

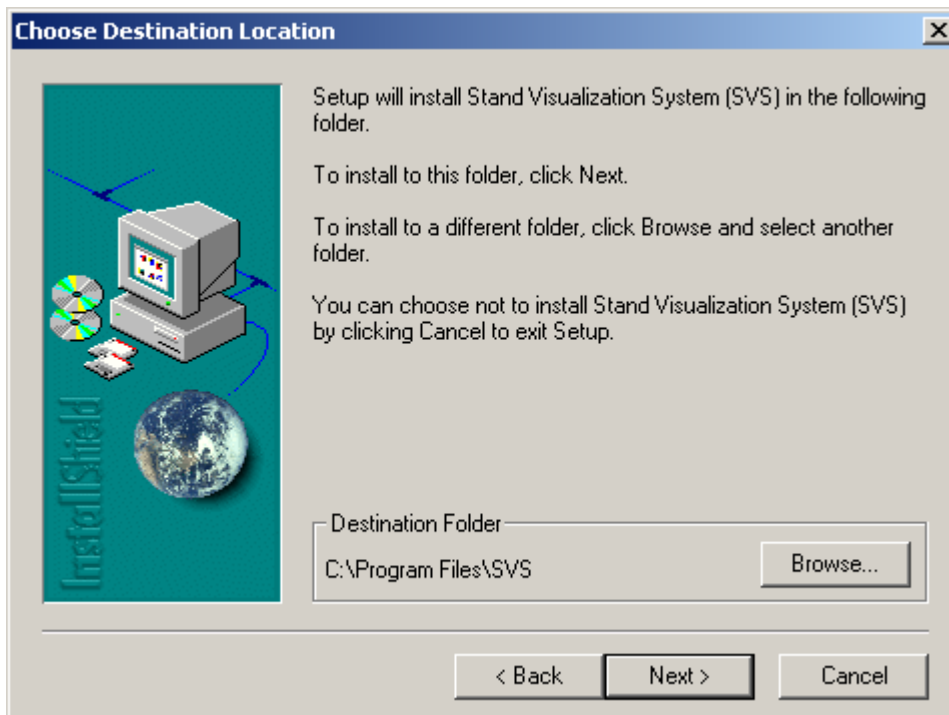


Figure 27. Stand Visualization System install directory.

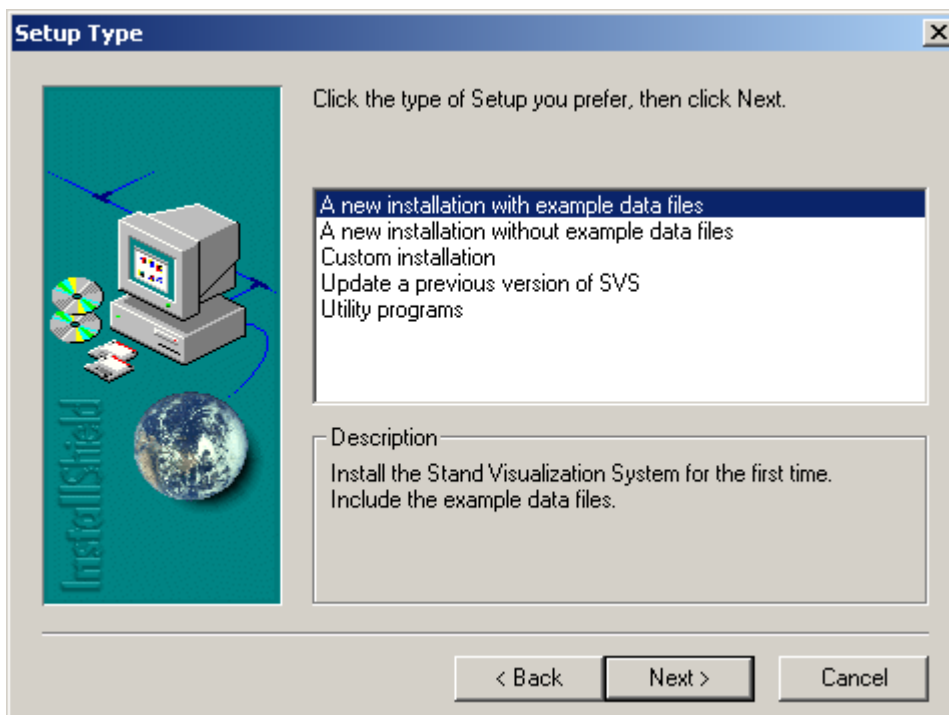


Figure 28. Stand Visualization System install options.

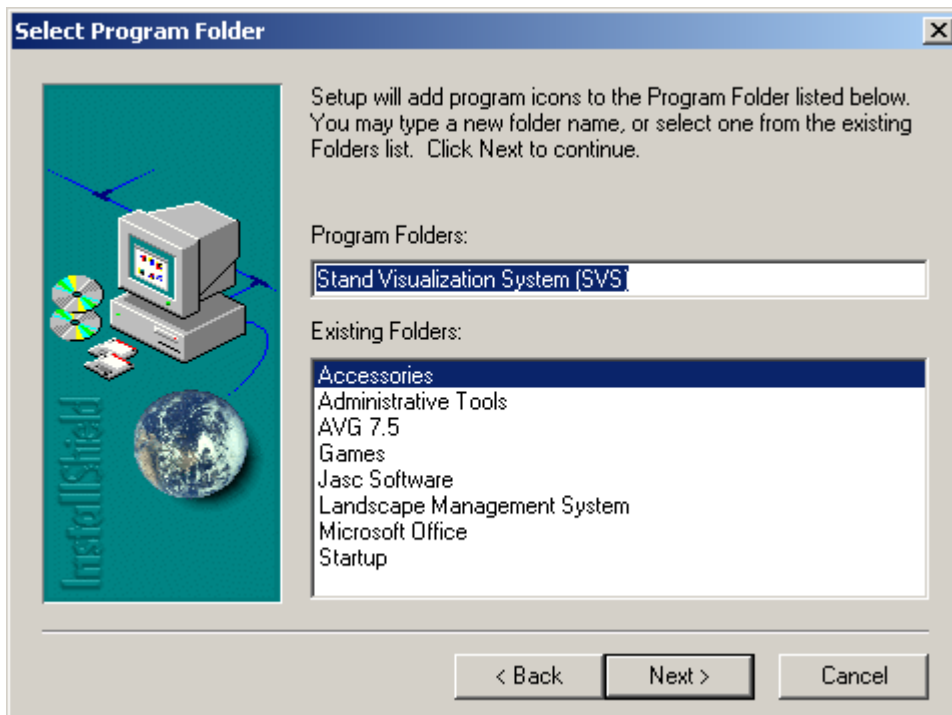


Figure 29. Stand Visualization System install program folder.

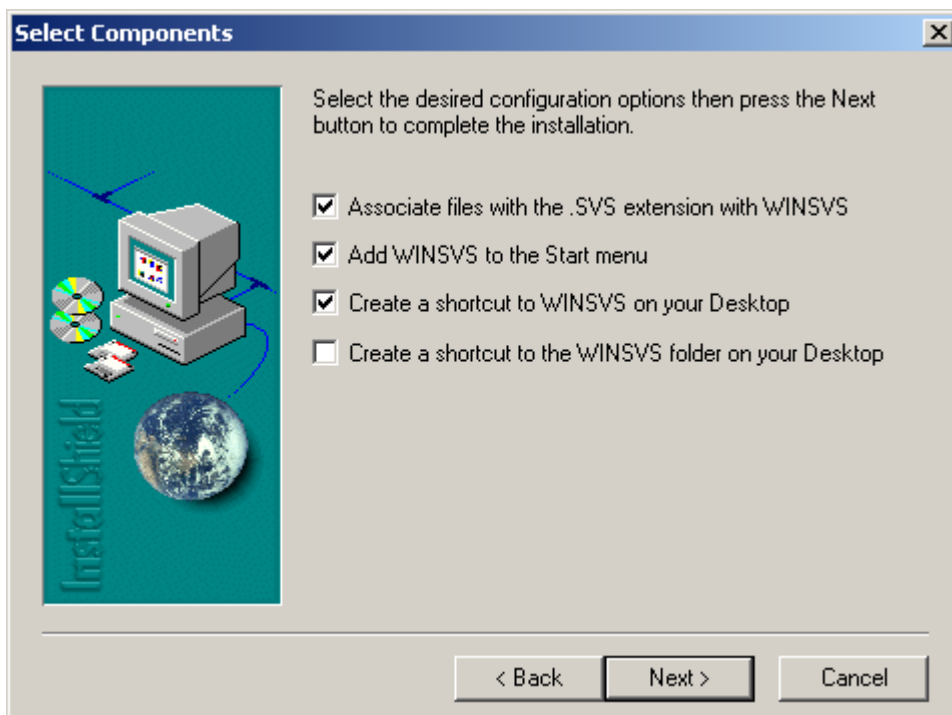


Figure 30. Stand Visualization System install shortcuts.



Figure 31. Stand Visualization System install finished.

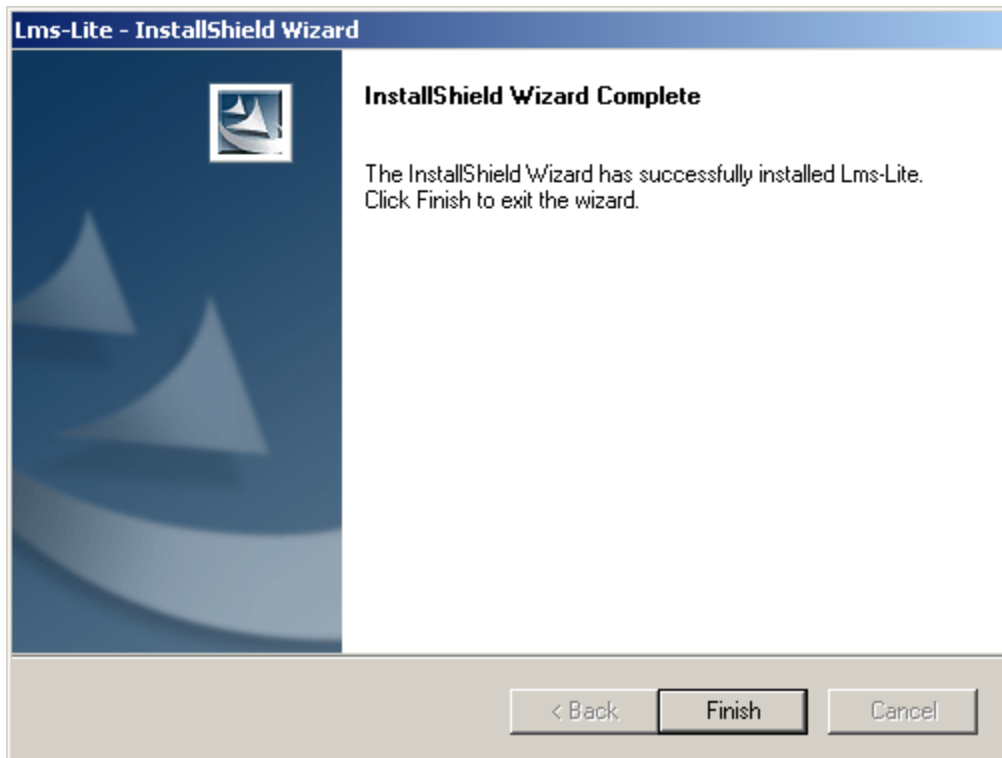


Figure 32. LMS-Lite InstallShield Wizard showing that the installation is finished.

After the installation is completed the LMS-Lite icon will appear on the desktop and the Landscape Management System program group will appear in the Start/Programs menu.

Uninstalling LMS-Lite

LMS-Lite can be removed from the computer by using Add or Remove Programs in the Control Panel (Start/Settings/Control Panel). Once the Add or Remove Programs dialog is open locate the LMS-Lite line, click on it, then click the Remove button. This will remove all the program files from C:\Program Files\LMS3 and installed data files in C:\LMSLiteData. Some temporary files may be left in the C:\LMSLiteData directories.

Appendix B: Creating Portfolios for LMS-Lite

Portfolios for LMS-Lite are created using the full LMS 3.1 to setup and configure the LMS-Lite portfolio.

Create Access Database with Stand, SiteIndex, Inventory, Snag tables.

Table 1. Stand table format required for creating an LMS portfolio.

Field Name	Field Type	Description
Primary	Long Integer	Key field used by LMS.
Stand	Text (30)	Stand name (no spaces)
Plot	Long Integer	Plot number
Age	Long Integer	Age of stand
Slope	Double	Average slope (percent) for stand
Aspect	Double	Average aspect for stand
Elevation	Double	Average elevation (feet) for stand
Latitude	Double	Latitude of stand (optional)
Acres	Double	Acres of stand
Location	Text (50)	Location code (FVS) for stand
Habitat	Text (50)	Habitat code (FVS) for stand

Table 2. SiteIndex table format required for creating an LMS portfolio.

Field Name	Field Type	Description
Primary	Long Integer	Key field used by LMS
Stand	Text (30)	Stand name (no spaces)
Plot	Long Integer	Plot number
Species	Text (10)	Species code (NRCS Plants)
CurveID	Long Integer	Reference number for site index curve
Base	Long Integer	Base age for site index curve
Index	Long Integer	Site index value
SDIMax	Long Integer	Maximum SDI for species

Table 3. Inventory table format required for creating an LMS portfolio

Field Name	Field Type	Description
Primary	Long Integer	Key field use by LMS
Stand	Text (30)	Stand name (no spaces)
Plot	Long Integer	Plot number
Tree#	Long Integer	Tree number
X	Double	X coordinate of tree
Y	Double	Y coordinate of tree
Species	Text (10)	Species code (NRCS Plants)
Age	Long Integer	Age of tree

DBH	Double	Diameter Breast Height (inches)
DBHInc	Double	Diameter increment
Height	Double	Height of tree
TopHeight	Double	Top Height of tree
HeightInc	Double	Height increment
CrownR	Double	Crown ratio (decimal precent)
CrownW	Double	Crown width (height units)
VolBf	Double	Volume – Board Foot
VolMr	Double	Volume – Merch. Cubic Foot
VolCu	Double	Volume – Cubic Foot
TPA	Double	Trees per acre
D1	Long Integer	Damage Code 1
S1	Long Integer	Severity Code 1
D2	Long Integer	Damage Code 2
S2	Long Integer	Severity Code 2
D3	Long Integer	Damage Code 3
S3	Long Integer	Severity Code 3

Table 4. Snag table format required for creating an LMS portfolio.

Field Name	Field Type	Description
Primary	Long Integer	Key field used by LMS
Stand	Text (30)	Stand name (no spaces)
Plot	Long Integer	Plot number
Tree#	Long Integer	Tree number
X	Double	X coordinate
Y	Double	Y coordinate
Species	Text (10)	Species code (NRCS Plants)
Age	Long Integer	Age
Type	Long Integer	Snag = 1, Log – 0
DBH	Double	Diameter (inches)
Height	Double	Height (feet)
CrownR	Double	Crown Ratio (decimal percent)
CrownW	Double	Crown Width (height units)
DecayCls	Long Integer	Decay class
TPA	Double	Trees per acre

Set registry to LMSLiteData portfolio path (registry file comes with LMS31 install).

Use Large Portfolio Builder to create the portfolio.

Use LMS 3.1 to configure portfolio for the correct FVS variant.

Use LMS 3.1 to configure LMSLite tools.

Use LMS 3.1 to create 3 regeneration files

Rename regeneration files to LitePlant0.rgn, LitePlant1.rgn, and LitePlant2.rgn