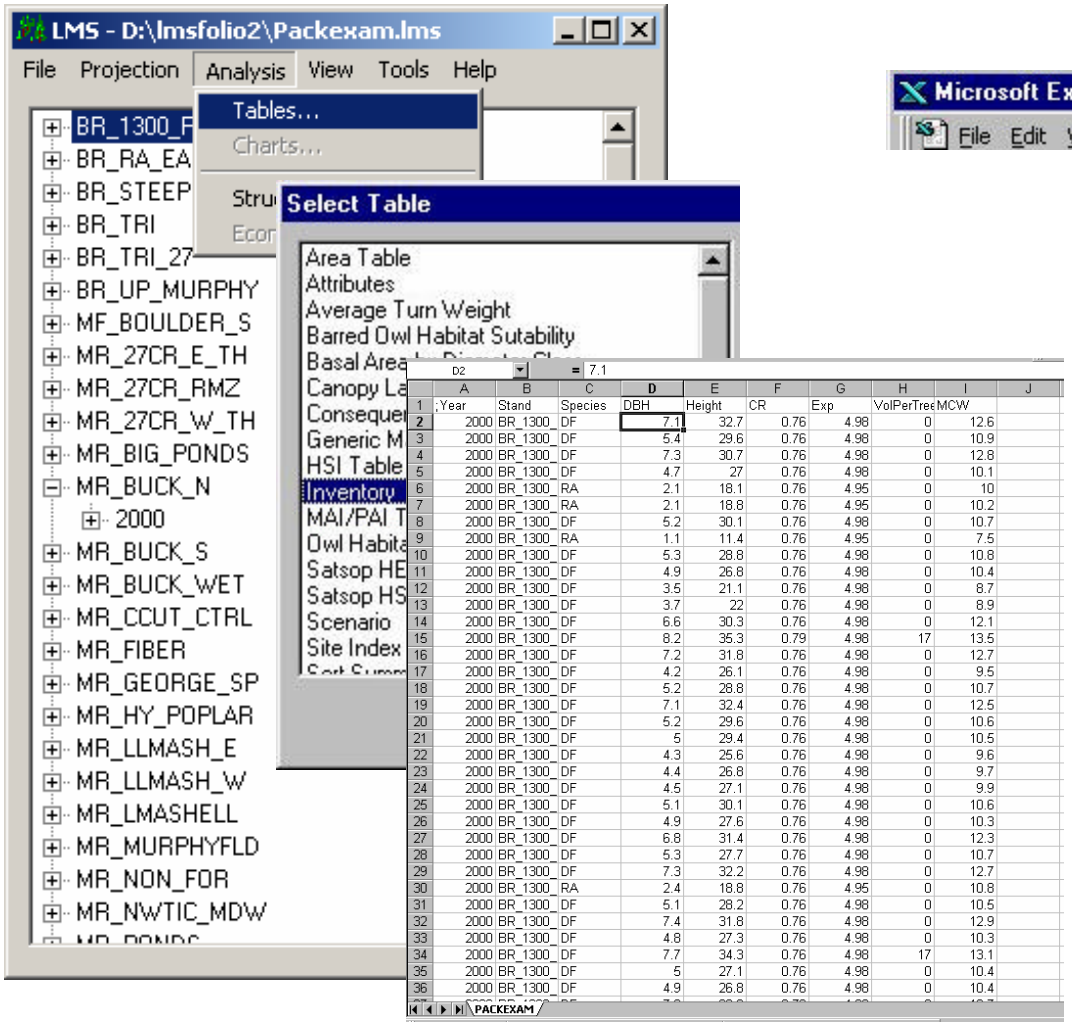
Excel Functions & Charts

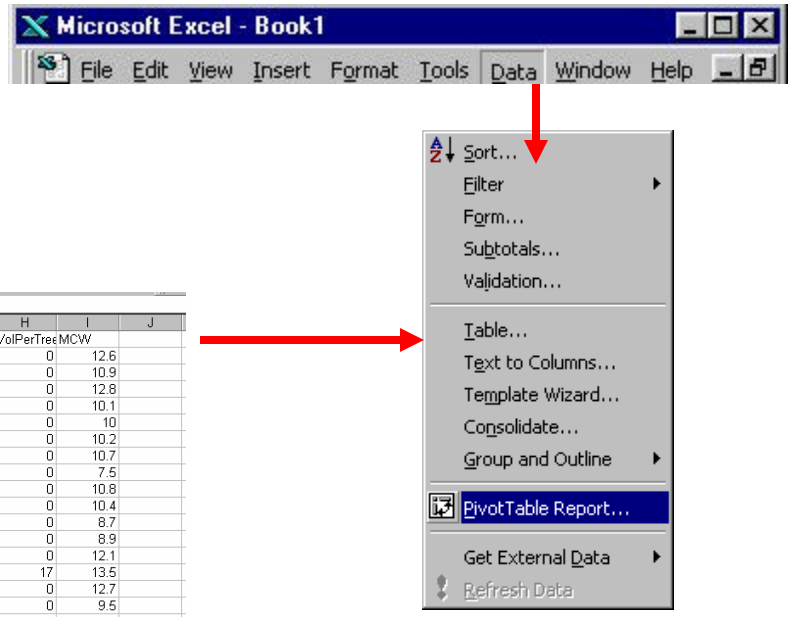
Microsoft Excel® is a powerful companion program for use with LMS. To open Excel, click **Start** on the **Task Bar** then **Programs/ Office/ Microsoft Excel**.

Pivot tables are used in Excel to automate organization and calculation of spread sheet data.

In the following pages, the user will learn to create a Pivot table to summarize stand volumes by species.

Pivot Table using Excel 2000

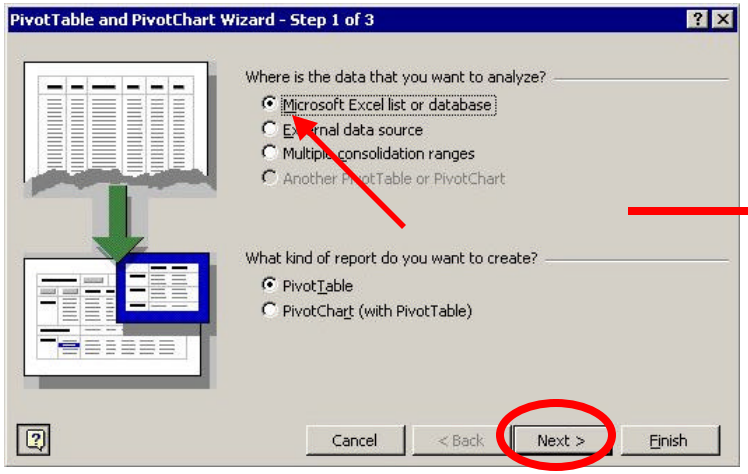




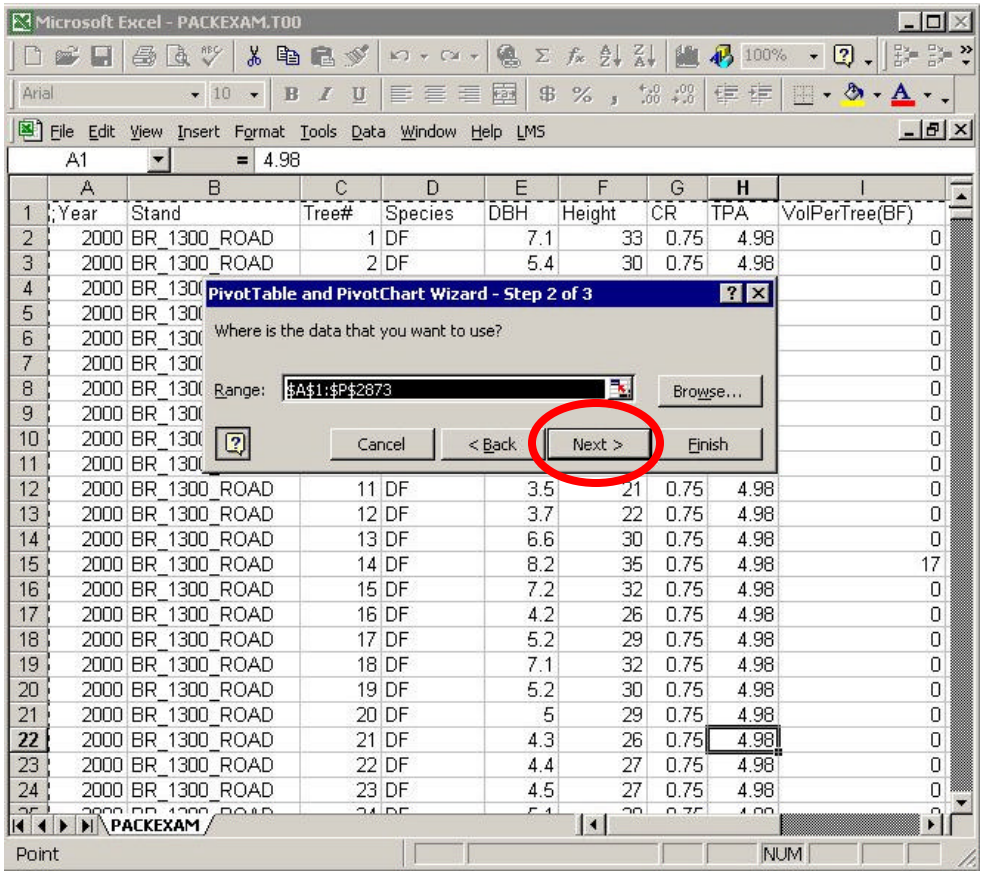
Step 2: With a cell selected within the table area, click on the **Data** drop down menu in Excel. Then click on **Pivot Table Report**.

Step 1: From LMS main window, click **Analysis/Tables/Inventory**, select the year 2000, select all stands, open and delimit Inventory table with macro control key (see Tables section).

Pivot Table using Excel 2000



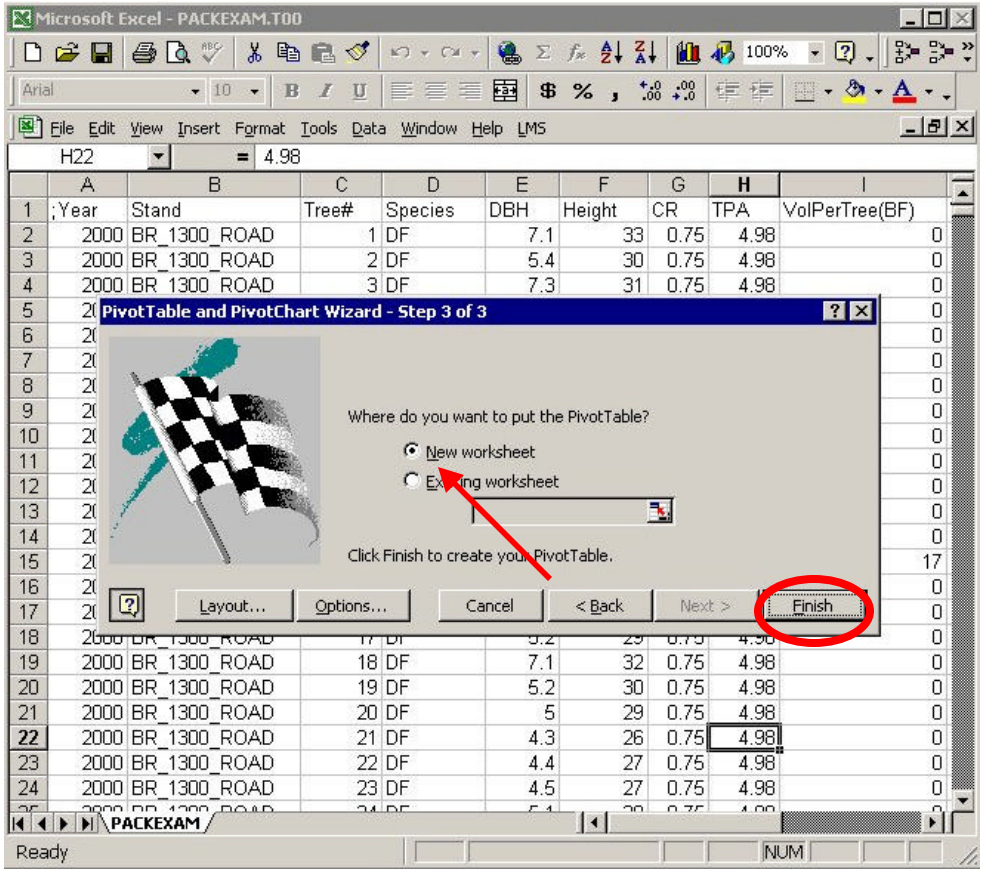
Step 3: Select **Microsoft Excel list or database.** Click **Next**.



	A	B	C	D	E	F	G	H	I
1	Year	Stand	Tree#	Species	DBH	Height	CR	TPA	VolPerTree(BF)
2	2000	BR_1300_ROAD	1	DF	7.1	33	0.75	4.98	0
3	2000	BR_1300_ROAD	2	DF	5.4	30	0.75	4.98	0
12	2000	BR_1300_ROAD	11	DF	3.5	21	0.75	4.98	0
13	2000	BR_1300_ROAD	12	DF	3.7	22	0.75	4.98	0
14	2000	BR_1300_ROAD	13	DF	6.6	30	0.75	4.98	0
15	2000	BR_1300_ROAD	14	DF	8.2	35	0.75	4.98	17
16	2000	BR_1300_ROAD	15	DF	7.2	32	0.75	4.98	0
17	2000	BR_1300_ROAD	16	DF	4.2	26	0.75	4.98	0
18	2000	BR_1300_ROAD	17	DF	5.2	29	0.75	4.98	0
19	2000	BR_1300_ROAD	18	DF	7.1	32	0.75	4.98	0
20	2000	BR_1300_ROAD	19	DF	5.2	30	0.75	4.98	0
21	2000	BR_1300_ROAD	20	DF	5	29	0.75	4.98	0
22	2000	BR_1300_ROAD	21	DF	4.3	26	0.75	4.98	0
23	2000	BR_1300_ROAD	22	DF	4.4	27	0.75	4.98	0
24	2000	BR_1300_ROAD	23	DF	4.5	27	0.75	4.98	0

Step 4: The data area should be surrounded by a dashed line, click on **Next**.

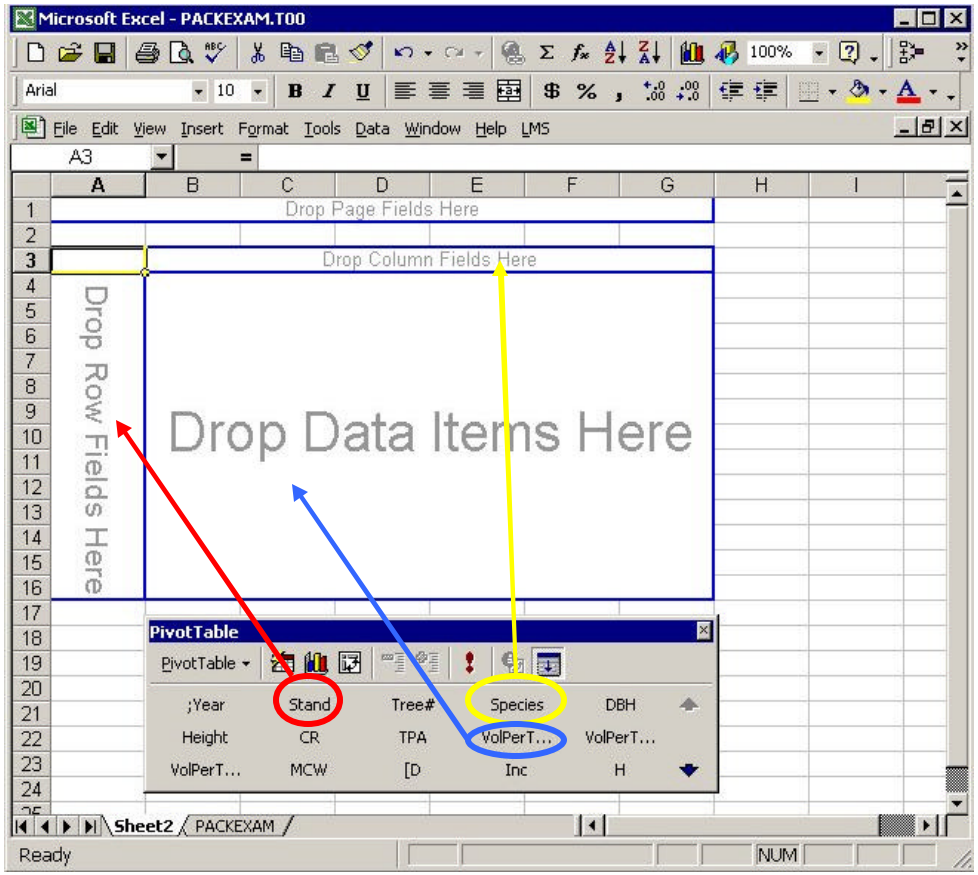
Pivot Table using Excel 2000



	A	B	C	D	E	F	G	H	I
1	;Year	Stand	Tree#	Species	DBH	Height	CR	TPA	VolPerTree(BF)
2	2000	BR_1300_ROAD	1	DF	7.1	33	0.75	4.98	0
3	2000	BR_1300_ROAD	2	DF	5.4	30	0.75	4.98	0
4	2000	BR_1300_ROAD	3	DF	7.3	31	0.75	4.98	0
19	2000	BR_1300_ROAD	18	DF	7.1	32	0.75	4.98	0
20	2000	BR_1300_ROAD	19	DF	5.2	30	0.75	4.98	0
21	2000	BR_1300_ROAD	20	DF	5	29	0.75	4.98	0
22	2000	BR_1300_ROAD	21	DF	4.3	26	0.75	4.98	0
23	2000	BR_1300_ROAD	22	DF	4.4	27	0.75	4.98	0
24	2000	BR_1300_ROAD	23	DF	4.5	27	0.75	4.98	0

Step 3: Select **New worksheet**. Click **Finish...**

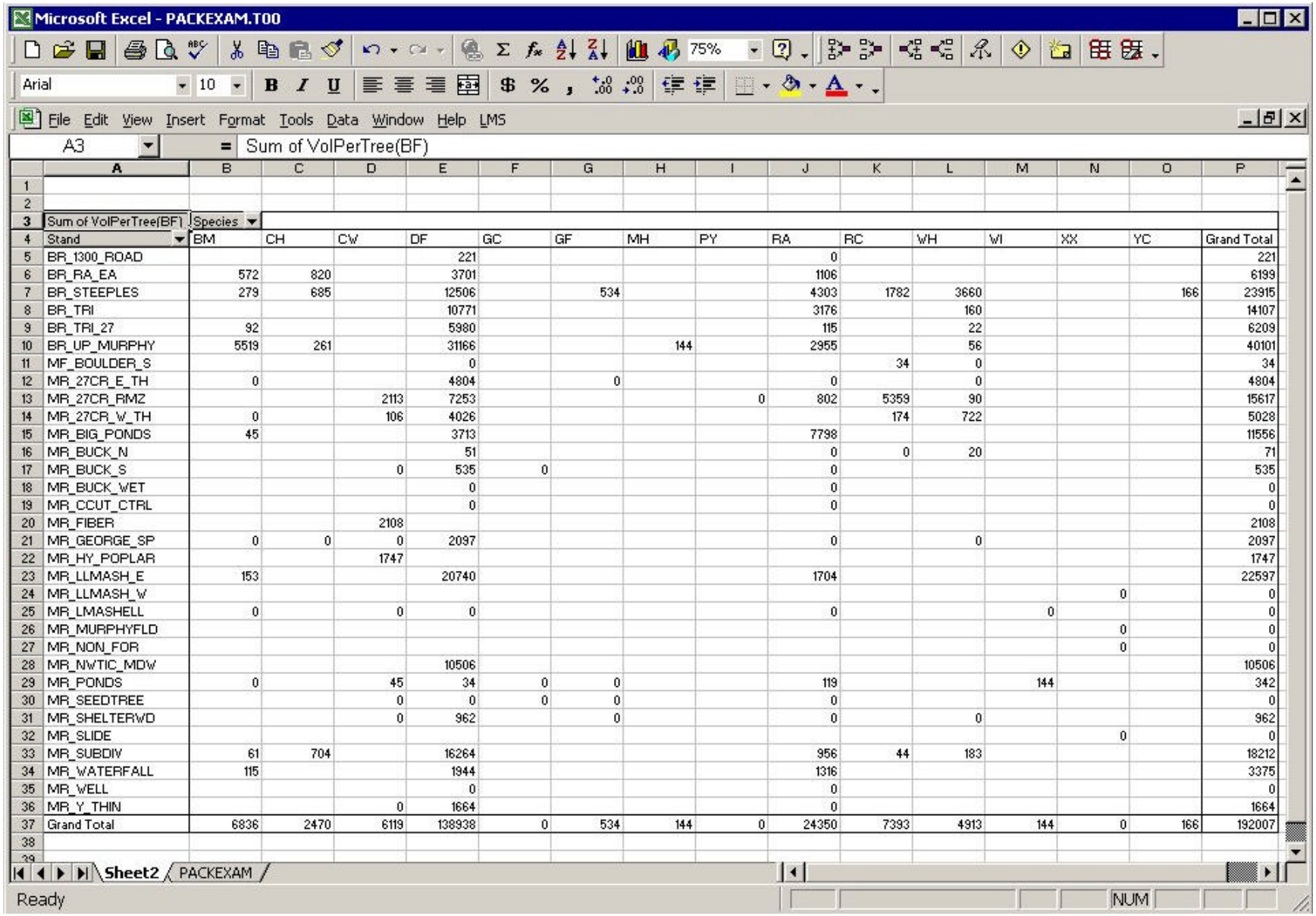
Pivot Table using Excel 2000



Step 4: Click and drag **Stand** to the Row area, click and drag **Species** to the column area, click and drag **VolPer Tree** to the data area.

Pivot Table using Excel 2000

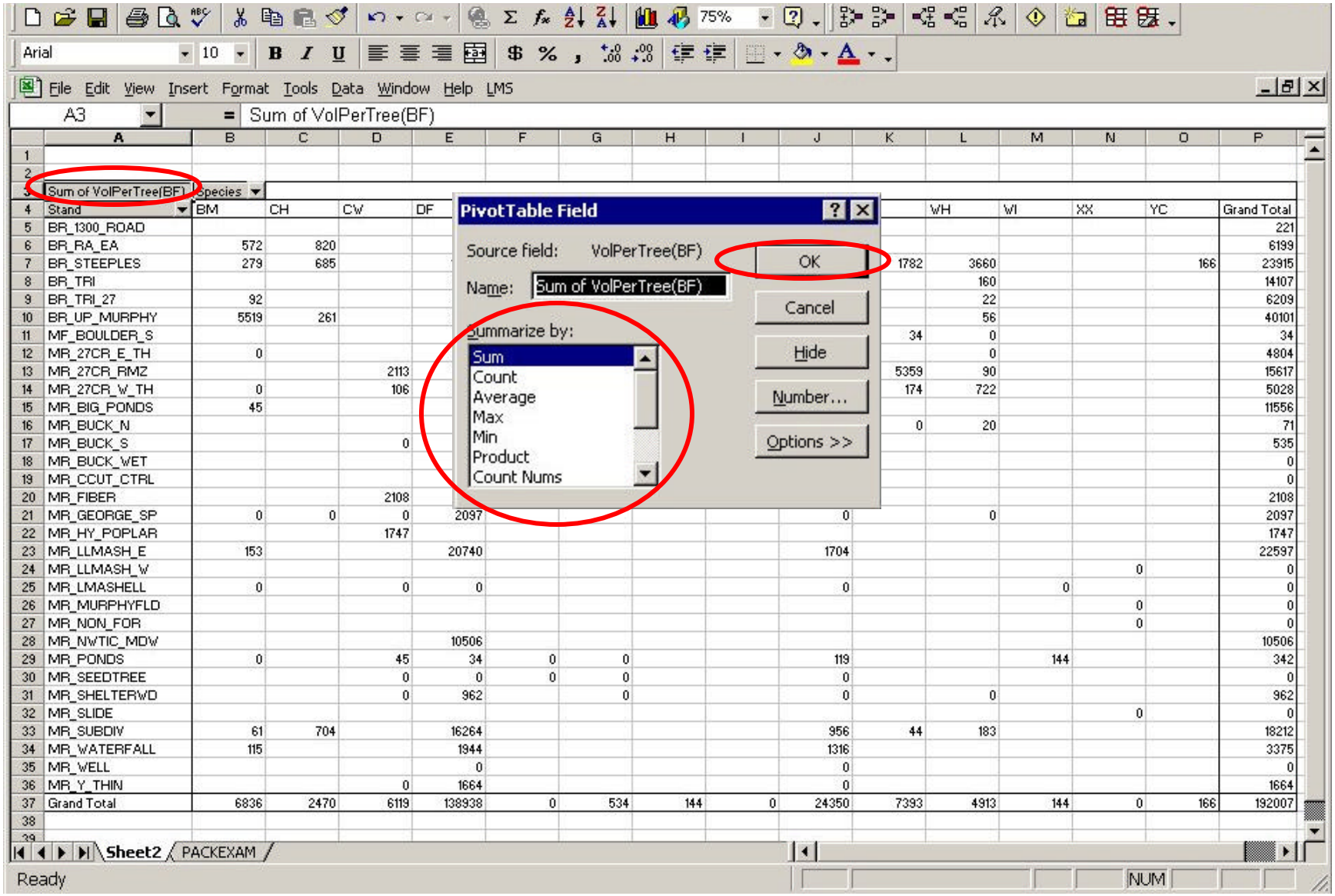
A **Pivot table** that displays volume by species by stand is created.



Sum of VolPerTree(BF)	Species														
Stand	BM	CH	CW	DF	GC	GF	MH	PY	RA	RC	WH	WI	XX	YC	Grand Total
BR_1300_ROAD				221					0						221
BR_RA_EA	572	820		3701					1106						6199
BR_STEEPLES	279	685		12506		534			4303	1782	3660			166	23915
BR_TRI				10771					3176		160				14107
BR_TRI_27	92			5980					115		22				6209
BR_UP_MURPHY	5519	261		31166			144		2955		56				40101
MF_BOULDER_S				0						34	0				34
MR_27CR_E_TH	0			4804		0			0		0				4804
MR_27CR_RMZ			2113	7253				0	802	5359	90				15617
MR_27CR_W_TH	0		106	4026						174	722				5028
MR_BIG_PONDS	45			3713					7798						11556
MR_BUCK_N				51					0	0	20				71
MR_BUCK_S			0	535	0				0						535
MR_BUCK_WET				0					0						0
MR_CCUT_CTRL				0					0						0
MR_FIBER			2108												2108
MR_GEORGE_SP	0	0	0	2097					0		0				2097
MR_HY_POPLAR			1747												1747
MR_LLMASH_E	153			20740					1704						22597
MR_LLMASH_W													0		0
MR_LMASHELL	0		0	0					0			0			0
MR_MURPHYFLD													0		0
MR_NON_FOR													0		0
MR_NWTIC_MDW				10506											10506
MR_PONDS	0		45	34	0	0			119			144			342
MR_SEEDTREE			0	0	0	0			0						0
MR_SHELTERWD			0	962		0			0		0				962
MR_SLIDE													0		0
MR_SUBDIV	61	704		16264					956	44	183				18212
MR_WATERFALL	115			1944					1316						3375
MR_WELL				0					0						0
MR_Y_THIN			0	1664					0						1664
Grand Total	6836	2470	6119	138938	0	534	144	0	24350	7393	4913	144	0	166	192007

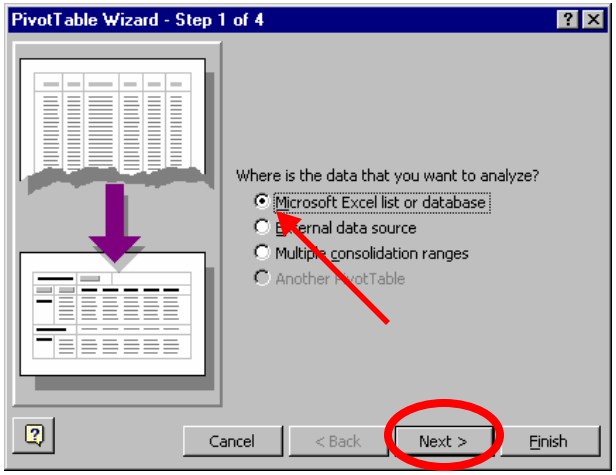
Pivot Table using Excel 2000

To change pivot table field values double-click on upper left cell of pivot table to get **Pivot Table Fields** dialogue box. Select appropriate summary type and click **OK**.

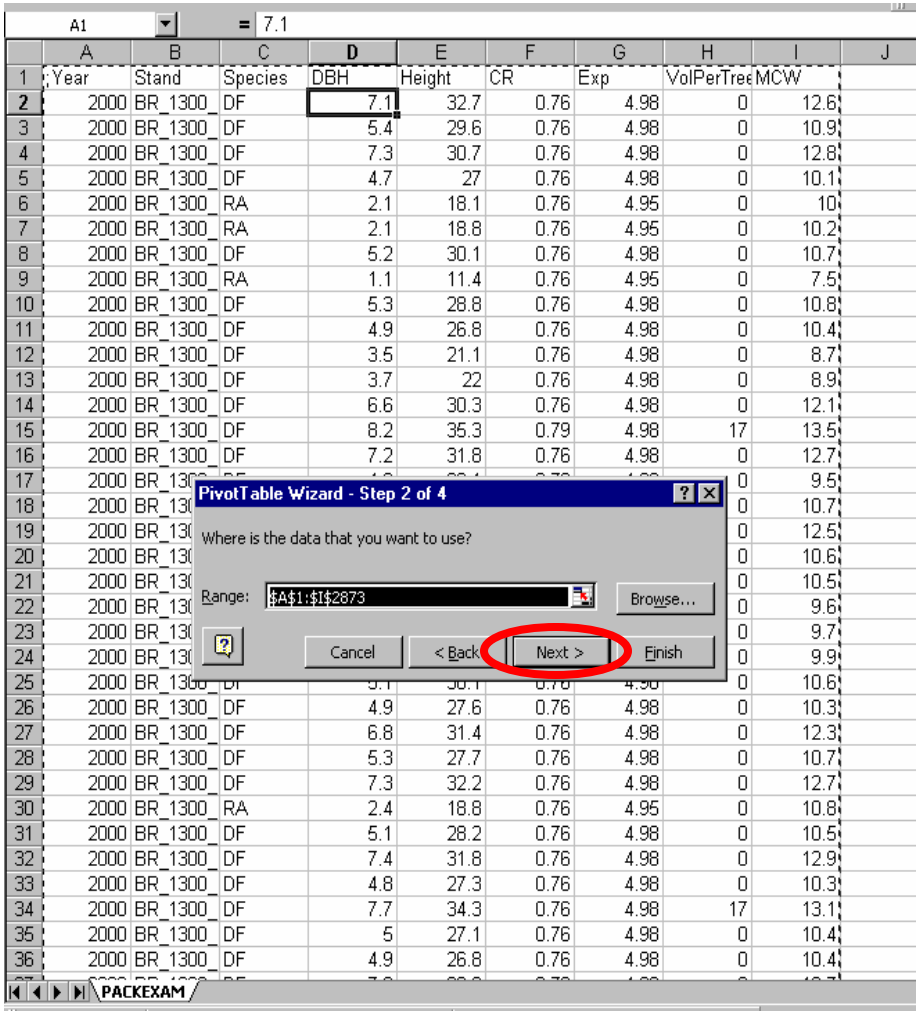


Sum of VolPerTree(BF)	Species														
Stand	BM	CH	CW	DF						WH	WI	XX	YC	Grand Total
BR_1300_ROAD														221
BR_RA_EA	572	820												6199
BR_STEEPLES	279	685							1782	3660			166	23915
BR_TRI										160				14107
BR_TRI_27	92									22				6209
BR_UP_MURPHY	5519	261								56				40101
MF_BOULDER_S									34	0				34
MR_27CR_E_TH	0									0				4804
MR_27CR_RMZ			2113						5359	90				15617
MR_27CR_W_TH	0		106						174	722				5028
MR_BIG_PONDS	45													11556
MR_BUCK_N									0	20				71
MR_BUCK_S			0											535
MR_BUCK_WET														0
MR_CCUT_CTRL														0
MR_FIBER			2108											2108
MR_GEORGE_SP	0	0	0	2097				0		0				2097
MR_HY_POPLAR			1747											1747
MR_LLMASH_E	153			20740				1704						22597
MR_LLMASH_W												0		0
MR_LMASHELL	0		0	0				0			0			0
MR_MURPHYFLD												0		0
MR_NON_FOR												0		0
MR_NWTIC_MDW				10506										10506
MR_PONDS	0		45	34	0	0		119			144			342
MR_SEEDTREE			0	0	0	0		0						0
MR_SHELTERWD			0	962		0		0		0				962
MR_SLIDE												0		0
MR_SUBDIV	61	704		16264				956	44	183				18212
MR_WATERFALL	115			1944				1316						3375
MR_WELL				0				0						0
MR_Y_THIN			0	1664				0						1664
Grand Total	6836	2470	6119	138938	0	534	144	0	24350	7393	4913	144	0	166	192007

Pivot Table using Excel 97

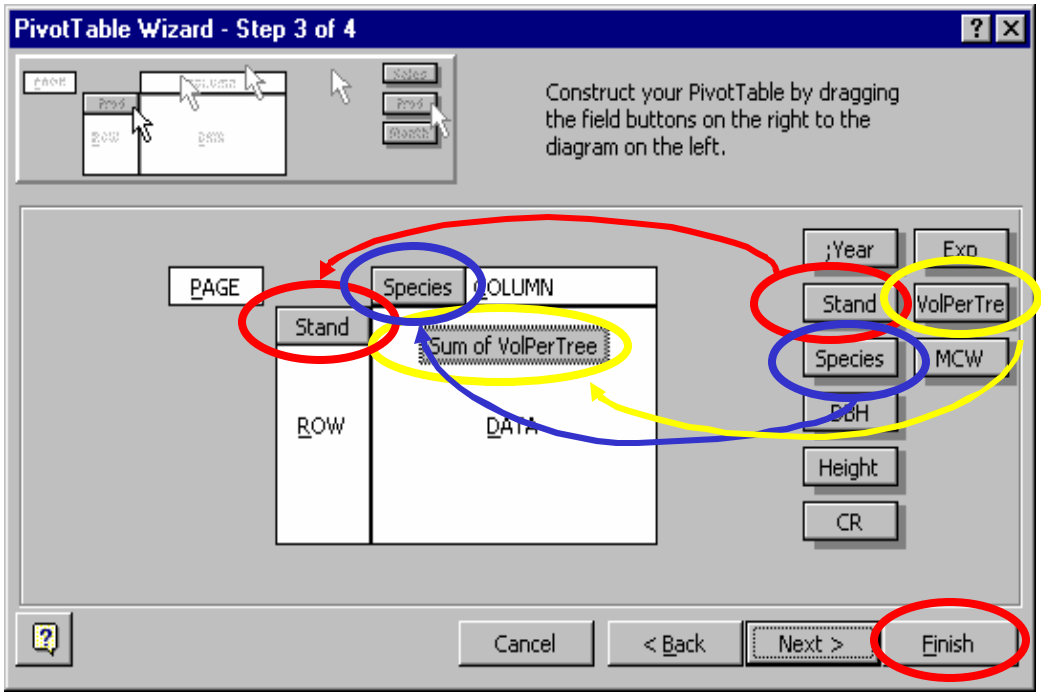


Step 3: Select **Microsoft Excel list or database.** Click **Next**.



Step 4: The data area should be surrounded by a dashed line, click on **Next**.

Pivot Table using Excel 97



Step 5: Click and drag **Stand** to the Row area, click and drag **Species** to the column area, click and drag **VolPer Tree** to the data area. Click **Finish...**

Pivot Table using Excel 97

and a **Pivot table** that displays volume by species by stand is created.

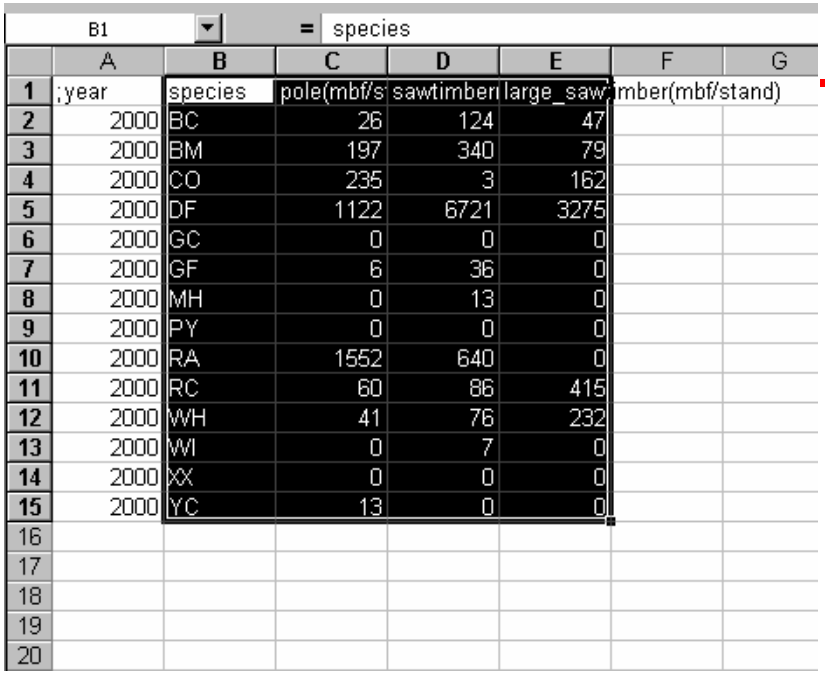
A1 = Sum of VolPerTree

Sum of VolPerTree	Species														
Stand	BC	BM	CO	DF	GC	GF	MH	PY	RA	RC	WH	WI	XX	YC	Grand Total
BR_1300_ROAD				204					0						204
BR_RA_EA	820	572		3701					1078						6171
BR_STEEPLES	685	279		12562		534			4308	1782	3660			166	23976
BR_TRI				10743					3176		160				14079
BR_TRI_27		92		5945					115		22				6174
BR_UP_MURPHY	261	5519		31141			144		2964		56				40085
MF_BOULDER_S				0						34	0				34
MR_27CR_E_TH		0		4804		0			0		0				4804
MR_27CR_RMZ			2137	7253				0	802	5357	90				15639
MR_27CR_W_TH		0	106	4026						174	722				5028
MR_BIG_PONDS		0		3716					7838						11554
MR_BUCK_N				39					0	0	20				59
MR_BUCK_S			0	515	0				0						515
MR_BUCK_WET				0					0						0
MR_CCUT_CTRL				0					0						0
MR_FIBER			2130												2130
MR_GEORGE_SP	0	0	0	2028					0		0				2028
MR_HY_POPLAR			1756												1756
MR_LLMASH_E		153		20600					1704						22457
MR_LLMASH_W													0		0
MR_LMASHELL		0	0	0					0			0			0
MR_MURPHYFLD													0		0
MR_NON_FOR													0		0
MR_NWTIC_MDW				10190											10190
MR_PONDS		0	45	34	0	0			119			144			342
MR_SEEDTREE			0	0	0	0			0						0
MR_SHELTERWD			0	962		0			0		0				962
MR_SLIDE													0		0
MR_SUBDIV	704	61		16414					956	33	183				18351
MR_WATERFALL		115		1896					1316						3327
MR_WELL				0					0						0
MR_Y_THIN			0	1664					0						1664
Grand Total	2470	6791	6174	138437	0	534	144	0	24376	7380	4913	144	0	166	191529

Sheet1 PACKEXAM

Column charts are used in Excel to visually display data quantity distributions.

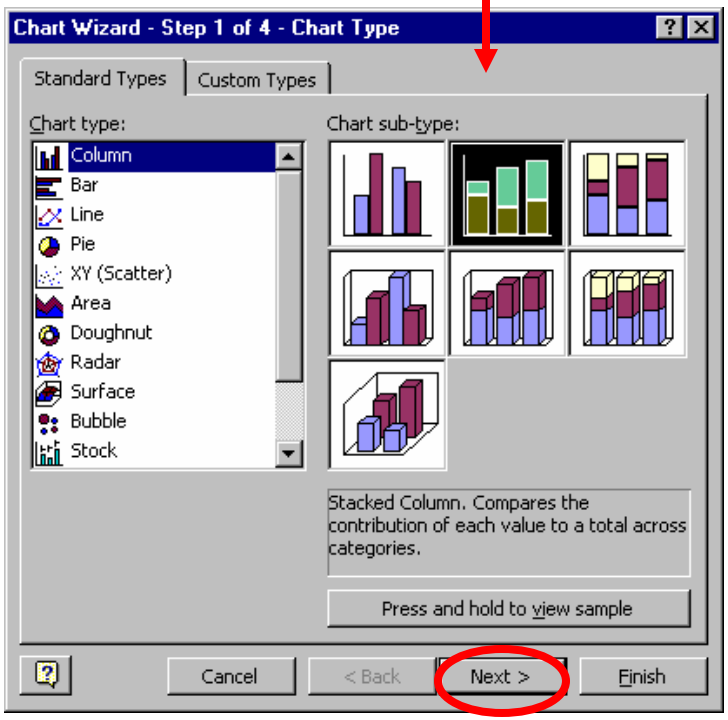
In the next few pages, the user will learn to create a column chart that summarizes timber volumes and grades for the Pack Example landscape.



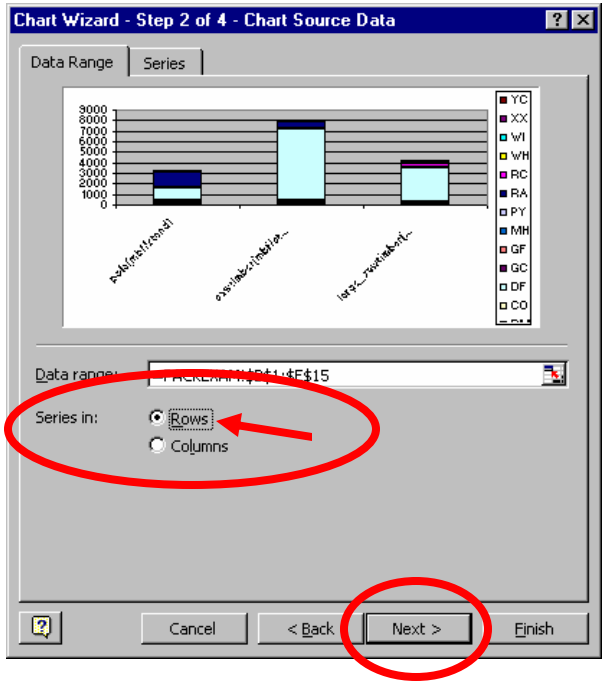
	A	B	C	D	E	F	G
1	;year	species	pole(mbf/s	sawtimber	large_saw	mber(mbf/stand)	
2	2000	BC	26	124	47		
3	2000	BM	197	340	79		
4	2000	CO	235	3	162		
5	2000	DF	1122	6721	3275		
6	2000	GC	0	0	0		
7	2000	GF	6	36	0		
8	2000	MH	0	13	0		
9	2000	PY	0	0	0		
10	2000	RA	1552	640	0		
11	2000	RC	60	86	415		
12	2000	WH	41	76	232		
13	2000	WI	0	7	0		
14	2000	XX	0	0	0		
15	2000	YC	13	0	0		
16							
17							
18							
19							
20							

Step 1: In **LMS** main window click **Analysis/Tables/Volume by Species and Size**, open and delimit (use the macro created earlier) Volume by Species and Size table. **Highlight** the species and log size columns.

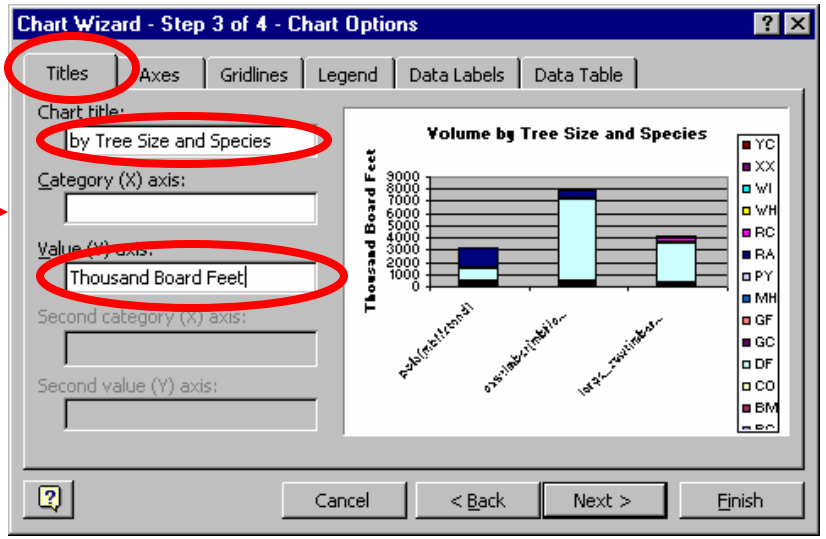
Step 2: From the Excel tool bar **Graphical User Interface (GUI),** click on the **Chart Wizard** button. This can also be accomplished from the drop down menu by clicking **Insert/Chart**.



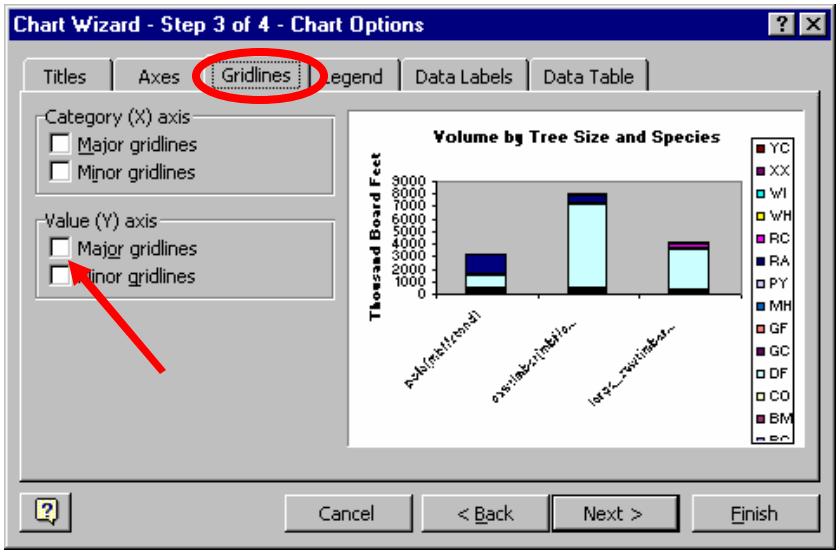
Step 3: Choose the **Column** chart in the top center. Click **Next**.



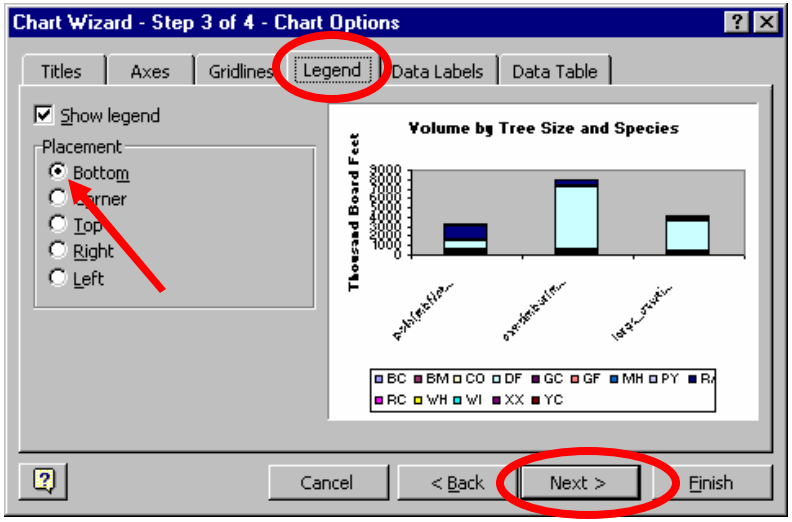
Step 4: Click **Series in Rows**. Click **Next**.

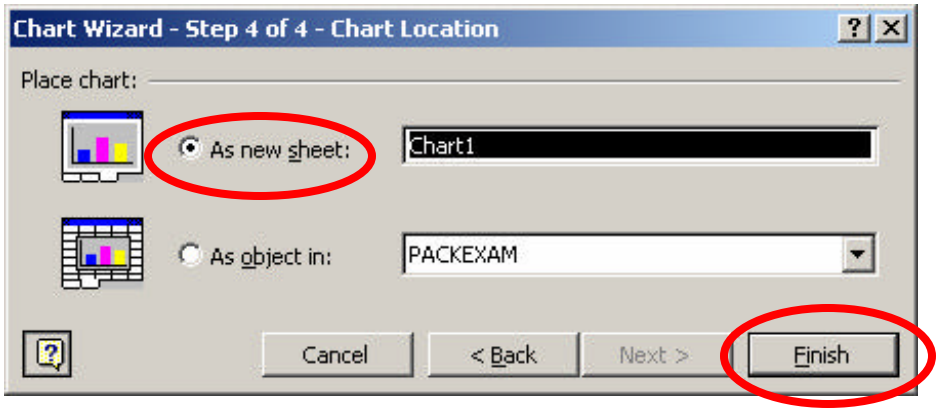


Step 5: Click on the **Titles** tab and **add title**, Volume by Tree Size and Species. **Label Y axis** by typing in Thousand Board Feet.



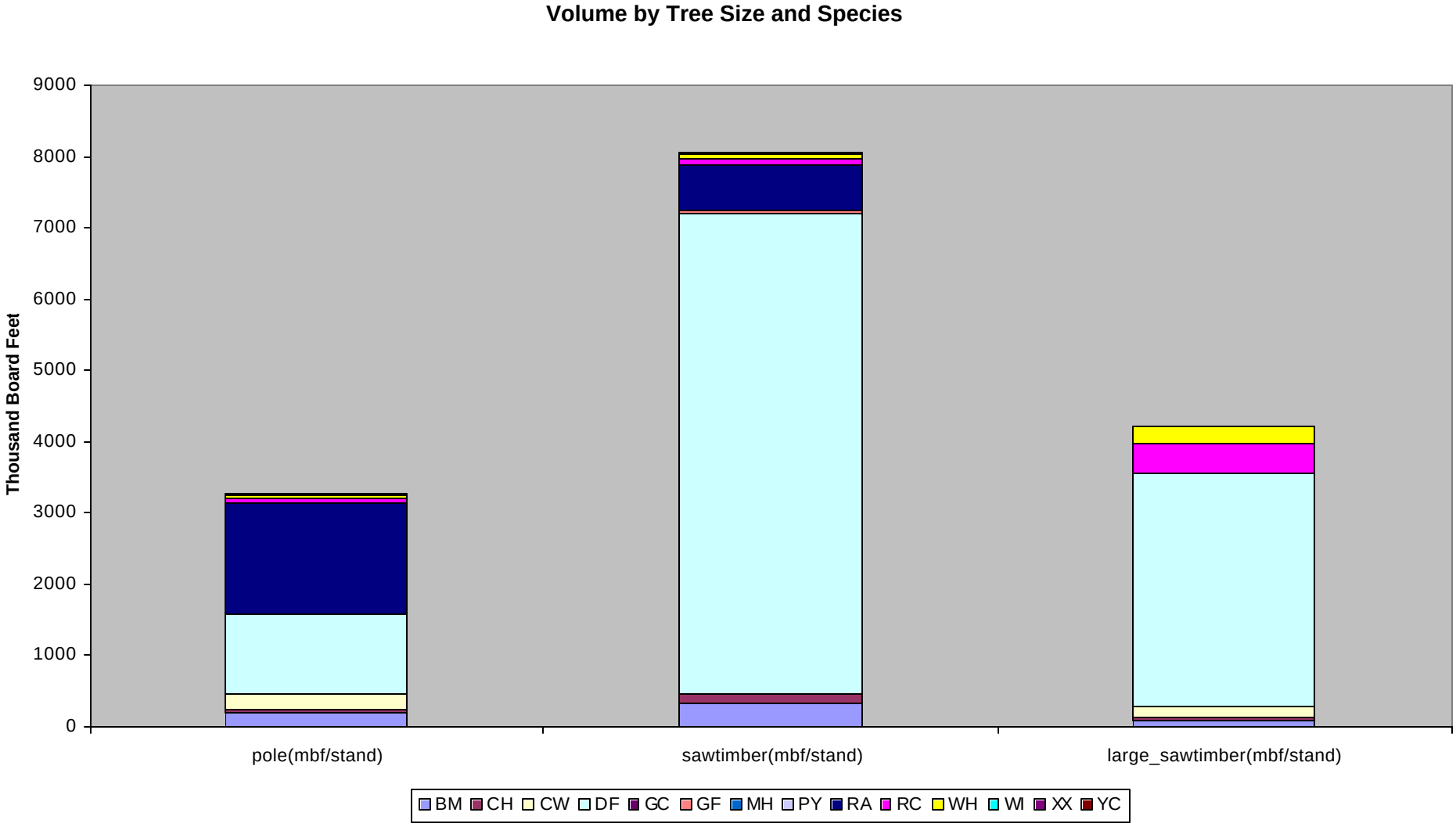
Step 6: Click on the **Gridlines** tab and uncheck **Major gridlines**.

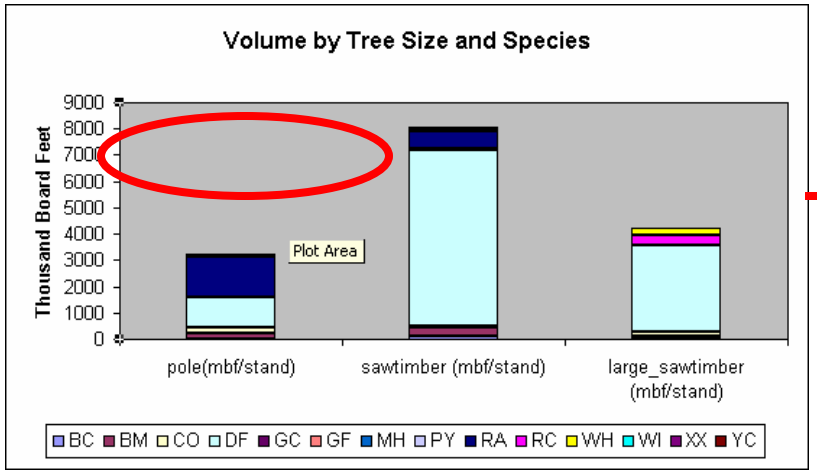




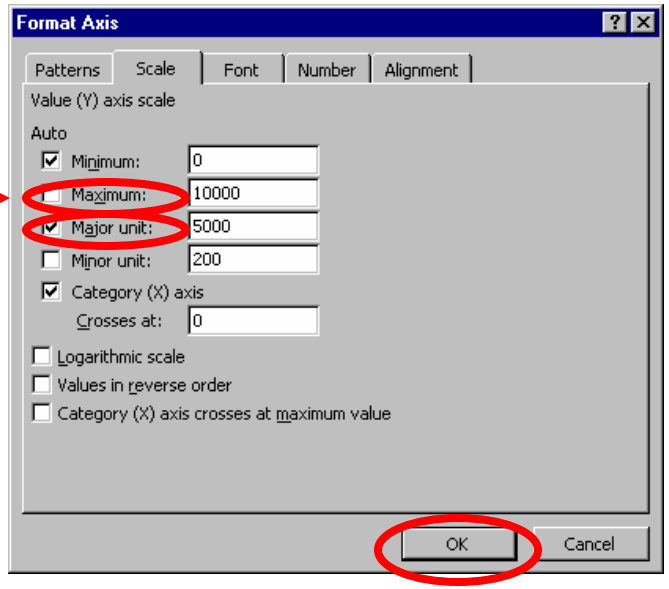
Step 7: Click the **Legend** Tab. Click on **Bottom** to move the legend to the bottom of the chart. Click **Next**.

Step 8: Click **new sheet** as location for this chart. Click **Finish.**

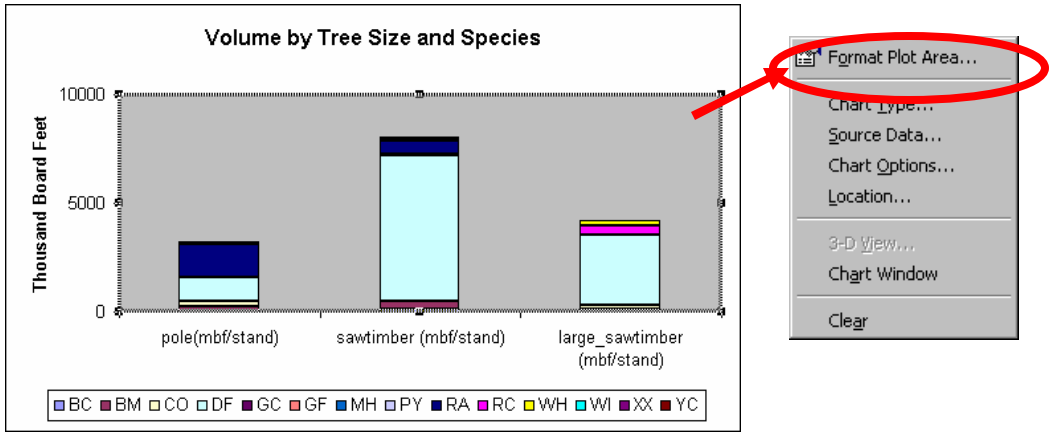

Volume by Tree Size and Species
Thousand Board Feet
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
pole(mbf/stand)
sawtimber(mbf/stand)
large_sawtimber(mbf/stand)
BM
CH
CW
DF
GC
GF
MH
PY
RA
RC
WH
WI
XX
YC



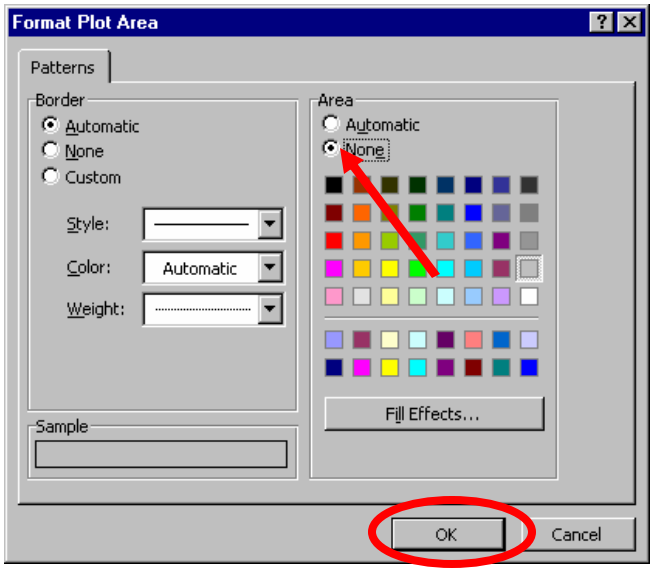
Step 9: Right click on the **Y axis** and then click **Format Axis.**



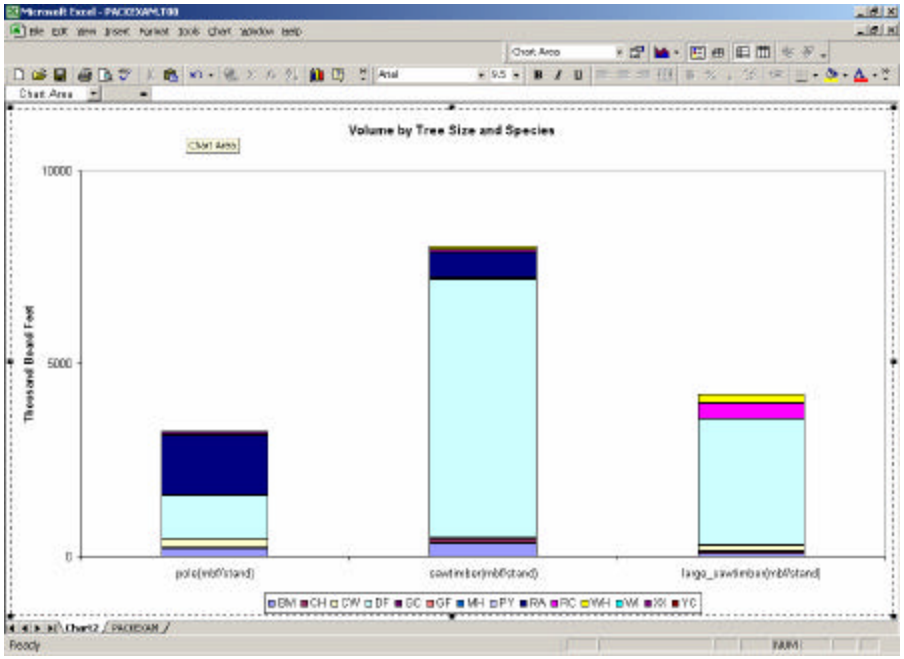
Step 10: Click on the **Scale** tab. Change the **Maximum** to 10000 and the **Major** unit to 5000. Click **OK**.



Step 11: Right click in the plot area. Then click **Format Plot Area**.



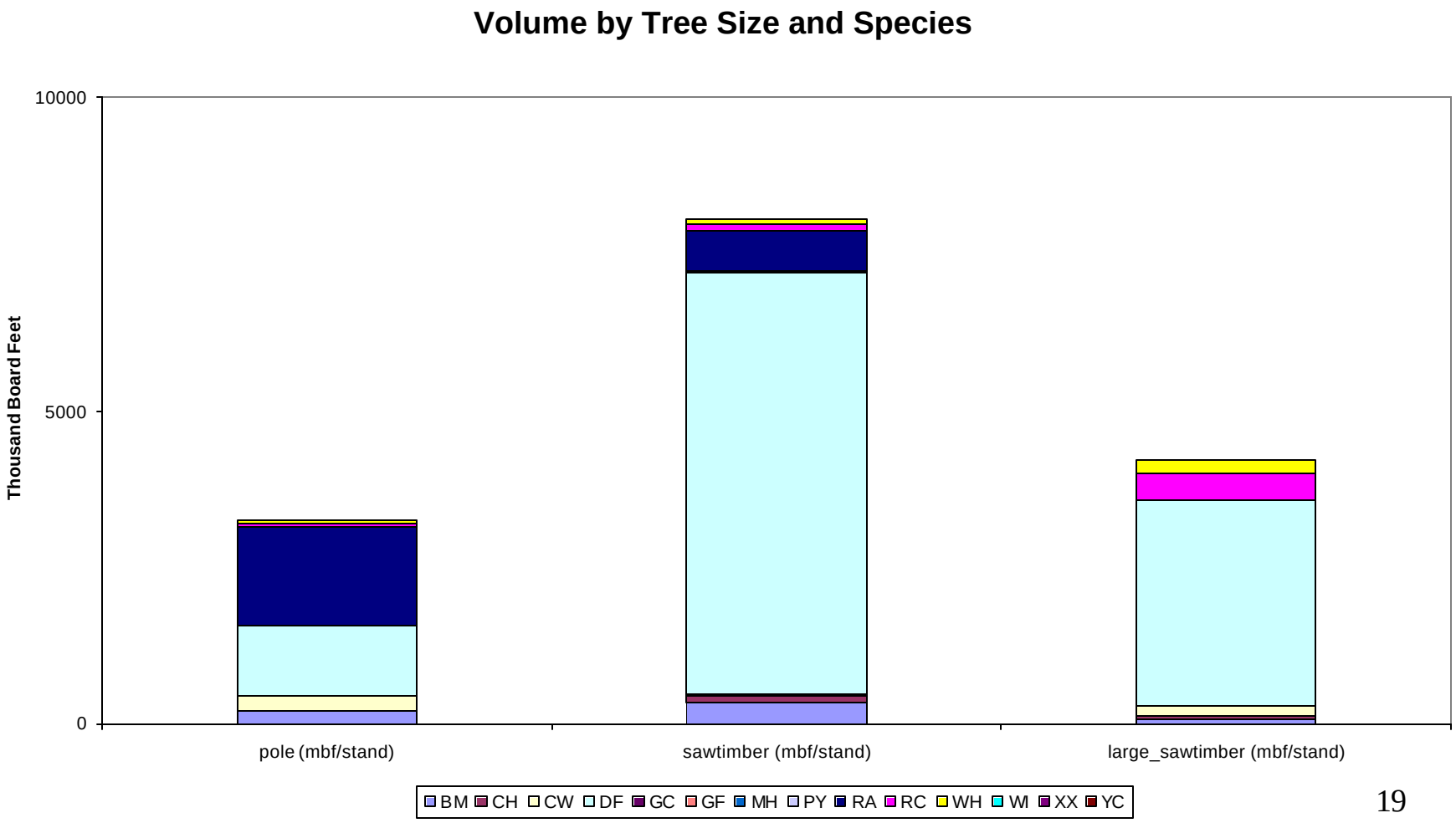
Step 12: Select **None** for **Area**. Click **OK**.



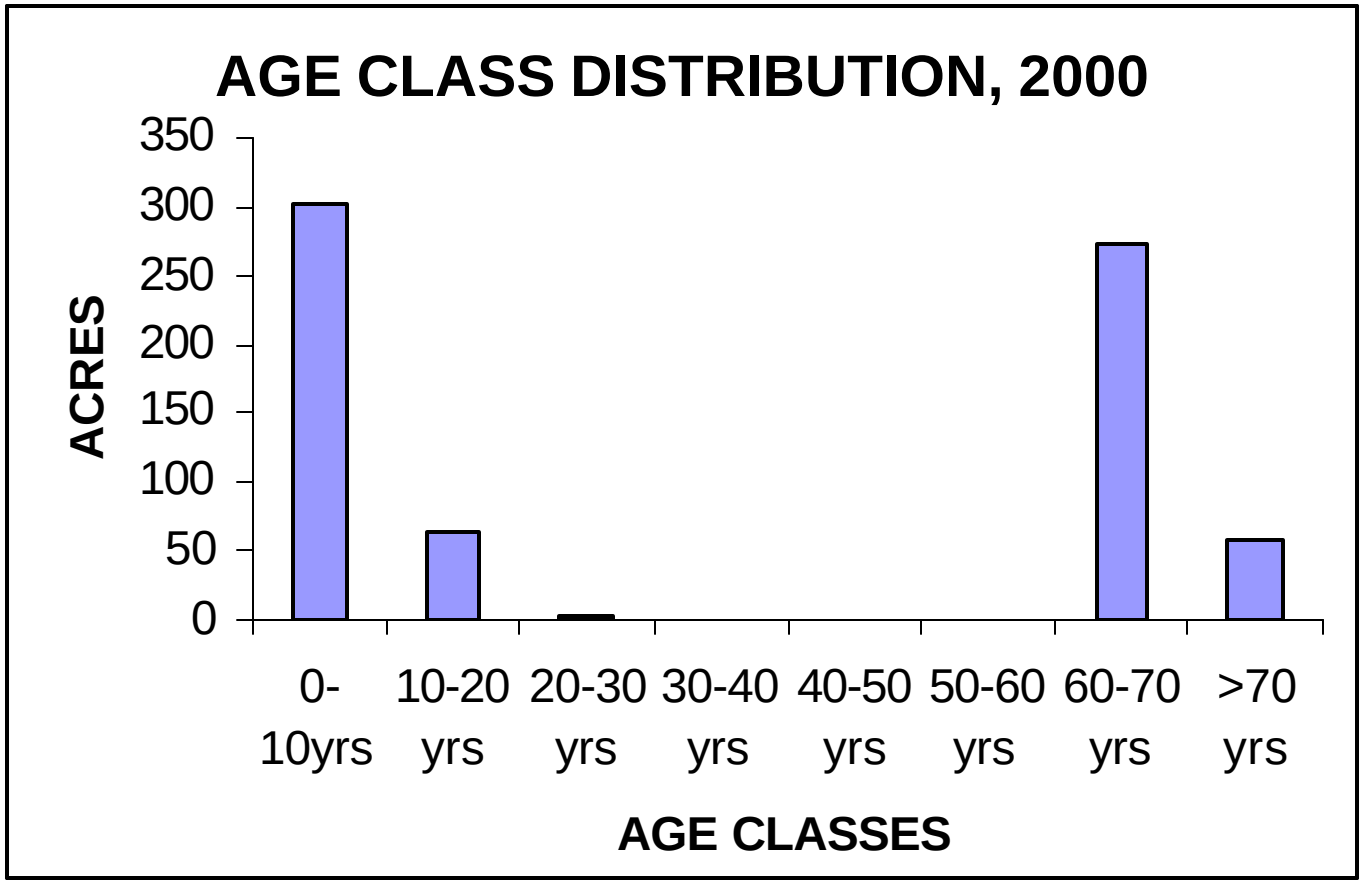
Step 13: To copy and paste the chart into a PowerPoint presentation, click on the chart border to select. The chart is selected when small squares appear on the border. Click on the **Edit** in the Excel drop down menu and click **Copy**. Go to PowerPoint

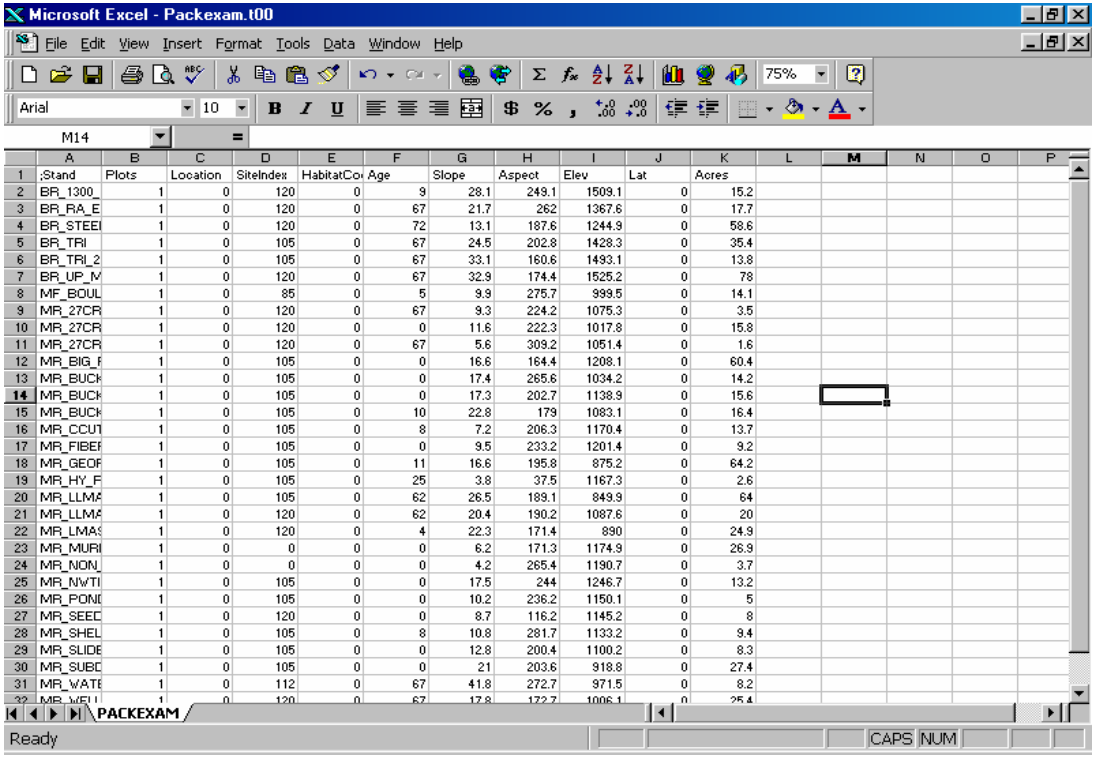
Step 14: With a new slide open in PowerPoint (add title format), click the **Edit** drop down menu and then click **Paste**. Click in the **add title** space provided on slide, adjust font size to 24, and click bold. Type in Title, **Volume by Species and Tree Size Summaries made in Excel from the Volume by Species and Size table.** Size the pasted chart to fit available space by dragging one of the small corner squares. Slide is finished.

Volume by Species and Tree Size Summaries made in Excel from the Volume by Species and Size table



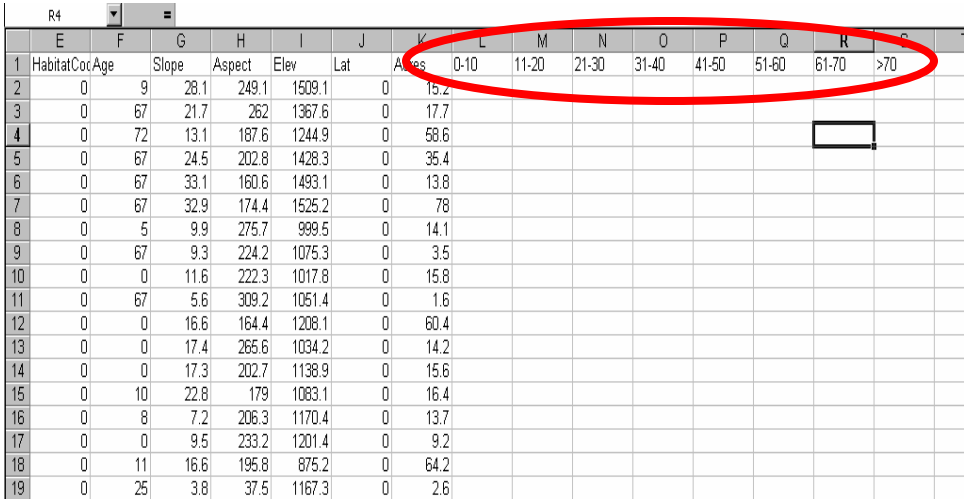
Excel column charts can also be used to display Age class distribution. For this exercise the user will learn to use IF statements to group data and then use grouped data to create a chart.

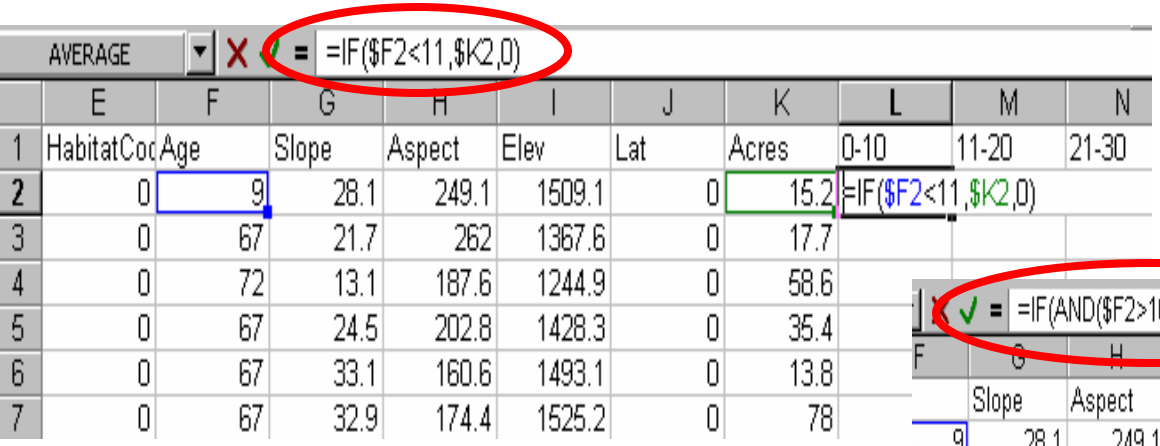


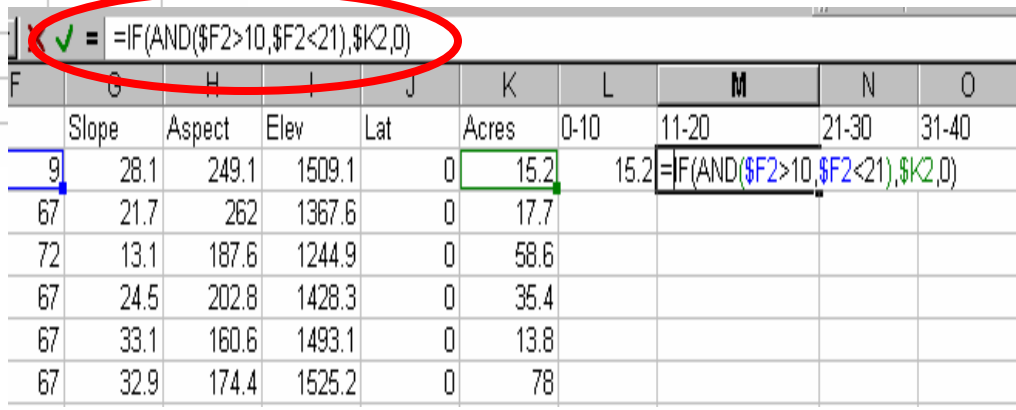


Step 1: From LMS main window click **Analysis/Tables/Attributes** open and delimit Strand Attributes Table.

Step 2: Enter age classes (0-10,11-20, 21-30, 31-40, 41-50, 51-60, 61-70, >70) as column titles in the columns next to the Stand Attributes data. Be sure to begin your entry with a single quote (‘) to avoid Excel thinking you are entering dates.





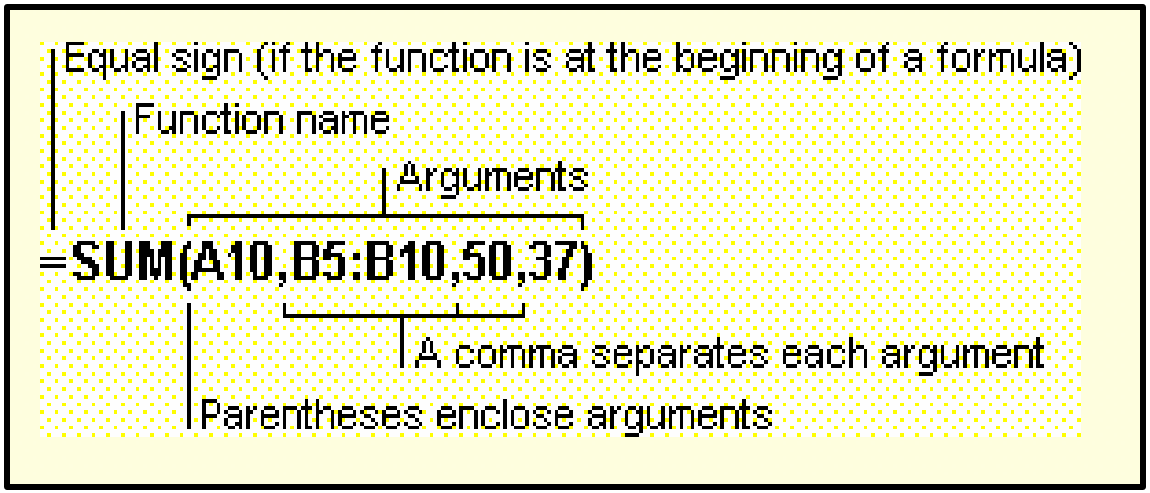


Step 3: To group the stands into the appropriate age classes, an **IF** statement is used. Click on cell L2, the first cell under the 0-10 age class heading. Type in **IF** formula as shown, =IF($F2<11,$K2,0). The first part of the **IF** statement ($F2<11) evaluates the stand age. In this case if the stand is less than 11 years old. The second ($K2) part of the **IF** statement says what to put in that cell if the first part is true, in this case the stand acreage. The third part of the **IF** statement (0) says what to put in the cell if the first part of the statement is false. For this example the first and last columns of age class cell formulas are created in a similar manner. For the last column cell (S2), type in the formula: =IF($F2>70,$K2,0).

Step 4: For the middle columns, the stand age class is a more discrete range (11-20, 21-30, etc.). Here the **IF** statement is varied a little by using an **AND** condition to pick up the range. Only the first part of the **IF** statement changes. Now a range is given using the **AND** condition, =IF(AND($F2>10,$F2<21),$K2,0). Now the first part of the **IF** statement must meet both conditions to be considered true, for example older than 10 and younger than 21. Repeat using appropriate ranges for the rest of the middle columns in this row.

Note: $ are used in Excel formulas to fix column and/or row designates so that when formulas are copied to other cells the reference remains constant. For our age grouping the column reference must remain the same but the row reference must adjust to accommodate entry in the data table from each of the Pack stands in lower rows.
Subsequently, the column designate is preceded by the $ while the row designate is not (example: $F2, $K2).

Parentheses are used in Excel to isolate components of formulas called arguments. In the case of the greater or less than formula used in the previous steps, one set of parentheses is used, however, when we isolate discrete ranges for age groups an additional set of parentheses is required to separate the AND portion (range) of the formula from the IF portion. Below see formula schematic from Excel help.



L2 = =IF($F2<11,$K2,0)

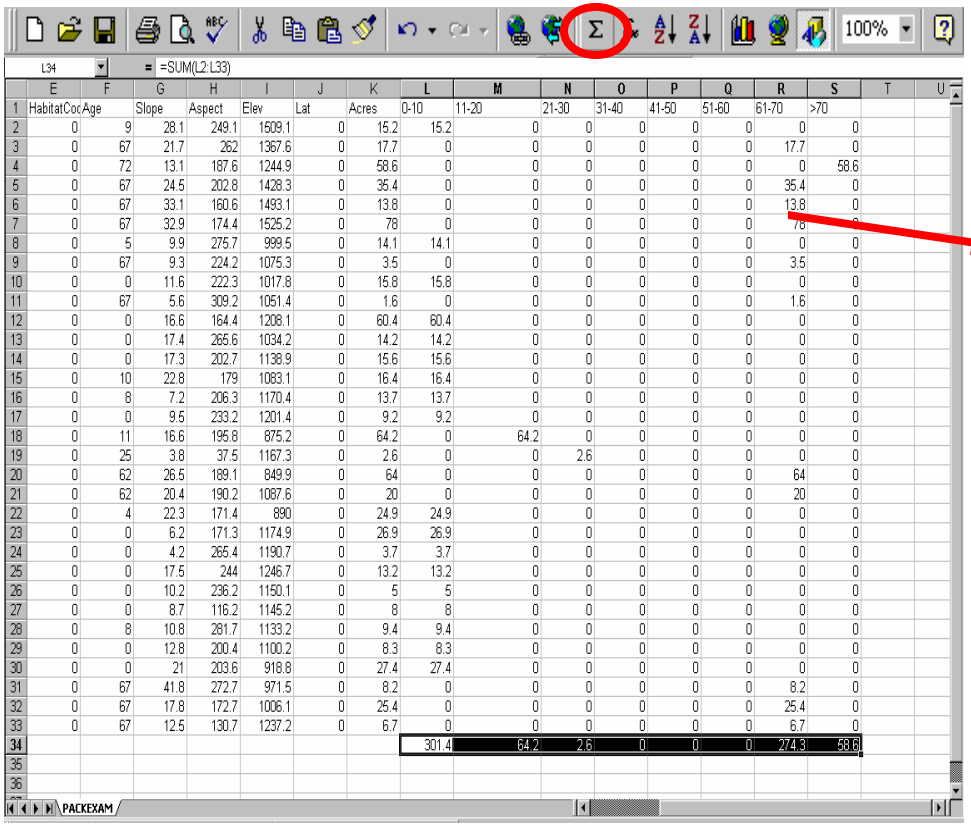
	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
1	HabitatCoc	Age	Slope	Aspect	Elev	Lat	Acres	0-10	11-20	21-30	31-40	41-50	51-60	61-70	>70	
2	0	9	28.1	249.1	1509.1	0	15.2	15.2	0	0	0	0	0	0	0	
3	0	67	21.7	262	1367.6	0	17.7									
4	0	72	13.1	187.6	1244.9	0	58.6									
5	0	67	24.5	202.8	1428.3	0	35.4									
6	0	67	33.1	160.6	1493.1	0	13.8									
7	0	67	32.9	174.4	1525.2	0	78									
8	0	5	9.9	275.7	999.5	0	14.1									
9	0	67	9.3	224.2	1075.3	0	3.5									
10	0	0	11.6	222.3	1017.8	0	15.8									

Step 5: Once all of the **IF** statements are entered into the first row, the columns can be **filled** (copied) down. This will put the appropriate **IF** statement into each cell to segregate stand acreage by age class. To **fill,** select all the cells with the **IF** statements entered. A little square will appear on the bottom right-hand corner of the selected cells. Click on this square and drag down. The **IF** statements will then copy to all cells to create the new table. This table will display acreage by age class.

L2 = =IF($F2<11,$K2,0)

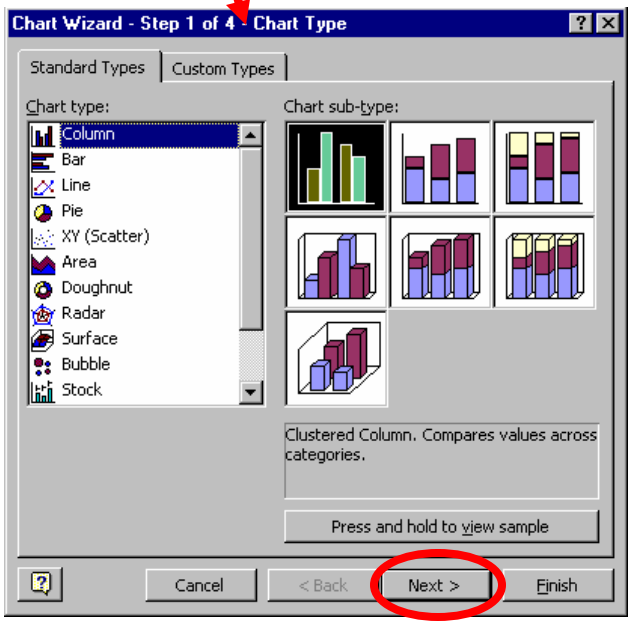
	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
1	HabitatCoc	Age	Slope	Aspect	Elev	Lat	Acres	0-10	11-20	21-30	31-40	41-50	51-60	61-70	>70		
2	0	9	28.1	249.1	1509.1	0	15.2	15.2	0	0	0	0	0	0	0		
3	0	67	21.7	262	1367.6	0	17.7	0	0	0	0	0	0	17.7	0		
4	0	72	13.1	187.6	1244.9	0	58.6	0	0	0	0	0	0	0	58.6		
5	0	67	24.5	202.8	1428.3	0	35.4	0	0	0	0	0	0	35.4	0		
6	0	67	33.1	160.6	1493.1	0	13.8	0	0	0	0	0	0	13.8	0		
7	0	67	32.9	174.4	1525.2	0	78	0	0	0	0	0	0	78	0		
8	0	5	9.9	275.7	999.5	0	14.1	14.1	0	0	0	0	0	0	0		
9	0	67	9.3	224.2	1075.3	0	3.5	0	0	0	0	0	0	3.5	0		
10	0	0	11.6	222.3	1017.8	0	15.8	15.8	0	0	0	0	0	0	0		
11	0	67	5.6	309.2	1051.4	0	1.6	0	0	0	0	0	0	1.6	0		
12	0	0	16.6	164.4	1208.1	0	60.4	60.4	0	0	0	0	0	0	0		
13	0	0	17.4	265.6	1034.2	0	14.2	14.2	0	0	0	0	0	0	0		
14	0	0	17.3	202.7	1138.9	0	15.6	15.6	0	0	0	0	0	0	0		
15	0	10	22.8	179	1083.1	0	16.4	16.4	0	0	0	0	0	0	0		
16	0	8	7.2	206.3	1170.4	0	13.7	13.7	0	0	0	0	0	0	0		
17	0	0	9.5	233.2	1201.4	0	9.2	9.2	0	0	0	0	0	0	0		
18	0	11	16.6	195.8	875.2	0	64.2	0	64.2	0	0	0	0	0	0		
19	0	25	3.8	37.5	1167.3	0	2.6	0	0	2.6	0	0	0	0	0		
20	0	62	26.5	189.1	849.9	0	64	0	0	0	0	0	0	64	0		
21	0	62	20.4	190.2	1087.6	0	20	0	0	0	0	0	0	20	0		
22	0	4	22.3	171.4	890	0	24.9	24.9	0	0	0	0	0	0	0		
23	0	0	6.2	171.3	1174.9	0	26.9	26.9	0	0	0	0	0	0	0		
24	0	0	4.2	265.4	1190.7	0	3.7	3.7	0	0	0	0	0	0	0		
25	0	0	17.5	244	1246.7	0	13.2	13.2	0	0	0	0	0	0	0		
26	0	0	10.2	236.2	1150.1	0	5	5	0	0	0	0	0	0	0		
27	0	0	8.7	116.2	1145.2	0	8	8	0	0	0	0	0	0	0		
28	0	8	10.8	281.7	1133.2	0	9.4	9.4	0	0	0	0	0	0	0		
29	0	0	12.8	200.4	1100.2	0	8.3	8.3	0	0	0	0	0	0	0		
30	0	0	21	203.6	918.8	0	27.4	27.4	0	0	0	0	0	0	0		
31	0	67	41.8	272.7	971.5	0	8.2	0	0	0	0	0	0	8.2	0		
32	0	67	17.8	172.7	1006.1	0	25.4	0	0	0	0	0	0	25.4	0		
33	0	67	12.5	130.7	1237.2	0	6.7	0	0	0	0	0	0	6.7	0		
34																	
35																	
36																	

PACKEXAM

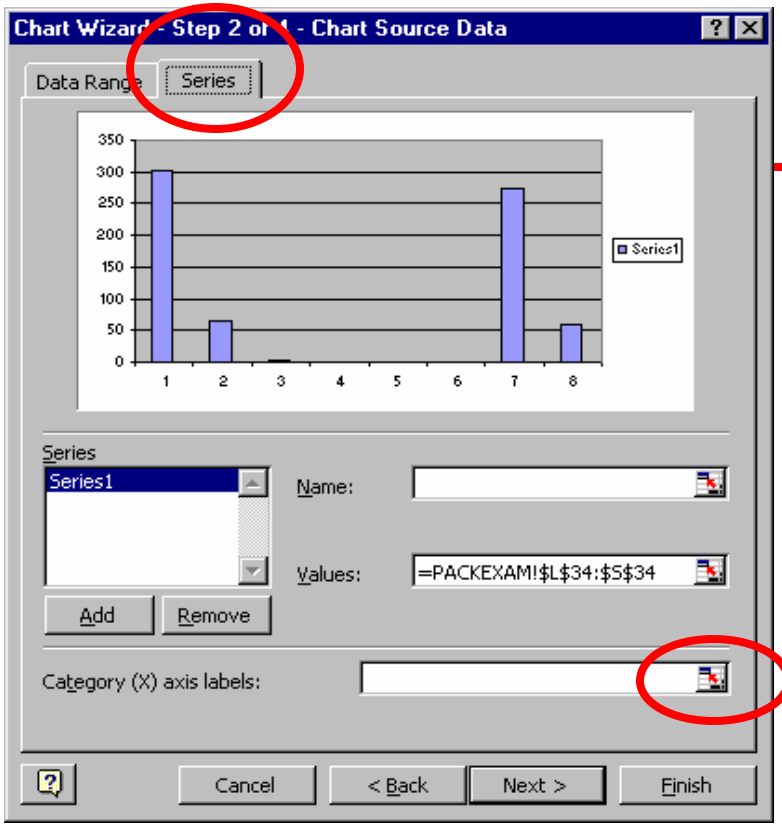


Step 6: To sum up the acres in each age class, highlight the cells across the bottom of the age class columns. Next click the **sum button (**Σ**)** from the GUI (Graphical User Interface or speed bar).

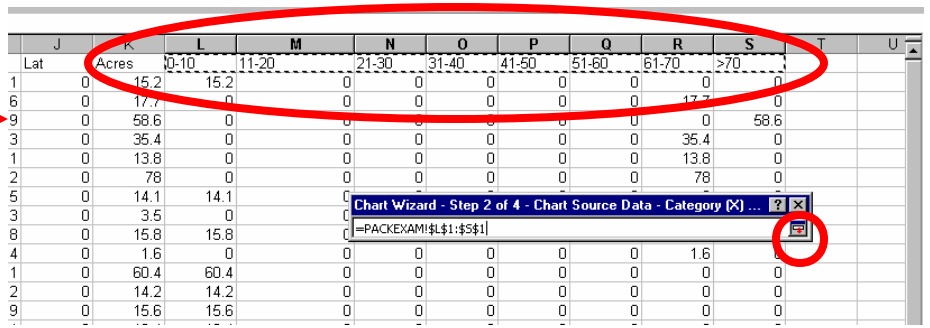
Step 7: With the summed cells still highlighted, click on the **Chart Wizard** button from the GUI or click **Insert/Chart** from the drop down menu.



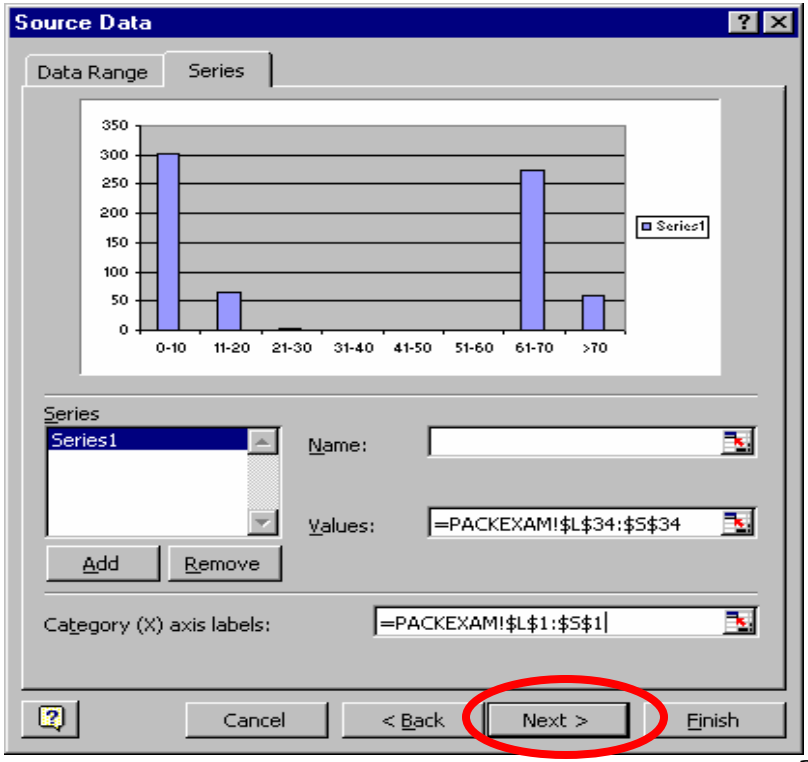
Step 8: Choose the column chart in the upper left corner and click **Next**.



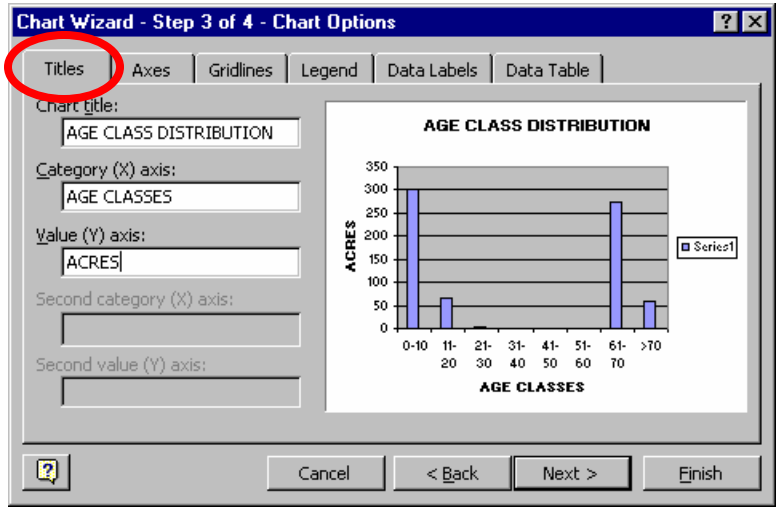
Step 9: Click on the **Series** tab.
To get the proper labels (diameter classes) on the x axis, click on the **Category (X) axis labels** box.



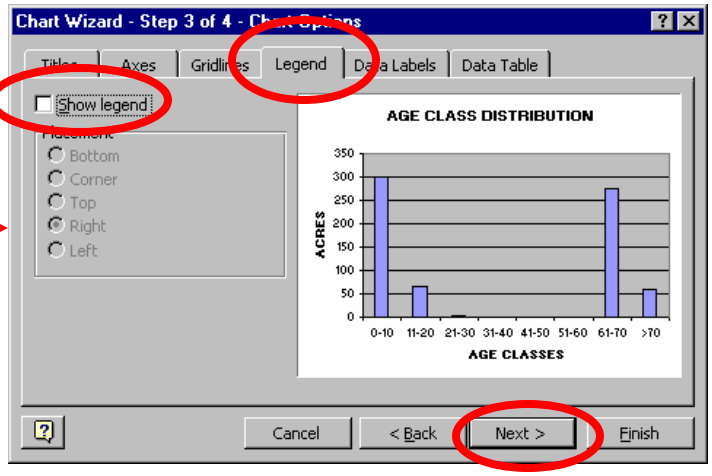
Step 10: Highlight the age classes and click on the box again. Age classes will appear on the x axis.



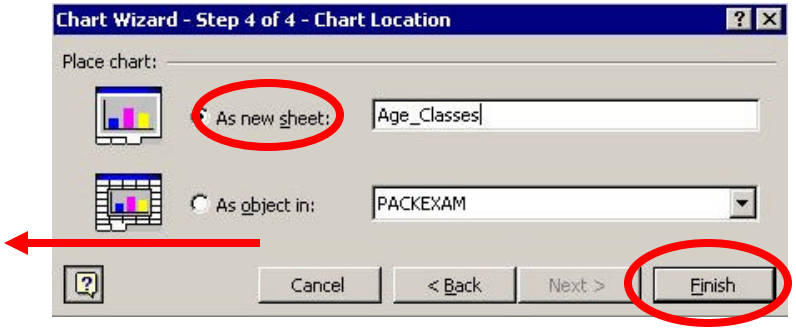
Step 11: Click on **Next.**



Step 12: Click on the **Titles** tab and enter the appropriate titles as shown.

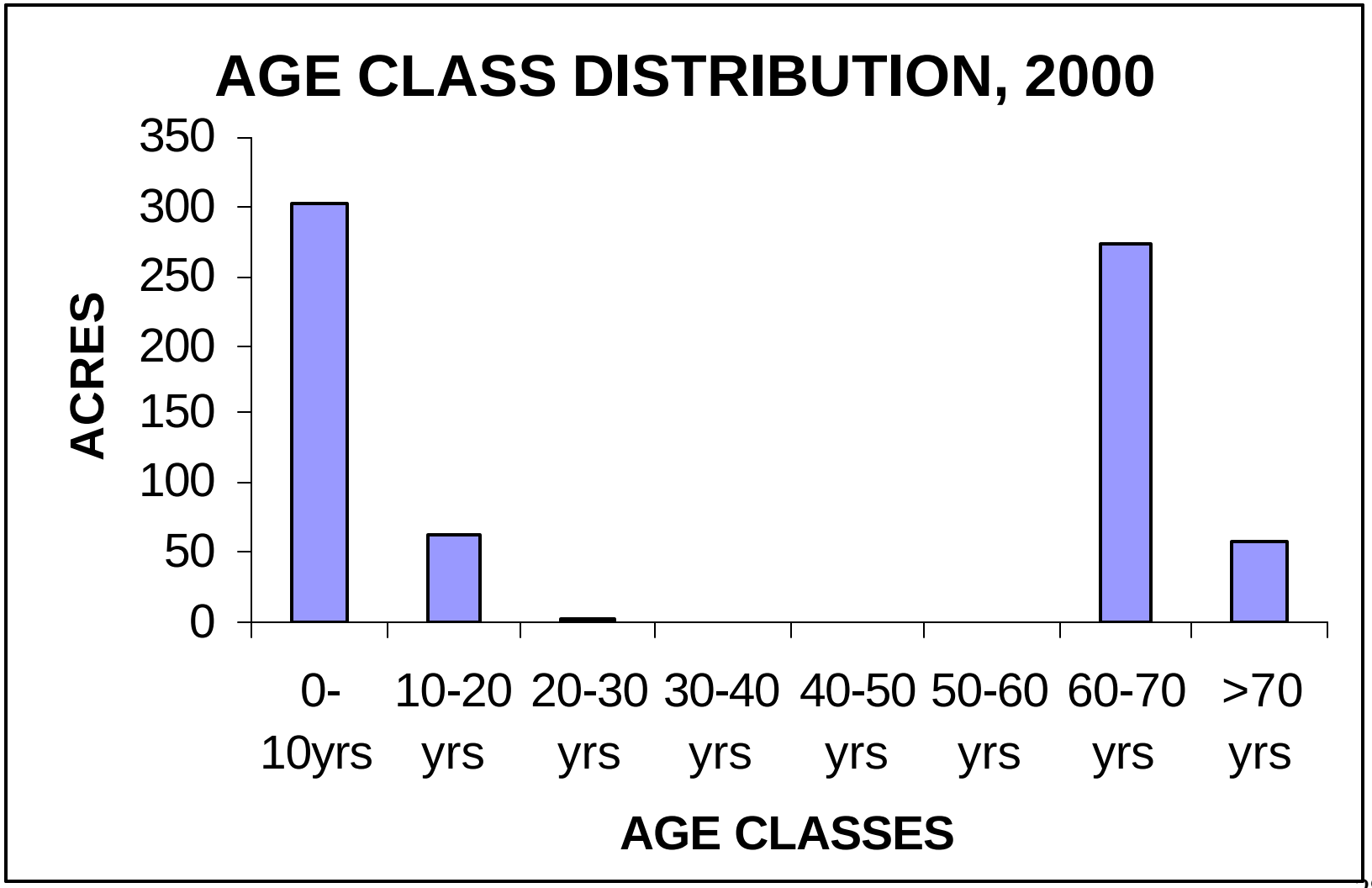


Step 13: Click on the **Legend** tab and uncheck **Show legend**. Click **Next,** then **As new sheet**, replace **Chart1** with **Age_Classes,** and then click **Finish**.

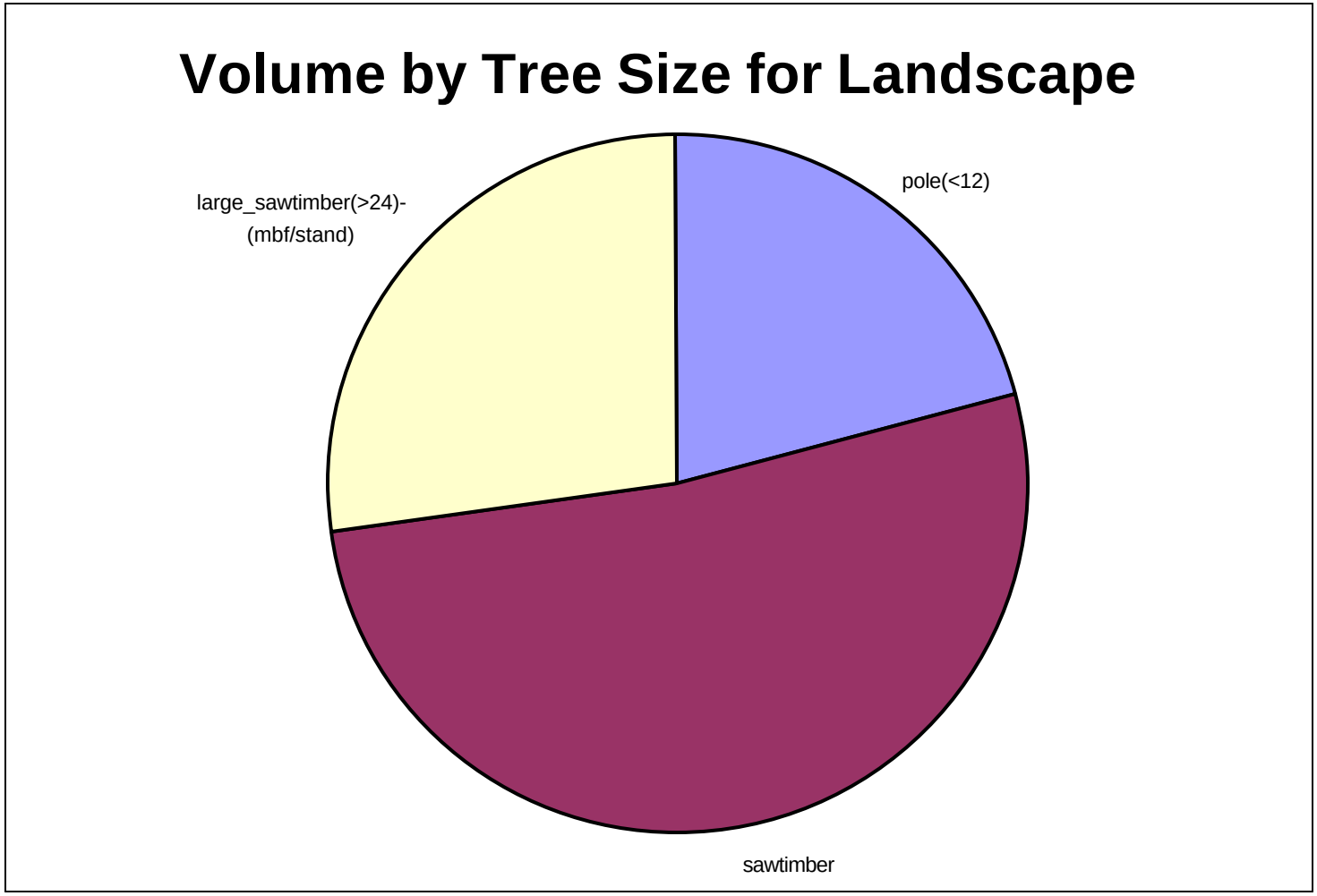


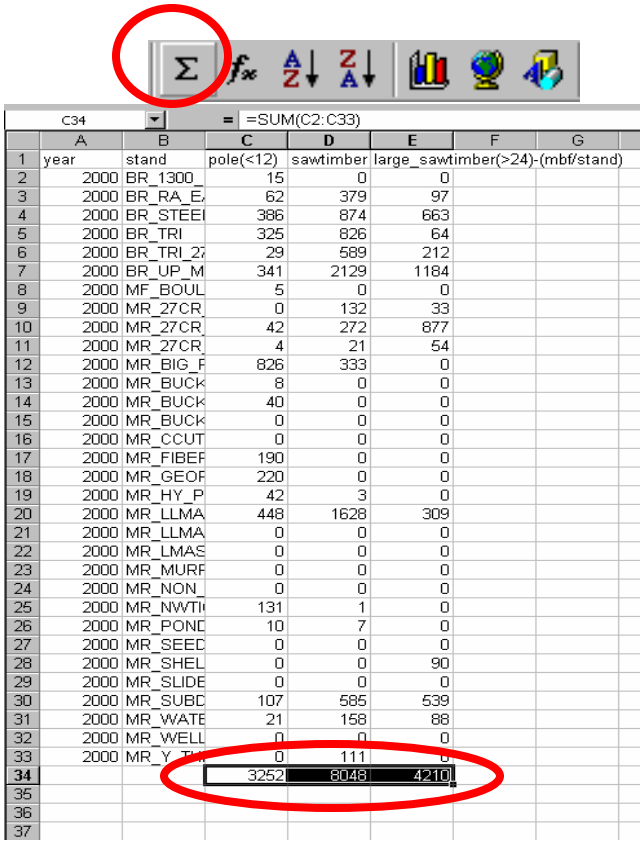
Step 14: Make other chart format changes as desired and then **Copy and Paste** the chart into PowerPoint (see previous chart paste).

Made in Excel from the Stand Attributes table

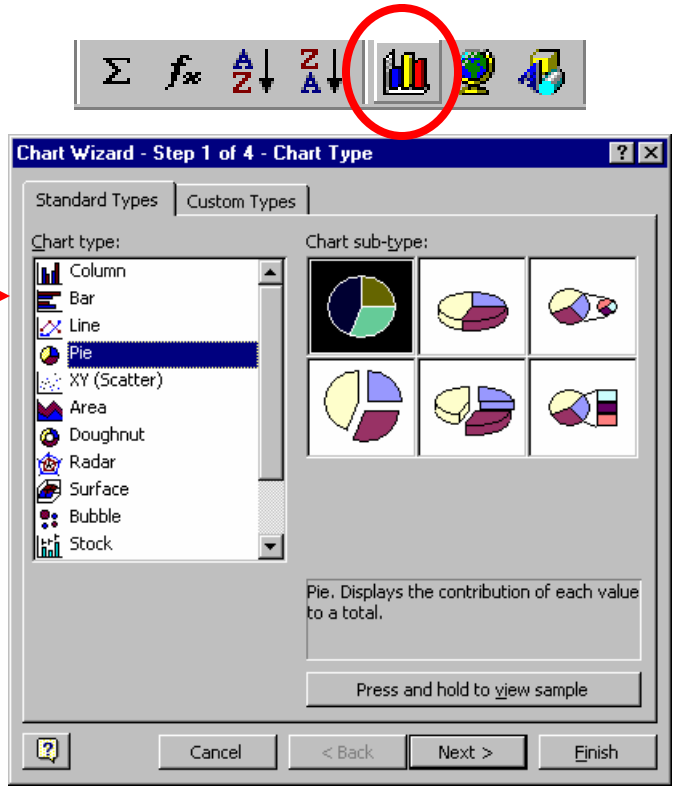


A number of chart types are available for creation within Excel. Next, the user will learn to create a pie chart that displays volume by tree size for the landscape.

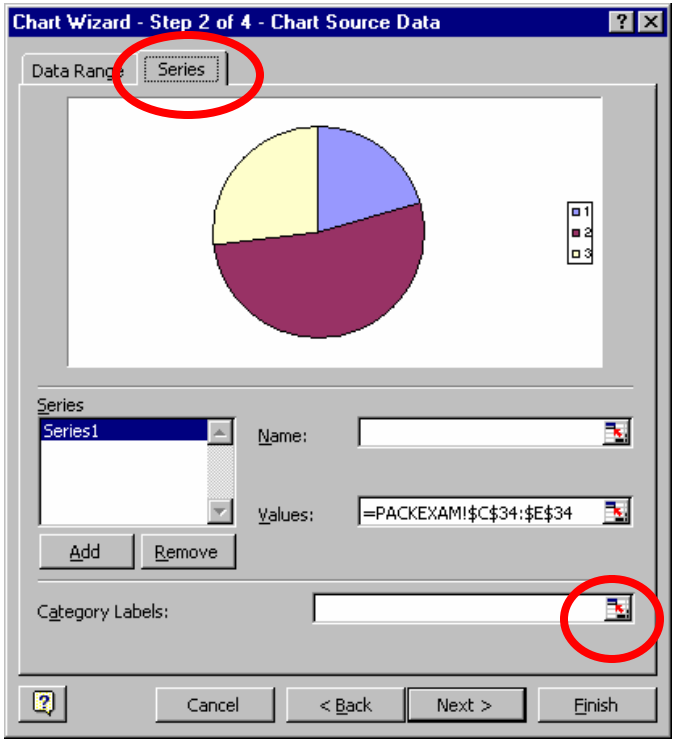




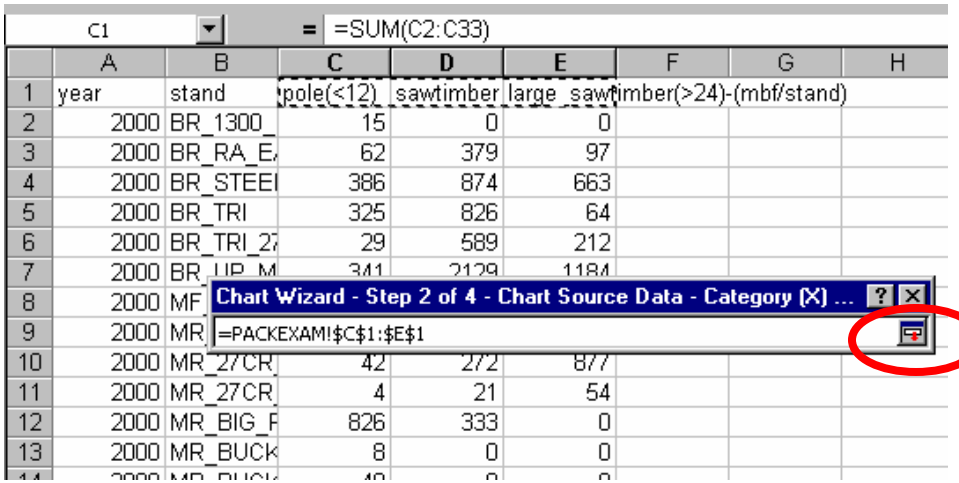
Step 1: In LMS main window click **Analysis/Tables/Volume by Size Class.** Open and delimit (your macro) the Volume by Size Class table. Highlight the cells on the bottom of the size class columns. Click the Sum **(**S**)** button from the GUI. This will add up the volumes in each size class.



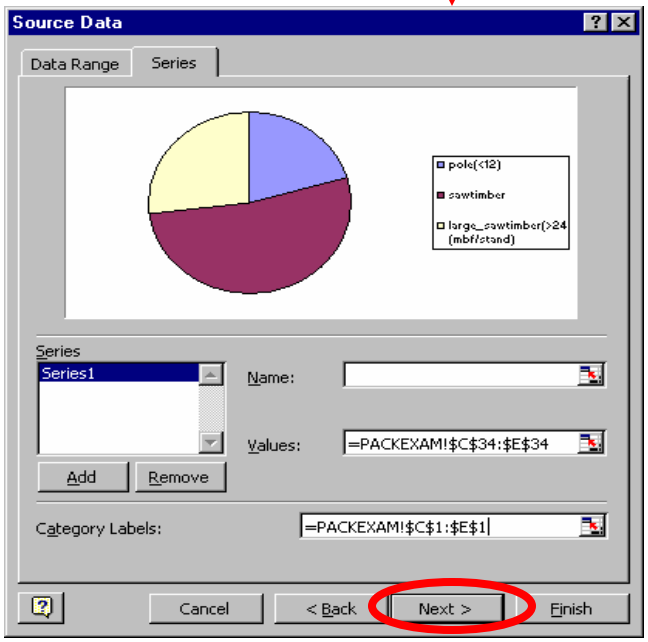
Step 2: With the Sums still selected, click the **Chart Wizard** button. Select Chart type: Pie and then chose the **Pie** chart in the upper left corner.



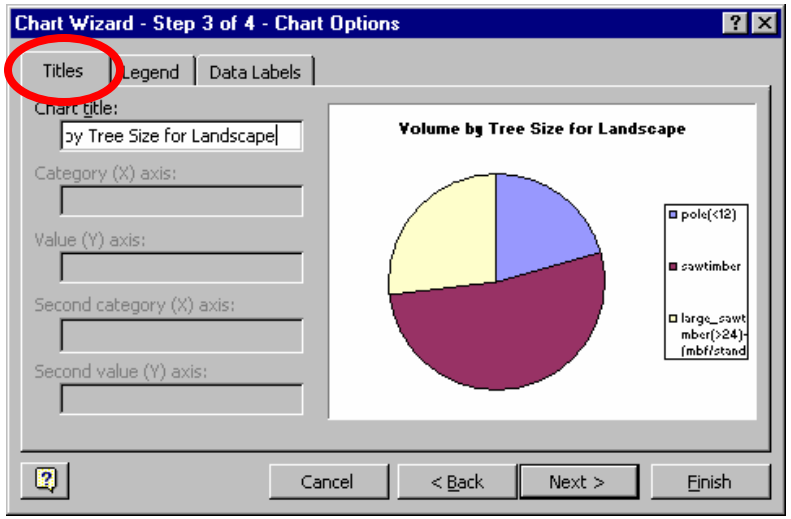
Step 3: Click on the **Series** tab then click on the **Category Labels** box.



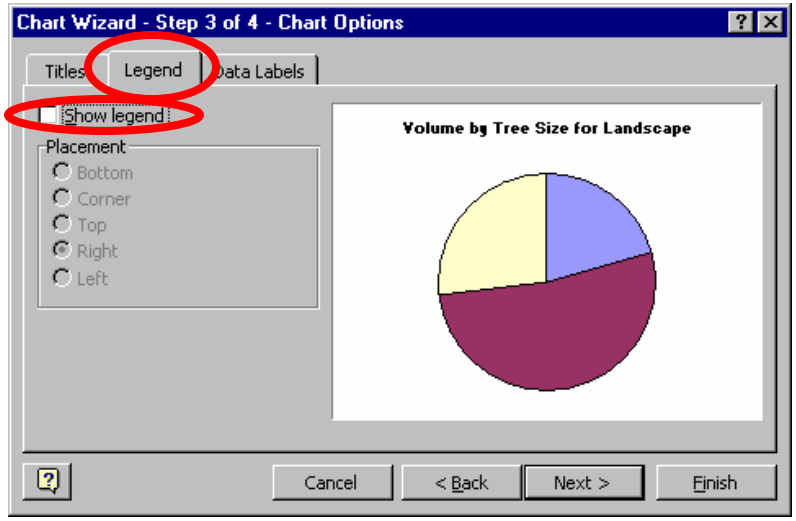
Step 4: Highlight the size classes in the table and click the **Category Labels** box again.



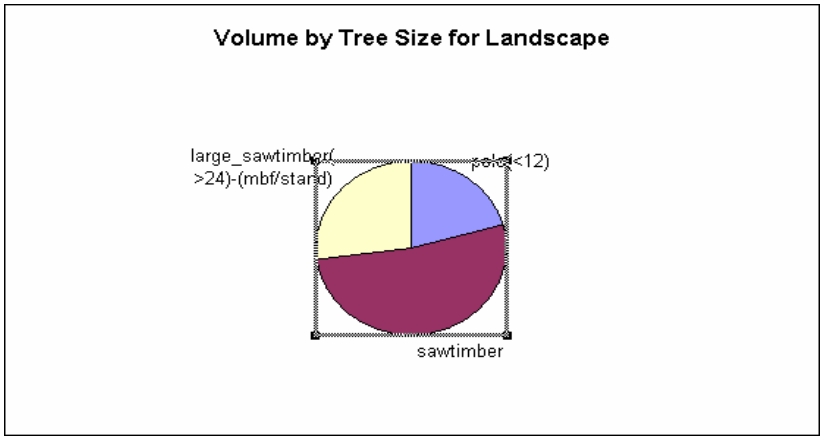
Step 5: Click **Next**.



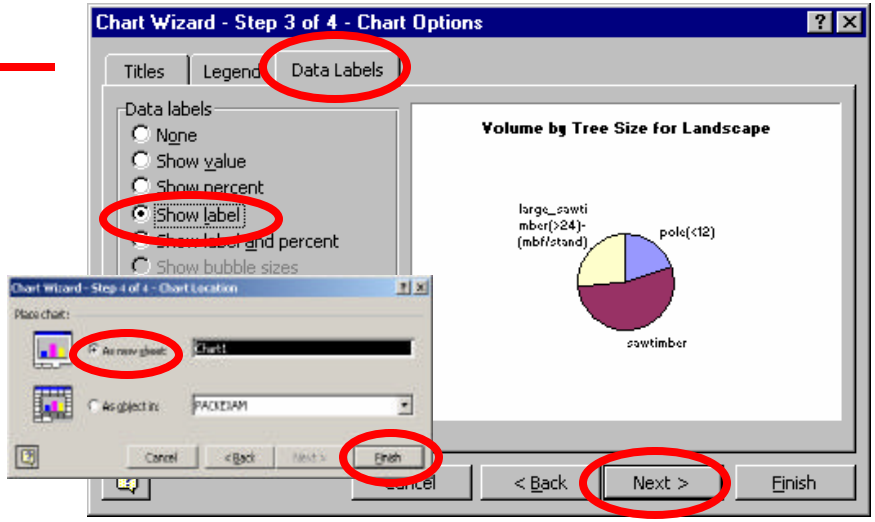
Step 6: Click on the **Titles** tab and add the title, Volume by Tree Size for Landscape.



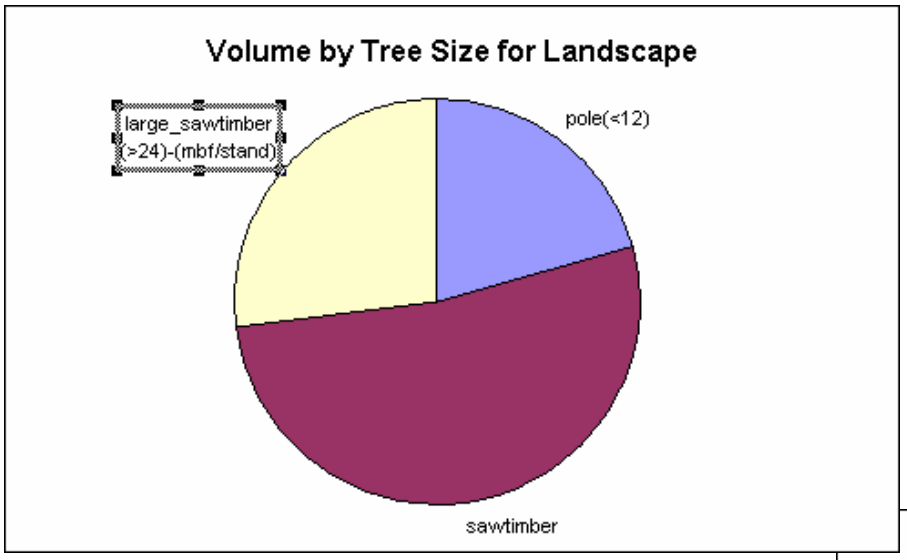
Step 7: Click on the **Legend** tab and unselect **Show Legend**.



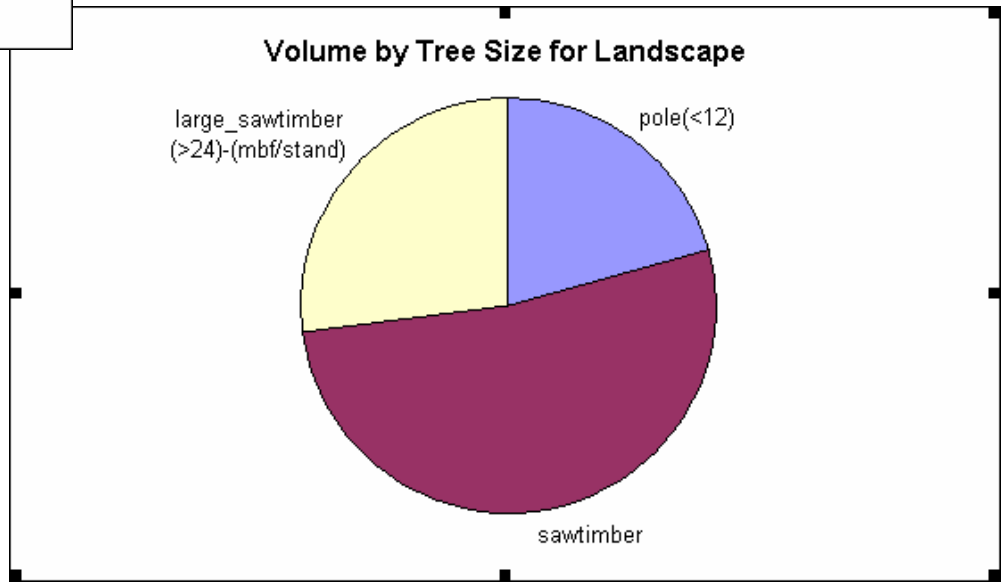
Step 9: To adjust the size of the Pie chart, click near the Pie chart until a square appears around the chart. Click on one of the corners of the square and drag to adjust to desired size.



Step 8: Click on the **Data Labels** tab and select **Show label**. Click Next. Click **As new sheet**, name the sheet **Vol_by_tree_size** and click **Finish**.

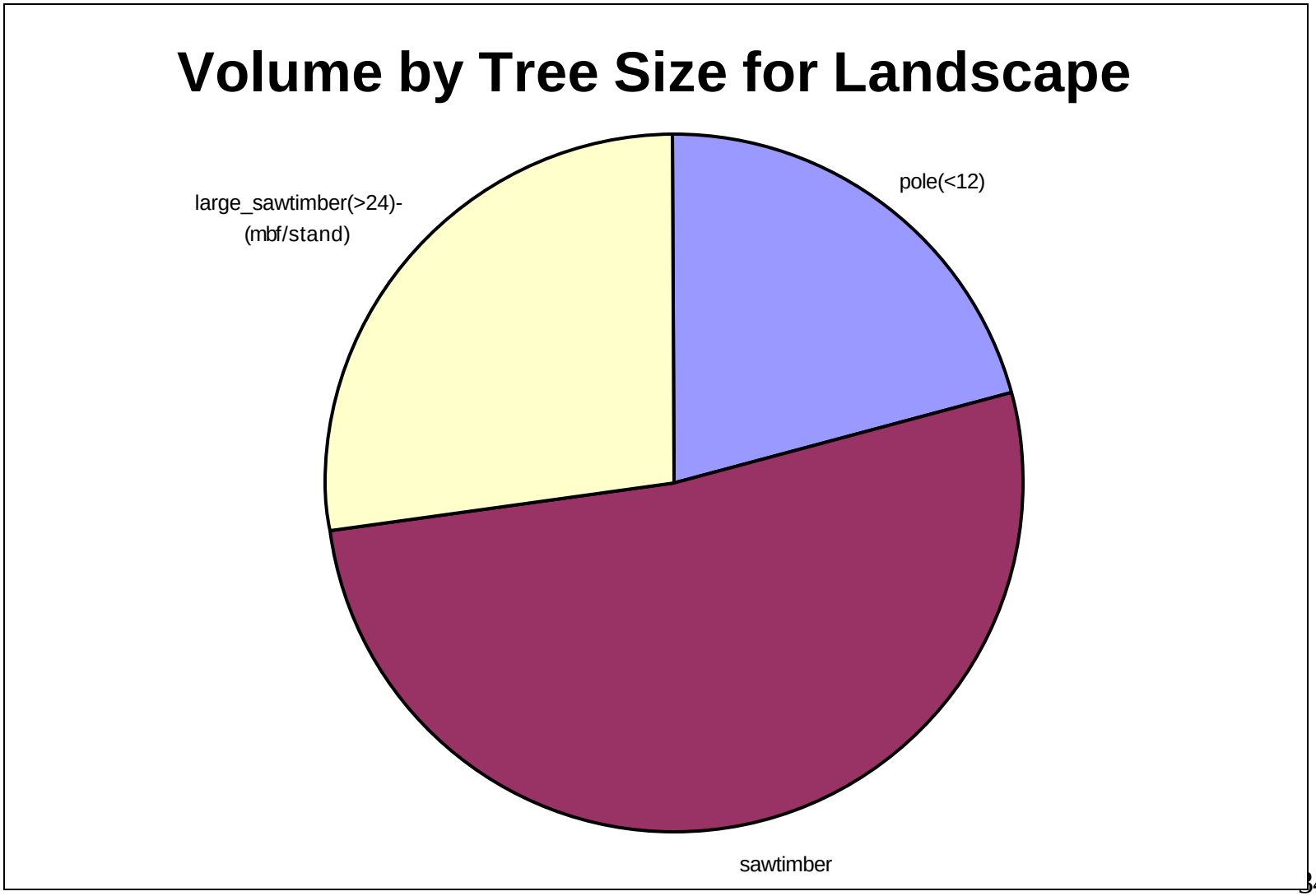


Step 10: Data labels may be edited for spacing, content, and font size by clicking on the data label so that a box around text appears.



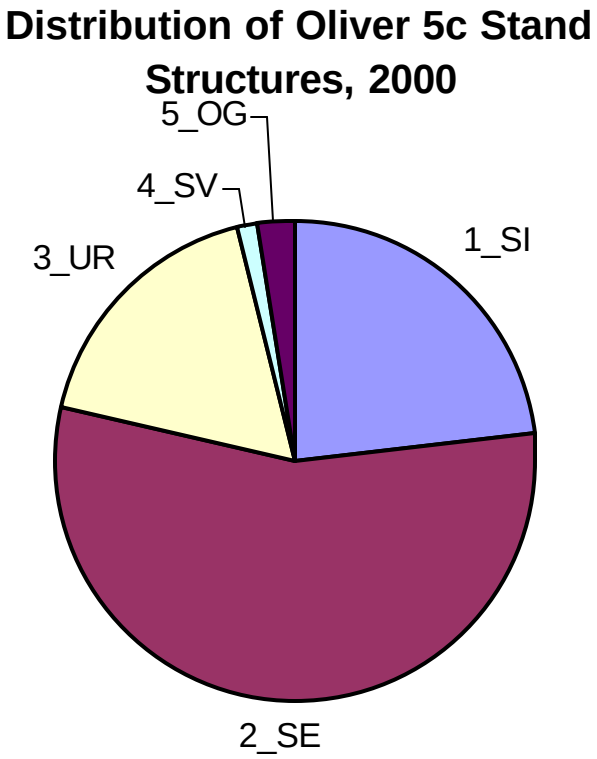
Step 11: Copy and Paste chart into PowerPoint.

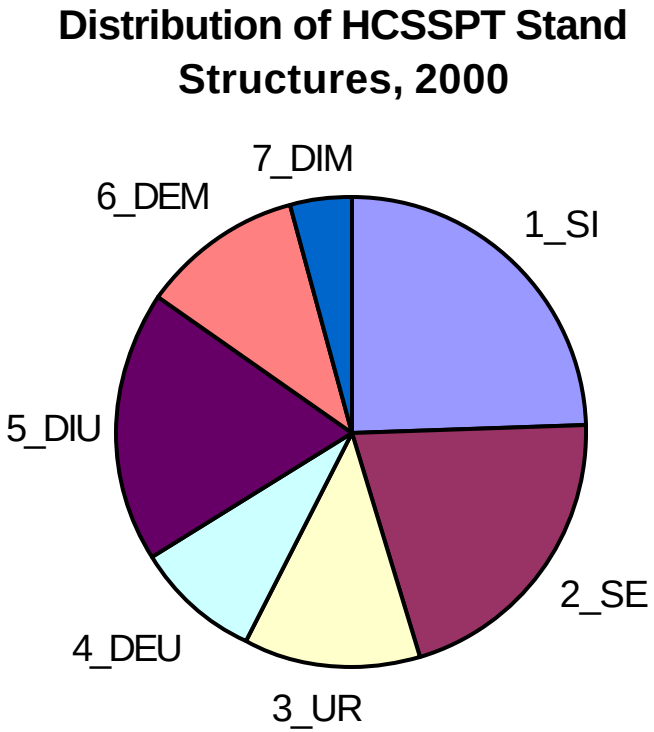
Pie Chart made in Excel from Volume by Size Class table

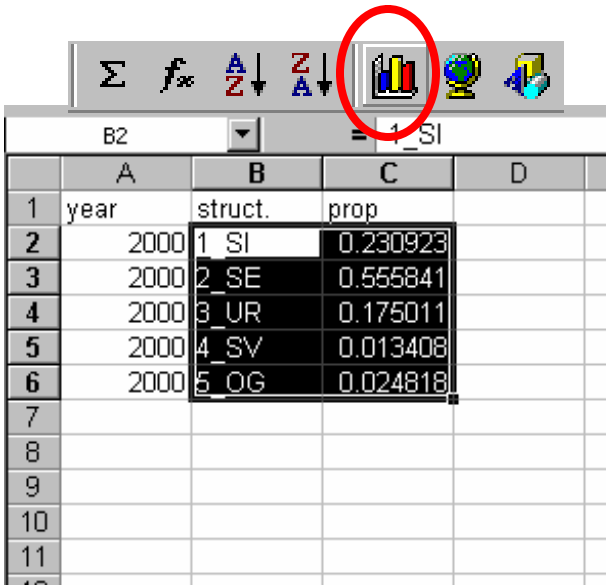


Other Pie charts can easily be made from LMS Analysis data.

Shown below are pie charts displaying structural stages. The structural stage options in LMS reflect different approaches to categorize forest successional stages. To open these tables from the LMS main window click **Analysis/Structural Stages** (see tables section). When the Select Structure classes window opens, click by Structure and then choose desired structure classification. For this example, Oliver 5c was chosen for the first Pie chart creation and HCSSPT was chosen for the second Pie chart.

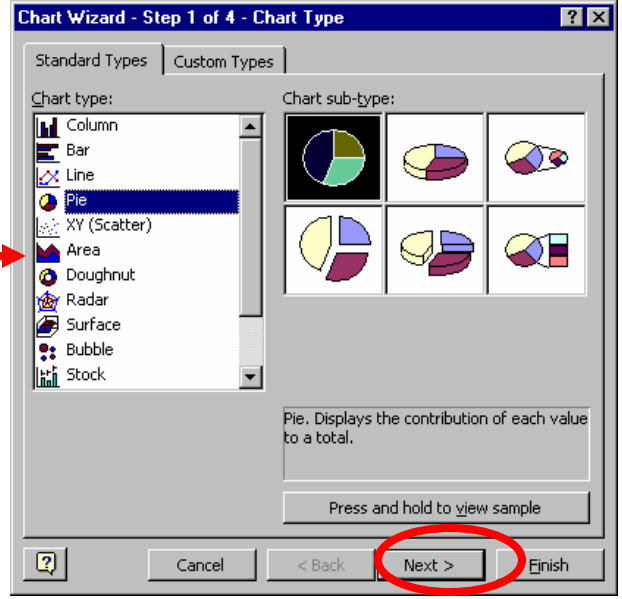




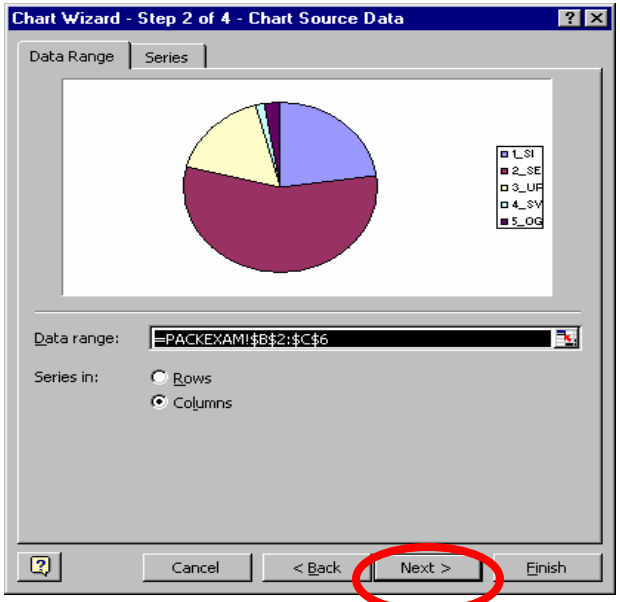


	A	B	C	D
1	year	struct.	prop	
2	2000	1_SI	0.230923	
3	2000	2_SE	0.555841	
4	2000	3_UR	0.175011	
5	2000	4_SV	0.013408	
6	2000	5_OG	0.024818	
7				
8				
9				
10				
11				

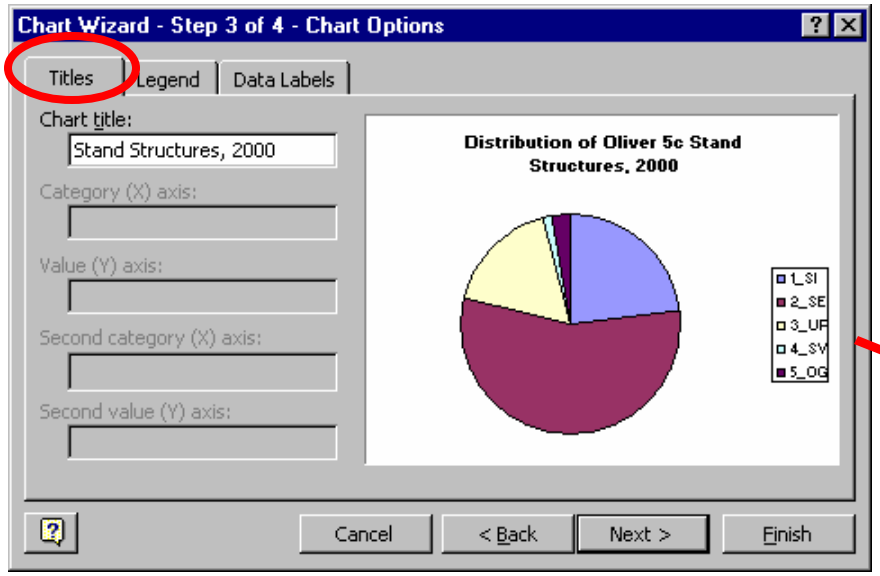
Step 1: Open and delimit **Oliver 5c** from the **Select Structure Classes** window. Highlight the structures and proportions of structure and click on the **Chart Wizard**.



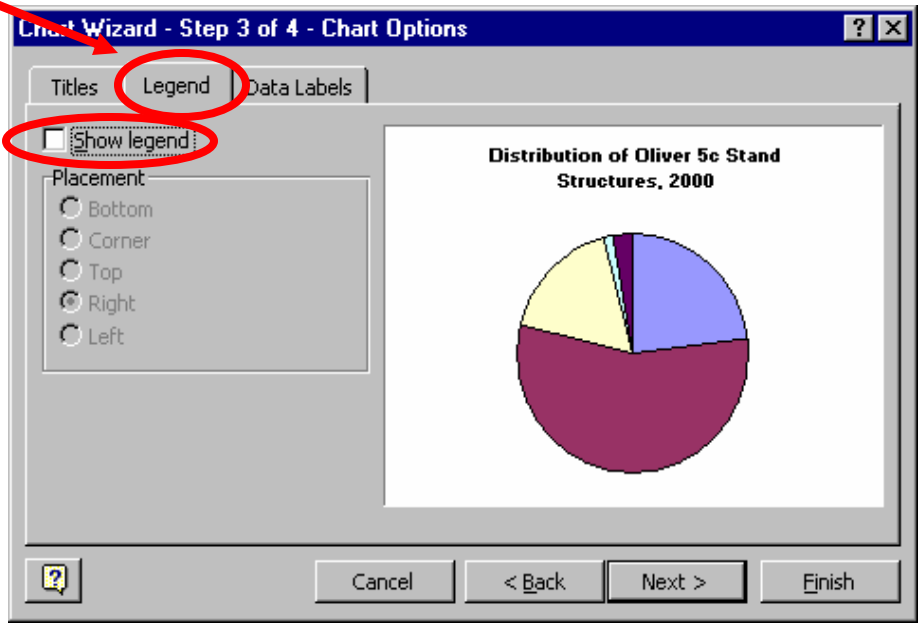
Step 2: Select the **Pie** Chart in the upper left corner. Click **Next**.



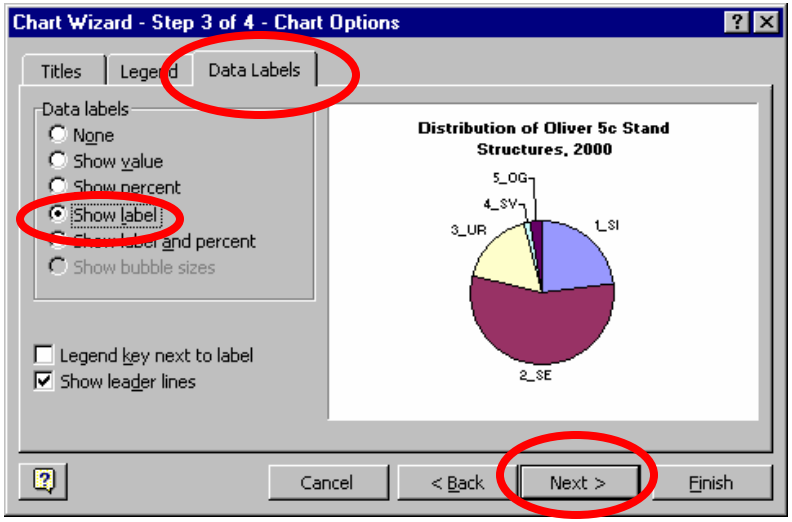
Step 3: Click on **Next** again.



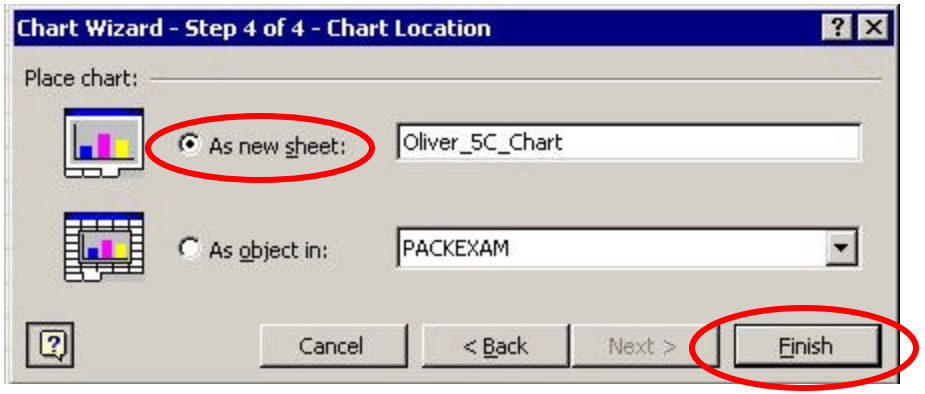
Step 4: Click on the **Titles** tab and enter the title.



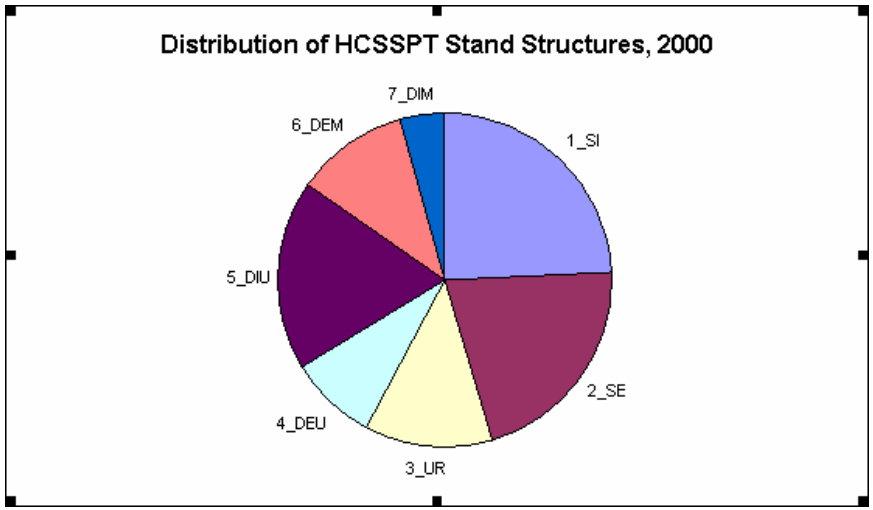
Step 5: Click on the **Legend** tab and unselect **Show legend**.

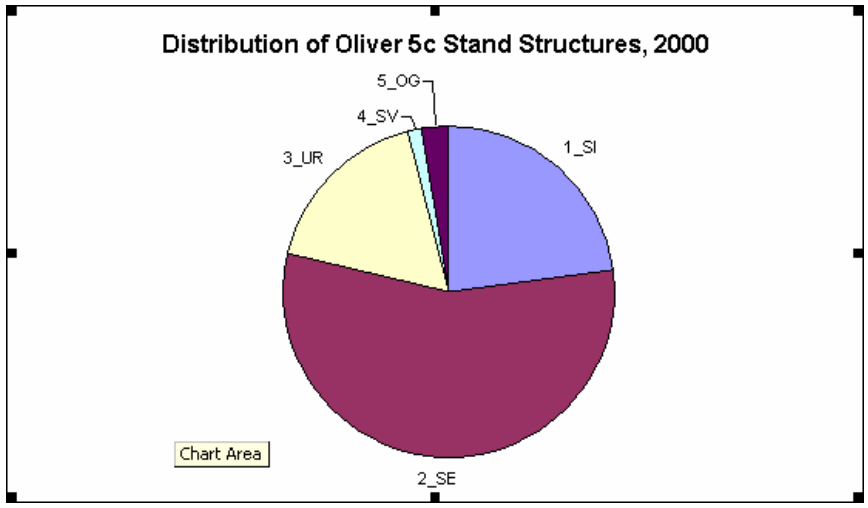


Step 6: Click on the **Data Labels** tab and select **Show label**. Click **Next**.



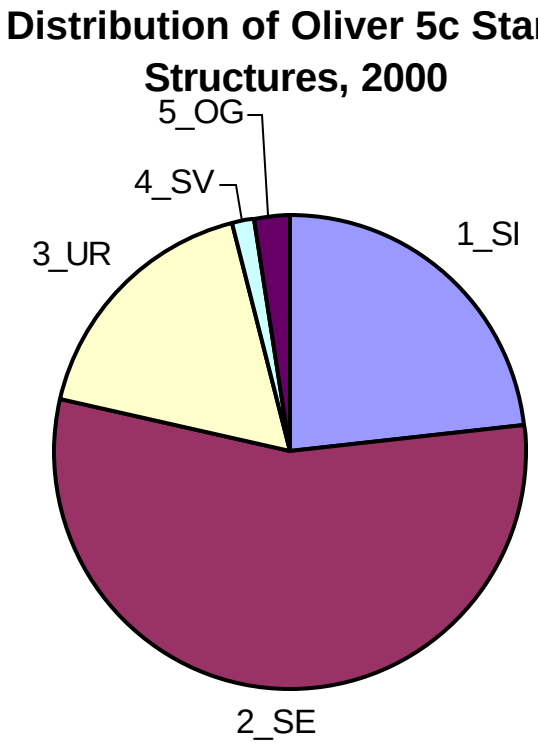
Step 7: Click **As new sheet**, name the sheet Oliver_5C_Chart and click **Finish**. Repeat Steps 1 - 6 with the HCSSPT structural instead of Oliver 5c.

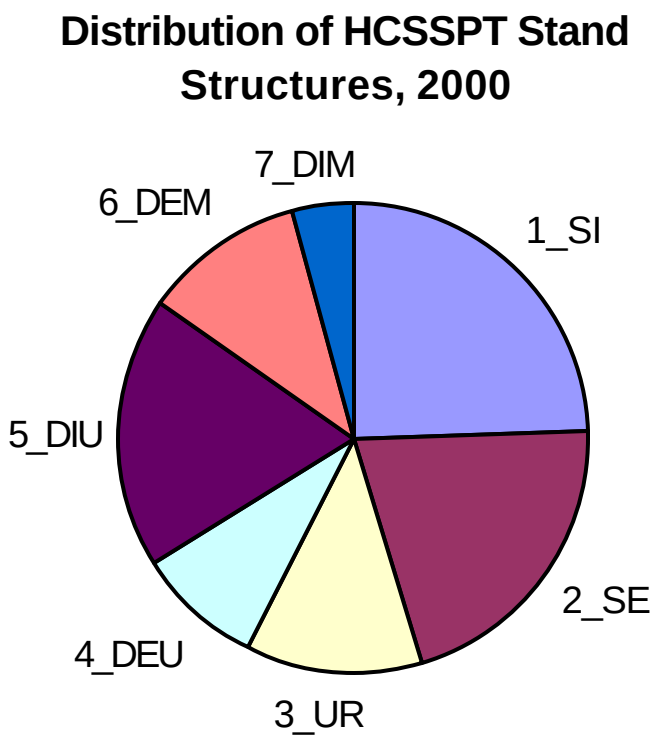




Step 7: Copy and paste each chart into one PowerPoint slide for side by side comparison. Type in title.

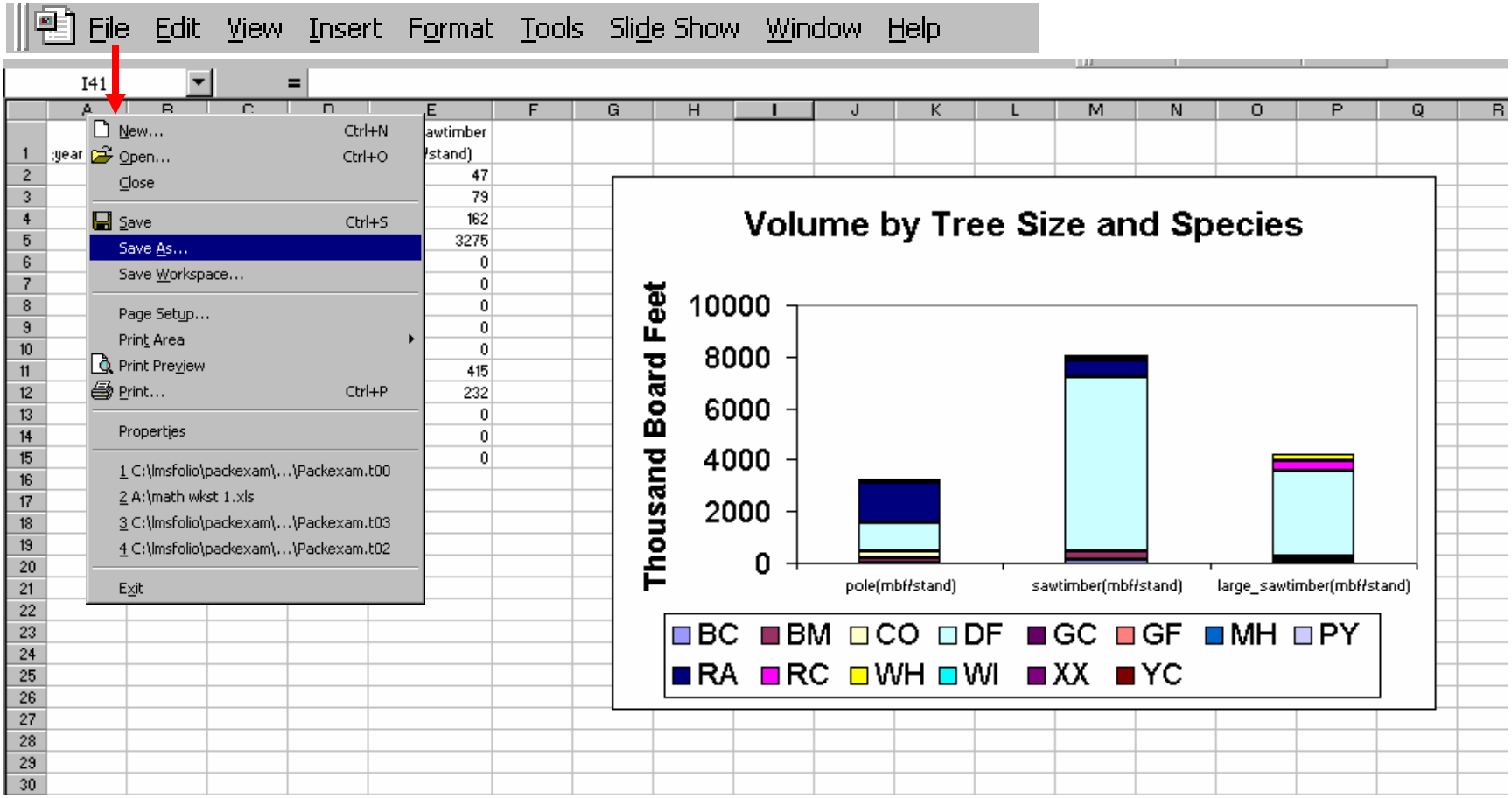
Pie Chart comparisons of Stand Structure distributions made in Excel from Stand Structure Analyses tables



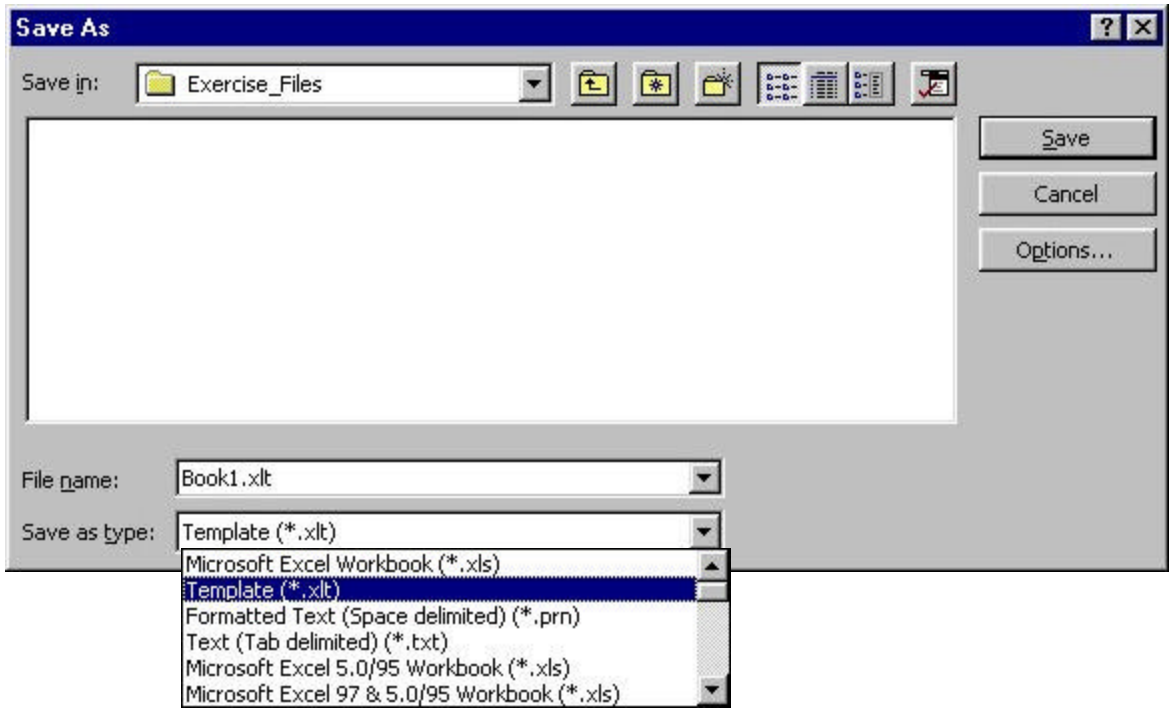


Any of the charts that have just been created may be saved as Templates in Excel. By saving tables and charts as templates, in the future when the user wants to view the same chart only with different data, all the user must do is to paste the appropriate data into the template table. Then the charts will change automatically to reflect the new data.

The following pages show the user how to save an Excel workbook and accompanying chart as a template.



Step 1: When a chart is completed, click on the **File** drop down menu then click on **Save As**.



Step 2: Save in **C:/lmsfolio2/ packexam/Exercise_Files** with your other saved files. Click on the **Save as type**: and chose **Template (*.xlt)**. Give the file an appropriate name such as Vol_Size_Spp.xlt and click **Save**.

Exercise

- Create each of the previous tables and graphs for other data sets available from LMS Analysis drop down.

- Save workbooks as templates *.xlt with appropriate names that you will remember in C:/lmsfolio2/packexam/Exercise_Files/.