United States
Department
of Agriculture

Forest Service

Forest Management Service Center

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Advance FVS Topics: Landscape Analysis Software Tools

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Preface

This document is a collection of software tools that have been developed to enhance the capabilities of the Forest Vegetation Simulator for landscape planning projects. The programs referred to in this document can be obtained from the Forest Management Service Center's Internet site (http://www.fs.fed.us/fmsc) or the FSWeb Intranet site (http://fsweb.ftcol.wo.fs.fed.us/frs/fmsc/fvs/).

Please let the developer know about any errors that you note in the document. If you have any questions or comments about this text or downloading, installing, and using the software, do not hesitate to contact:

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Content

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Topic Pre-Suppose: Pre-processor to Suppose

Concepts: data querying via the Pre-Suppose program.

A presumption of the Suppose interface to the Forest Vegetation Simulation is that inventory data is available in the proper form for growth and yield forecasting. Various computer programs have been developed to translate data from stand examination and permanent plot inventories for all regions of this country. However, most data translation programs provide limited ability to scrutinize strata elements prior to export. Users are baffled as to how to assemble inventory data into a comprehensive unit for further analysis. The Pre-Suppose program was developed to address the data attribute querying need.

In Brief

Pre-Suppose rapidly generates preliminary statistics on a proposed data group. This allows a user the ability to quickly evaluate the homogeneity of selected forest strata. Plot attributes can be chose based on a variety of code and range keys to designate a data group. Rapid processing of plot summary values renders important statistical information relevant to the keyed items. Given that the user is satisfied with the selected criteria and resultant output, support files can be created that link directly to the Suppose interface. Pre-Suppose has been programmed to work dynamically with forest inventory data stored in a Microsoft Access database. A case example using Forest Inventory Analysis (FIA) data from the Black Hills National Forest in South Dakota will be presented to demonstrate program capabilities.

Let's Prep First

The "Prep" program was developed to read values from State FIADB database files available on the Web and build a Microsoft Access database that could be read by the Pre-Suppose program. Prep must be run prior to using Pre-Suppose. The Users Guide for Prep can be found in the collection of topic papers in the document "Advance FVS Tools for Landscape Planning" located at this Web address:

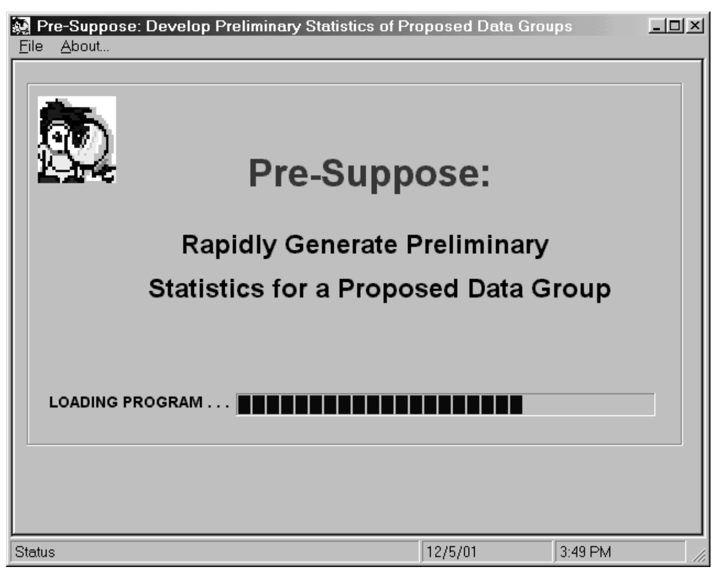
http://www.fs.fed.us/fmsc/ftp/fvs/docs/gtr/Advance_Topics.pdf

Now How with Pre-Suppose

Use the following steps to guide you through Pre-Suppose:

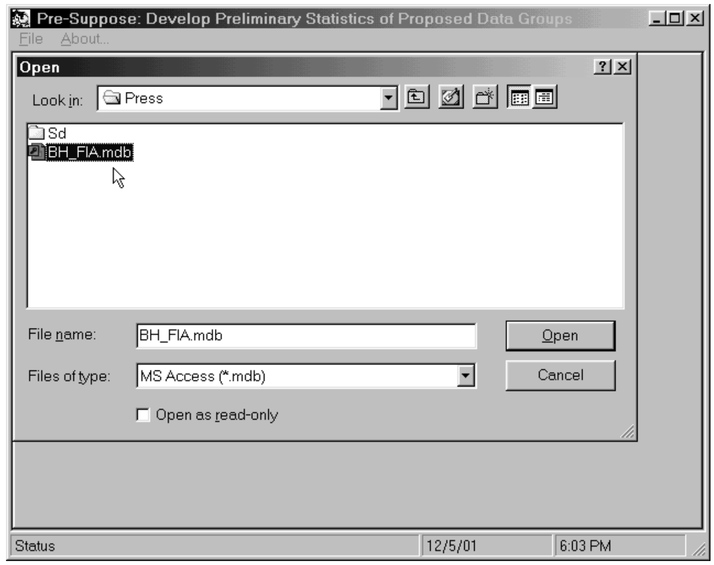
1. To execute **Pre-Suppose**, double-click the Pre-Suppose icon.

2. The Pre-Suppose **Splash Screen** will appear.



Note: You do not have to wait for the Pre-Suppose program to load. The Splash Screen is intended to show that the Pre-Suppose has been invoked by the user. Simply press any key on the keyboard or perform a mouse click in the area below the Progress Bar. Either of these actions will unload the Splash Screen and automatically display the Open Database dialog window.

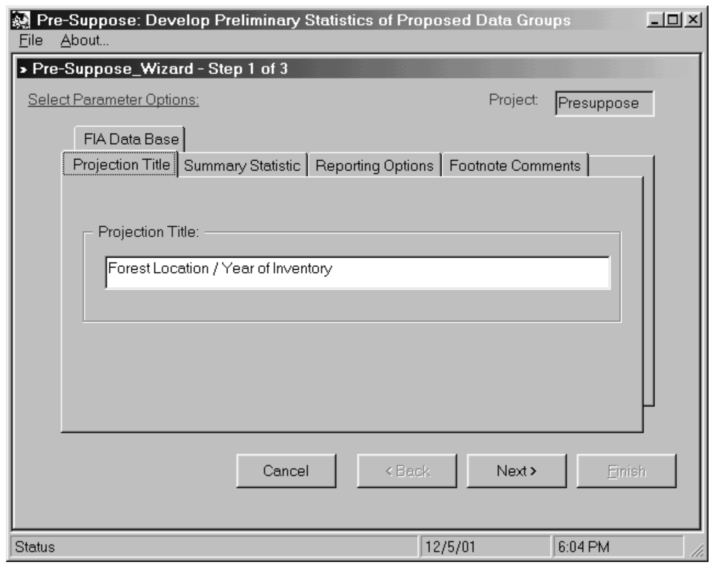
3. Select the **Database** to process.
4. Click the **Open** command button to proceed.

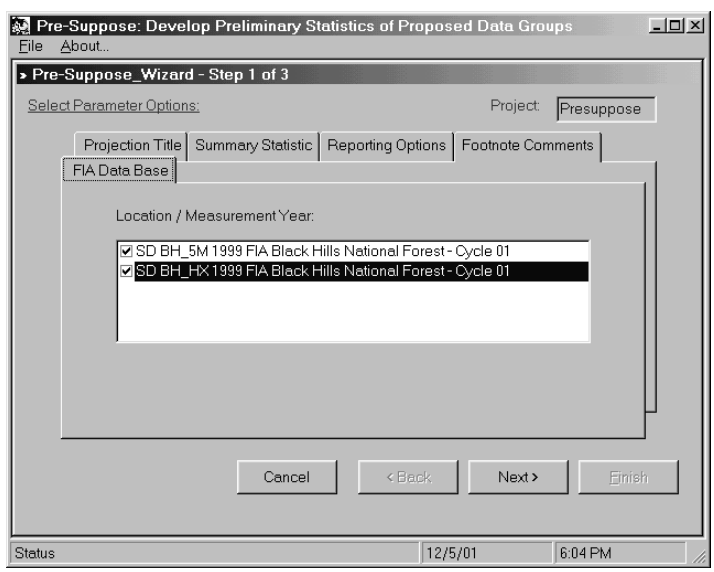


5. The Microsoft Access Database is scanned for resident data tables. After this, a **Pre-Suppose Wizard** will appear. In **Step 1** of the Wizard, the FIA database(s) is selected, the projection is titled and footnoted, and the desired Summary Statistics are selected.

   Make the following selections:

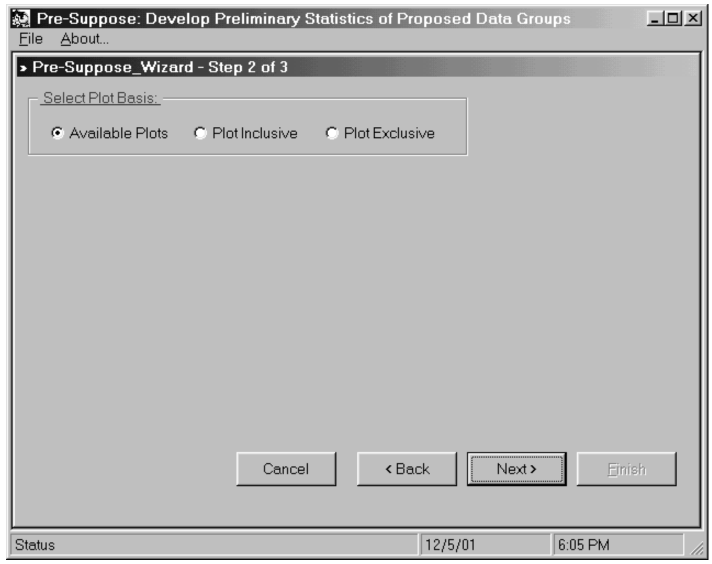
   a. **Projection Title** tab: "**Black Hill National Forest – 1999 FIA**".
   b. **FIA Data Base** tab: Select both check boxes indicating that you will include the **5 thousand meter grid** and new **Hex grid** plots.
   c. **Summary Statistic** tab: Choose the "**Live Tree**: All Tree Classes - Net" check box. **Harvest** and **Mortality** tree statistics can be reported by selecting their check boxes. For this example, we will pick live trees only.
   d. **Reporting Options** tab: Three reports are generated by Pre-Suppose. They are: "**Plot Summary Statistical Analysis**", "**Listing of Plot Attributes**", and "**Listing of Plot Values**". Make sure all of these are selected.
   e. **Footnote Comments** tab: Note 1 - Enter your name. Note 2 – Enter the date.





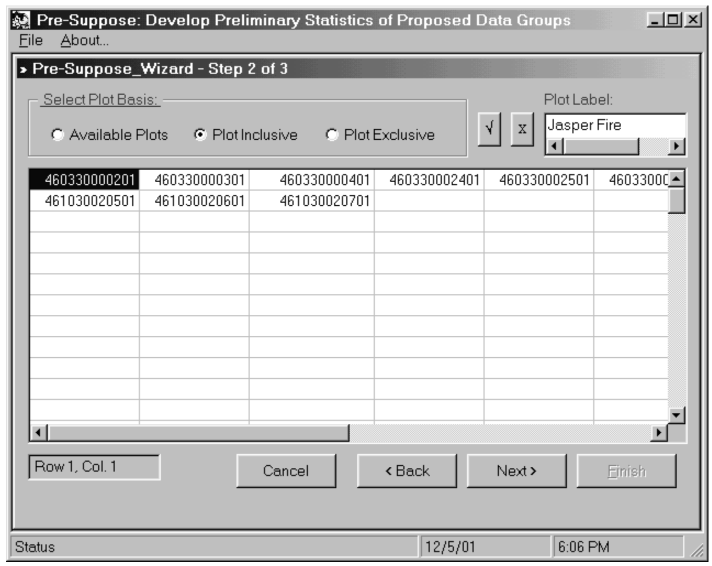
6. The **Projection Parameters** have been set. Click the "**Next >**" command button to proceed to the next step of the Pre-Suppose Wizard.

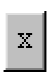
7. **Step 2** of the **Pre-Suppose Wizard** allows the user to select specific plots to include in the projection. The radio button next to the "**Available Plots**" should be selected to include all plots.

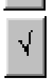


8. To include or exclude specific plots from a projection, use the "**Plot Inclusive**" or "**Plot Exclusive**" radio buttons, respectively. This feature allows external plot lists to be entered to establish the plots used for projection. Non-coded items can be identified using manual processes or GIS to determine plot lists. The external plot lists are ASCII text files. The plot label must be consistent with the default plot list file, "**Presuppose.lst**". The Black Hills FIA data set follows this scheme:

   a. State Code – 2 digits
   b. County Code – 3 digits
   c. Plot Number – 5 digits
   d. Measurement Cycle – 2 digits



The  command button will **clear** the current plot list.

The  command button will display an **Open File** dialog box that will allow the user to choose existing plot list from filename extension of ***.plt**. Adding the plot list will populate the plot grid.

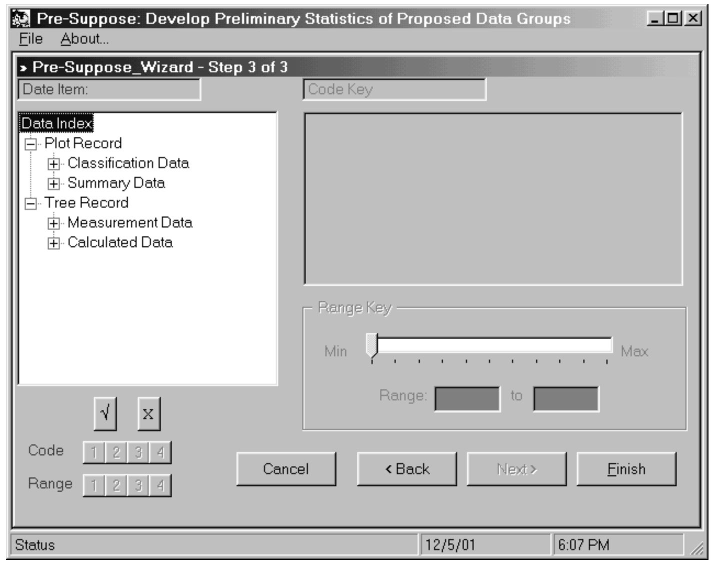
9. Once the **Plot Basis** has been specified, click the **"Next >"** command button to proceed to the next step of the Pre-Suppose Wizard. For this example, make sure the "**Available Plots**" radio button is chosen.

10. The **Step 3** window of the **Pre-Suppose Wizard** will appear. In this step, **Code Keys** and **Range Keys** are specified to further winnow the data set to develop strata for projection. There can be up to four Code and Range Keys entered for a query.

    NOTE: All data items as collected during the inventory or computed thereafter are available as sort keys. The user is the "Master of the Domain" to create any strata imaginable. The Pre-Suppose program facilitates the analysis process to determine if the conceived strata are acceptable for further projection. Additional data items can be appended to the data set at any time. This feature provides the capability to enhance a static data set. Methods for doing so will be described later in this document.

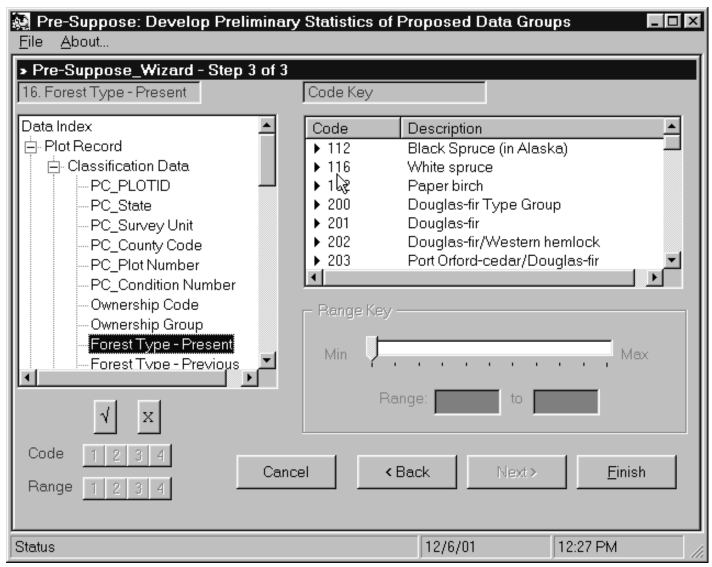
11. The **Data Index** window is similar to the treeview folder pane of the Windows Explorer program. The **Plot Record** branch nodes are derived from the FIA plot record. The Plot Record is further defined as either **Classification Data** or **Summary Data**. Classification data are coded stand measurement. Summary data are per acre stand values.

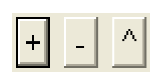
    The **Tree Record** branch nodes are derived from the FIA tree record. The Tree Record is further defined as either **Measurement Data** or **Calculated Data**. Measurement data are field-measured items. Calculated data are per tree computed values.

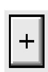


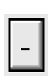
For this example, we will examine the mature component of the White Spruce forest cover type on the Black Hills National Forest. To do so, follow these steps:

a. Under **Plot Record**, click the **"+"** next to the **Classification Data** to expand the treeview nodes.
b. Scroll down to the "**Forest Type – Present**" branch and select by left-mouse clicking, once.
c. A **listview window** will awaken in the upper right corner of the Step 3 window displaying available code items.
d. Click on the "**116**" code to select the White Spruce forest type.



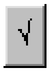
Note: Updated command button symbols -→ 

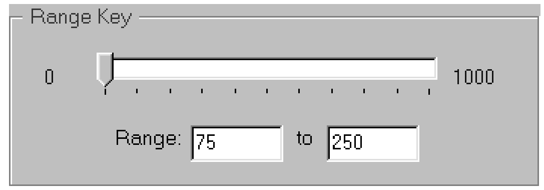
Navigate down to the  command button and click to add the key. Notice that the number **"1"** Code command button will highlight indicating that the key has been entered.

To remove a key, click the  command button. Notice that the numbered command button will dim to indicate that it is inactive.

The  command button will allow updating an existing Code or Range keys.

e. Under the **Plot Record** treeview, **Classification Data** node, select "**Stand Age**". The Range Key frame in the lower right corner will awaken.
f. Next to the '**Range:**' label in the Range Key frame, enter the number **"75"** in the left text box to indicate a minimum Stand Age of 75 years old.
g. In the right text box, enter the number **"250"** to indicate a maximum Stand Age value of 250 years.

h. Use the  command button to add the range key to the sort query.



i. We have finished defining the data and key elements for the mature White Spruce strata on the Black Hills.

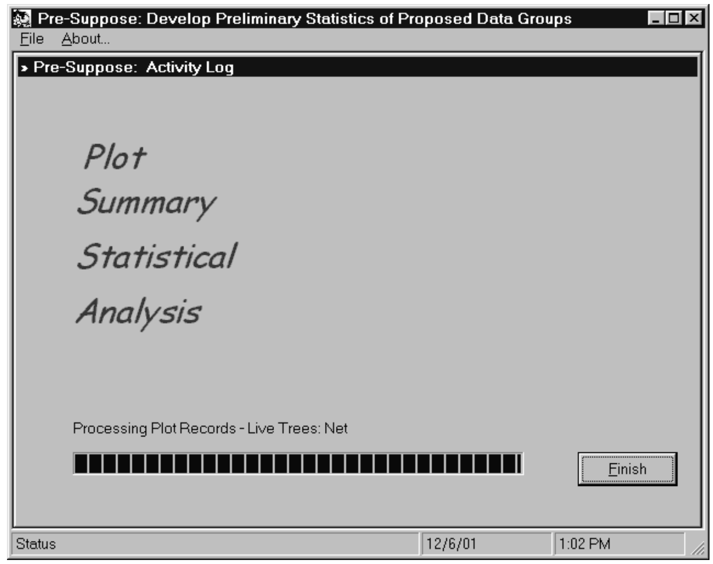
Click the 

command button to allow Pre-Suppose to process your request.

Pre-Suppose will query the Microsoft Access database tables and compute a statistical analysis of the selected plot data.

12. When processing is complete, the command button in the lower right corner of the **Pre-Suppose Activity Log** window will indicate, "**Finish**", if there is at least one sample plot that is represented by the request. If not, a message box will appear stating that there were no plots that met the sort criteria. At that point Pre-Suppose will allow you to go "**Back**" to redefine your Keys and/or Plot basis.

13. Click the **Finish** command button to proceed to the **Print Preview** window. Pre-Suppose automatically formats its output reports to your default printer specifications.



Plot Summary Statistical Analysis Report

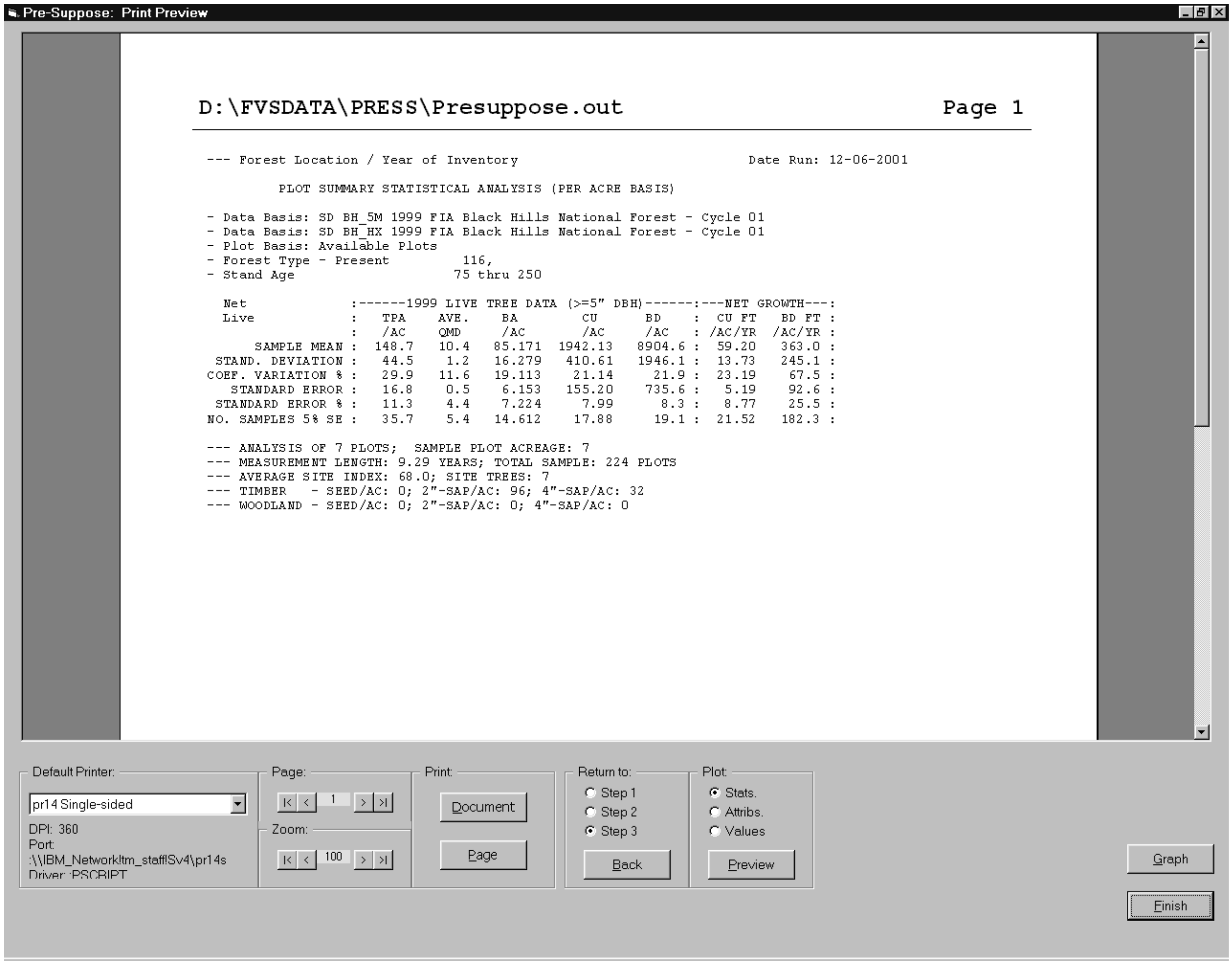
Pre-Suppose produces three output reports. The first, 'Plot Summary Statistical Analysis' contains an abbreviated statistical analysis of the specified strata. The top of each tree class table reports the selected FIA database table(s), plot basis, and key sort values. Double-check this information for correctness. Number of trees, average quadratic mean diameter, basal area, cubic foot, and board foot values are displayed on a per acre basis. Measured cubic foot and board foot growth rates are portrayed on a per acre, per year basis. Values appearing in this table are for trees five inches and greater, diameter. The bottom of each tree class table lists the number of plots that met the sort criteria, growth measurement period, total sample size, average site index, number of site trees, and seedling/saplings information.

Listing of Plot Attributes Report

The second report generated by Pre-Suppose is a listing of plots that composed the requested strata. Two important uses of this report come to mind. First, a permanent record of the exact plots comprising the data sort can be obtained. Second, plot data relationships can be examined. For example, suppose a forest analyst selected a data sort specifying 'slope and aspect' as sort criteria. The plot listing may reveal a particular soil type or habitat type was prevalent for those conditions.

Listing of Plot Values Report

The third text file provided by Pre-Suppose is a complete listing of the plot summary values (trees, quadratic mean diameter, basal area, cubic foot, and board foot data on a per acre basis). Annual cubic and board foot growth rate are reported for the measurement period. Seedling and sapling per acre values are also reported in this listing.



The control bar at the bottom of the Print Preview window includes various options. You can:

- ☑ Select a **Default Printer**;
- ☑ Move between **Pages** (if more than one page in the output);
- ☑ **Zoom** in or out on the report page;
- ☑ **Print** either the entire document or a single page in the view;
- ☑ **Return** back to a previous Step in the Pre-Suppose Wizard:
- ☑ **Preview** the Plot Statistics, Plot Attributes, or Plot Values reports.

14. To Preview the "**Listing of Plot Attributes Report**", select the "**Attribs**" radio button within the Plot frame and click the **Preview** command button.

The Pre-Suppose Print Preview will refresh and the selected report will appear. You can resize or zoom in and out using the controls at the bottom of the preview window.

15. To Preview the "**Listing of Plot Values Report**", select the "**Values**" radio button within the Plot frame and click the **Preview** command button.

D:\FVSDATA\PRESS\Presuppose.att

```
--- Forest Location / Year of Inventory                                         Date Run: 12-06-2001

        A LISTING OF PLOT ATTRIBUTES

- Plot Basis: Available Plots
- Forest Type - Present        116,
- Stand Age                   75 thru 250

                                              R
                          S                   E             S T      I N  G  A
      P       C    P   O  T  T  STS      S    S             AO R     N O  R  L R        E         E         E         E                   M  RS
      L S     O    L  OW  Y  Y  TDI  S   I  A ELL      S    SI E     H N  S  S E        X         X         X         X                 M C  NT  F
      O T U   U    TC WN  P  P  DST  I   B  D RCC      L  E PL A     I S  T  T M        P         P         P         P                 D Y  GD  L
      T A N   N    NO NG  C  O  AIE  S   A  F VCO      O  L EG TP    B T  K  K P        A         V         G         M       L      L  A C  DC  H
      I T I   T    UN ER  U  L  GZC  P S G  O CUL  B   P  E CR ON    P P  P  P E        C         O         R         O       O      A  T L  TL  I
      D E T   Y    MD RP  R  D  EEL  C I E  R 1RD  A   E  V TP PC    C C  C  C R        R         L         O         R       N      T  E E  RS  S

 1903464623 81    451111116  010915 94 8050203  110 77 12 54 290 0200501 0 0 38 4110      6175      6175      6175      6175103.8757 44.29299906 1 110681
 1931464623 81    681111116  0 7715122 5650203  110 76  4 67  00 0200501 0 0 47 4710      6175      6175      6175      6175103.9984 44.15459906 1  40  0
 1936464623 81    601111116  010215 94 8150203  110 84 18 63 310 0200501 0 7 51 5110      6175      6175      6175      6175103.9361 44.20709905 1 110681
 2258464623103    821111116  010615122 5350203  110106  2 51  00 0200501 0 0 62 6210      6175      6175      6175      6175103.6465 44.06629905 1  60680
 2281464623103    771111116  0 9014 94 9250203  110 90 18 68 570 0200503 0 0 50 5010      6175      6175      6175      6175103.9274 44.06749905 1  40  0
 2283464623103 30761111116  010916122 5550203  110140 31 69 260 0200503 0 0 87 87 5      6175      6175      6175      6175103.9684 44.08049905 1  40  0
 2285464623103    451111116  010416122 5950203  110 74  9 692270 0200503 0 0 45 4510      6175      6175      6175      6175103.9403 44.11349905 1  40  0
```

D:\FVSDATA\PRESS\Presuppose.val **Page**

--- Forest Location / Year of Inventory Date Run: 12-06-2001

A LISTING OF PLOT VALUES

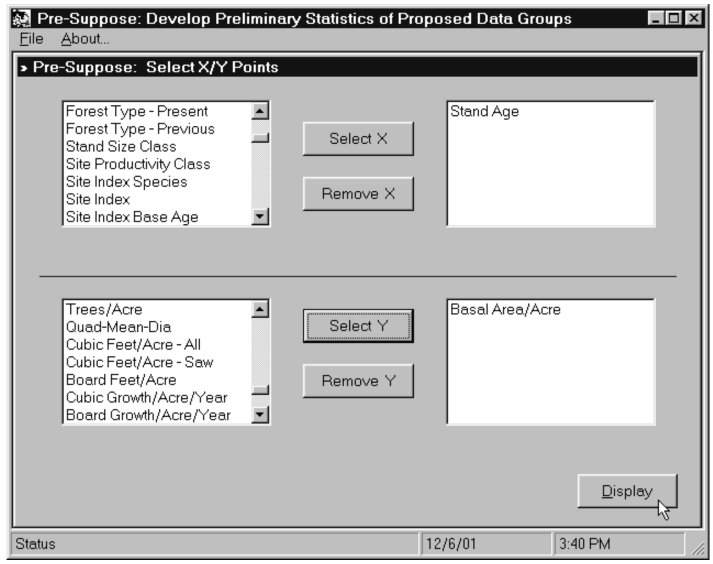
- Plot Basis: Available Plots
- Forest Type - Present 116,
- Stand Age 75 thru 250

STATE	UNIT	CO	PLOT #	CYCLE	TREES (>=5" DBH) /ACRE	QMD	BASAL AREA /ACRE	TOTAL CUBIC FEET /ACRE	SAWLOG CUBIC FEET /ACRE	SAWLOG BOARD FEET /ACRE	GROWTH TOT CU /ACRE /YEAR	GROWTH SAW BD /ACRE /YEAR	****TIMBER**** SEED /AC	2" SAP /AC	4" SAP /AC	***WOODLAND*** SEED /AC	2" SAP /AC	4" SAP /AC
46	23	81	45	1	162.48	8.68	66.733	1396.96	756.86	4978.2	63.93	767.7	0	375	150	0	0	0
46	23	81	68	1	96.29	12.07	76.484	1677.12	1343.01	8554.0	80.88	664.1	0	0	0	0	0	0
46	23	81	60	1	126.38	10.66	78.291	1977.01	1493.83	9746.3	56.74	202.9	0	0	0	0	0	0
46	23	103	82	1	204.62	9.73	105.642	2480.61	1668.42	10213.4	51.96	236.5	0	150	0	0	0	0
46	23	103	77	1	156.47	10.00	85.334	2133.73	1473.01	9577.6	71.41	228.6	0	0	75	0	0	0
46	23	103	3076	1	198.60	10.05	109.446	2361.77	1641.69	10906.8	42.25	167.4	0	150	0	0	0	0
46	23	103	45	1	96.29	11.89	74.269	1567.71	1281.58	8356.2	47.21	273.7	0	0	0	0	0	0

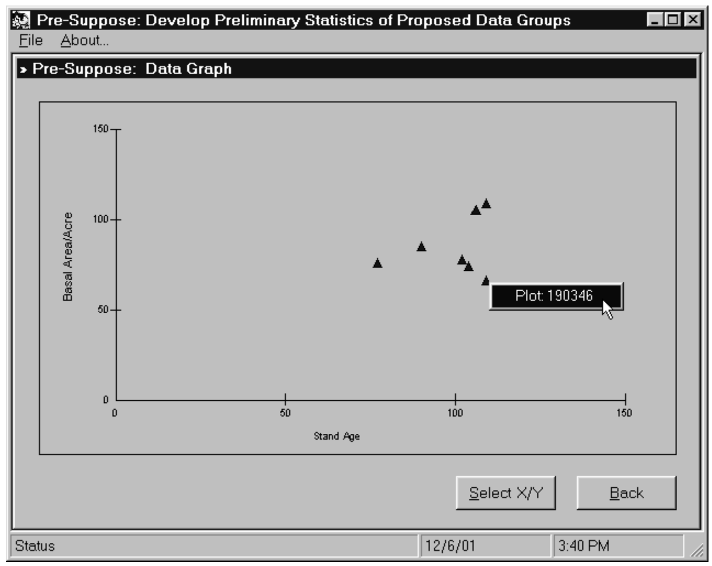
To aid in visually viewing the data, a graphing option is available. A scatter plot is displayed. This feature is extremely important in locating suspicious outliers in the proposed data stratum. The initial graph depicts trees per acre on the Y-axis versus successive plots on the X-axis.

16. Click the **Graph** command button to render the scatter plot.

17. Click the "**Select X/Y**" command button to pick data items to view.
18. In the upper window, scroll down to "**Stand Age**". Click the **Select X** command button to include in the graph.
19. In the lower window, scroll down to "**Basal Area/Acre**". Click the **Select Y** command button to include in the graph.
20. Click the **Display** command button located on the lower right of the Select X/Y window to view the selection.



21. By right-mouse clicking once on a data point, you can **reveal** its associated **plot number**.
22. Use the **Back** command button to return to the Print Preview window within Pre-Suppose.

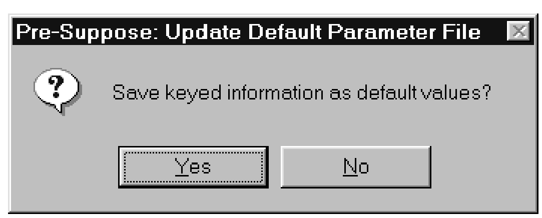


23. Click the 

command button in the lower right corner of the Print Preview window.

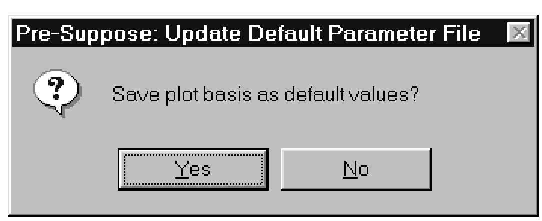
24. A message box will appear with the question, "**Save keyed information as default values?**". Selecting **Yes** will save the Code and Range Keys from this run to be displayed as the default values for the next run. Selecting **No** will not save the keyed parameters.

Click the **Yes** command button.



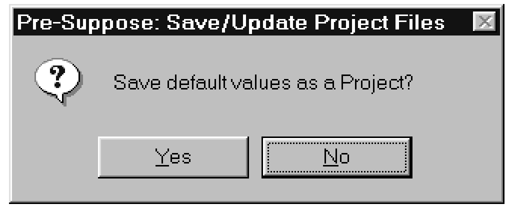
25. Another message box will appear asking whether to "**Save the plot basis as default values?**". This will save the current selection of plots to be stored in the default Pre-Suppose plot list (file: Presuppose.plt). Upon the subsequent run of Pre-Suppose, these plots will appear when Plot Inclusive or Plot Exclusive options are selected during Step 2 of the Wizard.

Click the **Yes** command button.



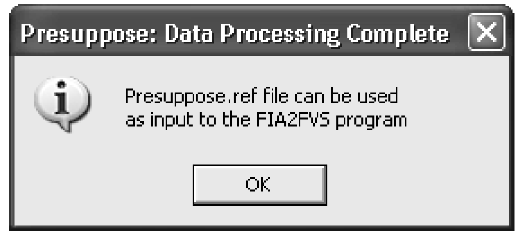
26. A third message box will appear inquiring, "**Save default values as a Project?**". This is a handy feature to save the keyed parameters and the plot basis under a project name for later retrieval. You never know when you might have to rerun a data sort.

    Click the **No** command button.



27. Finally, a message box will appear that informs "**Presuppose.ref file can be used as input to the FIA2FVS program**". The FIA2FVS program uses the same State FIA database file that the Prep program used to build the Pre-Suppose input database. In conjunction with the FIA plots listed in the Presuppose.ref file, FIA2FVS creates the Suppose.loc and input database used by Suppose and FVS.

    Click the **OK** command button to exit Pre-Suppose.



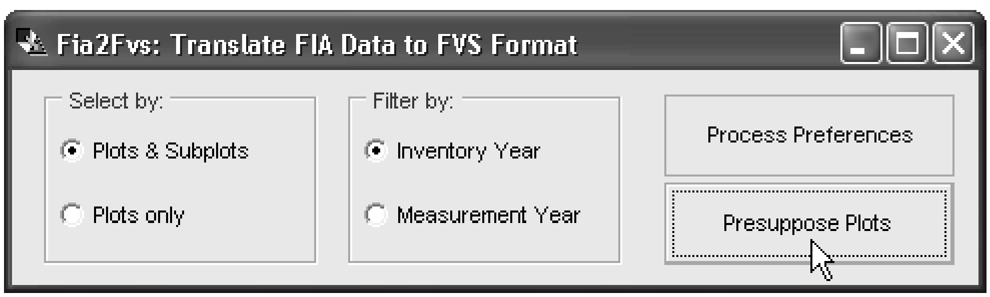
The FIA2FVS program can be used to translate FIA data into FVS format. The Users Guide for FIA2FVS can be found in the collection of topic papers in the document "Advance FVS Tools for Landscape Planning" located at this Web address:

http://www.fs.fed.us/fmsc/ftp/fvs/docs/gtr/Advance_Topics.pdf

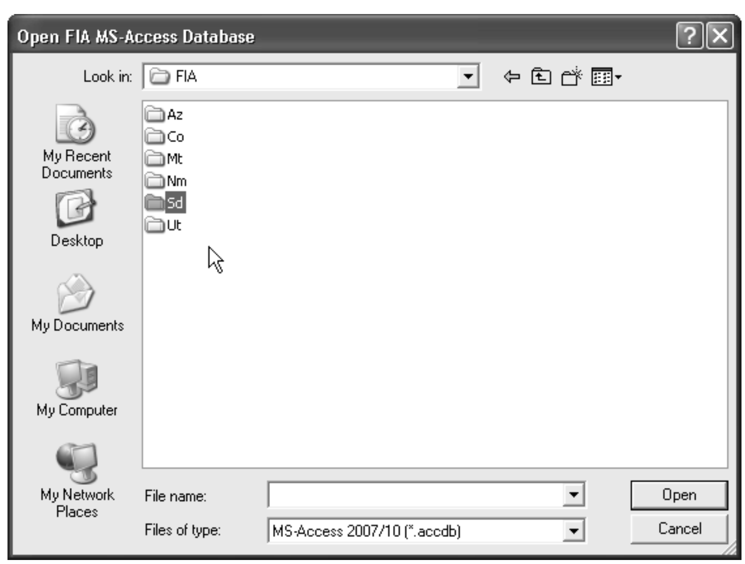
Use the installation program to set up the FIA2FVS program.

28. Execute **FIA2FVS** using the Start Menu, All Programs, FVS group, Fia2Fvs icon.
    - Alternatively, create a Desktop shortcut by right mouse clicking and directing to the desktop.

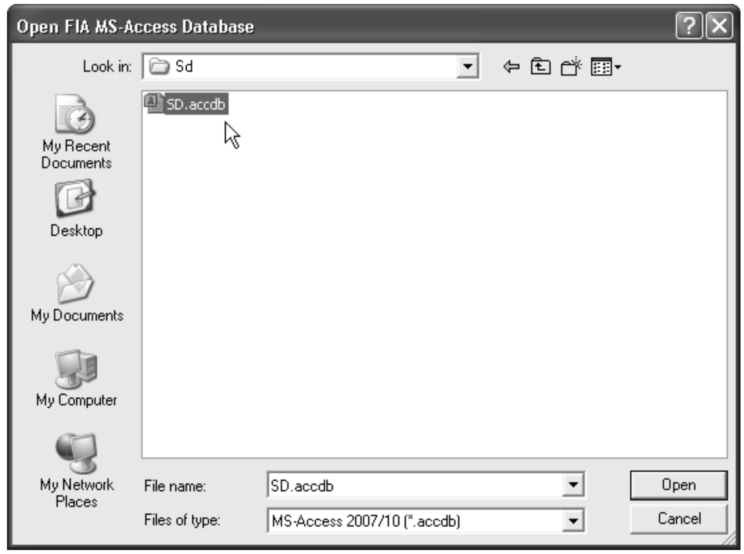
29. Click the **"Presuppose Plots"** button.



30. Navigate to the *working folder* that contains the **State FIA database**.

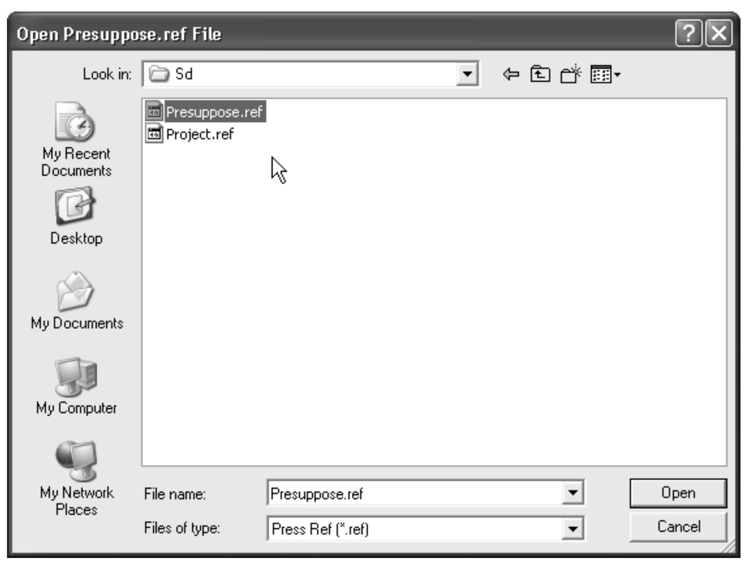


31. In the **“Open FIA MS-Access Database”** window, select the **State FIA database**.



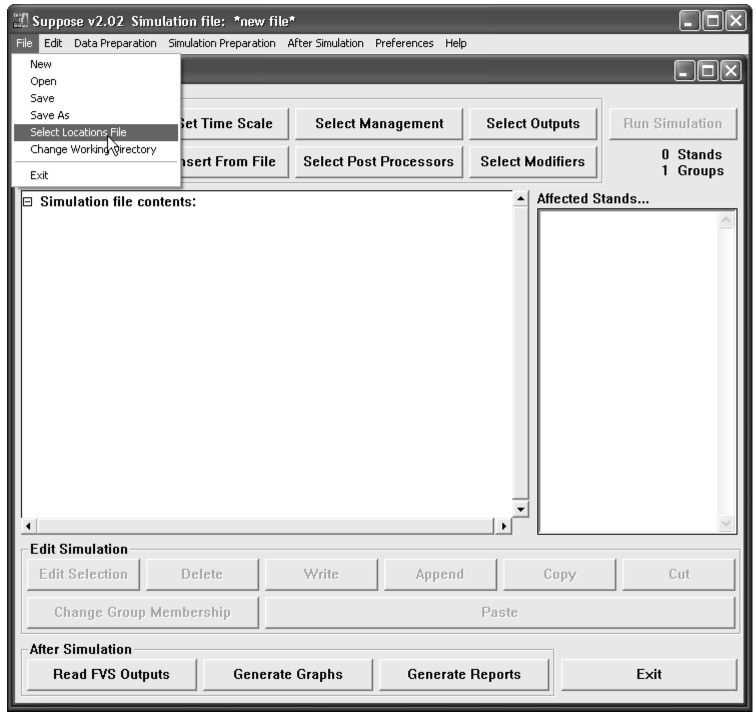
32. If the ***Fia2Fvs.mdb file exists*** from a previous execution of the program, a message box will prompt whether to delete this file. Select **“Yes”** to proceed.

33. An **“Open Presuppose.ref File”** window will appear, prompting selection of associated file created by the Pre-Suppose program.

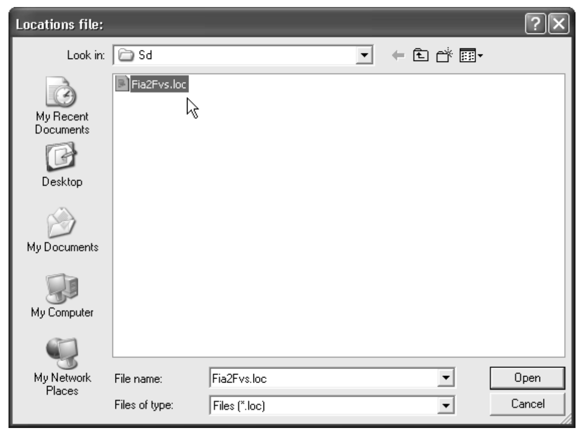


Follow the instruction beginning on page 4, step 23, of the FIA2FVS Users Guide (i.e.Topic_FIA2FVS). Once completed, input files for FVS will be created in the working folder based on the plots listed in the Presuppose.ref file.

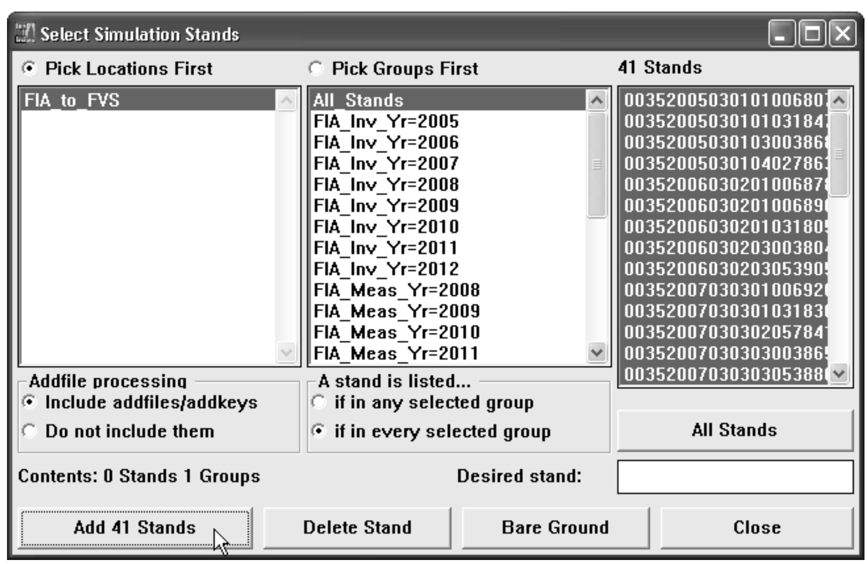
34. Execute the **Suppose** interface.



35. The stratum is ready to be run in **Suppose**. Use the **File, Select Locations File**, menu option to locate your newly create Suppose.loc file.



36. The **Select Simulation Stands** window within **Suppose** will appear. Pick the **Location Title** and **Group Code** as designated in Pre-Suppose. The associated stands will be displayed in the available Stands text box.



From this point on, you will be able to *presuppose* your input data set.

Additional Features:

Pre-Suppose Menu Options

The Pre-Suppose menu offers the following items:

File

Open Project	Retrieve saved parameter files
Exit	Exit Pre-Suppose

Help

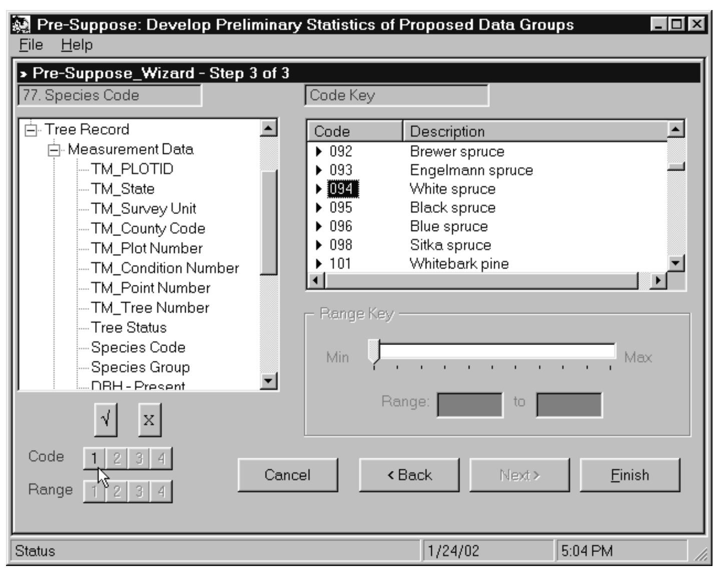
Contents	Offers an index to help topics
About	Displays vital statistics about Pre-Suppose

Tree Record Queries

Pre-Suppose generates the Plot Summary Statistical Analysis Report based on data in the plot tables. These tables contain one record per plot. In contrast, the tree tables contain one record per tree. Thus, the plot tables are significantly smaller in size versus the tree tables. Processing of the plot tables requires less input/output of records, which allow faster reporting. However, there are situations when the forest analyst needs information at the tree level. In this regard, the Plot Statistical Analysis Report renders an improper result. It displays all tree records, not the specified tree level attribute.

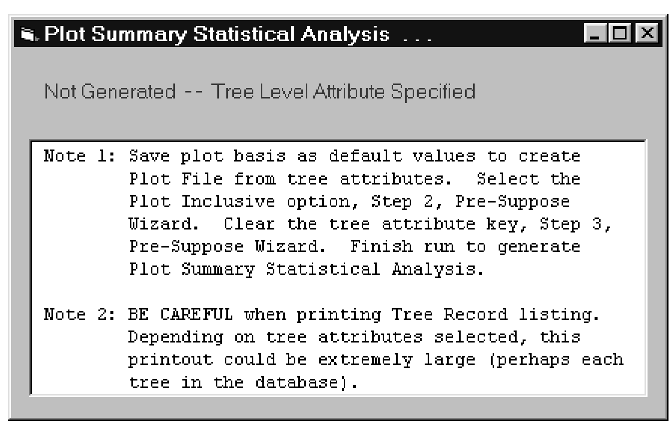
Suppose a particular tree species is threatened or endangered due to insect, disease, or human cause. No longer are plot summary values of interest. You can use Pre-Suppose to query plots that contain the tree species attribute. As an example, we will select White Spruce trees resident on the Black Hills National Forest during the 1999 FIA measurement. Let's pick up **Tree Level Processing** with **Step 3** of the **Pre-Suppose Wizard**.

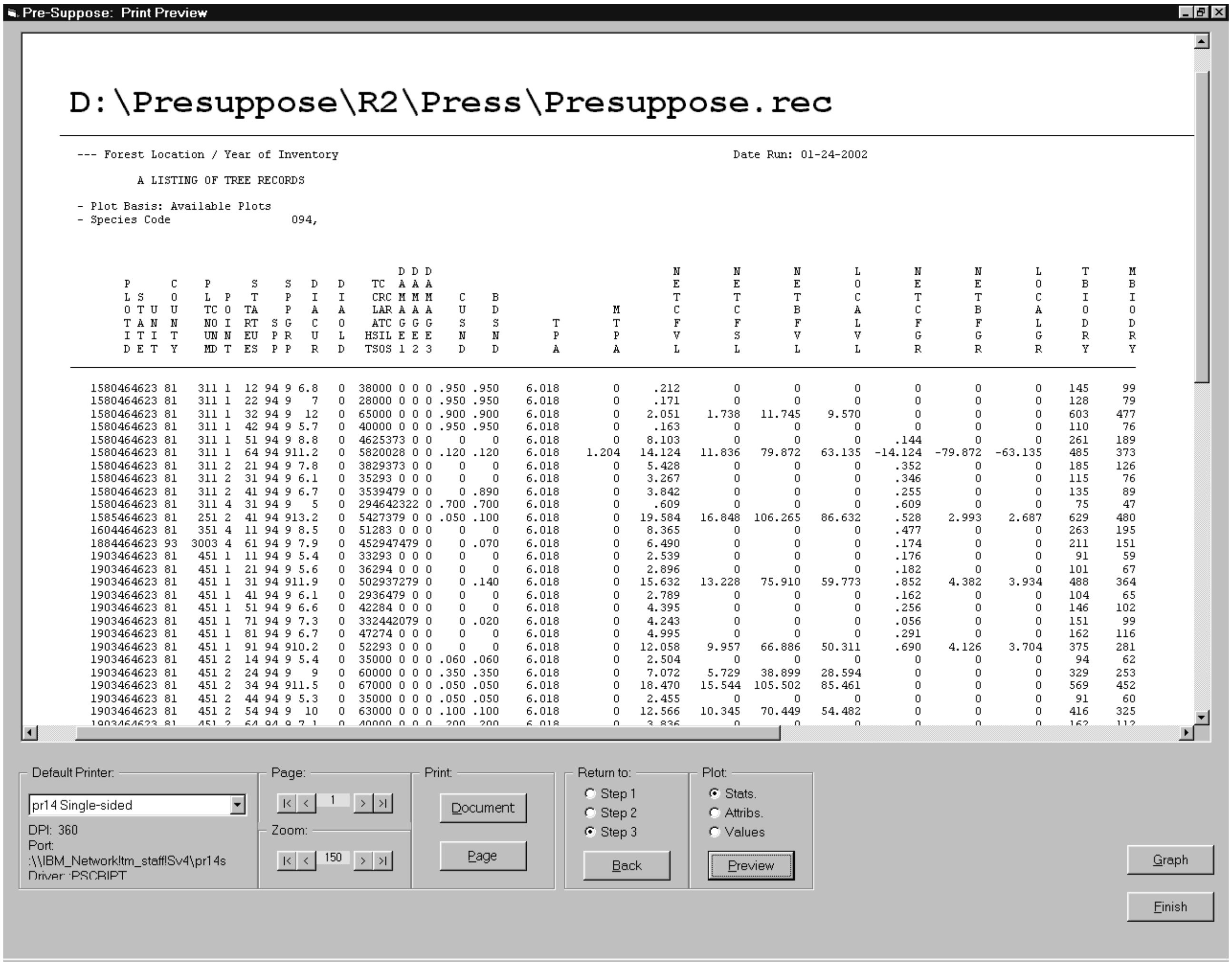
1. From the **Data Index** Window, click the **"+"** symbol next to the **Measurement Data** branch.
2. Click the **"Species Code"** data item in the treeview window in the left windowpane.
3. Scroll to the "**White Spruce**" option in the listview window in the right windowpane.
4. Select the "**094**" FIA Species Code and click the "**Add Key**" checkmark command button to include. **Code Key 1** should be highlighted.
5. Click the "**Finish**" command button to process your tree level request.
6. Click "**Finish**" again once the Plot Summary Statistical Analysis has been completed.



A dialog box will appear in the **Print Preview** window. It specifies that the **P**lot **S**ummary **S**tatistical **A**nalysis has been deferred as a result of a tree level attribute being included. **Note 1** details steps how to produce a Plot Summary Statistical Analysis for all trees on the plots that contain the tree level attribute. **Note 2** states a caution. Since the tree tables can be quite large and depending on the tree attribute requested, the output report listing the individual tree records could be rather extensive. Be careful not to produce a pile of unnecessary paper.

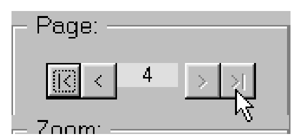
You can **close** this **dialog box** by using the **"X"** control box option in the upper right corner of the window.





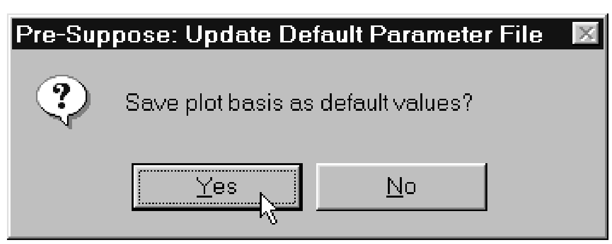
Listing of Tree Records

Pre-Suppose produces a complete listing of each tree record that met the tree level attribute. Tree measurement data is concatenated with tree calculated data to generated this report. This printout can be very large. If you choose to print the entire document, carefully examine the number of pages to be printed using the Page frame at the bottom of the Print Preview window.

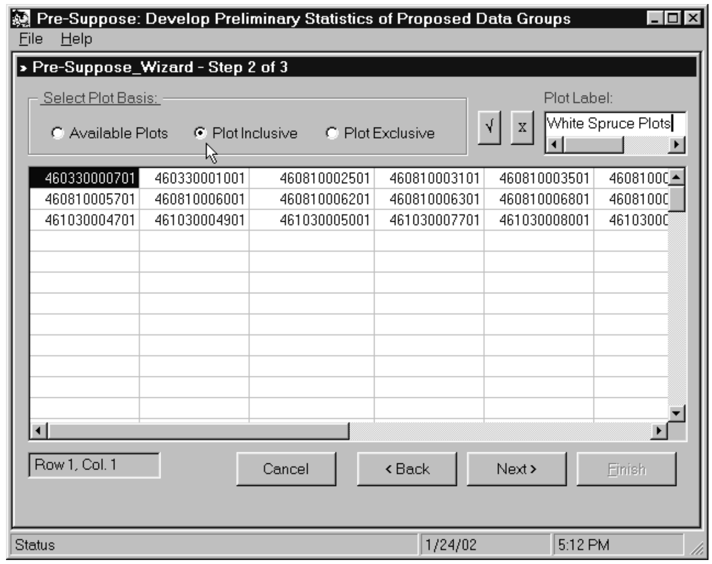


The **"Listing of Plot Attributes Report"** and **"Listing of Plot Values Report"** can be viewed by selecting the respective radio buttons in the Plot frame. Click the Preview command button to display. These listings contain the plot records with the tree level attribute. You can proceed to **capture** these **plots as the default input plot file** for Pre-Suppose. Follow these steps:

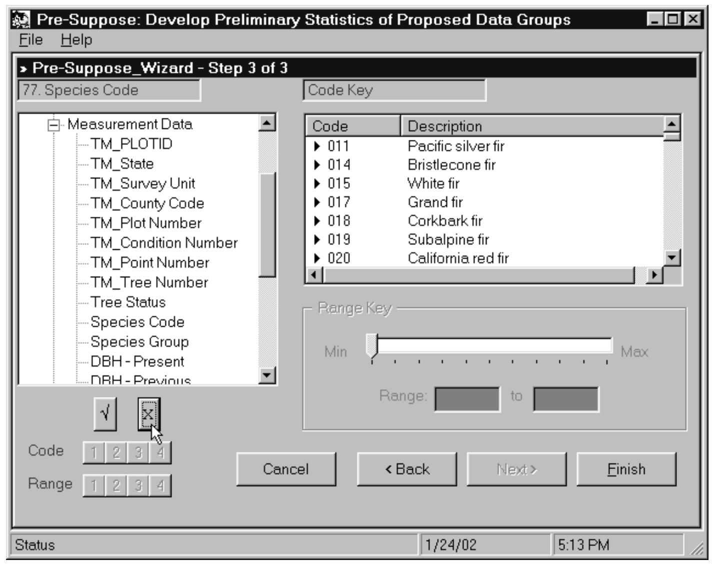
7. Click the "**Finish**" command button on the Print Preview window to proceed.
8. When prompted to "**Update Default Parameter File**", choose the "**Yes**" option to "**Save plot basis as default values**".
9. Answer remaining **Pre-Suppose prompts** to complete current run.
10. **Re-start** the **Pre-Suppose** program and **proceed** to **Step 2** of the run **Wizard**.



11. Select the "**Plot Inclusive**" radio button option to insert the plot numbers into the grid.
12. Make sure to include a "**Plot Label**" in the text box in the upper right corner of the form. This label will be display on the output reports.
13. Click the "**Next**" command button to continue on to **Step 3** of the **Pre-Suppose Wizard**.

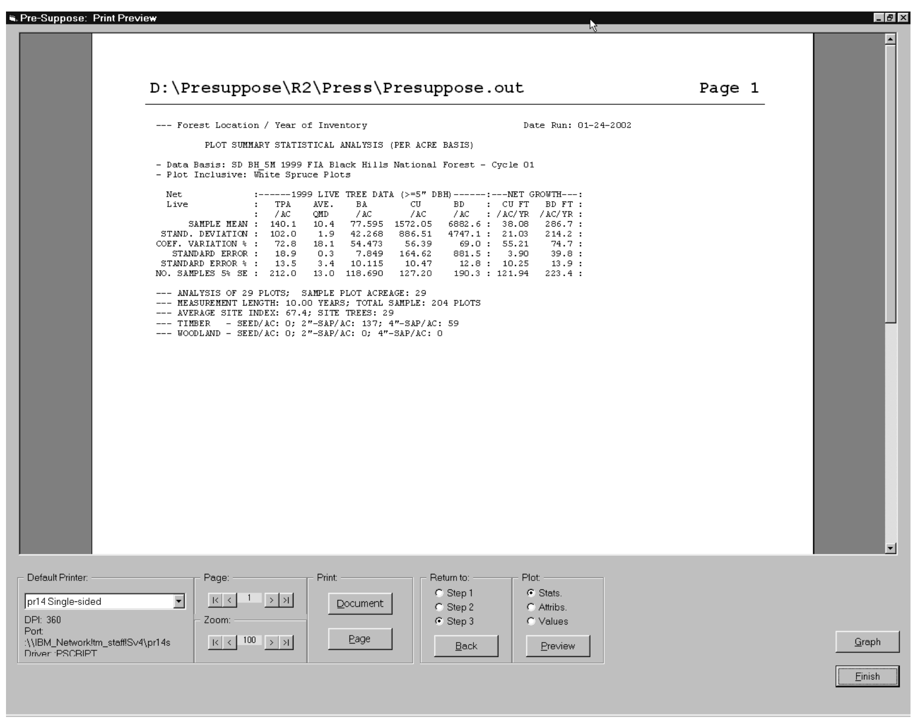


14. Use the **"X" Clear Key** command button to remove the tree level attribute from the run.
15. Click the **"Finish"** command button to initiate the **P**lot **S**ummary **S**tatistical **A**nalysis computation.
16. Click the **"Finish"** command button once again to proceed to the **Print Preview** window.



The **P**lot **S**ummary **S**tatistical **A**nalysis displays total plot information for all trees relative to the tree attribute specified in the previous run of Pre-Suppose. You can continue through the remaining steps and **link** these plots to the **Suppose Interface** as discussed previously.

Specifying tree level attributes can be rather tricky, at least in interpreting results. Do not hesitate to contact the developer and/or support team for further assistance if needed. We are here to help!



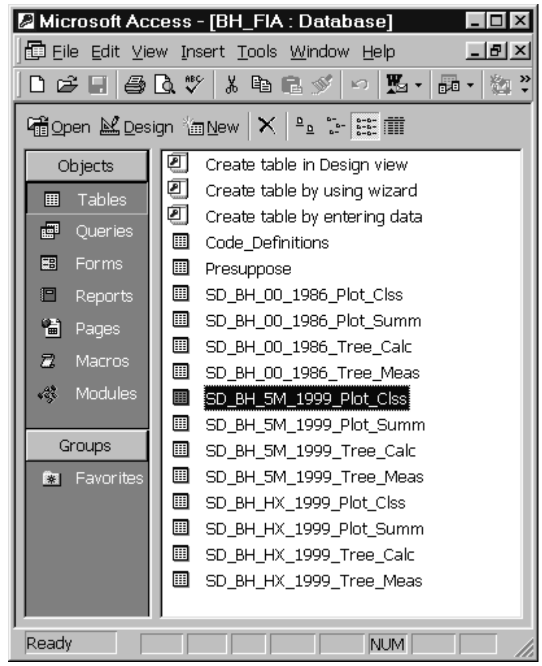
Data Base Considerations

Four data tables per location per inventory comprise the background database for Pre-Suppose. They are:

1. **Plot Classification** (_Plot_Clss)
2. **Plot Summary** (_Plot_Summ)
3. **Tree Measurement** (_Tree_Meas)
4. **Tree Calculation** (_Tree_Calc)

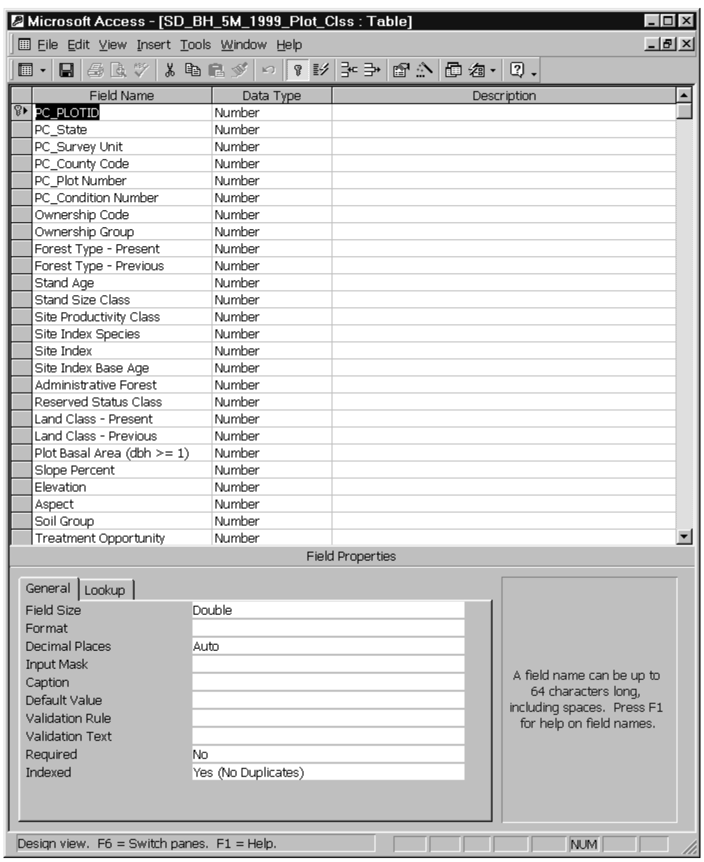
Notice that these same categories populate the **treeview** window on **Step 3** of the **Pre-Suppose Wizard**. Each forms a branch node that inherently contains relative data items. These data fields comprise the columns within the data tables.

Let's examine each of these individual tables.



Plot Classification Table

Plot classification data are field items collected during the inventory that describe the plot location attributes. In a general sense, this information records plot identification, stand classification, and site qualifications data. The basic design and view of the plot classification table are as follows:



Microsoft Access - [SD_BH_5M_1999_Plot_Clss : Table]

Field Name	Data Type	Description
PC_PLOTID	Number	
PC_State	Number	
PC_Survey Unit	Number	
PC_County Code	Number	
PC_Plot Number	Number	
PC_Condition Number	Number	
Ownership Code	Number	
Ownership Group	Number	
Forest Type - Present	Number	
Forest Type - Previous	Number	
Stand Age	Number	
Stand Size Class	Number	
Site Productivity Class	Number	
Site Index Species	Number	
Site Index	Number	
Site Index Base Age	Number	
Administrative Forest	Number	
Reserved Status Class	Number	
Land Class - Present	Number	
Land Class - Previous	Number	
Plot Basal Area (dbh >= 1)	Number	
Slope Percent	Number	
Elevation	Number	
Aspect	Number	
Soil Group	Number	
Treatment Opportunity	Number	

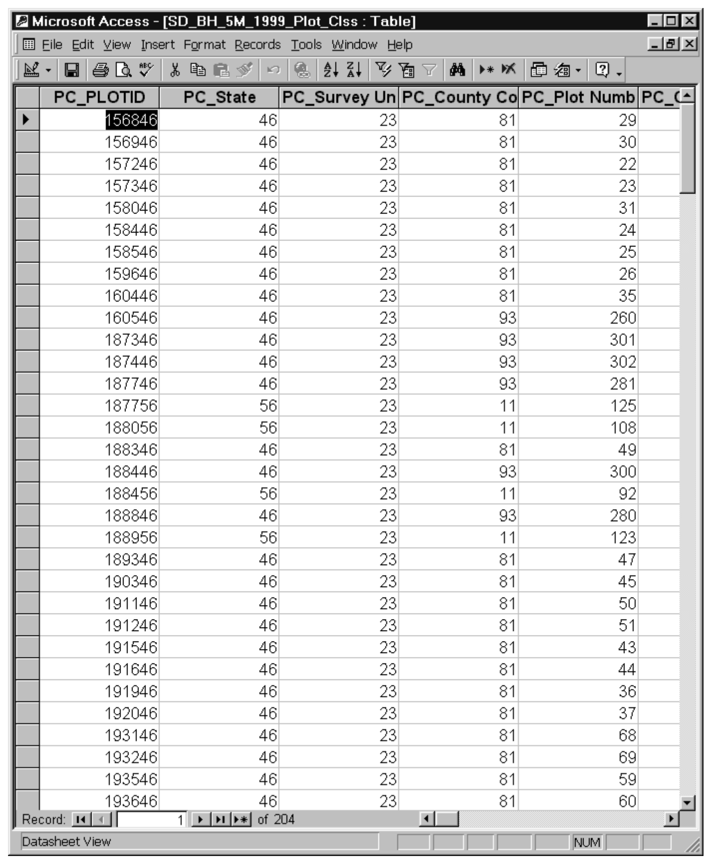
Field Properties

General | Lookup

Field Size	Double
Format	
Decimal Places	Auto
Input Mask	
Caption	
Default Value	
Validation Rule	
Validation Text	
Required	No
Indexed	Yes (No Duplicates)

A field name can be up to 64 characters long, including spaces. Press F1 for help on field names.

Design view. F6 = Switch panes. F1 = Help.



Microsoft Access - [SD_BH_5M_1999_Plot_Clss : Table]

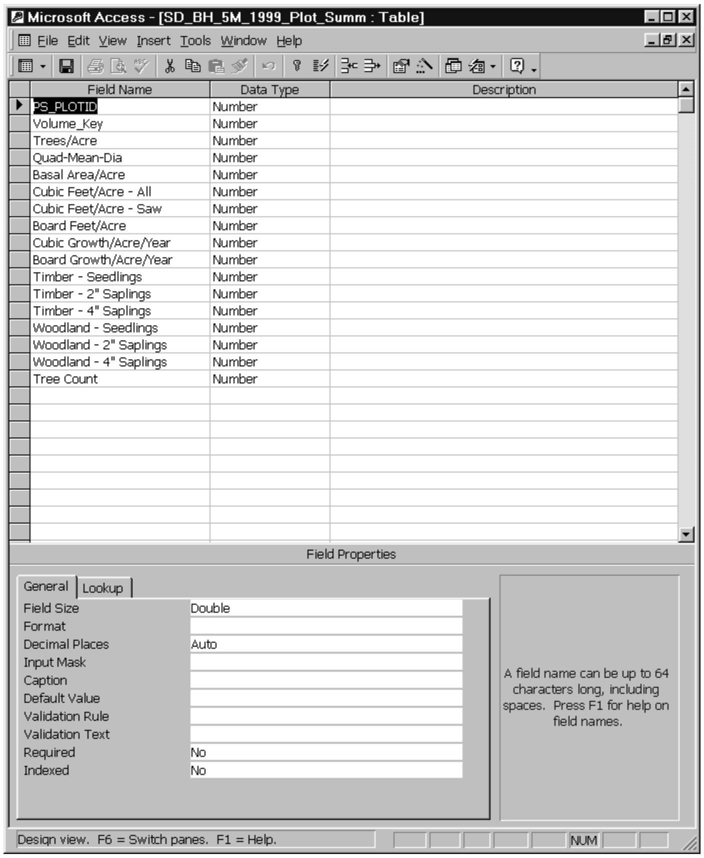
PC_PLOTID	PC_State	PC_Survey Un	PC_County Co	PC_Plot Numb	PC_(
156846	46	23	81	29	
156946	46	23	81	30	
157246	46	23	81	22	
157346	46	23	81	23	
158046	46	23	81	31	
158446	46	23	81	24	
158546	46	23	81	25	
159646	46	23	81	26	
160446	46	23	81	35	
160546	46	23	93	260	
187346	46	23	93	301	
187446	46	23	93	302	
187746	46	23	93	281	
187756	56	23	11	125	
188056	56	23	11	108	
188346	46	23	81	49	
188446	46	23	93	300	
188456	56	23	11	92	
188846	46	23	93	280	
188956	56	23	11	123	
189346	46	23	81	47	
190346	46	23	81	45	
191146	46	23	81	50	
191246	46	23	81	51	
191546	46	23	81	43	
191646	46	23	81	44	
191946	46	23	81	36	
192046	46	23	81	37	
193146	46	23	81	68	
193246	46	23	81	69	
193546	46	23	81	59	
193646	46	23	81	60	

Record: 1 of 204

Datasheet View

Plot Summary Table

Plot characteristics that are compiled to a per acre basis are referred to as Plot Summary data. Commonly, these are trees frequencies, quadratic mean diameter, basal area, cubic foot volume, and board foot volume components. The basic design and view of the plot summary table are as follows:


Microsoft Access - [SD_BH_5M_1999_Plot_Summ : Table]

Field Name	Data Type	Description
PS_PLOTID	Number	
Volume_Key	Number	
Trees/Acre	Number	
Quad-Mean-Dia	Number	
Basal Area/Acre	Number	
Cubic Feet/Acre - All	Number	
Cubic Feet/Acre - Saw	Number	
Board Feet/Acre	Number	
Cubic Growth/Acre/Year	Number	
Board Growth/Acre/Year	Number	
Timber - Seedlings	Number	
Timber - 2" Saplings	Number	
Timber - 4" Saplings	Number	
Woodland - Seedlings	Number	
Woodland - 2" Saplings	Number	
Woodland - 4" Saplings	Number	
Tree Count	Number	

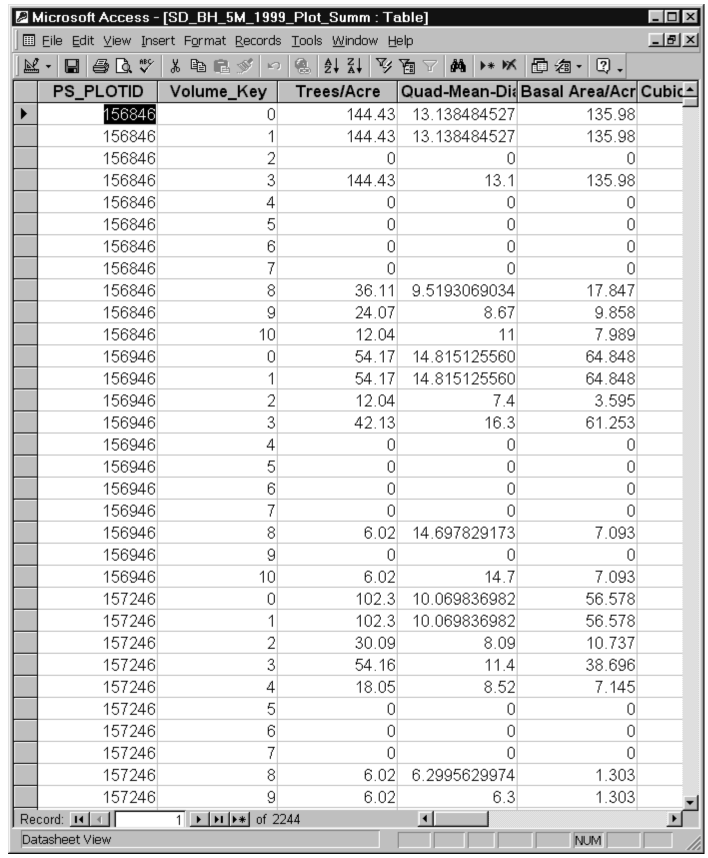
Field Properties

General | Lookup

Field Size	Double
Format	
Decimal Places	Auto
Input Mask	
Caption	
Default Value	
Validation Rule	
Validation Text	
Required	No
Indexed	No

A field name can be up to 64 characters long, including spaces. Press F1 for help on field names.

Design view. F6 = Switch panes. F1 = Help.


Microsoft Access - [SD_BH_5M_1999_Plot_Summ : Table]

PS_PLOTID	Volume_Key	Trees/Acre	Quad-Mean-Di	Basal Area/Acr	Cubic
156846	0	144.43	13.138484527	135.98	
156846	1	144.43	13.138484527	135.98	
156846	2	0	0	0	
156846	3	144.43	13.1	135.98	
156846	4	0	0	0	
156846	5	0	0	0	
156846	6	0	0	0	
156846	7	0	0	0	
156846	8	36.11	9.5193069034	17.847	
156846	9	24.07	8.67	9.858	
156846	10	12.04	11	7.989	
156946	0	54.17	14.815125560	64.848	
156946	1	54.17	14.815125560	64.848	
156946	2	12.04	7.4	3.595	
156946	3	42.13	16.3	61.253	
156946	4	0	0	0	
156946	5	0	0	0	
156946	6	0	0	0	
156946	7	0	0	0	
156946	8	6.02	14.697829173	7.093	
156946	9	0	0	0	
156946	10	6.02	14.7	7.093	
157246	0	102.3	10.069836982	56.578	
157246	1	102.3	10.069836982	56.578	
157246	2	30.09	8.09	10.737	
157246	3	54.16	11.4	38.696	
157246	4	18.05	8.52	7.145	
157246	5	0	0	0	
157246	6	0	0	0	
157246	7	0	0	0	
157246	8	6.02	6.2995629974	1.303	
157246	9	6.02	6.3	1.303	

Record: 1 of 2244

Datasheet View

The **Volume_Key** field is defined as follows:

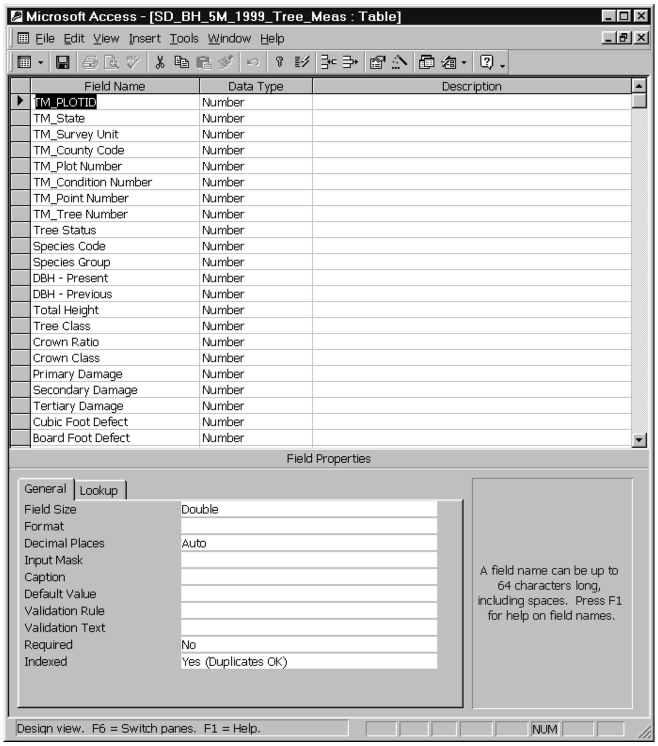
Volume_Key(0) = Live All - Gross
Volume_Key(1) = Live All - Net
Volume_Key(2) = Live Pulp
Volume_Key(3) = Live Saw
Volume_Key(4) = Live Rough cull
Volume_Key(5) = Live Rotten Cull
Volume_Key(6) = Woodland
Volume_Key(7) = Harvest All
Volume_Key(8) = Mortality All
Volume_Key(9) = Mortality Salvage
Volume_Key(10) = Mortality Non-Salvage

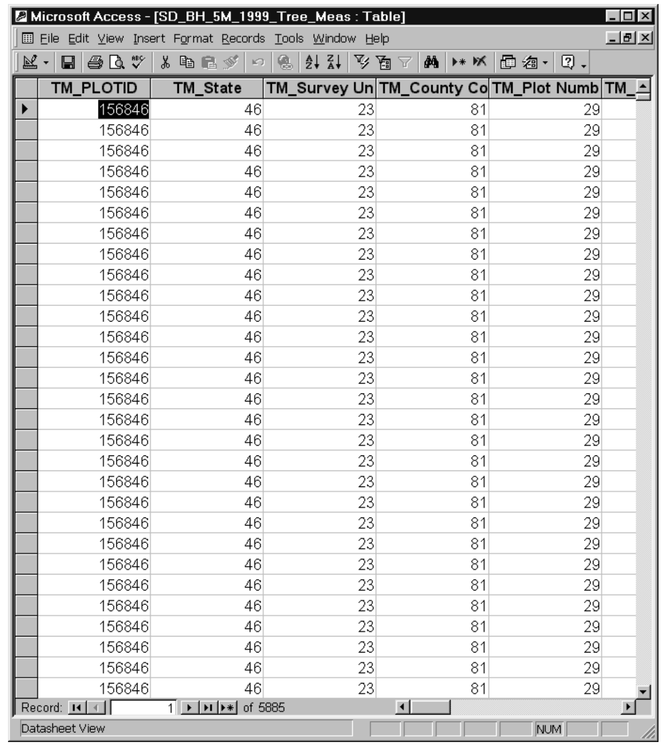
Plot Summary Statistical Reports can be generated in several flavors. The **Volume_Key** field represents various definitions of "**Tree Class**". The FIA categorizes each tree by timber or woodland species; by live, cut, or dead; and, by various soundness breaks. Plot summary data is winnowed into its proper Volume_Key by sorting of the Tree Class code. Notice that the "**Summary Statistic**" Tab on **Step 1** of the **Pre-Suppose Wizard** displays each of these categories. Potentially, any one or all could be produced by Pre-Suppose.

Plot summary data pertains to trees with **diameters greater** than or equal to **5.0 inches**. Saplings are tallied by species and recorded by 2-inch diameter classes. Seedling counts are tallied by species for trees less than 1.0 inch in diameter. Timber species seedling and sapling data is placed on Volume_Key 0 and 1 record types. Woodland species seedling and sapling data is stored on Volume_Key 6 records.

Tree Measurement Table

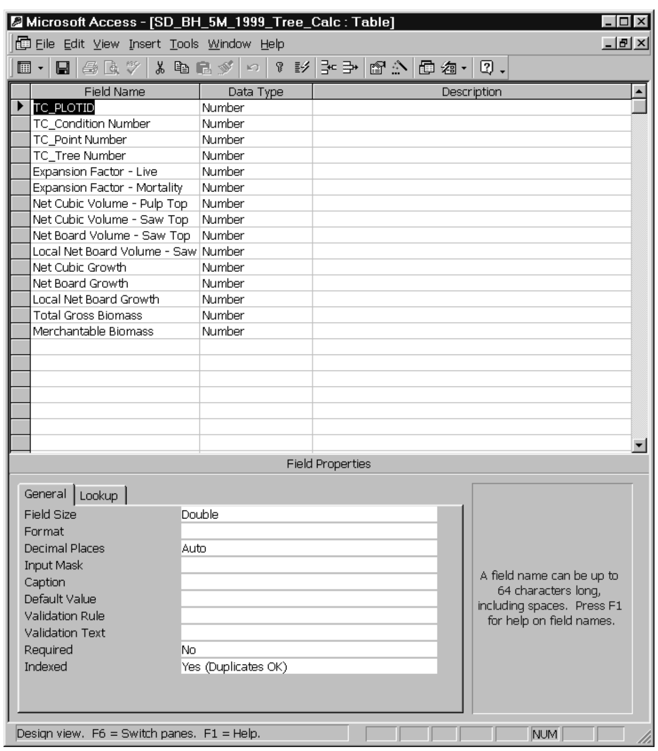
Tree measurement data is composed of tree identification and collected information. Tree numbers are assigned; species identification is determined. Diameter, height, class, status, and damage coding is often collected. This information is stored in the tree measurement table. The basic design and view of the tree measurement table are as follows:

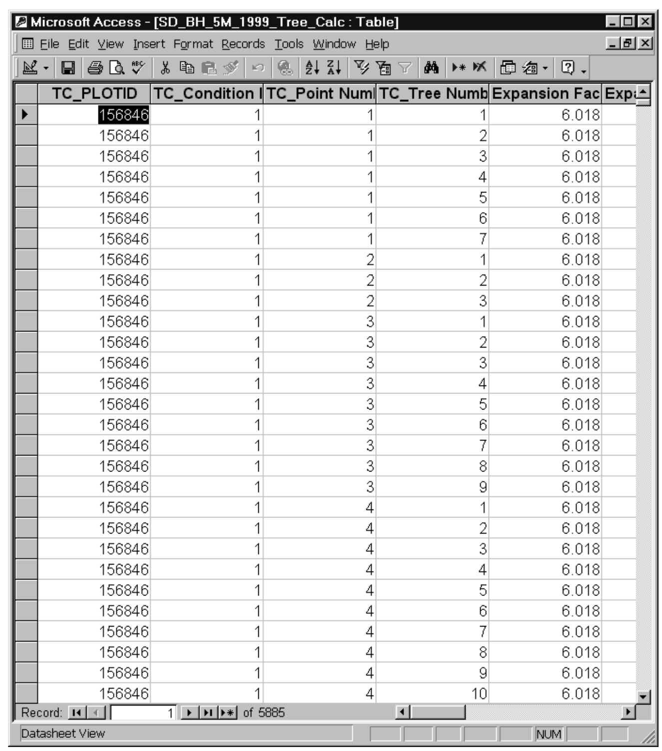




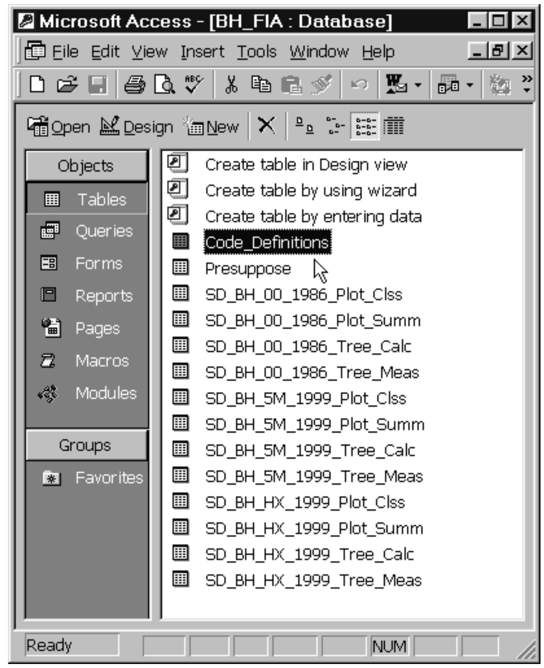
Tree Calculation Table

Office processing of the field measurements includes the computation of tree volume information. Cubic and board volume as well as biomass predictions are made. Expansion factors render trees per acre estimates based on the sampling design. These data are stored in the tree calculation table. The basic design and view of the tree calculation table are as follows:





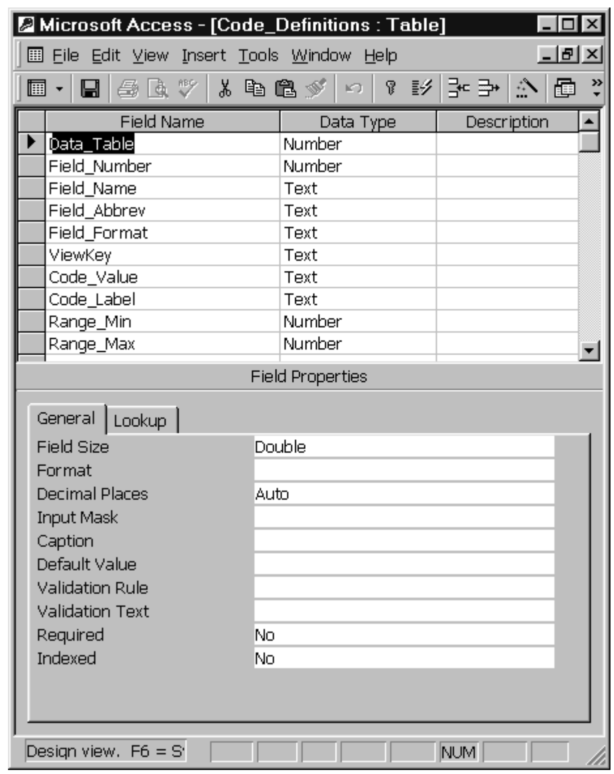
There are an **additional** two **tables** that Pre-Suppose uses for operation: one for input, one for output. The **Code_Definitions Table** is developed in conjunction with the Plot and Tree Tables. This table provides the link to the other input tables and is the main driver of the Pre-Suppose program. The **Presuppose Table** is created internally by Pre-Suppose and renders the output of the requested query. Let's take an in depth look at the Code_Definitions Table.



Code Definitions Table

The Code_Definitions Table can be easily developed from an inventory field manual or from a data base user guide. Code Definition fields are:

1. **Data_Table**
   a. **"1"** = Plot Classification
   b. **"2"** = Plot Summary
   c. **"3"** = Tree Measurement
   d. **"4"** = Tree Calculation
2. **Field_Number**: Data Item Number
3. **Field_Name**: Common Name
4. **Field_Abbrev**: Abbreviate Name
   (Used for Report Columns)
5. **Field_Format**: Print Format String
   (Used for Report Rows)
6. **ViewKey**:
   a. **"C"** = Code Key
   b. **"R"** = Range Key
   c. "**X** = Coded Value, Not Displayed
   d. "**N**" = Not Coded, Not Displayed
7. **Code_Value**: Available Codes
8. **Code_Label**: Associated Labels
9. **Range_Min**: Minimum Range Value
10. **Range_Max**: Maximum Range Value



The report headers and records for the **Plot Attribute** and **Tree Record Listings** are self-generated from the database. Pre-Suppose uses the **Field_Abbrev** and **Field_Format** columns to determine proper placement of labels and printed values.

Data fields are considered either "**Code**" or "**Range**" items. Stored fields that are **categorical** in nature are best described as **Code** items. Those that are **continuous** in nature are best described as **Range** items. For example, State, Survey Unit, County, and Ownership would be coded items. Plot Number, Site Index, Stand Age, and Basal Area per Acre would be good examples of range items. Depending on whether a data item is considered a Code or Range entity determines the set up of the Code Definition Table. The term "**Key**" is used to describe **data query attributes**. The "**X**" and "**N**" **ViewKey** designations are placeholders in the database. These data items **do not appear** on **Step 3** of the **Pre-Suppose Wizard**.
Let's take a look inside the **Code_Definitions Table**:

Data_Table 1: Plot Classification

Microsoft Access - [Code_Definitions : Table]

Data_Table	Field_Number	Field_Name	Field_Abbrev	Field_Format	ViewKey	Code_Value	Code_Label	Range_Min	Range_Max
1	1	PC_PLOTID	PC_PLOTID	I9	R			0	1000000
1	2	PC_State	PC_STATE	I2	C	46	South Dakota		
1	2	PC_State	PC_STATE	I2	C	56	Wyoming		
1	2	PC_State	PC_STATE	I2	C	49	Utah		
1	2	PC_State	PC_STATE	I2	C	41	Oregon		
1	2	PC_State	PC_STATE	I2	C	35	New Mexico		
1	2	PC_State	PC_STATE	I2	C	32	Neveda		
1	2	PC_State	PC_STATE	I2	C	16	Idaho		
1	2	PC_State	PC_STATE	I2	C	15	Hawaii		
1	2	PC_State	PC_STATE	I2	C	08	Colorado		
1	2	PC_State	PC_STATE	I2	C	02	Alaska		
1	2	PC_State	PC_STATE	I2	C	06	California		
1	2	PC_State	PC_STATE	I2	C	53	Washington		
1	2	PC_State	PC_STATE	I2	C	04	Arizona		
1	2	PC_State	PC_STATE	I2	C	30	Montana		
1	3	PC_Survey Unit	PC_UNIT	I2	R			0	10
1	4	PC_County Code	PC_COUNTY	I3	R			0	1000
1	5	PC_Plot Number	PC_PLTNUM	I5	R			0	10000
1	6	PC_Condition Number	PC_COND	I1	R			0	10
1	7	Ownership Code	PC_OWNER	I2	C	16	County and Municipal		

Record: 1 of 729

Datasheet View

Data_Table 2: Plot Summary

Microsoft Access - [Code_Definitions : Table]

Data_Table	Field_Number	Field_Name	Field_Abbrev	Field_Format	ViewKey	Code_Value	Code_Label	Range_Min	Range_Max
2	1	PS_PLOTID	PS_PLOTID	I9	R			0	1000000
2	2	Volume_Key	PS_VOLKEY	I1	R			0	9
2	3	Trees/Acre	PS_TPA	F7.2	R			0	500
2	4	Quad-Mean-Dia	PS_QMD	F5.2	R			5	50
2	5	Basal Area/Acre	PS_BA	F7.3	R			0	250
2	6	Cubic Feet/Acre - All	PS_CUA	F8.2	R			0	10000
2	7	Cubic Feet/Acre - Saw	PS_CUS	F8.2	R			0	10000
2	8	Board Feet/Acre	PS_BD	F8.1	R			0	50000
2	9	Cubic Growth/Acre/Yea	PS_CUGR	F8.2	R			0	250
2	10	Board Growth/Acre/Yea	PS_BDGR	F8.1	R			0	1250
2	11	Timber - Seedlings	PS_TIMBSEED	I5	R			0	10000
2	12	Timber - 2" Saplings	PS_TIMBSAP2	I5	R			0	5000
2	13	Timber - 4" Saplings	PS_TIMBSAP4	I5	R			0	5000
2	14	Woodland - Seedlings	PS_WOODSEED	I5	R			0	10000
2	15	Woodland - 2" Saplings	PS_WOODSAP2	I5	R			0	5000
2	16	Woodland - 4" Saplings	PS_WOODSAP4	I5	R			0	5000
2	17	Tree Count	PS_TREECNT	I7	R			0	25000
3	1	TM_PLOTID	TM_PLOTID	I9	R			0	1000000
3	2	TM_State	TM_STATE	I2	C	16	Idaho		
3	2	TM_State	TM_STATE	I2	C	56	Wyoming		

Record: 486 of 729

Datasheet View

Data_Table 3: Tree Measurement

Microsoft Access - [Code_Definitions : Table]

Data_Table	Field_Number	Field_Name	Field_Abbrev	Field_Format	ViewKey	Code_Value	Code_Label	Range_Min	Range_Max
3	1	TM_PLOTID	TM_PLOTID	I9	R			0	1000000
3	2	TM_State	TM_STATE	I2	C	16	Idaho		
3	2	TM_State	TM_STATE	I2	C	56	Wyoming		
3	2	TM_State	TM_STATE	I2	C	53	Washington		
3	2	TM_State	TM_STATE	I2	C	49	Utah		
3	2	TM_State	TM_STATE	I2	C	46	South Dakota		
3	2	TM_State	TM_STATE	I2	C	41	Oregon		
3	2	TM_State	TM_STATE	I2	C	35	New Mexico		
3	2	TM_State	TM_STATE	I2	C	30	Montana		
3	2	TM_State	TM_STATE	I2	C	15	Hawaii		
3	2	TM_State	TM_STATE	I2	C	8	Colorado		
3	2	TM_State	TM_STATE	I2	C	6	California		
3	2	TM_State	TM_STATE	I2	C	4	Arizona		
3	2	TM_State	TM_STATE	I2	C	2	Alaska		
3	2	TM_State	TM_STATE	I2	C	32	Neveda		
3	3	TM_Survey Unit	TM_UNIT	I2	R			0	10
3	4	TM_County Code	TM_COUNTY	I3	R			0	1000
3	5	TM_Plot Number	TM_PLTNUM	I5	R			0	10000
3	6	TM_Condition Number	TM_COND	I1	R			0	10
3	7	TM_Point Number	TM_POINT	I2	R			0	10

Record: 503 of 729

Datasheet View

Data_Table 4: Tree Calculation

Data_Table	Field_Number	Field_Name	Field_Abbrev	Field_Format	ViewKey	Code_Value	Code_Label	Range_Min	Range_Max
4	1	TC_PLOTID	TC_PLOTID	I9	R			0	1000000
4	2	TC_Condition Number	TC_COND	I1	R			0	10
4	3	TC_Point Number	TC_POINT	I2	R			0	10
4	4	TC_Tree Number	TC_TREE	I3	R			0	100
4	5	Expansion Factor - Live	TC_TPA	F9.3	R			0	10000
4	6	Expansion Factor - Mor	TC_MTPA	F9.3	R			0	10000
4	7	Net Cubic Volume - Pu	TC_NETCFVL	F9.3	R			0	250
4	8	Net Cubic Volume - Sa	TC_NETCFSL	F9.3	R			0	250
4	9	Net Board Volume - Sa	TC_NETBFVL	F9.3	R			0	2000
4	10	Local Net Board Volum	TC_LOCALVL	F9.3	R			0	2000
4	11	Net Cubic Growth	TC_NETCFGR	F9.3	R			0	25
4	12	Net Board Growth	TC_NETBFGR	F9.3	R			0	200
4	13	Local Net Board Growth	TC_LOCALGR	F9.3	R			0	200
4	14	Total Gross Biomass	TC_TBIODRY	F7.0	R			0	10000
4	15	Merchantable Biomass	TC_MBIODRY	F7.0	R			0	10000

Record: 715 of 729

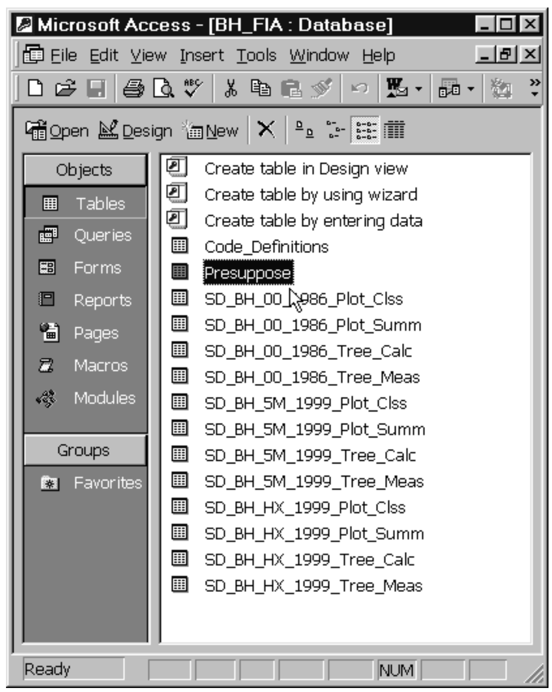
Pre-Suppose uses the **ViewKey** and associated **Code_Value** and **Code_Label** ***or*** **Range_Min** and **Range_Max** fields to populate the **treeview** and **listview** windows for **Step 3** of the **Wizard**.

*****<u>IT IS IMPERATIVE</u>***** that the **Field_Name labels** match exactly to the **column headings** of the **P**lot **C**lassification, **P**lot **S**ummary, **T**ree **M**easurement, and **T**ree **C**alculation Tables. If they do not, Pre-Suppose will not process properly.

Dynamically Modify the Database

Users of Pre-Suppose can easily **add additional data items** to the database. Open the **Code_Definitions Table** in Datasheet View mode. At the bottom of the table, use the blank row to insert a new data item. Fill in the columns appropriately. You will need multiple rows if you are describing a coded item. Range items only need one row. **Proceed to** the **data table** that contains the new data item. Open the table in Design View mode. Insert the new row in the proper location. This will create a new column in the database. Populate the column appropriately. **Using a spreadsheet simplifies that task**. You can copy and paste a column from the spreadsheet to the database with just a few keystrokes. The spreadsheet also allows easy manipulation of the data. However, spreadsheets are limited in the number of rows they can represent.

Pre-Suppose creates an **output** table named "**Presuppose**" that contains the fields generated from the Code and Range Keys entered on **Step 3** of the **Wizard**. Users can open this table and examine the resultant data set. Plot and tree attributes are produced from this set of records.



Notes:

Topic TOSS: **Tossing Logs with Table Output Selection Screen**

Concepts: learn how to create logs with the TOSS Post Processor.

The **Table Output Selection Screen (TOSS)** allows users to pick desired tables from one or more FVS Main Output files (files with the extension **.out**). The selected tables are stored in a file called **Toss.log**. The user can rename this file for later retrieval if desired. Multi-plot runs that are common with forest planning analysis can use **TOSS** to quickly examine individual plot projections without having to wade through the enormous volume of output produced by the FVS Variant.

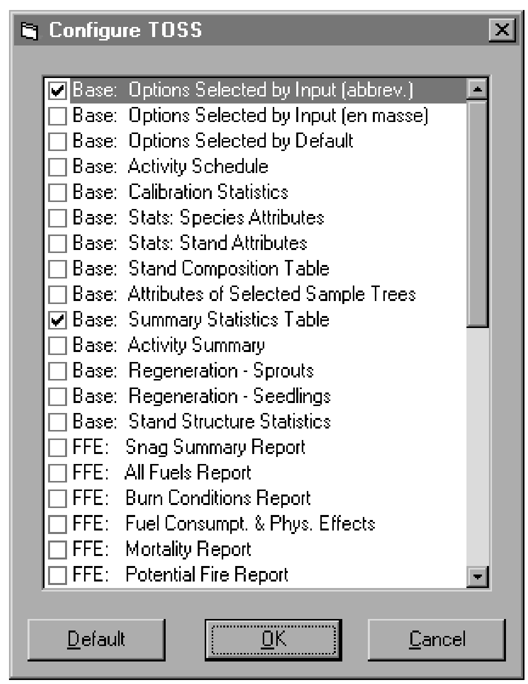
TOSS can be run as a post processor from within Suppose or as a stand alone program. Examples are presented under each topic that demonstrates the utility of **TOSS**. The example output was derived from Forest Inventory and Analysis (FIA) data from the Flathead National Forest.

TOSS Menu Options

The TOSS menu offers the following items:

- File
  - Preference
    - Configure — Specifies selected tables as user default
    - Default — Resets selected tables to program defaults
  - Exit — Exit TOSS
- Help
  - Help Topics — Offers an index to help topics
  - About — Displays vital statistics about TOSS

TOSS Preference



The **TOSS** Preference option allows setting the predefined selected tables to either a user specified set or to the embedded program default values. Currently, there are over forty tables that can occur in the FVS Main Output file. By programmatic default, only the *abbreviated Option Selected by Input* and *Summary Statistics Table* are extracted from the main output file. A user can set their preferred selected tables by using this menu option. The following window appears:

By simply selecting the appropriate checkbox in the listbox window, user specified default tables will be printed to the **Toss.log** output report. The various tables within the FVS Main Output report are listed sequentially as either being created by the base model or by model extensions. The acronym for the model extension should suffice to aid in table selection.

To reset predefined selected tables to the embedded program defaults, simply click the **Default** command button. Select the **OK** command button to continue. Selecting the **Cancel** command button will return the predefined selected tables to their original values.

TOSS as a Post Processor

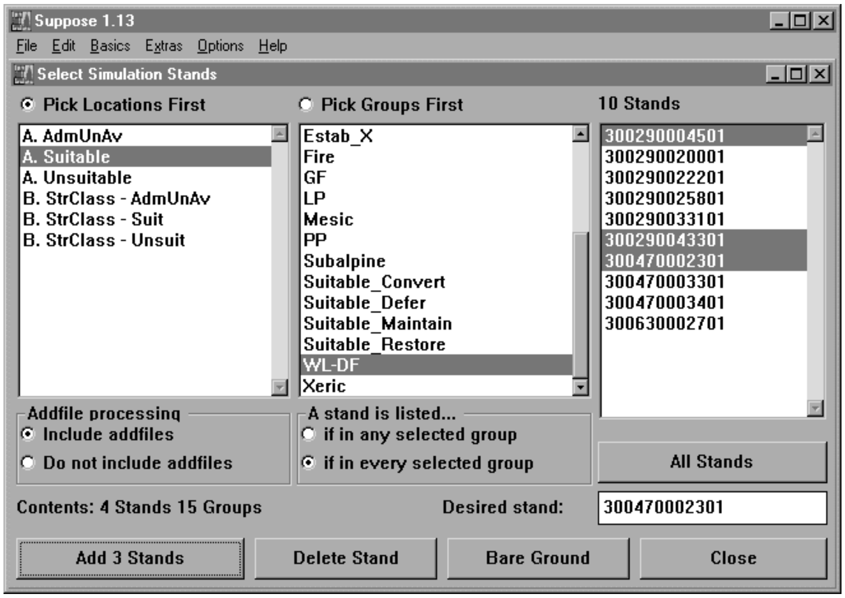
TOSS can be run as a post processor from within Suppose. An example, using Forest Inventory and Analysis (FIA) data from the Flathead National Forest, follows as a demonstration of the process. The simulation projection includes tables from the FVS Base Model, Fire and Fuels Extension, Western Root Disease Extension, and Dwarf Mistletoe Extension.

Running Suppose

From the Desktop or Start Menu, select the **Suppose** icon:

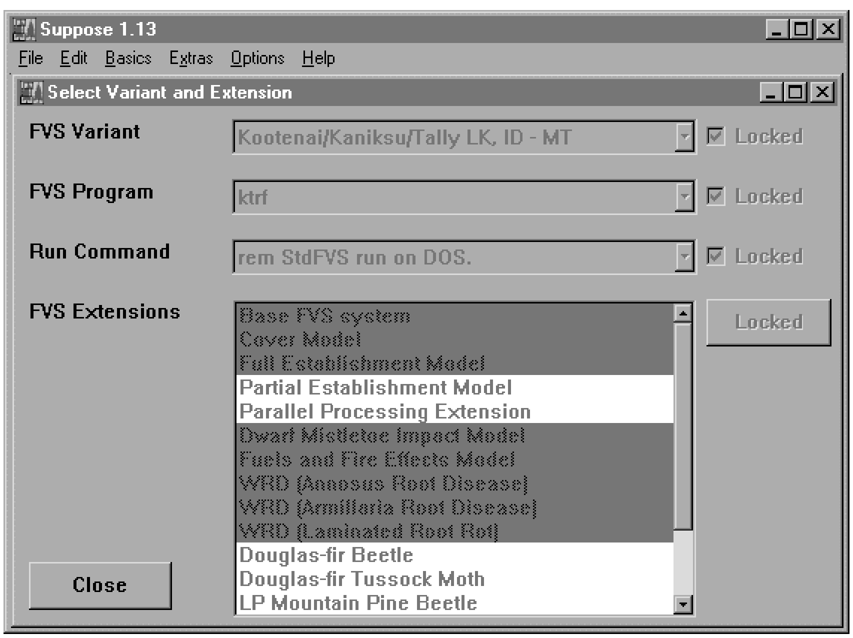
Selecting Stands

From the **Suppose** main window, click the **Select Simulation Stands** command button and choose the desired stands:



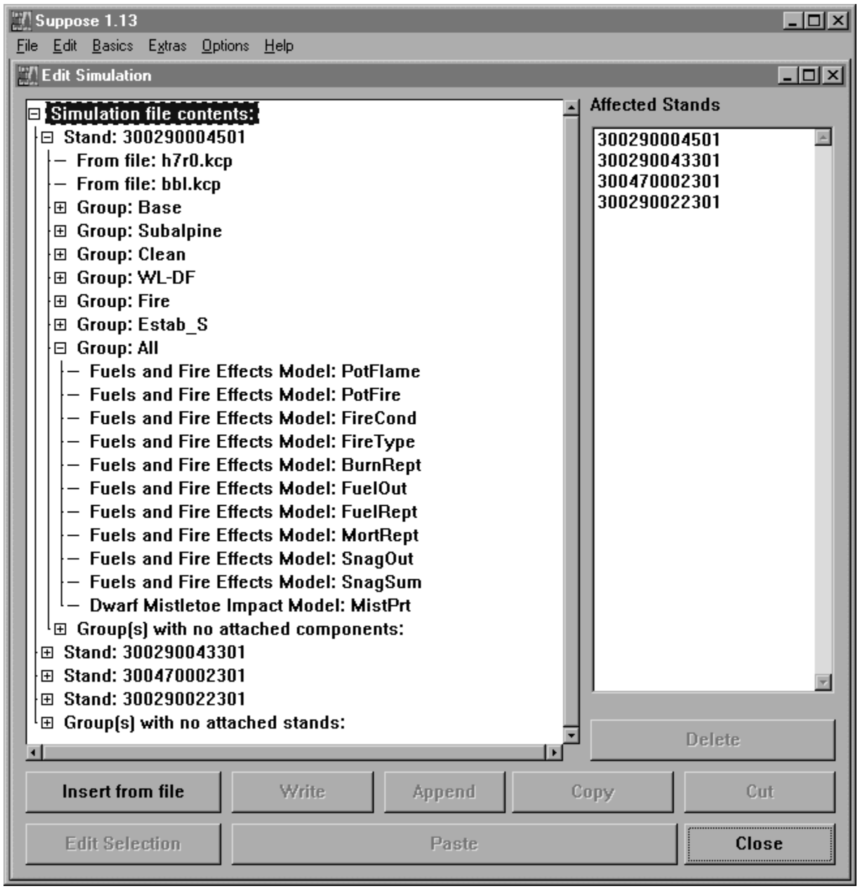
Selecting FVS Variant

From the **Suppose** main window, click the **Extras** menu option, choose the **Select Variant and Extensions** option to enable the proper FVS Variant.



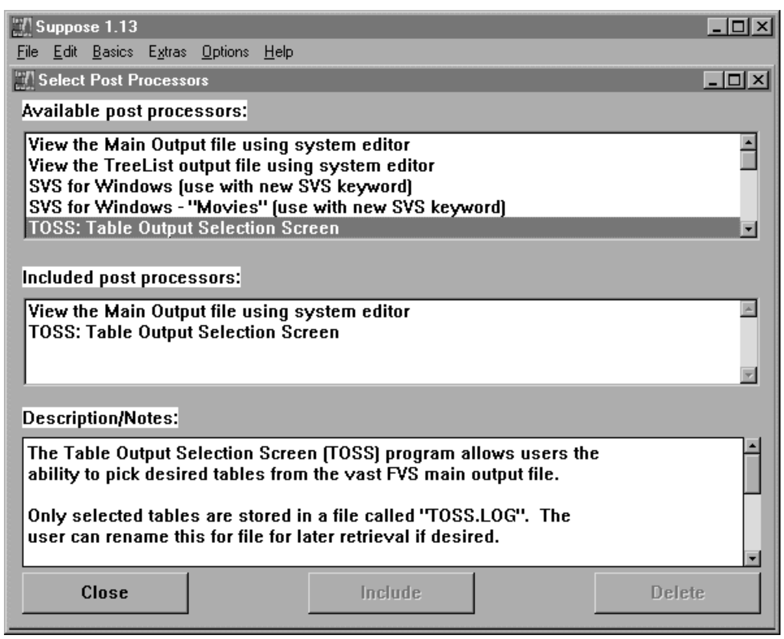
Treatment Options

Input **Management Actions** and **FVS Keywords** to direct the simulation. Review projection parameters by clicking the **Edit Simulation File** from the main **Suppose** window.



Select TOSS as a Post Processor

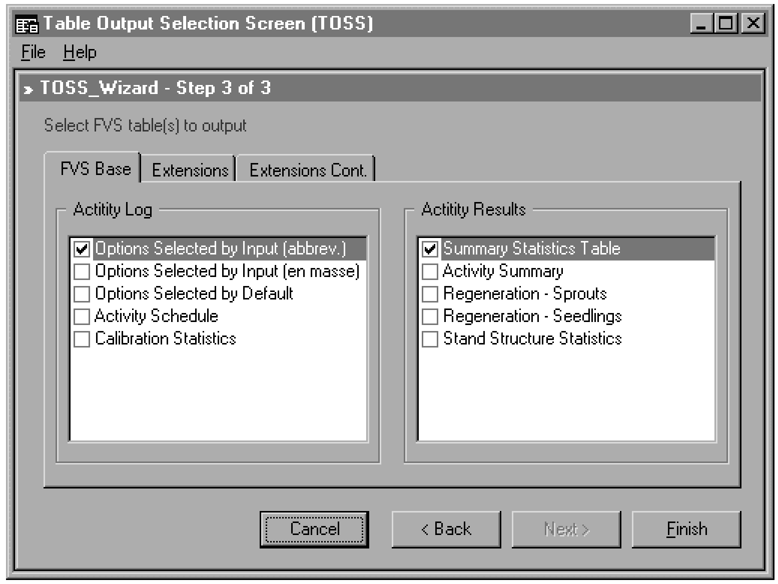
From the **Suppose** main window, click the **Select Post Processors** command button. Include **TOSS: Table Selection Output Screen** program into the run.



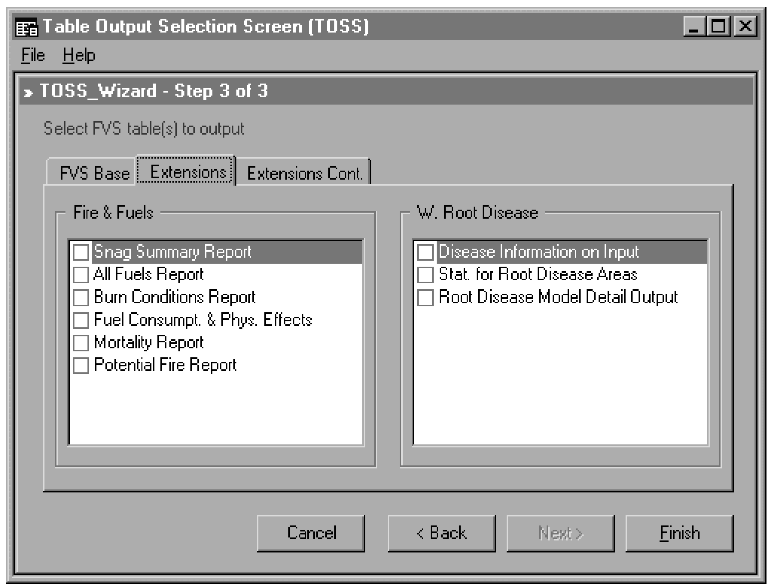
Click the **Run Simulation** command button to process the projection.

Selecting FVS Tables for Output

You enter **TOSS** at **Step 3** of the **TOSS_Wizard** when you use **TOSS** as a post processor. At this step, you can choose which portion of the FVS Main Output that you wish to view. The FVS Base Model reports are divided by input and output process listings. The Activity Log, appearing in the left windowpane of the FVS Base frame, list reports dealing with input processes. The Activity Results, appearing in the right windowpane of the FVS Base frame, list reports dealing with output processes. Each of the FVS Model Extensions produces a set of reports specific to their emphasis.



Predefined tables, as defined by the **TOSS** configuration (File Menu/Preference), are initially selected. Users may deselect one or more of these tables and select additional tables for inclusive into the **Toss.log** file. When all desired tables are selected, click the **Finish** command button to proceed.



Producing Toss.log

At this point, the **Toss.log** report will be created based on selected tables. **Toss.log** is an ASCII text file that is stored in the folder in which the FVS Main Output file resides. **Toss.log** will be automatically formatted to appear in a print preview window. Consult the **TOSS Print Previewer** subtopic for a detailed description of this window.

TOSS as a Stand Alone Program

TOSS can be run as a stand alone program outside of Suppose. An example using Forest Inventory and Analysis (FIA) data from the Flathead National Forest follows.

Running TOSS as a Stand Alone Program

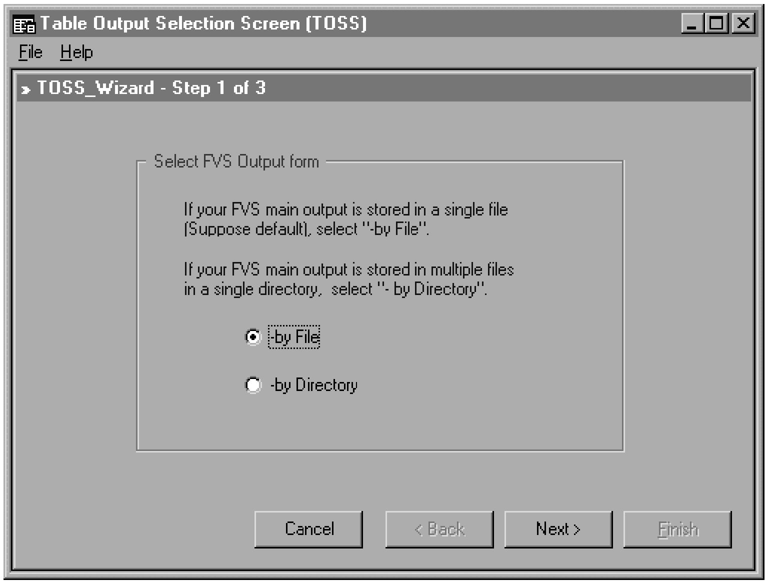
From the Desktop or Start Menu - Suppose Program Group, select the **TOSS** icon:

Step 1 of the TOSS_Wizard

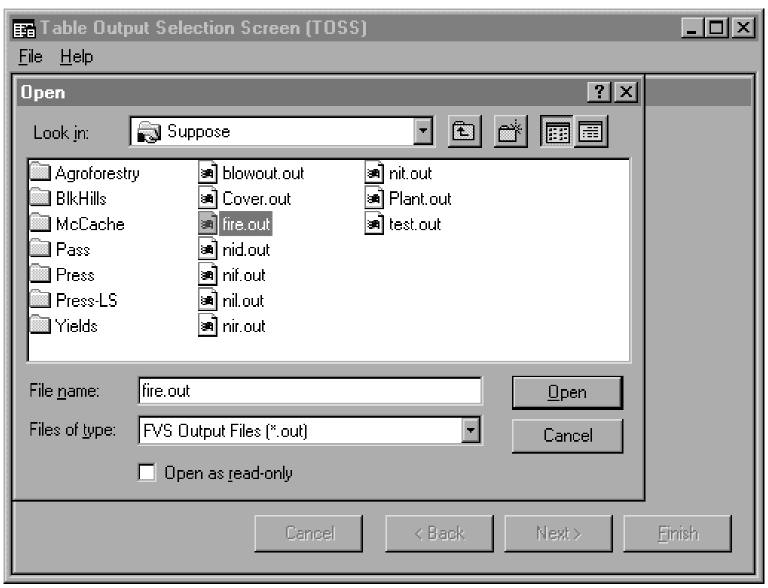
The **TOSS_Wizard** will appear. In **Step 1** of the Wizard, you select whether you want to extract tables from one FVS output file or from all FVS output files within a particular folder. The Suppose default is "*by File*".

- by File

The radial button for the "*by File*" option should be selected. Click the **Next** command button to proceed.

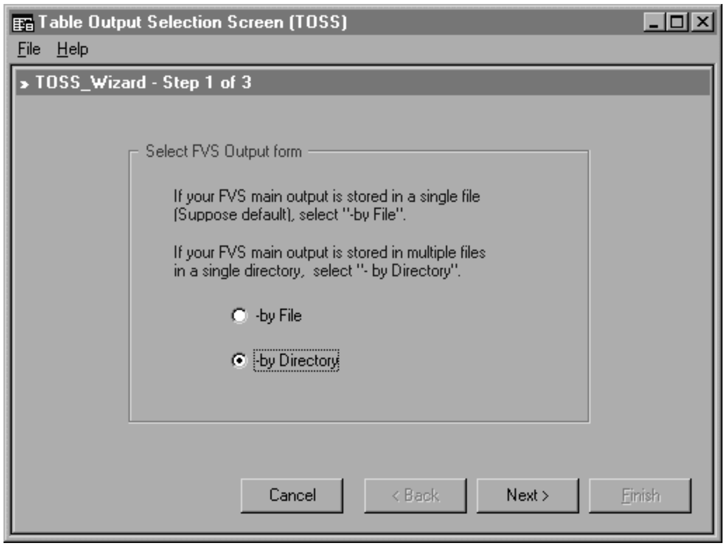


An *Open File* dialog box will appear. Navigate to the folder that contains the FVS Main Output file that you wish to process. Select the desired file in the folder/file listbox and its name should appear in the *File name:* box. Click the **Open** command button to proceed.

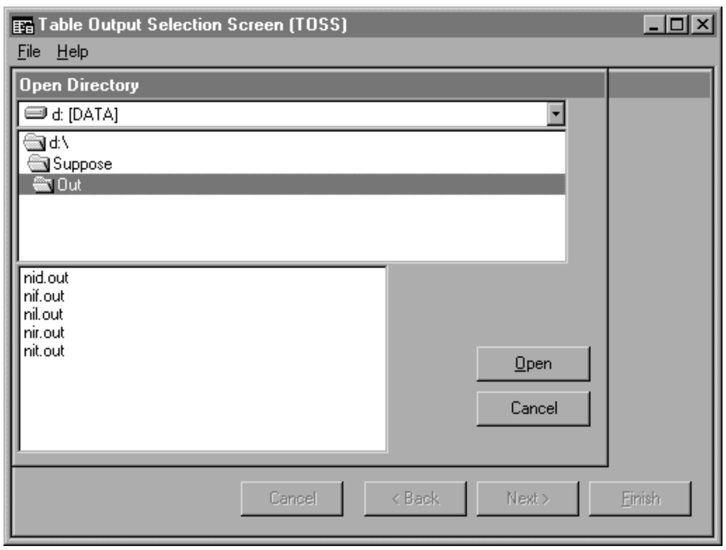


-By Directory

The radial button for the "*by Directory*" option should be selected. Click the **Next** command button to proceed.

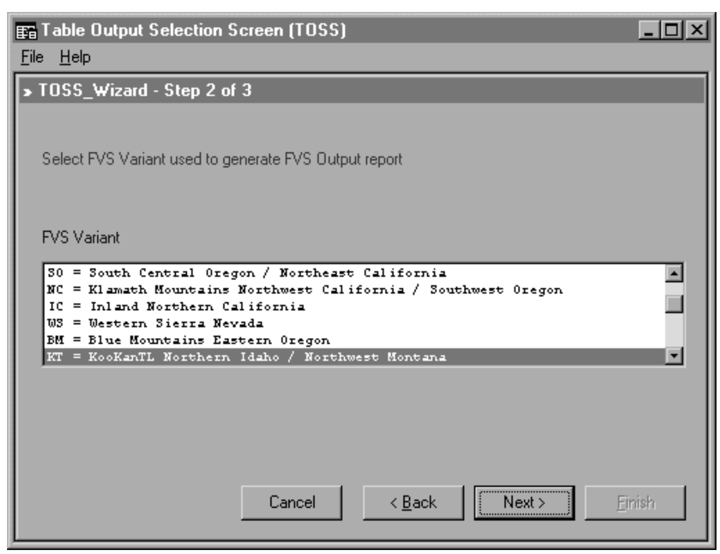


An *Open Directory* dialog box will appear. Navigate to the folder that contains the set of FVS Main Output files that you wish to process. Click the **Open** command button to proceed.



Step 2 of the TOSS_Wizard

The **TOSS_Wizard** will continue to **Step 2**. In this step, there will be a list of available FVS Variants with the applicable variant selected. This step reinforces that the proper FVS Main Output report has been chosen. Click the **Next** command button to proceed.



Step 3 of the TOSS_Wizard

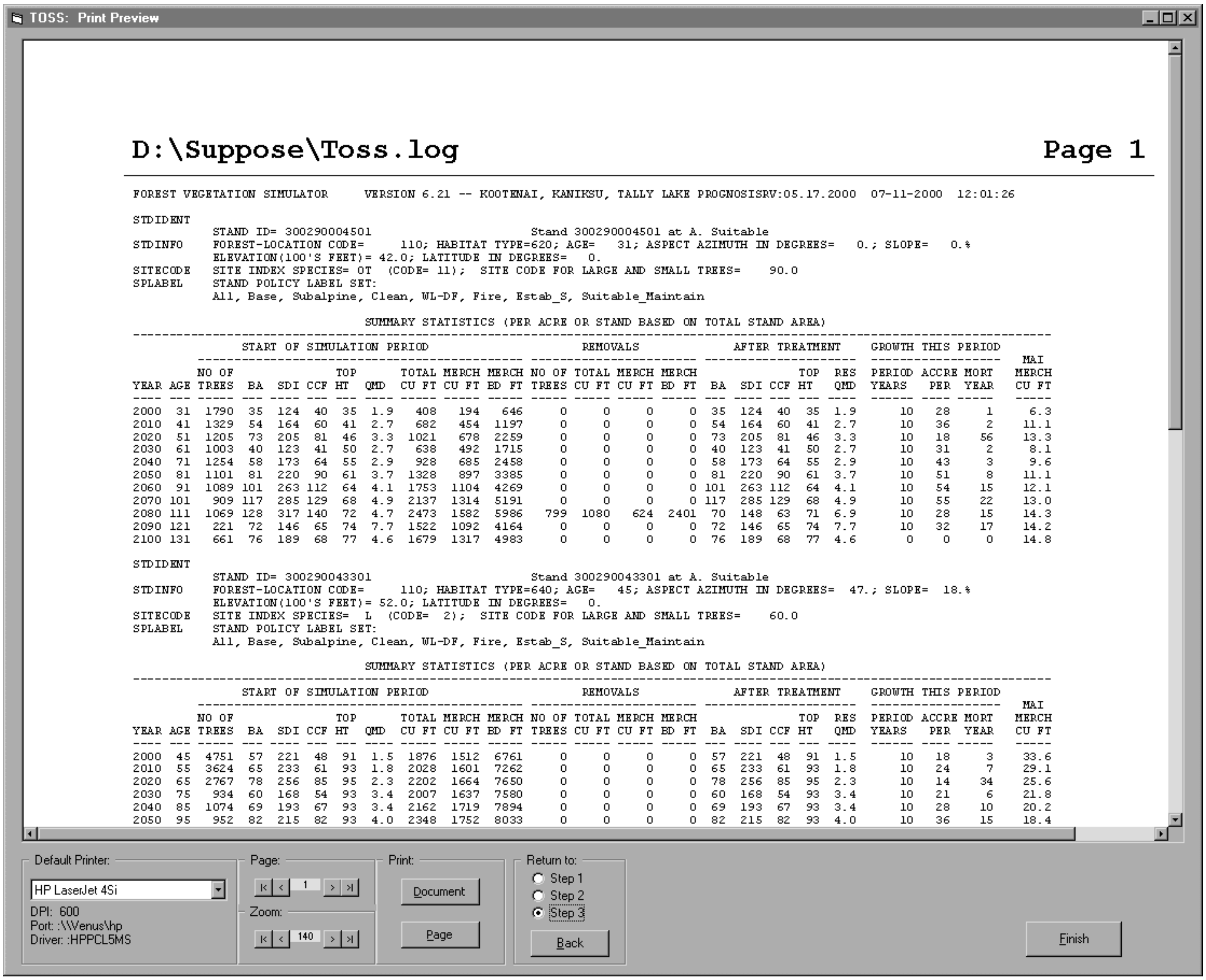
At this point, **Step 3** of the **TOSS_Wizard** will appear. Consult **Selecting FVS Tables for Output** subtopic, **TOSS as a Post Processor**, for a detailed description of **Step 3**.

TOSS Print Previewer

TOSS will take a moment to prepare the tables for viewing. A *Print Preview* window will appear displaying the selected tables for each stand.

Previewing Toss.log

The **Toss.log** file is formatted to be printed as indicated on the Default Printer listed in the lower left corner of the window. A *Header* is displayed at the top of each page, listing the location of the **Toss.log** file and the page number.



D:\Suppose\Toss.log Page 1

FOREST VEGETATION SIMULATOR VERSION 6.21 -- KOOTENAI, KANIKSU, TALLY LAKE PROGNOSISRV:05.17.2000 07-11-2000 12:01:26

```
STDIDENT
          STAND ID= 300290004501                      Stand 300290004501 at A. Suitable
STDINFO   FOREST-LOCATION CODE=     110; HABITAT TYPE=620; AGE=   31; ASPECT AZIMUTH IN DEGREES=   0.; SLOPE=   0.%
          ELEVATION(100'S FEET)= 42.0; LATITUDE IN DEGREES=   0.
SITECODE  SITE INDEX SPECIES= OT  (CODE= 11);  SITE CODE FOR LARGE AND SMALL TREES=    90.0
SPLABEL   STAND POLICY LABEL SET:
          All, Base, Subalpine, Clean, WL-DF, Fire, Estab_S, Suitable_Maintain
```

SUMMARY STATISTICS (PER ACRE OR STAND BASED ON TOTAL STAND AREA)

		START OF SIMULATION PERIOD									REMOVALS				AFTER TREATMENT					GROWTH THIS PERIOD			
YEAR	AGE	NO OF TREES	BA	SDI	CCF	TOP HT	QMD	TOTAL CU FT	MERCH CU FT	MERCH BD FT	NO OF TREES	TOTAL CU FT	MERCH CU FT	MERCH BD FT	BA	SDI	CCF	TOP HT	RES QMD	PERIOD YEARS	ACCRE PER	MORT YEAR	MAI MERCH CU FT
2000	31	1790	35	124	40	35	1.9	408	194	646	0	0	0	0	35	124	40	35	1.9	10	28	1	6.3
2010	41	1329	54	164	60	41	2.7	682	454	1197	0	0	0	0	54	164	60	41	2.7	10	36	2	11.1
2020	51	1205	73	205	81	46	3.3	1021	678	2259	0	0	0	0	73	205	81	46	3.3	10	18	56	13.3
2030	61	1003	40	123	41	50	2.7	638	492	1715	0	0	0	0	40	123	41	50	2.7	10	31	2	8.1
2040	71	1254	58	173	64	55	2.9	928	685	2458	0	0	0	0	58	173	64	55	2.9	10	43	3	9.6
2050	81	1101	81	220	90	61	3.7	1328	897	3385	0	0	0	0	81	220	90	61	3.7	10	51	8	11.1
2060	91	1089	101	263	112	64	4.1	1753	1104	4269	0	0	0	0	101	263	112	64	4.1	10	54	15	12.1
2070	101	909	117	285	129	68	4.9	2137	1314	5191	0	0	0	0	117	285	129	68	4.9	10	55	22	13.0
2080	111	1069	128	317	140	72	4.7	2473	1582	5986	799	1080	624	2401	70	148	63	71	6.9	10	28	15	14.3
2090	121	221	72	146	65	74	7.7	1522	1092	4164	0	0	0	0	72	146	65	74	7.7	10	32	17	14.2
2100	131	661	76	189	68	77	4.6	1679	1317	4983	0	0	0	0	76	189	68	77	4.6	0	0	0	14.8

```
STDIDENT
          STAND ID= 300290043301                      Stand 300290043301 at A. Suitable
STDINFO   FOREST-LOCATION CODE=     110; HABITAT TYPE=640; AGE=   45; ASPECT AZIMUTH IN DEGREES=  47.; SLOPE=  18.%
          ELEVATION(100'S FEET)= 52.0; LATITUDE IN DEGREES=   0.
SITECODE  SITE INDEX SPECIES=  L  (CODE=  2);  SITE CODE FOR LARGE AND SMALL TREES=    60.0
SPLABEL   STAND POLICY LABEL SET:
          All, Base, Subalpine, Clean, WL-DF, Fire, Estab_S, Suitable_Maintain
```

SUMMARY STATISTICS (PER ACRE OR STAND BASED ON TOTAL STAND AREA)

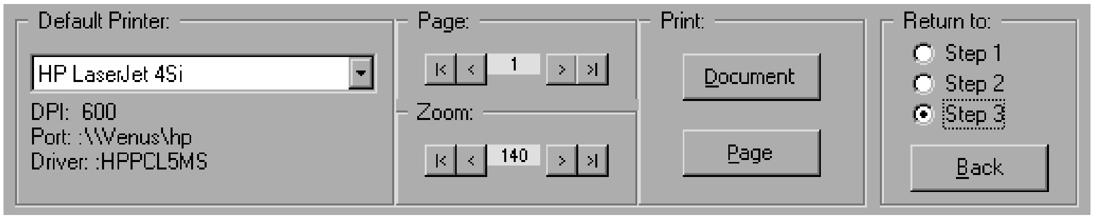
		START OF SIMULATION PERIOD									REMOVALS				AFTER TREATMENT					GROWTH THIS PERIOD			
YEAR	AGE	NO OF TREES	BA	SDI	CCF	TOP HT	QMD	TOTAL CU FT	MERCH CU FT	MERCH BD FT	NO OF TREES	TOTAL CU FT	MERCH CU FT	MERCH BD FT	BA	SDI	CCF	TOP HT	RES QMD	PERIOD YEARS	ACCRE PER	MORT YEAR	MAI MERCH CU FT
2000	45	4751	57	221	48	91	1.5	1876	1512	6761	0	0	0	0	57	221	48	91	1.5	10	18	3	33.6
2010	55	3624	65	233	61	93	1.8	2028	1601	7262	0	0	0	0	65	233	61	93	1.8	10	24	7	29.1
2020	65	2767	78	256	85	95	2.3	2202	1664	7650	0	0	0	0	78	256	85	95	2.3	10	14	34	25.6
2030	75	934	60	168	54	93	3.4	2007	1637	7580	0	0	0	0	60	168	54	93	3.4	10	21	6	21.8
2040	85	1074	69	193	67	93	3.4	2162	1719	7894	0	0	0	0	69	193	67	93	3.4	10	28	10	20.2
2050	95	952	82	215	82	93	4.0	2348	1752	8033	0	0	0	0	82	215	82	93	4.0	10	36	15	18.4

Print Option Frame

The *Default Printer* will be the printer that is specified as the default by Windows. To change to a different printer, simply press the down arrow in the *Default Printer* frame and select another printer in the listbox.

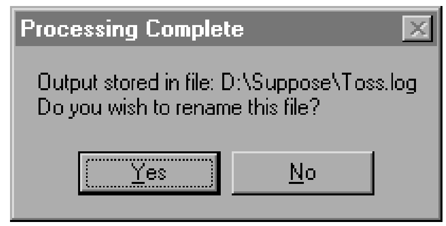
The *Page* indictor aids in moving through the printed report. Clicking the arrows at either end of the frame will take the user to the beginning or end of the **Toss.log** report. Clicking the arrow inside the frame will increment the page counter by one, up or down, to move sequentially through **Toss.log**. The *Zoom* frame allows increasing or decreasing the field of view. A user can zoom in and out to achieve the level of visibility desired.

There are two print options available. To print the entire **Toss.log** report, click the **Document** command button within the *Print* frame. To print the single page that is currently displayed in the print preview window, click the **Page** command button. An option is available to *Return to* any of the previous steps within the **Toss_Wizard**. Simply choose the desired step within the *Return to* frame, click the **Back** command button, and **TOSS** will display the respective window.



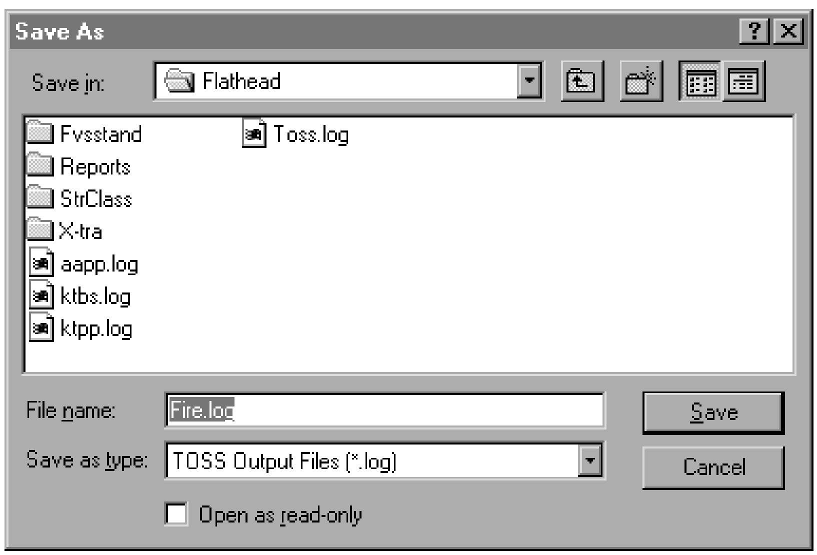
Renaming Toss.log

Whether you are returning to a previous step or exiting the program via clicking the **Finish** command button located in the right bottom of the window, there will be an option to save and rename the **Toss.log** report prior to continuing.



A **Save As** dialog box will appear that will allow navigating to the correct folder location. You can also create a new folder by clicking the second icon to the right of the *Save in* listbox. Enter a new file name in the File Name text box located below the folder listbox.

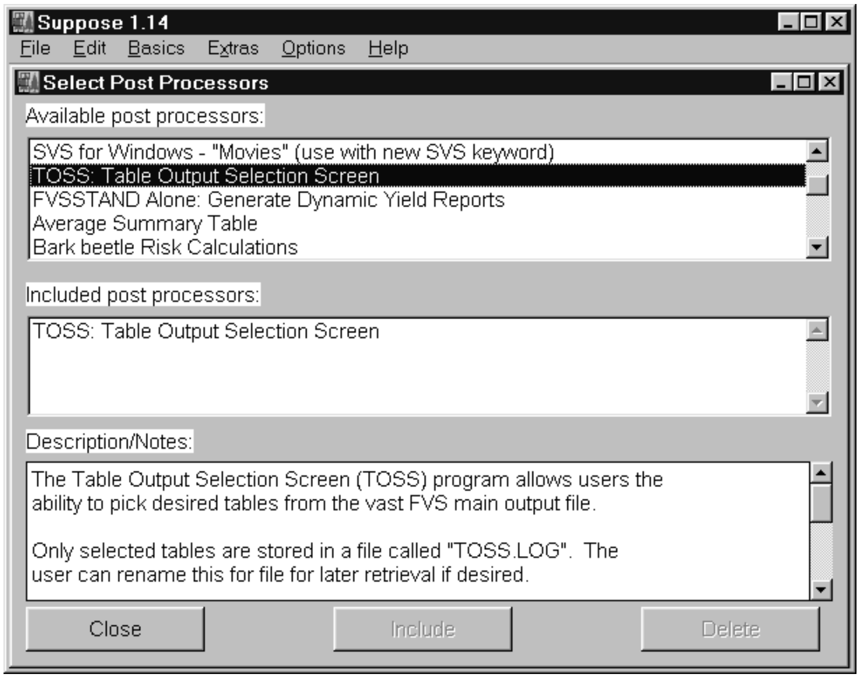
It is important to know that the default **Toss.log** file will be overwritten during subsequent executions of the **TOSS** program. Thus, if you want to save a unique listing, you must rename the **Toss.log** file.



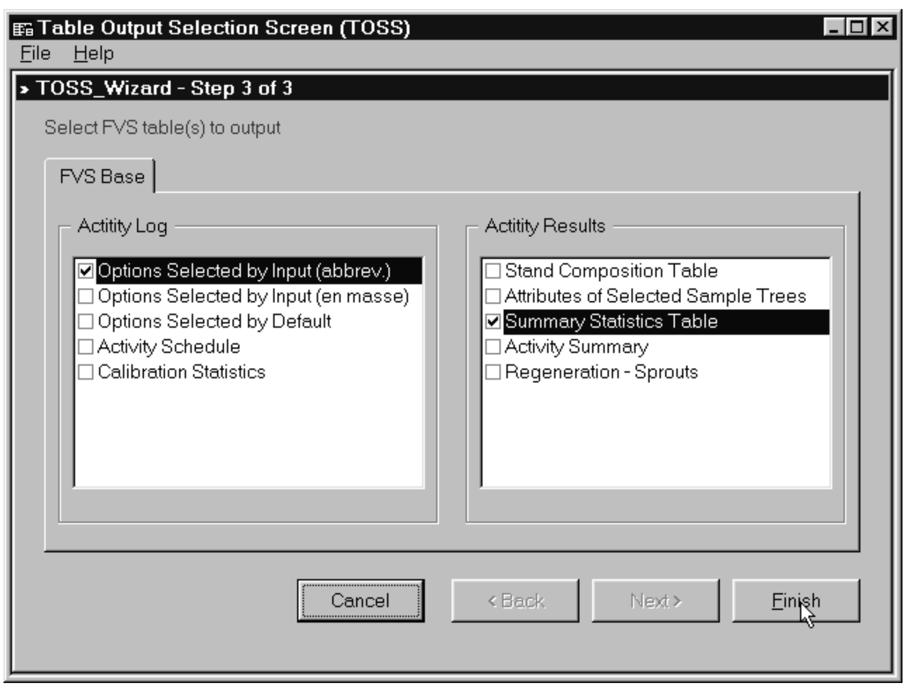
Good luck and have a good time, *Tossing Logs*.

Skill Challenge:

Bill Army (use to be Navy, but after that mysterious early discharge) is getting tired of fishing for the Summary Statistics Table from the FVS Main Output file and decides to give TOSS a try. Using the **R6 Example** stands, **Timber** group, he includes TOSS as a post processor from within Suppose.

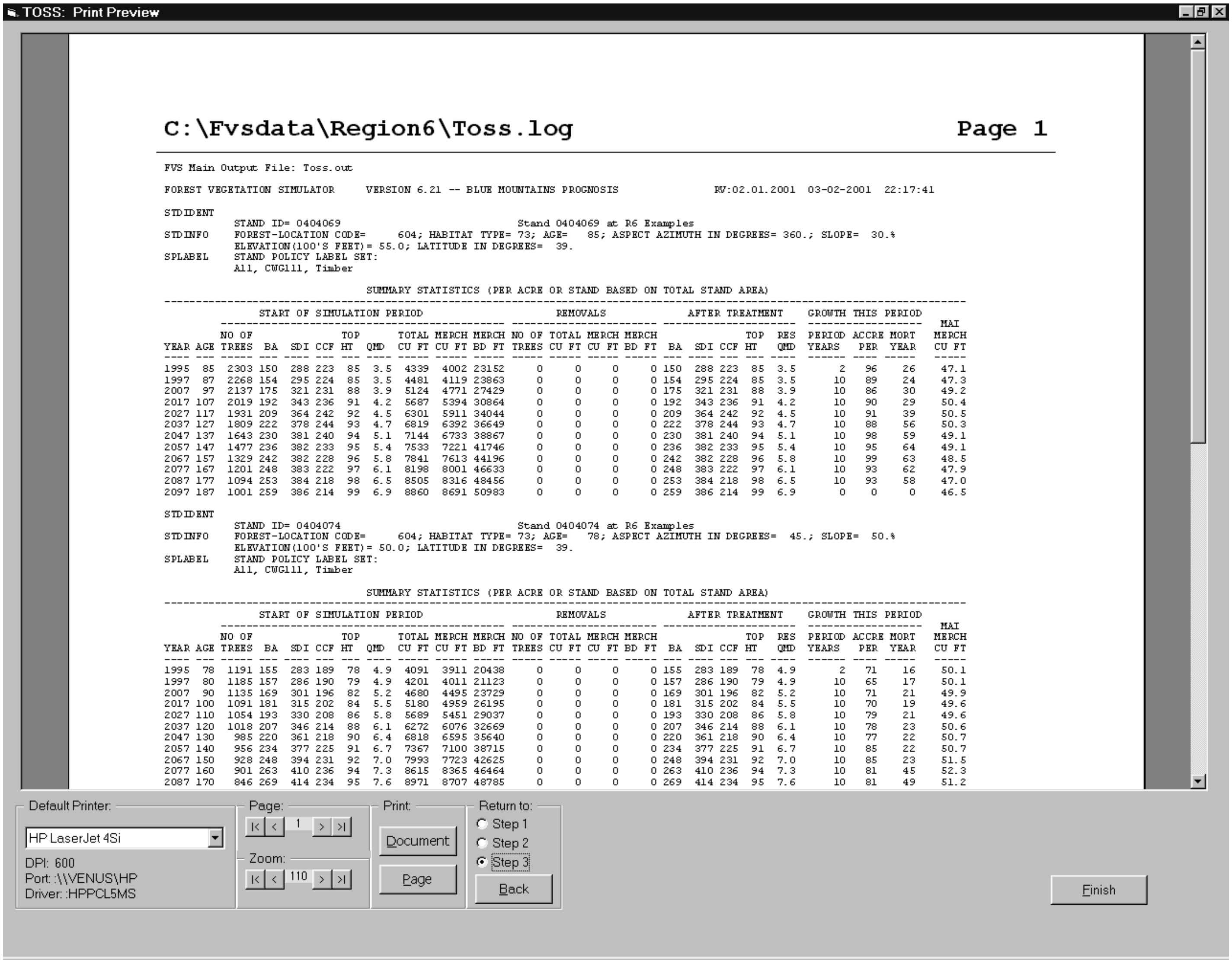


After running the simulation as **Toss.key**, the following Window appears.



Generate the **Toss.log** file. Cycle through the page numbers. Review the output.

Skill Challenge Solution:



C:\Fvsdata\Region6\Toss.log Page 1

FVS Main Output File: Toss.out

FOREST VEGETATION SIMULATOR VERSION 6.21 -- BLUE MOUNTAINS PROGNOSIS RV:02.01.2001 03-02-2001 22:17:41

STDIDENT
STAND ID= 0404069 Stand 0404069 at R6 Examples
STDINFO FOREST-LOCATION CODE= 604; HABITAT TYPE= 73; AGE= 85; ASPECT AZIMUTH IN DEGREES= 360.; SLOPE= 30.%
ELEVATION(100'S FEET)= 55.0; LATITUDE IN DEGREES= 39.
SPLABEL STAND POLICY LABEL SET:
All, CWG111, Timber

SUMMARY STATISTICS (PER ACRE OR STAND BASED ON TOTAL STAND AREA)

		START OF SIMULATION PERIOD									REMOVALS				AFTER TREATMENT					GROWTH THIS PERIOD			
YEAR	AGE	NO OF TREES	BA	SDI	CCF	TOP HT	QMD	TOTAL CU FT	MERCH CU FT	MERCH BD FT	NO OF TREES	TOTAL CU FT	MERCH CU FT	MERCH BD FT	BA	SDI	CCF	TOP HT	RES QMD	PERIOD YEARS	ACCRE PER	MORT YEAR	MAI MERCH CU FT
1995	85	2303	150	288	223	85	3.5	4339	4002	23152	0	0	0	0	150	288	223	85	3.5	2	96	26	47.1
1997	87	2268	154	295	224	85	3.5	4481	4119	23863	0	0	0	0	154	295	224	85	3.5	10	89	24	47.3
2007	97	2137	175	321	231	88	3.9	5124	4771	27429	0	0	0	0	175	321	231	88	3.9	10	86	30	49.2
2017	107	2019	192	343	236	91	4.2	5687	5394	30864	0	0	0	0	192	343	236	91	4.2	10	90	29	50.4
2027	117	1931	209	364	242	92	4.5	6301	5911	34044	0	0	0	0	209	364	242	92	4.5	10	91	39	50.5
2037	127	1809	222	378	244	93	4.7	6819	6392	36649	0	0	0	0	222	378	244	93	4.7	10	88	56	50.3
2047	137	1643	230	381	240	94	5.1	7144	6733	38867	0	0	0	0	230	381	240	94	5.1	10	98	59	49.1
2057	147	1477	236	382	233	95	5.4	7533	7221	41746	0	0	0	0	236	382	233	95	5.4	10	95	64	49.1
2067	157	1329	242	382	228	96	5.8	7841	7613	44196	0	0	0	0	242	382	228	96	5.8	10	99	63	48.5
2077	167	1201	248	383	222	97	6.1	8198	8001	46633	0	0	0	0	248	383	222	97	6.1	10	93	62	47.9
2087	177	1094	253	384	218	98	6.5	8505	8316	48456	0	0	0	0	253	384	218	98	6.5	10	93	58	47.0
2097	187	1001	259	386	214	99	6.9	8860	8691	50983	0	0	0	0	259	386	214	99	6.9	0	0	0	46.5

STDIDENT
STAND ID= 0404074 Stand 0404074 at R6 Examples
STDINFO FOREST-LOCATION CODE= 604; HABITAT TYPE= 73; AGE= 78; ASPECT AZIMUTH IN DEGREES= 45.; SLOPE= 50.%
ELEVATION(100'S FEET)= 50.0; LATITUDE IN DEGREES= 39.
SPLABEL STAND POLICY LABEL SET:
All, CWG111, Timber

SUMMARY STATISTICS (PER ACRE OR STAND BASED ON TOTAL STAND AREA)

		START OF SIMULATION PERIOD									REMOVALS				AFTER TREATMENT					GROWTH THIS PERIOD			
YEAR	AGE	NO OF TREES	BA	SDI	CCF	TOP HT	QMD	TOTAL CU FT	MERCH CU FT	MERCH BD FT	NO OF TREES	TOTAL CU FT	MERCH CU FT	MERCH BD FT	BA	SDI	CCF	TOP HT	RES QMD	PERIOD YEARS	ACCRE PER	MORT YEAR	MAI MERCH CU FT
1995	78	1191	155	283	189	78	4.9	4091	3911	20438	0	0	0	0	155	283	189	78	4.9	2	71	16	50.1
1997	80	1185	157	286	190	79	4.9	4201	4011	21123	0	0	0	0	157	286	190	79	4.9	10	65	17	50.1
2007	90	1135	169	301	196	82	5.2	4680	4495	23729	0	0	0	0	169	301	196	82	5.2	10	71	21	49.9
2017	100	1091	181	315	202	84	5.5	5180	4959	26195	0	0	0	0	181	315	202	84	5.5	10	70	19	49.6
2027	110	1054	193	330	208	86	5.8	5689	5451	29037	0	0	0	0	193	330	208	86	5.8	10	79	21	49.6
2037	120	1018	207	346	214	88	6.1	6272	6076	32669	0	0	0	0	207	346	214	88	6.1	10	78	23	50.6
2047	130	985	220	361	218	90	6.4	6818	6595	35640	0	0	0	0	220	361	218	90	6.4	10	77	22	50.7
2057	140	956	234	377	225	91	6.7	7367	7100	38715	0	0	0	0	234	377	225	91	6.7	10	85	22	50.7
2067	150	928	248	394	231	92	7.0	7993	7723	42625	0	0	0	0	248	394	231	92	7.0	10	85	23	51.5
2077	160	901	263	410	236	94	7.3	8615	8365	46464	0	0	0	0	263	410	236	94	7.3	10	81	45	52.3
2087	170	846	269	414	234	95	7.6	8971	8707	48785	0	0	0	0	269	414	234	95	7.6	10	81	49	51.2

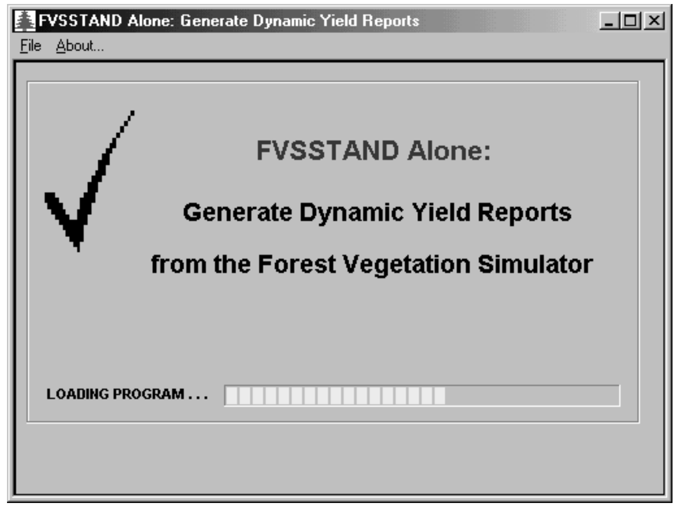
Topic FVSSTAND: **Creating Yield Tables Using FVSSTAND Alone**

Concepts: gain familiarity with the FVSSTAND Post Processor.

Data can be displayed in several different fashions. The two most common are tabular and visual output. Tabular tends to be two-dimensional reports of numeric values. Visualization adds a third dimension; portraying realistic representations of stand components. In terms of the Forest Vegetation Simulator, *post processors* have been developed that display both tabular and visual information. The FVSSTAND Alone program provides comprehensive tabular output in the form of Yield Reports and classic Stand and Stock Tables. The Stand Visualization System provides geometric depictions of stand conditions. The objective of this topic will be to inform users of the various features of the FVSSTAND software.

Abstract -- FVSTAND

FVSSTAND Alone is a Forest Vegetation Simulator Post-Processor program. It produces Yield Reports and standard Stand and Stock Tables. Two types of yield reports are available: time-dependent and age-dependant. These reports are specifically designed for importation into forest planning models. Two types of stand and stock tables are available: diameter class and size class. These tables have been used for forest type designation, structural stage forecasting, and product merchandizing. An additional program feature is the ability to embed localized tree volume equations. Linkage to the Stand Visualization System is also included.



The FVSSTAND program setup file can be downloaded from the Forest Management Service Center's World Wide Web (Internet) site. The address is **hhttp://www.fs.fed.us/fmsc/.** Follow the **FVS** link to the ***FVS Software*** page; then select the ***Pre- and Post-Processors*** link. Select the **fvsstd_z.exe** link to download the FVSSTAND setup program file. There is also a link on this web page to access installation instructions for FVSSTAND.

About FVSTAND

The need to generate stand and stock tables from the Forest Vegetation Simulator originated from a management-planning project on the Flathead Indian Reservation (1992). The FVS program was used to forecast existing and regenerated stand structures over time to aid in the development of yield profiles. After reviewing the standard output tables from FVS, it became evident that species-specific information by size class would be difficult to obtain. Percentile data is of little use in the application of silvicultural regimes for planning purposes. Thus, the development of a stand table program that would interface with Forest Vegetation Simulator at each projection cycle was pursued.

The FVS program produces pre- and post-treatment tree lists at each time interval for a given management prescription. Tree records within the tree list file contain species, diameter, height, crown, and other tree attribute information. Stands, as represented by field inventory data from permanent plots or temporary points, are grown individually by FVS and summarized via the FVSSTAND program.

Either of two types of yield reports can be generated: Time Basis Yields or Age Basis Yields. Time-based yields are generally associated with all-aged stands. Values are reported as a function of time period. Age-based yields are generally associated with even-aged stands. Values are reported as a function of stand age. Stand tables generated from FVSSTAND display stocking, growth, harvest, and mortality information per tree species. Two forms are available. First, expanded tables by 2-inch diameter class are arrayed. Second, collapsed summary tables by size class are produced.

An added feature of FVSSTAND is the creation of flat files (yield reports that are ASCII based text characters/column delimited) for importation into forest planning models. Yield streams from FVSSTAND have been successfully incorporated into numerous planning models. A compatible file format for the SPECTRUM model has been developed. Currently, forest cover type, structural class, stand density index, tree frequency, quadratic mean diameter, basal area, and cubic and board foot volume data can be exported from the stand tables into the yield reports. Tree species and user specified size class breaks form further subdivision of this information. Links to the Stand Visualization System provide a graphical depiction of the stand tables.

FVSTAND – Generate a Time-Based Yield Report

FVSSTAND can be used as a post-processor through the Suppose interface or as a stand-alone program. The steps needed to use FVSSTAND as a post-processor will be demonstrated first, followed by the steps needed for use as a stand-alone program.

****IMPORTANT**** The FVSSTAND keyword must be included in your FVS run to produce the input file needed by the FVSSTAND program.

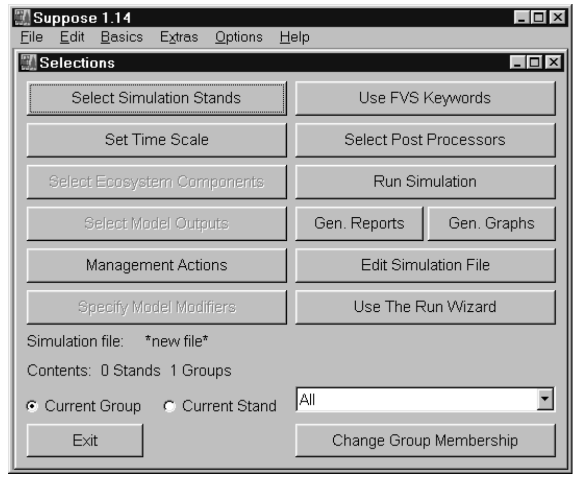
FVSTAND as a Post-Processor

Execute **Suppose** by double-clicking the **Suppose** icon.

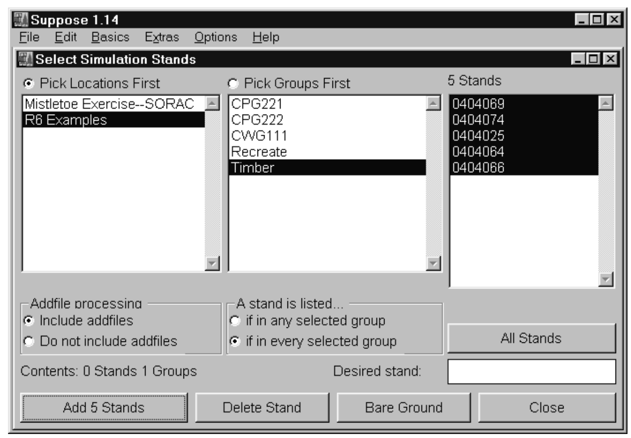
Stand (Plot) Selection

First, you must select the stands derived from the **R6 Examples** for the FVS simulation.

1. Select "**File**" on the main menu bar in Suppose.
2. Click "**New**" to clear previous simulation from memory.
3. Select "**File**" on the main menu bar in Suppose.
4. Click "**Open Locations File**".
5. Navigate to the "**C:\Fvsdata\Region6**" folder. You should be there given the Properties of the Suppose icon are properly set.
6. Select the "**Suppose.loc**" file.
7. Click the "**Open**" button.

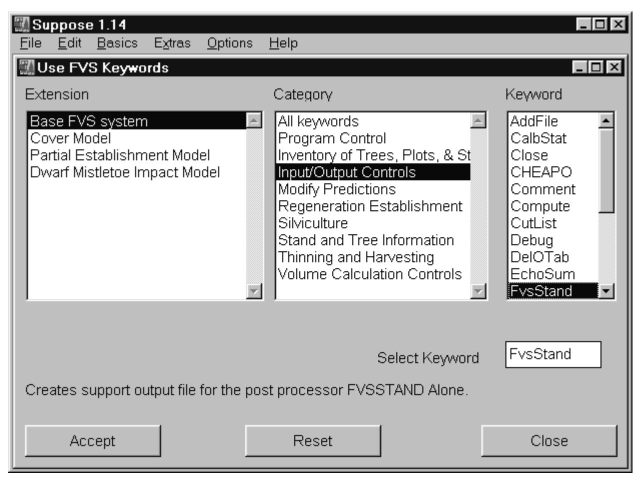


8. Select Location: **R6 Examples.**
9. Select Group: **Timber.**
10. Click the **All Stands** button.
11. Click the **Add 5 Stands** button.
12. Click the **Close** button.

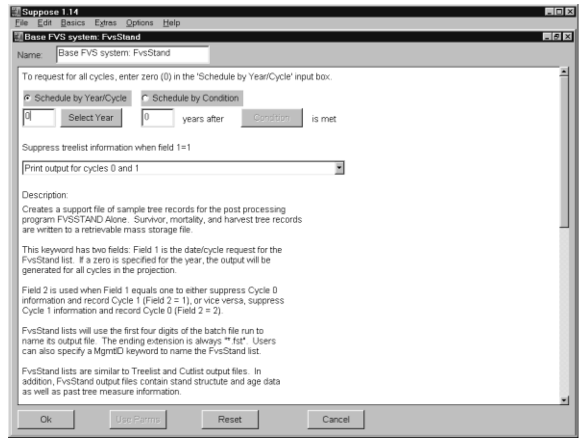


Select the FVSSTAND Keyword

1. Click the button **Use FVS Keywords** on the Suppose main selections window.
2. Select the **Extension**, **Base FVS System**.
3. Select the **Category**, **Input/Output Controls**.
4. Select the **Keyword**, **FvsStand**.
5. Click the **Accept** button. A dialog box will appear for the keyword.
6. Include the **StrClass** Keyword, accepting the default parameters. This is an optional input to the simulation.



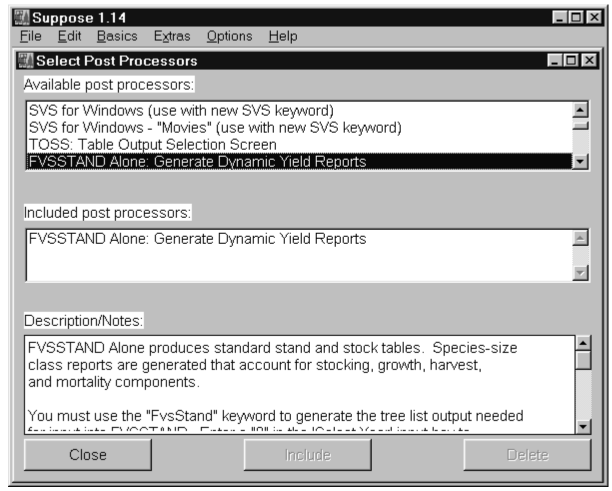
The FVSSTAND keyword dialog box contains options to produce FVSSTAND input files by Year/Cycle or upon meeting a specific condition. Defaults are Schedule by Year/Cycle and the inventory year of the data. The pull-down box below the Schedule buttons allows the user to process input for cycles 0 and 1 (default), for cycle 1 only, or cycle 0 only. ***It is highly recommended that the user put 0 in the Select Year entry under Schedule by Year/Cycle to produce output for all cycles.***



14. For this exercise, replace "1997" with "0" in the Select Year entry under Schedule by Year/Cycle. This allows creation of stand tables for all projection years.

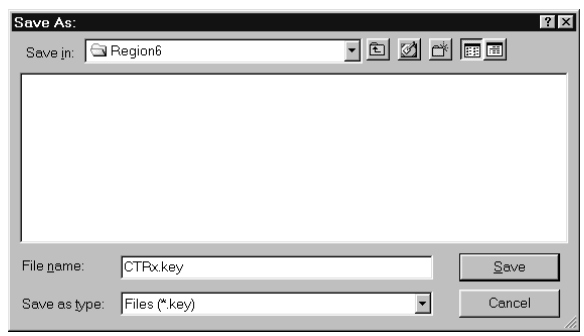
7. Select the **OK** button.
8. Close the **Use FVS Keywords** window by clicking the **Close** button.

Select the FVSSTAND Post-processor



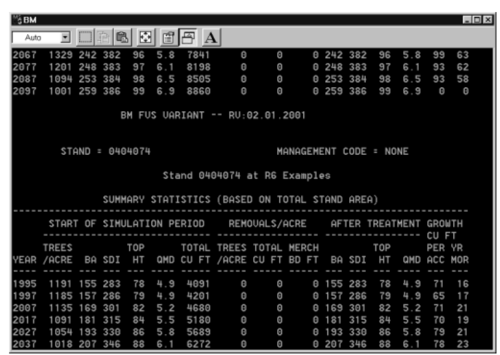
1. Click the **Select Post Processors** button on the **Suppose** Selections menu.
2. Under **Available post processors**, scroll down and select the **FVSSTAND Alone: Generate Dynamic Yield Reports**.
3. Click the **Include** button.
4. Click the **Close** button to complete post-processor selection.

Run the Simulation



1. Click the **Run Simulation** button on the **Suppose** main selections window.
2. Type in **CTRx.key** in the **Save As: File name:** box.
3. Click on the **Save** button.
4. Click on the **Run** button.

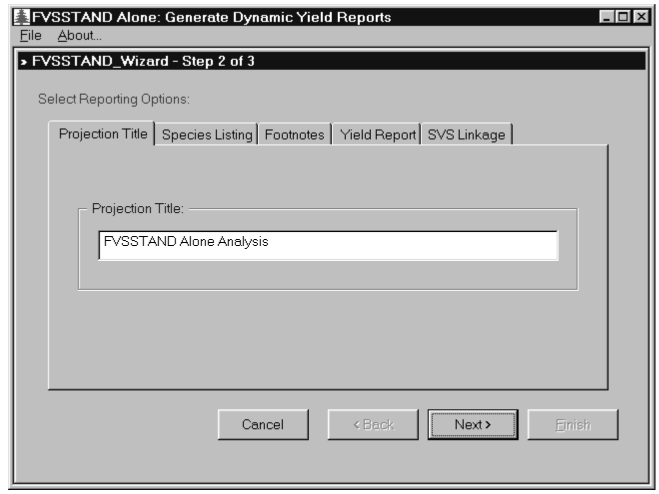
An MS-DOS window will appear with the simulations scrolling down inside the window. The five stands will be projected for 10-ten year cycles (by default).



FVSSTAND_Wizard

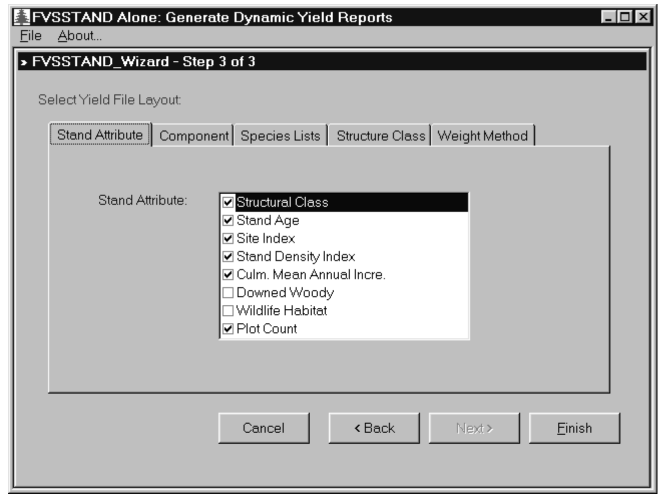
After the five stands are projected; **Step 2** of the **FVSSTAND_Wizard** will appear.

Make the following selections:



1. **Projection Title** tab: "**Region 6 Example**".
2. **Species Listing** tab: **Complete Individual Species** and accept the default **Diameter Boundaries**.
3. **Footnotes** tab: Note 1, **Timber**.
4. **Yield Report** tab: **Time Basis.**
5. **SVS Linkage** tab: **Yes**.
6. Click the **Next>** button.

Step 3 of the FVSSTAND Wizard appears next. This screen allows the user to specify the parameters for yield files. The tabs comprise the yield table attributes.



Stand Attribute: The user specifies the stand attributes that are displayed in the yield file at this tab. The Structural Class item requires that the structural class keyword (STRCLASS) be used in the FVS run. The Downed Woody and Wildlife Habitat items are currently inactive.

Component: The Stand Component tab allows the user to specify the portions of the stocking to include in the yield report and how to describe the component.

Species Lists: This tab gives the user the opportunity to create yield files for per species, for species groups, and for all species.

Structural Class: This tab is linked to the Diameter Boundaries of the Species Listing tab in Step2 of the Wizard. Specific size classes can be designated for inclusion in the yield report, thus excluding the unselected classes. For example, a user might want to create a yield table for only the sawtimber component. To accomplish this, the user would check only the Mid-Age and Mature Forest structure classes.

Weight Method: At this tab, the user selects the weighting method appropriate for the data. Select number of plots for forest inventory data where plots are located on a systematic grid and have equal area representation. Number of Points would be selected for stand examinations that involved cluster plot designs. Number of acres is for stand examination situations that include stands of different acreages.

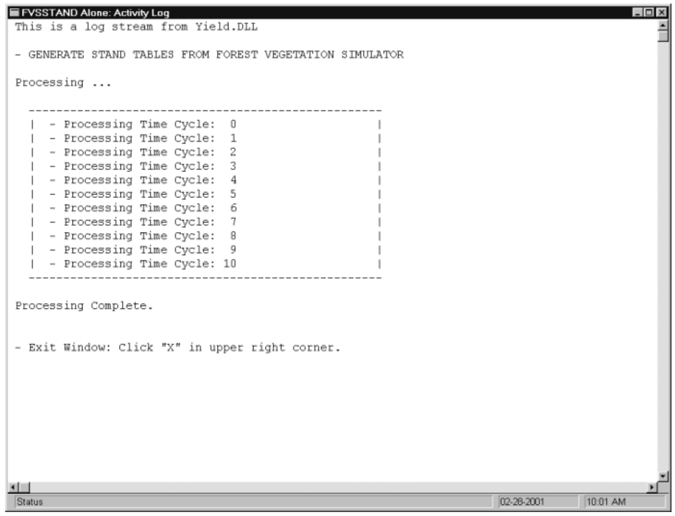
Make the following selections:

7. **Stand Attribute** tab: check all except Downed Woody and Wildlife Habitat.
8. **Component** tab: leave all items checked.
9. **Species List** tab: make sure (000) All Species Combined is included. Use the **<<Remove** button to delete other species.
10. **Structure Class** tab: check All Size Classes.
11. **Weight Method** tab: check Number of Plots.
12. Click the **Finish** button. FVSSTAND will process the stands and link the FVS treelist files.
13. When the process is complete, a button box will appear. Click the **OK** button.

A FVSSTAND Alone Activity Log window will appear. This window indicates that FVSSTAND is processing the stand tables. A line of text will appear as each cycle is processed. When FVSSTAND is finished processing all cycles, a message will appear indicating that processing is complete. To continue with report generation, a message in the window will prompt the user to 'Exit Window: Click "X" in upper right corner.'

Yield.dll Processing

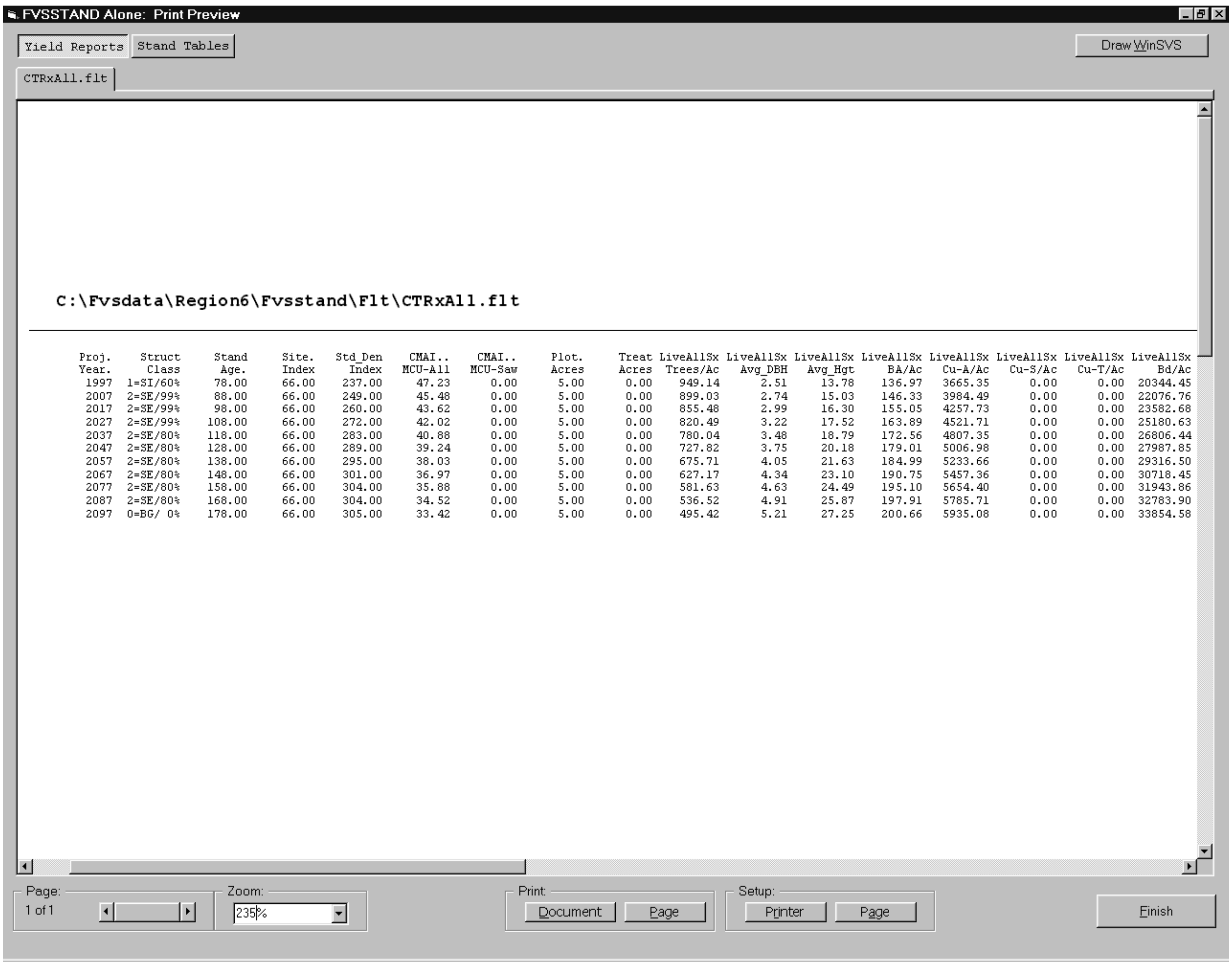
14. Therefore, after your run has finished processing, click the **X**-button in the upper right corner of the window.



A FVSSTAND Print Preview window will appear next. The opening view is of the empirical yield table displaying the information you specified in the FVSSTAND Wizard (built from the selection criteria of step 3).

You can view the various reports FVSSTAND produces with this viewer. The viewer includes viewing, navigation and print controls. You can also view these files with a text editor by accessing an FVSSTAND folder that is created under your simulation folder; in this case, the text files would reside in "**C:\Fvsdata\Region6\ Fvsstand**". Instructions for viewing these files follow later in this description.

Yield Reports



C:\Fvsdata\Region6\Fvsstand\Flt\CTRxAll.flt

Proj. Year.	Struct Class	Stand Age.	Site. Index	Std_Den Index	CMAI.. MCU-All	CMAI.. MCU-Saw	Plot. Acres	Treat Acres	LiveAllSx Trees/Ac	LiveAllSx Avg_DBH	LiveAllSx Avg_Hgt	LiveAllSx BA/Ac	LiveAllSx Cu-A/Ac	LiveAllSx Cu-S/Ac	LiveAllSx Cu-T/Ac	LiveAllSx Bd/Ac
1997	1=SI/60%	78.00	66.00	237.00	47.23	0.00	5.00	0.00	949.14	2.51	13.78	136.97	3665.35	0.00	0.00	20344.45
2007	2=SE/99%	88.00	66.00	249.00	45.48	0.00	5.00	0.00	899.03	2.74	15.03	146.33	3984.49	0.00	0.00	22076.76
2017	2=SE/99%	98.00	66.00	260.00	43.62	0.00	5.00	0.00	855.48	2.99	16.30	155.05	4257.73	0.00	0.00	23582.68
2027	2=SE/99%	108.00	66.00	272.00	42.02	0.00	5.00	0.00	820.49	3.22	17.52	163.89	4521.71	0.00	0.00	25180.63
2037	2=SE/80%	118.00	66.00	283.00	40.88	0.00	5.00	0.00	780.04	3.48	18.79	172.56	4807.35	0.00	0.00	26806.44
2047	2=SE/80%	128.00	66.00	289.00	39.24	0.00	5.00	0.00	727.82	3.75	20.18	179.01	5006.98	0.00	0.00	27987.85
2057	2=SE/80%	138.00	66.00	295.00	38.03	0.00	5.00	0.00	675.71	4.05	21.63	184.99	5233.66	0.00	0.00	29316.50
2067	2=SE/80%	148.00	66.00	301.00	36.97	0.00	5.00	0.00	627.17	4.34	23.10	190.75	5457.36	0.00	0.00	30718.45
2077	2=SE/80%	158.00	66.00	304.00	35.88	0.00	5.00	0.00	581.63	4.63	24.49	195.10	5654.40	0.00	0.00	31943.86
2087	2=SE/80%	168.00	66.00	304.00	34.52	0.00	5.00	0.00	536.52	4.91	25.87	197.91	5785.71	0.00	0.00	32783.90
2097	0=BG/ 0%	178.00	66.00	305.00	33.42	0.00	5.00	0.00	495.42	5.21	27.25	200.66	5935.08	0.00	0.00	33854.58

The Yield Reports are formatted as ASCII character based, space delimited files (flat files). These types of files can be easily imported into commercial spreadsheets and database programs for further processing and reporting. Also, many forest planning models have import facilities for flat files. Consequently, to support this file format, the header rows are somewhat cryptic in nature. A template is provided in the text box on the following page to aid interpretation.

```
Yield Report File - Heading Definition Template
-----------------------------------------------

" Proj. Year.  " = Projection Cycle Year
" Struct Class " = Structure Class
" Stand Age.   " = Stand Age
" Site. Index  " = Site Index
" Std_Den Index" = Stand Density Index
" CMAI MCU-All " = Culmination Mean Annual Increment - Merchantable Cubic Feet, All Trees
" CMAI MCU-Saw " = Culmination Mean Annual Increment - Merchantable Cubic Feet, Sawtimber Trees
" Downed Woody " = Downed Woody Material
" Wild. Habit  " = Wildlife Habitat
" Plot Acres   " = Plot Acres (Count)
" Treat Acres  " = Treatment Acres (Count)

" LiveAllSx Trees/Ac" = Live/Trees per Acre/All Species/All Size Classes
" LiveAllSx Avg_DBH " = Live/Average DBH/All Species/All Size Classes
" LiveAllSx Avg_Hgt " = Live/Average Height/All Species/All Size Classes
" LiveAllSx BA/Ac   " = Live/Basal Area per Acre/All Species/All Size Classes
" LiveAllSx Cu-A/Ac " = Live/Cubic Feet per Acre/All Species/All Size Classes, All Trees - Cubic Top
" LiveAllSx Cu-S/Ac " = Live/Cubic Feet per Acre/All Species/All Size Classes, Sawtimber - Board Top
" LiveAllSx Cu-T/Ac " = Live/Cubic Feet per Acre/All Species/All Size Classes, Topwood - Board to Cubic Top
" LiveAllSx Bd/Ac   " = Live/Board Feet per Acre/All Species/All Size Classes
" HarvAllSx Trees/Ac" = Harvest/Trees per Acre/All Species/All Size Classes
" HarvAllSx Avg_DBH " = Harvest/Average DBH/All Species/All Size Classes
" HarvAllSx Avg_Hgt " = Harvest/Average Height/All Species/All Size Classes
" HarvAllSx BA/Ac   " = Harvest/Basal Area per Acre/All Species/All Size Classes
" HarvAllSx Cu-A/Ac " = Harvest/Cubic Feet per Acre/All Species/All Size Classes, All Trees - Cubic Top
" HarvAllSx Cu-S/Ac " = Harvest/Cubic Feet per Acre/All Species/All Size Classes, Sawtimber - Board Top
" HarvAllSx Cu-T/Ac " = Harvest/Cubic Feet per Acre/All Species/All Size Classes, Topwood - Board to Cubic Top
" HarvAllSx Bd/Ac   " = Harvest/Board Feet per Acre/All Species/All Size Classes
" MortAllSx Trees/Ac" = Mortality/Trees per Acre/All Species/All Size Classes
" MortAllSx Avg_DBH " = Mortality/Average DBH/All Species/All Size Classes
" MortAllSx Avg_Hgt " = Mortality/Average Height/All Species/All Size Classes
" MortAllSx BA/Ac   " = Mortality/Basal Area per Acre/All Species/All Size Classes
" MortAllSx Cu-A/Ac " = Mortality/Cubic Feet per Acre/All Species/All Size Classes, All Trees - Cubic Top
" MortAllSx Cu-S/Ac " = Mortality/Cubic Feet per Acre/All Species/All Size Classes, Sawtimber - Board Top
" MortAllSx Cu-T/Ac " = Mortality/Cubic Feet per Acre/All Species/All Size Classes, Topwood - Board to Cubic Top
" MortAllSx Bd/Ac   " = Mortality/Board Feet per Acre/All Species/All Size Classes
      | |\/
      \ / ---> Structural Stage (2 digits) used to identify size class attributes
       |          - "Sx" indicates sapling to mature size classes (All sizes) (1)
       |          - "Sm" indicates sapling to mid-age size classes            (2)
       |          - "Sy" indicates sapling to young size classes              (3)
       |          - "Ss" indicates sapling size class                         (4)
       |          - "Yx" indicates young to mature size classes               (5)
       |          - "Ym" indicates young to mid-age size classes              (6)
       |          - "Yy" indicates young size class                           (7)
       |          - "Mx" indicates mid-age to mature size classes             (8)
       |          - "Mm" indicates mid-age size class                         (9)
       |          - "Xx" indicates mature size class                          (0)
       |
       ------> FIA Species Codes (3 digits) used to identify individual species
                  - "All" indicates all species combined
                  - "Sft" indicates all softwood species
                  - "Hrd" indicates all hardwood species
                  - "Gp1" indicates species group 1
                  - "Gp2" indicates species group 2
                  - "Gp3" indicates species group 3
                  - "Gp4" indicates species group 4
                  - "Gp5" indicates species group 5
                  - "Gp6" indicates species group 6
                  - "Gp7" indicates species group 7
                  - "Gp8" indicates species group 8
```

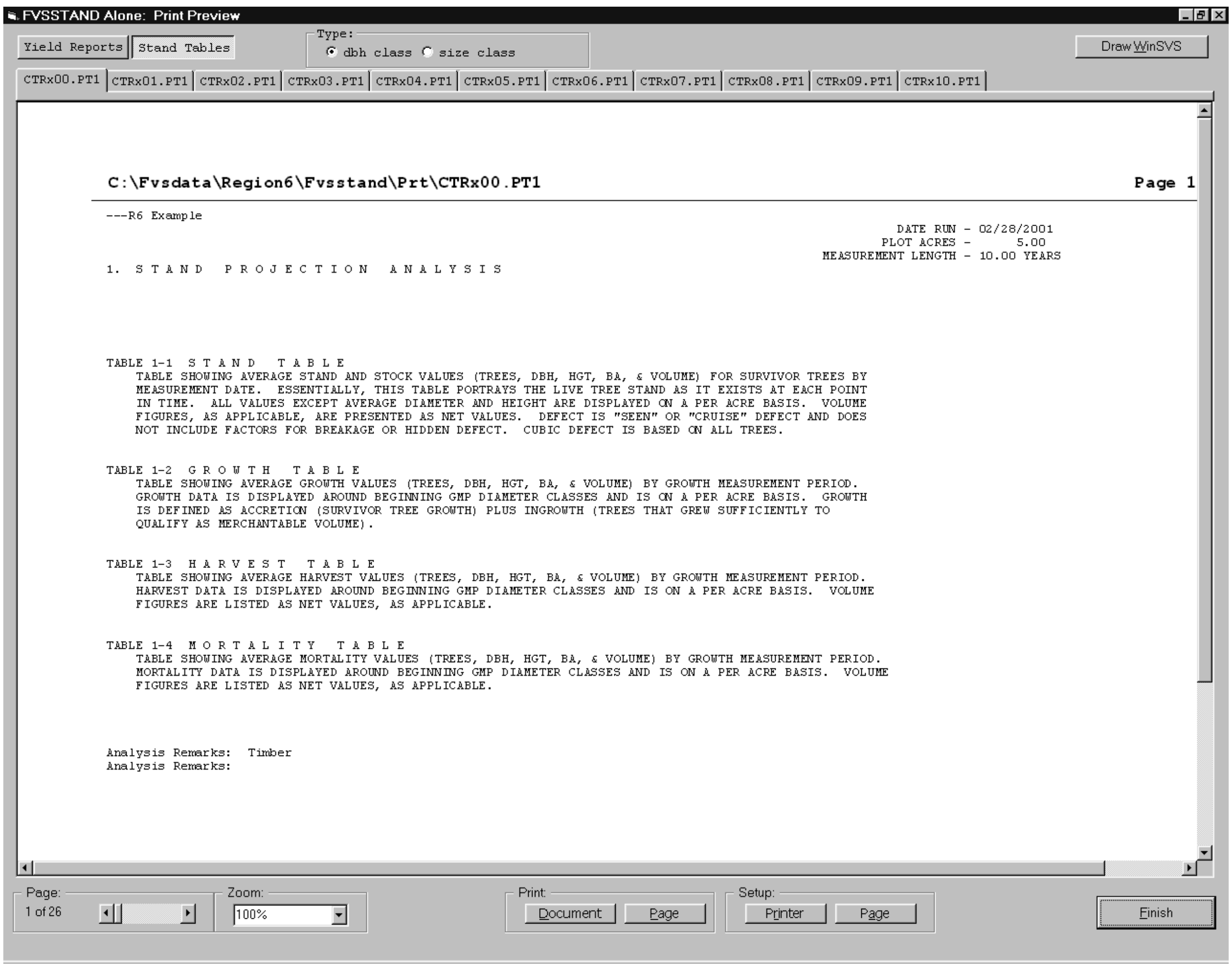
If the **Species Lists** tab on **Step 3** of the **FVSSTAND_Wizard** had designated individual species or species groups, separate yield reports would have been created per entry. A composite yield report is also constructed from each of the individual and grouped species. The label of this file has a unique Species Coding of **"Tot"** for total combined yield report. Using this demonstration as an example, the file **"CTRxTot.flt"** in the folder **C:\Fvsdata\Region6\Fvsstand\Flt** would contain the summation of the individual species and species groups appended horizontally. It is easier to work with this one combined file rather than the multiple files constructed per individual species and species groups.

The **Structure Class** column in the yield reports is provided when the **Structural Class** stand attribute is checked on **Step 3** of the **FVSSTAND_Wizard**. It is only population if the **StrClass** Keyword is included in the FVS run. The value listed is a combination of Structure Class code and the plurality of occurance. Thus, if there are five stands in the simulation and four of the stands have a computed structural class of Stem Exclusion (SE), then the resultant label would be **"2=SE/80%"**. To verify these results, a file is provided in the **C:\Fvsdata\Region6\Fvsstand\Flt** folder that has a ***.str** filename extension. In this case, the file is **"CTRx.str"**. The contents of this file are as follows.

YEAR/AGE	0 = BG	1 = SI	2 = SE	3 = UR	4 = YM	5 = OS	6 = OM	TOTAL
1997	0	3	2	0	0	0	0	5
2007	0	0	5	0	0	0	0	5
2017	0	0	5	0	0	0	0	5
2027	0	0	5	0	0	0	0	5
2037	0	0	4	1	0	0	0	5
2047	0	0	4	1	0	0	0	5
2057	0	0	4	1	0	0	0	5
2067	0	0	4	1	0	0	0	5
2077	0	0	4	1	0	0	0	5
2087	0	0	4	1	0	0	0	5
2097	0	0	0	0	0	0	0	0

Stand and Stock Tables

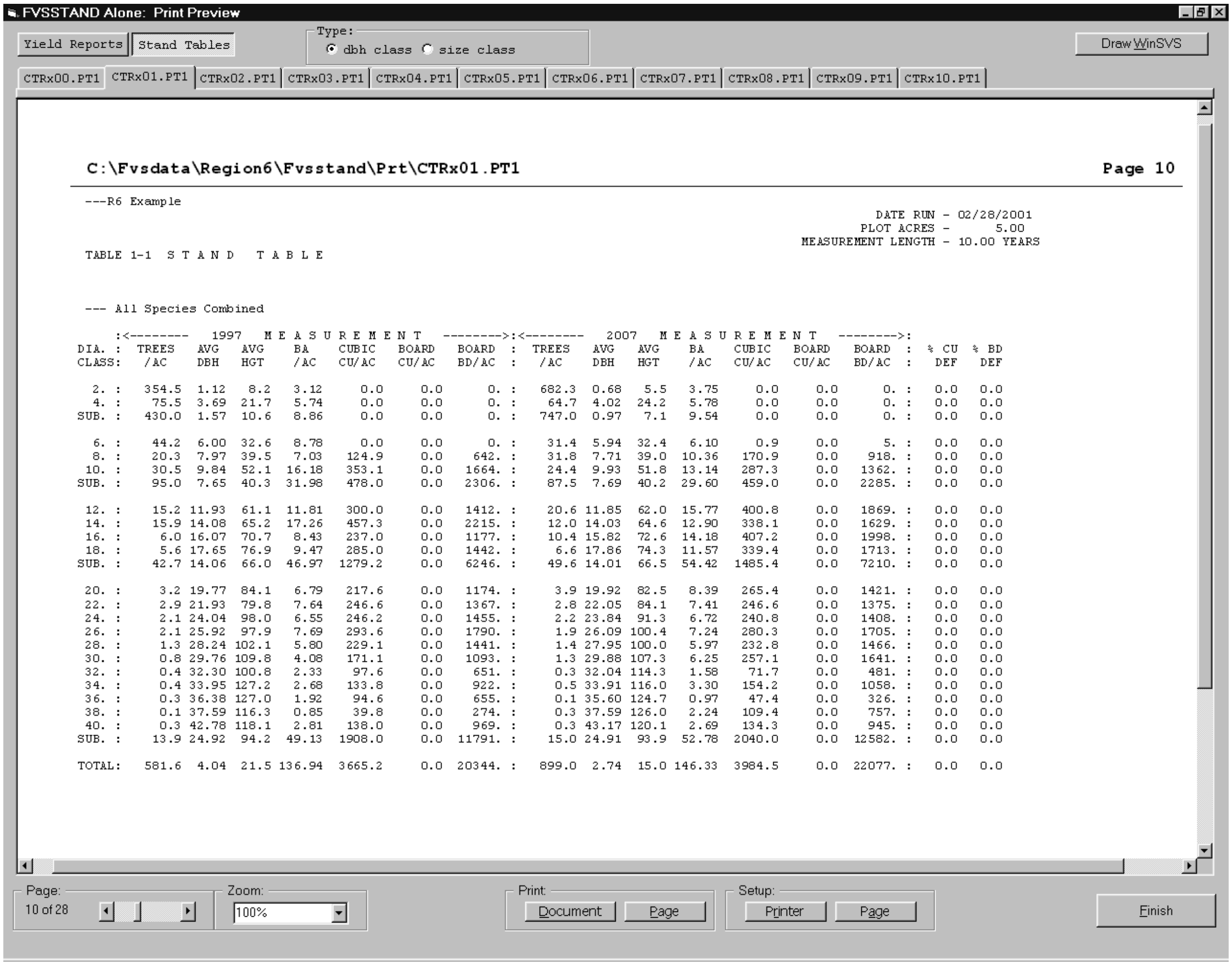
Mensurationally speaking, a **Stand Table** displays number of trees per acre by species by diameter class. A **Stock Table** displays volume per acre by species by diameter class. The stand tables presented by **FVSSTAND** in actuality show both stand and stock table information combined. Clicking the **Stand Tables** button on the **FVSTAND Alone: Print Preview** reveals a tabbed view displaying the **Stocking, Growth, Harvest,** and **Mortality** tables by 2-inch diameter class for each simulation cycle.



The **Projection Title** from **Step 2** of the **FVSSTAND_Wizard** is displayed at the top of the banner page of each table. The **Footnote** remarks are listed at the bottom.

Stand tables are produced by individual species as well as categorical designations of "**All Softwoods**", "**All Hardwoods**", and "**All Species Combined**" summaries. By using the **Species Listing** tab on **Step 2** of the **FVSSTAND_Wizard**, the volume of reporting can be reduced to just "**Condensed All Species**" summaries. This is definitely an option to consider if you are dealing with numerous species and would like to get a printed copy of the stand tables. You can figure that for each species, four tables are created. You must factor in the three additional "All Species" categories plus four banner pages to compute the number of pages produced. For example, for a run that contains six species, forty pages could possibly be rendered given that harvest and mortality components exist for each species.

Subtotals within the tables are based on the **Diameter Boundaries** information provided in **Step 2** of the **FVSSTAND-Wizard**, **Species Listing** tab. "**Young Forest**" designation is synonymous within poletimber whereas "**Mid-Age Forest**" is synonymous with small sawtimber designation.



C:\Fvsdata\Region6\Fvsstand\Prt\CTRx01.PT1 **Page 10**

---R6 Example

DATE RUN - 02/28/2001
PLOT ACRES - 5.00
MEASUREMENT LENGTH - 10.00 YEARS

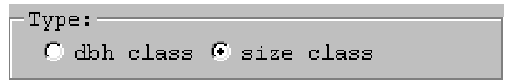
TABLE 1-1 S T A N D T A B L E

--- All Species Combined

DIA. CLASS	1997 MEASUREMENT TREES /AC	AVG DBH	AVG HGT	BA /AC	CUBIC CU/AC	BOARD CU/AC	BOARD BD/AC	2007 MEASUREMENT TREES /AC	AVG DBH	AVG HGT	BA /AC	CUBIC CU/AC	BOARD CU/AC	BOARD BD/AC	% CU DEF	% BD DEF
2.	354.5	1.12	8.2	3.12	0.0	0.0	0.	682.3	0.68	5.5	3.75	0.0	0.0	0.	0.0	0.0
4.	75.5	3.69	21.7	5.74	0.0	0.0	0.	64.7	4.02	24.2	5.78	0.0	0.0	0.	0.0	0.0
SUB.	430.0	1.57	10.6	8.86	0.0	0.0	0.	747.0	0.97	7.1	9.54	0.0	0.0	0.	0.0	0.0
6.	44.2	6.00	32.6	8.78	0.0	0.0	0.	31.4	5.94	32.4	6.10	0.9	0.0	5.	0.0	0.0
8.	20.3	7.97	39.5	7.03	124.9	0.0	642.	31.8	7.71	39.0	10.36	170.9	0.0	918.	0.0	0.0
10.	30.5	9.84	52.1	16.18	353.1	0.0	1664.	24.4	9.93	51.8	13.14	287.3	0.0	1362.	0.0	0.0
SUB.	95.0	7.65	40.3	31.98	478.0	0.0	2306.	87.5	7.69	40.2	29.60	459.0	0.0	2285.	0.0	0.0
12.	15.2	11.93	61.1	11.81	300.0	0.0	1412.	20.6	11.85	62.0	15.77	400.8	0.0	1869.	0.0	0.0
14.	15.9	14.08	65.2	17.26	457.3	0.0	2215.	12.0	14.03	64.6	12.90	338.1	0.0	1629.	0.0	0.0
16.	6.0	16.07	70.7	8.43	237.0	0.0	1177.	10.4	15.82	72.6	14.18	407.2	0.0	1998.	0.0	0.0
18.	5.6	17.65	76.9	9.47	285.0	0.0	1442.	6.6	17.86	74.3	11.57	339.4	0.0	1713.	0.0	0.0
SUB.	42.7	14.06	66.0	46.97	1279.2	0.0	6246.	49.6	14.01	66.5	54.42	1485.4	0.0	7210.	0.0	0.0
20.	3.2	19.77	84.1	6.79	217.6	0.0	1174.	3.9	19.92	82.5	8.39	265.4	0.0	1421.	0.0	0.0
22.	2.9	21.93	79.8	7.64	246.6	0.0	1367.	2.8	22.05	84.1	7.41	246.6	0.0	1375.	0.0	0.0
24.	2.1	24.04	98.0	6.55	246.2	0.0	1455.	2.2	23.84	91.3	6.72	240.8	0.0	1408.	0.0	0.0
26.	2.1	25.92	97.9	7.69	293.6	0.0	1790.	1.9	26.09	100.4	7.24	280.3	0.0	1705.	0.0	0.0
28.	1.3	28.24	102.1	5.80	229.1	0.0	1441.	1.4	27.95	100.0	5.97	232.8	0.0	1466.	0.0	0.0
30.	0.8	29.76	109.8	4.08	171.1	0.0	1093.	1.3	29.88	107.3	6.25	257.1	0.0	1641.	0.0	0.0
32.	0.4	32.30	100.8	2.33	97.6	0.0	651.	0.3	32.04	114.3	1.58	71.7	0.0	481.	0.0	0.0
34.	0.4	33.95	127.2	2.68	133.8	0.0	922.	0.5	33.91	116.0	3.30	154.2	0.0	1058.	0.0	0.0
36.	0.3	36.38	127.0	1.92	94.6	0.0	655.	0.1	35.60	124.7	0.97	47.4	0.0	326.	0.0	0.0
38.	0.1	37.59	116.3	0.85	39.8	0.0	274.	0.3	37.59	126.0	2.24	109.4	0.0	757.	0.0	0.0
40.	0.3	42.78	118.1	2.81	138.0	0.0	969.	0.3	43.17	120.1	2.69	134.3	0.0	945.	0.0	0.0
SUB.	13.9	24.92	94.2	49.13	1908.0	0.0	11791.	15.0	24.91	93.9	52.78	2040.0	0.0	12582.	0.0	0.0
TOTAL:	581.6	4.04	21.5	136.94	3665.2	0.0	20344.	899.0	2.74	15.0	146.33	3984.5	0.0	22077.	0.0	0.0

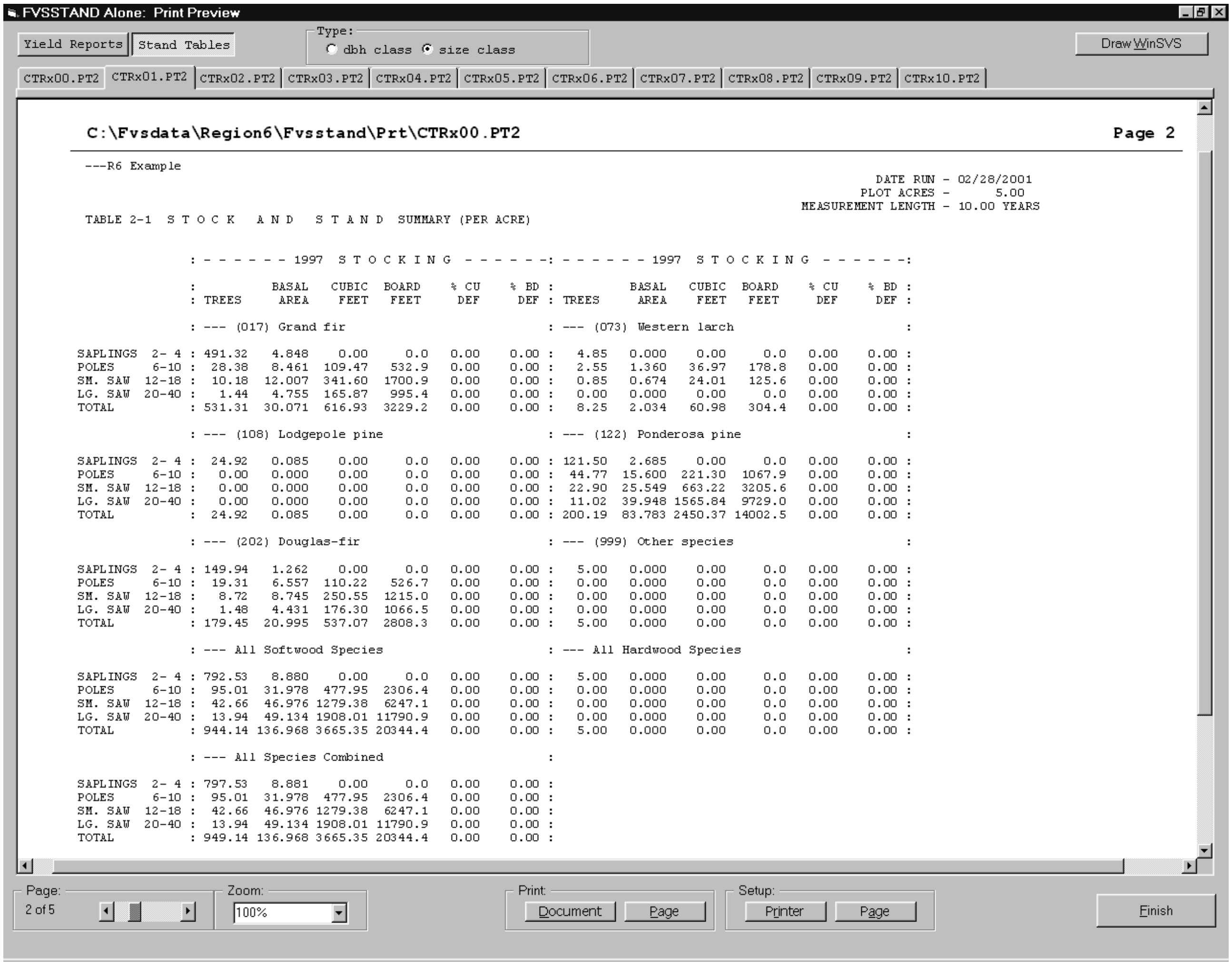
****IMPORTANT**** FVSSTAND uses a pre-defined convention for designating the **Stand Table files**. The *first four* characters of the stand table file names are derived from the first four characters of the **FVS Key file**. In this example, we named our run simulation **"CTRx.key"**. This naming convention works well with FVSSTAND insofar as the first four characters represent the Cover Type and Silvicultural Prescription associated with our simulation. Plots from a Ponderosa Pine stands that are designated to Let Grow could be named "PPLg". This would conform well with FVSSTAND Stand Table output. If a "**Time Basis**" yield as designated on the **Yield Report** tab during **Step 2** of the **FVSSTAND_Wizard** is selected the *fifth* and *sixth* characters of the Stand Table file name are significant. These two digits represent the projection cycle. An "01" would indicate the first projection cycle whereas a "10" would indicate the tenth. Past and present information is displayed by projection cycle. The present data is indicative of the current projection cycle values. In contrast, if an "**Age Basis**" yield as designated on the **Yield Report** tab during **Step 2** of the **FVSSTAND_Wizard** is selected the *fifth*, *sixth*, and *seventh* characters of the Stand Table file name are significant. The *fifth* digit indicates the origin of the stand. A code of **"0"** signifies the ***existing*** stand condition. A code of **"1"** signifies a ***first regenerated*** stand condition. A code of **"2"** signifies the ***second regenerated*** stand. Subsequent stand origin codes follow a similar pattern. A **"ResetAge"** Keyword would need to be entered into the simulation to bring out this feature. Digits *six* and *seven* indicate the age class. Age class codes are designated as multiples of the **Age Interval** as selected on the Yield Report tab on **Step 2** of the **FVSSTAND_Wizard**. For example, a "10" age class designation (5-year interval) would represent the 50 year-old age class. A "20" would represent the stand at age 100. Do not be too intimidated by this time/age filename digit designation convention. Simply choose a tab or file with a specified name and note the time/age listing on the top of each table to determine if you selected the desire report

There are two types of **FVSSTAND Alone Stand Tables:** 2-inch **diameter class** and **size class** summaries. Once again, the purpose of this was to cut down on the amount of printed output. The size class summaries are derived directly from the diameter class stand tables.



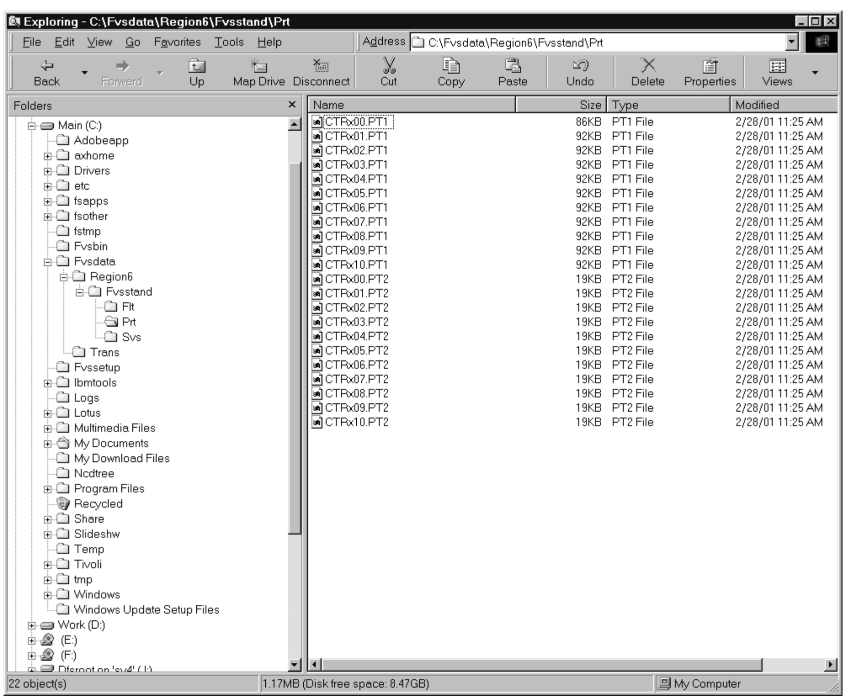
Subtotals and totals are extracted and put into the size class files. The diameter class stand tables have a file name extension of **"*.PT1"**. The size class stand tables have a file name extension of **"*.PT2"**. To preview the size class print files, simply click the radial option button with the **Stand Table – Type** frame. The size class print files will be displayed along the consecutive tabs.

To **view** a **different cycle**, click one of the tabs along the **Tab Strip** to bring it into the print previewer. To **cycle** through the **listing**, use the **directional** arrows in the **Page Frame**. The horizontal and vertical scroll bars simply move the current page viewing area. You can use the Print Frame to print the document or page. To reconfigure the printer or page, use the Setup Frame.




```
C:\Fvsdata\Region6\Fvsstand\Prt\CTRx00.PT2                                                  Page 2

 ---R6 Example
                                                                        DATE RUN - 02/28/2001
                                                                        PLOT ACRES -      5.00
                                                                   MEASUREMENT LENGTH - 10.00 YEARS
 TABLE 2-1  S T O C K   A N D   S T A N D  SUMMARY (PER ACRE)

                 : - - - - - - 1997  S T O C K I N G - - - - - -: - - - - - - 1997  S T O C K I N G - - - - - -:

                 :         BASAL   CUBIC  BOARD    % CU     % BD :         BASAL   CUBIC  BOARD    % CU     % BD :
                 : TREES    AREA    FEET   FEET     DEF      DEF : TREES    AREA    FEET   FEET     DEF      DEF :

                 : --- (017) Grand fir                           : --- (073) Western larch                       :

SAPLINGS  2- 4 : 491.32   4.848    0.00     0.0   0.00     0.00 :   4.85   0.000    0.00     0.0   0.00     0.00 :
POLES      6-10 :  28.38   8.461  109.47   532.9   0.00     0.00 :   2.55   1.360   36.97   178.8   0.00     0.00 :
SM. SAW  12-18 :  10.18  12.007  341.60  1700.9   0.00     0.00 :   0.85   0.674   24.01   125.6   0.00     0.00 :
LG. SAW  20-40 :   1.44   4.755  165.87   995.4   0.00     0.00 :   0.00   0.000    0.00     0.0   0.00     0.00 :
TOTAL           : 531.31  30.071  616.93  3229.2   0.00     0.00 :   8.25   2.034   60.98   304.4   0.00     0.00 :

                 : --- (108) Lodgepole pine                      : --- (122) Ponderosa pine                      :

SAPLINGS  2- 4 :  24.92   0.085    0.00     0.0   0.00     0.00 : 121.50   2.685    0.00     0.0   0.00     0.00 :
POLES      6-10 :   0.00   0.000    0.00     0.0   0.00     0.00 :  44.77  15.600  221.30  1067.9   0.00     0.00 :
SM. SAW  12-18 :   0.00   0.000    0.00     0.0   0.00     0.00 :  22.90  25.549  663.22  3205.6   0.00     0.00 :
LG. SAW  20-40 :   0.00   0.000    0.00     0.0   0.00     0.00 :  11.02  39.948 1565.84  9729.0   0.00     0.00 :
TOTAL           :  24.92   0.085    0.00     0.0   0.00     0.00 : 200.19  83.783 2450.37 14002.5   0.00     0.00 :

                 : --- (202) Douglas-fir                         : --- (999) Other species                       :

SAPLINGS  2- 4 : 149.94   1.262    0.00     0.0   0.00     0.00 :   5.00   0.000    0.00     0.0   0.00     0.00 :
POLES      6-10 :  19.31   6.557  110.22   526.7   0.00     0.00 :   0.00   0.000    0.00     0.0   0.00     0.00 :
SM. SAW  12-18 :   8.72   8.745  250.55  1215.0   0.00     0.00 :   0.00   0.000    0.00     0.0   0.00     0.00 :
LG. SAW  20-40 :   1.48   4.431  176.30  1066.5   0.00     0.00 :   0.00   0.000    0.00     0.0   0.00     0.00 :
TOTAL           : 179.45  20.995  537.07  2808.3   0.00     0.00 :   5.00   0.000    0.00     0.0   0.00     0.00 :

                 : --- All Softwood Species                      : --- All Hardwood Species                      :

SAPLINGS  2- 4 : 792.53   8.880    0.00     0.0   0.00     0.00 :   5.00   0.000    0.00     0.0   0.00     0.00 :
POLES      6-10 :  95.01  31.978  477.95  2306.4   0.00     0.00 :   0.00   0.000    0.00     0.0   0.00     0.00 :
SM. SAW  12-18 :  42.66  46.976 1279.38  6247.1   0.00     0.00 :   0.00   0.000    0.00     0.0   0.00     0.00 :
LG. SAW  20-40 :  13.94  49.134 1908.01 11790.9   0.00     0.00 :   0.00   0.000    0.00     0.0   0.00     0.00 :
TOTAL           : 944.14 136.968 3665.35 20344.4   0.00     0.00 :   5.00   0.000    0.00     0.0   0.00     0.00 :

                 : --- All Species Combined                      :

SAPLINGS  2- 4 : 797.53   8.881    0.00     0.0   0.00     0.00 :
POLES      6-10 :  95.01  31.978  477.95  2306.4   0.00     0.00 :
SM. SAW  12-18 :  42.66  46.976 1279.38  6247.1   0.00     0.00 :
LG. SAW  20-40 :  13.94  49.134 1908.01 11790.9   0.00     0.00 :
TOTAL           : 949.14 136.968 3665.35 20344.4   0.00     0.00 :
```

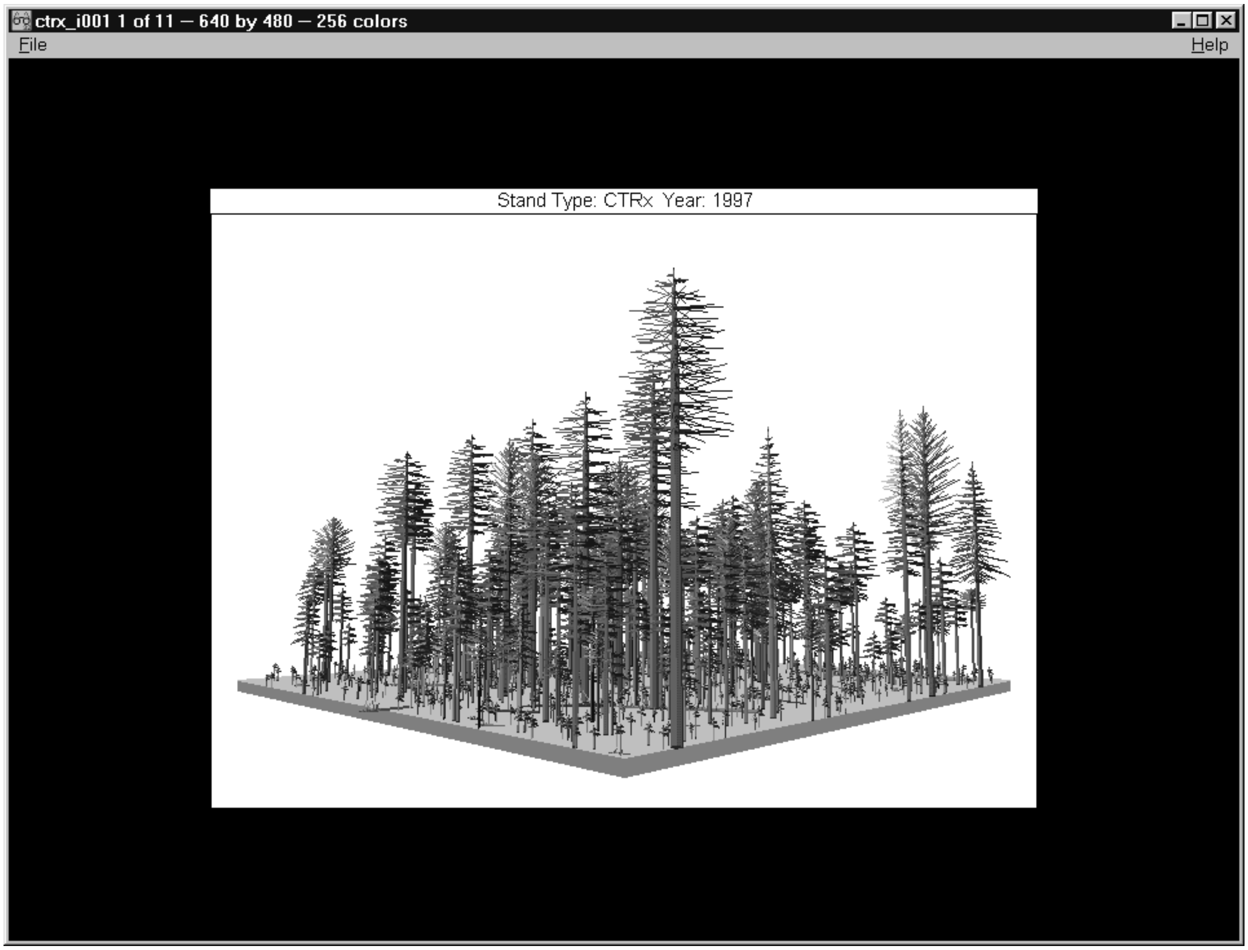
The print files of the stand tables are contained in a subordinate folder off of the Fvsstand folder. For this example, the diameter and size class stand table files are stored in **C:\Fvsdata\Region6\Fvsstand\Prt**.



SVS Linkage

The **Draw WinSVS** button will initiate the rendering of image files for each simulation cycle based on stand table values and launch the Stand Visualization System program.

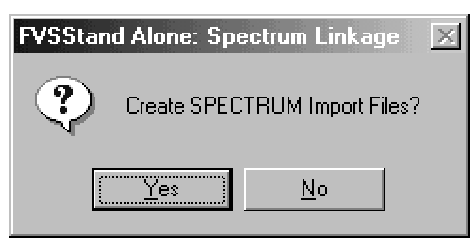
15. Click the **Draw Win SVS** button to create the files for a SVS movie. SVS will render SVS tree list files within the **\Fvsstand\SVS** folder into an image file that its viewer can play. When each cycle's linkage file is rendered, the SVS viewer window will appear. The first image file will be displayed.



At the bottom of the viewer's window are control buttons. You can view each cycle at a time with these controls, navigate back and forth between views, or play them as a movie.

Try each of the options to see what you can do with this viewer.

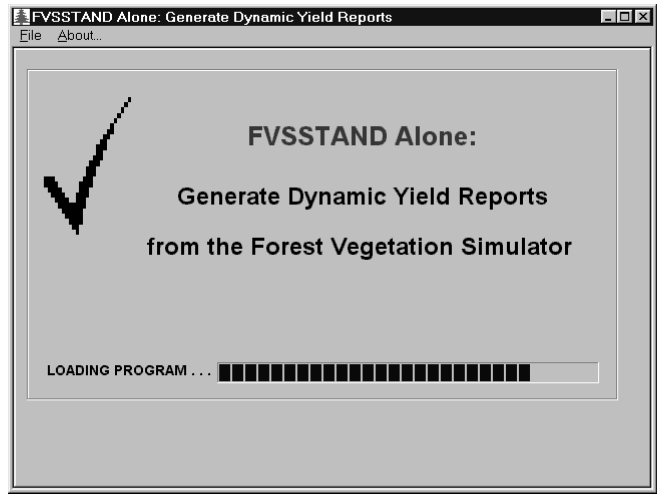
16. Close the SVS window when you are finished viewing the simulation images. Click **File**, **Exit** or click the **X** button in the upper right corner of the SVS viewer window.
17. When you are finished reviewing the yield reports and stand tables in the FVSSTAND viewer, click the **Finish** button in the lower right corner of the viewer.
18. A **Spectrum Linkage** button box will appear asking you whether you want to **Create Spectrum Import Files?** Selecting **Yes** converts the two line header seen in the Print Preview window to a one line header required by Spectrum. Spectrum export files, extension **.spc**, are created in the **"\Fvsstand\Flt"** folder.



19. Click the **Yes** button.
20. Another box will appear when processing is complete, "**Finished…**" Click the **OK** button. FVSSTAND will return to Windows.

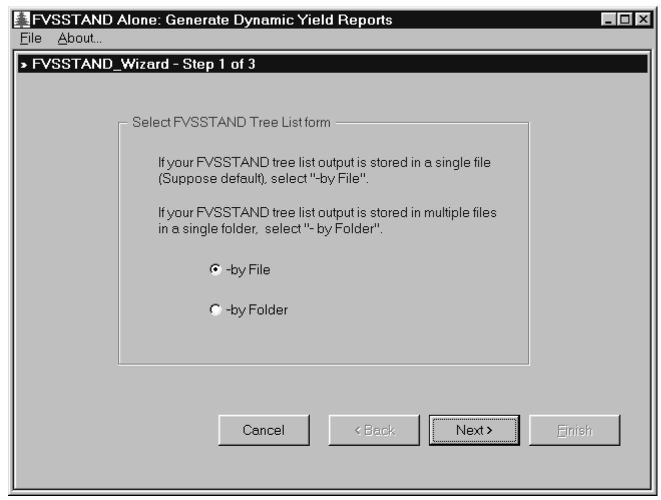
FVSTAND as a Stand-Alone Program

As advertised, FVSSTAND can be initiated from a desktop icon or from the Windows Start Menu, Program Files, Suppose Folder, FVSSTAND shortcut icon. An introductory **Splash** window will appear. The splash screen will be displayed for approximately 15 seconds. However, **it is not necessary to wait for the splash screen progress bar to finish**. Simply press any keyboard key or mouse click in the area below the splash screen frame and the FVSSTAND interface window. This will take you directly to the next step. You can also display the **About** window from the menu to cite the **revision** date of the program. From here, you will progress to the next step. The **File** menu option will allow you to **exit** the program.

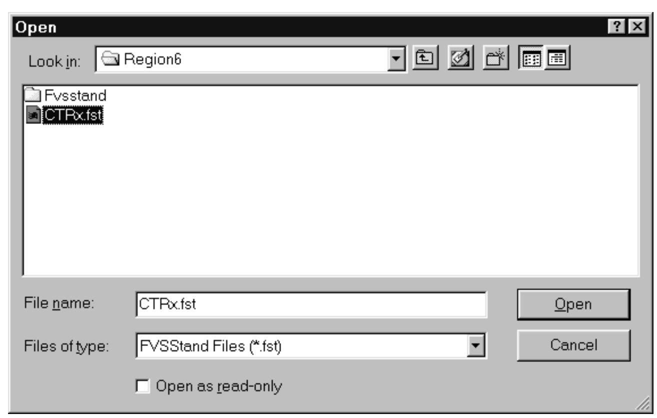


FVSSTAND_Wizard – Step 1

After the splash screen, the **Step 1** of the **FVSSTAND_Wizard** window appears.



1. In Step 1 of the Wizard, select whether you want to extract tables from one FVSSTAND tree list output file or several FVSSTAND tree list output files storage in a particular directory. Select **–by File** (Suppose default).
2. Click the **Next >** button.



3. An **Open** box will appear. Find and select the FVSSTAND tree list output file you wish to process (i.e. the file **CTRx.fst)**. Select this file in the folder/file box and its name will appear in the **File name:** box.
4. Click the **Open** button.

Step 2 of the **FVSSTAND_Wizard** will appear.

NOTE: From this point on, FVSSTAND operates the same regardless if executed by Suppose as a post-processor or if executed from a Windows shortcut as a stand-alone program.

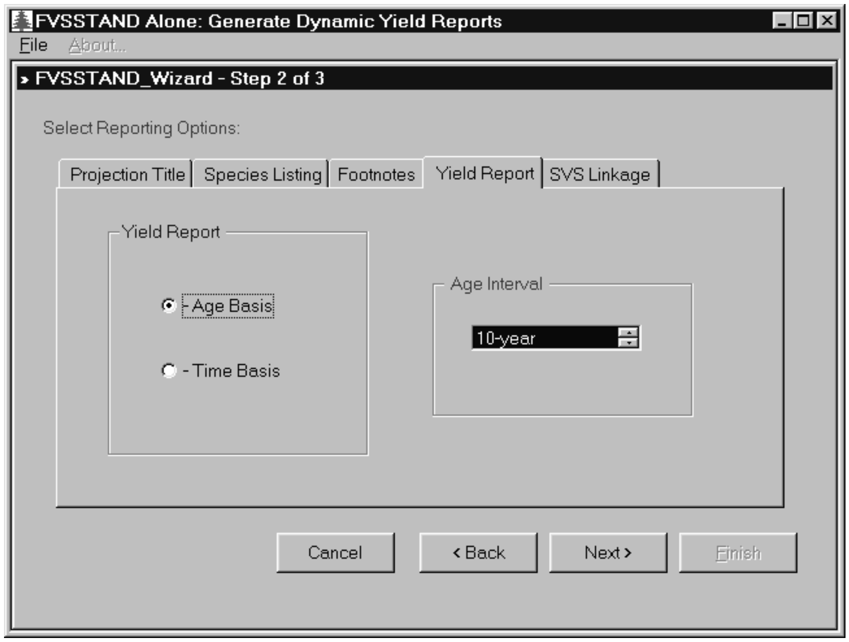
Viewing FVSSTAND Output Files with a Text Editor

FVSSTAND produces a variety of files including yield reports (or flat files), detailed and summary stand tables, and Stand Visualization System (SVS) image files. When FVSSTAND is run, in the project/strata folder, it creates an **"..\Fvsstand**" folder and three sub-folders beneath it: **"..\Fvsstand\Flt", "..\Fvsstand\Prt",** and "**..\Fvsstand\Svs".** These folders are the repositories for the yield report flat files (**..\Flt**), stand table printouts (**..\Prt**), and the SVS files (**..\Svs**). These files are stored permanently in these locations until they are deleted. Use your favorite text editor to access these files. FVS runstreams (Key files) with the same file name (first four characters) will overwrite existing files.

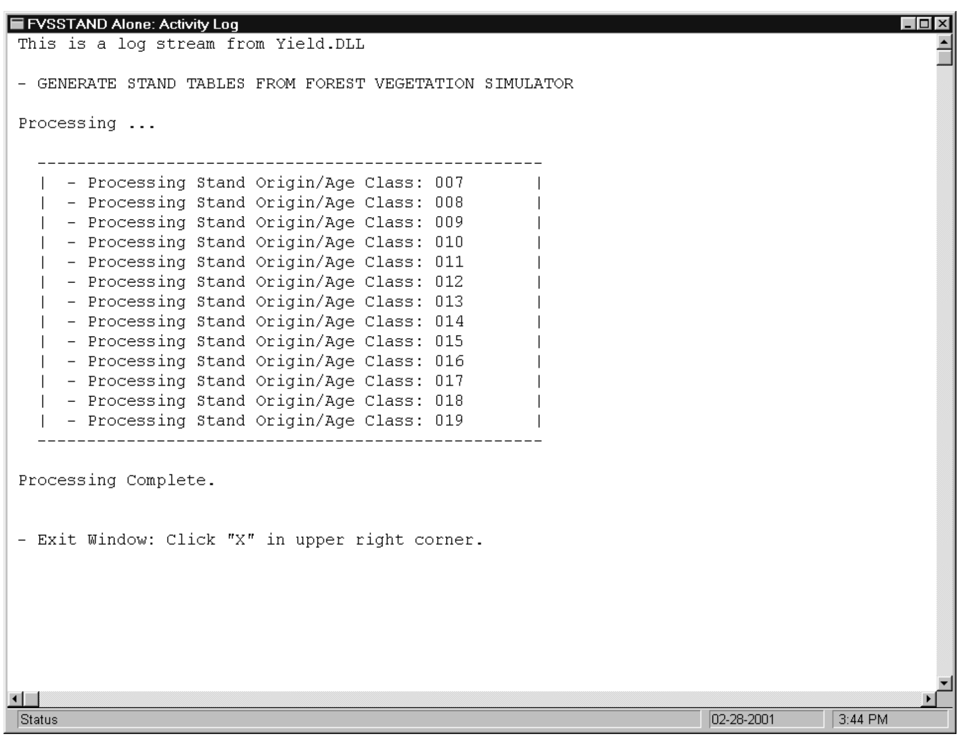
Notes:

Skill Challenge:

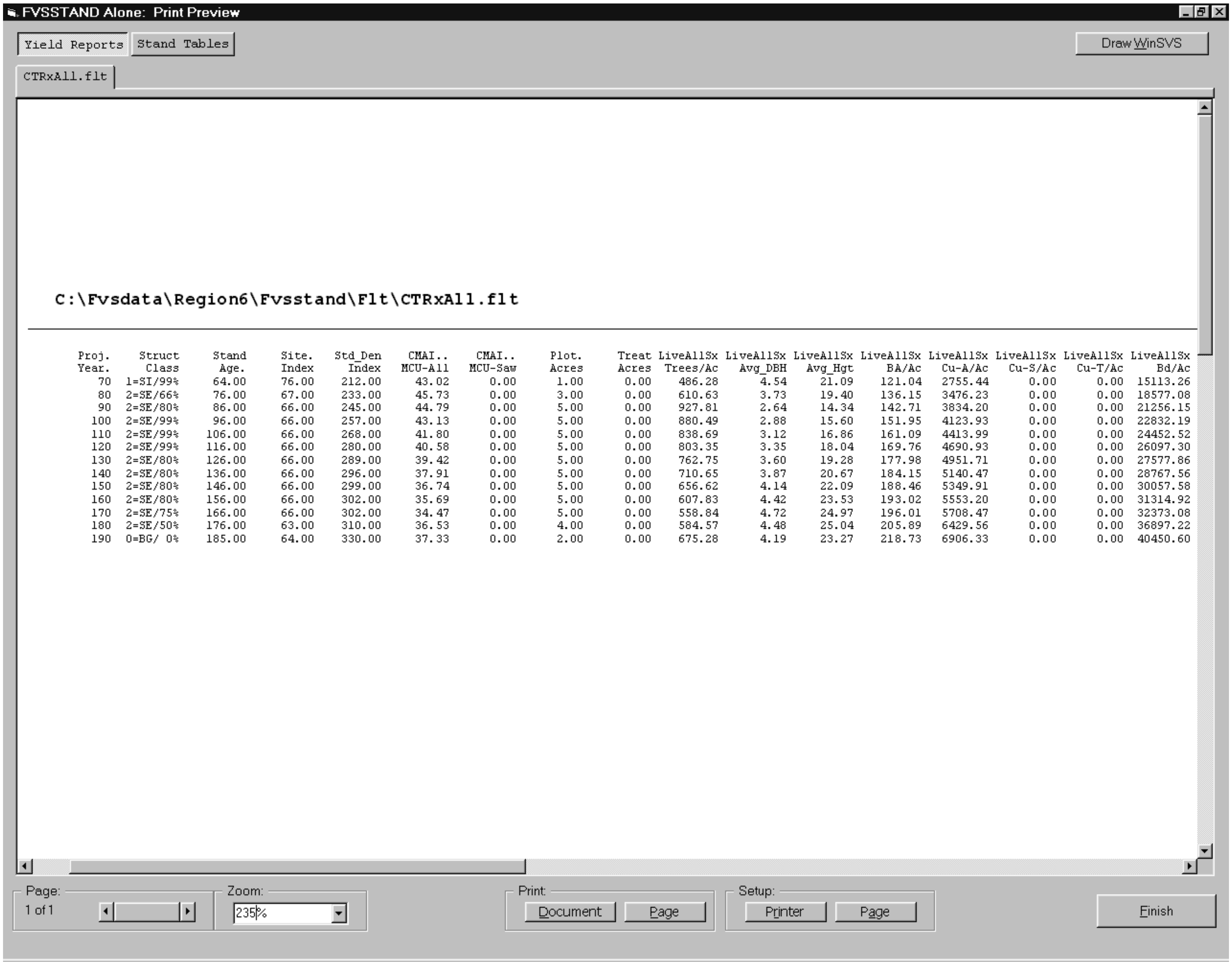
Steve Chugalug realized that the timber stratum from R6 Examples deals primarily with even-aged stands. He decides to re-run the example, this time using the Age-Basis yield report option. Go ahead and give Steve a hand. See what you get for the "**All Species**" yield report.



Notice the processing notices presented in the Yield.dll activity. How does the file name nomenclature differ from the Time-Basis yield to the Age-Basis yield?



Skill Challenge Solution:



C:\Fvsdata\Region6\Fvsstand\Flt\CTRxAll.flt

Proj. Year.	Struct Class	Stand Age.	Site. Index	Std_Den Index	CMAI.. MCU-All	CMAI.. MCU-Saw	Plot. Acres	Treat Acres	LiveAllSx Trees/Ac	LiveAllSx Avg_DBH	LiveAllSx Avg_Hgt	LiveAllSx BA/Ac	LiveAllSx Cu-A/Ac	LiveAllSx Cu-S/Ac	LiveAllSx Cu-T/Ac	LiveAllSx Bd/Ac
70	1=SI/99%	64.00	76.00	212.00	43.02	0.00	1.00	0.00	486.28	4.54	21.09	121.04	2755.44	0.00	0.00	15113.26
80	2=SE/66%	76.00	67.00	233.00	45.73	0.00	3.00	0.00	610.63	3.73	19.40	136.15	3476.23	0.00	0.00	18577.08
90	2=SE/80%	86.00	66.00	245.00	44.79	0.00	5.00	0.00	927.81	2.64	14.34	142.71	3834.20	0.00	0.00	21256.15
100	2=SE/99%	96.00	66.00	257.00	43.13	0.00	5.00	0.00	880.49	2.88	15.60	151.95	4123.93	0.00	0.00	22832.19
110	2=SE/99%	106.00	66.00	268.00	41.80	0.00	5.00	0.00	838.69	3.12	16.86	161.09	4413.99	0.00	0.00	24452.52
120	2=SE/99%	116.00	66.00	280.00	40.58	0.00	5.00	0.00	803.35	3.35	18.04	169.76	4690.93	0.00	0.00	26097.30
130	2=SE/80%	126.00	66.00	289.00	39.42	0.00	5.00	0.00	762.75	3.60	19.28	177.98	4951.71	0.00	0.00	27577.86
140	2=SE/80%	136.00	66.00	296.00	37.91	0.00	5.00	0.00	710.65	3.87	20.67	184.15	5140.47	0.00	0.00	28767.56
150	2=SE/80%	146.00	66.00	299.00	36.74	0.00	5.00	0.00	656.62	4.14	22.09	188.46	5349.91	0.00	0.00	30057.58
160	2=SE/80%	156.00	66.00	302.00	35.69	0.00	5.00	0.00	607.83	4.42	23.53	193.02	5553.20	0.00	0.00	31314.92
170	2=SE/75%	166.00	66.00	302.00	34.47	0.00	5.00	0.00	558.84	4.72	24.97	196.01	5708.47	0.00	0.00	32373.08
180	2=SE/50%	176.00	63.00	310.00	36.53	0.00	4.00	0.00	584.57	4.48	25.04	205.89	6429.56	0.00	0.00	36897.22
190	0=BG/ 0%	185.00	64.00	330.00	37.33	0.00	2.00	0.00	675.28	4.19	23.27	218.73	6906.33	0.00	0.00	40450.60

FOREST VEGETATION SIMULATOR
FVSSTAND ALONE

LIST FILE - HEADER RECORD LAYOUT

Date: = 09/06/2000

Prepared by: Don
Vandendriesche
USDA Forest Service, Forest Management Service
Center

Item No.	Descriptive Name	Variable Name	Variable Length	Cumlative Length	List Codes
					T = Complete Tree List
01	Header Code (-999)	IHEAD	I5	5	C = Complete Cut List
02	Tree Count	ITCNT	I5	10	
03	Cycle Number	ICYCLE	I6	16	
04	Projection Year	IYEAR	I4	20	
05	Stand ID	ASTAND	A27	47	A9
06	Management ID	AMGMT	A5	52	
07	FVS Variant	AVARI	A3	55	
08	FVS Version	VER	F5.2	60	
09	Date	ADATE	A11	71	
10	Time	ATIME	A9	80	
11	List Code	ALIST	A2	82	
12	Period Length	IPROJ	I3	85	
13	Sampling Weight	AWGT	A14	99	
14	Variant Revision Date	AREV	A11	110	A9
15	PPE Variable	APPE	A12	122	
16	Stand Structure	ASTYP	A5	127	
17	Stand Age	IAGE	I4	131	
18	Stand Age Class 5 yr	IAC5	I4	135	
19	Stand Age Class 10 yr	IAC10	I4	139	
20	Stand Age Class 15 yr	IAC15	I4	143	
21	Forest Number	IFOR	I9	152	
22	Site Species	ASSPC	A4	156	FIA Species Codes
23	Site Index	ISI	I5	161	
24	Stand Basal Area	IPBA	I5	166	
25	Stand Density Index	ISDI	I5	171	
26	Tree Index	LINK	I10	181	

FOREST VEGETATION SIMULATOR
FVSSTAND ALONE

LIST FILE - TREE RECORD LAYOUT

Date: = 09/06/2000

Prepared by: Don Vandendriesche
USDA Forest Service, Forest Management Service Center

Item No.	Descriptive Name	Variable Name	Variable Length	Cumlative Length	
01	Tree Number	ATREE	A9	9	
02	Tree Index	INDX	I5	14	
03	Species Code	ASP	A3	17	
04	Species Number	ISPC	I3	20	
05	Tree Class	ITCL	I3	23	
06	Status Code	ISTA	I3	26	
07	Plot Code	IPNT	I4	30	
08	Trees/Acre	FAC	F9.3	39	
09	Mort. Trees/Acre	FACM	F9.3	48	
10	DBH	DBH1	F6.1	54	
11	DBH Increment	DINC	F6.2	60	
12	Total Height	HGT1	F6.1	66	
13	Height Increment	HINC	F5.1	71	
14	Crown Ratio	ICCR	I3	74	
15	Crown Width	CRWN	F5.1	79	
16	Dwarf Mistletoe	IDMR	I3	82	
17	BA %	BAPER	F7.2	89	
18	Point BA	IPTBA	I6	95	
19	Gross Cubic Foot	TCU1	F7.1	102	* Total Cubic - East
20	Net Cubic Foot	CU1	F7.1	109	Board Cubic - East
21	Net Board Foot	BD1	F8.1	117	
22	Cubic Defect	ICUDF1	I3	120	
23	Board Defect	IBDDF1	I3	123	
24	Truncated Height	ITHGT1	I4	127	
25	DBH	DBH0	F6.1	133	
26	Total Height	HGT0	F6.1	139	
27	Gross Cubic Foot	TCU0	F7.1	146	* Total Cubic - East
28	Net Cubic Foot	CU0	F7.1	153	Board Cubic - East
29	Net Board Foot	BD0	F8.1	161	
30	Cubic Defect	ICUDF0	I3	164	
31	Board Defect	IBDDF0	I3	167	

```
Spectrum Import File - Variable Definition Template
---------------------------------------------------

"Strata    " = Analysis Area
" Proj_YEAR" = Projection Cycle Year
" St_Age/10" = Stand Age/10 years
" Str_Class" = Structure Class
"    St_Age" = Stand Age
" SiteIndex" = Site Index
" StDnIndex" = Stand Density Index
" CulmMAI-A" = Culmination Mean Annual Increment - Merchantable Cubic Feet, All Trees
" CulmMAI-S" = Culmination Mean Annual Increment - Merchantable Cubic Feet, Sawtimber Trees
" Down_Wood" = Downed Woody Material
"  Wildlife" = Wildlife Habitat
" Plt_Acres" = Plot Acres (Count)
" Trt_Acres" = Treatment Acres (Count)
" LTr.AllSx" = Live/Trees per Acre/All Species/All Size Classes
" LAD.AllSx" = Live/Average DBH/All Species/All Size Classes
" LAH.AllSx" = Live/Average Height/All Species/All Size Classes
" LBA.AllSx" = Live/Basal Area per Acre/All Species/All Size Classes
" LCA.AllSx" = Live/Cubic Feet per Acre/All Species/All Size Classes, All Trees - Cubic Top
" LCS.AllSx" = Live/Cubic Feet per Acre/All Species/All Size Classes, Sawtimber - Board Top
" LCT.AllSx" = Live/Cubic Feet per Acre/All Species/All Size Classes, Topwood - Board to Cubic Top
" LBd.AllSx" = Live/Board Feet per Acre/All Species/All Size Classes
" HTr.AllSx" = Harvest/Trees per Acre/All Species/All Size Classes
" HAD.AllSx" = Harvest/Average DBH/All Species/All Size Classes
" HAH.AllSx" = Harvest/Average Height/All Species/All Size Classes
" HBA.AllSx" = Harvest/Basal Area per Acre/All Species/All Size Classes
" HCA.AllSx" = Harvest/Cubic Feet per Acre/All Species/All Size Classes, All Trees - Cubic Top
" HCS.AllSx" = Harvest/Cubic Feet per Acre/All Species/All Size Classes, Sawtimber - Board Top
" HCT.AllSx" = Harvest/Cubic Feet per Acre/All Species/All Size Classes, Topwood - Board to Cubic Top
" HBd.AllSx" = Harvest/Board Feet per Acre/All Species/All Size Classes
" MTr.AllSx" = Mortality/Trees per Acre/All Species/All Size Classes
" MAD.AllSx" = Mortality/Average DBH/All Species/All Size Classes
" MAH.AllSx" = Mortality/Average Height/All Species/All Size Classes
" MBA.AllSx" = Mortality/Basal Area per Acre/All Species/All Size Classes
" MCA.AllSx" = Mortality/Cubic Feet per Acre/All Species/All Size Classes, All Trees - Cubic Top
" MCS.AllSx" = Mortality/Cubic Feet per Acre/All Species/All Size Classes, Sawtimber - Board Top
" MCT.AllSx" = Mortality/Cubic Feet per Acre/All Species/All Size Classes, Topwood - Board to Cubic Top
" MBd.AllSx" = Mortality/Board Feet per Acre/All Species/All Size Classes
      | |\/
      \ / ---> Structural Stage (2 digits) used to identify size class attributes
       |         - "Sx" indicates sapling to mature size classes (All sizes) (1)
       |         - "Sm" indicates sapling to mid-age size classes            (2)
       |         - "Sy" indicates sapling to young size classes              (3)
       |         - "Ss" indicates sapling size class                         (4)
       |         - "Yx" indicates young to mature size classes               (5)
       |         - "Ym" indicates young to mid-age size classes              (6)
       |         - "Yy" indicates young size class                           (7)
       |         - "Mx" indicates mid-age to mature size classes             (8)
       |         - "Mm" indicates mid-age size class                         (9)
       |         - "Xx" indicates mature size class                          (0)
       |
       ------> FIA Species Codes (3 digits) used to identify individual species
                 - "All" indicates all species combined
                 - "Sft" indicates all softwood species
                 - "Hrd" indicates all hardwood species
                 - "Gp1" indicates species group 1
                 - "Gp2" indicates species group 2
                 - "Gp3" indicates species group 3
                 - "Gp4" indicates species group 4
                 - "Gp5" indicates species group 5
                 - "Gp6" indicates species group 6
                 - "Gp7" indicates species group 7
                 - "Gp8" indicates species group 8
```

Topic UAMA: **Uneven-Aged Management Action**

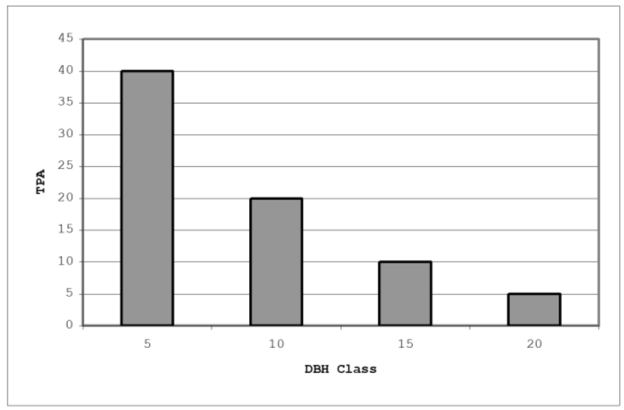
Concepts: explore the realm of uneven-aged silviculture; use ITS-BA Management Action option within Suppose.

In public land management, it is no longer permissible to treat forestland like cropland. Even in instances where even-aged silviculture is the best option for stand treatment, residual remnant trees are often left for non-timber purposes. The stewardship emphasis has shifted from commodity production to ecological sustainability. A new awareness of non-traditional forest practices has arisen. Foresters need to be equipped with the full array of silvicultural tools to meet the ever-changing demands of their profession.

Maintaining cover throughout the landscape is a prerequisite for most tree harvest activities today. If treatment techniques involve maintaining at least three age or size classes of trees, uneven-aged management is dictated. Analysis tools are needed to aid in the evaluation of resultant conditions. Although the Forest Vegetation Simulator has a myriad of thinning options, it was not readily apparent how to construct a proper coding sequence for uneven-aged treatments. During the summer months of 2000, an effort was undertaking to provide an initial Keyword file set that could be linked to the Management Actions feature of Suppose. This would allow users a relatively easy entry point into uneven-aged silviculture.

Uneven-Aged Management, the Basic Course

An exercise that is included in the Basic FVS Training course introduces students to uneven-aged management by dividing the stand into several five-inch diameter classes. Each of those classes is managed with a residual trees per acre target. The respective targets are as follows (varies by USFS Region):



5.0” - 10.0”	40 tpa
10.0” - 15.0”	20 tpa
15.0” - 20.0”	10 tpa
20.0” - 25.0”	5 tpa

Upon completion of this assignment, it is noted that the harvest did not occur for all five-inch diameter classes. The fallacy of this treatment was the fact that surplus classes were cut to residual target levels; deficient classes were not treated. What was the impact in regards to achieving a *stand level target*?

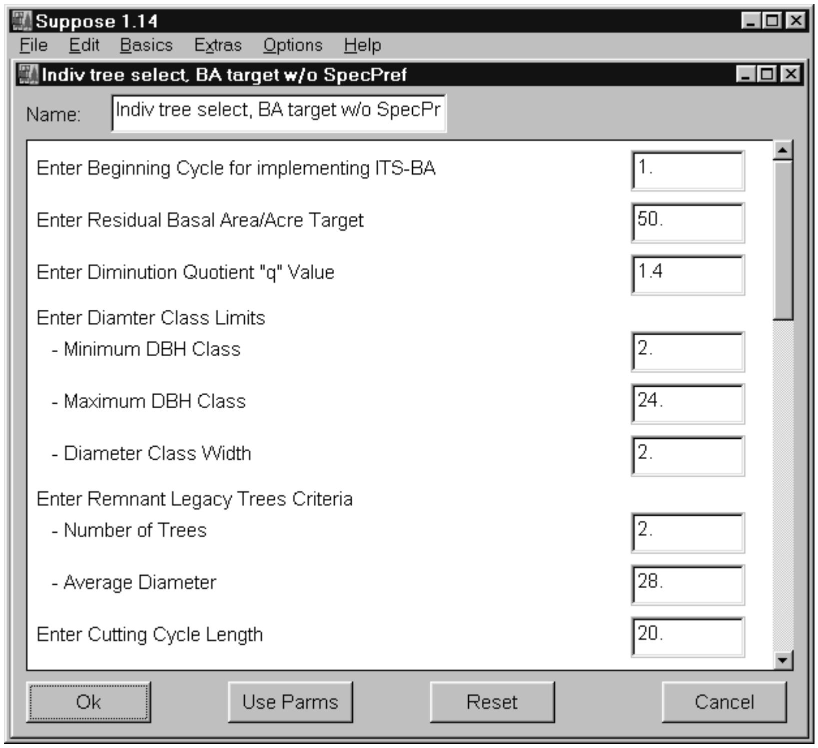
In uneven-aged management, stand level targets are more important than diameter class targets. In other words, to maintain the silvicultural integrity of the prescription, it is more important that the stocking pressure be achieved at the cost of individual diameter class values. With this in mind, an individual tree selection, basal area target management action was pursued.

Individual Tree Selection – Basal Area Target

The individual tree selection, basal area target (**ITS-BA**) management action, was designed to simulate an uneven-aged management scenario given a user specified target basal area per acre. Excess basal area is proportionally distributed to deficit diameter classes to maintain the basal area target. Input parameters are:

- Residual Basal Area per Acre Target
- Q-factor
- Minimum tree size
- Maximum tree size
- Diameter class interval

Additional features include: the ability to specify the beginning year of implementation of the ITS-BA prescription; the number remnant legacy trees to maintain; and, the cutting cycle length. The number of diameter classes that can be specified for regulation is limited to twenty. Checking is easy. Simply divide the maximum tree size by the diameter class interval. Make sure less than twenty classes are rendered. Several **ThinDBH** Keywords are used to remove surplus basal area per diameter class. **ThinDBH** applies a uniform thinning throughout the dbh range. However, **SpecPref** Keywords have no effect on the ThinDBH Keywords.



Management Action Keyword Set

```
*  Beginning of: Individual Tree Selection - Basal Area Target w/o SpecPref

*  by: Don Vandendriesche
*      USFS - FMSC
*      (970) 498-1781

*   Last revised: June, 15, 2000

*   This keyword set is designed to simulate uneven-aged management given
*   a user specified target basal area per acre.  Excess basal area is
*   proportionally distributed to deficit diameter classes to maintain the
*   basal area target.  Input parameters are:
*                          Q-factor
*                          Minimum tree size
*                          Maximum tree size
*                          Diameter class interval
*   Additional features include the ability to specify the number and size
*   of remnant legacy trees and the cutting cycle length.

*   -------
*   Example -->      COMPUTATION OF TARGET BASAL AREA BASED ON
*   -------       A DESIRED BASAL AREA OF 50, A "Q" OF 1.40 AND A
*              DBH RANGE OF 2.0 THRU 24.0 FOR A BALANCED ALL-AGED STAND
*
*   DBH      TRIAL        BA/       TRIAL   CONVERSION    TARGET     DESIRED
*  CLASS    TREES/AC      TREE        BA      FACTOR      BA/AC     TREES/AC
*   2.0      40.50       0.022       0.88    0.97362      0.86        39.43
*   4.0      28.93       0.087       2.52    0.97362      2.46        28.16
*   6.0      20.66       0.196       4.06    0.97362      3.95        20.12
*   8.0      14.76       0.349       5.15    0.97362      5.02        14.37
*  10.0      10.54       0.545       5.75    0.97362      5.60        10.26
*  12.0       7.53       0.785       5.91    0.97362      5.76         7.33
*  14.0       5.38       1.069       5.75    0.97362      5.60         5.24
*  16.0       3.84       1.396       5.36    0.97362      5.22         3.74
*  18.0       2.74       1.767       4.85    0.97362      4.72         2.67
*  20.0       1.96       2.182       4.28    0.97362      4.16         1.91
*  22.0       1.40       2.640       3.70    0.97362      3.60         1.36
*  24.0       1.00       3.142       3.14    0.97362      3.06         0.97

* TOTALS:   139.23                  51.35                50.00       135.56


```

```
*   Definition of Compute Variables:
*   > Supplied via Suppose - Management Action: ITS-BA Target window
*      _BC = Beginning Cycle
*      _BA = Target Basal Area/Acre
*       _Q = Q-Factor
*      _DB = Minimum Diameter Class
*      _DE = Maximum Diameter Class
*      _DI = Diameter Class Interval
*     _LLT = Number of Legacy Trees
*     _LLD = Diameter of Legacy Trees
*     _CCY = Cutting Cycle Length
*   > Computed within Key Component File
*     _APC = Additive Projection Cycle Length
*       _C = 0.00545415 (BA conversion constant)

* Initialize Additive Projection Cycle Variable and BA converstion constant

Compute            1
_BC =!1!
_BA =!2!
_Q  =!3!
_DB =!4!
_DE =!5!
_DI =!6!
_LLT=!7!
_LLD=!8!
_CCY=!9!
_APC=999.9
_C  =0.00545415
END

* Sequence Additive Projection Cycle Variable

IF                 0
CYCLE GE _BC AND CUT EQ 0
THEN
COMPUTE
_APC=_APC+(CENDYEAR-YEAR+1)
END
AGPLABEL
   All
ENDIF

* Conditional 'IF' based on _BA and Cutting Cycle Length

IF                 0
CYCLE GE _BC AND &
SpMcDBH(2,All,0,_DB-(_DI/2),_DE+(_DI/2),0.0,999.0,0) GE _BA AND _CCY LE _APC
Then

* Compute DBH Classes, Trial TPA, BA/Tree, Trial BA, and Conversion Factor

Compute            0
_X20=(LININT(LININT(MAX((_DE-(_DI*00)),0),_DB,_DB,0,1),1,1,0, &
     MAX((_DE-(_DI*00)),0)))**2*_Q**00*_C
_X19=(LININT(LININT(MAX((_DE-(_DI*01)),0),_DB,_DB,0,1),1,1,0, &
     MAX((_DE-(_DI*01)),0)))**2*_Q**01*_C
_X18=(LININT(LININT(MAX((_DE-(_DI*02)),0),_DB,_DB,0,1),1,1,0, &
     MAX((_DE-(_DI*02)),0)))**2*_Q**02*_C
_X17=(LININT(LININT(MAX((_DE-(_DI*03)),0),_DB,_DB,0,1),1,1,0, &
     MAX((_DE-(_DI*03)),0)))**2*_Q**03*_C
_X16=(LININT(LININT(MAX((_DE-(_DI*04)),0),_DB,_DB,0,1),1,1,0, &
     MAX((_DE-(_DI*04)),0)))**2*_Q**04*_C
_X15=(LININT(LININT(MAX((_DE-(_DI*05)),0),_DB,_DB,0,1),1,1,0, &
     MAX((_DE-(_DI*05)),0)))**2*_Q**05*_C
_X14=(LININT(LININT(MAX((_DE-(_DI*06)),0),_DB,_DB,0,1),1,1,0, &
     MAX((_DE-(_DI*06)),0)))**2*_Q**06*_C
_X13=(LININT(LININT(MAX((_DE-(_DI*07)),0),_DB,_DB,0,1),1,1,0, &
     MAX((_DE-(_DI*07)),0)))**2*_Q**07*_C
_X12=(LININT(LININT(MAX((_DE-(_DI*08)),0),_DB,_DB,0,1),1,1,0, &
     MAX((_DE-(_DI*08)),0)))**2*_Q**08*_C
_X11=(LININT(LININT(MAX((_DE-(_DI*09)),0),_DB,_DB,0,1),1,1,0, &
     MAX((_DE-(_DI*09)),0)))**2*_Q**09*_C
_X10=(LININT(LININT(MAX((_DE-(_DI*10)),0),_DB,_DB,0,1),1,1,0, &
     MAX((_DE-(_DI*10)),0)))**2*_Q**10*_C
_X09=(LININT(LININT(MAX((_DE-(_DI*11)),0),_DB,_DB,0,1),1,1,0, &
     MAX((_DE-(_DI*11)),0)))**2*_Q**11*_C
_X08=(LININT(LININT(MAX((_DE-(_DI*12)),0),_DB,_DB,0,1),1,1,0, &
     MAX((_DE-(_DI*12)),0)))**2*_Q**12*_C
_X07=(LININT(LININT(MAX((_DE-(_DI*13)),0),_DB,_DB,0,1),1,1,0, &
     MAX((_DE-(_DI*13)),0)))**2*_Q**13*_C
_X06=(LININT(LININT(MAX((_DE-(_DI*14)),0),_DB,_DB,0,1),1,1,0, &
     MAX((_DE-(_DI*14)),0)))**2*_Q**14*_C
_X05=(LININT(LININT(MAX((_DE-(_DI*15)),0),_DB,_DB,0,1),1,1,0, &
     MAX((_DE-(_DI*15)),0)))**2*_Q**15*_C
_X04=(LININT(LININT(MAX((_DE-(_DI*16)),0),_DB,_DB,0,1),1,1,0, &
     MAX((_DE-(_DI*16)),0)))**2*_Q**16*_C
_X03=(LININT(LININT(MAX((_DE-(_DI*17)),0),_DB,_DB,0,1),1,1,0, &
```

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       MAX((_DE-(_DI*17)),0)))**2*_Q**17*_C
_X02=(LININT(LININT(MAX((_DE-(_DI*18)),0),_DB,_DB,0,1),1,1,0, &
       MAX((_DE-(_DI*18)),0)))**2*_Q**18*_C
_X01=(LININT(LININT(MAX((_DE-(_DI*19)),0),_DB,_DB,0,1),1,1,0, &
       MAX((_DE-(_DI*19)),0)))**2*_Q**19*_C
_CF=_BA/(_X20+_X19+_X18+_X17+_X16+_X15+_X14+_X13+_X12+_X11+_X10+ &
       _X09+_X08+_X07+_X06+_X05+_X04+_X03+_X02+_X01)
End

** Compute Target BA/Ac + BA of Legacy Trees (largest dbh class)
Compute          0
_Y21=_LLT*(_LLD**2)*_C
_Y20=_X20*_CF
_Y19=_X19*_CF
_Y18=_X18*_CF
_Y17=_X17*_CF
_Y16=_X16*_CF
_Y15=_X15*_CF
_Y14=_X14*_CF
_Y13=_X13*_CF
_Y12=_X12*_CF
_Y11=_X11*_CF
_Y10=_X10*_CF
_Y09=_X09*_CF
_Y08=_X08*_CF
_Y07=_X07*_CF
_Y06=_X06*_CF
_Y05=_X05*_CF
_Y04=_X04*_CF
_Y03=_X03*_CF
_Y02=_X02*_CF
_Y01=_X01*_CF
End

** Calculate Excess BA/Ac = Actual BA/Ac - Desired BA/Ac
Compute          0
_Z20=LININT(LININT(_X20,0.001,0.001,0,1),1,1,0, &
       (MAX((SpMcDBH(2,All,0,MAX((_DE-(_DI*00))-_DI/2,0), &
        MAX((_DE-(_DI*00))+_DI/2,0),0.0,999.0,0))-_Y20,0)))
_Z19=LININT(LININT(_X19,0.001,0.001,0,1),1,1,0, &
       (MAX((SpMcDBH(2,All,0,MAX((_DE-(_DI*01))-_DI/2,0), &
        MAX((_DE-(_DI*01))+_DI/2,0),0.0,999.0,0))-_Y19,0)))
_Z18=LININT(LININT(_X18,0.001,0.001,0,1),1,1,0, &
       (MAX((SpMcDBH(2,All,0,MAX((_DE-(_DI*02))-_DI/2,0), &
        MAX((_DE-(_DI*02))+_DI/2,0),0.0,999.0,0))-_Y18,0)))
_Z17=LININT(LININT(_X17,0.001,0.001,0,1),1,1,0, &
       (MAX((SpMcDBH(2,All,0,MAX((_DE-(_DI*03))-_DI/2,0), &
        MAX((_DE-(_DI*03))+_DI/2,0),0.0,999.0,0))-_Y17,0)))
_Z16=LININT(LININT(_X16,0.001,0.001,0,1),1,1,0, &
       (MAX((SpMcDBH(2,All,0,MAX((_DE-(_DI*04))-_DI/2,0), &
        MAX((_DE-(_DI*04))+_DI/2,0),0.0,999.0,0))-_Y16,0)))
_Z15=LININT(LININT(_X15,0.001,0.001,0,1),1,1,0, &
       (MAX((SpMcDBH(2,All,0,MAX((_DE-(_DI*05))-_DI/2,0), &
        MAX((_DE-(_DI*05))+_DI/2,0),0.0,999.0,0))-_Y15,0)))
_Z14=LININT(LININT(_X14,0.001,0.001,0,1),1,1,0, &
       (MAX((SpMcDBH(2,All,0,MAX((_DE-(_DI*06))-_DI/2,0), &
        MAX((_DE-(_DI*06))+_DI/2,0),0.0,999.0,0))-_Y14,0)))
_Z13=LININT(LININT(_X13,0.001,0.001,0,1),1,1,0, &
       (MAX((SpMcDBH(2,All,0,MAX((_DE-(_DI*07))-_DI/2,0), &
        MAX((_DE-(_DI*07))+_DI/2,0),0.0,999.0,0))-_Y13,0)))
_Z12=LININT(LININT(_X12,0.001,0.001,0,1),1,1,0, &
       (MAX((SpMcDBH(2,All,0,MAX((_DE-(_DI*08))-_DI/2,0), &
        MAX((_DE-(_DI*08))+_DI/2,0),0.0,999.0,0))-_Y12,0)))
_Z11=LININT(LININT(_X11,0.001,0.001,0,1),1,1,0, &
       (MAX((SpMcDBH(2,All,0,MAX((_DE-(_DI*09))-_DI/2,0), &
        MAX((_DE-(_DI*09))+_DI/2,0),0.0,999.0,0))-_Y11,0)))
_Z10=LININT(LININT(_X10,0.001,0.001,0,1),1,1,0, &
       (MAX((SpMcDBH(2,All,0,MAX((_DE-(_DI*10))-_DI/2,0), &
        MAX((_DE-(_DI*10))+_DI/2,0),0.0,999.0,0))-_Y10,0)))
_Z09=LININT(LININT(_X09,0.001,0.001,0,1),1,1,0, &
       (MAX((SpMcDBH(2,All,0,MAX((_DE-(_DI*11))-_DI/2,0), &
        MAX((_DE-(_DI*11))+_DI/2,0),0.0,999.0,0))-_Y09,0)))
_Z08=LININT(LININT(_X08,0.001,0.001,0,1),1,1,0, &
       (MAX((SpMcDBH(2,All,0,MAX((_DE-(_DI*12))-_DI/2,0), &
        MAX((_DE-(_DI*12))+_DI/2,0),0.0,999.0,0))-_Y08,0)))
_Z07=LININT(LININT(_X07,0.001,0.001,0,1),1,1,0, &
       (MAX((SpMcDBH(2,All,0,MAX((_DE-(_DI*13))-_DI/2,0), &
        MAX((_DE-(_DI*13))+_DI/2,0),0.0,999.0,0))-_Y07,0)))
_Z06=LININT(LININT(_X06,0.001,0.001,0,1),1,1,0, &
       (MAX((SpMcDBH(2,All,0,MAX((_DE-(_DI*14))-_DI/2,0), &
        MAX((_DE-(_DI*14))+_DI/2,0),0.0,999.0,0))-_Y06,0)))
_Z05=LININT(LININT(_X05,0.001,0.001,0,1),1,1,0, &
       (MAX((SpMcDBH(2,All,0,MAX((_DE-(_DI*15))-_DI/2,0), &
        MAX((_DE-(_DI*15))+_DI/2,0),0.0,999.0,0))-_Y05,0)))
_Z04=LININT(LININT(_X04,0.001,0.001,0,1),1,1,0, &
       (MAX((SpMcDBH(2,All,0,MAX((_DE-(_DI*16))-_DI/2,0), &
        MAX((_DE-(_DI*16))+_DI/2,0),0.0,999.0,0))-_Y04,0)))
_Z03=LININT(LININT(_X03,0.001,0.001,0,1),1,1,0, &
```

```
      (MAX((SpMcDBH(2,All,0,MAX((_DE-(_DI*17))-_DI/2,0), &
       MAX((_DE-(_DI*17))+_DI/2,0),0.0,999.0,0))-_Y03,0)))
_Z02=LININT(LININT(_X02,0.001,0.001,0,1),1,1,0, &
      (MAX((SpMcDBH(2,All,0,MAX((_DE-(_DI*18))-_DI/2,0), &
       MAX((_DE-(_DI*18))+_DI/2,0),0.0,999.0,0))-_Y02,0)))
_Z01=LININT(LININT(_X01,0.001,0.001,0,1),1,1,0, &
      (MAX((SpMcDBH(2,All,0,MAX((_DE-(_DI*19))-_DI/2,0), &
       MAX((_DE-(_DI*19))+_DI/2,0),0.0,999.0,0))-_Y01,0)))
_ZBA=(SpMcDBH(2,All,0,_DB-(_DI/2),_DE+(_DI/2),0.0,999.0,0)-_BA) &
       /(_Z20+_Z19+_Z18+_Z17+_Z16+_Z15+_Z14+_Z13+_Z12+_Z11+ &
        _Z10+_Z09+_Z08+_Z07+_Z06+_Z05+_Z04+_Z03+_Z02+_Z01)
End

** ThinDBH

** Sets Thinning through all DBH Classes
*  Arguments: Min DBH, Max DBH, Cut Efficiency, Species, Residual TPA, Residual BA/Ac
*
* Min DBH           MAX((_DE-(_DI*01))-_DI/2,0)
* Max DBH           MAX((_DE-(_DI*01))+_DI/2,0)
* Cut Efficiency    1.00
* Species           All
* Residual TPA      0
* Residual BA/Ac    LININT(LININT(_Y19,0.001,0.001,0,1),1,1,999.0,_Y19+(_Z19-_Z19*_ZBA))

* Legacy Trees
ThinABA            0   Parms(_Y21,1.00,(_DE+(MAX((_LLD-_DE),3))-_DI), &
(_DE+(MAX((_LLD-_DE),3))+_DI),0,999)
ThinABA            0   Parms(_Y21,1.00,(_DE+(_DI*01)-_DI/2),999.0,0,999)
* Legacy Trees
*ThinDBH            0   Parms((_LLD-_DI),(_LLD+_DI),1.00,All,0,_Y21)
*ThinDBH            0   Parms((_DE+(_DI*01)-_DI/2),999.0,1.00,All,0,_Y21)
* Managed DBH Classes
ThinDBH            0   Parms(MAX((_DE-(_DI*00))-_DI/2,0), &
MAX((_DE-(_DI*00))+_DI/2,0),1.00,All,0,&
LININT(LININT(_Y20,0.001,0.001,0,1),1,1,999.0,_Y20+(_Z20-_Z20*_ZBA)))
ThinDBH            0   Parms(MAX((_DE-(_DI*01))-_DI/2,0), &
MAX((_DE-(_DI*01))+_DI/2,0),1.00,All,0,&
LININT(LININT(_Y19,0.001,0.001,0,1),1,1,999.0,_Y19+(_Z19-_Z19*_ZBA)))
ThinDBH            0   Parms(MAX((_DE-(_DI*02))-_DI/2,0), &
MAX((_DE-(_DI*02))+_DI/2,0),1.00,All,0,&
LININT(LININT(_Y18,0.001,0.001,0,1),1,1,999.0,_Y18+(_Z18-_Z18*_ZBA)))
ThinDBH            0   Parms(MAX((_DE-(_DI*03))-_DI/2,0), &
MAX((_DE-(_DI*03))+_DI/2,0),1.00,All,0,&
LININT(LININT(_Y17,0.001,0.001,0,1),1,1,999.0,_Y17+(_Z17-_Z17*_ZBA)))
ThinDBH            0   Parms(MAX((_DE-(_DI*04))-_DI/2,0), &
MAX((_DE-(_DI*04))+_DI/2,0),1.00,All,0,&
LININT(LININT(_Y16,0.001,0.001,0,1),1,1,999.0,_Y16+(_Z16-_Z16*_ZBA)))
ThinDBH            0   Parms(MAX((_DE-(_DI*05))-_DI/2,0), &
MAX((_DE-(_DI*05))+_DI/2,0),1.00,All,0,&
LININT(LININT(_Y15,0.001,0.001,0,1),1,1,999.0,_Y15+(_Z15-_Z15*_ZBA)))
ThinDBH            0   Parms(MAX((_DE-(_DI*06))-_DI/2,0), &
MAX((_DE-(_DI*06))+_DI/2,0),1.00,All,0,&
LININT(LININT(_Y14,0.001,0.001,0,1),1,1,999.0,_Y14+(_Z14-_Z14*_ZBA)))
ThinDBH            0   Parms(MAX((_DE-(_DI*07))-_DI/2,0), &
MAX((_DE-(_DI*07))+_DI/2,0),1.00,All,0,&
LININT(LININT(_Y13,0.001,0.001,0,1),1,1,999.0,_Y13+(_Z13-_Z13*_ZBA)))
ThinDBH            0   Parms(MAX((_DE-(_DI*08))-_DI/2,0), &
MAX((_DE-(_DI*08))+_DI/2,0),1.00,All,0,&
LININT(LININT(_Y12,0.001,0.001,0,1),1,1,999.0,_Y12+(_Z12-_Z12*_ZBA)))
ThinDBH            0   Parms(MAX((_DE-(_DI*09))-_DI/2,0), &
MAX((_DE-(_DI*09))+_DI/2,0),1.00,All,0,&
LININT(LININT(_Y11,0.001,0.001,0,1),1,1,999.0,_Y11+(_Z11-_Z11*_ZBA)))
ThinDBH            0   Parms(MAX((_DE-(_DI*10))-_DI/2,0), &
MAX((_DE-(_DI*10))+_DI/2,0),1.00,All,0,&
LININT(LININT(_Y10,0.001,0.001,0,1),1,1,999.0,_Y10+(_Z10-_Z10*_ZBA)))
ThinDBH            0   Parms(MAX((_DE-(_DI*11))-_DI/2,0), &
MAX((_DE-(_DI*11))+_DI/2,0),1.00,All,0,&
LININT(LININT(_Y09,0.001,0.001,0,1),1,1,999.0,_Y09+(_Z09-_Z09*_ZBA)))
ThinDBH            0   Parms(MAX((_DE-(_DI*12))-_DI/2,0), &
MAX((_DE-(_DI*12))+_DI/2,0),1.00,All,0,&
LININT(LININT(_Y08,0.001,0.001,0,1),1,1,999.0,_Y08+(_Z08-_Z08*_ZBA)))
ThinDBH            0   Parms(MAX((_DE-(_DI*13))-_DI/2,0), &
MAX((_DE-(_DI*13))+_DI/2,0),1.00,All,0,&
LININT(LININT(_Y07,0.001,0.001,0,1),1,1,999.0,_Y07+(_Z07-_Z07*_ZBA)))
ThinDBH            0   Parms(MAX((_DE-(_DI*14))-_DI/2,0), &
MAX((_DE-(_DI*14))+_DI/2,0),1.00,All,0,&
LININT(LININT(_Y06,0.001,0.001,0,1),1,1,999.0,_Y06+(_Z06-_Z06*_ZBA)))
ThinDBH            0   Parms(MAX((_DE-(_DI*15))-_DI/2,0), &
MAX((_DE-(_DI*15))+_DI/2,0),1.00,All,0,&
LININT(LININT(_Y05,0.001,0.001,0,1),1,1,999.0,_Y05+(_Z05-_Z05*_ZBA)))
ThinDBH            0   Parms(MAX((_DE-(_DI*16))-_DI/2,0), &
MAX((_DE-(_DI*16))+_DI/2,0),1.00,All,0,&
LININT(LININT(_Y04,0.001,0.001,0,1),1,1,999.0,_Y04+(_Z04-_Z04*_ZBA)))
ThinDBH            0   Parms(MAX((_DE-(_DI*17))-_DI/2,0), &
MAX((_DE-(_DI*17))+_DI/2,0),1.00,All,0,&
LININT(LININT(_Y03,0.001,0.001,0,1),1,1,999.0,_Y03+(_Z03-_Z03*_ZBA)))
ThinDBH            0   Parms(MAX((_DE-(_DI*18))-_DI/2,0), &
```

```
MAX((_DE-(_DI*18))+_DI/2,0),1.00,All,0,&
LININT(LININT(_Y02,0.001,0.001,0,1),1,1,999.0,_Y02+(_Z02-_Z02*_ZBA)))
ThinDBH            0    Parms(MAX((_DE-(_DI*19))-_DI/2,0), &
MAX((_DE-(_DI*19))+_DI/2,0),1.00,All,0,&
LININT(LININT(_Y01,0.001,0.001,0,1),1,1,999.0,_Y01+(_Z01-_Z01*_ZBA)))
AGPLABEL
   All
Endif

** Reset Additive Projection Cycle Variable
IF                 0
CYCLE GE _BC AND CUT EQ 1 OR (_APC LT 999.9 AND _APC GE _CCY)
THEN
COMPUTE
_APC=0
END
AGPLABEL
   All
ENDIF

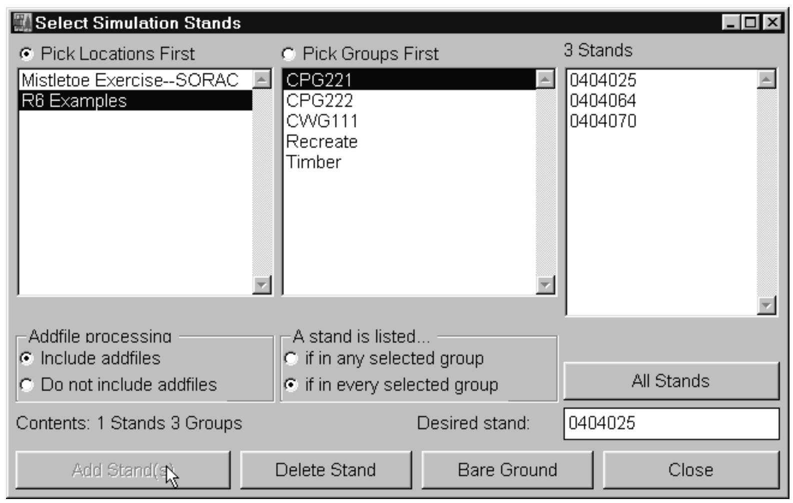
*     End of: Individual Tree Selection - Basal Area Target w/o SpecPref
```

Questions:

1. How does the '**Additive Projection Cycle**' compute variable work?
2. Explain the function **LININT(LININT(…………..))** statements.
3. How could you change this Keyword file set to allow **SpecPref** to influence which trees are selected for harvest?

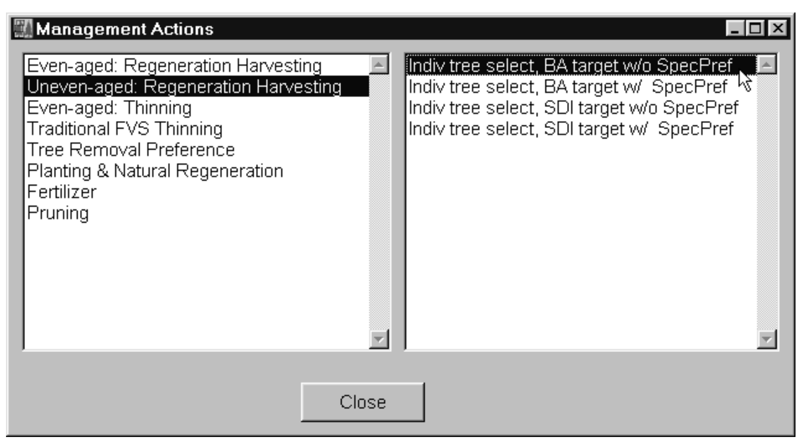
Example:

1. Select **R6 Examples, Group CPG221, Stand 0404025**.

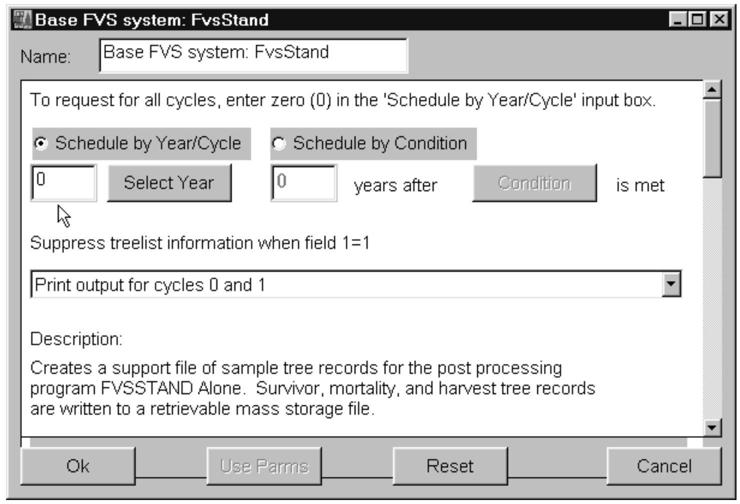


2. Chose **Management Actions, Uneven-aged: Regeneration Harvesting**.

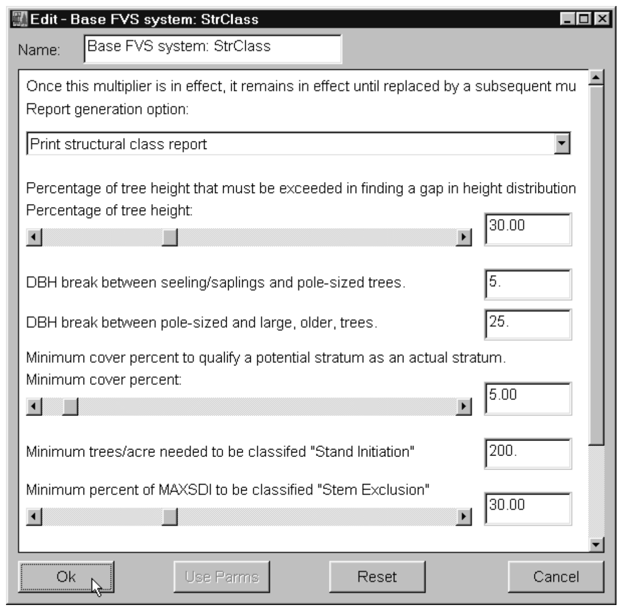
3. Select **Individual tree selection, BA target without SpecPref.**



4. Include **FvsStand Keyword.**

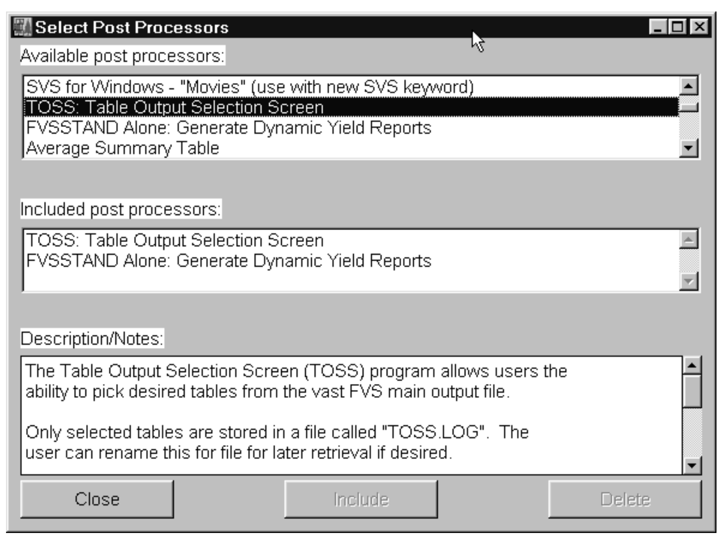


5. Include **StrClass Keyword.**



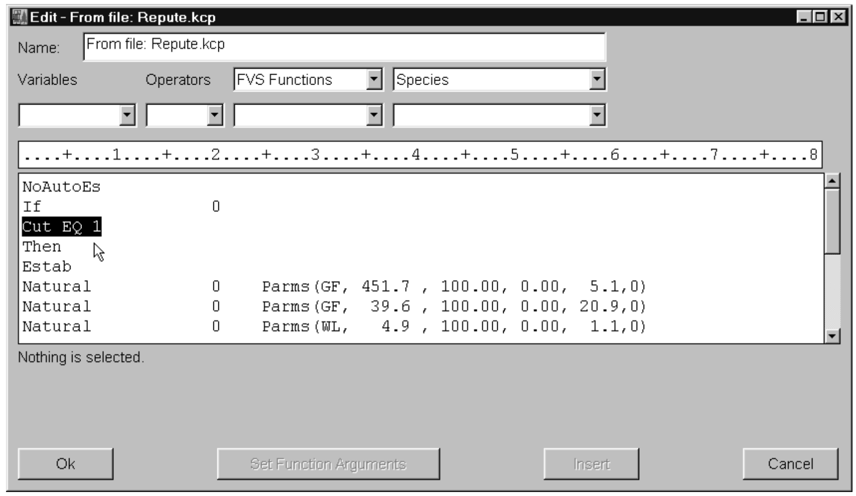
6. Select **TOSS** post processor.

7. Select **FVSSTAND Alone** post processor.

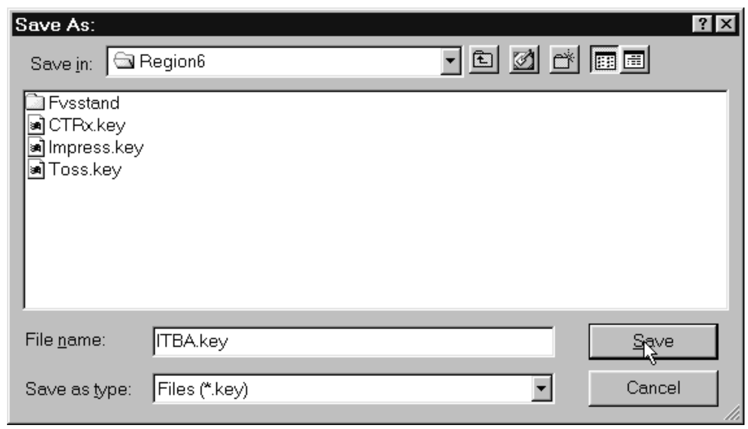


8. From **Edit Simulation** window, include the **Repute.kcp** regeneration keyword component file. You can find this file in **C:\Fvsdata\Region6\Fvsstand** folder.

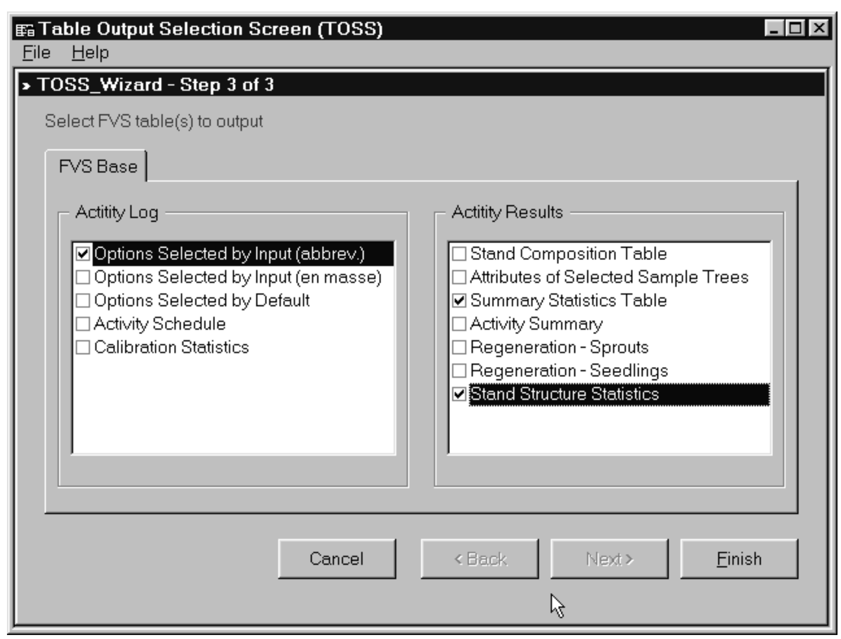
9. Change the **If** statement to "**Cut EQ 1**" to include regeneration after harvest treatments.



10. Run the simulation. Save as: **ITBA.key**.

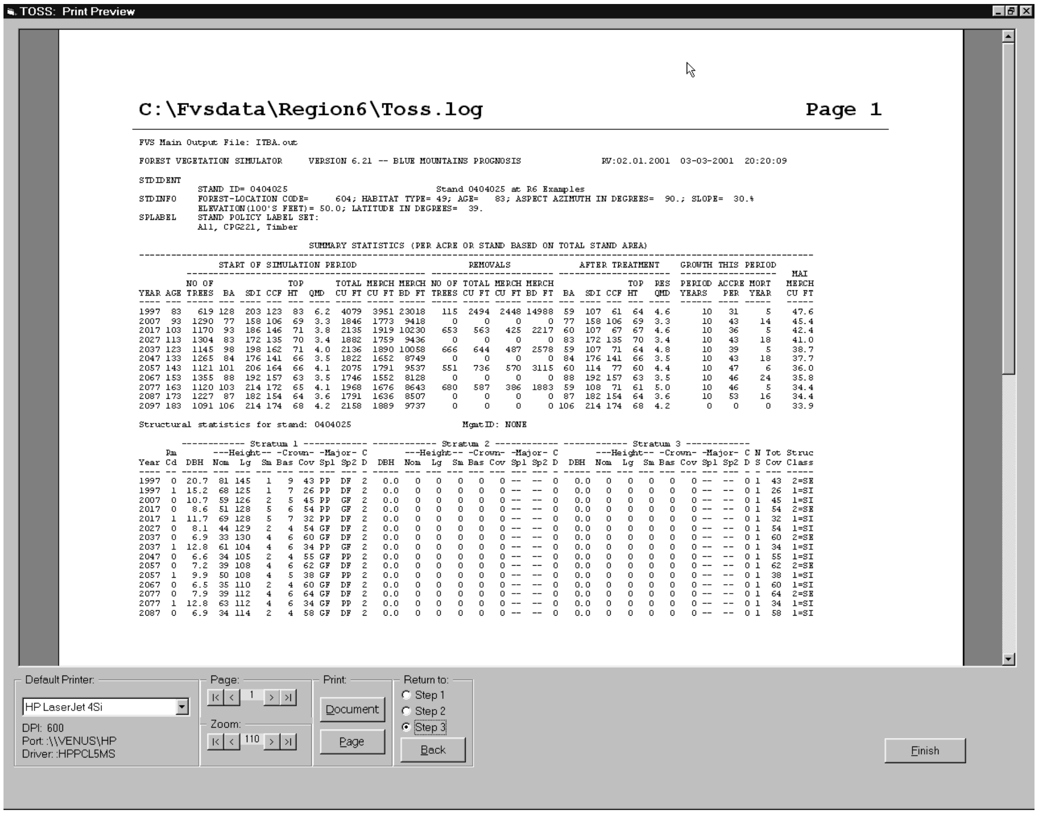


11. Select the **Stand Structure Statistics** during **Step 3 of the TOSS_Wizard**.



12. Did the **after treatment** basal area meet your objective?

13. Describe the structure of the stand. Does it appear to be uneven-aged from the **Structural Statistics Table**?



C:\Fvsdata\Region6\Toss.log Page 1

FVS Main Output File: ITBA.out

FOREST VEGETATION SIMULATOR VERSION 6.21 -- BLUE MOUNTAINS PROGNOSIS RV:02.01.2001 03-03-2001 20:20:09

STDIDENT
STAND ID= 0404025 Stand 0404025 at R6 Examples
STDINFO FOREST-LOCATION CODE= 604; HABITAT TYPE= 49; AGE= 83; ASPECT AZIMUTH IN DEGREES= 90.; SLOPE= 30.%
ELEVATION(100'S FEET)= 50.0; LATITUDE IN DEGREES= 39.
SPLABEL STAND POLICY LABEL SET:
All, CPG221, Timber

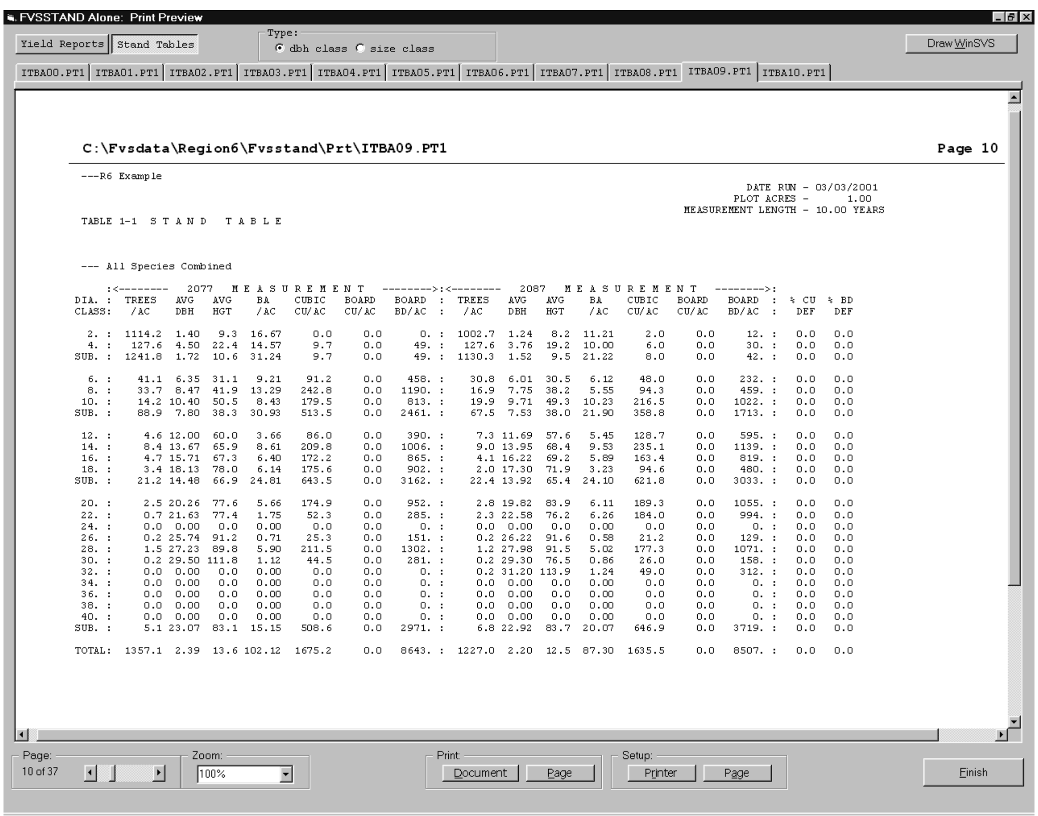
SUMMARY STATISTICS (PER ACRE OR STAND BASED ON TOTAL STAND AREA)

		START OF SIMULATION PERIOD									REMOVALS				AFTER TREATMENT					GROWTH THIS PERIOD			
YEAR	AGE	NO OF TREES	BA	SDI	CCF	TOP HT	QMD	TOTAL CU FT	MERCH CU FT	MERCH BD FT	NO OF TREES	TOTAL CU FT	MERCH CU FT	MERCH BD FT	BA	SDI	CCF	TOP HT	RES QMD	PERIOD YEARS	ACCRE PER	MORT YEAR	MAI MERCH CU FT
1997	83	619	128	203	123	83	6.2	4079	3951	23018	115	2494	2448	14988	59	107	61	64	4.6	10	31	5	47.6
2007	93	1290	77	158	106	69	3.3	1846	1773	9418	0	0	0	0	77	158	106	69	3.3	10	43	14	45.4
2017	103	1170	93	186	146	71	3.8	2135	1919	10230	653	563	425	2217	60	107	67	67	4.6	10	36	5	42.4
2027	113	1304	83	172	135	70	3.4	1882	1759	9436	0	0	0	0	83	172	135	70	3.4	10	43	18	41.0
2037	123	1145	98	198	162	71	4.0	2136	1890	10058	666	644	487	2578	59	107	71	64	4.8	10	39	5	38.7
2047	133	1265	84	176	141	66	3.5	1822	1652	8749	0	0	0	0	84	176	141	66	3.5	10	43	18	37.7
2057	143	1121	101	206	164	66	4.1	2075	1791	9537	551	736	570	3115	60	114	77	60	4.4	10	47	6	36.0
2067	153	1355	88	192	157	63	3.5	1746	1552	8128	0	0	0	0	88	192	157	63	3.5	10	46	24	35.8
2077	163	1120	103	214	172	65	4.1	1968	1676	8643	680	587	386	1883	59	108	71	61	5.0	10	46	5	34.4
2087	173	1227	87	182	154	64	3.6	1791	1636	8507	0	0	0	0	87	182	154	64	3.6	10	53	16	34.4
2097	183	1091	106	214	174	68	4.2	2158	1889	9737	0	0	0	0	106	214	174	68	4.2	0	0	0	33.9

Structural statistics for stand: 0404025 MgmtID: NONE

		Stratum 1									Stratum 2									Stratum 3											
			---Height--			-Crown-		-Major-				---Height--			-Crown-		-Major-				---Height--			-Crown-		-Major-					
Year	Rm Cd	DBH	Nom	Lg	Sm	Bas	Cov	Spl	Sp2	C D	DBH	Nom	Lg	Sm	Bas	Cov	Spl	Sp2	C D	DBH	Nom	Lg	Sm	Bas	Cov	Spl	Sp2	C D	N S	Tot Cov	Struc Class
1997	0	20.7	81	145	1	9	43	PP	DF	2	0.0	0	0	0	0	0	--	--	0	0.0	0	0	0	0	0	--	--	0	1	43	2=SE
1997	1	15.2	68	125	1	7	26	PP	DF	2	0.0	0	0	0	0	0	--	--	0	0.0	0	0	0	0	0	--	--	0	1	26	1=SI
2007	0	10.7	59	126	2	5	45	PP	GF	2	0.0	0	0	0	0	0	--	--	0	0.0	0	0	0	0	0	--	--	0	1	45	1=SI
2017	0	8.6	51	128	5	6	54	PP	GF	2	0.0	0	0	0	0	0	--	--	0	0.0	0	0	0	0	0	--	--	0	1	54	2=SE
2017	1	11.7	69	128	5	7	32	PP	DF	2	0.0	0	0	0	0	0	--	--	0	0.0	0	0	0	0	0	--	--	0	1	32	1=SI
2027	0	8.1	44	129	2	4	54	GF	DF	2	0.0	0	0	0	0	0	--	--	0	0.0	0	0	0	0	0	--	--	0	1	54	1=SI
2037	0	6.9	33	130	4	6	60	GF	DF	2	0.0	0	0	0	0	0	--	--	0	0.0	0	0	0	0	0	--	--	0	1	60	2=SE
2037	1	12.8	61	104	4	6	34	PP	GF	2	0.0	0	0	0	0	0	--	--	0	0.0	0	0	0	0	0	--	--	0	1	34	1=SI
2047	0	6.6	34	105	2	4	55	GF	PP	2	0.0	0	0	0	0	0	--	--	0	0.0	0	0	0	0	0	--	--	0	1	55	1=SI
2057	0	7.2	39	108	4	6	62	GF	DF	2	0.0	0	0	0	0	0	--	--	0	0.0	0	0	0	0	0	--	--	0	1	62	2=SE
2057	1	9.9	50	108	4	5	38	GF	PP	2	0.0	0	0	0	0	0	--	--	0	0.0	0	0	0	0	0	--	--	0	1	38	1=SI
2067	0	6.5	35	110	2	4	60	GF	DF	2	0.0	0	0	0	0	0	--	--	0	0.0	0	0	0	0	0	--	--	0	1	60	1=SI
2077	0	7.9	39	112	4	6	64	GF	DF	2	0.0	0	0	0	0	0	--	--	0	0.0	0	0	0	0	0	--	--	0	1	64	2=SE
2077	1	12.8	63	112	4	6	34	GF	PP	2	0.0	0	0	0	0	0	--	--	0	0.0	0	0	0	0	0	--	--	0	1	34	1=SI
2087	0	6.9	34	114	2	4	58	GF	DF	2	0.0	0	0	0	0	0	--	--	0	0.0	0	0	0	0	0	--	--	0	1	58	1=SI

14. Review the live tree **Stand Table** from **FVSSTAND**. Is the stand conforming to a balance J-shaped diameter distribution?



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---R6 Example

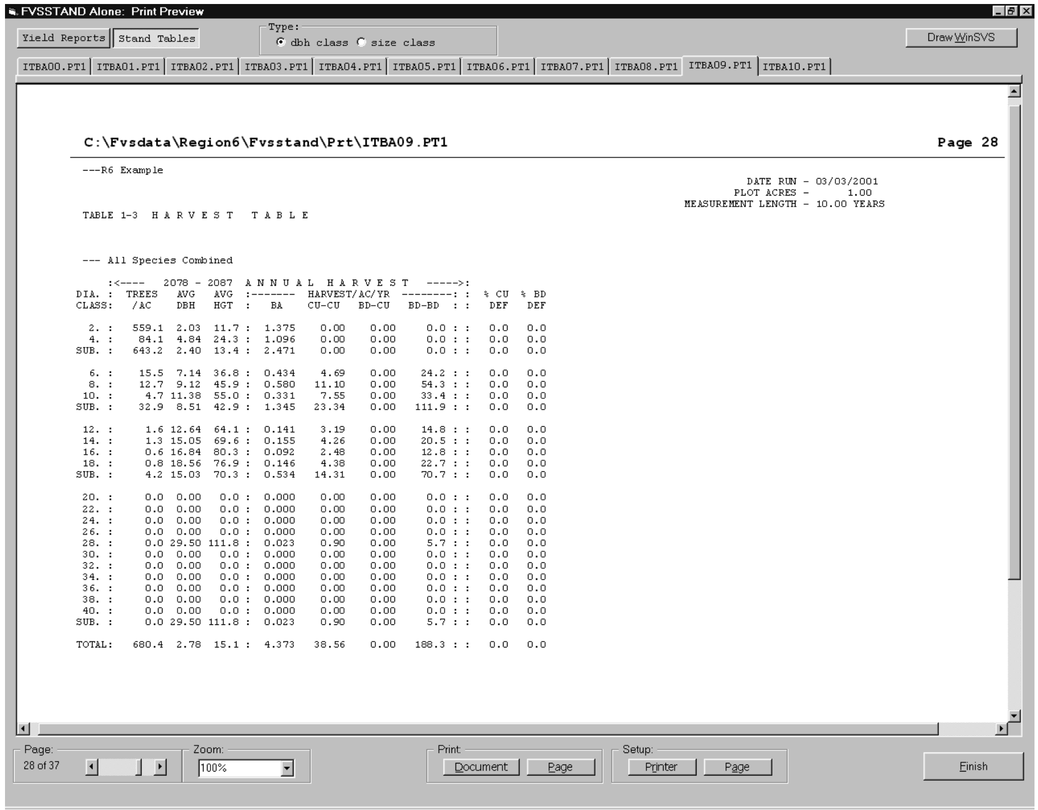
DATE RUN - 03/03/2001
PLOT ACRES - 1.00
MEASUREMENT LENGTH - 10.00 YEARS

TABLE 1-1 S T A N D T A B L E

--- All Species Combined

	2077 M E A S U R E M E N T							2087 M E A S U R E M E N T								
DIA. CLASS	TREES /AC	AVG DBH	AVG HGT	BA /AC	CUBIC CU/AC	BOARD CU/AC	BOARD BD/AC	TREES /AC	AVG DBH	AVG HGT	BA /AC	CUBIC CU/AC	BOARD CU/AC	BOARD BD/AC	% CU DEF	% BD DEF
2.	1114.2	1.40	9.3	16.67	0.0	0.0	0.	1002.7	1.24	8.2	11.21	2.0	0.0	12.	0.0	0.0
4.	127.6	4.50	22.4	14.57	9.7	0.0	49.	127.6	3.76	19.2	10.00	6.0	0.0	30.	0.0	0.0
SUB.	1241.8	1.72	10.6	31.24	9.7	0.0	49.	1130.3	1.52	9.5	21.22	8.0	0.0	42.	0.0	0.0
6.	41.1	6.35	31.1	9.21	91.2	0.0	458.	30.8	6.01	30.5	6.12	48.0	0.0	232.	0.0	0.0
8.	33.7	8.47	41.9	13.29	242.8	0.0	1190.	16.9	7.75	38.2	5.55	94.3	0.0	459.	0.0	0.0
10.	14.2	10.40	50.5	8.43	179.5	0.0	813.	19.9	9.71	49.3	10.23	216.5	0.0	1022.	0.0	0.0
SUB.	88.9	7.80	38.3	30.93	513.5	0.0	2461.	67.5	7.53	38.0	21.90	358.8	0.0	1713.	0.0	0.0
12.	4.6	12.00	60.0	3.66	86.0	0.0	390.	7.3	11.69	57.6	5.45	128.7	0.0	595.	0.0	0.0
14.	8.4	13.67	65.9	8.61	209.8	0.0	1006.	9.0	13.95	68.4	9.53	235.1	0.0	1139.	0.0	0.0
16.	4.7	15.71	67.3	6.40	172.2	0.0	865.	4.1	16.22	69.2	5.89	163.4	0.0	819.	0.0	0.0
18.	3.4	18.13	78.0	6.14	175.6	0.0	902.	2.0	17.30	71.9	3.23	94.6	0.0	480.	0.0	0.0
SUB.	21.2	14.48	66.9	24.81	643.5	0.0	3162.	22.4	13.92	65.4	24.10	621.8	0.0	3033.	0.0	0.0
20.	2.5	20.26	77.6	5.66	174.9	0.0	952.	2.8	19.82	83.9	6.11	189.3	0.0	1055.	0.0	0.0
22.	0.7	21.63	77.4	1.75	52.3	0.0	285.	2.3	22.58	76.2	6.26	184.0	0.0	994.	0.0	0.0
24.	0.0	0.00	0.0	0.00	0.0	0.0	0.	0.0	0.00	0.0	0.00	0.0	0.0	0.	0.0	0.0
26.	0.2	25.74	91.2	0.71	25.3	0.0	151.	0.2	26.22	91.6	0.58	21.2	0.0	129.	0.0	0.0
28.	1.5	27.23	89.8	5.90	211.5	0.0	1302.	1.2	27.98	91.5	5.02	177.3	0.0	1071.	0.0	0.0
30.	0.2	29.50	111.8	1.12	44.5	0.0	281.	0.2	29.30	76.5	0.86	26.0	0.0	158.	0.0	0.0
32.	0.0	0.00	0.0	0.00	0.0	0.0	0.	0.2	31.20	113.9	1.24	49.0	0.0	312.	0.0	0.0
34.	0.0	0.00	0.0	0.00	0.0	0.0	0.	0.0	0.00	0.0	0.00	0.0	0.0	0.	0.0	0.0
36.	0.0	0.00	0.0	0.00	0.0	0.0	0.	0.0	0.00	0.0	0.00	0.0	0.0	0.	0.0	0.0
38.	0.0	0.00	0.0	0.00	0.0	0.0	0.	0.0	0.00	0.0	0.00	0.0	0.0	0.	0.0	0.0
40.	0.0	0.00	0.0	0.00	0.0	0.0	0.	0.0	0.00	0.0	0.00	0.0	0.0	0.	0.0	0.0
SUB.	5.1	23.07	83.1	15.15	508.6	0.0	2971.	6.8	22.92	83.7	20.07	646.9	0.0	3719.	0.0	0.0
TOTAL:	1357.1	2.39	13.6	102.12	1675.2	0.0	8643.	1227.0	2.20	12.5	87.30	1635.5	0.0	8507.	0.0	0.0

15. Perhaps the tree data in the **Harvest Table** from **FVSSTAND** can shed some light on the residual stand.



C:\Fvsdata\Region6\Fvsstand\Prt\ITBA09.PT1 — Page 28

---R6 Example

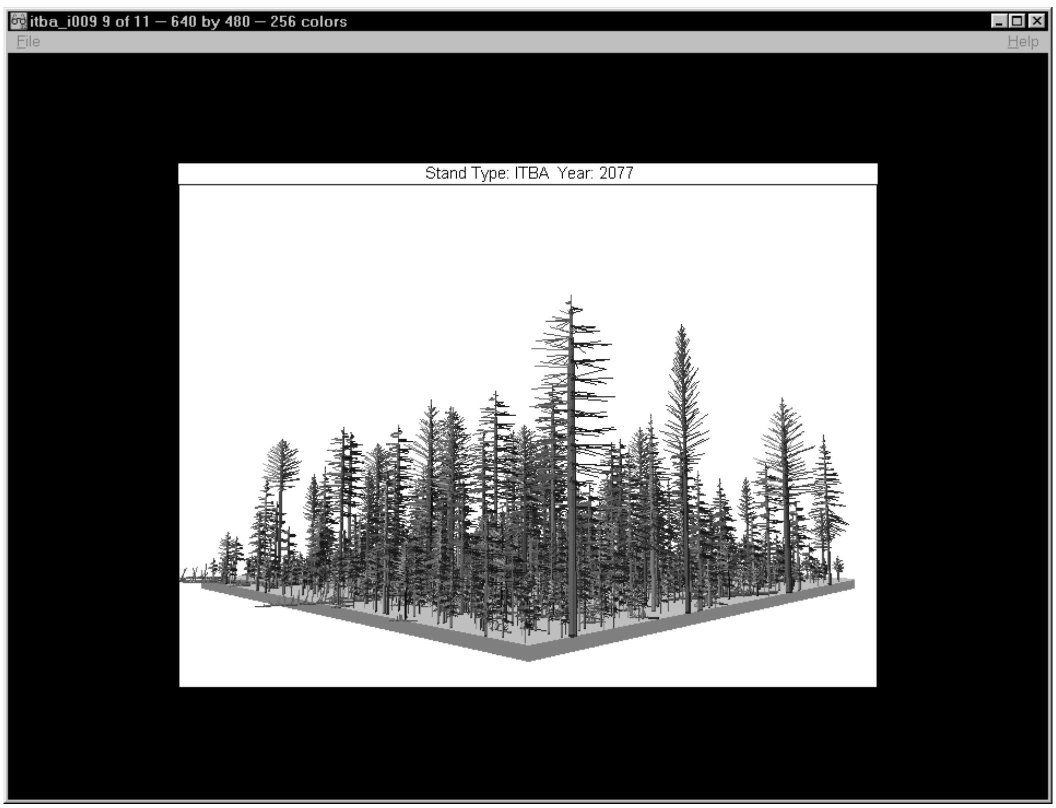
DATE RUN - 03/03/2001
PLOT ACRES - 1.00
MEASUREMENT LENGTH - 10.00 YEARS

TABLE 1-3 H A R V E S T T A B L E

--- All Species Combined

DIA. CLASS	TREES /AC	AVG DBH	AVG HGT	BA	CU-CU	BD-CU	BD-BD	% CU DEF	% BD DEF
	2078 - 2087 ANNUAL HARVEST			HARVEST/AC/YR					
2.	559.1	2.03	11.7	1.375	0.00	0.00	0.0	0.0	0.0
4.	84.1	4.84	24.3	1.096	0.00	0.00	0.0	0.0	0.0
SUB.	643.2	2.40	13.4	2.471	0.00	0.00	0.0	0.0	0.0
6.	15.5	7.14	36.8	0.434	4.69	0.00	24.2	0.0	0.0
8.	12.7	9.12	45.9	0.580	11.10	0.00	54.3	0.0	0.0
10.	4.7	11.38	55.0	0.331	7.55	0.00	33.4	0.0	0.0
SUB.	32.9	8.51	42.9	1.345	23.34	0.00	111.9	0.0	0.0
12.	1.6	12.64	64.1	0.141	3.19	0.00	14.8	0.0	0.0
14.	1.3	15.05	69.6	0.155	4.26	0.00	20.5	0.0	0.0
16.	0.6	16.84	80.3	0.092	2.48	0.00	12.8	0.0	0.0
18.	0.8	18.56	76.9	0.146	4.38	0.00	22.7	0.0	0.0
SUB.	4.2	15.03	70.3	0.534	14.31	0.00	70.7	0.0	0.0
20.	0.0	0.00	0.0	0.000	0.00	0.00	0.0	0.0	0.0
22.	0.0	0.00	0.0	0.000	0.00	0.00	0.0	0.0	0.0
24.	0.0	0.00	0.0	0.000	0.00	0.00	0.0	0.0	0.0
26.	0.0	0.00	0.0	0.000	0.00	0.00	0.0	0.0	0.0
28.	0.0	29.50	111.8	0.023	0.90	0.00	5.7	0.0	0.0
30.	0.0	0.00	0.0	0.000	0.00	0.00	0.0	0.0	0.0
32.	0.0	0.00	0.0	0.000	0.00	0.00	0.0	0.0	0.0
34.	0.0	0.00	0.0	0.000	0.00	0.00	0.0	0.0	0.0
36.	0.0	0.00	0.0	0.000	0.00	0.00	0.0	0.0	0.0
38.	0.0	0.00	0.0	0.000	0.00	0.00	0.0	0.0	0.0
40.	0.0	0.00	0.0	0.000	0.00	0.00	0.0	0.0	0.0
SUB.	0.0	29.50	111.8	0.023	0.90	0.00	5.7	0.0	0.0
TOTAL	680.4	2.78	15.1	4.373	38.56	0.00	188.3	0.0	0.0

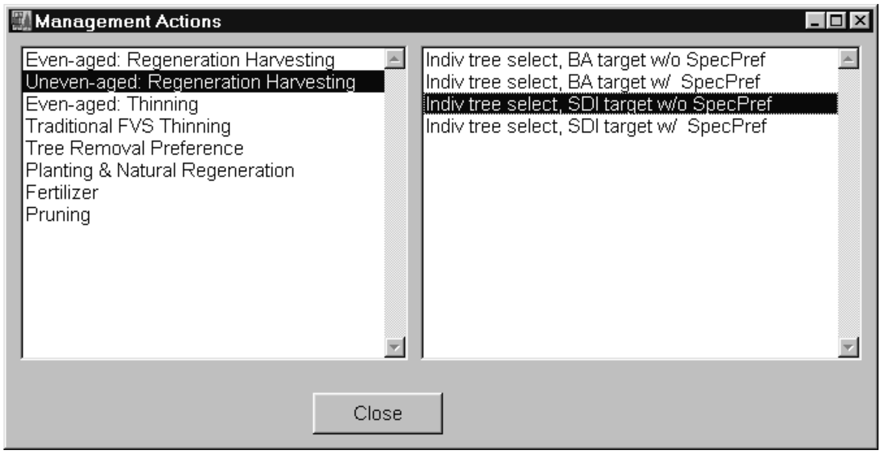
16. Let's look at a **SVS** picture of the stand in **2007**.



Now, isn't uneven-aged management fun to do!

Skill Challenge:

Stone James works on the Eastside of the Cascades in south-central Oregon. After being bounced around amongst several supervisors, Stone is convinced that if he could 'make his mark' with the Analysis Group on the Forest, he could settle there to stay. Stone has been keeping up with the **FVS Bulletins** as they are issued. He notices that recently, a new keyword, **ThinSDI** has been created and added to the system. **Stand Density Index** (SDI) is an important parameter for measuring stocking on his forest. Uneven-aged management is also gaining prominence. He reviews the "**Individual Tree Selection, SDI Target"** Management Actions within Suppose and realizes that they were created prior to the new ThinSDI Keyword.



Thus, Stone takes it upon himself to **re-vamp** the two **ITS-SDI Management Actions** using the new **ThinSDI** Keyword. Stone is rock solid in his effort. The resultant Keyword set now reads (fill in the white space):

Skill Challenge Solution:

Counting on your help here!

P.S. Any thoughts on Group Selection Silviculture?

Notes:

Topic REGEN: Regenerating the Future

Concepts: review aspects dealing with stand regeneration.

Two of the most difficult components to predict in forest stand growth and yield modeling are regeneration and mortality. Both events are stochastic in nature. The factors that influence these phenomena are not easily determined. Inventory data sets upon which algorithms are developed rarely cite the statistical parameters needed to effectively predict their outcomes. Thus, the weakest links in the vegetation growth and yield modeling chain are the prediction estimates for regeneration and mortality. These are very important aspects of stand development. They compose the recruitment in and withdrawal out of the life spectrum of a forest stand. It is the objective of this discussion to present ideas relative to providing input for stand reproduction. Imminent mortality is a separate topic.

Aspects of the FVS Base Model

Let's begin with the FVS Base Model. The Forest Vegetation Simulator base model is a composed of several (some would say numerous) FORTRAN subroutines compiled into a functioning growth and yield model. This growth and yield model is comprised of three primary sub-models. They are the: ***Small Tree Model***, ***Large Tree Model***, and ***Mortality Model***. Again, we will leave the discussion of mortality for another topic. The derivation of the live tree sub-models is apparent from a field inventory collection standpoint. Many of the data sets that are used to develop the growth equations have nested plot designs. That is, larger trees are measured on a major plot that covers a significantly broader surface area than that used for smaller trees. For instance, many permanent plot inventories collect information on trees five inches and greater in diameter on a fifth-acre plot, whereas the trees less than five inches diameter are collected on a hundredth acre plot. Given that the data is collected in this manner, analysis procedures must follow a similar course to take full advantage of available information.

Many of the FVS Variant Overview documents have a table that cites the 'break-point' diameter between the Small Tree and Large Tree growth relationships. There is a *smoothing* algorithm that tapers the regression lines from one to the next, thus, no dramatic changes are revealed due to the transition between the two live tree sub-models. The following table is extracted from the South Central Oregon/Northeast California (SORNEC) Variant Overview.

	WP	SP	DF	WF	MH	IC	LP	ES	RF	PP	Other
Minimum DBH	2	2	2	2	2	2	1	2	2	2	2
Maximum DBH	4	4	4	4	4	4	5	4	6	6	6

A smoothing algorithm is used to transition diameter growth from the Small Tree to the Large Tree in the range between the minimum and maximum diameters.

Predictive equations are developed for diameter growth, height growth, and crown development. The growth estimation sequence in the Small Tree Model is height, diameter, and crown. The growth estimation sequence in the Large Tree Model begins with diameter, then height, and then crown. Generally speaking, it is more relevant to track the height development when trees are smaller. As trees growth larger, diameter growth becomes the dominant qualifier of stand dynamics.

Aspects of the Full and Partial Regeneration Establishment Model

Additional FORTRAN modules/subroutines, called ***Model Extensions***, which simulate various insect and disease impacts, and the development of understory vegetation, have been linked to the FVS Base Model. Each model extension begins with a *trigger* FVS Keyword and ends with the END FVS Keyword. The trigger keyword indicates that the processing sequence is leaving the FVS Base Model. Computations are continued through the model extension subroutines, and then returned to the FVS Base Model upon the terminating END keyword.

The Regeneration Establishment Model Extension was developed by the Intermountain Research Station to predict understory tree development for stand conditions in the Northern Rocky Mountains. Important features of the regeneration model are:

- Predictions of New Trees via the PLANT and NATURAL Keywords.
- Automatic Tallies of Seedlings following Thinning Activities.
- Ingrowth of Shade Tolerant Trees following a Prolonged Period without Disturbance.
- Stump Sprouting from Harvested Trees.

Use of the PLANT and NATURAL Keywords initiate a 20-year *regeneration period*. The regeneration period is the number of years during which regeneration becomes established as a result of a disturbance. The length of the regeneration period varies depending on site conditions; however, for modeling purposes, it has been set for 20 years. Regeneration that occurs after the regeneration period is called *ingrowth*. Ingrowth is both the result of succession by shade tolerant species and the continued regeneration of trees into gaps in the overstory canopy. The use of the NATURAL Keyword renders the automatic tally and ingrowth features inactive.

The *Full* Regeneration Establishment Model that includes the aforementioned features has been linked to the AK, CI, EM, IE, and KT FVS Variants. The *Partial* Regeneration Establishment Model has been embedded in the remaining FVS Variants. The use of the PLANT and NATURAL Keywords and the stump sprouting features comprise the Partial Regeneration Establishment Model.

User Created Regeneration Models

In the absence of the Full Regeneration Establishment Model, several aspects pertaining to the development of a new stand need to be addressed. Keyword Component Files, also known as Add-Files, have been developed to simulate understory recruitment of seedlings. Let review two examples.

Example 1:

```
RANNSEED          777
NUMCYCLE           10
ECHOSUM
INVYEAR          2000
NOTREES
SCREEN
TREELIST            0          3          0          0          0          0
IF                  0
CYCLE GE 0
THEN
COMPUTE
RANDOM = RANN
END
ENDIF

IF                  0
 RANDOM LE .01
THEN
COMPUTE             0
SEEDLING = 1000
END
ESTAB
PLANT               0   PARMS(6,SEEDLING,100,1,0.2,0)
END
ENDIF

IF
 RANDOM GT .01 AND RANDOM LE .05
THEN
COMPUTE             0
SEEDLING = 500
END
ESTAB
PLANT               0   PARMS(6,SEEDLING,100,1,0.2,0)
END
ENDIF

IF
 RANDOM GT .05 AND RANDOM LE .20
THEN
COMPUTE             0
SEEDLING = 100
END
ESTAB
PLANT               0   PARMS(6,SEEDLING,100,1,0.2,0)
END
ENDIF

IF
 RANDOM GT .20)
THEN
COMPUTE             0
SEEDLING = 0
END
END
ESTAB
PLANT               0   PARMS(6,SEEDLING,100,1,0.2,0)
END
ENDIF

COMMENT
 PROGNOSIS VERSION NUMBER 37 WAS SELECTED
SCALE               1          2          3          4          5          6          7
END
PROCESS
STOP
```

Example 2:

```
          FOREST VEGETATION SIMULATOR     VERSION 6.2 -- UTAH PROGNOSIS          03-05-1995  18:23:20

----------------------------------------------------------------------------------------------------

                                        OPTIONS SELECTED BY INPUT

----------------------------------------------------------------------------------------------------
KEYWORD    PARAMETERS:
--------   -----------------------------------------------------------------------------------------

INVYEAR    INVENTORY YEAR= 1984

SITECODE   SITE INDEX SPECIES= ES (CODE=  8);  SITE CODE FOR LARGE AND SMALL TREES=    50.0

NUMCYCLE   NUMBER OF CYCLES=  6

DELOTAB    TABLE NUMBER   2  SPECIFIED.  SAMPLE TREE TABLE WILL BE DELETED.
           HABITAT TYPE IS NOT USED IN THIS VARIANT

STDINFO    FOREST-LOCATION CODE=   410; HABITAT TYPE=  0; AGE=  140; ASPECT AZIMUTH IN DEGREES= 360.; SLOPE=  20.%
           ELEVATION(100'S FEET)= 96.0; LATITUDE IN DEGREES=  39.

DESIGN     BASAL AREA FACTOR=  40.0; INVERSE OF FIXED PLOT AREA=  300.0; BREAK DBH=    5.0
           SEE "OPTIONS SELECTED BY DEFAULT" FOR PLOT COUNTS AND SAMPLING WEIGHT.
           PROPORTION OF STAND CONSIDERED STOCKABLE=  1.000

IF         MINIMUM DELAY TIME BETWEEN RESPONSES TO THE EVENT =    10

           CYCLE GT 1

THEN       ACTIVITIES WHICH FOLLOW WILL NOT BE SCHEDULED UNTIL THE EVENT HAPPENS (WHEN THE LOGICAL EXPRESSION IS TRUE).

THINDBH    DATE/CYCLE=    0;   PARMS(5,99,0.15,8,0,0)

THINDBH    DATE/CYCLE=    0;   PARMS(5,99,0.15,9,0,0)

ENDIF      ACTIVITIES WHICH FOLLOW WILL BE SCHEDULED.

SCREEN     SUMMARY TABLE WILL BE PRINTED TO DATA SET REFERENCE NUMBER     6 AS RUN PROGRESSES.

NOTRIPLE

OPEN       DATA SET REFERENCE NUMBER =    40; BLANK=ZERO; STATUS=UNKNOWN
           MAXIMUM RECORD LENGTH (IGNORED ON SOME MACHINES) =  80; FILE FORM= 1 (1=FORMATTED, 2=UNFORMATTED)
           DATA SET NAME = REGEN2.KEYS

ADDFILE    DATA SET REFERENCE NUMBER= 40


           **********************************************************************
           *                             REGEN2.KEYS                            *
           **********************************************************************
           *
           *

COMMENT
                The objective of this REGENeration keyword set is to "inject" new
           seedlings into the understory.  The timing, species, number, and
           survival of the seedlings is then determined by stand characteristics.
                Currently, the only method of simulating regeneration in many FVS
           variants is to use some form of the ESTAB - PLANT sequence.
           1.   Assumptions behind this keyword set are:
           Regardless of the species mix in a stand, trees with dbh of 5-inches
           and greater are capable of producing seed.
           2.   Density of the stand does not significantly inhibit seed
           germination.
           However, the idea here is that if one or more mature tree of species x
           is present in the stand, then seedfall and germination will occur to
           sufficient degree to provide a source of seedings.  Whether or not
           these seedings survive any length of time is another matter entirely.

           3.   Germinated seedling survival depends primarily upon density of the
           stand and how that density interacts with the shade tolerance of the
           seedling species.
           4.   The idea behind this keyword file is to generate ideas that you
           can use for creating your own regeneration keyword file based on data
           and observations specific to your geographic region and local conditions

END


           *
           *    The following COMPUTEs provide variables useful later and variables
           *    that are included to check on attributes of the stand through the
           *    simulation.
           *

COMPUTE    DATE/CYCLE=    0; DEFINE THE FOLLOWING:

           TPA5P  =SPMCDBH(1,0,0,5,99)
           TPA5PAS=SPMCDBH(1,AS,0,5,99)
           TPA5PLP=SPMCDBH(1,LP,0,5,99)
           TPA5PES=SPMCDBH(1,ES,0,5,99)
           TPA5PAF=SPMCDBH(1,AF,0,5,99)
           TOTT5PSF=TPA5PES+TPA5PAF
           PRPT5PES=100*(TPA5PES/TOTT5PSF)
           PRPT5PAF=100*(TPA5PAF/TOTT5PSF)
           BA1P =SPMCDBH(2,0,0,1)
           TPA1P=SPMCDBH(1,0,0,1)
           AMDBA1P=1266.41679*TPA1P**(-0.20378)
           PCNTAMD=(BA1P/AMDBA1P)*100.0
           PCNTAMD=INT(PCNTAMD+0.5)

END


           *
           ***********************************************************************
           *     The first linear interpolation function for survival of shade
           *     intolerant species incorporates the following tabular function:
           *  %AMD              %SURVIVAL
           *  0-20              90                NOTE:  This portrays idea
           *  21-55             50                that intolerants do better
           *  56-85             30                in full sunlight (low AMD).
           *  86+               10
           *
           *     The second linear interpolation function for survival of shade
           *     tolerant species incorporates the following tabular function:
           *  %AMD              %SURVIVAL
           *  0-20              10       NOTE:  This portrays idea that tol-
           *  21-55             90       erant species do best in mixed sun
           *  56-85             50       and shade, and poorly in either
           *  86+               10       full sun or (??) very heavy shade.
           *

COMPUTE    DATE/CYCLE=    0; DEFINE THE FOLLOWING:

           SRVIVINT=LININT(PCNTAMD,0,20,21,55,56,85,86,100,90,90,50,50,30,30,10,10)
           SRVIVTOL=LININT(PCNTAMD,0,20,21,55,56,85,86,100,10,10,90,90,50,50,10,10)
           NAS=1000*(TPA5PAS/TPA5P)
           NLP=1000*(TPA5PLP/TPA5P)
           NES=1000*(TPA5PES/TPA5P)
           NAF=1000*(TPA5PAF/TPA5P)

END


           *

IF         MINIMUM DELAY TIME BETWEEN RESPONSES TO THE EVENT =     0
```

```
                CUT EQ 1

THEN            ACTIVITIES WHICH FOLLOW WILL NOT BE SCHEDULED UNTIL THE EVENT HAPPENS (WHEN THE LOGICAL EXPRESSION IS TRUE).

ESTAB           REGENERATION ESTABLISHMENT OPTIONS:

NATURAL         DATE/CYCLE=    0;   PARMS(6,NAS,SRVIVINT,1,0.25,2)

NATURAL         DATE/CYCLE=    0;   PARMS(7,NLP,SRVIVINT,1,0.25,2)

NATURAL         DATE/CYCLE=    0;   PARMS(8,NES,SRVIVTOL,1,0.25,1)

NATURAL         DATE/CYCLE=    0;   PARMS(9,NAF,SRVIVTOL,1,0.25,1)

END             REGENERATION TALLY SEQUENCE SCHEDULED TO START    1 YEARS AFTER THE EVENT IS OCCURS.
                END OF ESTABLISHMENT KEYWORDS

ENDIF           ACTIVITIES WHICH FOLLOW WILL BE SCHEDULED.

PROCESS         PROCESS THE STAND.
```

Regeneration Imputation Models

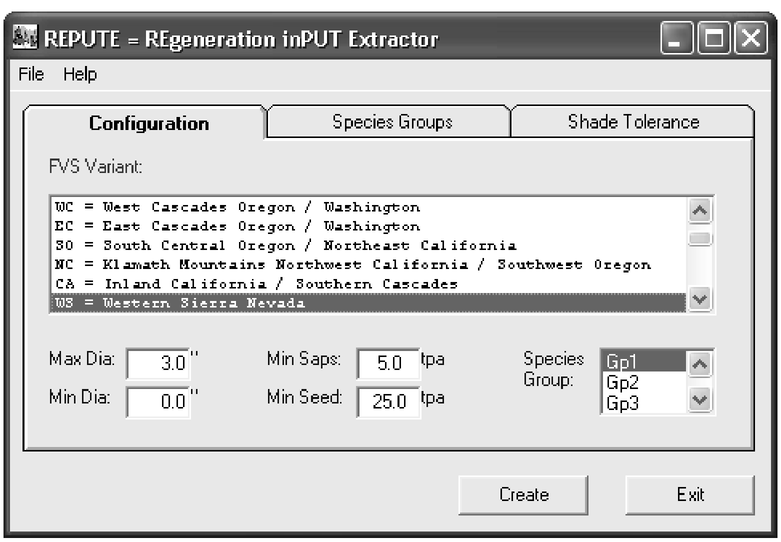
To impute would imply to ascribe one to another. That is, use measured attributes to replace missing values. Recently, Mouer and Stage (1995) introduced imputation for "most similar neighbor inference" in an inventory context. Ek et al. (1996) utilized imputation techniques in producing regeneration models for forest in Minnesota. In the context of ***Regeneration Imputation***, basically, the process calls for querying existing data sets for representative *stand types* (stands of similar administrative, vegetative, and developmental characteristics) and tabulating the seedling/sapling component.

REPUTE the Program

A post processing program has been written that embodies the concept of Regeneration Imputation. This program reads Stand Table output files from the FVSSTAND Alone program to develop regeneration Keyword Component files. Let's see how the *RE*generation In*PUT E*xtractor (***REPUTE***) program works.

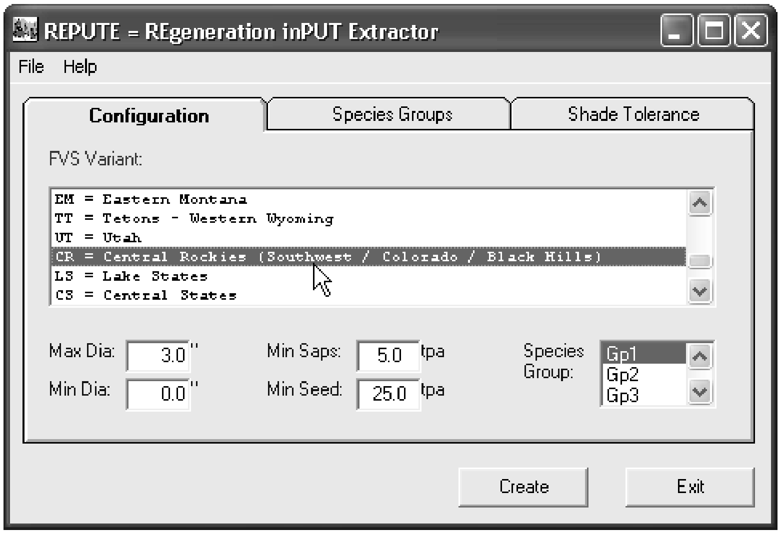
Prior to creating a regeneration add-file, Repute needs to be configured for the particular FVS Variant of interest. Once the FVS Variant is select, individual tree species can be assigned to a "Species Group". This capability is extremely useful for FVS Variants that contain a multitude of trees species. For example, in setting up Repute to build regeneration files for the National Forests of North Carolina, Dry Mesic-Oak Hickory, Dry-Oak Hickory, Loblolly Pine, Longleaf Pine, and Shortleaf Pine forest community types were identified as distinct vegetation strata. Subsets of predominant tree species were assigned per strata. Those tree species that are not assigned to a specific species group are summarized in default software or hardwood designations. The FVS model is limited in activity storage. Designating every tree species for regeneration would exhaust the internal memory capacity. Here are the important steps to follow in using the Repute Program:

1. Execute **REPUTE** from the Windows Start Menu, All Programs, FVS folder, Repute icon.

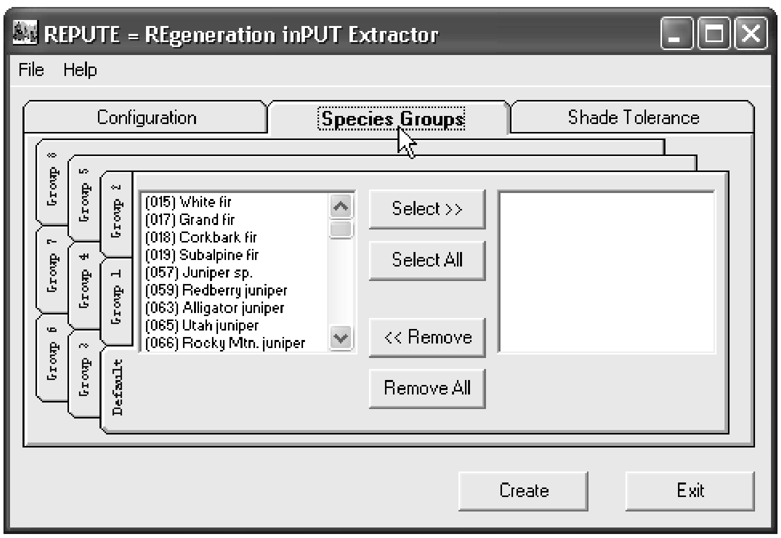


2. The ***default parameters from the previous run*** of Repute will be displayed (i.e. WS FVS Variant).

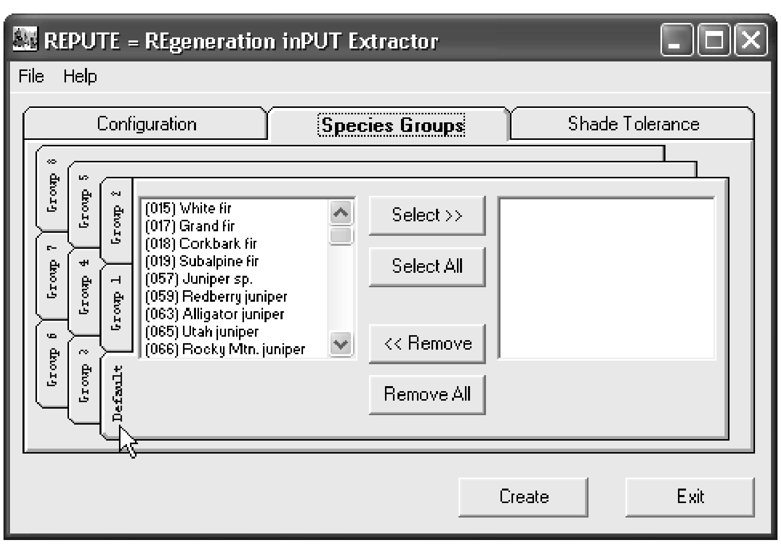
3. Select the **FVS Variant** to be used. For this example, the "**CR = Central Rockies"** FVS Variant.



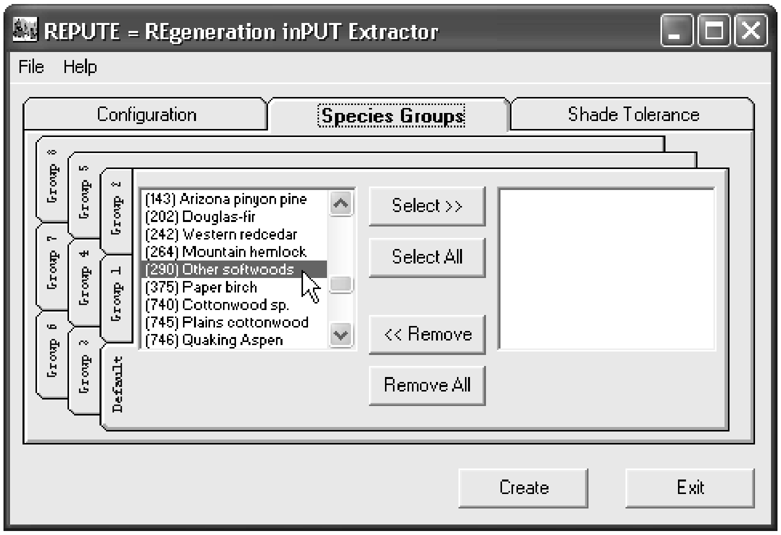
4. **Click** the **Species Groups** tab.

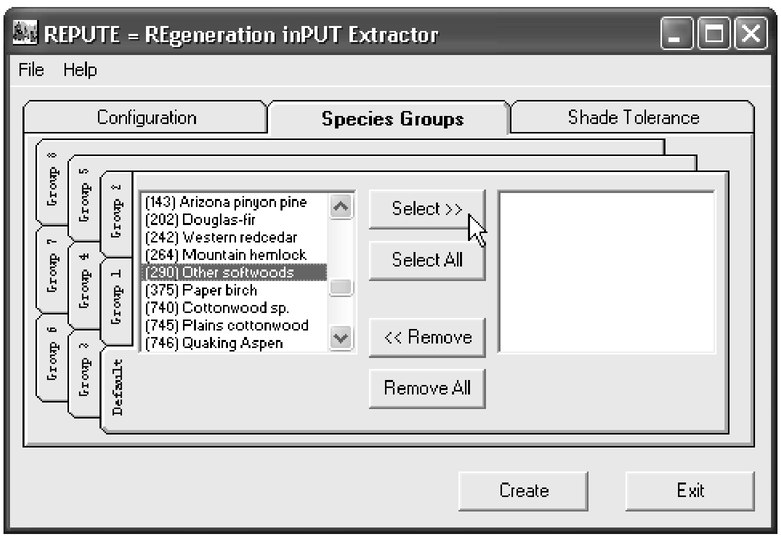


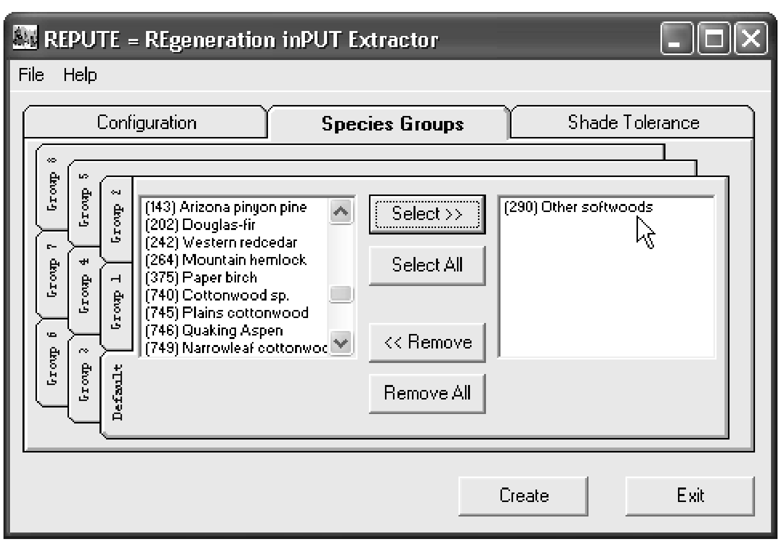
5. Note the tab tiered tab strip on the left side of the Species Groups tab. The **Default** tab allows designation of the catch-all categories for **non-declared** individual tree species.

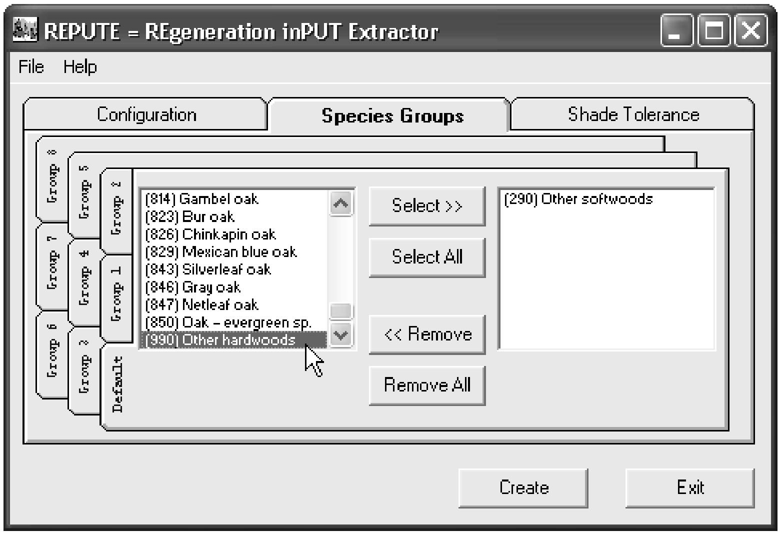


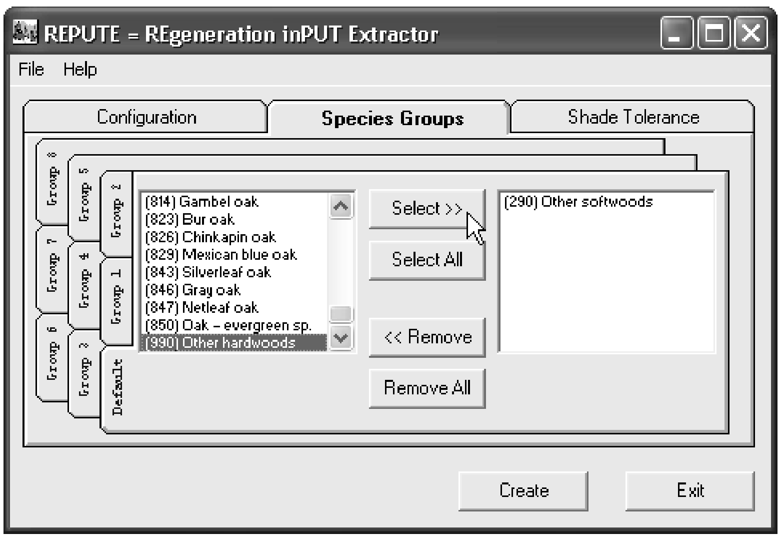
6. The left window pane provides a list of all tree species within a FVS Variant. Moving the tree species to the right window pane designates that species to be included in the regeneration add-file produced by Repute. To **set up** the **default softwood and hardwood designations**, use the following screen captures:

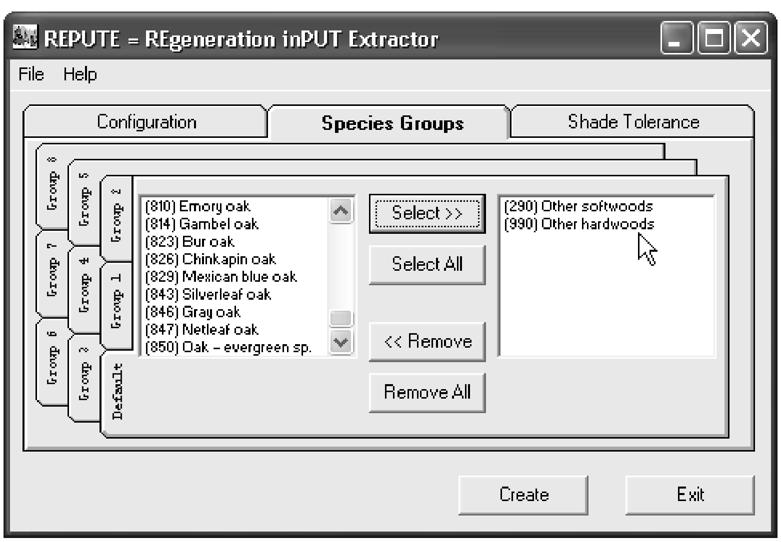




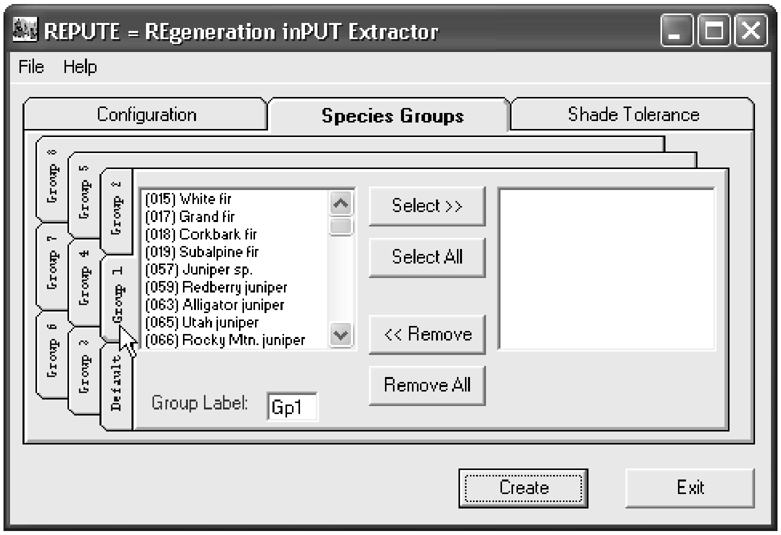


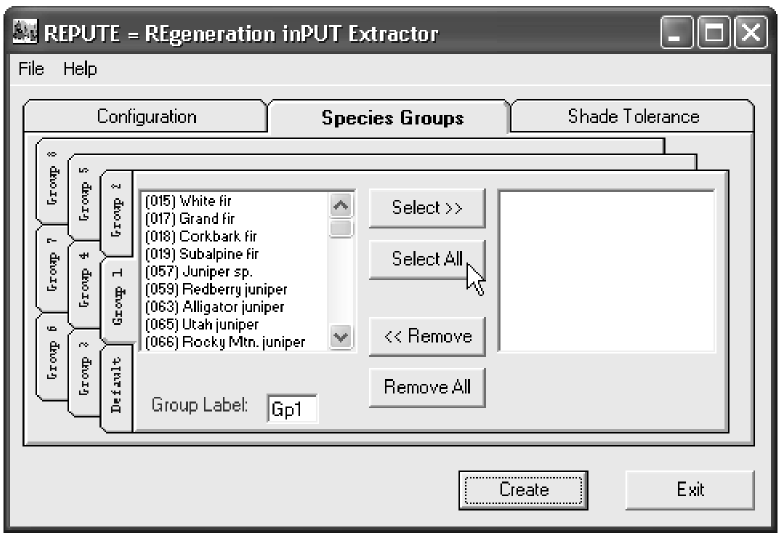




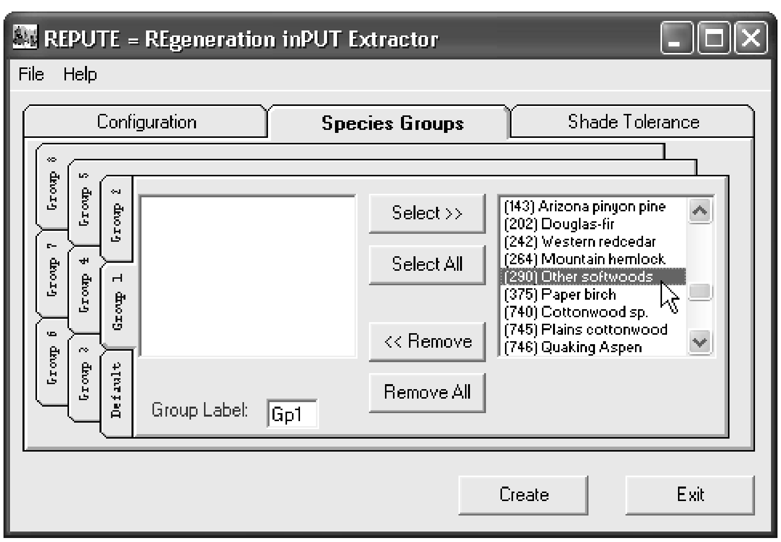


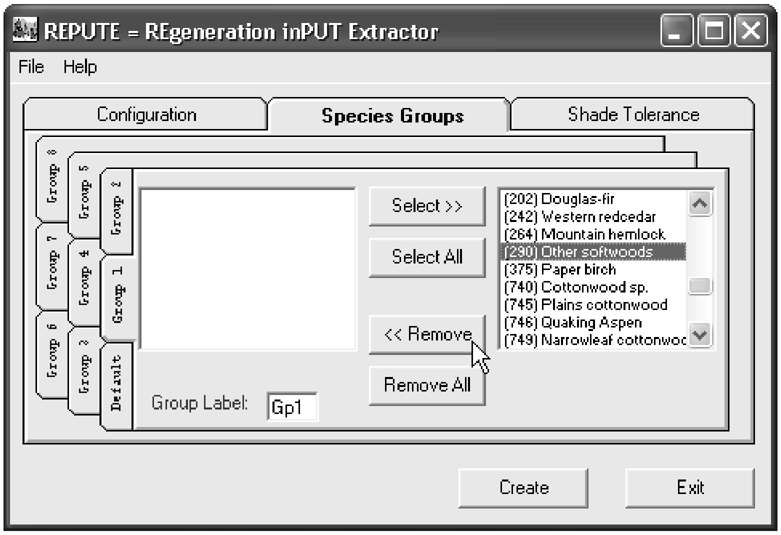
7. Use the following screen captures to **configure** a **Species Group** tab:

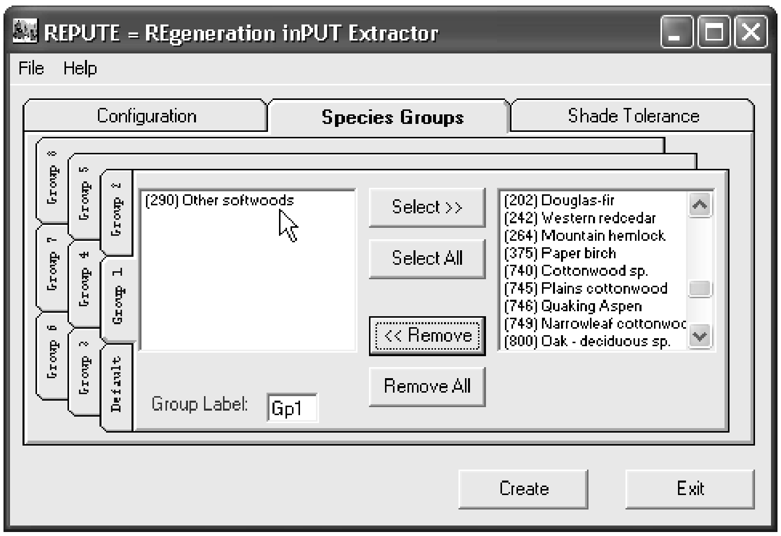


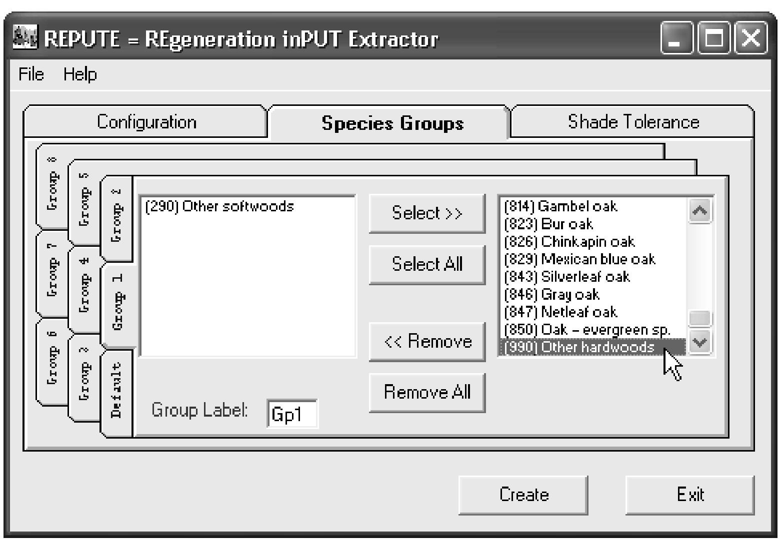


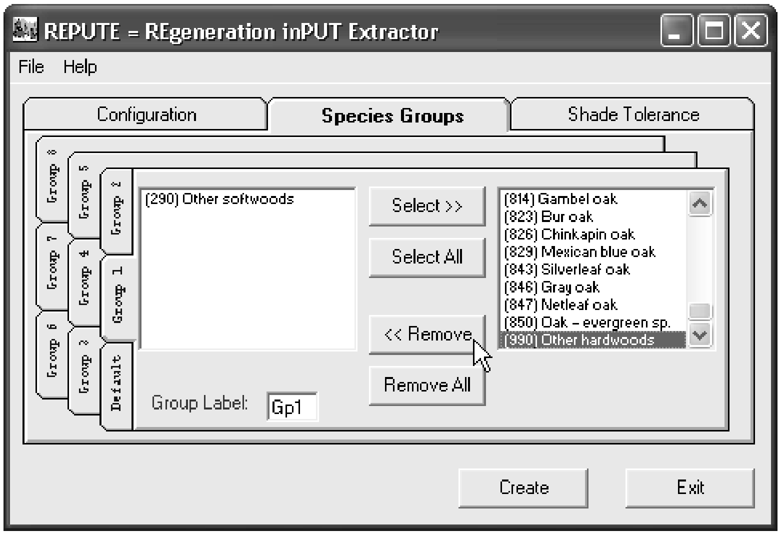
8. **Exclude default softwood and hardwood** designations as follows:

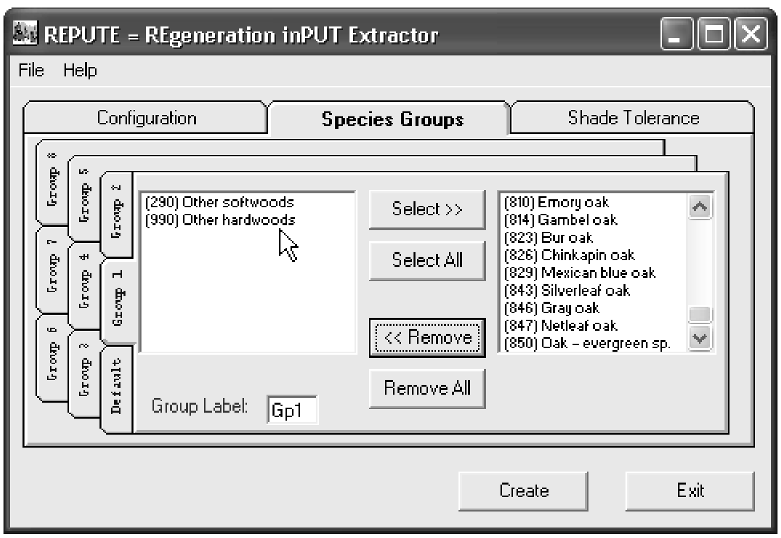



REPUTE = REgeneration inPUT Extractor
File
Help
Configuration
Species Groups
Shade Tolerance
Group 8
Group 5
Group 2
Group 7
Group 4
Group 1
Group 6
Group 3
Default
Select >>
Select All
<< Remove
Remove All
(202) Douglas-fir
(242) Western redcedar
(264) Mountain hemlock
(290) Other softwoods
(375) Paper birch
(740) Cottonwood sp.
(745) Plains cottonwood
(746) Quaking Aspen
(749) Narrowleaf cottonwoc
Group Label:
Gp1
Create
Exit

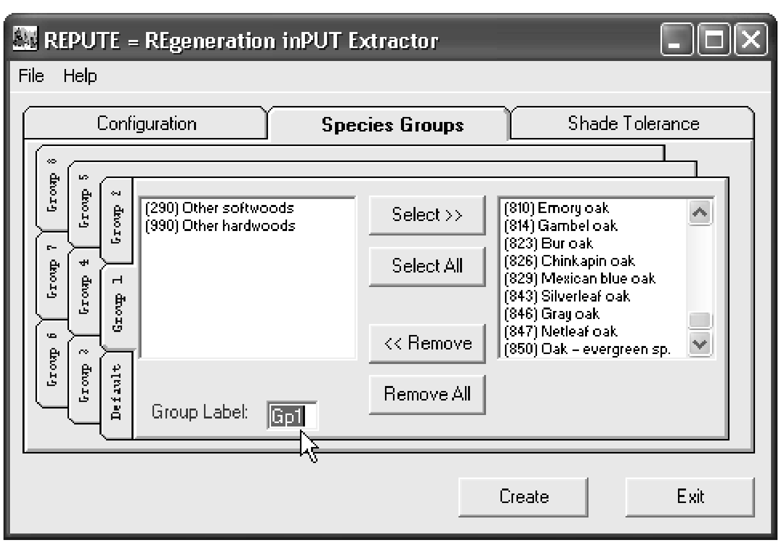

REPUTE = REgeneration inPUT Extractor
File
Help
Configuration
Species Groups
Shade Tolerance
Group 8
Group 5
Group 2
Group 7
Group 4
Group 1
Group 6
Group 3
Default
(290) Other softwoods
Select >>
Select All
<< Remove
Remove All
(202) Douglas-fir
(242) Western redcedar
(264) Mountain hemlock
(375) Paper birch
(740) Cottonwood sp.
(745) Plains cottonwood
(746) Quaking Aspen
(749) Narrowleaf cottonwoc
(800) Oak - deciduous sp.
Group Label:
Gp1
Create
Exit


REPUTE = REgeneration inPUT Extractor
File
Help
Configuration
Species Groups
Shade Tolerance
Group 8
Group 5
Group 2
Group 7
Group 4
Group 1
Group 6
Group 3
Default
(290) Other softwoods
Select >>
Select All
<< Remove
Remove All
(814) Gambel oak
(823) Bur oak
(826) Chinkapin oak
(829) Mexican blue oak
(843) Silverleaf oak
(846) Gray oak
(847) Netleaf oak
(850) Oak – evergreen sp.
(990) Other hardwoods
Group Label:
Gp1
Create
Exit

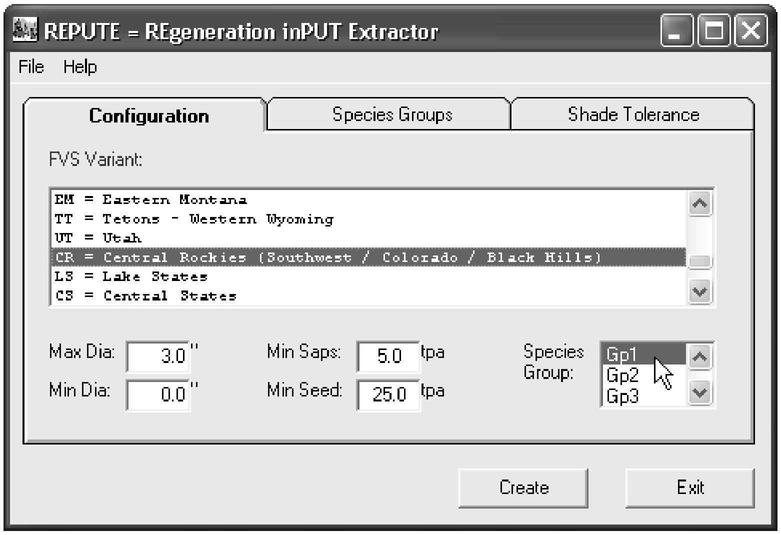




9. **Note** that the **"Group 1"** tab is **associated** with the **Group Label: *Gp1***.



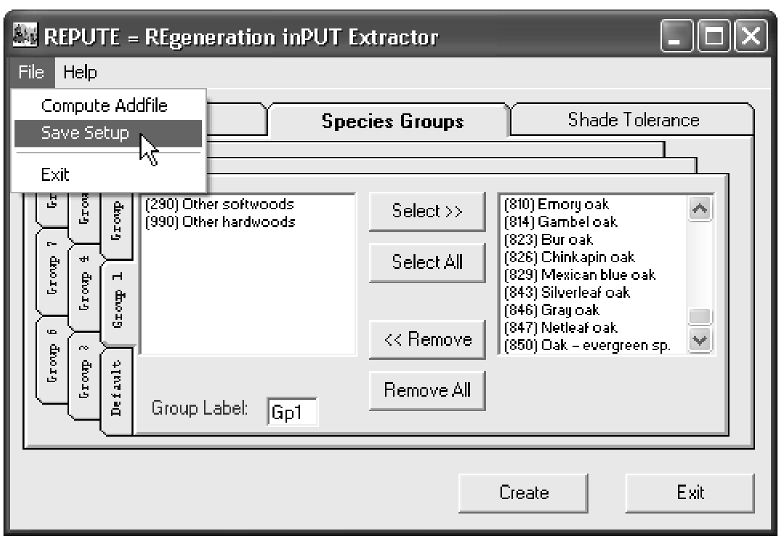
10. **Click** the **Configuration** tab. Note that for the **Species Group label, *Gp1*** is **selected**.



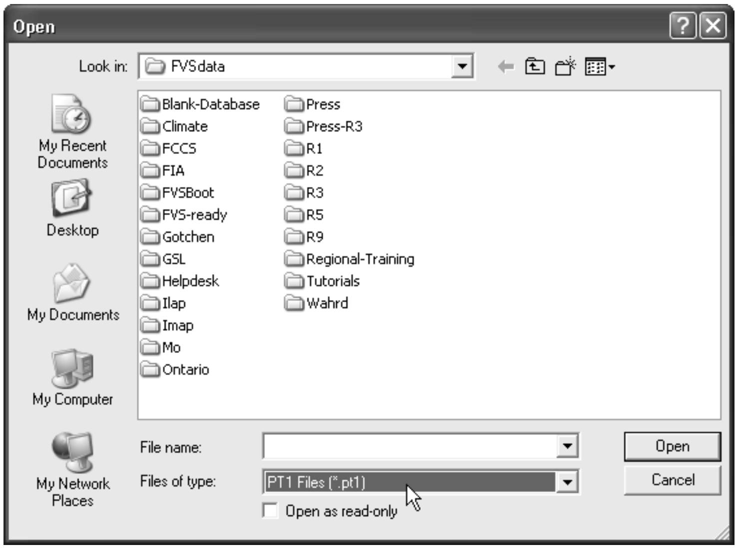
11. Note that ***Repute creates separate FVS regeneration Keywords (i.e. Natural) for seedling and small sapling*** records. The FVSSTAND print reports (i.e. Stand Tables) are displayed by 2" diameter classes; except for seedlings. The diameter range for seedlings is 0.0-1.0" for seedlings and 1.0-3.0" for small saplings. The **text boxes located at the left-bottom** of the **Configuration tab** can be used modify the selected diameter ranges. For example, on the Allegheny National Forest, deer browsing in unfenced areas renders little or no trees less than 1.0" in diameter. Changing the **"Min Dia"** and **"Max Dia"** will allow for larger sapling recruitment (e.g. Min Dia = 1.0" and Max Dia = 5.0" will capture the 1.0-3.0" and 3.0-5.0" diameter classes from the FVSSTAND print reports).

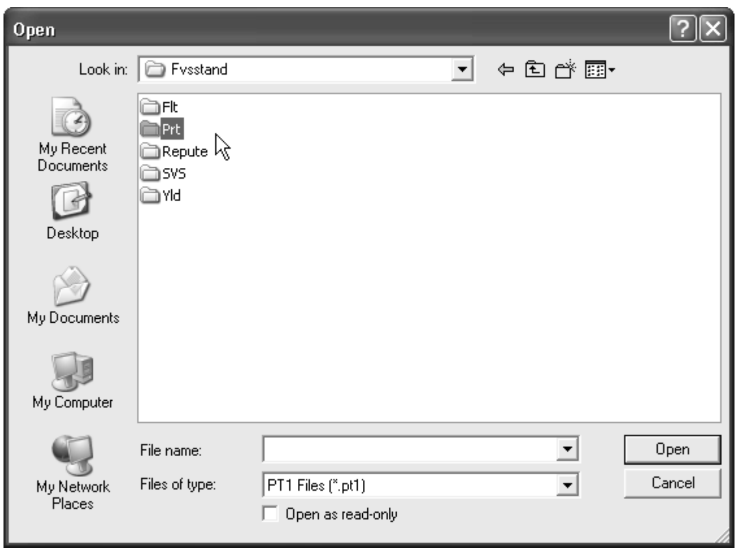
12. The goal of using Repute is to ***regenerate predominant tree species*** within forest cover type groups. Individual records in the FVS add-files are created per tree species listed from the **Species Groups** as specified on the **Group tabs**. The **"Min Seed"** and **"Min Saps"** text boxes can be used to set threshold for occurrence to ensure that a minimum tree count of the predominant tree species are regenerated. The values presented are in terms of trees per acre.

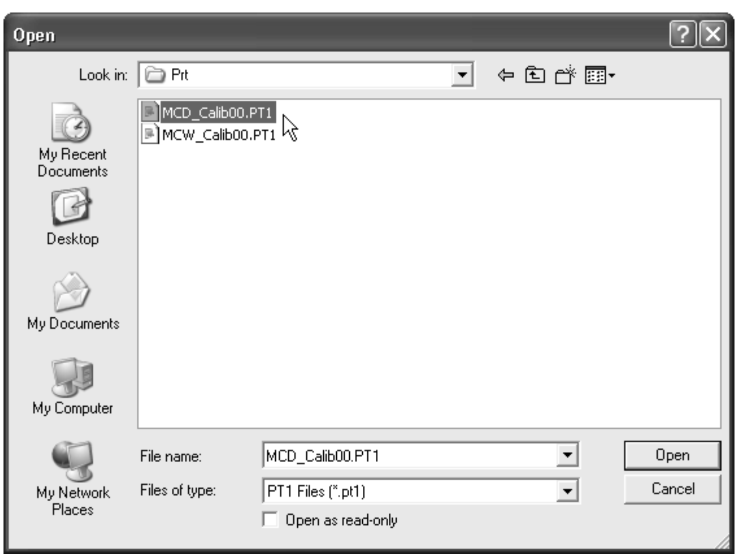
13. Click the **File** menu and select the **Save Setup** option to save configurations. Use the following screen captures to do so:



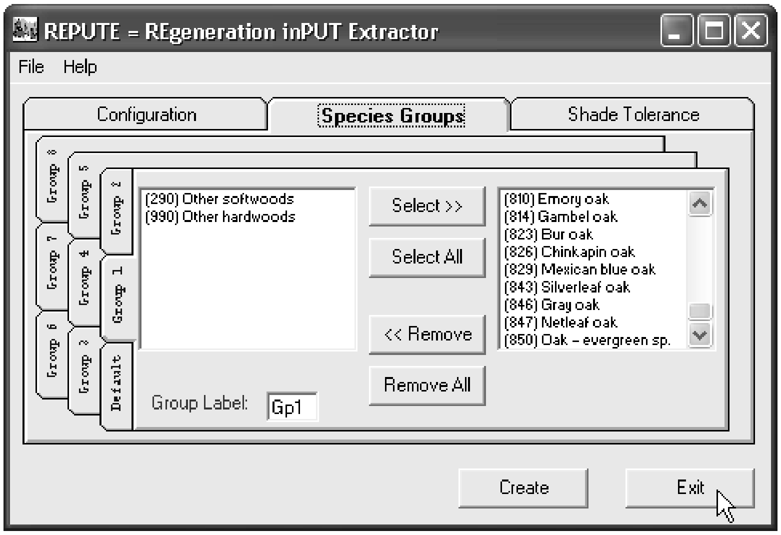
14. **Navigate** to the folder that contains the **FVSSTAND print report**.



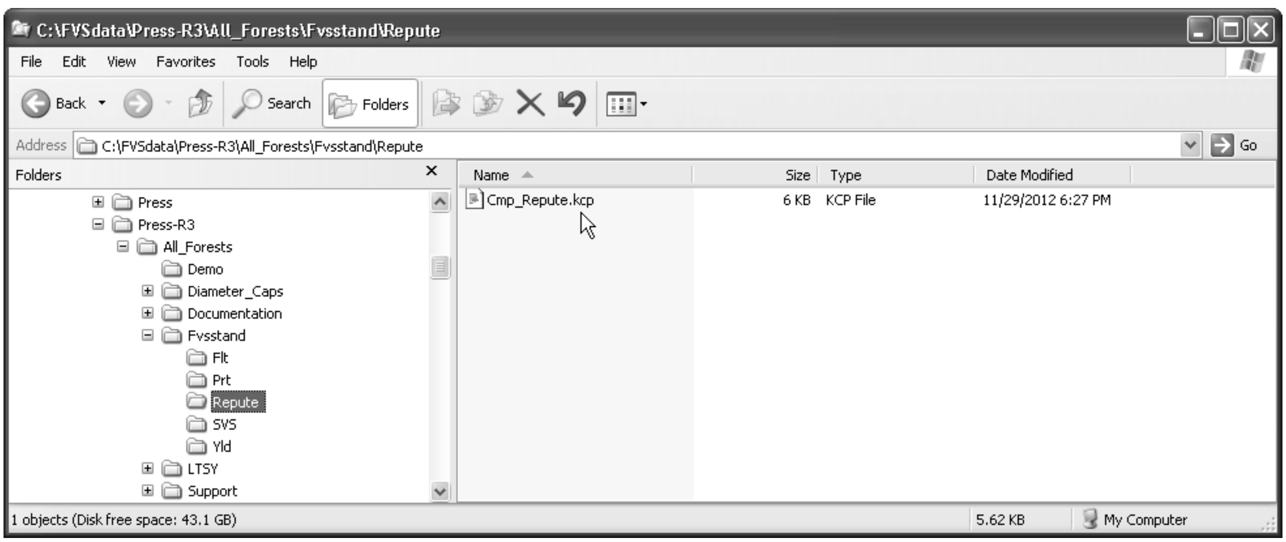




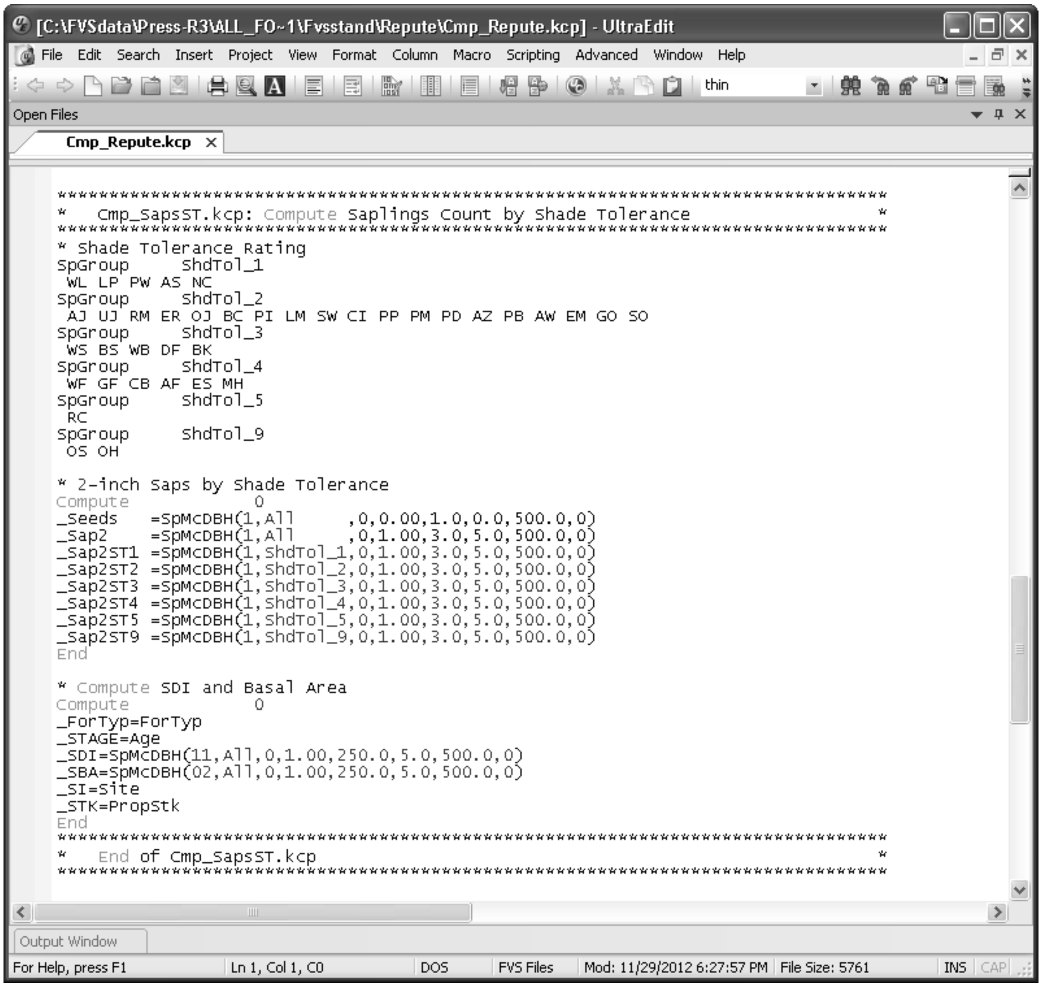
15. **Exit** from **Repute**.



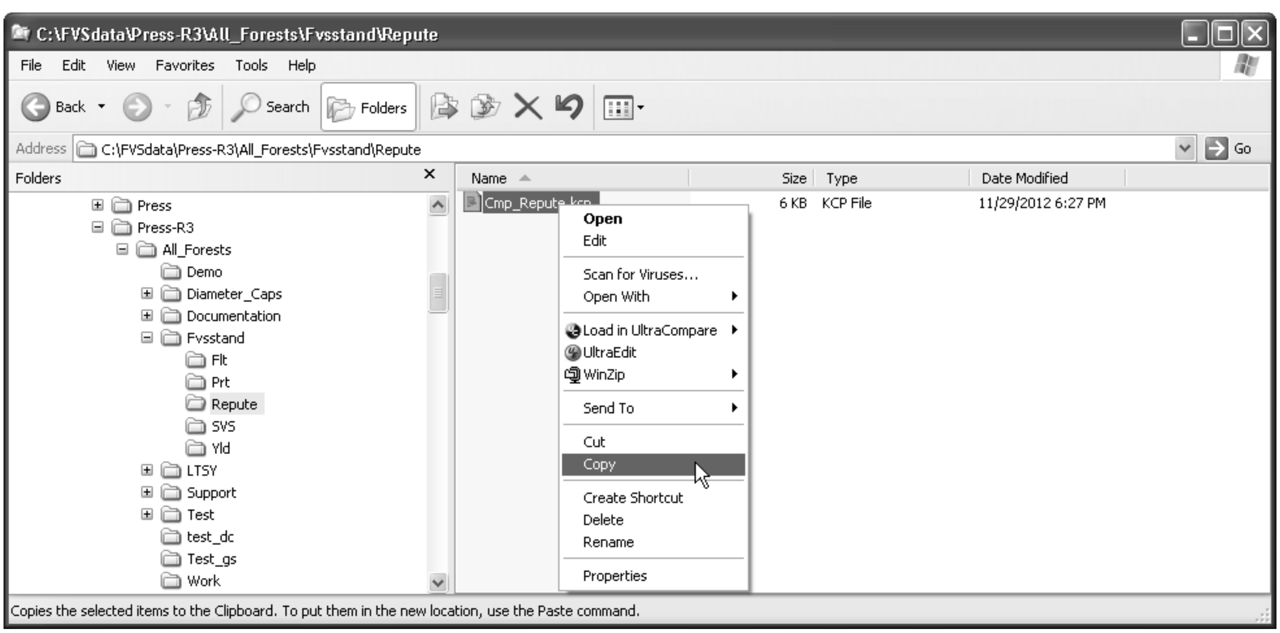
16. Using **Windows Explorer**, navigate to the **{Working Drive}\{Working Folder}\Fvsstand\Repute** folder. The working folder is the location of the FVS Keyword file.

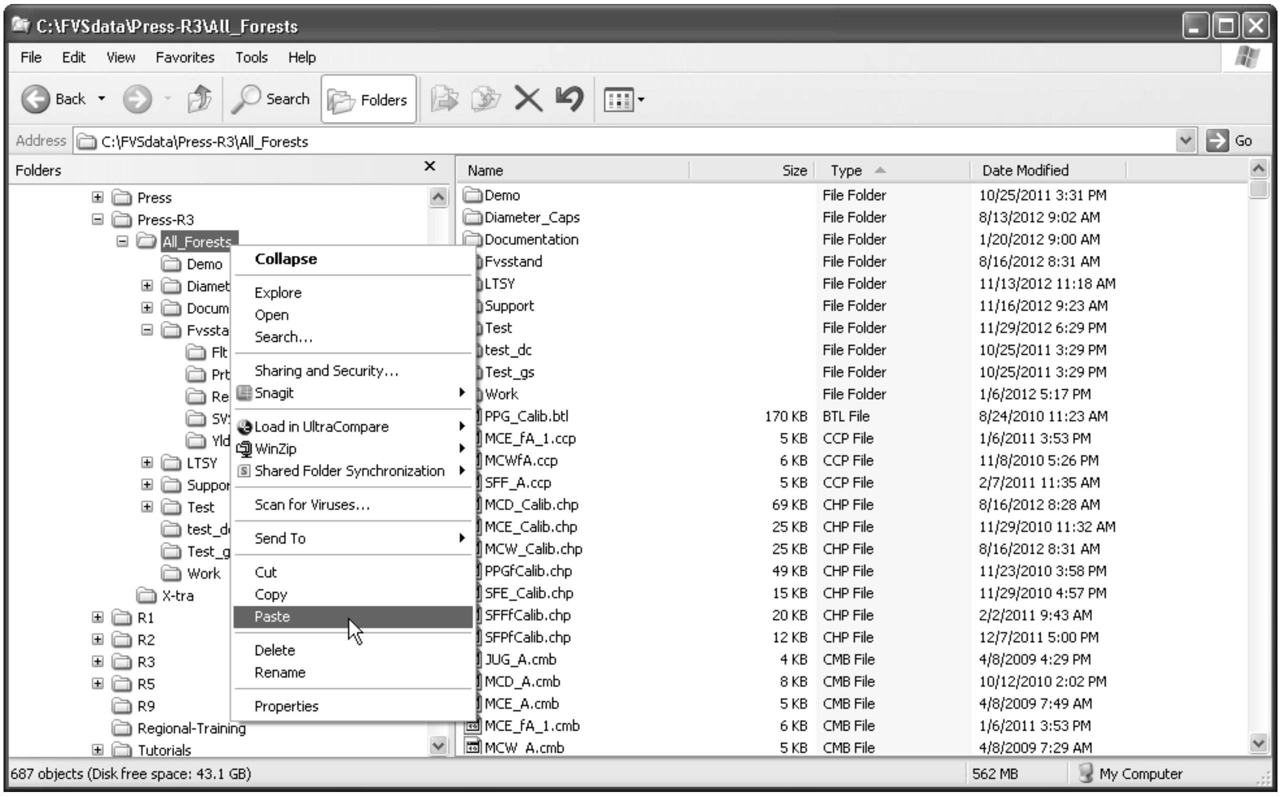


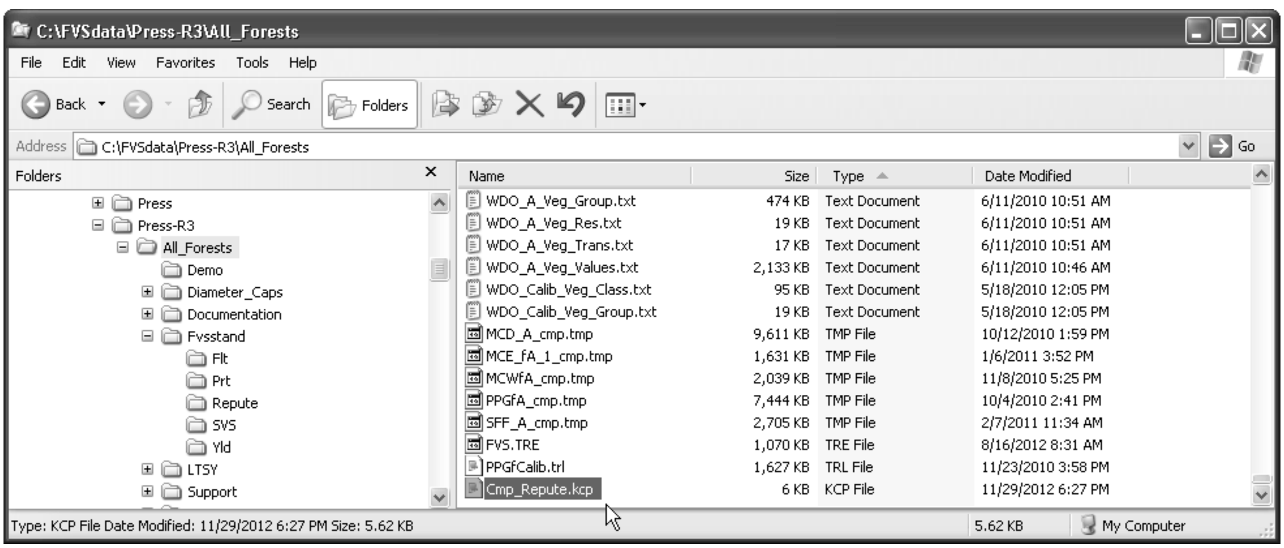
17. The Cmp_Repute.kcp file contains **FVS Event Monitor** coding that determines the **size and density class** for each inventory plot that was used to create the FVSSTAND print reports (i.e. Stand Tables). Also, **Event Monitor** statements are used to compute **2" sapling counts** by shade tolerance class. The ***Repute program uses both of these inferences to build the FVS regeneration add-file***.



18. Copy the Cmp_Repute.kcp file from the **{Working Drive}\{Working Folder}\Fvsstand\Repute** folder to the **{Working Drive}\{Working Folder}** folder as such:



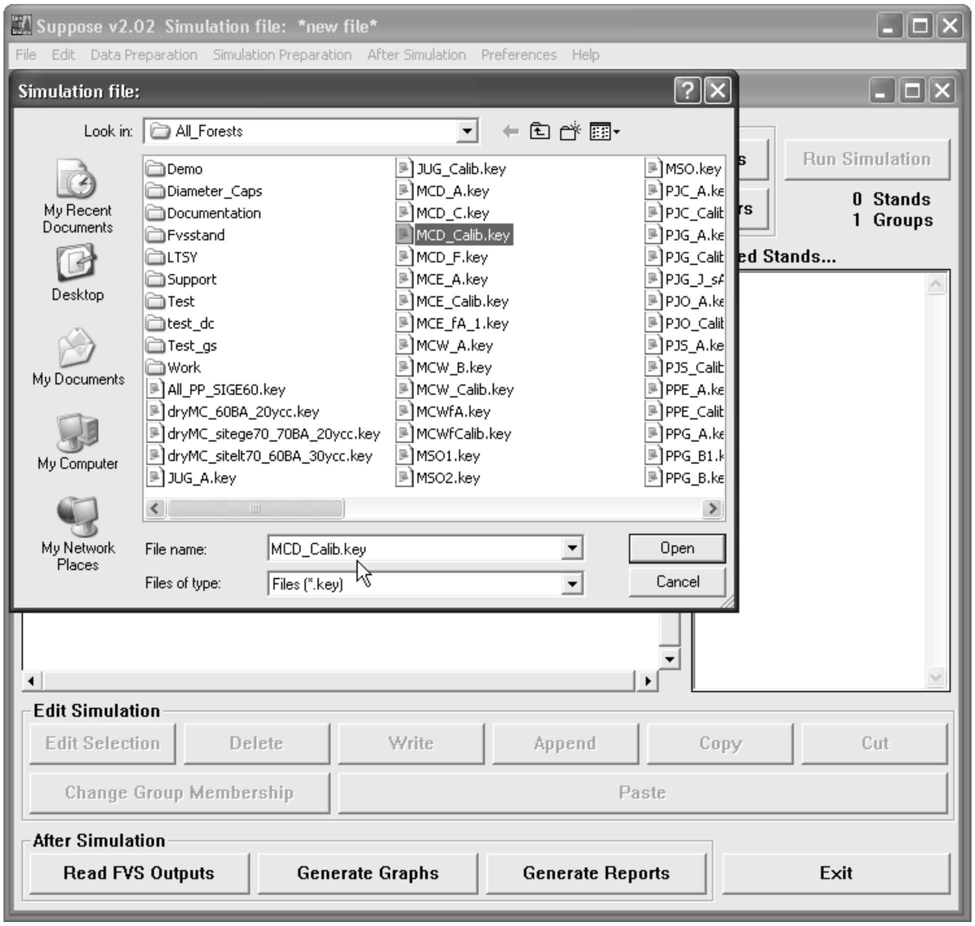




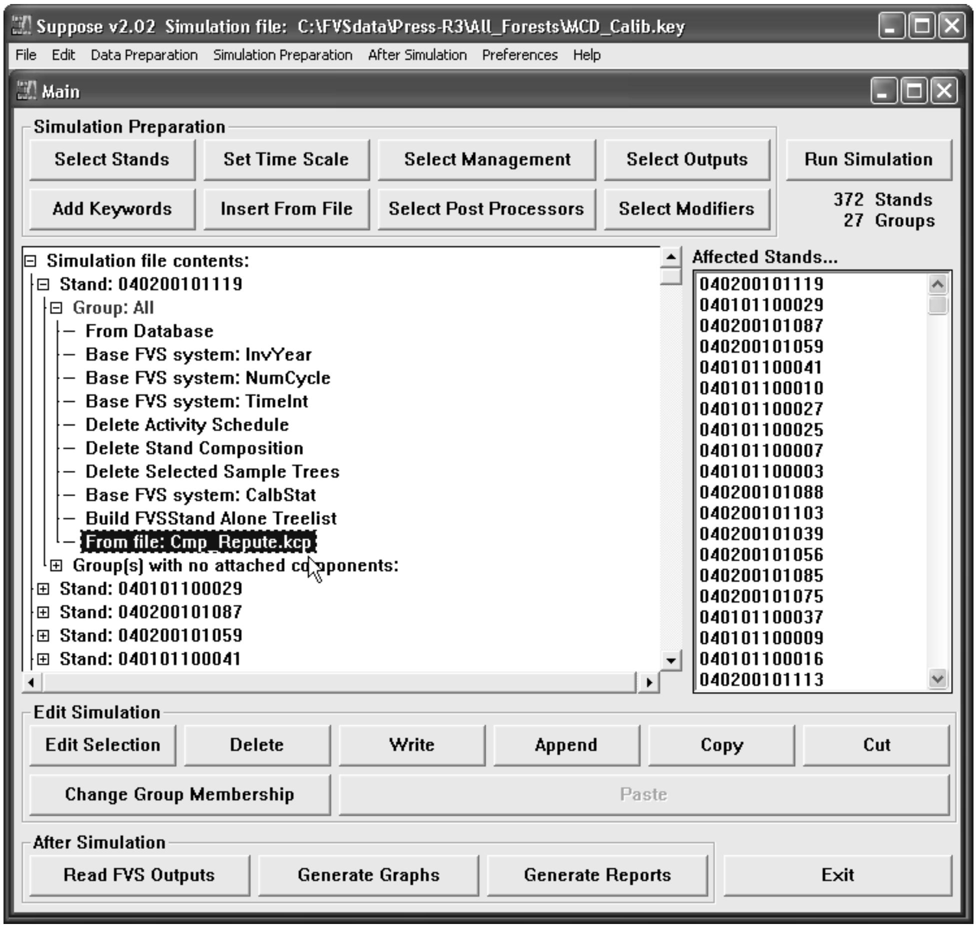
19. Execute the **Suppose** interface. Use the **File/Open** menu option to ***retrieve base adjustment FVS Keyword file***.

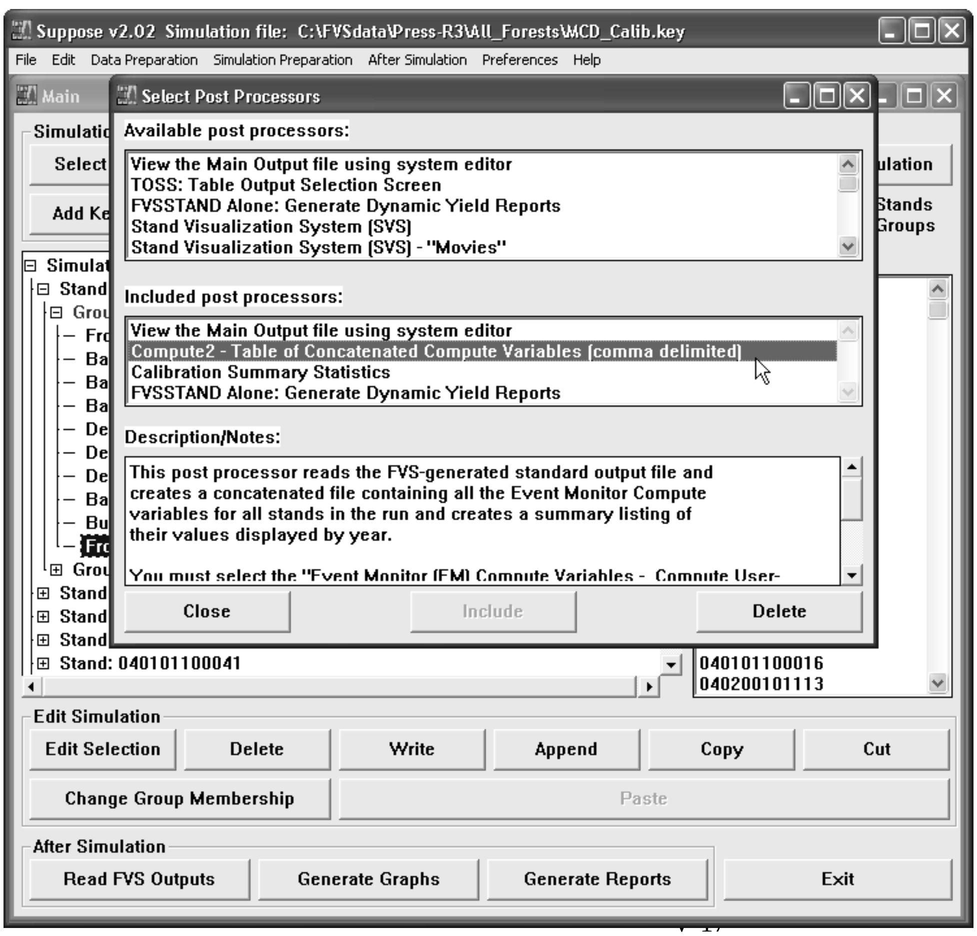
20. Choose the **"Insert From File"** button on the main window of **Suppose**. Locate the **Cmp_Repute.kcp** add-file and include it in the projection.

21. Choose the **"Select Post Processor"** button on the main window of **Suppose**. Locate the ***"Compute2 – Table of Concatenated Variables {comma delimited}"*** program from the list and include it in the projection.

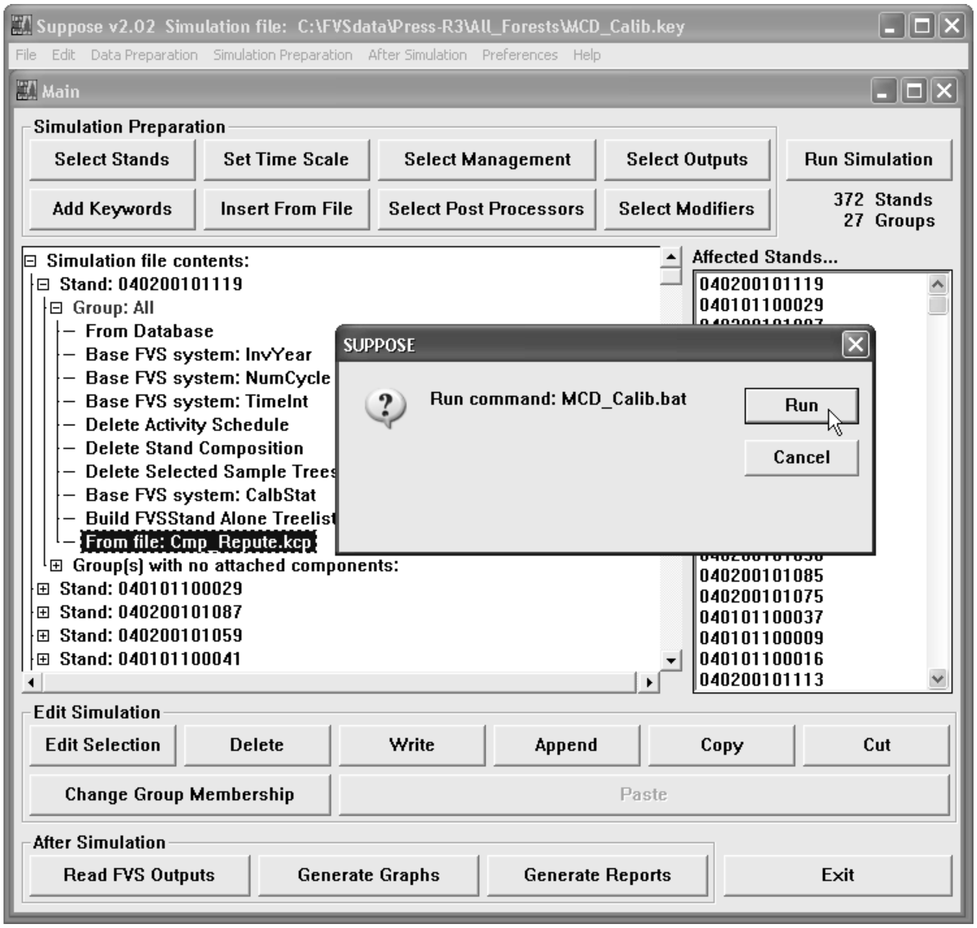

Suppose v2.02 Simulation file: *new file*
File Edit Data Preparation Simulation Preparation After Simulation Preferences Help
Simulation file:
Look in: All_Forests
My Recent Documents
Desktop
My Documents
My Computer
My Network Places
Demo
Diameter_Caps
Documentation
Fvsstand
LTSY
Support
Test
test_dc
Test_gs
Work
All_PP_SIGE60.key
dryMC_60BA_20ycc.key
dryMC_sitege70_70BA_20ycc.key
dryMC_sitelt70_60BA_30ycc.key
JUG_A.key
JUG_Calib.key
MCD_A.key
MCD_C.key
MCD_Calib.key
MCD_F.key
MCE_A.key
MCE_Calib.key
MCE_fA_1.key
MCW_A.key
MCW_B.key
MCW_Calib.key
MCWfA.key
MCWfCalib.key
MSO1.key
MSO2.key
MSO.key
File name: MCD_Calib.key
Files of type: Files (*.key)
Open
Cancel
Run Simulation
0 Stands
1 Groups
Edit Simulation
Edit Selection
Delete
Write
Append
Copy
Cut
Change Group Membership
Paste
After Simulation
Read FVS Outputs
Generate Graphs
Generate Reports
Exit


Suppose v2.02 Simulation file: C:\FVSdata\Press-R3\All_Forests\MCD_Calib.key
File Edit Data Preparation Simulation Preparation After Simulation Preferences Help
Main
Simulation Preparation
Select Stands
Set Time Scale
Select Management
Select Outputs
Run Simulation
Add Keywords
Insert From File
Select Post Processors
Select Modifiers
372 Stands
27 Groups
Group: All
Insert component from file:
Look in: All_Forests
My Recent Documents
Desktop
My Documents
My Computer
My Network Places
Demo
Diameter_Caps
Documentation
Fvsstand
LTSY
Support
Test
test_dc
Test_gs
Work
Add_GS_Rx.kcp
Adj_FuelDecay.kcp
Adj_SnagFall.kcp
ASQ_Cmp_Variables.kcp
ASQ_Dia_Limit.kcp
Cmp_DMR.kcp
Cmp_FVS_Model_Output.kcp
Cmp_Repute.kcp
Cmp_SapDis.kcp
Cmp_SapShdTol.kcp
Cmp_SapTmbWdl.kcp
Cmp_ShdTol.kcp
Cmp_StndMax.kcp
Cmp_Strata.kcp
Cmp_VegSt.kcp
Compress.kcp
Delotab.kcp
DM_Compute.kcp
DM_Compute_bak.kcp
Elk_Adjustment.kcp
Fvsstand.kcp
Grp_Sel.kcp
Grp_Sel_1st.kcp
Grp_Sel_2nd.kcp
Grp_Slct.kcp
InvYr.kcp
JUG_Repute.kcp
File name: Cmp_Repute.kcp
Files of type: Files (*.kcp)
Open
Cancel
Edit Simulation
Edit Selection
Change Group Membership
Paste
After Simulation
Read FVS Outputs
Generate Graphs
Generate Reports
Exit

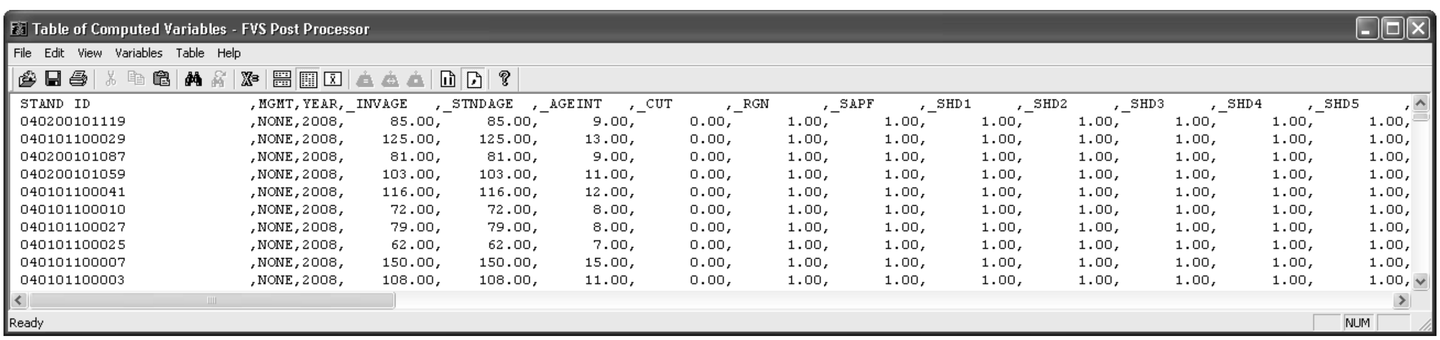

Suppose v2.02 Simulation file: C:\FVSdata\Press-R3\All_Forests\MCD_Calib.key
File Edit Data Preparation Simulation Preparation After Simulation Preferences Help
Main
Simulation Preparation
Select Stands
Set Time Scale
Select Management
Select Outputs
Run Simulation
Add Keywords
Insert From File
Select Post Processors
Select Modifiers
372 Stands
27 Groups
Simulation file contents:
Stand: 040200101119
Group: All
From Database
Base FVS system: InvYear
Base FVS system: NumCycle
Base FVS system: TimeInt
Delete Activity Schedule
Delete Stand Composition
Delete Selected Sample Trees
Base FVS system: CalbStat
Build FVSStand Alone Treelist
From file: Cmp_Repute.kcp
Group(s) with no attached components:
Stand: 040101100029
Stand: 040200101087
Stand: 040200101059
Stand: 040101100041
Affected Stands...
Edit Simulation
Edit Selection
Delete
Write
Append
Copy
Cut
Change Group Membership
Paste
After Simulation
Read FVS Outputs
Generate Graphs
Generate Reports
Exit


Suppose v2.02 Simulation file: C:\FVSdata\Press-R3\All_Forests\MCD_Calib.key
Select Post Processors
Available post processors:
View the Main Output file using system editor
TOSS: Table Output Selection Screen
FVSSTAND Alone: Generate Dynamic Yield Reports
Stand Visualization System (SVS)
Stand Visualization System (SVS) - "Movies"
Included post processors:
View the Main Output file using system editor
Compute2 - Table of Concatenated Compute Variables (comma delimited)
Calibration Summary Statistics
FVSSTAND Alone: Generate Dynamic Yield Reports
Description/Notes:
This post processor reads the FVS-generated standard output file and creates a concatenated file containing all the Event Monitor Compute variables for all stands in the run and creates a summary listing of their values displayed by year.
Close
Include
Delete
Edit Simulation
Edit Selection
Delete
Write
Append
Copy
Cut
Change Group Membership
Paste
After Simulation
Read FVS Outputs
Generate Graphs
Generate Reports
Exit

22. Choose the **“Run Simulation”** button on the main window of **Suppose**. Run the batch file.

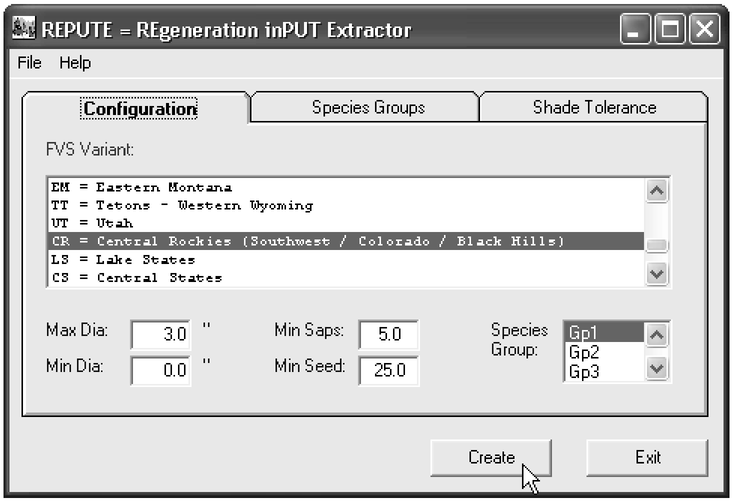


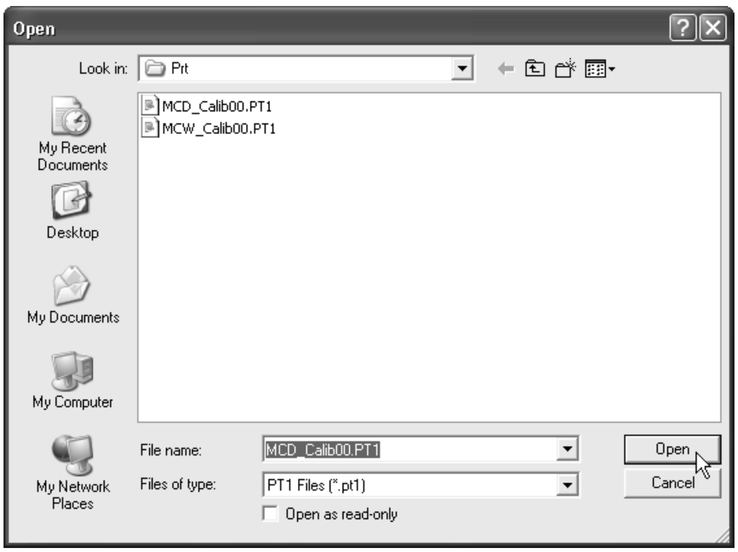
23. The **Compute2 post processor** will produce a text file **report** of **Event Monitor computed variables**. Repute uses these values in its processing and development of the FVS regeneration add-file.



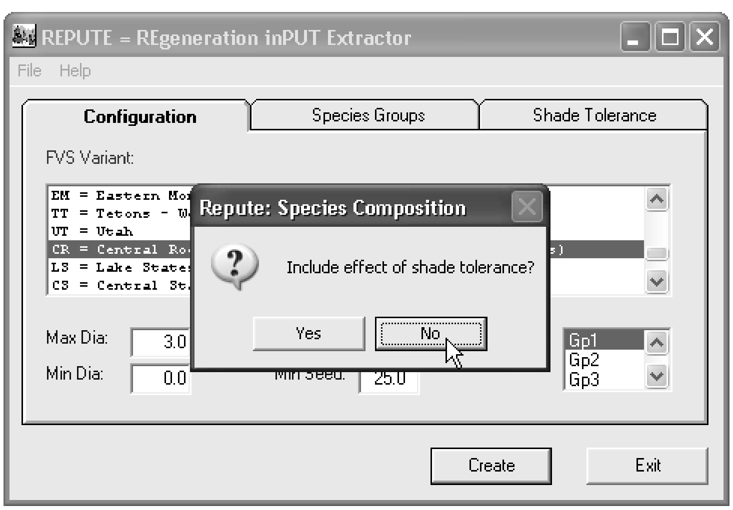
24. At this point, **Repute can be run for each Species Group** that was configured prior. **Execute** the **Repute** program from the Start Menu or from a desktop icon. Choose the **“Create”** button.

25. Repute requires the FVSSTAND print report (i.e. Stand Table) from the ***base adjustment FVS Keyword file*** that is located in the **{Working Drive}\{Working Folder}\Fvsstand\Prt** folder.

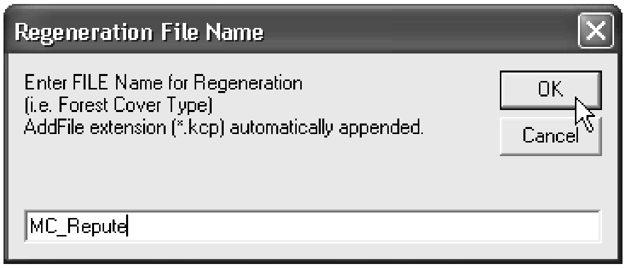




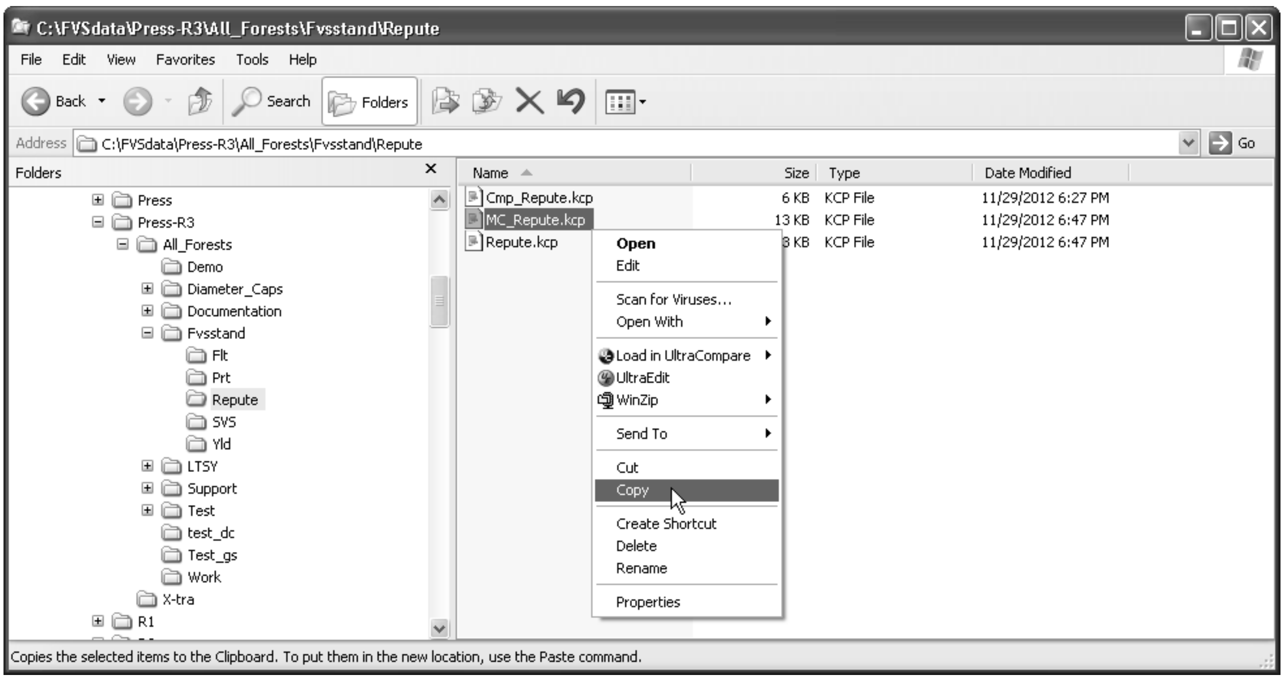
26. A prompt will appear whether to **"Include effects of shade tolerance"**. Generally, in **"Fire Dominated Ecosystem"**, ***choose not to include***. For **"Moisture Driven Ecosystem"**, ***choose to include***.

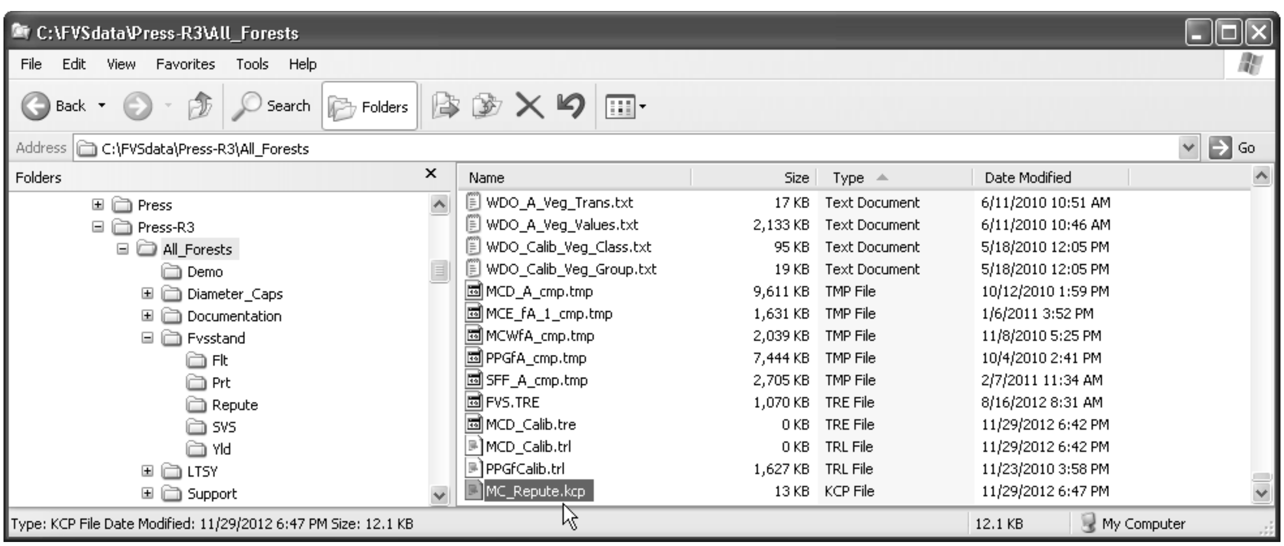


27. Click the **“Finished”** button when prompted.
28. **Name** the **regeneration file** created by Repute.

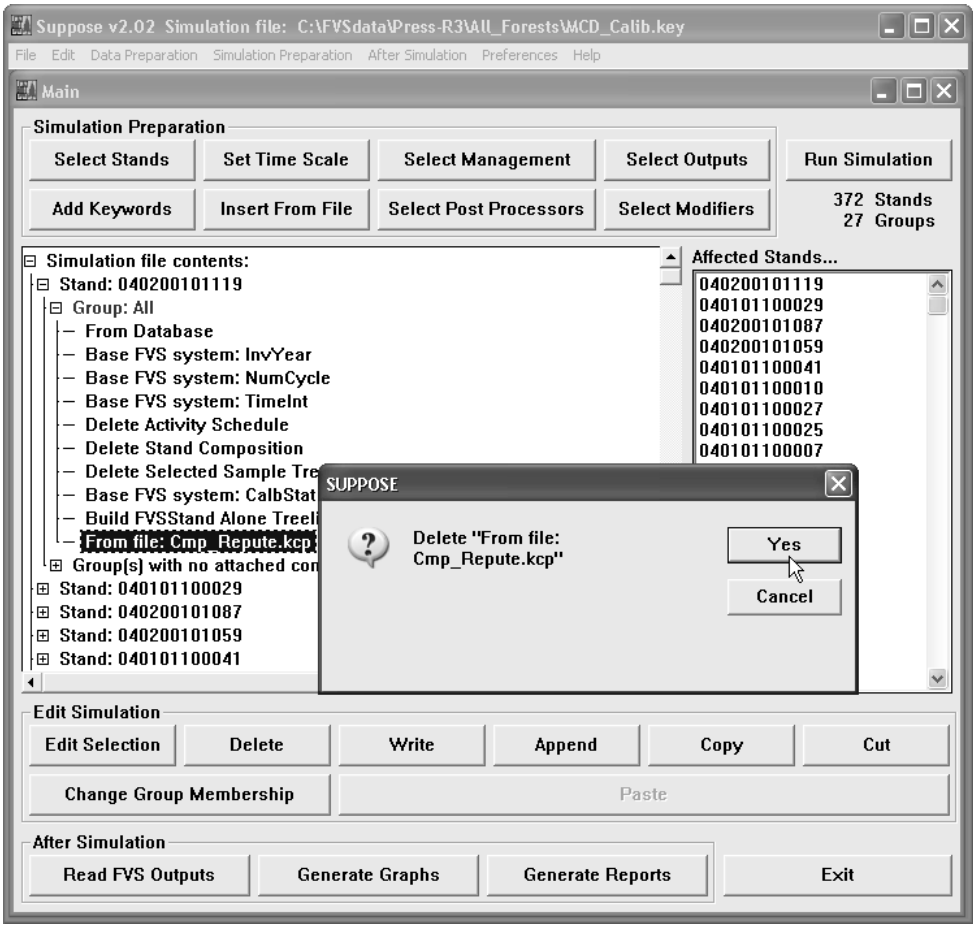


29. **Copy** the **{Strata}_Repute.kcp** file from the **{Working Drive}\{Working Folder}\Fvsstand\Repute** folder to the **{Working Drive}\{Working Folder}** folder as such:



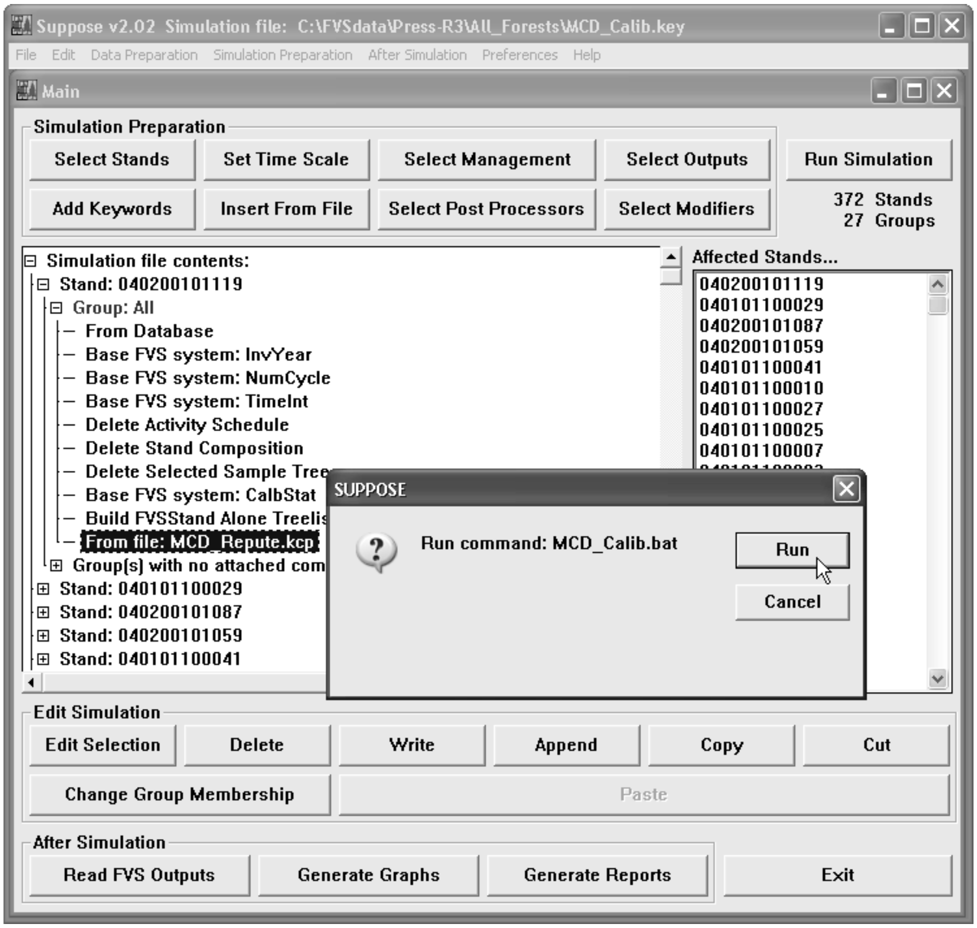


30. **Increase** the **“NumCycle”** entry to the desired number of projection cycles (i.e. 20 = 200 years).
31. **Configure** the **“FVStand Alone Treelist”** entry to output **“Inventory Year and All Cycles”**.
32. **Delete** ***“Cmp_Repute.kcp”*** and **insert** ***{Strata}_Repute.kcp*** file in the projection run as follows:


Suppose v2.02 Simulation file: C:\FVSdata\Press-R3\All_Forests\MCD_Calib.key
File Edit Data Preparation Simulation Preparation After Simulation Preferences Help
Main
Simulation Preparation
Select Stands
Set Time Scale
Select Management
Select Outputs
Run Simulation
Add Keywords
Insert From File
Select Post Processors
Select Modifiers
372 Stands
27 Groups
Simulation file contents:
Stand: 040200101119
Group: All
From Database
Base FVS system: InvYear
Base FVS system: NumCycle
Base FVS system: TimeInt
Delete Activity Schedule
Delete Stand Composition
Base FVS system: CalbStat
From file: Cmp_Repute.kcp
Stand: 040101100029
Stand: 040200101087
Stand: 040200101059
Stand: 040101100041
Affected Stands...
040200101119
040101100029
040200101087
040200101059
040101100041
040101100010
040101100027
040101100025
040101100007
SUPPOSE
Delete "From file: Cmp_Repute.kcp"
Yes
Cancel
Edit Simulation
Edit Selection
Delete
Write
Append
Copy
Cut
Change Group Membership
Paste
After Simulation
Read FVS Outputs
Generate Graphs
Generate Reports
Exit


Suppose v2.02 Simulation file: C:\FVSdata\Press-R3\All_Forests\MCD_Calib.key
File Edit Data Preparation Simulation Preparation After Simulation Preferences Help
Main
Simulation Preparation
Select Stands
Set Time Scale
Select Management
Select Outputs
Run Simulation
Add Keywords
Insert From File
Select Post Processors
Select Modifiers
372 Stands
27 Groups
Group: All
Insert component from file:
Look in: All_Forests
My Recent Documents
Desktop
My Documents
My Computer
My Network Places
JUGfRepute.kcp
JUGfStand_Max.kcp
JUGfTree_Max.kcp
MC_Repute.kcp
MCD_ReAdCorD.kcp
MCD_Repute.kcp
MCD_Repute_Managed.kcp
MCD_Repute_Unmanaged.kcp
MCD_Stand_Max.kcp
MCD_Tree_Max_Annual.kcp
MCD_Tree_Max_Period.kcp
MCDfReAdCorD.kcp
MCDfRepute.kcp
MCDfStand_Max.kcp
MCDfTree_Max.kcp
MCE_Adjustment.kcp
MCQ.kcp
MCW_ReAdCorD.kcp
MCW_Repute.kcp
MCW_Stand_Max.kcp
MCW_Tree_Max_Annual.kcp
MCW_Tree_Max_Period.kcp
MCWfReAdCorD.kcp
MCWfRepute.kcp
MCWfStand_Max.kcp
MCWfTree_Max.kcp
MSO2.kcp
MSO.kcp
Output_MistPref.kcp
Output_SpcPref.kcp
PJC_Repute.kcp
PJCfRepute.kcp
PJG_Repute.kcp
File name: MCD_Repute.kcp
Files of type: Files (*.kcp)
Open
Cancel
Edit Simulation
Edit Selection
Change Group Membership
Paste
After Simulation
Read FVS Outputs
Generate Graphs
Generate Reports
Exit

33. Choose the **"Run Simulation"** button on the main window of **Suppose**. Run the batch file with the Repute FVS regeneration add-file.

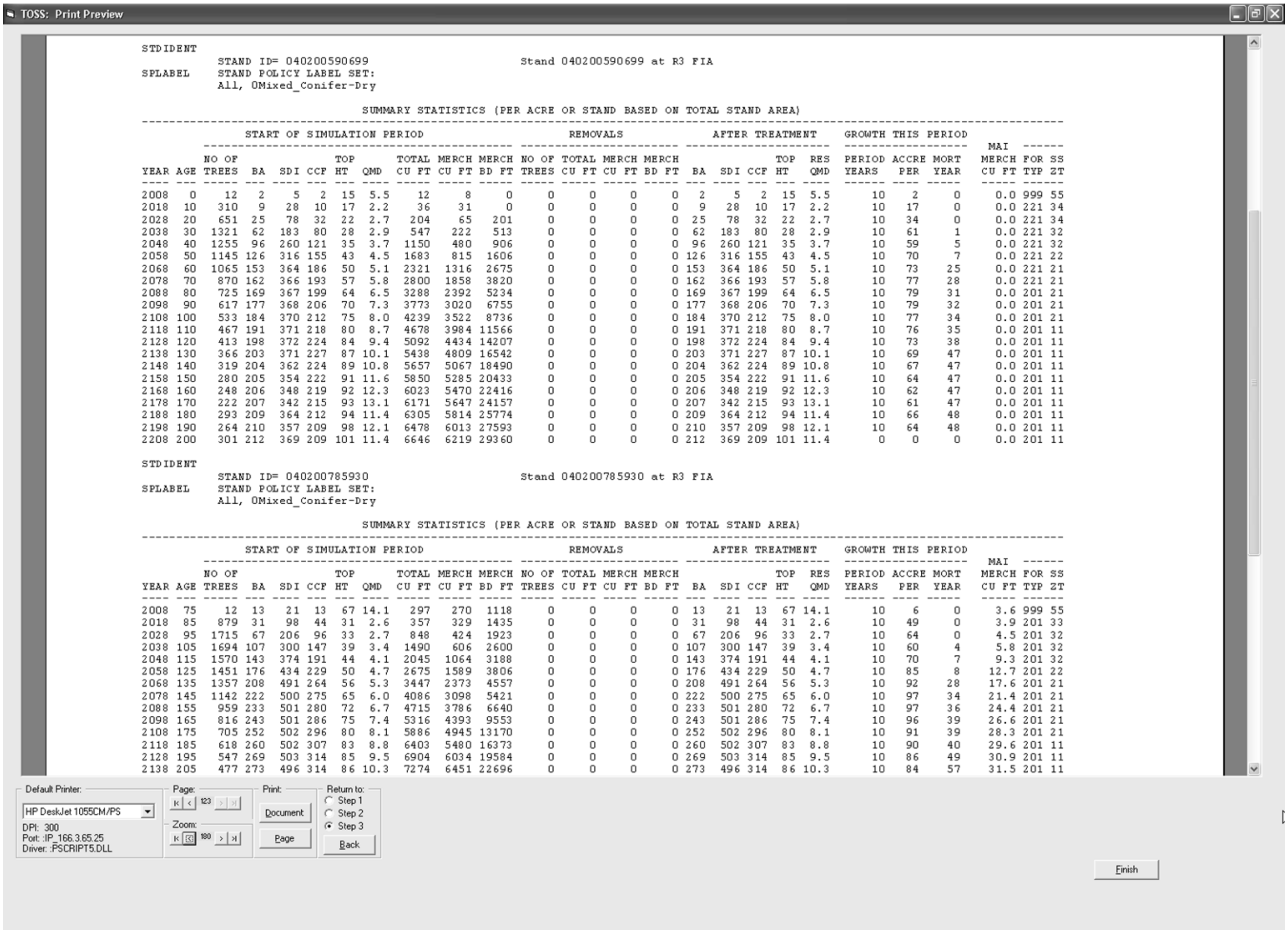


34. Use the Toss post processor to examine the regeneration response as provided by using the Repute Program.

<u>Published reference that documents the Repute process can be found at</u>:

Vandendriesche, D. 2010. An Empirical Approach for Estimating Natural Regeneration for the Forest Vegetation Simulator. In: Jain, Theresa; Graham, Russell T.; and Sandquist, Jonathan, tech. eds. Integrated management of carbon sequestration and biomass utilization opportunities in a changing climate: Proceedings of the 2009 National Silviculture Workshop; 2009 June 15-18; Boise, ID. Proceedings RMRS-P-61. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. P. 307-320.

Web Link: http://www.fs.fed.us/rm/pubs/rmrs_p061/rmrs_p061_307_327.pdf



TOSS: Print Preview

STDIDENT
STAND ID= 040200590699 Stand 040200590699 at R3 FIA
SPLABEL STAND POLICY LABEL SET:
All, 0Mixed_Conifer-Dry

SUMMARY STATISTICS (PER ACRE OR STAND BASED ON TOTAL STAND AREA)

YEAR	AGE	START OF SIMULATION PERIOD: NO OF TREES	BA	SDI	CCF	TOP HT	QMD	TOTAL CU FT	MERCH CU FT	MERCH BD FT	REMOVALS: NO OF TREES	TOTAL CU FT	MERCH CU FT	MERCH BD FT	AFTER TREATMENT: BA	SDI	CCF	TOP HT	RES QMD	GROWTH THIS PERIOD: PERIOD YEARS	ACCRE PER	MORT YEAR	MAI MERCH CU FT	FOR TYP	SS ZT
2008	0	12	2	5	2	15	5.5	12	8	0	0	0	0	0	2	5	2	15	5.5	10	2	0	0.0	999	55
2018	10	310	9	28	10	17	2.2	36	31	0	0	0	0	0	9	28	10	17	2.2	10	17	0	0.0	221	34
2028	20	651	25	78	32	22	2.7	204	65	201	0	0	0	0	25	78	32	22	2.7	10	34	0	0.0	221	34
2038	30	1321	62	183	80	28	2.9	547	222	513	0	0	0	0	62	183	80	28	2.9	10	61	1	0.0	221	32
2048	40	1255	96	260	121	35	3.7	1150	480	906	0	0	0	0	96	260	121	35	3.7	10	59	5	0.0	221	32
2058	50	1145	126	316	155	43	4.5	1683	815	1606	0	0	0	0	126	316	155	43	4.5	10	70	7	0.0	221	22
2068	60	1065	153	364	186	50	5.1	2321	1316	2675	0	0	0	0	153	364	186	50	5.1	10	73	25	0.0	221	21
2078	70	870	162	366	193	57	5.8	2800	1858	3820	0	0	0	0	162	366	193	57	5.8	10	77	28	0.0	221	21
2088	80	725	169	367	199	64	6.5	3288	2392	5234	0	0	0	0	169	367	199	64	6.5	10	79	31	0.0	201	21
2098	90	617	177	368	206	70	7.3	3773	3020	6755	0	0	0	0	177	368	206	70	7.3	10	79	32	0.0	201	21
2108	100	533	184	370	212	75	8.0	4239	3522	8736	0	0	0	0	184	370	212	75	8.0	10	77	34	0.0	201	21
2118	110	467	191	371	218	80	8.7	4678	3984	11566	0	0	0	0	191	371	218	80	8.7	10	76	35	0.0	201	11
2128	120	413	198	372	224	84	9.4	5092	4434	14207	0	0	0	0	198	372	224	84	9.4	10	73	38	0.0	201	11
2138	130	366	203	371	227	87	10.1	5438	4809	16542	0	0	0	0	203	371	227	87	10.1	10	69	47	0.0	201	11
2148	140	319	204	362	224	89	10.8	5657	5067	18490	0	0	0	0	204	362	224	89	10.8	10	67	47	0.0	201	11
2158	150	280	205	354	222	91	11.6	5850	5285	20433	0	0	0	0	205	354	222	91	11.6	10	64	47	0.0	201	11
2168	160	248	206	348	219	92	12.3	6023	5470	22416	0	0	0	0	206	348	219	92	12.3	10	62	47	0.0	201	11
2178	170	222	207	342	215	93	13.1	6171	5647	24157	0	0	0	0	207	342	215	93	13.1	10	61	47	0.0	201	11
2188	180	293	209	364	212	94	11.4	6305	5814	25774	0	0	0	0	209	364	212	94	11.4	10	66	48	0.0	201	11
2198	190	264	210	357	209	98	12.1	6478	6013	27593	0	0	0	0	210	357	209	98	12.1	10	64	48	0.0	201	11
2208	200	301	212	369	209	101	11.4	6646	6219	29360	0	0	0	0	212	369	209	101	11.4	0	0	0	0.0	201	11

STDIDENT
STAND ID= 040200785930 Stand 040200785930 at R3 FIA
SPLABEL STAND POLICY LABEL SET:
All, 0Mixed_Conifer-Dry

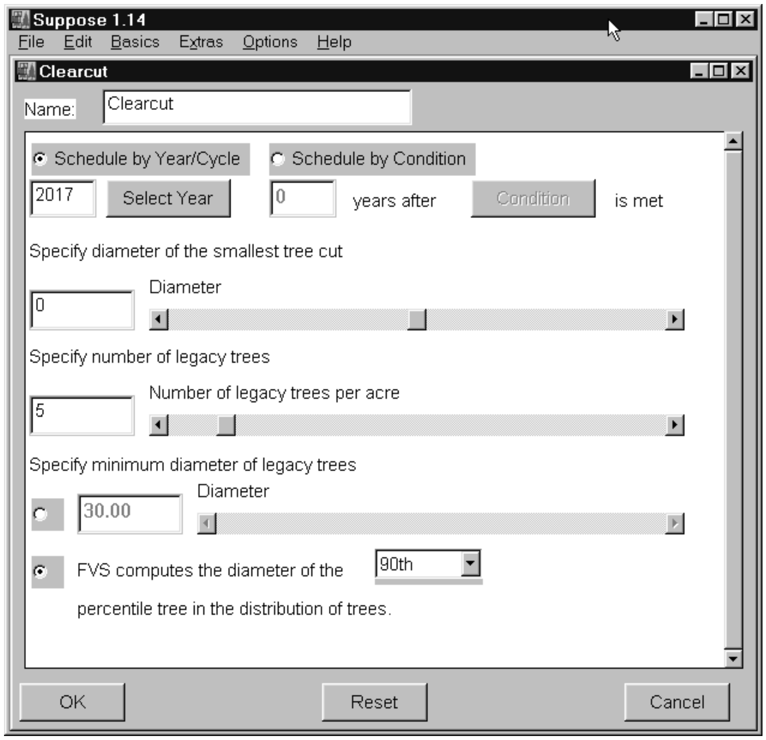
SUMMARY STATISTICS (PER ACRE OR STAND BASED ON TOTAL STAND AREA)

YEAR	AGE	START OF SIMULATION PERIOD: NO OF TREES	BA	SDI	CCF	TOP HT	QMD	TOTAL CU FT	MERCH CU FT	MERCH BD FT	REMOVALS: NO OF TREES	TOTAL CU FT	MERCH CU FT	MERCH BD FT	AFTER TREATMENT: BA	SDI	CCF	TOP HT	RES QMD	GROWTH THIS PERIOD: PERIOD YEARS	ACCRE PER	MORT YEAR	MAI MERCH CU FT	FOR TYP	SS ZT
2008	75	12	13	21	13	67	14.1	297	270	1118	0	0	0	0	13	21	13	67	14.1	10	6	0	3.6	999	55
2018	85	879	31	98	44	31	2.6	357	329	1435	0	0	0	0	31	98	44	31	2.6	10	49	0	3.9	201	33
2028	95	1715	67	206	96	33	2.7	848	424	1923	0	0	0	0	67	206	96	33	2.7	10	64	0	4.5	201	32
2038	105	1694	107	300	147	39	3.4	1490	606	2600	0	0	0	0	107	300	147	39	3.4	10	60	4	5.8	201	32
2048	115	1570	143	374	191	44	4.1	2045	1064	3188	0	0	0	0	143	374	191	44	4.1	10	70	7	9.3	201	32
2058	125	1451	176	434	229	50	4.7	2675	1589	3806	0	0	0	0	176	434	229	50	4.7	10	85	8	12.7	201	22
2068	135	1357	208	491	264	56	5.3	3447	2373	4557	0	0	0	0	208	491	264	56	5.3	10	92	28	17.6	201	21
2078	145	1142	222	500	275	65	6.0	4086	3098	5421	0	0	0	0	222	500	275	65	6.0	10	97	34	21.4	201	21
2088	155	959	233	501	280	72	6.7	4715	3786	6640	0	0	0	0	233	501	280	72	6.7	10	97	36	24.4	201	21
2098	165	816	243	501	286	75	7.4	5316	4393	9553	0	0	0	0	243	501	286	75	7.4	10	96	39	26.6	201	21
2108	175	705	252	502	296	80	8.1	5886	4945	13170	0	0	0	0	252	502	296	80	8.1	10	91	39	28.3	201	21
2118	185	618	260	502	307	83	8.8	6403	5480	16373	0	0	0	0	260	502	307	83	8.8	10	90	40	29.6	201	11
2128	195	547	269	503	314	85	9.5	6904	6034	19584	0	0	0	0	269	503	314	85	9.5	10	86	49	30.9	201	11
2138	205	477	273	496	314	86	10.3	7274	6451	22696	0	0	0	0	273	496	314	86	10.3	10	84	57	31.5	201	11

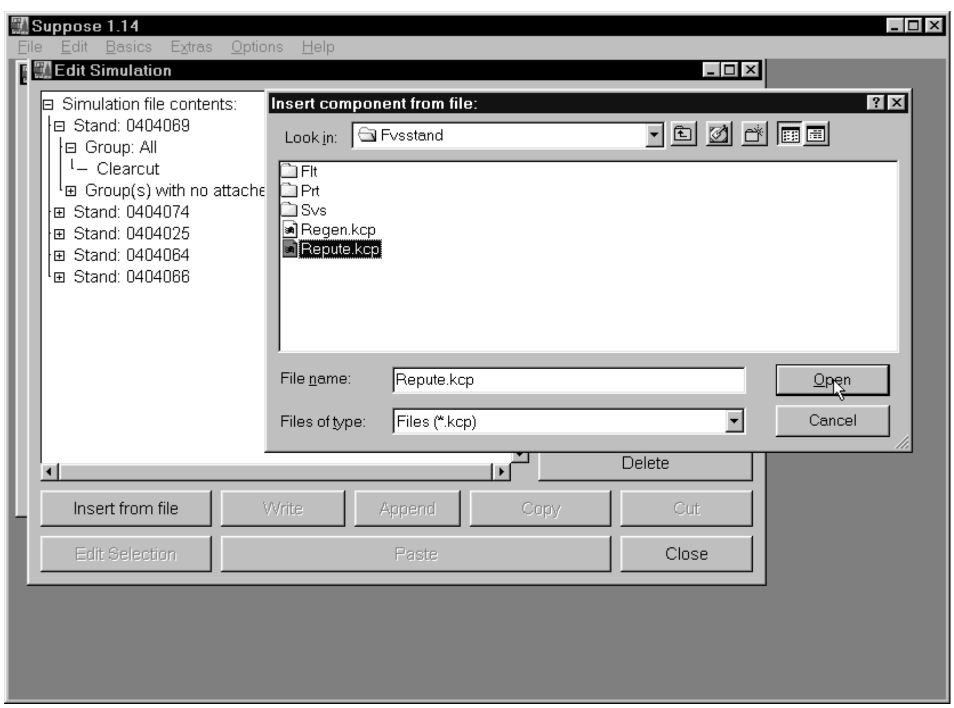
Notes:

Skill Challenge:

Arnie Brownnose has recently been promoted. In an effort to impress his new supervisor, he decides he would like to include the newly created regeneration keyword component file into the Region 6, Timber stands. To bring out their full utility, he use the "Even-aged: Regeneration Harvesting" Management Action, "Clearcut" option with the following parameters:

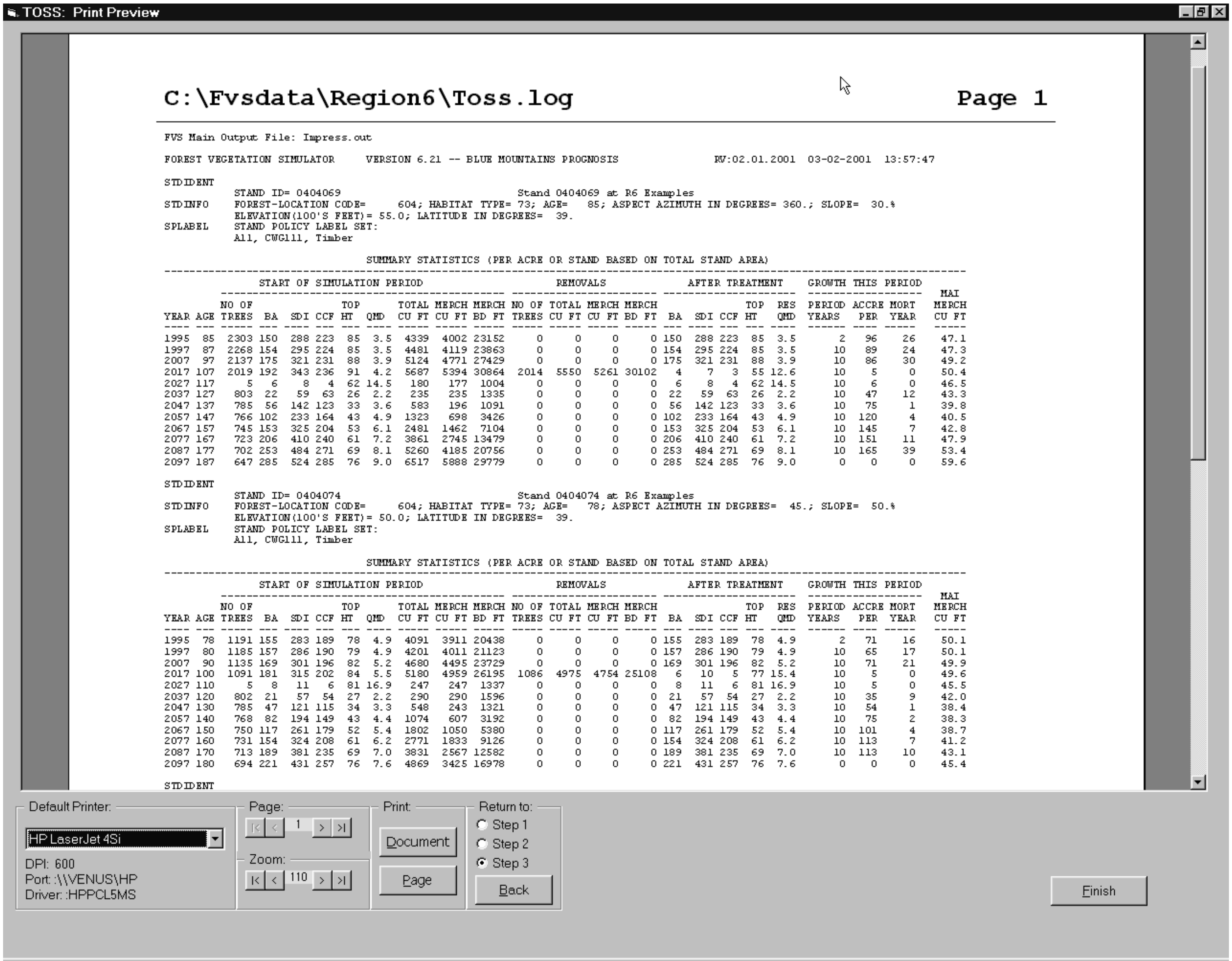


He then proceeds to include the **"Repute.kcp"** from the **C:\Fvsdata\Region6\Fvsstand** folder, using the Edit Simulation command from the main Suppose window.



Include the Main FVS Output File as the Post Processor. Interpret results.

Skill Challenge Solution:



C:\Fvsdata\Region6\Toss.log Page 1

FVS Main Output File: Impress.out

FOREST VEGETATION SIMULATOR VERSION 6.21 -- BLUE MOUNTAINS PROGNOSIS RV:02.01.2001 03-02-2001 13:57:47

STDIDENT
STAND ID= 0404069 Stand 0404069 at R6 Examples
STDINFO FOREST-LOCATION CODE= 604; HABITAT TYPE= 73; AGE= 85; ASPECT AZIMUTH IN DEGREES= 360.; SLOPE= 30.%
ELEVATION(100'S FEET)= 55.0; LATITUDE IN DEGREES= 39.
SPLABEL STAND POLICY LABEL SET:
All, CWG111, Timber

SUMMARY STATISTICS (PER ACRE OR STAND BASED ON TOTAL STAND AREA)

		START OF SIMULATION PERIOD									REMOVALS				AFTER TREATMENT					GROWTH THIS PERIOD			
YEAR	AGE	NO OF TREES	BA	SDI	CCF	TOP HT	QMD	TOTAL CU FT	MERCH CU FT	MERCH BD FT	NO OF TREES	TOTAL CU FT	MERCH CU FT	MERCH BD FT	BA	SDI	CCF	TOP HT	RES QMD	PERIOD YEARS	ACCRE PER	MORT YEAR	MAI MERCH CU FT
1995	85	2303	150	288	223	85	3.5	4339	4002	23152	0	0	0	0	150	288	223	85	3.5	2	96	26	47.1
1997	87	2268	154	295	224	85	3.5	4481	4119	23863	0	0	0	0	154	295	224	85	3.5	10	89	24	47.3
2007	97	2137	175	321	231	88	3.9	5124	4771	27429	0	0	0	0	175	321	231	88	3.9	10	86	30	49.2
2017	107	2019	192	343	236	91	4.2	5687	5394	30864	2014	5550	5261	30102	4	7	3	55	12.6	10	5	0	50.4
2027	117	5	6	8	4	62	14.5	180	177	1004	0	0	0	0	6	8	4	62	14.5	10	6	0	46.5
2037	127	803	22	59	63	26	2.2	235	235	1335	0	0	0	0	22	59	63	26	2.2	10	47	12	43.3
2047	137	785	56	142	123	33	3.6	583	196	1091	0	0	0	0	56	142	123	33	3.6	10	75	1	39.8
2057	147	766	102	233	164	43	4.9	1323	698	3426	0	0	0	0	102	233	164	43	4.9	10	120	4	40.5
2067	157	745	153	325	204	53	6.1	2481	1462	7104	0	0	0	0	153	325	204	53	6.1	10	145	7	42.8
2077	167	723	206	410	240	61	7.2	3861	2745	13479	0	0	0	0	206	410	240	61	7.2	10	151	11	47.9
2087	177	702	253	484	271	69	8.1	5260	4185	20756	0	0	0	0	253	484	271	69	8.1	10	165	39	53.4
2097	187	647	285	524	285	76	9.0	6517	5888	29779	0	0	0	0	285	524	285	76	9.0	0	0	0	59.6

STDIDENT
STAND ID= 0404074 Stand 0404074 at R6 Examples
STDINFO FOREST-LOCATION CODE= 604; HABITAT TYPE= 73; AGE= 78; ASPECT AZIMUTH IN DEGREES= 45.; SLOPE= 50.%
ELEVATION(100'S FEET)= 50.0; LATITUDE IN DEGREES= 39.
SPLABEL STAND POLICY LABEL SET:
All, CWG111, Timber

SUMMARY STATISTICS (PER ACRE OR STAND BASED ON TOTAL STAND AREA)

		START OF SIMULATION PERIOD									REMOVALS				AFTER TREATMENT					GROWTH THIS PERIOD			
YEAR	AGE	NO OF TREES	BA	SDI	CCF	TOP HT	QMD	TOTAL CU FT	MERCH CU FT	MERCH BD FT	NO OF TREES	TOTAL CU FT	MERCH CU FT	MERCH BD FT	BA	SDI	CCF	TOP HT	RES QMD	PERIOD YEARS	ACCRE PER	MORT YEAR	MAI MERCH CU FT
1995	78	1191	155	283	189	78	4.9	4091	3911	20438	0	0	0	0	155	283	189	78	4.9	2	71	16	50.1
1997	80	1185	157	286	190	79	4.9	4201	4011	21123	0	0	0	0	157	286	190	79	4.9	10	65	17	50.1
2007	90	1135	169	301	196	82	5.2	4680	4495	23729	0	0	0	0	169	301	196	82	5.2	10	71	21	49.9
2017	100	1091	181	315	202	84	5.5	5180	4959	26195	1086	4975	4754	25108	6	10	5	77	15.4	10	5	0	49.6
2027	110	5	8	11	6	81	16.9	247	247	1337	0	0	0	0	8	11	6	81	16.9	10	5	0	45.5
2037	120	802	21	57	54	27	2.2	290	290	1596	0	0	0	0	21	57	54	27	2.2	10	35	9	42.0
2047	130	785	47	121	115	34	3.3	548	243	1321	0	0	0	0	47	121	115	34	3.3	10	54	1	38.4
2057	140	768	82	194	149	43	4.4	1074	607	3192	0	0	0	0	82	194	149	43	4.4	10	75	2	38.3
2067	150	750	117	261	179	52	5.4	1802	1050	5380	0	0	0	0	117	261	179	52	5.4	10	101	4	38.7
2077	160	731	154	324	208	61	6.2	2771	1833	9126	0	0	0	0	154	324	208	61	6.2	10	113	7	41.2
2087	170	713	189	381	235	69	7.0	3831	2567	12582	0	0	0	0	189	381	235	69	7.0	10	113	10	43.1
2097	180	694	221	431	257	76	7.6	4869	3425	16978	0	0	0	0	221	431	257	76	7.6	0	0	0	45.4

STDIDENT

Exercise BG: Performing a Bare Ground Plant

Concepts: understanding the steps needed to establish a plantation on bare ground soil.

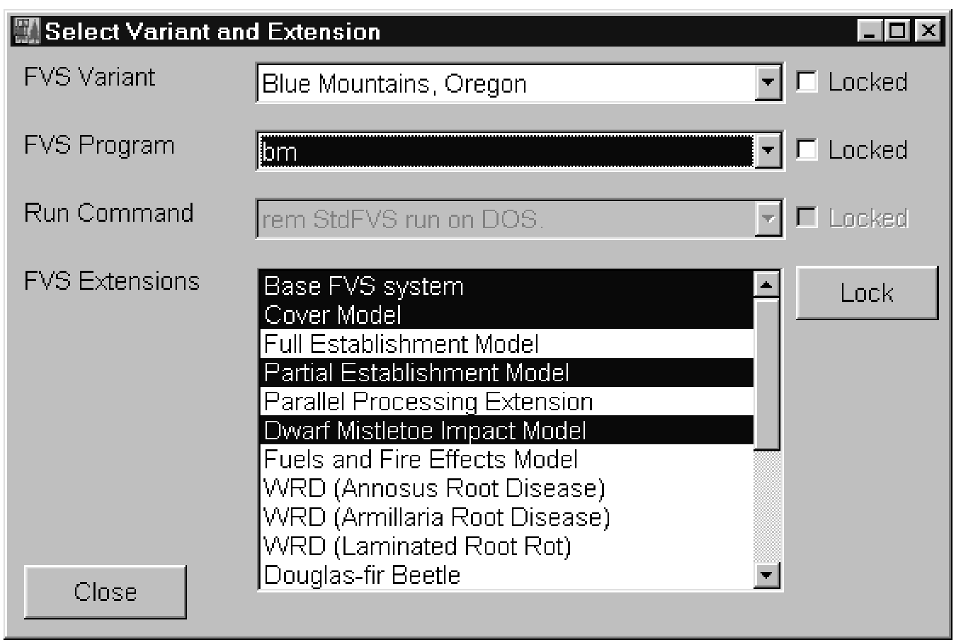
Following natural or human disturbance, there is often times when establishing regeneration on bare ground is needed. In these situations, there is no pre-existing stand to bring into the simulation to project forward. The connection between the Suppose Stand List File and FVS Tree Data File is not obvious. In this exercise, we will cover the steps necessary to originate a stand of trees from scratch.

Step 1. Select the Geographic Variant.

1) Make sure that **no previous simulation** is in memory. If a simulation is in memory, then:
   a) Click on "File" on the menu bar.
   b) Select "New".

If you wish to append a bare ground plant to an existing Suppose.loc file (which is what we will be doing for the class exercise), proceed directly to Steps 2 through 4. If you wish to start your simulation in an entirely new working folder, use the "Options" menu pick from the main Suppose window, select "Edit Locations File", and create a new Suppose.loc file in the preferred directory. Then proceed directly to Steps 2 through 4

2) Click "File" on the Suppose main menu.
3) Click "Open Locations File" and navigate to the Suppose.loc file that you wish to append a bare ground plant.
4) Close "Select Simulations Stands" window.
5) Click "Extras" on the menu bar at the top of the SUPPOSE window to reveal a pull-down menu.
6) Click "Select Variant and Extensions".
7) Select the FVS Geographic Variant that is applicable to your area. In this exercise, pick "Blue Mountains, Oregon" or "bm" Variant using the down arrow next to the pick box window.

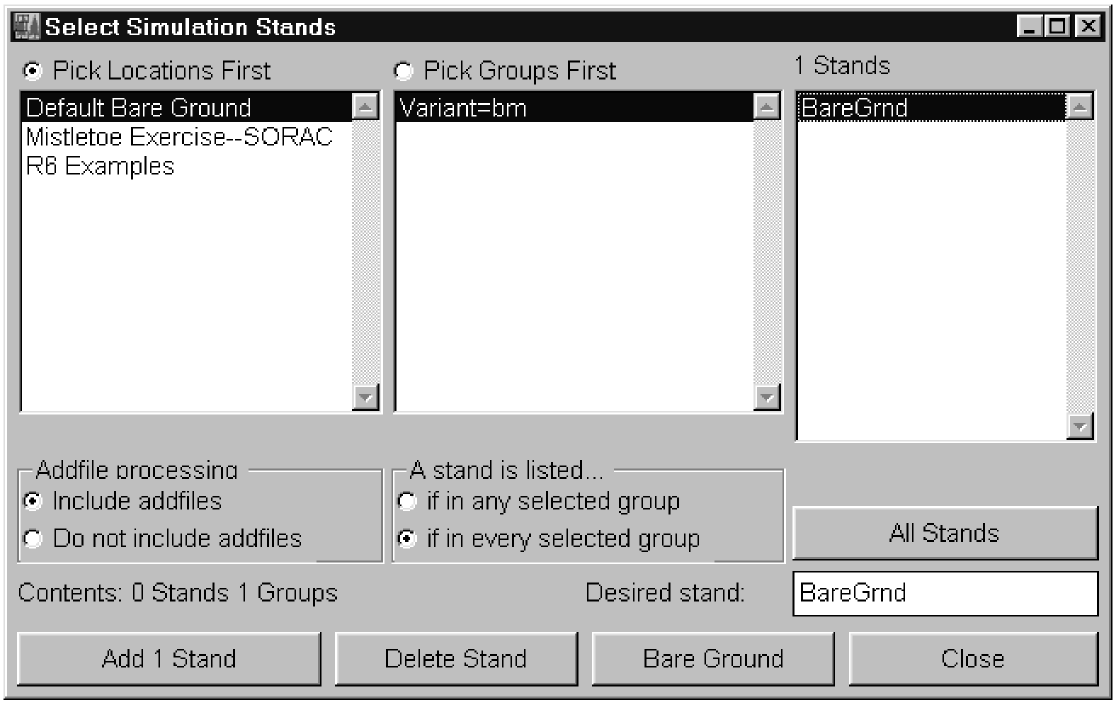


8) Use the "Locked" check box to force all internal Suppose parameters to be set to this Geographic FVS Variant.
9) Click "Close" to close the Select Variant window.

Step 2. Pick Bare Ground Stand.

10) From the main Suppose window, click the "Select Simulation Stands" command button.

11) ***IMPORTANT***- Click the "Bare Ground" command button located at the bottom right corner of the Select Simulation Stands window. This action will create or append a "baregrnd.slf" (Stand List File) in the default working folder specified by Suppose. Note, the left windowpane will be labeled: "Default Bare Ground".
12) Click the "Default Bare Ground" location entry in the left windowpane. Notice the group assignment of "Variant=bm" appears in the middle window pane.
13) Click the "Variant=bm" group. Notice the stand listed as "BareGrnd" appears in the right windowpane of the Select Simulation Stands window.
14) Select the "BareGrnd" stand.
15) Add bare ground stand into simulation via the "Add Stand(s)" command button located at the lower left corner of the Select Simulation Stands window.
16) "Close" via the close command button.



Step 3. Plant Bare Ground Site.

17) Choose "Management Actions" from the main Suppose window.
18) Select the "Plant & Natural Regeneration" option from the Management Actions window.
19) Click the "Plant/Natural with Full Estab Model" choice from the right text box.

Stand regeneration objective are to plant equal quantities of Western White Pine, Ponderosa Pine, and Western Larch to establish 525 trees per acre, or 175 tree per species per acre. Let's assume 100 percent survival and take default values for age and height with uniform distribution.

20) Click the down arrow next to the "Species" pick box.
21) Choose "White Pine" from the species list.
22) Enter "175" seedlings in the "Trees/acre" text box.

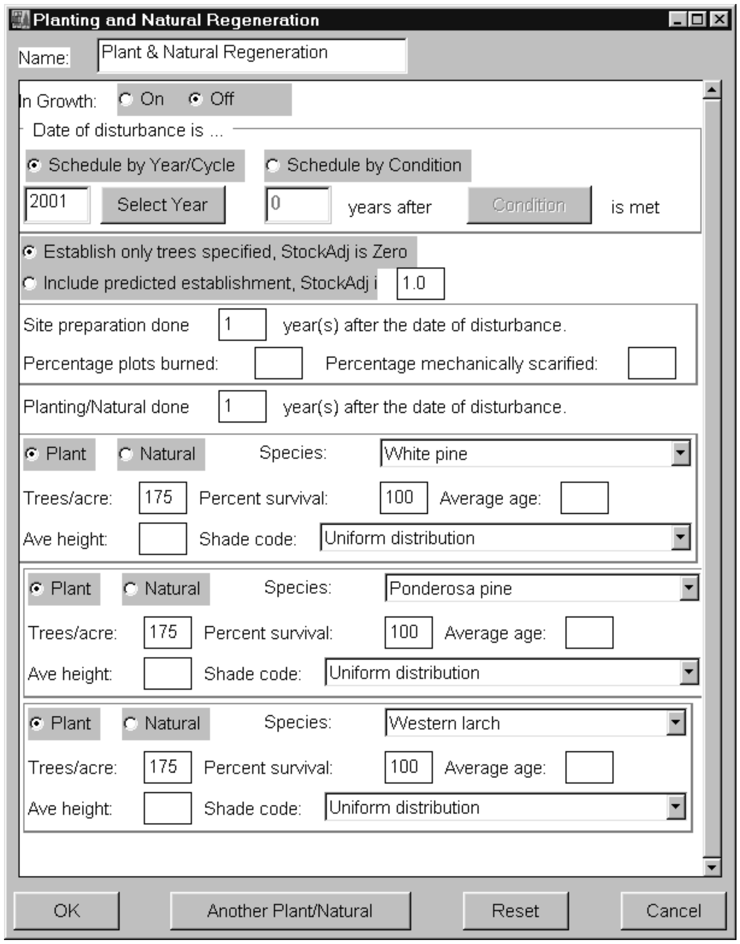
At this point, it helps to have maximized, the main Suppose window. It is also beneficial to pull down the button frame of the Planting and Natural Regeneration window to be able to see successive species plantings.

23) Click the "Another Plant/Natural" command button at the bottom of the Regeneration window.
24) Choose "Ponderosa Pine" from the species list.
25) Enter "175" seedlings in the "Trees/acre" text box.

26) Repeat the process for "Western Larch".
27) Press the "OK" command button to close the regeneration window.
28) Press the "Close" command button to close the Management Action window.

What is the process to double check that the simulation is set up the way that you wanted, prior to running the key file?

29) From the main SUPPOSE window, select "Edit Simulation File" command button.
30) Highlight, by clicking, the Plant & Natural Regeneration text line below the "Group: All" designation.
31) Click the "Edit Selection" command button at the bottom of the Edit Simulation window.
32) Pull down the button of the "Edit – Plant & Natural Regeneration" window to review input data.
33) Click "OK" to close the edit regeneration window.
34) Click "Close" to close the Edit Simulation window".



Step 4. Run Simulation and Check Results.

35) Choose "Select Post Processors" from the main Suppose window.
36) Select "View the Main Output File using system editor".
37) Close via "Close" command button.
38) Choose "Run Simulation" from the main Suppose window.
39) File Name: "exbg.key".
40) Save via "Save" command button.
41) Run simulation via "Run" command button.

Review the Main FVS Output File and answer the follow questions.

In which year were the seedlings planted? _______________

In which year were the seedlings reported according to the Main Output File? _______________

Which table(s) did you use to find this tidbit? _______________

What is the average height of the Western Larch in the "Fall of 2010? _______________

What steps would be required to introduce site factors (plant association, slope, aspect, elevation, site index species, site index, group codes, etc.) into this simulation? Hint: It has something to do with the Stand List File.

____

How would you produce a stand visualization of this plantation? Go for it!!!

Topic HSS: **Computing Habitat Structural Stages**

Concepts: develop keyword component file that depicts habitat structural stages using features from the Event Monitor.

The following example is taken from a recent effort to describe structure stages for the Phase I Amendment of the Revised Land and Resource Management Plan for the Black Hills National Forest. Monitoring Goshawk habitat was an integral requirement of the plan amendment. A balance of structural stages as prescribed by Reynolds, et al, in the "Management Recommendations for the Northern Goshawk in the Southwestern United States" was to be applied to the Black Hills National Forest in South Dakota. For Region 3, Arizona and New Mexico, stand development has been classified via six 'Vegetative Structural Stages' (VSS). A FVS Post Processor exists to compute R3-VSS. Region 2, Interior Rocky Mountains including the Black Hills, identifies five size class divisions in their coding of 'Habitat Structural Stages'. No FVS Post Processor exists for this classification scheme. Unfortunately, R3 VSS classification system could not be correlated to R2. Hence, the need for a keyword component file arose.

Region 3 – Vegetation Structural Stages

Region 3

Code	Structural Stage	Canopy Closure	Stories
1	Grass-forb/shrub		
2A	Seedling/sapling	open	
2B	Seedling/sapling	moderate	
2C	Seedling/sapling	closed	
3ASS	Young forest	open	single
3AMS	Young forest	open	multiple
3BSS	Young forest	moderate	single
3BMS	Young forest	moderate	multiple
3CSS	Young forest	closed	single
3CMS	Young forest	closed	multiple
4ASS	Mid-aged forest	open	single
4AMS	Mid-aged forest	open	multiple
4BSS	Mid-aged forest	moderate	single
4BMS	Mid-aged forest	moderate	multiple
4CSS	Mid-aged forest	closed	single
4CMS	Mid-aged forest	closed	multiple
5ASS	Mature forest	open	single
5AMS	Mature forest	open	multiple
5BSS	Mature forest	moderate	single
5BMS	Mature forest	moderate	multiple
5CSS	Mature forest	closed	single
5CMS	Mature forest	closed	multiple
6BSS	Old-growth	moderate	single
6BMS	Old-growth	moderate	multiple
6CSS	Old-growth	closed	single
6CMS	Old-growth	closed	multiple

September 14, 1994 RMRIS Data Dictionary

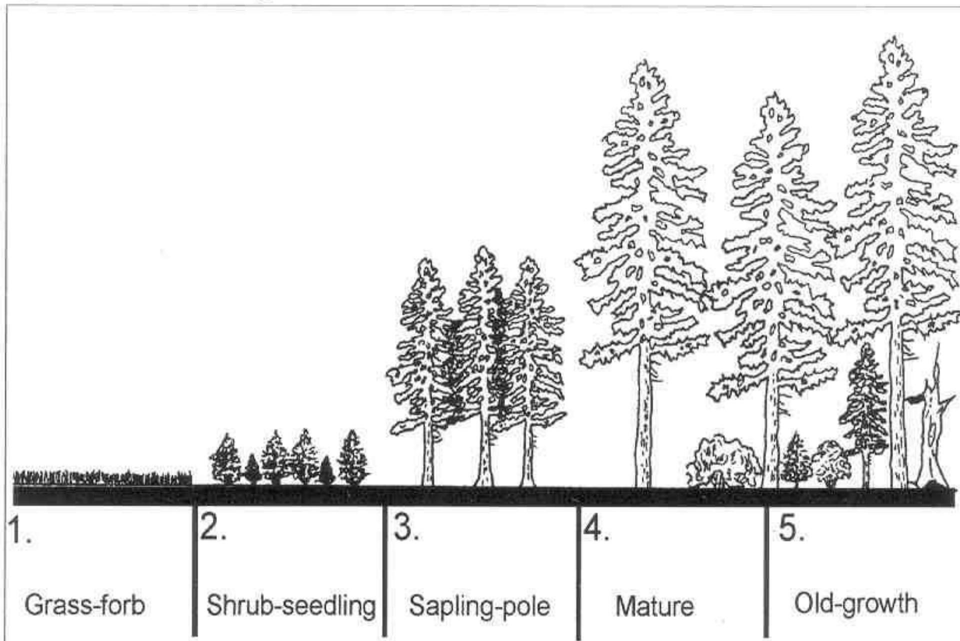
Region 2 – Habitat Structural Stages

Regions 2

Code	Description: Structural Stage	Tree Size Class	Diameter Range for Most Trees	Crown Cover %
1	Grass-Forb	Nonstocked		0-10
2	Shrub-Seedling (shrubs or trees)	Established	Less than 1 inch	11-100
3a	Sapling-Pole	Small, medium	Trees mostly 1-9 inches	11-40
3b				41-70
3c				71-100
4a	Mature	Large, very large	Trees mostly 9 inches and larger	11-40
4b				41-70
4c				71-100
5	Old Growth*	Large, very large	varies	

* Old growth is generally based on an ocular or calculated score card. Old growth candidates are based on photo interpretation and may be selected based the very large tree size or large with the presence of declining crowns.

Figure B-2. Structural Stages



Source: Managing Forested Lands for Wildlife, Hoover, R.L. and Wills, D.L. eds. Denver: Colorado Division of Wildlife; 1987. Reprinted with permission.

The following definitions and assumptions were used in estimating structural stages:

Structural Stage 1: The grass/forb stage was historically a product of fires, windthrow or similar disturbances. Under forest management, this stage can be created through harvesting. This stage is dominated by grasses and forbs lasting until tree seedlings become established.

The grass/forb structural stage can be created through timber management via clearcuts, patch cuts, fire-simulation treatments, hardwood conversions and meadow conversions.

Structural Stage 2: The shrub/seedling stage consists of shrubs such as chokecherry, rose and serviceberry along with ponderosa pine seedlings. A stand remains in Stage 2 until the pine seedlings reach one inch diameter at breast height (DBH), which should take less than a decade.

Structural Stage 2 may result from the succession of a grass/forb stage or through an overstory removal in an area with established seedlings.

Structural Stage 3: The sapling/pole stage consists of trees with stems one to nine inches DBH. This stage typically persists up to 30 years. Natural sapling/pole stands tend to be dense, normally exceeding 70 percent canopy cover (i.e. Stage 3C). Naturally open stands, though less common, do occur. The understory herbaceous and shrub productivity is dependent on the category of canopy closure (i.e. A, B or C). Less than 40 percent canopy closure is 3A; 40 to less than 70 percent canopy closures is 3B; and greater than 70 percent canopy closure is 3C. Understory production is inversely related to overstory pine canopy cover.

This stage develops from Structural Stage 2 or can be produced by an overstory removal from stands with a sapling/pole understory. Stages 3A and 3B are typically a result of precommercial thinning that releases stands to grow into large size classes. Dense pole stands (i.e. 3C) will reach a threshold and stagnate unless disturbed by harvest, fire, insects, etc.

Structural Stage 4: For the purposes of HABCAP modeling, the mature stage begins when trees reach the 9-inch DBH class. Trees remain in this stage until they are about 160 years old. As with Structural Stage 3, understory productivity depends upon the overstory canopy cover. The sizes of trees in this stage will vary depending upon growing-site potential and the density of the stand.

This structural stage yields the preponderance of the commercial timber in the Black Hills. Stage 4A is a result of seed-tree cuts, seed cuts or commercial thinning.

Structural Stage 5: This is the late successional structural stage. Trees are at least 160 years in age; ponderosa pine that reach this age are commonly referred to as "yellow barks." The HABCAP model treats late succession as dense stands. In reality, late succession ponderosa pine may also grow in the open or in "park-like" stands (Mehl 1992).

Late succession is not typically considered a by-product of management. However, in the disturbance-dominated ecosystem of the Black Hills, conifer stands were typically affected by fire and/or insects. Dense stands often were thinned by disturbance during maturation, allowing trees to reach large sizes. Large old trees that were scattered across the Black Hills were survivors of disturbances that eliminated adjacent trees in the same age classes. Some thinning treatments, typically precommercial, may provide desired late successional structural characteristics, because some of the effects of fire and insects have been suppressed by forest management.

Region 2 – Old Growth Habitat Scorecard

OLD GROWTH HABITAT SCORECARD

Timber Type ______ Compartment ______ Stand ______ Date ______

District ______ ¼ Section + Sec. ______ RIS Site ______ Examiner ______

Forest ______ Township & Range ______ Numeric Rating ______ + Old Growth Condition ______

	5	4	3	2	1
A. Overstory	3 or more species. Spruce and/or Fir >50% ____	3 or more species Spruce and/or Fir <50% ____	2 species Spruce and/or Fir >50% ____	2 species Spruce and/or Fir <50% ____	1 specie 100% ____
B. Midstory	3 or more species Spruce and/or Fir >50% ____	3 or more species Spruce and/or Fir <50% ____	2 species Spruce and/or Fir >50% ____	2 species Spruce and/or Fir <50% ____	1 specie 100% ____
C. Understory	3 or more species Spruce and/or Fir >50% ____	3 or more species Spruce and/or Fir <50% ____	2 species Spruce and/or Fir >50% ____	2 species Spruce and/or Fir <50% ____	1 specie 100% ____
D. Total Canopy Cover	70% + ____	70-50% ____	50-30% ____	30-10% ____	<10% ____
E. Overstory, Canopy Cover	50-30% ____	70-50% or 30-10% ____	100-70% or 10-1% ____		
F. Midstory Canopy Cover	40-20% ____	70-40% or 20-10% ____	100-70% or 10-1% ____		
G. Overstory Ave. DBH (Live)	16" + ____	15" - 13" ____	12" - 10" ____	9" - 7" ____	<7" ____
H. Midstory Ave. DBH (Live)	9" + ____	8" - 6" ____	5" - 3" ____	<3" ____	
I. Standing Snags Ave. DBH (Record only those snags above 6' in height)	16" + ____	15" - 13" ____	12" - 10" ____	9" - 7" ____	
J. Standing Snags #/Acre (Record only those snags above 6' in height and 7" DBH))	6 + ____	6 - 4 ____	3 - 1 ____		
K. Dead. Down Logs Ave. DBH	16" + ____	15" - 13" ____	12" - 10" ____	9" - 7" ____	
L. Dead. Down Logs #/Acre (Record only those above 7" DBH)	12 + ____	12 - 6 ____	6 - 2 ____		
Column Totals	____	____	____	____	____

Region 2 – Old Growth Rating Values

Rating Value

Numeric	Old Growth Condition
46 - 60 45 - 38 37 - 28 27 - 18 17 - 0	Adjective rating value, i.e., high, moderate, low, none, etc., to be developed locally as needed.

Other Habitat Characteristics which Complement an Old Growth Stand.

Recorded, but not rated.

A. Average Sight Distance @ 360°
- ____ <125'
- ____ 125' - 200'
- ____ 200' +

B. Presence of Water
- ____ Perennial within Stand
- ____ Intermittent Surface Water Present
- ____ Perennial within ¼ Mile of Stand Boundary

C. General Stand Condition
- ____ Decadent
- ____ Late Old Growth Stage
- ____ Early Old Growth Stage
- ____ Mature Sawtimber
- ____ Other (Seed-Sap, Post-Pole, Etc.)

D. Acreage of Stand ____

E. Other tree species which constitute less than 10% of the total trees per acre. (Not rated on Scorecard.)

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F. Remarks/Recommendations: ______________________________

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Black Hills Habitat Structural Stage Keyword Component File

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*******************************************************************************
*   HSS.kcp
*      - Compute Habitat Estimated Structural Stage (_CHESS)
*           Stage       Tree Size                 Diameter       Canopy Cover
*            1           Grass/Forb                                  0-10%
*            2           Shrub/Seedling               <1"            11-100%
*            3A          Poles/Saplings - low        1-9"            11-40%
*            3B          Poles/Saplings - med.       1-9"            41-70%
*            3C          Poles/Saplings - high       1-9"            71-100%
*            4A          Mature - low                 >9"            11-40%
*            4B          Mature - med.                >9"            41-70%
*            4C          Mature - high                >9"            71-100%
*            5           Old Growth                   >9"            11-100%
*******************************************************************************
DelOTab            1
DelOTab            2

* Track Stand Age
COMPUTE            0
_STAGE = AGE
END

* Determine Computed Habitat Estimated Structural Stage (_CHESS)
COMPUTE            0
_TPA0=SpMcDBH(1,All,0,0.00,999.00,0.0,500.0,0)
_BA0=SpMcDBH(2,All,0,0.00,999.00,0.0,500.0,0)
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_BA1=SpMcDBH(2,All,0,1.00,999.00,0.0,500.0,0)
_BA5=SpMcDBH(2,All,0,5.00,999.00,0.0,500.0,0)
_BA9=SpMcDBH(2,All,0,9.00,999.00,0.0,500.0,0)
_BA16=SpMcDBH(2,All,0,16.00,999.00,0.0,500.0,0)
_BA1t5=SpMcDBH(2,All,0,1.00,5.00,0.0,500.0,0)
_BA5t9=SpMcDBH(2,All,0,5.00,9.00,0.0,500.0,0)
_QMD=SpMcDBH(5,All,0,1.00,999.00,0.0,500.0,0)
_BARAT=0
_TPAMAX=0
_TPAMIN=300
_BAMAX=0
_BAMIN=0
_CanCov0=SpMcDBH(7,All,0,0.00,999.00,0.0,500.0,0)
_CanCov2=SpMcDBH(7,All,0,0.00,1.00,0.0,500.0,0)
_CanCov3=SpMcDBH(7,All,0,1.00,9.00,0.0,500.0,0)
_CanCov4=SpMcDBH(7,All,0,9.00,999.00,0.0,500.0,0)
*_HSS1=MaxIndex(_CanCov2,_CanCov3,_CanCov4)+1
_PHS=0
END

IF                 0
_PHS EQ 0
THEN
COMPUTE
_PHS=_PHS+1
END
AGPLABEL
   All
ENDIF

IF                 0
_PHS EQ 1 AND _BA9 GT 0
THEN
COMPUTE
_BARAT=_BA16/_BA9
_PHS=_PHS+1
END
AGPLABEL
   All
ENDIF

IF                 0
_PHS EQ 1 AND _QMD GT 0
THEN
COMPUTE
_TPAMAX=18641.0/(_QMD**1.659925)
_BAMAX=101.67*(_QMD**0.34007)
_BAMIN=_BAMAX*0.10
_PHS=_PHS+1
END
AGPLABEL
   All
ENDIF

IF                 0
_PHS EQ 2 AND _BAMIN LT 20
THEN
COMPUTE
_BAMIN=20
_PHS=_PHS+1
END
AGPLABEL
   All
ENDIF

*Tree Size Class = Very Large
IF                 0
_PHS EQ 3 AND _BA5 GE _BAMIN AND _BA5 GE _BA1t5 AND &
_BA9 GT 0 AND _BA9 GE _BA5t9 AND _BARAT GT 0.50
THEN
COMPUTE
_TSC=6
_PHS=_PHS+1
END
AGPLABEL
   All
ENDIF

*Tree Size Class = Large
IF                 0
_PHS EQ 3 AND _BA5 GE _BAMIN AND _BA5 GE _BA1t5 AND &
_BA9 GT 0 AND _BA9 GE _BA5t9 AND _BARAT LE 0.50
THEN
COMPUTE
_TSC=5
_PHS=_PHS+1
END
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AGPLABEL
   All
ENDIF

*Tree Size Class = Medium
IF                  0
_PHS EQ 3 AND _BA5 GE _BAMIN AND _BA5 GE _BA1t5 AND &
_BA9 LT _BA5t9
THEN
COMPUTE
_TSC=4
_PHS=_PHS+1
END
AGPLABEL
   All
ENDIF

*Tree Size Class = Small
IF                  0
_PHS EQ 3 AND _BA5 GE _BAMIN AND _BA5 LT _BA1t5
THEN
COMPUTE
_TSC=3
_PHS=_PHS+1
END
AGPLABEL
   All
ENDIF

*Tree Size Class = Established Seedlings
IF                  0
_PHS EQ 3 AND _BA5 LT _BAMIN AND _TPA0 GE _TPAMIN
THEN
COMPUTE
_TSC=2
_PHS=_PHS+1
END
AGPLABEL
   All
ENDIF

*Habitat Structural Stage - Mature (Code 4)
IF                  0
_PHS EQ 4 AND (_TSC EQ 5 OR _TSC EQ 6)
THEN
COMPUTE
_HSS1=4
_HSS2=LinInt(_CanCov0,0,40,40,70,70,100,1,1,2,2,3,3)
_CHESS=_HSS1*10+_HSS2
_PHS=_PHS+1
END
AGPLABEL
   All
ENDIF

*Habitat Structural Stage - Poles/Saplings (Code 3)
IF                  0
_PHS EQ 4 AND (_TSC EQ 3 OR _TSC EQ 4)
THEN
COMPUTE
_HSS1=3
_HSS2=LinInt(_CanCov0,0,40,40,70,70,100,1,1,2,2,3,3)
_CHESS=_HSS1*10+_HSS2
END
AGPLABEL
   All
ENDIF

*Habitat Structural Stage - Seedlings/Shrubs (Code 2)
IF                  0
_PHS EQ 4 AND _TSC EQ 2
THEN
COMPUTE
_HSS1=2
_HSS2=0
_CHESS=_HSS1*10+_HSS2
END
AGPLABEL
   All
ENDIF

*Habitat Structural Stage - Non-Stocked (Code 1)
IF                  0
_PHS EQ 4 AND _CanCov0 LE 10
THEN
COMPUTE
_HSS1=1
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```
_HSS2=0
_CHESS=_HSS1*10+_HSS2
END
AGPLABEL
   All
ENDIF

*Habitat Structural Stage - Old Growth (Code 5)
IF                  0
_PHS EQ 5 AND _HSS1 EQ 4
THEN
COMPUTE
_PPBA=SpMcDBH(2,PP,0,0.10,200.0,0.0,500.0,0)
_WSBA=SpMcDBH(2,WS,0,0.10,200.0,0.0,500.0,0)
_QABA=SpMcDBH(2,AS,0,0.10,200.0,0.0,500.0,0)
_SPBA=_PPBA+_WSBA+_QABA
_PPCT=LININT(_PPBA,0.001,0.001,0,1)
_WSCT=LININT(_WSBA,0.001,0.001,0,1)
_QACT=LININT(_QABA,0.001,0.001,0,1)
_SPCT=_PPCT+_WSCT+_QACT
_WSPC=LININT(_WSBA/_SPBA,0.500,0.500,0,1)
_A=_SPCT+_WSPC
_B=_A
_C=_B
_D=LinInt(SpMcDBH(7,PP,0,0.10,200.0,0.0,500.0,0)+ &
SpMcDBH(2,WS,0,0.10,200.0,0.0,500.0,0)+ &
SpMcDBH(2,AS,0,0.10,200.0,0.0,500.0,0), &
0,10,10,30,30,50,50,70,70,100,1,1,2,2,3,3,4,4,5,5)
_OBA16=SpMcDBH(2,PP,0,16.00,999.00,0.0,500.0,0)+ &
SpMcDBH(2,WS,0,16.00,999.00,0.0,500.0,0)+ &
SpMcDBH(2,AS,0,16.00,999.00,0.0,500.0,0)
_OBA13=SpMcDBH(2,PP,0,13.00,16.00,0.0,500.0,0)+ &
SpMcDBH(2,WS,0,13.00,16.00,0.0,500.0,0)+ &
SpMcDBH(2,AS,0,13.00,16.00,0.0,500.0,0)
_OBA10=SpMcDBH(2,PP,0,10.00,13.00,0.0,500.0,0)+ &
SpMcDBH(2,WS,0,10.00,13.00,0.0,500.0,0)+ &
SpMcDBH(2,AS,0,10.00,13.00,0.0,500.0,0)
_OBA07=SpMcDBH(2,PP,0,7.00,10.00,0.0,500.0,0)+ &
SpMcDBH(2,WS,0,7.00,10.00,0.0,500.0,0)+ &
SpMcDBH(2,AS,0,7.00,10.00,0.0,500.0,0)
_OBA00=SpMcDBH(2,PP,0,0.00,7.00,0.0,500.0,0)+ &
SpMcDBH(2,WS,0,0.00,7.00,0.0,500.0,0)+ &
SpMcDBH(2,AS,0,0.00,7.00,0.0,500.0,0)
_G=MaxIndex(_OBA00,_OBA07,_OBA10,_OBA13,_OBA16)
_MBA09=SpMcDBH(2,PP,0,9.00,16.00,0.0,500.0,0)+ &
SpMcDBH(2,WS,0,9.00,16.00,0.0,500.0,0)+ &
SpMcDBH(2,AS,0,9.00,16.00,0.0,500.0,0)
_MBA06=SpMcDBH(2,PP,0,6.00,9.00,0.0,500.0,0)+ &
SpMcDBH(2,WS,0,6.00,9.00,0.0,500.0,0)+ &
SpMcDBH(2,AS,0,6.00,9.00,0.0,500.0,0)
_MBA03=SpMcDBH(2,PP,0,3.00,6.00,0.0,500.0,0)+ &
SpMcDBH(2,WS,0,3.00,6.00,0.0,500.0,0)+ &
SpMcDBH(2,AS,0,3.00,6.00,0.0,500.0,0)
_MBA00=SpMcDBH(2,PP,0,0.00,3.00,0.0,500.0,0)+ &
SpMcDBH(2,WS,0,0.00,3.00,0.0,500.0,0)+ &
SpMcDBH(2,AS,0,0.00,3.00,0.0,500.0,0)
_H=0
_SQMD=SpMcDBH(5,PP,0,7.00,999.00,0.0,500.0,1)+ &
SpMcDBH(5,WS,0,7.00,999.00,0.0,500.0,1)+ &
SpMcDBH(5,AS,0,7.00,999.00,0.0,500.0,1)
_I=LinInt(_SQMD,0,7,7,10,10,13,13,16,16,999,0,0,2,2,3,3,4,4,5,5)
_STPA=SpMcDBH(1,PP,0,7.00,999.00,0.0,500.0,1)+ &
SpMcDBH(1,WS,0,7.00,999.00,0.0,500.0,1)+ &
SpMcDBH(1,AS,0,7.00,999.00,0.0,500.0,1)
_J=LinInt(_STPA,0,.1,.1,4,4,6,6,999,0,0,3,3,4,4,5,5)
_K=_I
_L=_J
_PHS=_PHS+1
END
AGPLABEL
   All
ENDIF

IF                  0
_PHS EQ 6 AND _HSS1 EQ 4 AND _SPCT EQ 3
THEN
COMPUTE
_A=_A+_WSPC+1
_B=_A
_C=_B
_PHS=_PHS+1
END
AGPLABEL
   All
ENDIF

IF                  0
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_PHS EQ 6 AND _HSS1 EQ 4 AND _G EQ 5 AND &
_MBA00+_MBA03+_MBA06+_MBA09 GT 0
THEN
COMPUTE
_H=MaxIndex(_MBA00,_MBA03,_MBA06,_MBA09)+1
_E=LinInt(SpMcDBH(7,PP,0,16.00,999.00,0.0,500.0,0)+ &
SpMcDBH(7,WS,0,16.00,999.00,0.0,500.0,0)+ &
SpMcDBH(7,AS,0,16.00,999.00,0.0,500.0,0), &
0,1,1,10,10,30,30,100,0,0,3,3,4,4,5,5)
_PHS=_PHS+1
END
AGPLABEL
   All
ENDIF

IF                0
_PHS EQ 6 AND _HSS1 EQ 4 AND _G EQ 4 AND &
_MBA00+_MBA03+_MBA06 GT 0
THEN
COMPUTE
_H=MaxIndex(_MBA00,_MBA03,_MBA06)+1
_E=LinInt(SpMcDBH(7,PP,0,13.00,16.00,0.0,500.0,0)+ &
SpMcDBH(7,WS,0,13.00,16.00,0.0,500.0,0)+ &
SpMcDBH(7,AS,0,13.00,16.00,0.0,500.0,0), &
0,1,1,10,10,30,30,100,0,0,3,3,4,4,5,5)
_PHS=_PHS+1
END
AGPLABEL
   All
ENDIF

IF                0
_PHS EQ 6 AND _HSS1 EQ 4 AND _G EQ 3 AND &
_MBA00+_MBA03 GT 0
THEN
COMPUTE
_H=MaxIndex(_MBA00,_MBA03)+1
_E=LinInt(SpMcDBH(7,PP,0,10.00,13.00,0.0,500.0,0)+ &
SpMcDBH(7,WS,0,10.00,13.00,0.0,500.0,0)+ &
SpMcDBH(7,AS,0,10.00,13.00,0.0,500.0,0), &
0,1,1,10,10,30,30,100,0,0,3,3,4,4,5,5)
_PHS=_PHS+1
END
AGPLABEL
   All
ENDIF

IF                0
_PHS EQ 6 AND _HSS1 EQ 4 AND _G EQ 2 AND &
_MBA00 GT 0
THEN
COMPUTE
_H=MaxIndex(_MBA00)+1
_E=LinInt(SpMcDBH(7,PP,0,7.00,10.00,0.0,500.0,0)+ &
SpMcDBH(7,WS,0,7.00,10.00,0.0,500.0,0)+ &
SpMcDBH(7,AS,0,7.00,10.00,0.0,500.0,0), &
0,1,1,10,10,30,30,100,0,0,3,3,4,4,5,5)
_PHS=_PHS+1
END
AGPLABEL
   All
ENDIF

IF                0
_PHS EQ 6 AND _HSS1 EQ 4 AND _G EQ 1
THEN
COMPUTE
_H=0
_E=LinInt(SpMcDBH(7,PP,0,0.00,7.00,0.0,500.0,0)+ &
SpMcDBH(7,WS,0,0.00,7.00,0.0,500.0,0)+ &
SpMcDBH(7,AS,0,0.00,7.00,0.0,500.0,0), &
0,1,1,10,10,30,30,100,0,0,3,3,4,4,5,5)
_PHS=_PHS+1
END
AGPLABEL
   All
ENDIF

IF                0
_PHS EQ 7 AND _HSS1 EQ 4 AND _H EQ 5
THEN
COMPUTE
_F=LinInt(SpMcDBH(7,PP,0,9.00,16.00,0.0,500.0,0)+ &
SpMcDBH(7,WS,0,9.00,16.00,0.0,500.0,0)+ &
SpMcDBH(7,AS,0,9.00,16.00,0.0,500.0,0), &
0,1,1,10,10,20,20,100,0,0,3,3,4,4,5,5)
_PHS=_PHS+1
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```
END
AGPLABEL
   All
ENDIF

IF                 0
_PHS EQ 7 AND _HSS1 EQ 4 AND _H EQ 4
THEN
COMPUTE
_F=LinInt(SpMcDBH(7,PP,0,6.00,9.00,0.0,500.0,0)+ &
SpMcDBH(7,WS,0,6.00,9.00,0.0,500.0,0)+ &
SpMcDBH(7,AS,0,6.00,9.00,0.0,500.0,0), &
0,1,1,10,10,20,20,100,0,0,3,3,4,4,5,5)
_PHS=_PHS+1
END
AGPLABEL
   All
ENDIF

IF                 0
_PHS EQ 7 AND _HSS1 EQ 4 AND _H EQ 3
THEN
COMPUTE
_F=LinInt(SpMcDBH(7,PP,0,3.00,6.00,0.0,500.0,0)+ &
SpMcDBH(7,WS,0,3.00,6.00,0.0,500.0,0)+ &
SpMcDBH(7,AS,0,3.00,6.00,0.0,500.0,0), &
0,1,1,10,10,20,20,100,0,0,3,3,4,4,5,5)
_PHS=_PHS+1
END
AGPLABEL
   All
ENDIF

IF                 0
_PHS EQ 7 AND _HSS1 EQ 4 AND _H EQ 2
THEN
COMPUTE
_F=LinInt(SpMcDBH(7,PP,0,0.00,3.00,0.0,500.0,0)+ &
SpMcDBH(7,WS,0,0.00,3.00,0.0,500.0,0)+ &
SpMcDBH(7,AS,0,0.00,3.00,0.0,500.0,0), &
0,1,1,10,10,20,20,100,0,0,3,3,4,4,5,5)
_PHS=_PHS+1
END
AGPLABEL
   All
ENDIF

IF                 0
_PHS EQ 7 AND _HSS1 EQ 4 AND (_H EQ 1 OR _H EQ 0)
THEN
COMPUTE
_F=LinInt(SpMcDBH(7,PP,0,0.00,0.00,0.0,500.0,0)+ &
SpMcDBH(7,WS,0,0.00,0.00,0.0,500.0,0)+ &
SpMcDBH(7,AS,0,0.00,0.00,0.0,500.0,0), &
0,1,1,10,10,20,20,100,0,0,3,3,4,4,5,5)
_PHS=_PHS+1
END
AGPLABEL
   All
ENDIF

IF                 0
_PHS EQ 8 AND _HSS1 EQ 4
THEN
COMPUTE
_OGSC=_A+_B+_C+_D+_E+_F+_G+_H+_I+_J+_K+_L
_PHS=_PHS+1
END
AGPLABEL
   All
ENDIF

IF                 0
_PHS EQ 9 AND _HSS1 EQ 4 AND _OGSC GE 42
THEN
COMPUTE
_CHESSER=50
_PHS=_PHS+1
END
AGPLABEL
   All
ENDIF

*******************************************************************************
*   End HSS.kcp
*******************************************************************************
```

Skill Challenge:

Ellen Young (soon to be Old after working on this project), Silviculturalist from Black Hills National Forest, condemned to work on Plan Amendment to the Revision, calls and says that HSS.kcp needs to be changed in the following manner:

```
********************************************************************************
*   BH_HSS.kcp
*   Written by Don Vandendriesche - WOFTCOL 7/31/2000
*   Modified by Ellen Jungck - BH 8/1/2000 (Combined Seeds and Saps)
*      - Compute Habitat Structural Stage (_CHESS)
*           Stage       Tree Size                   Diameter
*             1         Grass/Forb/Shrub                <1"
*             2         Seedlings/Saplings             1-5"
*             3         Young Forest - Poles           5-9"
*             4         Mid-Aged Forest - Small Saw    9-14"
*             5         Mature Forest - Large Saw     14-20"
*             6         Old Forest - Old Growth         >20"
*
********************************************************************************
```

Whew, Ellen just made your job easier. Simply simplify HSS.kcp to reflect Ellen wishes.

Skill Challenge Solution:

```
******************************************************************************
*   BH_HSS.kcp
*   Written by Don Vandendriesche - WOFTCOL 7/31/2000
*   Modified by Ellen Jungck - BH 8/1/2000 (Combined Seeds and Saps)
*      - Compute Habitat Structural Stage (_CHESS)
*           Stage       Tree Size                    Diameter
*             1         Grass/Forb/Shrub                <1"
*             2         Seedlings/Saplings             1-5"
*             3         Young Forest - Poles           5-9"
*             4         Mid-Aged Forest - Small Saw    9-14"
*             5         Mature Forest - Large Saw     14-20"
*             6         Old Forest - Old Growth         >20"
*
******************************************************************************
DelOTab            1
DelOTab            2

* Track Stand Age
COMPUTE            0
_STAGE = AGE
END

* Determine Computed Habitat Estimated Structural Stage (_CHESS)
COMPUTE            0
_TPA0=SpMcDBH(1,All,0,0.00,999.00,0.0,500.0,0)
_TPA0t1=SpMcDBH(1,All,0,0.00,1.00,0.0,500.0,0)
_TPA1t5=SpMcDBH(1,All,0,1.00,5.00,0.0,500.0,0)
_BA0=SpMcDBH(2,All,0,0.00,999.00,0.0,500.0,0)
_BA1=SpMcDBH(2,All,0,1.00,999.00,0.0,500.0,0)
_BA5=SpMcDBH(2,All,0,5.00,999.00,0.0,500.0,0)
_BA9=SpMcDBH(2,All,0,9.00,999.00,0.0,500.0,0)
_BA14=SpMcDBH(2,All,0,14.00,999.00,0.0,500.0,0)
_BA20=SpMcDBH(2,All,0,20.00,999.00,0.0,500.0,0)
_BA0t1=SpMcDBH(2,All,0,0.00,1.00,0.0,500.0,0)
_BA1t5=SpMcDBH(2,All,0,1.00,5.00,0.0,500.0,0)
_BA5t9=SpMcDBH(2,All,0,5.00,9.00,0.0,500.0,0)
_BA9t14=SpMcDBH(2,All,0,9.00,14.00,0.0,500.0,0)
_BA14t20=SpMcDBH(2,All,0,14.00,20.00,0.0,500.0,0)
_BA20t99=SpMcDBH(2,All,0,20.00,999.00,0.0,500.0,0)
_QMD=SpMcDBH(5,All,0,1.00,999.00,0.0,500.0,0)
_BAR9=0
_BAR14=0
_BAR20=0
_TPAMAX=0
_TPAMIN=300
_BAMAX=0
_BAMIN=0
_CV0=SpMcDBH(7,All,0,0.00,999.00,0.0,500.0,0)
_CV0t1=SpMcDBH(7,All,0,0.00,1.00,0.0,500.0,0)
_CV1t5=SpMcDBH(7,All,0,1.00,5.00,0.0,500.0,0)
_CV5t9=SpMcDBH(7,All,0,5.00,9.00,0.0,500.0,0)
_CV9t14=SpMcDBH(7,All,0,9.00,14.00,0.0,500.0,0)
_CV14t20=SpMcDBH(7,All,0,14.00,20.00,0.0,500.0,0)
_CV20t99=SpMcDBH(7,All,0,20.00,999.00,0.0,500.0,0)
_PHS=0
END

IF                 0
_PHS EQ 0
THEN
COMPUTE
_PHS=_PHS+1
END
AGPLABEL
   All
ENDIF

IF                 0
_PHS EQ 1 AND _BA9 GT 0
THEN
COMPUTE
_BAR9=_BA9t14/_BA9
_BAR14=_BA14t20/_BA9
_BAR20=_BA20t99/_BA9
_PHS=_PHS+1
END
AGPLABEL
   All
ENDIF

IF                 0
_PHS EQ 1 AND _QMD GT 0
THEN
COMPUTE
```

```
_TPAMAX=18641.0/(_QMD**1.659925)
_BAMAX=101.67*(_QMD**0.34007)
_BAMIN=_BAMAX*0.10
_PHS=_PHS+1
END
AGPLABEL
   All
ENDIF

IF                  0
_PHS EQ 1 AND _QMD EQ 1
THEN
COMPUTE
_PHS=_PHS+1
END
AGPLABEL
   All
ENDIF

IF                  0
_PHS EQ 2 AND _BAMIN LT 20
THEN
COMPUTE
_BAMIN=20
_PHS=_PHS+1
END
AGPLABEL
   All
ENDIF

*Tree Size Class = Over Mature (6)
IF                  0
_PHS EQ 3 AND &
_BA0 GE _BAMIN AND _BA5 GE (_BA0t1+_BA1t5) AND &
_BA9 GT      0 AND _BA9 GE  _BA5t9         AND &
MaxIndex(_BAR9,_BAR14,_BAR20) EQ 3
THEN
COMPUTE
_TSC=6
_PHS=_PHS+1
END
AGPLABEL
   All
ENDIF

*Tree Size Class = Mature (5)
IF                  0
_PHS EQ 3 AND &
_BA0 GE _BAMIN AND _BA5 GE (_BA0t1+_BA1t5) AND &
_BA9 GT      0 AND _BA9 GE  _BA5t9         AND &
MaxIndex(_BAR9,_BAR14,_BAR20) EQ 2
THEN
COMPUTE
_TSC=5
_PHS=_PHS+1
END
AGPLABEL
   All
ENDIF

*Tree Size Class = Mid-Aged (4)
IF                  0
_PHS EQ 3 AND &
_BA0 GE _BAMIN AND _BA5 GE (_BA0t1+_BA1t5) AND &
_BA9 GT      0 AND _BA9 GE  _BA5t9         AND &
MaxIndex(_BAR9,_BAR14,_BAR20) EQ 1
THEN
COMPUTE
_TSC=4
_PHS=_PHS+1
END
AGPLABEL
   All
ENDIF

*Tree Size Class = Young (3)
IF                  0
_PHS EQ 3 AND &
_BA0 GE _BAMIN AND _BA5 GE (_BA0t1+_BA1t5) AND &
_BA9 LT _BA5t9
THEN
COMPUTE
_TSC=3
_PHS=_PHS+1
END
AGPLABEL
   All
```

```
ENDIF

*Tree Size Class = Seedlings/Saplings (2)
IF                 0
_PHS EQ 3 AND &
_BA0 GE _BAMIN AND _BA5 LT (_BA0t1+_BA1t5) AND &
MaxIndex(_TPA0t1,_TPA1t5) EQ 2
THEN
COMPUTE
_TSC=2
_PHS=_PHS+1
END
AGPLABEL
   All
ENDIF

*Tree Size Class = Grass/Forb/Shrub (1)
IF                 0
_PHS EQ 3 AND &
(_BA0 GE _BAMIN AND _BA5 LT (_BA0t1+_BA1t5) AND &
MaxIndex(_TPA0t1,_TPA1t5) EQ 1) OR &
(_BA0 LT _BAMIN)
THEN
COMPUTE
_TSC=1
_PHS=_PHS+1
END
AGPLABEL
   All
ENDIF

*Habitat Structural Stage
IF                 0
_PHS EQ 4
THEN
COMPUTE
_HSS1=_TSC
_HSS2=_CV0
_CHESS=_HSS1*1000+_HSS2
_PHS=_PHS+1
END
AGPLABEL
   All
ENDIF

********************************************************************************
*   End BH_HSS.kcp
********************************************************************************
```

Notes:

<u>Topic KIN:</u> The "Keyword Iteration Navigator"

Concepts: relating to the next of KIN Post Processor.

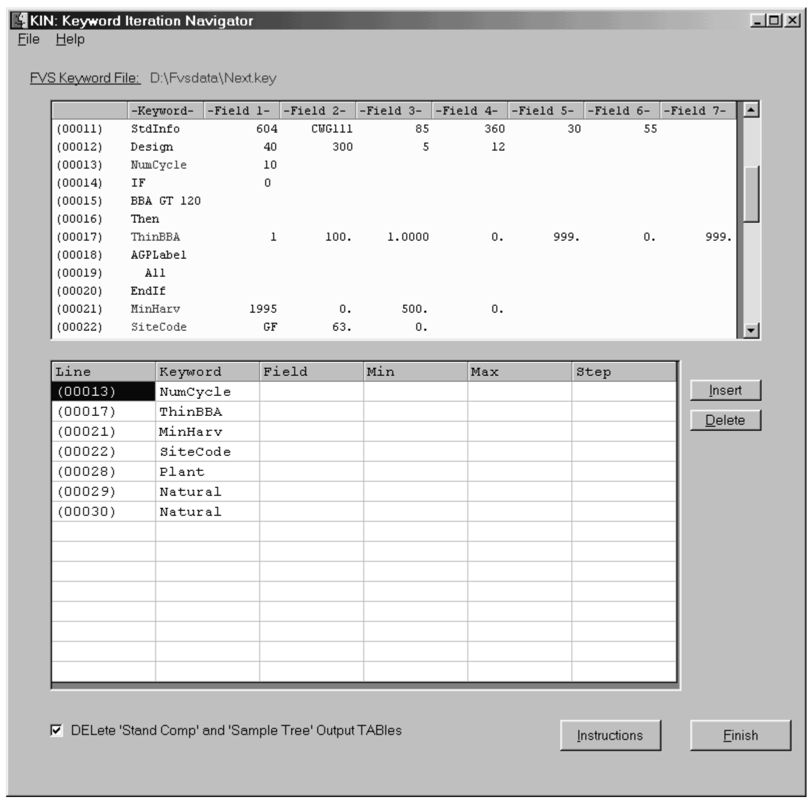
An Aside

One of the most difficult aspects in developing a new program is naming the product. To be sure, you do not want to pick an offensive title but on the other hand, it is always fun to select a catchy phrase. After lamenting several would-be names, I finally settled on KIN. By definition, kin are relatives. The output Keyword sets generated by the iterative process would be similar through inheritance from the original parent. Thus, KIN seems to be an appropriate name.

About KIN

Dr. Gary Kronrad from Steven F. Austin University in Nacogdoches, Texas, approached our staff regarding the ability to produce iterations of a FVS Keyword file based upon range values. In other words, allow a user to specify minimum, maximum, and step increments for various Keyword Parameter Fields. For example, enable thinning from below to a target residual of 60 to 100 square feet basal area in steps of 10. Using the Suppose interface, this would require five separate Keyword file sets and five different runs, not too bad. However, what if you wanted to test ranges of site productivity, minimum harvest standards, and various regeneration regimes, all in combination, then using Suppose would be out of the question. Dr. Kronrad work involves testing various forestry scenarios for carbon sequestration. His efforts include thousands of combinations of physical, vegetative, and developmental characteristics. A robust interface was needed to handle Keyword iterations.

KIN works from existing FVS Keyword files. The initial Keyword file can be set up using Suppose, PrognosisBC SIMprog, or a text editor. They serve as a beginning template for the iteration process. The user simply selects Keywords that they wish to designate minimum, maximum, and increment values. This step is aided by an auxiliary database that contains Candidate Keywords for range specification. Users can broaden the scope of the existing set of Candidate Keywords by modifying this database. KIN automatically displays potential Candidate Keywords. Multiple listings of the same Keyword are differentiated by an association with the line number on which they occur. Users can enumerate multiple Parameter Fields within the same Keyword. Unnecessary Candidate Keyword can be easily removed from the iteration process. The resultant output file is stored in the working directory with a filename extension of *.kin. The Stand Identification label is modified per iteration to provide a trace through the iteration process. A trace file is created that displays the iterative thread of a specific run. It has a filename extension of *.run.



KIN Menu Options

The KIN menu offers the following items:

File

Open	Opens template FVS Keyword file
Exit	Exit KIN

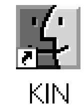
Help

Contents	Offers an index to help topics
About	Displays vital statistics about KIN

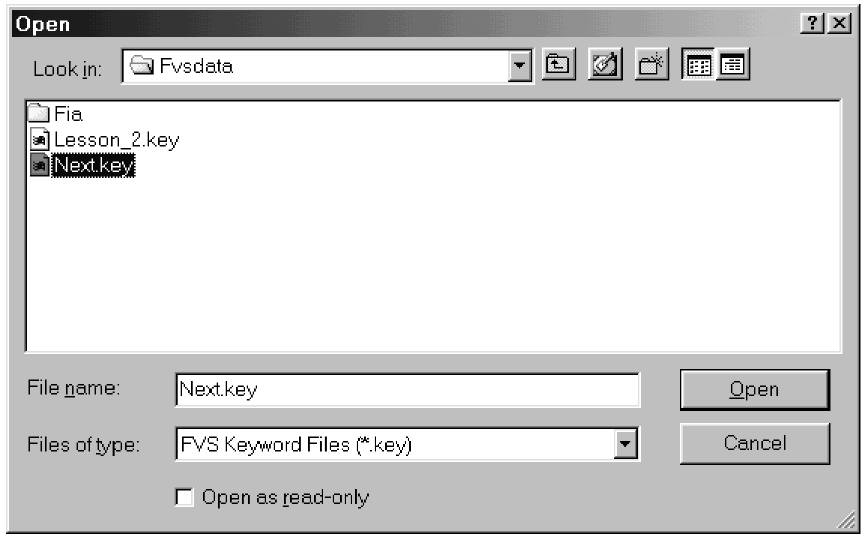
KIN Operation

Running KIN

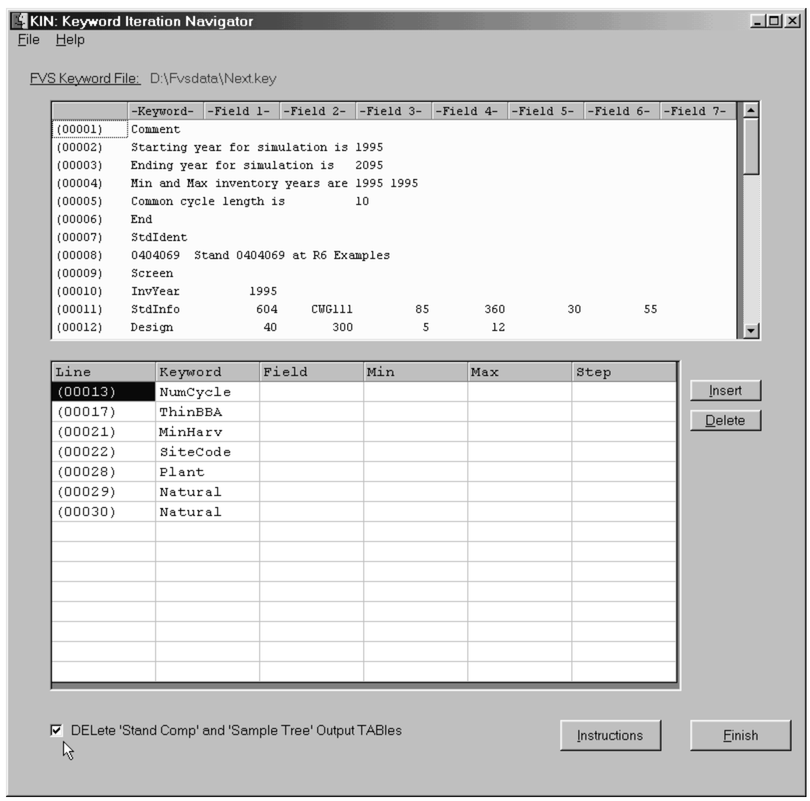
You can begin a KIN operation by selecting the program icon either on your desktop or by using the Start Menu, Program Group.



You will be immediately prompted to select an existing Keyword file to use as your template for iteration. Your default working directory is displayed as the initial folder for resident FVS Keyword files. If this folder does not contain the desired Keyword file, navigate to the folder that does. Select the Keyword file that you wish to use as the template.

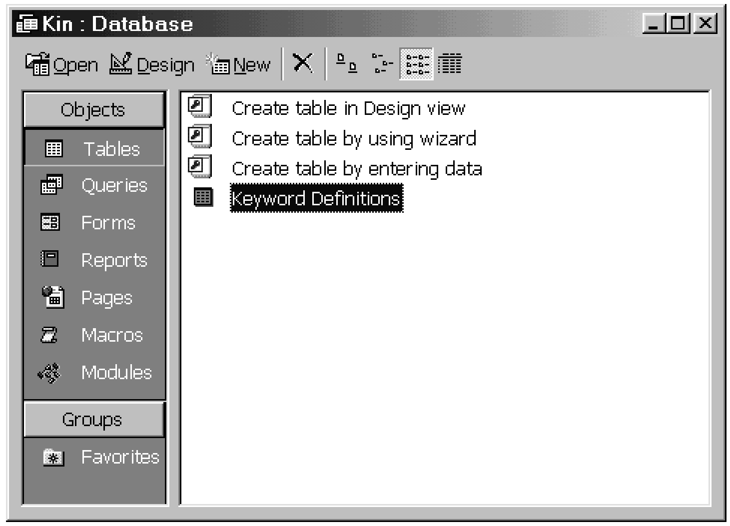


By default, if DELOTAB Keywords are not currently present within the run, they are automatically inserted. DELOTAB Keywords delete the Stand Composition and Selected Sample Tree tables from the Main FVS Output Report. Given that there will be several projection runs processed consecutively, the main output report may became enormous. This option will eliminate unnecessary bunk in the *.out file. If you wish to have these table printed, unchecked the option box at the bottom of the Navigator screen. You will need to go to the File/Open menu option to re-read the Keyword template file.

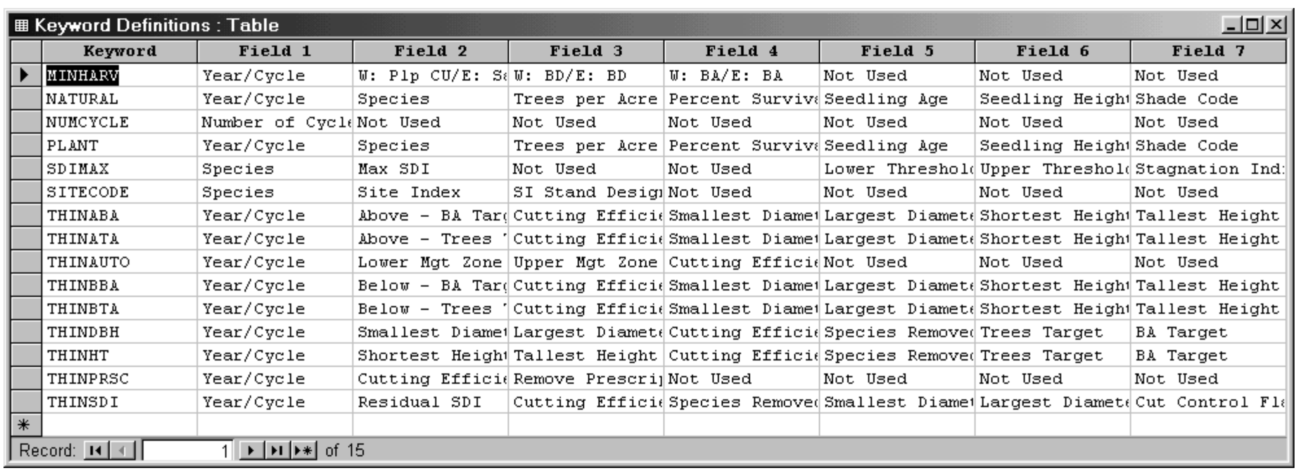


Two grids will appear on the main Navigator screen. The upper grid displays all FVS Keywords contained in the template Keyword file set. Basically, any record that started with an asterisk “*” or a exclamation “!” are ignored. The difference between these two delimiters is that lines beginning with asterisk will appear in the FVS Main Output Report, Options Selected on Input Table. Lines beginning with exclamation points will not. This notation is used by the Suppose interface. For brevity sake, both of these record types will be dropped for iteration processing.

The bottom grid is composed of Candidate Keywords that can be utilized to specify range values. In an effort to make the Navigator dynamic to user needs, a background database is relied upon to populate the Candidate Keyword grid. The file is a Microsoft Access database entitled “KIN.mdb”. It resides in the same folder as the KIN.exe application. The table that contains the Candidate Keyword is reference as “Keyword Definitions”.



The structure of the Keyword Definition table is the name of the Keyword followed by the various Parameter Fields. An excellent descriptive source is the “Keyword Reference Guide for the Forest Vegetation Simulator” as produced by the Forest Management Service Center (FMSC). This document is available on the FMSC Web Page or can be obtained directly from our staff.

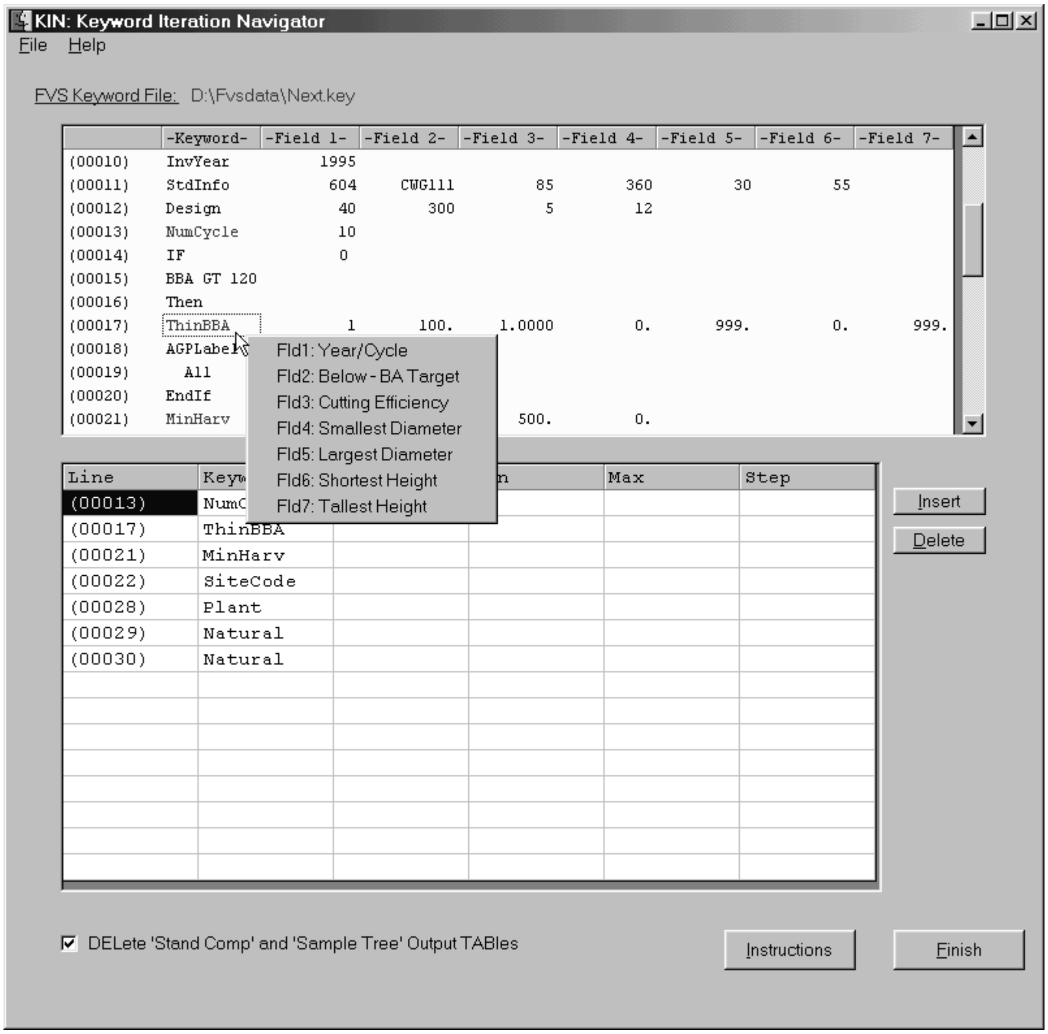


Keyword Definitions : Table

Keyword	Field 1	Field 2	Field 3	Field 4	Field 5	Field 6	Field 7
MINHARV	Year/Cycle	W: Plp CU/E: S	W: BD/E: BD	W: BA/E: BA	Not Used	Not Used	Not Used
NATURAL	Year/Cycle	Species	Trees per Acre	Percent Surviv	Seedling Age	Seedling Heigh	Shade Code
NUMCYCLE	Number of Cycl	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used
PLANT	Year/Cycle	Species	Trees per Acre	Percent Surviv	Seedling Age	Seedling Heigh	Shade Code
SDIMAX	Species	Max SDI	Not Used	Not Used	Lower Threshol	Upper Threshol	Stagnation Ind
SITECODE	Species	Site Index	SI Stand Desig	Not Used	Not Used	Not Used	Not Used
THINABA	Year/Cycle	Above - BA Tar	Cutting Effici	Smallest Diame	Largest Diamet	Shortest Heigh	Tallest Height
THINATA	Year/Cycle	Above - Trees	Cutting Effici	Smallest Diame	Largest Diamet	Shortest Heigh	Tallest Height
THINAUTO	Year/Cycle	Lower Mgt Zone	Upper Mgt Zone	Cutting Effici	Not Used	Not Used	Not Used
THINBBA	Year/Cycle	Below - BA Tar	Cutting Effici	Smallest Diame	Largest Diamet	Shortest Heigh	Tallest Height
THINBTA	Year/Cycle	Below - Trees	Cutting Effici	Smallest Diame	Largest Diamet	Shortest Heigh	Tallest Height
THINDBH	Year/Cycle	Smallest Diame	Largest Diamet	Cutting Effici	Species Remove	Trees Target	BA Target
THINHT	Year/Cycle	Shortest Heigh	Tallest Height	Cutting Effici	Species Remove	Trees Target	BA Target
THINPRSC	Year/Cycle	Cutting Effici	Remove Prescri	Not Used	Not Used	Not Used	Not Used
THINSDI	Year/Cycle	Residual SDI	Cutting Effici	Species Remove	Smallest Diame	Largest Diamet	Cut Control Fl

Record: 1 of 15

Be sure to abbreviate your Parameter Field descriptors. This text appears in conjunction with right mouse button clicking Candidate Keywords in the upper grid. Notice that the Candidate Keywords that appear in the lower grid are highlighted in the upper grid. It is certainly hard to remember each and every Parameter Field for each Keyword. As a quick guide, right mouse click support has been built into the Navigator. Thus the need to look up Keywords in the Guide should be alleviated. Simply left mouse click the highlighted Candidate Keywords in the upper grid, then right mouse click to reveal the pop-up help menu. Again, these descriptors are derived from the Kin.mdb database, Keyword Definition table. The labeling is primarily at the discretion of the user.

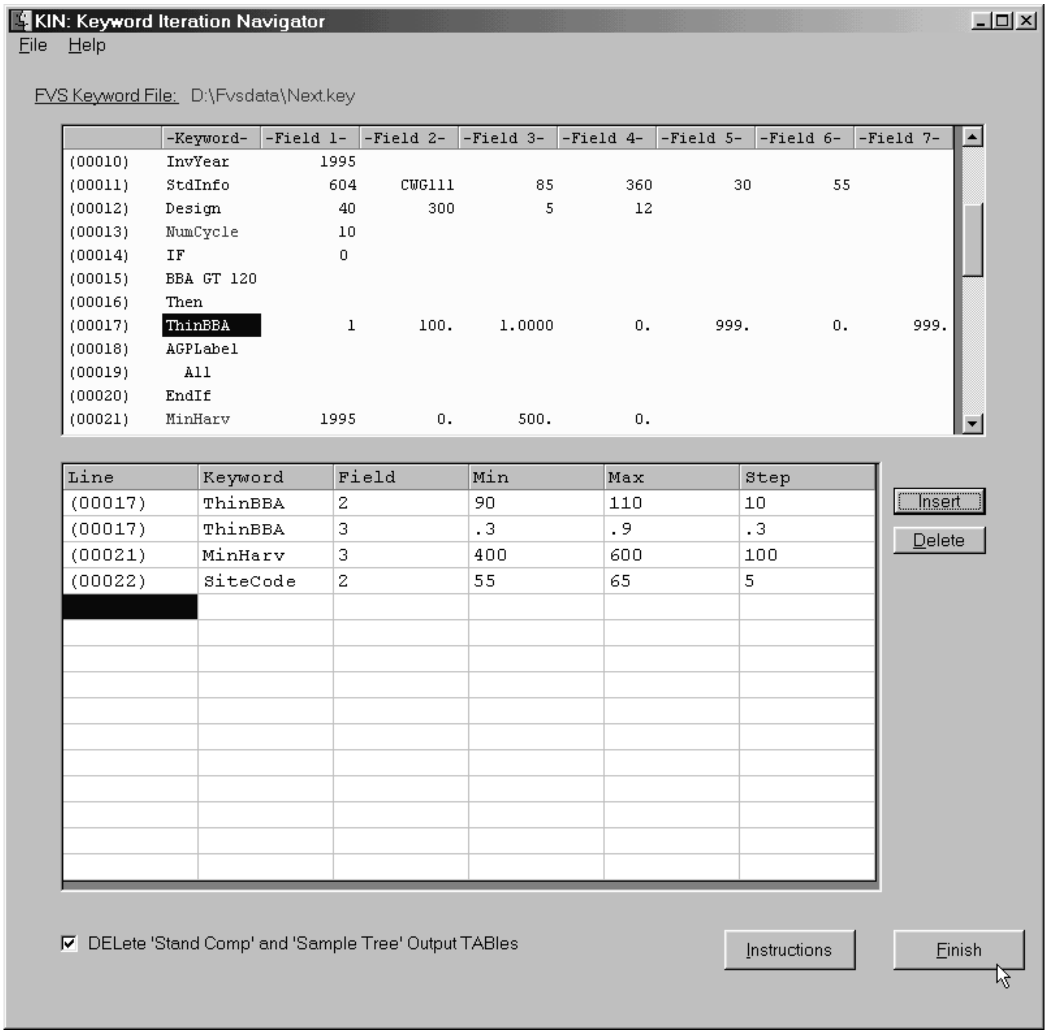


An "Instructions" command button has been developed to assist in setting up the bottom grid. It informs the users of the necessary steps.

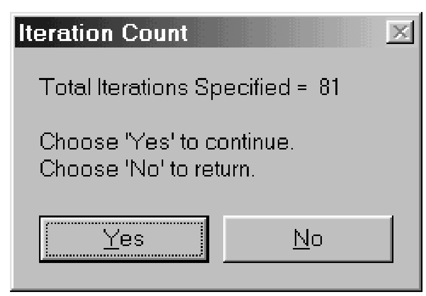
Click the "OK" command button to continue.

Choose the Candidate Keyword you wish to run range values on. Input the minimum and maximum value and a logical range increment that will get you from the beginning to end points. Use the "Tab" key to jump from grid cell to grid cell. You may specify more than one Parameter Field per Candidate Keyword. Place the cursor in the first two columns of the Candidate Keyword you wish to duplicate, then click the "Insert" command button to do so. If there are Candidate Keywords that you do not wish to use for range incrementing, place the cursor in the first two columns and click the "Delete" command button.

That should do it! You should be ready to process your request. Several error check messages have been programmed into the Keyword Iteration Navigator. If you have violated any of the bounds of the check values, a message box will appear warning you of the potential error. These appear after clicking the "Finish" command button. Upon returning to the Navigator, review your input Candidate Keywords for the discrepancy listed in the error check message box. Once corrected, click the "Finish" command button to proceed to iteration processing.



There is one last opportunity to bale out. A message box will appear indicating the number of iteration runs specified by the combination of Candidate Keywords and their associated minimum, maximum, and step values. If this number matches what you think it ought to, press the "Yes" option to proceed.

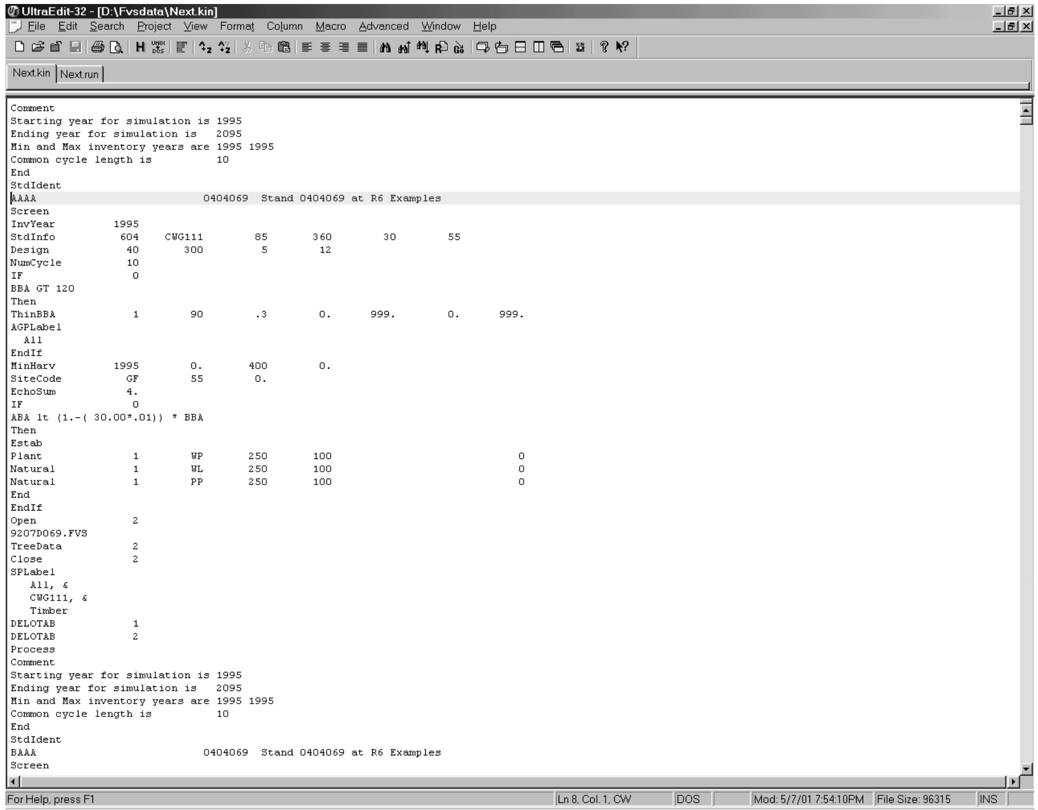


Resulting KIN

The Keyword Iteration Navigator creates two output files that are located in the working directory folder. The first file contains the newly created Keyword kinships developed by the iteration heuristic. The filename uses your original Keyword filename and appends a "*.kin" file extension to it. To enable tracking of the various combinations for Candidate Keywords and their associated range values, the StdIdent Keyword supplemental record has been modified. This encrypted string represents the thread of the iteration process.

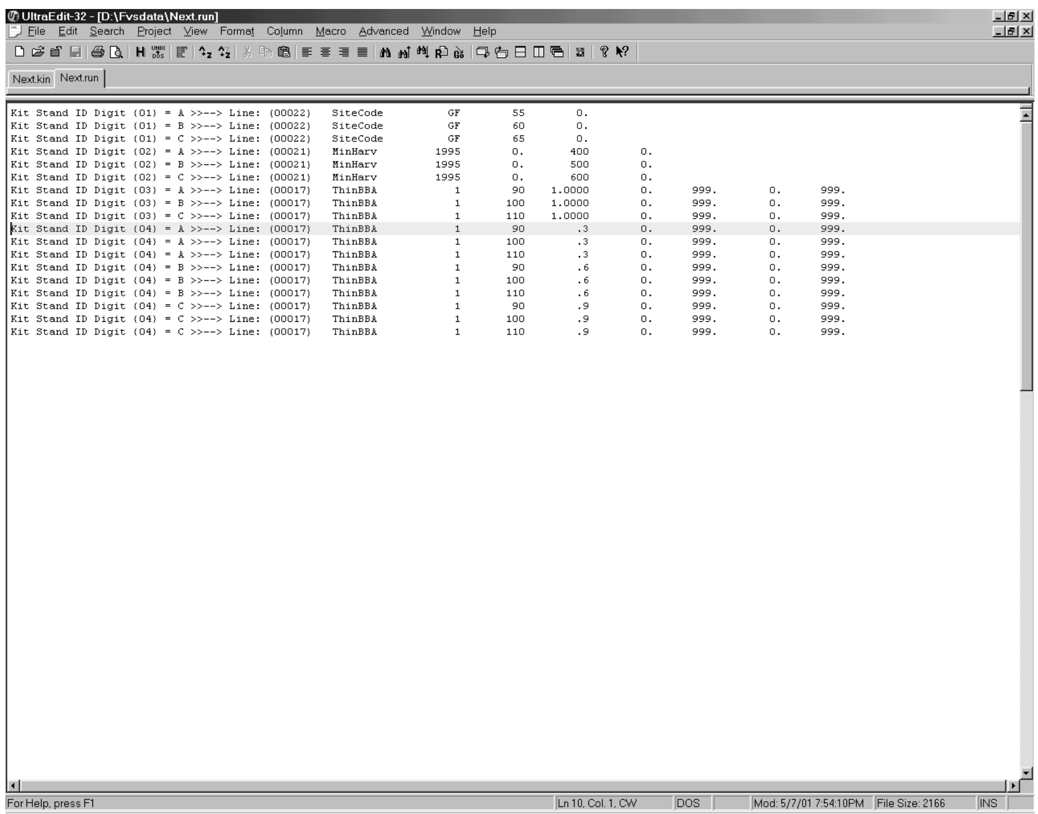
The second file that is created lists the trace values of the individual runs. The filename uses your original Keyword filename and appends a "*.run" file extension to it. This file provides a cross-reference of the digit placement of the StdIdent label with the Candidate Keyword parameter line. For multiple Parameter Fields within a Candidate Keyword, several lines are listed to show the various combinations.

Contents of “Next.kin” file:



```
Comment
Starting year for simulation is 1995
Ending year for simulation is   2095
Min and Max inventory years are 1995 1995
Common cycle length is          10
End
StdIdent
AAAA                         0404069  Stand 0404069 at R6 Examples
Screen
InvYear         1995
StdInfo          604    CWG111        85       360        30        55
Design            40       300         5        12
NumCycle          10
IF                 0
BBA GT 120
Then
ThinBBA            1        90        .3        0.      999.        0.      999.
AGPLabel
  All
EndIf
MinHarv         1995        0.       400        0.
SiteCode          GF        55        0.
EchoSum           4.
IF                 0
ABA lt (1.-( 30.00*.01)) * BBA
Then
Estab
Plant              1        WP       250       100                             0
Natural            1        WL       250       100                             0
Natural            1        PP       250       100                             0
End
EndIf
Open               2
9207D069.FVS
TreeData           2
Close              2
SPLabel
   All, &
   CWG111, &
   Timber
DELOTAB            1
DELOTAB            2
Process
Comment
Starting year for simulation is 1995
Ending year for simulation is   2095
Min and Max inventory years are 1995 1995
Common cycle length is          10
End
StdIdent
BAAA                         0404069  Stand 0404069 at R6 Examples
Screen
```

Contents of “Next.run” file:



```
Kit Stand ID Digit (01) = A >>--> Line: (00022)   SiteCode        GF        55        0.
Kit Stand ID Digit (01) = B >>--> Line: (00022)   SiteCode        GF        60        0.
Kit Stand ID Digit (01) = C >>--> Line: (00022)   SiteCode        GF        65        0.
Kit Stand ID Digit (02) = A >>--> Line: (00021)   MinHarv       1995        0.       400        0.
Kit Stand ID Digit (02) = B >>--> Line: (00021)   MinHarv       1995        0.       500        0.
Kit Stand ID Digit (02) = C >>--> Line: (00021)   MinHarv       1995        0.       600        0.
Kit Stand ID Digit (03) = A >>--> Line: (00017)   ThinBBA          1        90    1.0000        0.      999.        0.      999.
Kit Stand ID Digit (03) = B >>--> Line: (00017)   ThinBBA          1       100    1.0000        0.      999.        0.      999.
Kit Stand ID Digit (03) = C >>--> Line: (00017)   ThinBBA          1       110    1.0000        0.      999.        0.      999.
Kit Stand ID Digit (04) = A >>--> Line: (00017)   ThinBBA          1        90        .3        0.      999.        0.      999.
Kit Stand ID Digit (04) = A >>--> Line: (00017)   ThinBBA          1       100        .3        0.      999.        0.      999.
Kit Stand ID Digit (04) = A >>--> Line: (00017)   ThinBBA          1       110        .3        0.      999.        0.      999.
Kit Stand ID Digit (04) = B >>--> Line: (00017)   ThinBBA          1        90        .6        0.      999.        0.      999.
Kit Stand ID Digit (04) = B >>--> Line: (00017)   ThinBBA          1       100        .6        0.      999.        0.      999.
Kit Stand ID Digit (04) = B >>--> Line: (00017)   ThinBBA          1       110        .6        0.      999.        0.      999.
Kit Stand ID Digit (04) = C >>--> Line: (00017)   ThinBBA          1        90        .9        0.      999.        0.      999.
Kit Stand ID Digit (04) = C >>--> Line: (00017)   ThinBBA          1       100        .9        0.      999.        0.      999.
Kit Stand ID Digit (04) = C >>--> Line: (00017)   ThinBBA          1       110        .9        0.      999.        0.      999.
```

Both, the digit placement and value are significant in following the iteration process. There is capacity for 26 range steps per 30 Candidate Keywords. That should handle the need for Keyword Iteration.

Batching KIN

A MS-DOS batch file named KIN.bat has been developed to assist running "*.kin" Keyword files. Make sure that KIN.bat and its associated response file KIN.rsp reside in the same folder as your "*.kin" Keyword file. At the MS-DOS prompt, enter the following command:

C:\Fvsdata>Kin.bat {FVS Geographic Variant} {*.kin filename only}

Example: *C:\Fvsdata*>Kin.bat bm test

Where: bm = Blue Mountains of Oregon FVS Variant
test = test.kin Keyword Iteration file

Following processing, a resultant *.out and *.sum file should be created with the filename specified on the command line.

Good luck. Go forth and develop KIN.

Notes:

<u>Topic Labels-PPE:</u> **Using Policy Labels and the PPE to Solve Resource Supply Problems**

Concepts: employ Policy Labeling capabilities and the Parallel Processing Extension of FVS to analyze resource supply trends.

'Label Processing' is a little known feature within the Forest Vegetation Simulator (FVS). When used in combination with the Parallel Processing Extension (PPE), it can provide a powerful analytical tool. Labels within FVS link forest stands to activities. These activities can be either silvicultural or managerial in context. The PPE can be used for resource supply analysis. An example from the Flathead National Forest is presented that employs the labeling and parallel processing capabilities of FVS to solve a resource supply problem.

Let's Digress

Have you ever performed a search for the text string "*****" within the main output report produced by the Forest Vegetation Simulator? If you haven't, you probably should consider doing so as part of your simulation review repertoire. Asterisks that appear in the main output indicate that errors were detected during processing. There are two types of errors that are reported: warning and terminal. Warning errors do not interrupt the projection. However, terminal errors are fatal and require user intervention to proceed.

Lets say that as a prudent FVS user, you perform your cursory check for runtime errors by searching for the asterisk text string. Low and behold, the following message appears within the 'Options Selected by Default' table (second report within the main output, following the 'Option Select by Input' table):

> ******** WARNING: 1 ACTIVITY GROUP(S) HAD NO LABEL AND WERE ASSIGNED THE STAND POLICY LABEL SET.

Like many FVS users, you have no idea what generated this error. Fortunately, it is a warning error and it does not crash the simulation. However, you cannot help but wonder what is the meaning of this particular error. Stay tuned; this paper will acquaint you with the label processing capabilities within the Forest Vegetation Simulator.

Back on Track

There are many forest planning problems that could be solved using the policy labeling capabilities and Parallel Processing Extension of the Forest Vegetation Simulator. The advantage of using these tools in combination would be that inventory information and associated silvicultural prescriptions would already be set up in the projection model. Preparing data and developing stand management options are prerequisites to any planning exercise. Labeling and the PPE facilitate the final planning step - decision analysis for multi-stand processing. This paper provides an introduction to policy labeling rules and to the utility of the Parallel Processor in solving resource supply problems.

Policy Labeling Feature

Specifying management policies using rules is a little known feature embedded within the FVS model. This process is spun through every aspect of FVS: the Suppose interface, the base model, the event monitor, and the model extensions. However, written references are limited and are only sought by those with an innate curiosity regarding this subject.

There are three levels of *labels* within FVS. Beginning with individual stand polygons and working toward a landscape perspective, they are:

- Stand Policy
- Activity Group Policy
- Multistand Policy

You may not have heard of stand policy labels, however, if you have used the Suppose interface, you certainly have unknowingly encountered them. Stand Policy Labels are synonymous with *Grouping Codes*. Grouping codes come into play when you invoke the 'Select Simulation Stands' command button from the main Suppose window. Grouping codes populate the middle windowpane on the Select Simulation Stand screen. Refer to Figure 1. They are used to help identify common characteristics amongst individual stands. In Figure 1, the DF grouping code is used to equate forest stands that are predominantly Douglas-fir forest cover type. Unbeknownst to most users, this is also a Stand Policy Label for this grouping of forest stands.

You may wonder where did the Suppose interface obtain these grouping codes. Recall that grouping codes are assigned in the Stand List Files, on Record Type C. Clever data translation programs such as Pre-Suppose can assist users in assigning grouping codes to common plot sets.

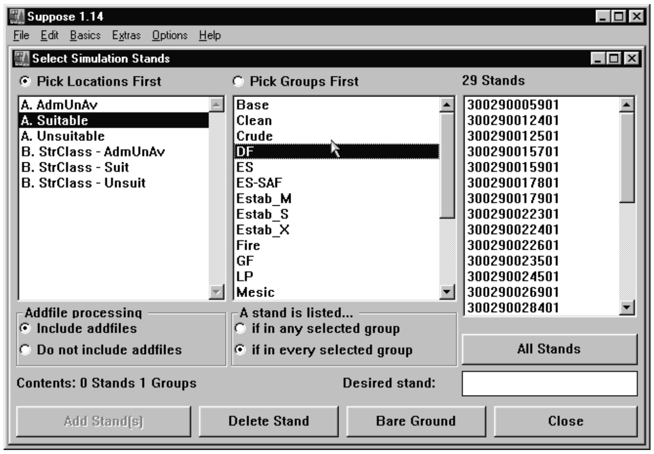


Figure 1—Stand Policy Label

Now that groups of stands have been labeled for identification purposes, associated silvicultural activities can be related to them. This is where *Activity Group Policy* labels come into play. Activity Group Policy labels were incorporated into FVS with the introduction of the Event Monitor. A keyword, AGPLABEL, is used to designate an Activity Group Policy label. This keyword is used in conjunction with *conditional scheduled* silvicultural events. In other words, when a user inserts an "If…Then…EndIf" sequence in an FVS projection, by default, an Activity Group Policy label is associated with this treatment. Refer to Figure 2 for an example of Activity Group Policy labeling within a conditionally scheduled event.

```
**********************************************************************
*   RegHarv Rx:
*      Minimum Bd. Ft. harvest >= 2000
*      - If stand age >= 80 years LP
                        90 years other forest types
*           QMD >= 5"
*      - Then
*           regeneration harvest via CC
*      - Initialize Regen Harvest Interval
**********************************************************************
MinHarv            0        0.     2000.        0.
If                 0
_Strata EQ _Type and (Age GE _RHAge and BaDBH GE 5.0)
Then
ThinDBH            0    Parms(0, DBHDist (3,3), 1.0, 0.0, 0.0, 0.0)
ThinDBH            0    Parms(DBHDist (3,3), 999., 1.0, 0.0, 9, 0.0)
AGPLABEL
   Suitable_Convert
EndIf
```

Figure 2—Activity Group Policy Label

If you have not assigned an Activity Group Policy label to an "If" sequence, the warning error described earlier in this paper will appear in your main output report. Methods to alleviate this error will be presented later in this paper.

Implementation of a forest plan requires setting standards and guidelines for distinct management areas. Many stands may be affected by a policy decision established at the programmatic level of planning. An optimal prescription for a given stand may not be feasible when viewed in the context of the entire forest area. There are many planning models available to forest analysts. To simplify solving such rich problems with FVS, the Parallel Processing Extension was developed. As with any FVS entity, there is an associated set of mnemonic keywords. To handle management directions involving many stands, a *Multistand Policy Label* was created. For the resource supply example demonstrated in this paper, three inputs direct the PPE. The first involves the management objective or target for the resource. The second involves the criteria for selecting which stand amongst many will contribute to meeting the management goal. The third involves the unit value of the contributing factor. For example, if the management policy objective were to harvest a specified allowable sale quantity (ASQ) from a particular stand type, a predetermined selection criteria would dictate the order in which stands are harvested (i.e. oldest stands first). The unit value would be in terms of volume rendered (i.e. cubic feet, board feet). Refer to Figure 3 as an example of the setup required to use the Multistand Policy Label.

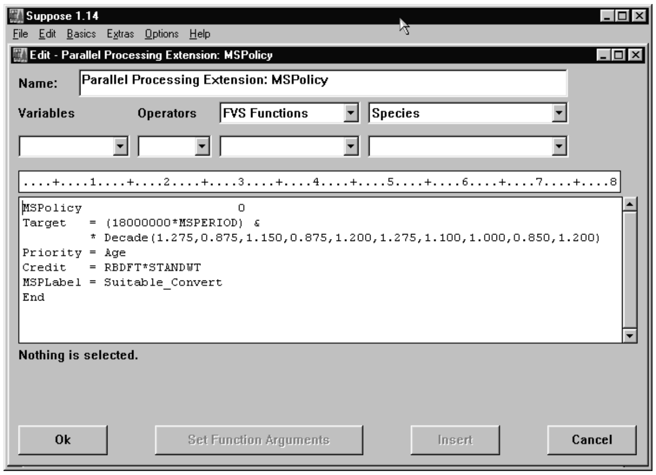


Figure 3—Multistand Policy Label

Parallel Processing Capabilities

Lets expand this discussion to the second facet of this paper, the Parallel Processing Extension of the Forest Vegetation Simulator. At this time, the PPE has the capability to address four types of problems. They are:

1. Multistand treatment scheduling
2. Resource supply trends
3. Contagion in pest dynamics
4. Decision trees

Multistand treatment scheduling involves trade-off analysis. For example, suppose a forested area composed of many stands was utilized for elk hiding cover and timber production. Favoring one entity involves impacts on the other. The PPE allows examination of these tradeoffs. Resource supply analysis involves gaming analysis. For example, suppose a forest analyst wanted to determine if a specified level of timber harvest were sustainable. The PPE, based on resource supply and public demand, can determine the level of diminishing return. A detailed example will be presented later in this paper. Contagion in pest dynamics deals with spatial analysis. For example, suppose a Mountain Pine Beetle epidemic was devastating an area. The PPE can be used to chart the progression of an insect or disease pathogen from one stand into another. Decision trees are used for decision analysis. For example, suppose a silviculturalist was trying to decide on the timing options for a thinning treatment. The PPE could be used to replicate a stand along several pathways to determine the best solution.

For each of these solution processes, labeling plays a vital role. Through the use of unions and intersections of the various text labels (i.e. stand policy, activity group policy, multistand policy), the Parallel Processing Extension performs its magic!

Flathead Example

The age-old adage that “Necessity is the Mother of Invention” holds true. A clause was attached to the Fiscal Year 2000 Senate Appropriations Act regarding U.S. Forest Service funding. The panic paragraph read as follows:

> “According to the Forest Service’s own data, the national forests contain roughly one-half of the nation’s softwood sawtimber inventory. The Committee directs the agency to provide a report to the Committee within 90 days of the enactment of this Act, which using the information currently available, summarizes the current timber growth, inventory, and mortality for each national forest, and nationally for the system as a whole, including projections of timber growth, mortality, and volume of standing inventory for the next 10, 20, and 50 years. To the extent practicable, the report should also include age class and/or structural stage distribution of the stands represented by the data.”

The Appropriations Act passed on November 29, 1999. The clock began to tick. By early February 2000, the Forest Management Service Center received notice that it would lead the charge to prepare a document to fulfill the Senate’s request. In an effort to respond in a timely fashion, selected forests within each Forest Service Region were chosen as representative examples. The Flathead National Forest in northwest Montana was designated forest for the Northern Region (R1).

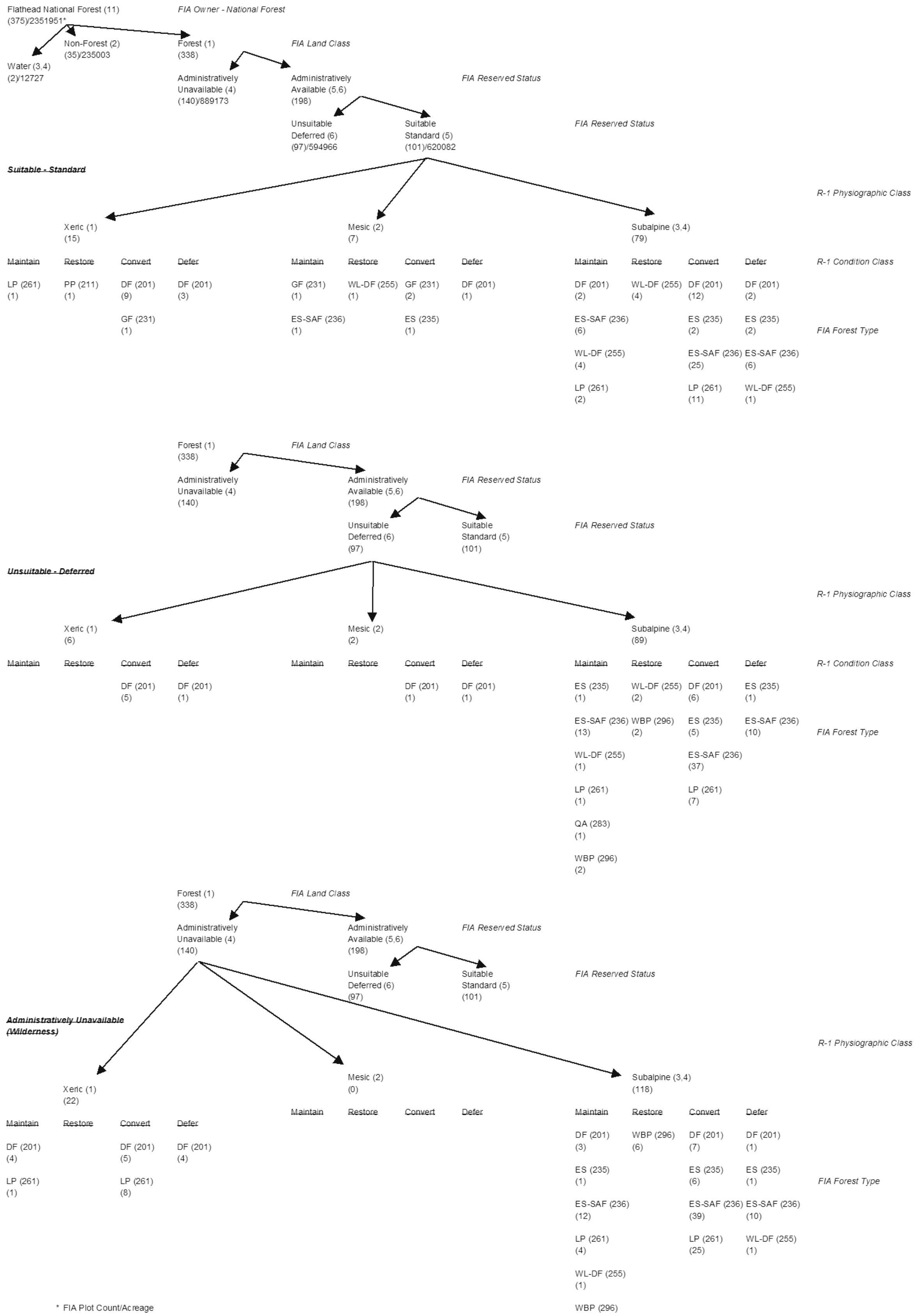


Figure 4—Forestland Classification Diagram

Since the request centered on resource supply (elements of timber stocking [inventory], growth, [harvest], and mortality), the use of FVS-PPE seemed to be a logical fit for the analysis. FVS-PPE also had the ability to project age/structure class distributions. However, up to this point in time, full integration of the labeling capabilities with the Parallel Processing Extension for resource supply trends had not been fully explored.

A systematic approach was developed to perform the required analysis. A framework similar to that used for forest management planning was employed. The major steps in the process were: formulating a forestland classification strategy, prescribing silvicultural choices, forecasting growth and yield, evaluating management polices, and allocating resource assignments. Relevant aspects of each of these steps are presented.

Forestland Classification

The Forest Inventory and Analysis (FIA) data set was used as the principle basis for the analysis. The systematic sampling design of FIA provided acreage values as well as per acre estimates of important plot and tree attributes. A strategy was developed to guide forestland classification assignments. Removing non-forest parcels from the acreage base and stratifying by *administrative availability* and *management suitability* rendered a hierarchal flow for data analysis. Physiographic class and condition class further defined each of the major stand types. Refer to Figure 4. Stand types were developed within each land unit using the Pre-Suppose program. Stand Policy Labels (grouping codes) embedded in the *Stand List Files* guided the assignments (fig. 1).

Silvicultural Options

Silvicultural treatments followed a conceptual framework. Rule sets for vegetation management were developed based on historic fire regimes. Departure of current vegetation due to missed fire return intervals resulted in invasion of shade tolerant tree species. Treatment opportunities were postulated to achieve an ecosystem in proper balance with regard to natural fire frequency. The diagram displayed in Figure 5 defines *condition classes* by major forest cover type and size class. Mechanized treatments and prescription fire comprise the available tools for stand management. Disturbance agents such as insects, disease, and wild fire have an impact on resultant forest structure. Each of these factors were identified and addressed.

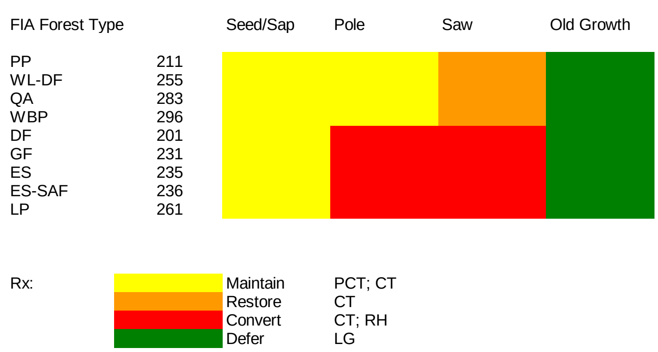


Figure 5—Silvicultural Options

Condition Classes—Four prescription options were recognized: maintenance, restoration, conversion, and deferment. A brief description of each follows.

Maintenance (Maintain) Rx: Applied to young stands. Favorable species exist on a given habitat type. Missed one or less fire intervals.

- Precommercial thin overstocked stands.
- Prescribe fire for fuel reduction.
- Deferring of activities, let grow.
- Commercial thinning as stands mature to regulate stocking and maintain health.

Restoration (Restore) Rx: Applied to older stands. Favorable species exist on a given habitat type. Missed two or less fire intervals. Slight invasion of shade tolerant species.

- Improve stand composition to seral species.
- Precommercial thin overstocked stands.
- Prescribe fire for fuel reduction.
- Commercial thinning as stands mature to regulate stocking and maintain health.

Conversion (Convert) Rx: Applied to older stands. Unfavorable species exist on a given habitat type. Missed two or more fire intervals. Massive invasion of shade tolerant species.

- Improve stand composition to seral species.
- Precommercial thin overstocked stands.
- Prescribe fire for fuel reduction.
- Commercial thinning as stands mature to regulate stocking and maintain health.
- Regeneration harvest to shade intolerant species as opportunity allows based on habitat type.

Deferment (Defer) Rx: Applied to *Old Growth,* defined as stands with 10 or more trees per acre greater than 20 inches dbh.

- Deferring of activities, let growth.
- Monitor stand age and structure.

Silvicultural Prescriptions—Mechanical treatments such as precommercial thinning, commercial thinning, and regeneration harvesting could only be implemented on the *Suitable* forestland base. The following parameters were used in designing the keyword sets for projection with the Forest Vegetation Simulator.

Pre-Commercial Thinnings (PCT): Thin to 500 trees per acre. Favor retention of seral species.

- Stands < 80 years old.
- Stands < 5 inches quadratic mean diameter.
- Stands > 1500 trees per acre.

Commercial Thinnings (CT): Thin to 70 square feet, basal area. Favor retention of seral species.

- Stands ≥ 20 years old.
- Stands ≥ 5 inches quadratic mean diameter.
- Stands ≥ 2,000 bd. ft./acre cut volume.
- Forty-year re-entry period.

Regeneration Harvest (RH): Even-Aged methods. Favor establishment of seral species.

- Stand ≥ age 80 for LP, age 90 for other forest types.
- Stands ≥ 5 inches quadratic mean diameter.
- Stands ≥ 2,000 bd. ft./acre cut volume.
- Leave 9 Legacy Trees for snag replacement.

Let Grow (LG) Rx: Defer Young and Old Growth Stands.

- Young stands < 40 years old (generally).
- Young stands < full stocking.
- Old stands > 120 years old (generally).
- Old stands with 10 trees per acre > 20" dbh.

Prescription Fire—Controlled burns could be used on both *Suitable* and *Unsuitable* forest areas as a low cost treatment to enhance species composition. Although a Fire and Fuels Extension had been developed for the FVS model, linkage to the Parallel Processor Extension had not been made at that time. The PPE was used as the modeling shell to bring the associated analytic pieces together. Keyword sets that simulated low and moderate intensity prescription fire scenarios were developed. Attributes of the prescription fire keyword sets were as follows:

Prescription Fire - Low Intensity

- Applicable only to Shade Intolerant and LP Types (i.e. PP, WL-DF, WBP, QA, LP).
- Used "FixMort" keyword to simulate fire-induced mortality.
    - 50% mortality in trees 0” ≤ dbh < 3”
    - 30% mortality in trees 3” ≤ dbh < 5”
    - 20% mortality in trees 5” ≤ dbh < 9”
    - 10% mortality in trees 9” ≤ dbh < 16”
    - 0% mortality in trees 16” ≤ dbh
    - Indiscriminate to all species.
    - Applicable only to *Suitable_Maintain* and *Restore* forest land classes.
    - Targeted 2,500 acres annually.

Prescription Fire - Moderate Intensity

- Applicable only to Shade Mid-Tolerant and Tolerant Types (i.e. DF, GF, ES, ES-SAF).
- Use "FixMort" keyword to simulate fire-induced mortality.
  - 80% mortality in trees 0” ≤ dbh < 3”
  - 60% mortality in trees 3” ≤ dbh < 5”
  - 50% mortality in trees 5” ≤ dbh < 9”
  - 30% mortality in trees 9” ≤ dbh < 16”
  - 20% mortality in trees 16” ≤ dbh
  - Indiscriminate to all species.
  - Applicable only to *Unsuitable_Convert* forest land classes
  - Targeted 3,500 acres annually.

Forest Health—Forest pests can have a significant impact on the current and future development of a stand. The Northern Regional Office developed forest pest risk maps for all Montana forests including the Flathead. Root rot, bark beetle, and dwarf mistletoe incidence were recorded on the FIA plots. Overlaying risk maps with the FIA plots enabled forecasting potential hazard sites. R-1 Forest Health Specialists developed associated FVS keyword file sets to simulate pest effects. By using the Western Root Disease Extension, these health issues were incorporated into the projections.

Fire Impacts—The Flathead National Forest had compiled a report of recorded wildfires during a ten-year period from 1985 to 1994. Based on this information, FVS keyword file sets were developed to randomly burn the approximate acreage as cited. The following parameters were used:

Wildfire - 1985-1994 period

Forest Land Class	Acres Burned 10 Yrs	Low Intensity 15%	Moderate Intensity 65%	High Intensity 20%
Suitable	12,250	1,837	7,962	2,450
Unsuitable	7,650	1,148	4,973	1,530
Wilderness	2,600	390	1,690	520
Total:	22,500	3,375	14,625	4,500

FVS keyword sets were written to describe each of these facets. Activity Group Policy Labels were assigned within conditionally scheduled events (If … Then … EndIf keyword sequences) to link grouping of stands with their associated treatment/disturbance activity. Refer to figure 2 as an example.

Yield Forecast

Stand projections were performed using the Forest Vegetation Simulator for a 100-year time horizon. Yield estimates were compared and calibrated to measured data as observed from the Flathead FIA data set.

Management Direction

The essence of the Senate Appropriations Committee’s request was that given a specified level of harvest based upon current production output, what would be the resultant condition of the forest in terms of growing stock and mortality rates over the next fifty years. An inference of the current harvest activity needed to be made.

Sale Quantity—The most recent Flathead Revised Forest Plan cited an allowable sale quantity of 54 million board feet per year from *suitable* lands. However, due to market constraints, pending litigation, threatened and endanger species considerations, and other unforeseen issues, the programmed financed sell had been 23 MMBF during the period from 1995 to 1999. This was the harvest level used for the analysis.

Implementation Strategy—Intermediate harvests (i.e. commercial thinnings) were targeted for the younger merchantable size classes of the *maintain* and *restore* condition classes (target 5.0 MMBF). Regeneration harvests were targeted for the older merchantable size classes of the *convert* condition class (target 18.0 MMBF). Also, high bark beetle hazard plots were prioritized for regeneration treatment. Stand improvement treatments (i.e. precommercial thinnings) were restricted to ten percent of the potential area to aid in metering out the acres treated.

Resource Allocation

The Parallel Processing Extension was used to solve the forest trend inquiry. For resource supply analysis, PPE is easy to implement.

PPE Set up—The Suppose interface distinguishes FVS keywords for PPE as one of three component types: top, bottom, and report. Relevant keywords used for resource allocation were as follows:

Top Components

Exact - Instructs PPE to use partial stands to meet target objectives.

Bottom Components

MsPolicy - Signals that a multistand policy will be entered.

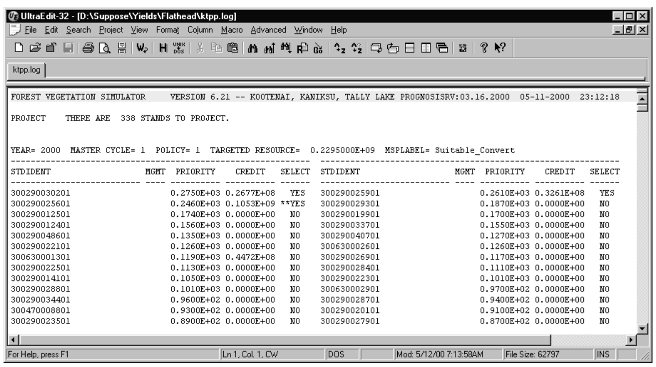
LabWts - Request labels and weights be written to auxiliary file. Used for post processing of stand structure statistics.

Report Components

Yields - Prints composite yield statistics table.

The MsPolicy keyword establishes the parameters associated with the *Multistand Policy Label* (fig. 3). This completes the link between groups of stands (Stand Policy) and their proposed silvicultural treatment (Activity Group Policy). For example, within the *suitable* forest land class on Flathead, there were 29 Douglas-fir stands (fig. 1). The *convert* condition class was comprised of a subset of 12 stands (fig. 4). Regeneration harvest can only be applied to the *suitable_convert* activity group (fig. 2). The overall multistand target for the *suitable_convert* forest land class was 18.0 MMBF (fig. 3). The priority for stand selection to meet target objectives was to harvest the oldest stands first. Their contribution to meeting the target goal was a factor of the stands' removal board foot volume and its size in acres. Therefore, if any Douglas-fir stand within the suitable_convert forest land class was the oldest stand available at that point in the projection, it would be selected for regeneration harvest to meet the target objective of 18.0 MMBF.

PPE Reports—Within the main output report of FVS, two important PPE tables relative to resource supply analysis are generated. The first, the *Targeted Resources Table* (fig. 6), displays a listing of stands selected to meet the management policy objective. Note that the *Priority* column is ordered sequentially from left to right then down in terms of descending stand age. The *Credit* column equates to the selected stands' harvested board foot volume multiplied by the number of acres within the stand. If only part of the stand was needed to meet the exact goal, then the remaining stand acres would be carried to the next time period. Split stands are denoted by a series of two asterisks in the *Select* column within the Targeted Resources table.


UltraEdit-32 - [D:\Suppose\Yields\Flathead\ktpp.log]

FOREST VEGETATION SIMULATOR VERSION 6.21 -- KOOTENAI, KANIKSU, TALLY LAKE PROGNOSISRV:03.16.2000 05-11-2000 23:12:18

PROJECT THERE ARE 338 STANDS TO PROJECT.

YEAR= 2000 MASTER CYCLE= 1 POLICY= 1 TARGETED RESOURCE= 0.2295000E+09 MSPLABEL= Suitable_Convert

STDIDENT	MGMT	PRIORITY	CREDIT	SELECT	STDIDENT	MGMT	PRIORITY	CREDIT	SELECT
300290030201		0.2750E+03	0.2677E+08	YES	300290025901		0.2610E+03	0.3261E+08	YES
300290025601		0.2460E+03	0.1053E+09	**YES	300290029301		0.1870E+03	0.0000E+00	NO
300290012501		0.1740E+03	0.0000E+00	NO	300290019901		0.1700E+03	0.0000E+00	NO
300290012401		0.1560E+03	0.0000E+00	NO	300290033701		0.1550E+03	0.0000E+00	NO
300290048601		0.1350E+03	0.0000E+00	NO	300290040701		0.1270E+03	0.0000E+00	NO
300290022101		0.1260E+03	0.0000E+00	NO	300630002601		0.1260E+03	0.0000E+00	NO
300630001301		0.1190E+03	0.4472E+08	NO	300290026901		0.1170E+03	0.0000E+00	NO
300290022501		0.1130E+03	0.0000E+00	NO	300290028401		0.1110E+03	0.0000E+00	NO
300290014101		0.1050E+03	0.0000E+00	NO	300290022301		0.1010E+03	0.0000E+00	NO
300290028801		0.1010E+03	0.0000E+00	NO	300630002901		0.9700E+02	0.0000E+00	NO
300290034401		0.9600E+02	0.0000E+00	NO	300290028701		0.9400E+02	0.0000E+00	NO
300470008801		0.9300E+02	0.0000E+00	NO	300290020101		0.9100E+02	0.0000E+00	NO
300290023501		0.8900E+02	0.0000E+00	NO	300290027901		0.8700E+02	0.0000E+00	NO

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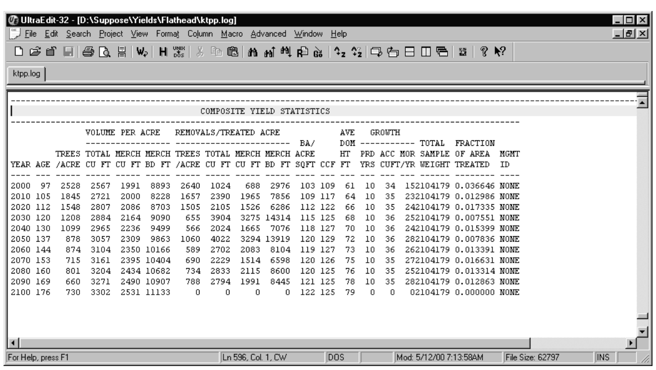
Figure 6—Targeted Resources Table

The second important PPE table to review is the *Composite Yield Statistics Table* (fig. 7). Average removal volume per acre is displayed. *Total Sample Weight* [acres] and *Fraction of Area Treated* are also presented. Multiplying these terms together will render the targeted volume goal. The Table Output Selection Screen (TOSS) post processor can be used to extract these tables from the main FVS output report.


UltraEdit-32 - [D:\Suppose\Yields\Flathead\ktpp.log]

COMPOSITE YIELD STATISTICS

			VOLUME PER ACRE			REMOVALS/TREATED ACRE						AVE	GROWTH					
YEAR	AGE	TREES /ACRE	TOTAL CU FT	MERCH CU FT	MERCH BD FT	TREES /ACRE	TOTAL CU FT	MERCH CU FT	MERCH BD FT	BA/ ACRE SQFT	CCF	DOM HT FT	PRD YRS	ACC CUFT/YR	MOR	TOTAL SAMPLE WEIGHT	FRACTION OF AREA TREATED	MGMT ID
2000	97	2528	2567	1991	8893	2640	1024	688	2976	103	109	61	10	34	15	2104179	0.036646	NONE
2010	105	1845	2721	2000	8228	1657	2390	1965	7856	109	117	64	10	35	23	2104179	0.012986	NONE
2020	112	1548	2807	2086	8703	1505	2105	1526	6286	112	122	66	10	35	24	2104179	0.017335	NONE
2030	120	1208	2884	2164	9090	655	3904	3275	14314	115	125	68	10	36	25	2104179	0.007551	NONE
2040	130	1099	2965	2236	9499	566	2024	1665	7076	118	127	70	10	36	24	2104179	0.015399	NONE
2050	137	878	3057	2309	9863	1060	4022	3294	13919	120	129	72	10	36	28	2104179	0.007836	NONE
2060	144	874	3104	2350	10166	589	2702	2083	8104	119	127	73	10	36	26	2104179	0.013391	NONE
2070	153	715	3161	2395	10404	690	2229	1514	6598	120	126	75	10	35	27	2104179	0.016631	NONE
2080	160	801	3204	2434	10682	734	2833	2115	8600	120	125	76	10	35	25	2104179	0.013314	NONE
2090	169	660	3271	2490	10907	788	2794	1991	8445	121	125	78	10	35	28	2104179	0.012863	NONE
2100	176	730	3302	2531	11133	0	0	0	0	122	125	79	0	0	0	2104179	0.000000	NONE

For Help, press F1 | Ln 596, Col. 1, CW | DOS | Mod: 5/12/00 7:13:58AM | File Size: 62797 | INS

Figure 7—Composite Yield Statistics Table

Additionally, the FVSSTAND Alone post processor can be used to produce stand and stock tables from treelists generated by the PPE. Attributes of live tree stocking, growth, harvest, and mortality can be reported. A composite yield table is produced that can be directly imported into a commercial spreadsheet program.

Wrap-Up

By using the labelling capabilities and Parallel Processing Extension of the Forest Vegetation Simulator, a comprehensive analysis of a resource supply problem was addressed. As requested by the FY2000 Senate Appropriations Committee, trends in forest stocking as impacted by changes in growth, harvest, and mortality were reported. Figure 8 displays the projected outcome relative to board foot volume over the next fifty-year period. Live tree stocking showed an ever-increasing accumulation as a result of forest growth outpacing harvest and mortality components.

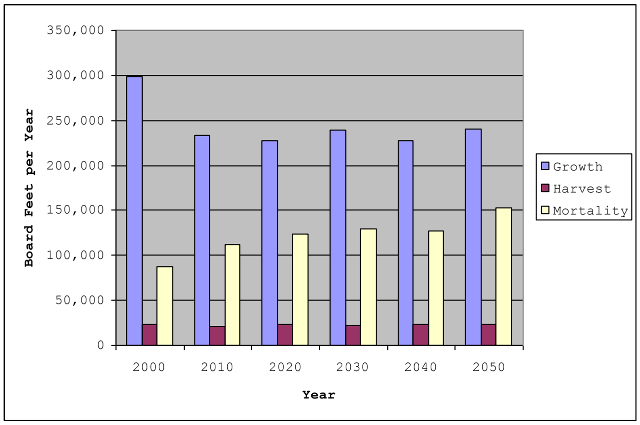


Figure 8—Flathead NF – Board Foot Volume Trends

<u>Acknowledgements</u>—The complexities of the Flathead example could not have been fully developed without the input and oversight provided by Doug Berglund, Forest Silviculturalist, Flathead National Forest. Doug's consummate knowledge of local history, ecology, and silviculture proved invaluable. Many thanks to Doug. Barry Bollenbacher, Region 1 Silviculturalist, and George Lightner (retired), Region 1 Inventory Specialist, provided preliminary support data and direction.

<u>Answer: "All"</u>—As promised, the way to suppress the warning error related to assigning a stand policy label to an activity group (opening paragraphs) is to include the following sequence prior the closing EndIf keyword:

If

Then

AGPLabel
    All
EndIf

Remember that Activity Group Policy Labels are associated with conditionally scheduled events (If … Then … EndIf keywords). Each forest stand is assigned the "All" Stand Policy Label by default. Using "All" in conjunction with the Activity Group Label will link both labels and thus suppress the warning error.

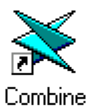
Life is '*good*' once more now that you know proper FVS labelling techniques.

Notes:

<u>Topic Combine:</u> **Time to Combine**

Concepts: aggregate means, modes, medians and much more with the Combine Post-Post Processor.

Forest planning projects often require summarizing data at the strata level. This usually entails compiling output from individual samples (i.e. inventory plots or stands) and reporting composite values. Inventory data is generally quantitative or qualitative in nature. That is, the metric was derived by either counting or classifying the data item. Quantitative and qualitative data are represented by two *variable* types: continuous and classification, respectively. Continuous variables span a range of values and are normally presented as integer or real numbers. Classification variables are discrete labels and are normally displayed as alpha or numeric characters. Examples of continuous variables are site index, trees per acre, and board foot volume. Examples of classification variables are forest cover type, stand structure class, and fire hazard rating. A statistical 'mean' is computed from continuous data to represent the average strata value. A statistical 'mode' is determined from classification data to represent the highest frequency label. The Combine program was written to facilitate the derivation of pre-eminent values. The objective of this topic will be to familiarize users of the many features of the Combine program. An example, based upon the Kootenai and Idaho Panhandle National Forests Planning Zone (KIPZ) project, will be presented to demonstrate program operation.



Why Combine?

A fundamental step in forest planning is the analysis of the management situation. Various alternatives are proposed to guide future programmatic direction. Inherent to the analysis process is the gathering of inventory data and the projection of potential outcomes. Computer models play an important role in the projection process and formulation of management alternatives. Generally, two types of computer programs are used for forest planning. They are a yield forecasting model and a decision support system. An analogy could be drawn to a mechanized vehicle. The yield model is akin to the motor. It powers current and future developments by providing value estimates. The decision support model is analogous to the chassis. It pulls together the resource supply and user demand components of forest planning. Coefficients computed by the yield model are keyed into the decision support model to drive allocation decisions.

Accounting Variables

A list of output variables is developed that are comprised of yield estimates. These values would be input into the forest planning model to aid in solving for the best combination of activities subject to resource constraints. Yield values for forest overstory cover type, understory attributes, stand structure, insect hazard, snag counts, wildfire rating, and harvest capacity can be generated by the Forest Vegetation Simulator. Several post processing programs have been written to produce the accounting variables needed for forest planning. Use of the various post processors follows.

FVSSTAND Yield Files

The FVSSTAND Alone post processing program contains several features designed for yield table production.

1. Aggregates data from one or many plots to produce composite results.
2. Tracks the total and treated inventory plots counts.
3. Generates many of the standard plot level accounting variables (i.e. stand age, average site index, culmination of mean annual increment, quadratic mean diameter).
4. Generates many of the standard tree level accounting variables (i.e. trees per acre, basal area per acre, cubic foot volume per acre, and board foot volume per acre).
5. Produces yield files per individual species or species group (i.e. Softwood, Hardwood appraisal groups).
6. Subtotals output values by size class (i.e. 0"-5" diameter class, "5-9" diameter class, 9"-15" diameter class, 15"+ diameter class).
7. Computes proportion of removal harvest volume versus beginning standing volume.

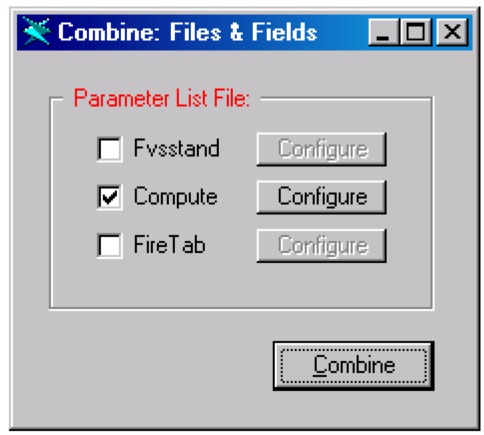
Perhaps the greatest asset of using FVSSTAND for generated yield table values is that it does not draw upon FVS internal memory arrays. FVS has limited capacity regarding the number of Event Monitor variables that can be computed and the number of conditional statements that can be defined. These internal program resources can be quickly exhausted when trying to develop classification coding schemes. Using FVSSTAND to produce standard accounting variables is a wise choice. For the KIPZ forest plan revision project, All Species Combined yield profiles were generated for mature, mid-age, young, and sapling size classes. Values for live and harvest tree components were also produced.

Compute Files

User defined variables can be declared using the Event Monitor, "Compute" keyword functionality, embedded within the Forest Vegetation Simulator. The Compute post processor program can be used to create a comma/column delimited file of variables generated by the Event Monitor. Regarding the KIPZ project, the pre-defined variables for forest cover type (ForTyp), size class (SizCls), and stocking class (StkCls) were assigned to user defined variables. The pre-defined Event Monitor function SpMcDbh was used to calculate canopy cover. Classification algorithms were coded to rank beetle, budworm, and tussock moth hazard. Lynx habitat was also declared. Designated user defined variables were parsed into an output file (*.csv) generated by the Compute post processor program.

FireTbl Tables

The FireTbl post processor generates a comma/column delimited table of values contained in the 'Potential Fire Report' and 'All Fuels Report' of the Main FVS Output file. These tables are produced by the Fire and Fuels Extension of the FVS model. In regards to the KIPZ project, crowning and torching index were computed and used to determine wildfire potential severity. Small and large snags counts were also reported for wildlife habitat purposes.



Of Means and Modes

Vegetation yields can be expressed in quantitative and qualitative terms. Quantitative data are described by continuous variables that render 'mean' or average value estimates. Examples are: average trees per acre, basal area, or volume units. Qualitative data are described by classification variables that render 'mode' or count value estimates. The class with the maximum count represents the strata condition. Examples are: structural stage, insect hazard, and fire severity.

The "Combine" computer program was initially written for the Black Hills National Forest, Phase II Amendment process, for the following reasons:

1. Re-compute the Compute output files to assign stand age class (10-year basis).
2. Re-compute the Compute output files to save FVS memory elements.
3. Calculate Compute strata mean values for continuous data items.
4. Calculate Compute strata mode values for classification data items.
5. Re-compute the FireTbl output tables to assign stand age class (10-year basis).
6. Re-compute the FireTbl output tables to save FVS memory elements.
7. Calculate FireTbl strata mean values for continuous data items.
8. Calculate FireTbl strata mode values for classification data items.
9. Combine yield file output from FVSSTAND, Compute, and FireTbl into one composite yield table.

The Combine program was initially written to run as a stand alone program for testing purposes. It was further enhanced to run in batch mode (without user prompts) to allow sequential processing of stand types.

The Combine program was the first attempt by an FVS post processor to generically scale accounting variables by either mean or mode processing. Two options for resolving ties to determine mode values for classification data were allowed. If it was reasonable to favor minimum values, then an ascending sort order could be specified. Thus, if two class variables had the exact number of plots counts representing the strata, then the lesser value would be chosen. For example, if a stand type yield estimate for structural size class rendered equal plot counts for large-mature and old growth, it is more desirable to be conservative and use the large-mature size class call rather than old growth. Sorting the mode column in an ascending fashion would accommodate this logic. If it was reasonable to favor maximum values, then a descending sort order could be specified. Good examples would be for insect and fire hazard. Responsiveness to impending impacts would be sensible.

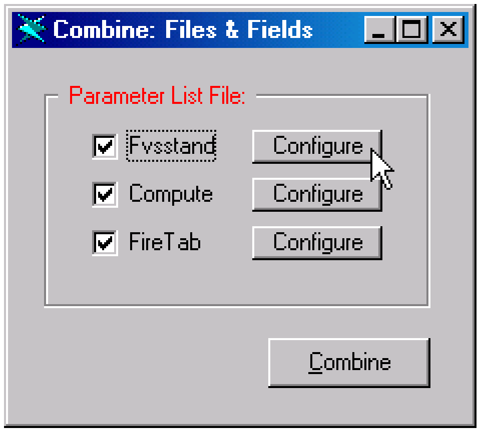
The ability to aggregate output columns from several post processing programs was also a unique feature of the Combine program. Further development of Combine was pursued to produce a fully featured program.

Post-Post Processing

"Combine" is fairly straightforward to use. Simply mouse click the checkbox for the FVS post processing output tables that you would like to merge, declare the variables to include; define the aggregation method per variable; and, proceed to combine the results. Let's try a sample using the KIPZ as an example.

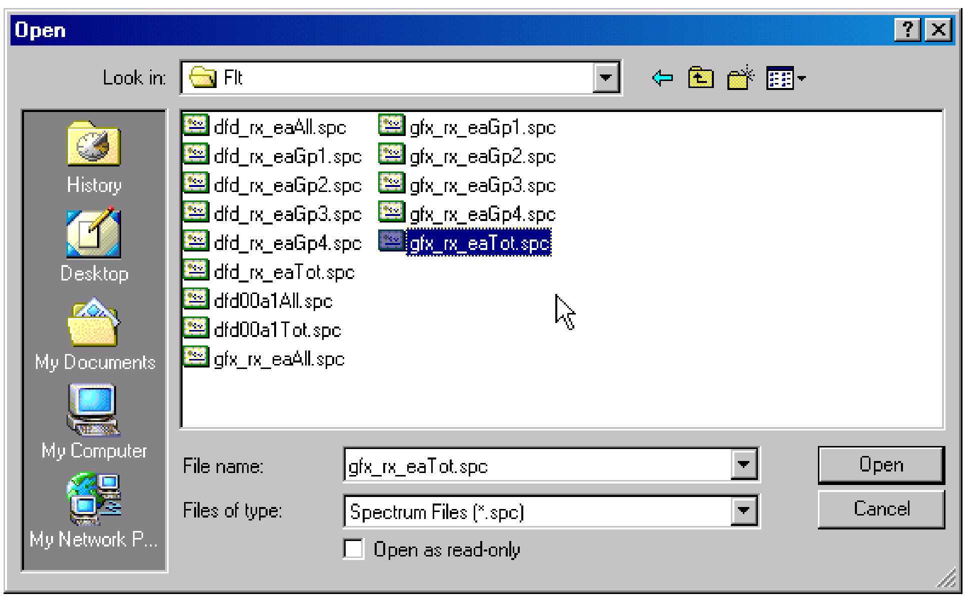
Selecting the Post Processing Reports

From the main "Combine" window, click the checkbox adjacent to the appropriate post processing program. Click the associated 'Configure' command button to advance to the next form.

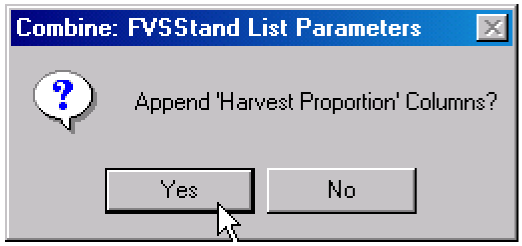


Selecting the Fvsstand Yield File

The MS-Windows common dialogue box for opening files will appear. Navigate to the \Fvsstand\Flt folder that contains the *.spc file to process. "Combine" only works on files with a one-row header. Fvsstand produces two forms of yield files: Flat files, filename extension of *.flt, that contain a two-row header; and, Spectrum Import files, filename extension of *.spc, that contain a one-row header. Make sure to create and use the *.spc yield files with "Combine". The file open window will default to 'Files of type:' Spectrum Files (*spc).

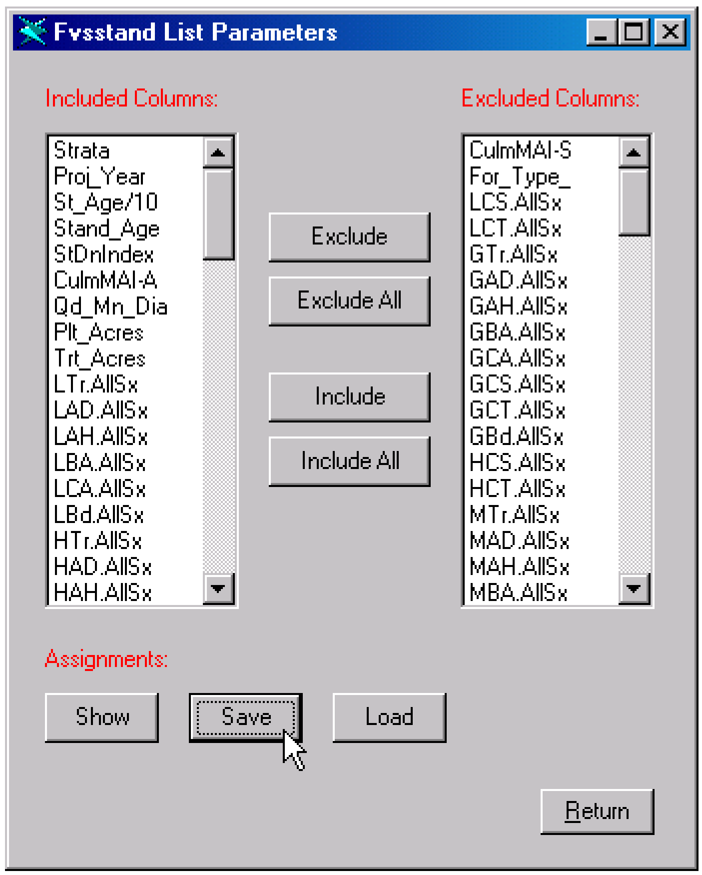


The Fvsstand Alone post processor calculates harvest proportions as a division of harvest volume by pre-harvest standing volume. An associated *.pro file is created with the same filename as the *.spc file. A message box appears prompting as to append the harvest proportions to the *.spc file or not. For the KIPZ project, harvest proportions were included in the "Combine" yield files.



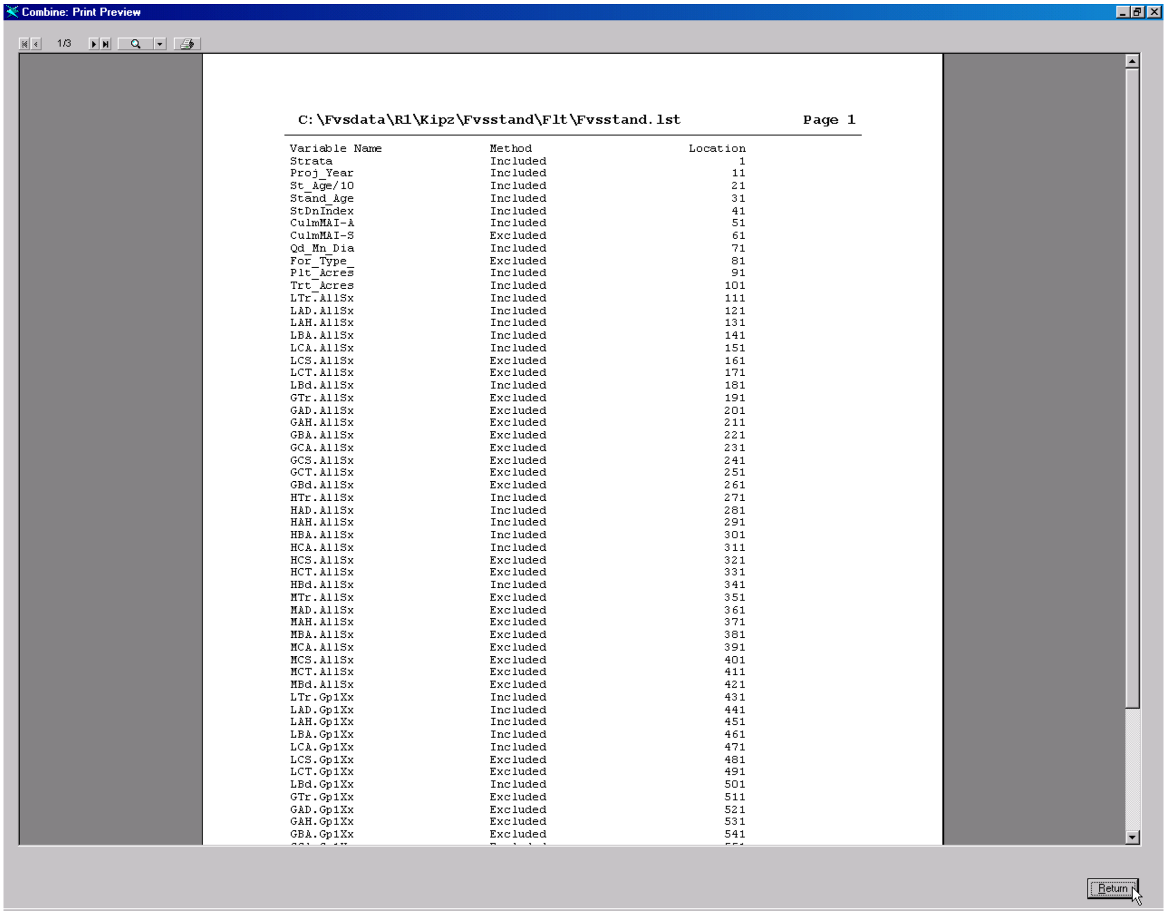
Configuring the Fvsstand Yield File

A narrow vertical window will appear that displays the output variable list generated by the Fvsstand Alone post processor. The listbox on the left contains the ‘Included Columns’ and the listbox on the right contains the ‘Excluded Columns’. Use the ‘Exclude’, ‘Exclude All’, ‘Include’, and ‘Include All’ command buttons to move variables from the left to right and right to left. Double mouse-clicking will also move a variable into the opposite listbox. This window assists in winnowing the desired variables to include in the composite yield table.



Once satisfied with the inclusion/exclusion of variables, choose to “Save” the assignments to store as a parameter list for the Fvsstand Alone yield file. Upon return to this form, the “Load” option can be use to retrieve the preset configurations.

To view the assignments per variable, the “Show” command button will display a ‘Print Preview’ window presenting the status of the variable assignments for the Fvsstand yield file. Choose “Return” to go back to the ‘Fvsstand List Parameters’ window. Choose “Return” again to go back to the main ‘Combine’ window.

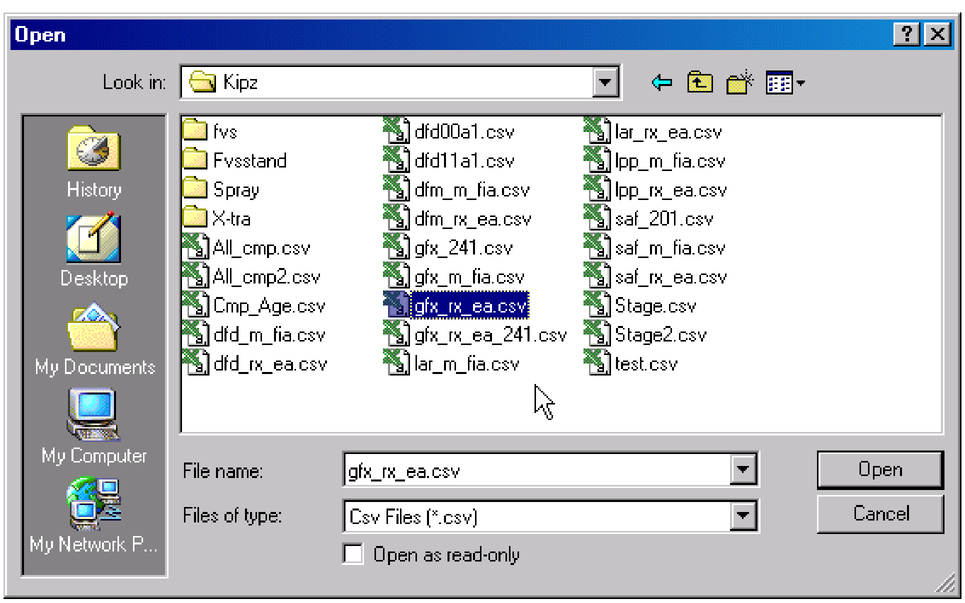


C:\Fvsdata\R1\Kipz\Fvsstand\Flt\Fvsstand.lst Page 1

Variable Name	Method	Location
Strata	Included	1
Proj_Year	Included	11
St_Age/10	Included	21
Stand_Age	Included	31
StDnIndex	Included	41
CulmMAI-A	Included	51
CulmMAI-S	Excluded	61
Qd_Mn_Dia	Included	71
For_Type_	Excluded	81
Plt_Acres	Included	91
Trt_Acres	Included	101
LTr.AllSx	Included	111
LAD.AllSx	Included	121
LAH.AllSx	Included	131
LBA.AllSx	Included	141
LCA.AllSx	Included	151
LCS.AllSx	Excluded	161
LCT.AllSx	Excluded	171
LBd.AllSx	Included	181
GTr.AllSx	Excluded	191
GAD.AllSx	Excluded	201
GAH.AllSx	Excluded	211
GBA.AllSx	Excluded	221
GCA.AllSx	Excluded	231
GCS.AllSx	Excluded	241
GCT.AllSx	Excluded	251
GBd.AllSx	Excluded	261
HTr.AllSx	Included	271
HAD.AllSx	Included	281
HAH.AllSx	Included	291
HBA.AllSx	Included	301
HCA.AllSx	Included	311
HCS.AllSx	Excluded	321
HCT.AllSx	Excluded	331
HBd.AllSx	Included	341
MTr.AllSx	Excluded	351
MAD.AllSx	Excluded	361
MAH.AllSx	Excluded	371
MBA.AllSx	Excluded	381
MCA.AllSx	Excluded	391
MCS.AllSx	Excluded	401
MCT.AllSx	Excluded	411
MBd.AllSx	Excluded	421
LTr.Gp1Xx	Included	431
LAD.Gp1Xx	Included	441
LAH.Gp1Xx	Included	451
LBA.Gp1Xx	Included	461
LCA.Gp1Xx	Included	471
LCS.Gp1Xx	Excluded	481
LCT.Gp1Xx	Excluded	491
LBd.Gp1Xx	Included	501
GTr.Gp1Xx	Excluded	511
GAD.Gp1Xx	Excluded	521
GAH.Gp1Xx	Excluded	531
GBA.Gp1Xx	Excluded	541

Selecting the Compute File

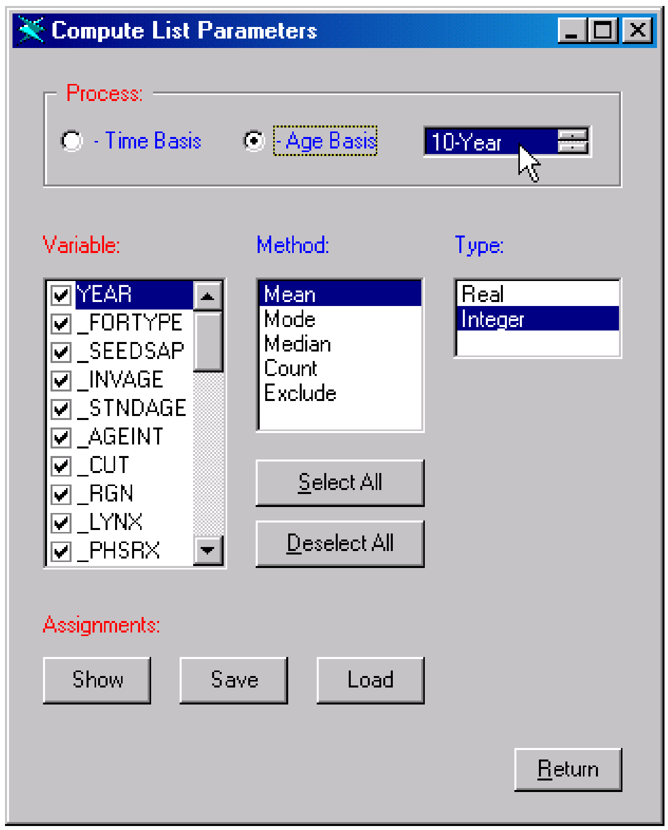
Clicking the “Configure” command button right of the Compute checkbox will invoke the Open File dialogue window to appear to allow selecting the appropriate Compute file to process.



By default, comma-separated-values (*.csv) file types will be displayed. Depending on the configuration settings for Compute post processing program within the Suppose interface the filename extension for the Compute program may vary from the *.csv filename extension. To change to *.csv, modification of the Suppose.prm text file may be required. To choose a file type different from *.csv, click the down arrow right of the listbox for the 'Files of type:' label. Filename extension of *.cp2 and *.all are available from the picklist.

Configuring the Compute File

Once the appropriate Compute file has been selected, the 'Compute List Parameters' window will appear. Prior to designating the variable assignments, make sure to indicate the type of processing that was done during the simulation. Two forms of data aggregation are available. Either a 'Time Basis' or 'Age Basis' can be chosen. Time basis indicates that the data should be arrayed by projection cycle. Age basis signifies that the resultant data should be arranged using stand age. Use the radio buttons to declare the proper method. It is important also to designate the 'Common Start Year' for 'Time Basis' or the 'Age Interval' for the 'Age Basis' aggregation method. The age interval has to match the FVS Time Interval length and the age interval specified for the Fvsstand output table. A 5-Year, 10-Year, or 15-Year interval can be indicated. *It is imperative to include an "_AGEINT" computed variable in the simulation run for 'Age Basis' aggregation (i.e. _AgeInt=_StndAge/10).* 'Combine' uses this variable for arraying common stand age rows within the Compute file.



Once the Process Method has been configured, the individual variable assignments can be made. The left listbox displays all available variable contained within the Compute output file. An associated check in the listbox indicates to include this variable. Options for aggregation are for computing a Mean, Mode, Median, or Count value. For the arithmetic mean, one of two types can be used: Real means to produce floating point number output, and, Integer means to display whole number output. For the statistical mode, use either Ascending or Descending order to resolve ties in frequency counts. Computing the Median is handy for instances where the associated data item contains extreme values. For example, crowning and torching index as related to wildfire intensity is measured in terms of wind speeds. Low crowning and torching indices have wind speeds in the order of magnitude of thousands mph. Whereas, high crowning and torching is indicated by wind speed values of zero. To offset this extreme range, Median output is best. Use the Count method to convey a plot count for a particular data item. For the KIPZ project, a Compute Variable was defined to indicate whether an FIA plot resided in Lynx habitat or not. Silvicultural treatments that prescribe commercial thinning could not be used in these areas. To have an inference of the magnitude of this management action, the Count method was used to sum the plots. If a variable was used auxiliary purposes and not needed for reporting in the output Combine file, the Exclude method can be employed.

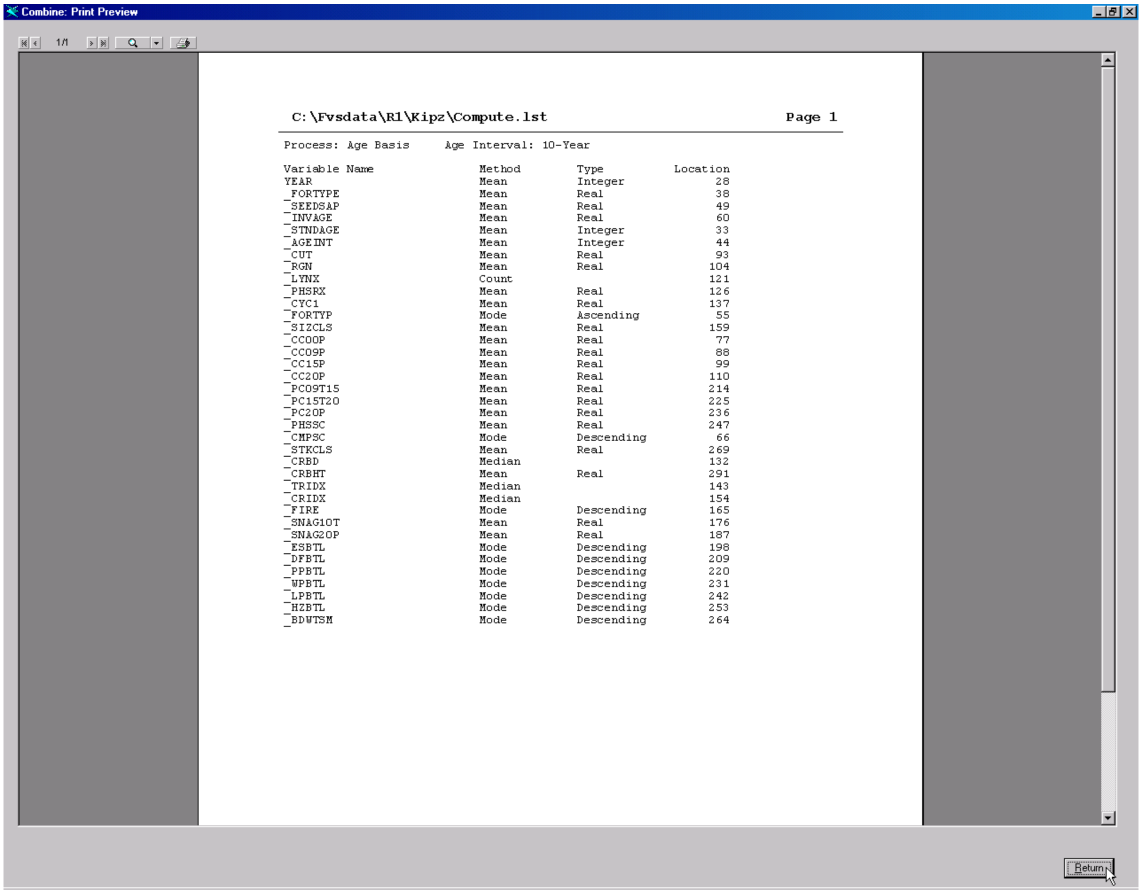
IMPORTANT NOTE: The left listbox is used to indicate current status of a specific variable. To change a variables assignment, use the following steps:

1. Select the variable in the left listbox {its current assignments regarding Method and Type are displayed}
2. Chose the appropriate Method {associated processing Type are displayed}
3. Chose the appropriate Type {be cognizant of the affects in the Combine output file}
4. Reselect the variables in the left listbox {its updated assignment for Method and Type will be displayed}

The “Select All” command button will put a check mark in the left listbox for all variables. Their default Method will be Mean and their Type will be Real. To exclude all variable from the listbox use the “Deselect All” command button. It would behoove the user to follow up with the individual variable declarations.

Once all of the variable assignments have been made, click the “Save” button to store the input parameters to the ‘Compute.lst’ text file. This file can subsequently be renamed (it is advised to do so) to associate to a relate project. This will aid for retrieval at a later time. Use the “Load” command button to populate the Compute List Parameters form with a file of stored variable assignments.

The “Show” command button can be used to display a Print Preview window of the variable assignments for the Compute output file. Use this view to confirm the processing method and type per variable. The icons in the upper right corner of the form can be used to configure the Print Preview and to print a hardcopy to the default printer. Choose “Return” button to go back to the ‘Compute List Parameters’ window. Choose “Return” again to go back to the main ‘Combine’ window.



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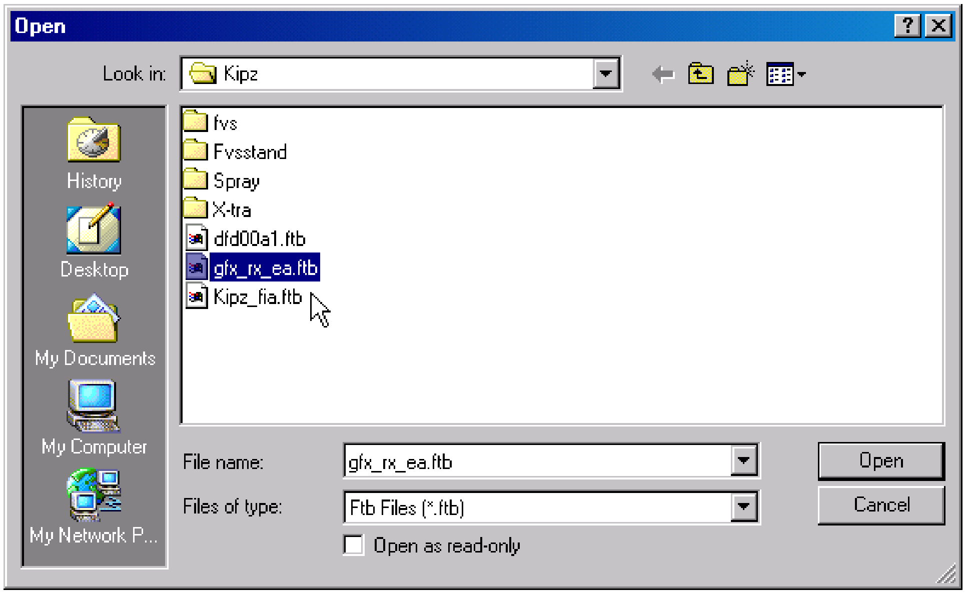
Process: Age Basis Age Interval: 10-Year

Variable Name	Method	Type	Location
YEAR	Mean	Integer	28
_FORTYPE	Mean	Real	38
_SEEDSAP	Mean	Real	49
_INVAGE	Mean	Real	60
_STNDAGE	Mean	Integer	33
_AGEINT	Mean	Integer	44
_CUT	Mean	Real	93
_RGN	Mean	Real	104
_LYNX	Count		121
_PHSRX	Mean	Real	126
_CYC1	Mean	Real	137
_FORTYP	Mode	Ascending	55
_SIZCLS	Mean	Real	159
_CC00P	Mean	Real	77
_CC09P	Mean	Real	88
_CC15P	Mean	Real	99
_CC20P	Mean	Real	110
_PC09T15	Mean	Real	214
_PC15T20	Mean	Real	225
_PC20P	Mean	Real	236
_PHSSC	Mean	Real	247
_CMPSC	Mode	Descending	66
_STKCLS	Mean	Real	269
_CRBD	Median		132
_CRBHT	Mean	Real	291
_TRIDX	Median		143
_CRIDX	Median		154
_FIRE	Mode	Descending	165
_SNAG10T	Mean	Real	176
_SNAG20P	Mean	Real	187
_ESBTL	Mode	Descending	198
_DFBTL	Mode	Descending	209
_PPBTL	Mode	Descending	220
_WPBTL	Mode	Descending	231
_LPBTL	Mode	Descending	242
_HZBTL	Mode	Descending	253
_BDWTSM	Mode	Descending	264

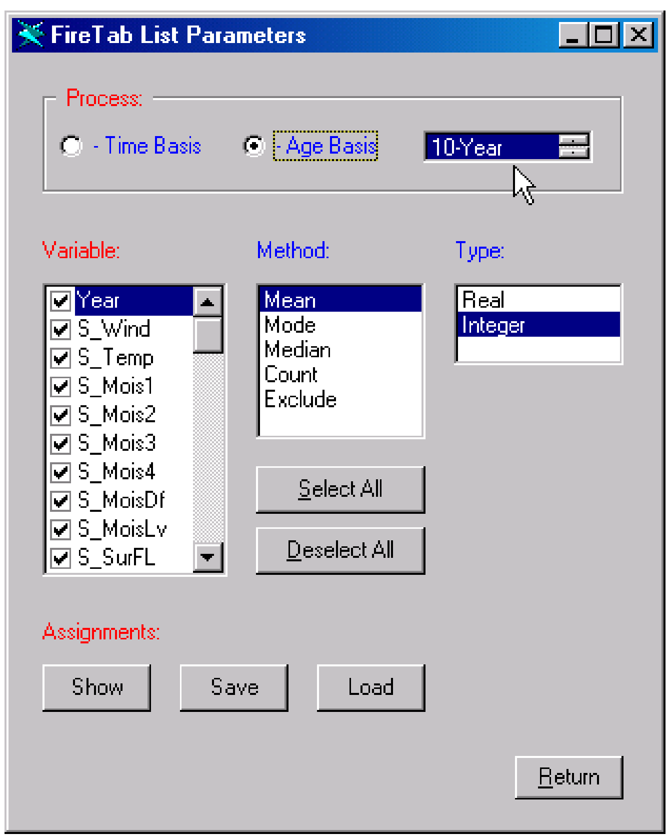
Selecting the Fire Table File

The Fire Table post processor extracts information from the ‘Potential Fire Report’ and ‘All Fuels Report’ of the Main FVS Output file and reformats it into a comma/column delimited output file. Upon clicking the “Configure” button adjacent to the FireTab checkbox, the File/Open window will prompt to select *.ftb files. Select the appropriate Fire Table report to open.



Configuring the Fire Table File

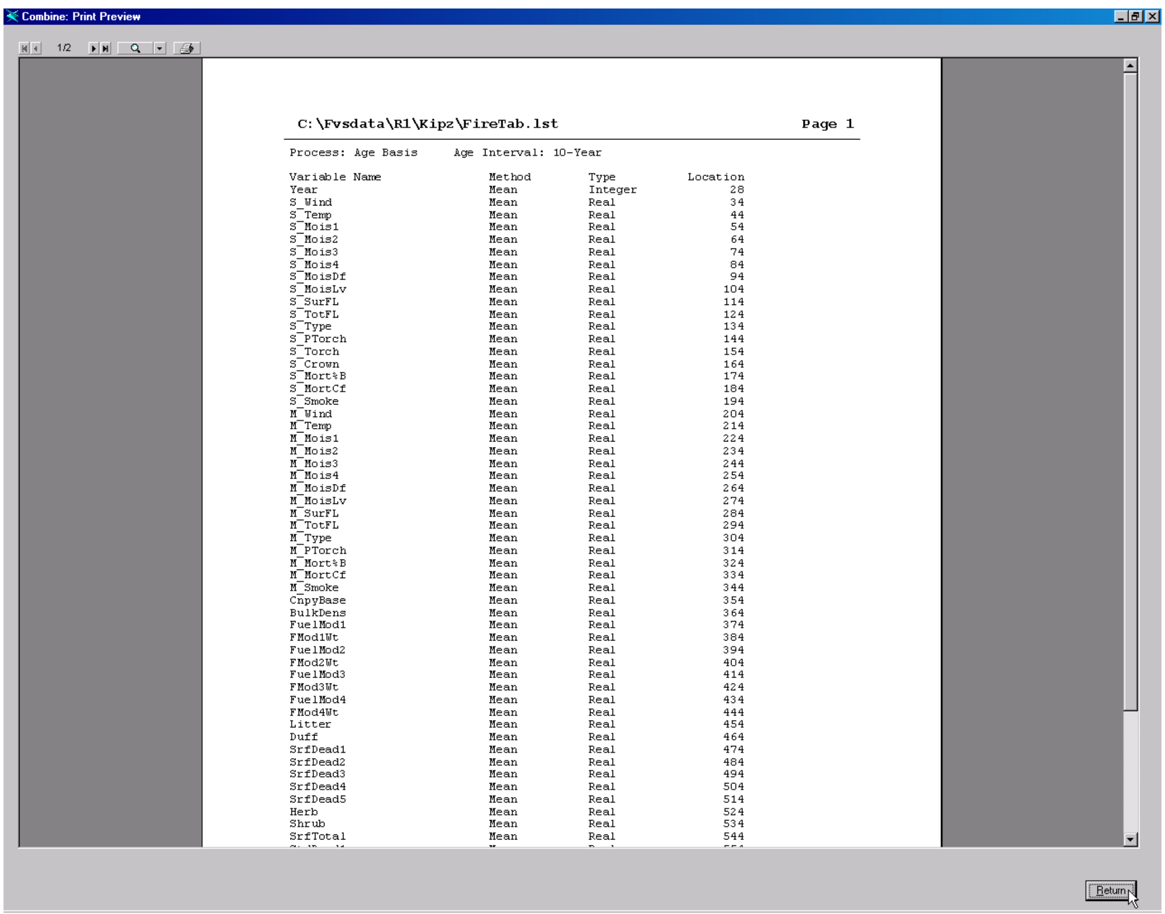
The ‘FireTab List Parameters’ window works exactly as the ‘Compute List Parameters’ window. Be sure to indicate whether ‘Time Basis’ or ‘Age Basis’ processing for combining the files. If time basis is selected, then the common start year will have to be specified. If age basis is chosen, then the proper age interval will need to be designated.



Proceed to assign the individual data items with their method of combining. If Means or Modes are selected, an associated Type will need to be picked. The left listbox displays the current status of each variable. Once a Method and Type has been clicked, the assignment status changes. Be sure to revisit the left listbox to double-check the variable's assignment.

The parameters of the FireTab List form can be stored via the "Save" command button. Use the "Load" button to retrieve saved settings. Be sure to rename the default FireTab.lst file to a filename relevant to the working project. The Combine program uses the FireTab.lst file for processing purposes. This file is overwritten with subsequent runs of Combine. To insure not losing precise settings, save a version of the FireTab.lst as some other named file.

The "Show" button on the FireTab List Parameters window will invoke a Print Preview display of the current variable assignments from the Fire Table post processor. Review and confirm the settings. Change where needed. For record keeping purposed, print a copy using the icon in the upper left corner. Use the "Return" button to go back to the FireTab parameters window. Use the "Return" button on this form to return to the main Combine window.



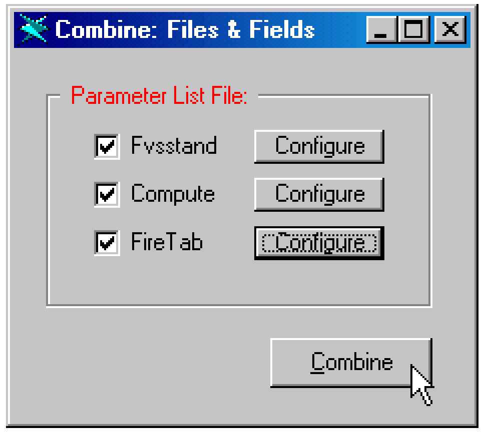
C:\Fvsdata\R1\Kipz\FireTab.lst Page 1

Process: Age Basis Age Interval: 10-Year

Variable Name	Method	Type	Location
Year	Mean	Integer	28
S_Wind	Mean	Real	34
S_Temp	Mean	Real	44
S_Mois1	Mean	Real	54
S_Mois2	Mean	Real	64
S_Mois3	Mean	Real	74
S_Mois4	Mean	Real	84
S_MoisDf	Mean	Real	94
S_MoisLv	Mean	Real	104
S_SurFL	Mean	Real	114
S_TotFL	Mean	Real	124
S_Type	Mean	Real	134
S_PTorch	Mean	Real	144
S_Torch	Mean	Real	154
S_Crown	Mean	Real	164
S_Mort%B	Mean	Real	174
S_MortCf	Mean	Real	184
S_Smoke	Mean	Real	194
M_Wind	Mean	Real	204
M_Temp	Mean	Real	214
M_Mois1	Mean	Real	224
M_Mois2	Mean	Real	234
M_Mois3	Mean	Real	244
M_Mois4	Mean	Real	254
M_MoisDf	Mean	Real	264
M_MoisLv	Mean	Real	274
M_SurFL	Mean	Real	284
M_TotFL	Mean	Real	294
M_Type	Mean	Real	304
M_PTorch	Mean	Real	314
M_Mort%B	Mean	Real	324
M_MortCf	Mean	Real	334
M_Smoke	Mean	Real	344
CnpyBase	Mean	Real	354
BulkDens	Mean	Real	364
FuelMod1	Mean	Real	374
FMod1Wt	Mean	Real	384
FuelMod2	Mean	Real	394
FMod2Wt	Mean	Real	404
FuelMod3	Mean	Real	414
FMod3Wt	Mean	Real	424
FuelMod4	Mean	Real	434
FMod4Wt	Mean	Real	444
Litter	Mean	Real	454
Duff	Mean	Real	464
SrfDead1	Mean	Real	474
SrfDead2	Mean	Real	484
SrfDead3	Mean	Real	494
SrfDead4	Mean	Real	504
SrfDead5	Mean	Real	514
Herb	Mean	Real	524
Shrub	Mean	Real	534
SrfTotal	Mean	Real	544

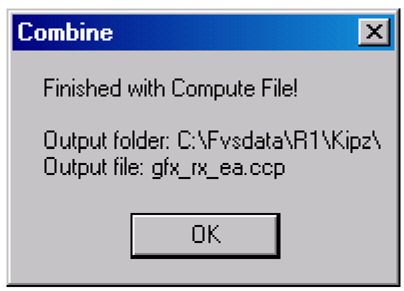
Combine Time

Once one or all of the post processing reports have been configured with their proper variable assignments, they are ready to be blended into one output report. Click the "Combine" command button on the main form. A series of message boxes will appear indicating the processing status per post processor.



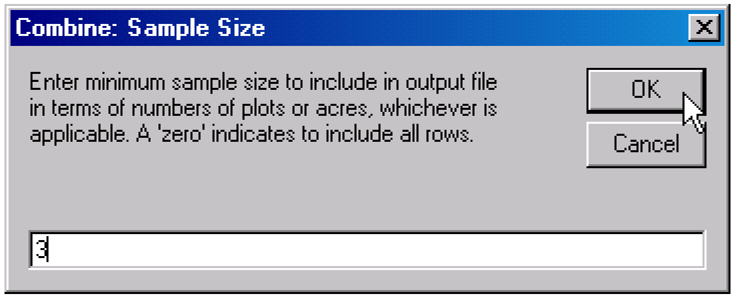
Combine output file for Fvsstand with filename extension *.cfs:

Combine output file for Compute with filename extension *.ccp:

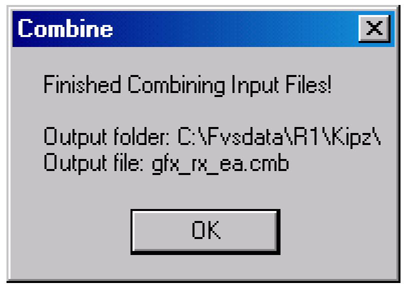


Combine output file for FireTab with filename extension *.cft:

An inputbox will appear that allows specifying the minimum sample size to include in the output file. When combining plots using an age basis, it is quite possible to have limited number of samples at younger and older ages. The computed means and modes may be obscured by the minimal plot set. It is best to indicate the lowest acceptable sample size to insure adequate interpretation and results.



The final message box will display the output folder and filename of the Combine File, filename extension *.cmb:



Batch Support

The “Combine” program can be executed from a MS-DOS Command Prompt window. “Combine” requires seven pieces of information to run correctly. They are:

Input Fields	Token Parameters
1. Start In Folder	APATH
2. Fvsstand Input File	AFFST
3. Compute Input File	AFCMP
4. FireTab Input File	AFFTB
5. Add Harvest Proportion Switch	-P
6. Minimum Sample Size Switch	-S:#
7. Batch Process Switch	-X

Token parameters serve as place holders for the input fields. For example, if only files from the Fvsstand and Compute post processors are needed to be combined, use of the “AFFTB” token name should be specified as the fourth input variable. Order is important and a space is needed to separate the input fields. Follow this template:

```
Command Line Arguments:  Combine Program

        Combine.exe   APATH   AFFST   AFCMP   AFFTB   -P   -S:#   -X
```

The “Combine” program was run in batch mode for the KIPZ project. The command line in the batch file read:

“C:\Fvsdata\R1\Kipz\Spray> **Combine.exe C:\Fvsdata\R1\Kipz\Spray** *{filename}***Tot.spc** *{filename}***.csv AFFTB -P -S:3 –X**”

The *{filename}* qualifier was denoted by the vegetation stand type designation (i.e. gfx11B1 – gfx=Grand Fir Mix vegetation type/11=Very Large size class/B=Even-Aged silvicultural prescription/1=Base timing option).

Final Thought

Notes:

<u>Topic Spray:</u> **Sequential Processing Routine for Arraying Yields**

Concepts: branch out and build a sequential processing tree using the Spray program.

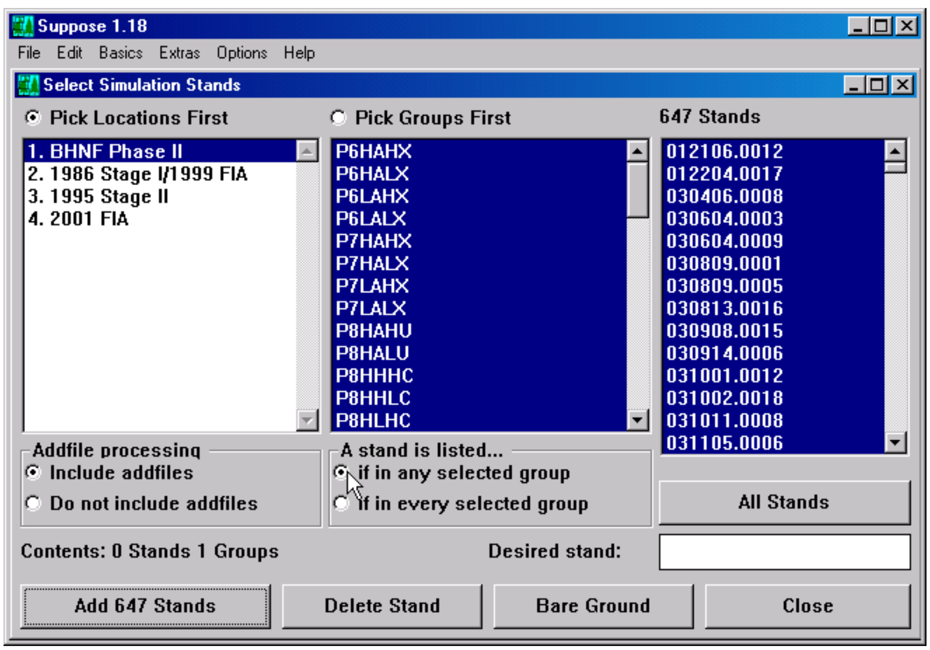
The Suppose program, the graphical user interface for the Forest Vegetation Simulator, was developed to simplify the task of building keyword sets to apply toward one or more stands of a given stand type. Suppose was not designed to process a series of stand types sequentially. The Parallel Processing Extension, the multistand analysis link for the Forest Vegetation Simulator, has the capability to address four types of problems, as follows: First, multistand treatment scheduling; second, resource supply trends; third, contagion in pest dynamics; and fourth, outcomes of management options. Multistand treatment scheduling involves trade-off analysis. Resource supply analysis involves gaming analysis. Contagion in pest dynamics deals with spatial analysis. Outcomes of management options deal with alternative analysis. The Parallel Processing Extension does not have the capacity to process a series of stand types sequentially.

Thus, the need to develop a program that will run a group of stands with particular treatment activities to produce yield profiles for decision analysis projects such as forest planning arose. The “Sequential Processing Routine Arraying Yields” (SPRAY) program was designed for such a purpose. The founding principles in the development of the SPRAY program was to utilize as much of the FVS existing software as possible. Then, design a user interface that would allow easy input of stand types, their associated silvicultural prescriptions, and possible timing options. A synopsis of the SPRAY program follows.

Suppose Connections

The objective of utilizing the Suppose interface was to take advantage of its ability to construct FVS keywords that describe basic inventory parameters. Using information provided in the ‘Stand List File’ (*.slf), the Suppose program builds the StdIdent, InvYear, ModType, StdInfo, Locate, Design, Growth, BAMax, SDIMax, SiteCode, NumCycle, TimeInt, Open, TreeData, SPLabel, and Process keywords per inventory plot. That is a lot of overhead that is being taken care of. Suppose is called upon to build the base keyword set for the entire inventory data base.

- Select appropriate stands for the project:

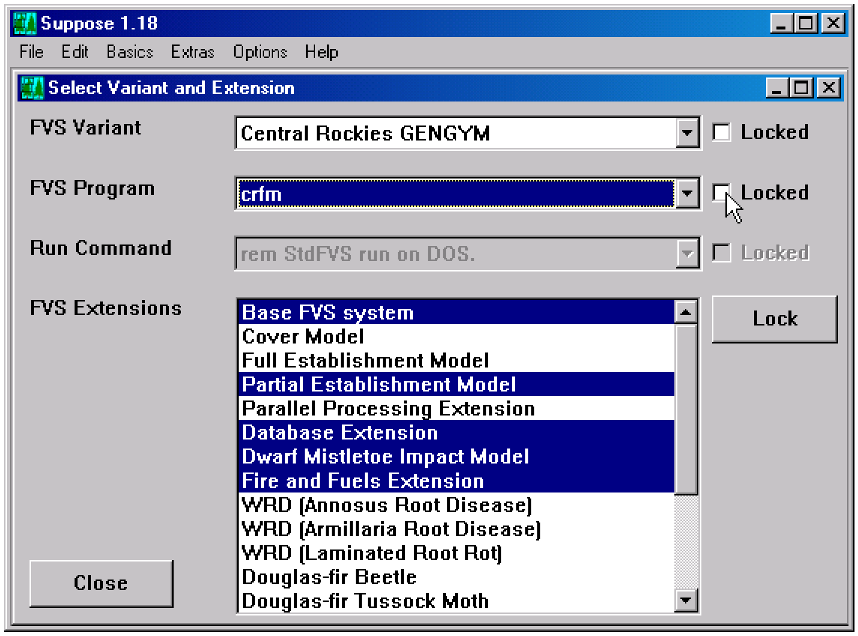


Be sure to toggle the radio button below the “A stand is listed …” label to “If in any selected group” to enable selecting all available stands.

IMPORTANT NOTE: *It is best to have only one label assigned per plot*. To do so, simply create a Stand List File {*.slf} that contains one primary vegetation grouping code on the Record Type C lines. Vegetation Type labels usually characterized the dominant forest cover type, its relative size, and associated crown density. The Spray program needs this label to organize its processing tree. Add a pointer to the Suppose.loc file to list the newly created stand list file.

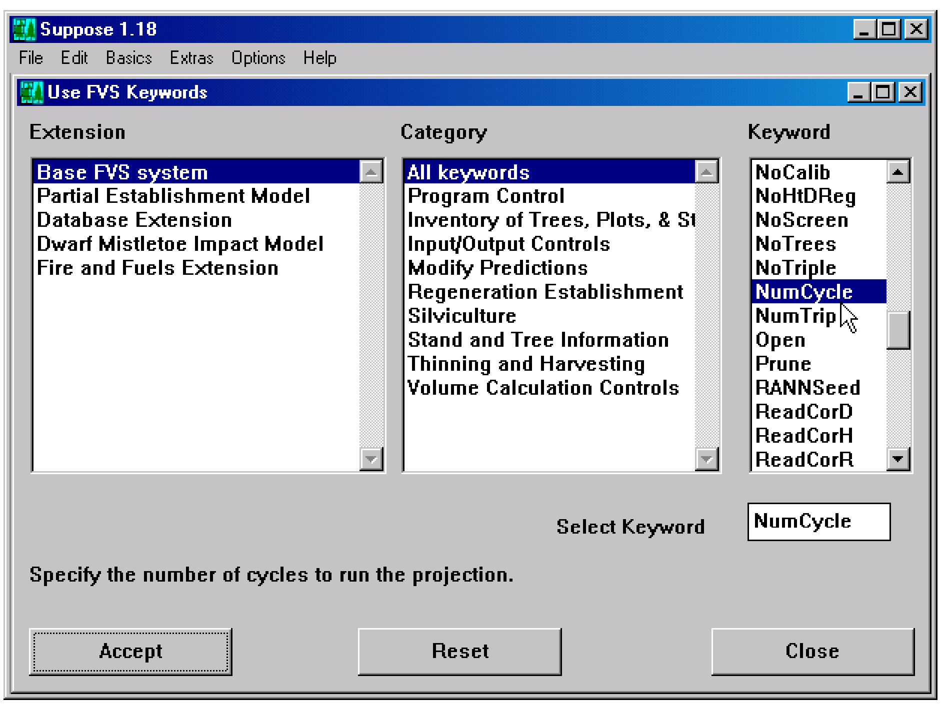
No additional configurations are required by Spray. However, it is good to specify the FVS Variant needed and limit the number of cycles to project to one for the base run.

- Select appropriate FVS Variant for the project:



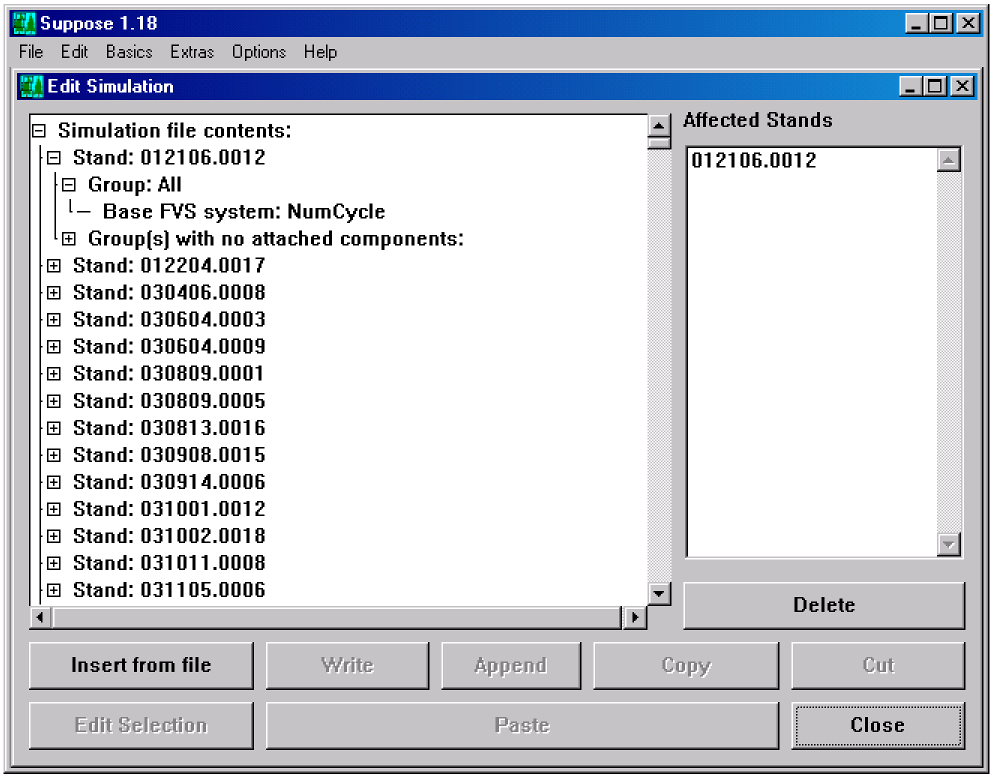
Use the "Extras" menu option on the main Suppose window to choose the FVS Variant. Click the down arrow adjacent to the "FVS Program" listbox. Find and "Lock" your selection.

- Limit number of projection cycles to one {default}:



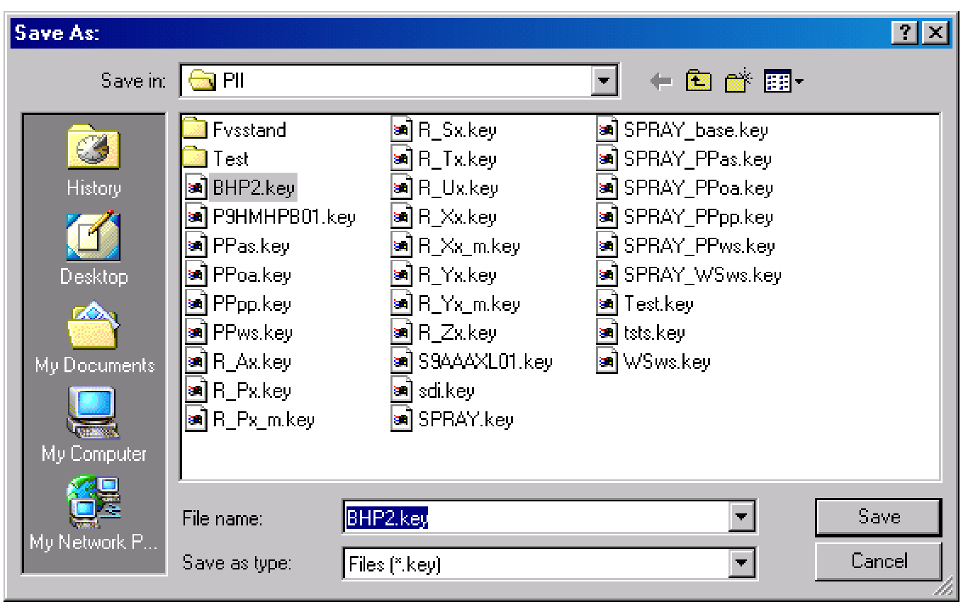
Click the "Use FVS Keywords" command button on the main Suppose window and scroll the Keyword listbox to the NumCycle keyword. "Accept" and "Ok" the default number of cycles as one.

- Confirm the projection parameters:



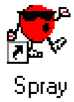
Click the “Edit Simulation File” command button on the main Suppose window to review the input plot list and the inclusion of the NumCycle keyword.

- Run the simulation to generate a global inventory keyword set:



Click the “Run Simulation” command button on the main Suppose window to generate the global keyword set. Windows Common Dialogue Box appears allowing naming and saving the base projection.

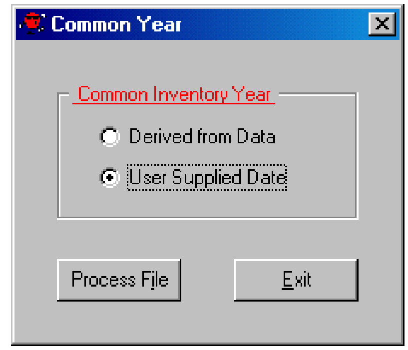
The SPRAY program picks up processing from here.



SPRAY Setup

SPRAY has a few initial setup steps prior to running a sequential processing tree. Use the "Setup" menu option on the main Spray form to access:

Common Year – Establishes a base inventory year, the number of cycles to project, and the length of the time interval per cycle for each plot in the global keyword file. The base inventory year can be derived from the most recent year recorded for all plots or it can be supplied by the user.

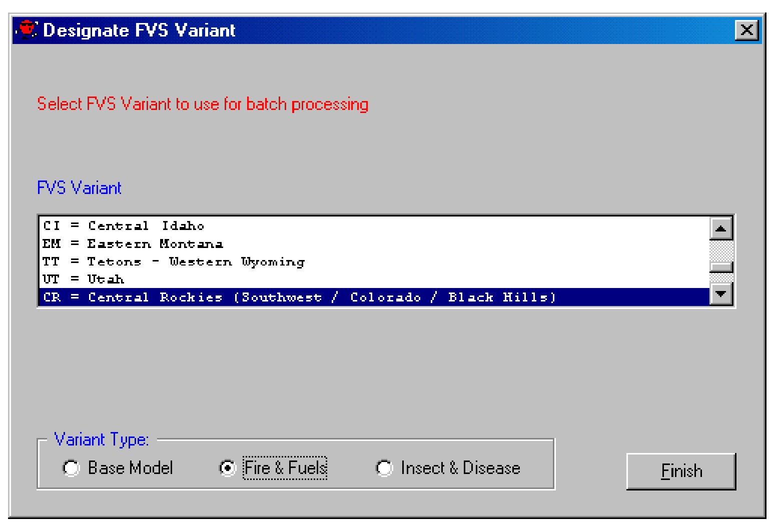


Index Strata – Creates a "Spray.key" file that contains FVS keywords. Suppose lines are removed from original global key file. The "Spray.key" is formatted as a 'direct access' file (records have equal length) to allow rapid retrieval of specified records. Creates complementary "Spray.idx" index file that links stand type labels with line numbers in the "Spray.key" file. Thus, an association is established between the "Spray.key" and "Spray.idx" files.

Spray.idx File:

Stand Type Label	Line Index Number
S7AAAX	12314
S7AAAX	12333
S8AAAX	12105
S8AAAX	12124
S8AAAX	12143
S8AAAX	12162
S8AAAX	12181
S8AAAX	12200
S8AAAX	12219
S9AAAX	12029
S9AAAX	12048
S9AAAX	12067

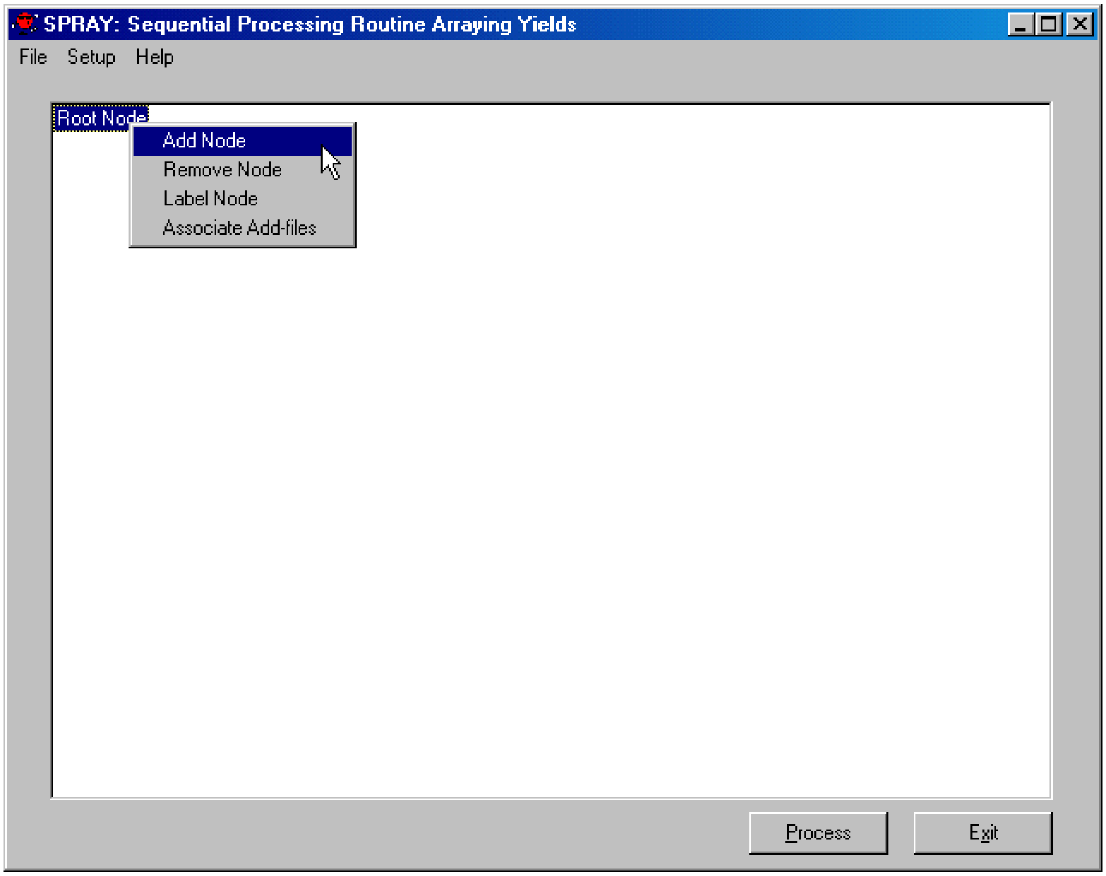
Select Variant – Designates the FVS geographic variant to use in the simulation runs. Model extension can be chosen as well.



Spray Nodes

The Sequential Processing Routine uses a treeview object similar to the folder view within the Windows Explorer program. Spray is design to process a four-level hierarchical tree. The "tree" is comprised of cascading branches of "nodes" {a.k.a. spray} and each node consists of a label and a set of associated FVS add-files. Building the Spray processing tree is easy.

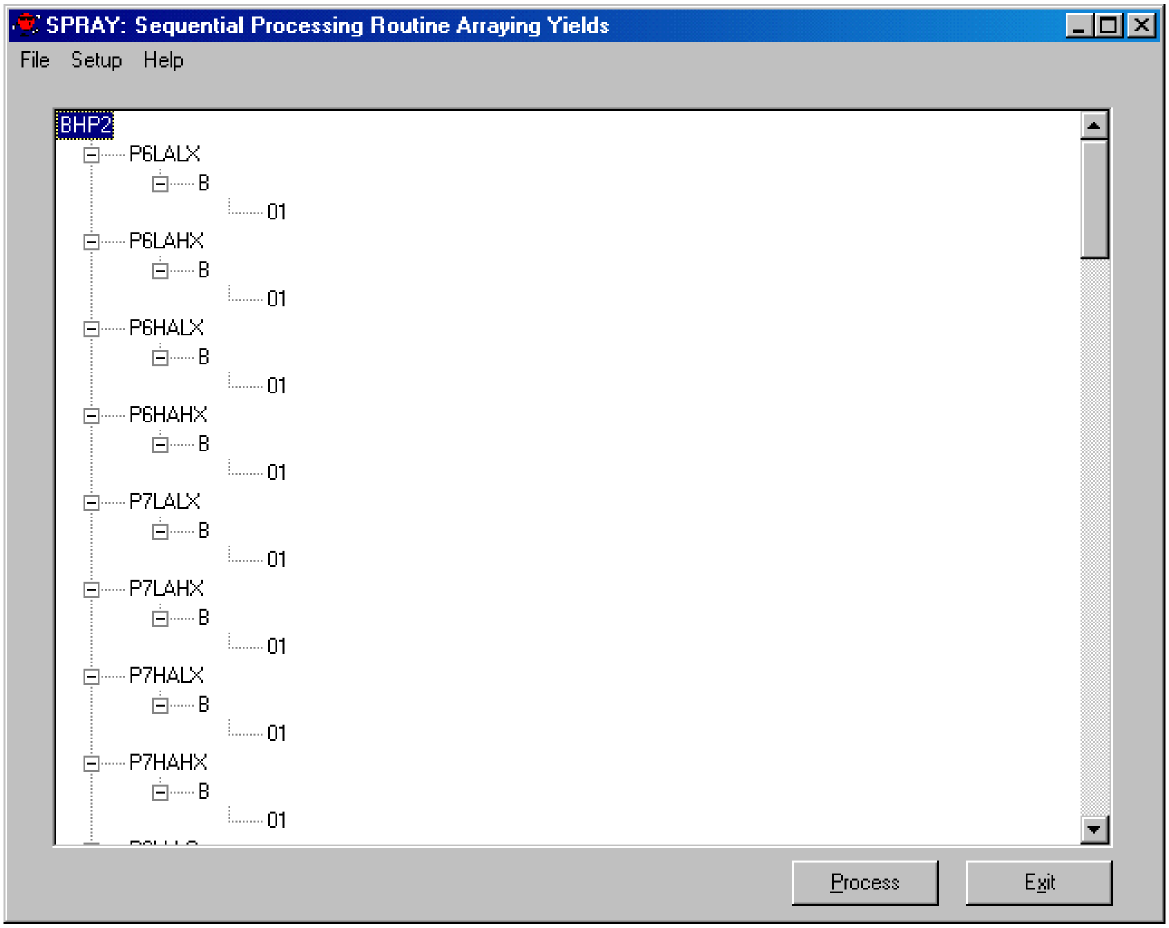
Right mouse clicking any existing node will elicit a pop-up menu to be displayed. Four options are available:



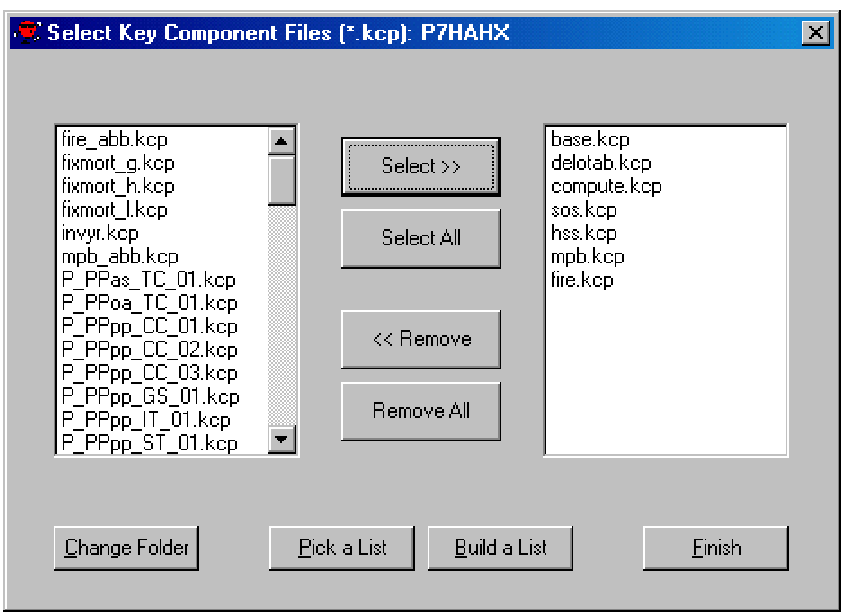
The base hierarchy established for sequential processing of the stand types is to assign a global level at the root node. Subordinate nodes declare vegetative stand types, silvicultural treatments, and timing options. Using the "Add Node" menu option will display a new subordinate node. It is recommended to fully complete the parent level before proceeding to the child level (i.e. enter all vegetative stand types before adding the silvicultural treatments nodes, work top/down). Using the "Remove Node" menu option will delete an existing node. Using the "Label Node" menu option will allow renaming the current node assignment. Using the "Associate Add-files" menu option will prompt a pick list window to appear that allows designating specific keyword component files to a path node. This is a very powerful feature that enables progressively building keyword runstreams to process through FVS.

Various pre-built Keyword Component files (*.kcp, a.k.a. FVS add-file) can be assigned to a tree node by either clicking the "Select" command button or double-clicking the appropriate file. Files listed in the right window pane will be appended sequentially to the FVS keyword run. Be careful. Inclusion order may be important for FVS to process correctly. Use the "Remove" command button to deselect a particular file. "Select All" and "Remove All" are convenient options for globally moving files left-to-right and right-to-left, respectively. Once the right listbox is properly assigned with associated add-files, the list can be saved for retrieval at a later time. This may aid in quickly assigning FVS *.kcp to processing nodes. Simply "Pick a List" to retrieve a previously saved add-file list. It is not necessary to associate *.kcp to redundantly labeled nodes. In other words, you only need to assign one set of add-files to a given node label. Click the "Finish" button to return to the main Spray window.

– Pathway Nodes for Black Hills National Forest Phase II Amendment Project



– Associating Keyword Component Files (Add-Files) to a Pathway Node



Spray Process

Once the pathway nodes have been defined and the associated add-files assigned to their applicable nodes, the runstream can be processed. The SPRAY program captured the user input in two files. The "Spray.prj" file contains the FVS variant designated for the runstream and the layout of the pathway nodes. This allows easy retrieval of existing project files (*.prj). The "Spray.add" file contains a listing of the associated add-files per node assignment. Review the following example of the Spray.prj and Spray.add files for the shelterwood prescription (B), first timing option (01) for the Black Hills National Forest, Phase II Amendment.

Layout for Spray.prj – RxB01 (Shelterwood)

```
CRFM
0   n0        n0        BHP2
1   n0        n1        P6LALX
2   n0        n2        P6LAHX
3   n0        n3        P6HALX
4   n0        n4        P6HAHX
5   n0        n5        P7LALX
6   n0        n6        P7LAHX
7   n0        n7        P7HALX
8   n0        n8        P7HAHX
9   n0        n9        P8LLLC
10  n0        n10       P8LLHC
11  n0        n11       P8LMLC
12  n0        n12       P8LMHC
13  n0        n13       P8LHLC
14  n0        n14       P8LHHC
15  n0        n15       P8LALU
16  n0        n16       P8LAHU
17  n0        n17       P8HLLC
18  n0        n18       P8HLHC
19  n0        n19       P8HMLC
20  n0        n20       P8HMHC
21  n0        n21       P8HHLC
22  n0        n22       P8HHHC
23  n0        n23       P8HALU
24  n0        n24       P8HAHU
25  n0        n25       P9LMLO
26  n0        n26       P9LLLP
27  n0        n27       P9LLHP
28  n0        n28       P9LMLP
29  n0        n29       P9LMHP
30  n0        n30       P9LHLP
31  n0        n31       P9LHHP
32  n0        n32       P9LMLA
33  n0        n33       P9LMHA
34  n0        n34       P9LMLS
35  n0        n35       P9HMLO
36  n0        n36       P9HLLP
37  n0        n37       P9HLHP
38  n0        n38       P9HMLP
39  n0        n39       P9HMHP
40  n0        n40       P9HHLP
41  n0        n41       P9HHHP
42  n0        n42       P9HMLA
43  n0        n43       P9HMHA
44  n0        n44       P9HMLS
45  n0        n45       S7AAAX
46  n0        n46       S8AAAX
47  n0        n47       S9AAAX
48  n1        n48       B
49  n2        n49       B
50  n3        n50       B
51  n4        n51       B
52  n5        n52       B
53  n6        n53       B
54  n7        n54       B
55  n8        n55       B
56  n9        n56       B
57  n10       n57       B
58  n11       n58       B
59  n12       n59       B
60  n13       n60       B
61  n14       n61       B
62  n15       n62       B
63  n16       n63       B
64  n17       n64       B
65  n18       n65       B
66  n19       n66       B
67  n20       n67       B
68  n21       n68       B
69  n22       n69       B
```

```
70  n23       n70       B
71  n24       n71       B
72  n25       n72       B
73  n26       n73       B
74  n27       n74       B
75  n28       n75       B
76  n29       n76       B
77  n30       n77       B
78  n31       n78       B
79  n32       n79       B
80  n33       n80       B
81  n34       n81       B
82  n35       n82       B
83  n36       n83       B
84  n37       n84       B
85  n38       n85       B
86  n39       n86       B
87  n40       n87       B
88  n41       n88       B
89  n42       n89       B
90  n43       n90       B
91  n44       n91       B
92  n45       n92       B
93  n46       n93       B
94  n47       n94       B
95  n48       n95       01
96  n49       n96       01
97  n50       n97       01
98  n51       n98       01
99  n52       n99       01
100 n53       n100      01
101 n54       n101      01
102 n55       n102      01
103 n56       n103      01
104 n57       n104      01
105 n58       n105      01
106 n59       n106      01
107 n60       n107      01
108 n61       n108      01
109 n62       n109      01
110 n63       n110      01
111 n64       n111      01
112 n65       n112      01
113 n66       n113      01
114 n67       n114      01
115 n68       n115      01
116 n69       n116      01
117 n70       n117      01
118 n71       n118      01
119 n72       n119      01
120 n73       n120      01
121 n74       n121      01
122 n75       n122      01
123 n76       n123      01
124 n77       n124      01
125 n78       n125      01
126 n79       n126      01
127 n80       n127      01
128 n81       n128      01
129 n82       n129      01
130 n83       n130      01
131 n84       n131      01
132 n85       n132      01
133 n86       n133      01
134 n87       n134      01
135 n88       n135      01
136 n89       n136      01
137 n90       n137      01
138 n91       n138      01
139 n92       n139      01
140 n93       n140      01
141 n94       n141      01
```

<u>Layout for Spray.add – RxB01 (Shelterwood)</u>

```
"BHP2","|","base.kcp","delotab.kcp","compute.kcp","sos.kcp","hss.kcp","mpb.kcp","fire.kcp","","",""
"P6LALX","|","rcd_p6aaax.kcp","reg_p7lalx.kcp","reg_p8lalc.kcp","reg_p9lmlp.kcp","","","","","",""
"P6LAHX","|","rcd_p6aaax.kcp","reg_p7lahx.kcp","reg_p8lahc.kcp","reg_p9lmhp.kcp","","","","","",""
"P6HALX","|","rcd_p6aaax.kcp","reg_p7halx.kcp","reg_p8halc.kcp","reg_p9hmlp.kcp","","","","","",""
"P6HAHX","|","rcd_p6aaax.kcp","reg_p7hahx.kcp","reg_p8hahc.kcp","reg_p9hmhp.kcp","","","","","",""
"P7LALX","|","rcd_p7aaax.kcp","reg_p7lalx.kcp","reg_p8lalc.kcp","reg_p9lmlp.kcp","","","","","",""
"P7LAHX","|","rcd_p7aaax.kcp","reg_p7lahx.kcp","reg_p8lahc.kcp","reg_p9lmhp.kcp","","","","","",""
"P7HALX","|","rcd_p7aaax.kcp","reg_p7halx.kcp","reg_p8halc.kcp","reg_p9hmlp.kcp","","","","","",""
"P7HAHX","|","rcd_p7aaax.kcp","reg_p7hahx.kcp","reg_p8hahc.kcp","reg_p9hmhp.kcp","","","","","",""
"P8LLLC","|","rcd_p8laac.kcp","reg_p7lalx.kcp","reg_p8lalc.kcp","reg_p9lmlp.kcp","","","","","",""
```

```
"P8LLHC","|","rcd_p8laac.kcp","reg_p7lahx.kcp","reg_p8lahc.kcp","reg_p9lmhp.kcp","","","","","",""
"P8LMLC","|","rcd_p8laac.kcp","reg_p7lalx.kcp","reg_p8lalc.kcp","reg_p9lmlp.kcp","","","","","",""
"P8LMHC","|","rcd_p8laac.kcp","reg_p7lahx.kcp","reg_p8lahc.kcp","reg_p9lmhp.kcp","","","","","",""
"P8LHLC","|","rcd_p8laac.kcp","reg_p7lalx.kcp","reg_p8lalc.kcp","reg_p9lmlp.kcp","","","","","",""
"P8LHHC","|","rcd_p8laac.kcp","reg_p7lahx.kcp","reg_p8lahc.kcp","reg_p9lmhp.kcp","","","","","",""
"P8LALU","|","rcd_p8laau.kcp","reg_p7lalx.kcp","reg_p8lalu.kcp","reg_p9lmlp.kcp","","","","","",""
"P8LAHU","|","rcd_p8laau.kcp","reg_p7lahx.kcp","reg_p8lahu.kcp","reg_p9lmhp.kcp","","","","","",""
"P8HLLC","|","rcd_p8haac.kcp","reg_p7halx.kcp","reg_p8halc.kcp","reg_p9hmlp.kcp","","","","","",""
"P8HLHC","|","rcd_p8haac.kcp","reg_p7hahx.kcp","reg_p8hahc.kcp","reg_p9hmhp.kcp","","","","","",""
"P8HMLC","|","rcd_p8haac.kcp","reg_p7halx.kcp","reg_p8halc.kcp","reg_p9hmlp.kcp","","","","","",""
"P8HMHC","|","rcd_p8haac.kcp","reg_p7hahx.kcp","reg_p8hahc.kcp","reg_p9hmhp.kcp","","","","","",""
"P8HHLC","|","rcd_p8haac.kcp","reg_p7halx.kcp","reg_p8halc.kcp","reg_p9hmlp.kcp","","","","","",""
"P8HHHC","|","rcd_p8haac.kcp","reg_p7hahx.kcp","reg_p8hahc.kcp","reg_p9hmhp.kcp","","","","","",""
"P8HALU","|","rcd_p8haau.kcp","reg_p7halx.kcp","reg_p8halu.kcp","reg_p9hmlp.kcp","","","","","",""
"P8HAHU","|","rcd_p8haau.kcp","reg_p7hahx.kcp","reg_p8hahu.kcp","reg_p9hmhp.kcp","","","","","",""
"P9LMLO","|","rcd_p9lala.kcp","reg_p7lalx.kcp","reg_p8lalu.kcp","reg_p9lmlo.kcp","","","","","",""
"P9LLLP","|","rcd_p9lala.kcp","reg_p7lalx.kcp","reg_p8lalc.kcp","reg_p9lmlp.kcp","","","","","",""
"P9LLHP","|","rcd_p9laha.kcp","reg_p7lahx.kcp","reg_p8lahc.kcp","reg_p9lmhp.kcp","","","","","",""
"P9LMLP","|","rcd_p9lala.kcp","reg_p7lalx.kcp","reg_p8lalc.kcp","reg_p9lmlp.kcp","","","","","",""
"P9LMHP","|","rcd_p9laha.kcp","reg_p7lahx.kcp","reg_p8lahc.kcp","reg_p9lmhp.kcp","","","","","",""
"P9LHLP","|","rcd_p9lala.kcp","reg_p7lalx.kcp","reg_p8lalc.kcp","reg_p9lmlp.kcp","","","","","",""
"P9LHHP","|","rcd_p9laha.kcp","reg_p7lahx.kcp","reg_p8lahc.kcp","reg_p9lmhp.kcp","","","","","",""
"P9LMLA","|","rcd_p9lala.kcp","reg_p7lalx.kcp","reg_p8lalu.kcp","reg_p9lmla.kcp","","","","","",""
"P9LMHA","|","rcd_p9laha.kcp","reg_p7lahx.kcp","reg_p8lahu.kcp","reg_p9lmha.kcp","","","","","",""
"P9LMLS","|","rcd_p9lala.kcp","reg_p7lalx.kcp","reg_p8lalc.kcp","reg_p9lmls.kcp","","","","","",""
"P9HMLO","|","rcd_p9hala.kcp","reg_p7halx.kcp","reg_p8halu.kcp","reg_p9hmlo.kcp","","","","","",""
"P9HLLP","|","rcd_p9hala.kcp","reg_p7halx.kcp","reg_p8halc.kcp","reg_p9hmlp.kcp","","","","","",""
"P9HLHP","|","rcd_p9haha.kcp","reg_p7hahx.kcp","reg_p8hahc.kcp","reg_p9hmhp.kcp","","","","","",""
"P9HMLP","|","rcd_p9hala.kcp","reg_p7halx.kcp","reg_p8halc.kcp","reg_p9hmlp.kcp","","","","","",""
"P9HMHP","|","rcd_p9haha.kcp","reg_p7hahx.kcp","reg_p8hahc.kcp","reg_p9hmhp.kcp","","","","","",""
"P9HHLP","|","rcd_p9hala.kcp","reg_p7halx.kcp","reg_p8halc.kcp","reg_p9hmlp.kcp","","","","","",""
"P9HHHP","|","rcd_p9haha.kcp","reg_p7hahx.kcp","reg_p8hahc.kcp","reg_p9hmhp.kcp","","","","","",""
"P9HMLA","|","rcd_p9hala.kcp","reg_p7halx.kcp","reg_p8halu.kcp","reg_p9hmla.kcp","","","","","",""
"P9HMHA","|","rcd_p9haha.kcp","reg_p7hahx.kcp","reg_p8hahu.kcp","reg_p9hmha.kcp","","","","","",""
"P9HMLS","|","rcd_p9hala.kcp","reg_p7halx.kcp","reg_p8halc.kcp","reg_p9hmls.kcp","","","","","",""
"S7AAAX","|","rcd_saaaaa.kcp","reg_s7aaax.kcp","reg_s8aaax.kcp","reg_s9aaax.kcp","","","","","",""
"S8AAAX","|","rcd_saaaaa.kcp","reg_s7aaax.kcp","reg_s8aaax.kcp","reg_s9aaax.kcp","","","","","",""
"S9AAAX","|","rcd_saaaaa.kcp","reg_s7aaax.kcp","reg_s8aaax.kcp","reg_s9aaax.kcp","","","","","",""
"B","|","rx_b.kcp","P_PPpp_SW_01.kcp","","","","","","","",""
"01","|","tc_01.kcp","","","","","","","","",""
```

The SPRAY program builds a composite keyword file set ("Spray.sim" file) per stand type per silvicultural prescription per timing option. Once created, the runstream is process through the specified FVS variant. The FVSSTAND, Compute, and FireTbl post processors are then called upon. Finally, the Combine program synthesizes the output files from the post processing program into one composite yield profile. Refer to associated Select Topic for further description of these FVS post processors. The processing continues with the next combination of vegetative stand type, silvicultural prescription, and timing option until all combinations have been processed. The resultant yield files provide the input values to the forest planning model.

Skill Challenge:

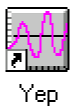
Rob Jailhouse wishes to short-cut the process of building the Spray tree and *.kcp file associations. He is good at sensing patterns and notices the architecture of both the *.prj and *.add files. Using his favorite Text Editor, he modifies the existing Spray.prj and Spray.add files to include an additional silvicultural prescription (a.k.a. "C") with two timing options (a.k.a. "01" and "02"). Do you wish to break out too? Give it a try!

Notes:

Topic YEP: **An Affirmative Reply using the Yield Examination Program**

Concepts: validate vegetation yield profiles using a scatter plot observation tool.

An important aspect of forest management planning involves forecasting vegetation development over time. Yield estimates are generally constructed using simulation models. These yield profiles are then incorporated into planning models that allocate resources to best address management issues. Vegetation yield profiles often specify stand metrics such as the number of trees per acre, stand basal area, average tree diameter and height, and merchantable volume. Additionally, classification variables are included that describe forest health conditions, stand structure dynamics, and wildfire severity hazard. The 'Yield Examination Program' (YEP) was developed to assist forest management planning staffs with the assessment of vegetation profiles. YEP imports tabular data from text files and displays the results in the form of scatter plots. Users can select from any one of the many columns of information contained in the yield files to designate X and Y coordinates. Visual examination of the scatter plots can aid in concluding the goodness-of-fit. The objective of this topic will be to familiarize users with the capabilities of the YEP program. An example, using vegetation yield profiles from the Kootenai and Idaho Panhandle National Forests Planning Zone (KIPZ), will be presented to demonstrate program functionality.



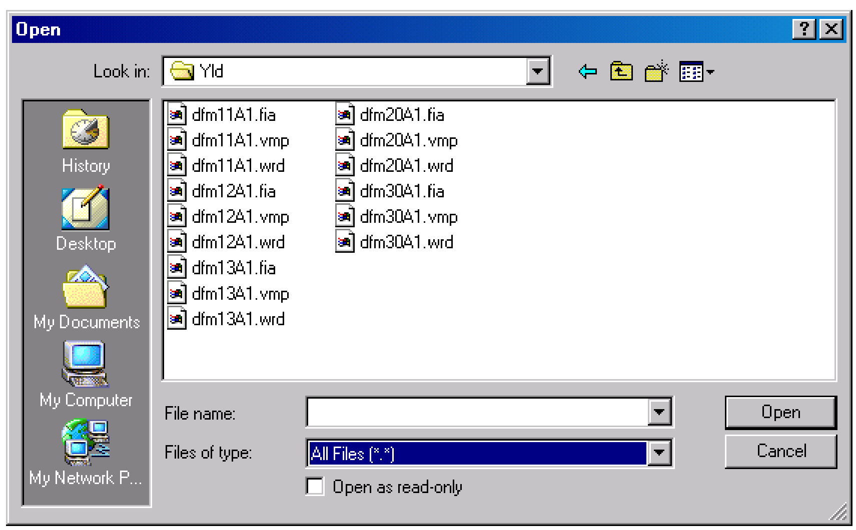
Let's Spot

The Yield Examination Program was written using the Visual Basic programming language. YEP provides a graphical user interface to allow perusing yield files built from the Forest Vegetation Simulator (FVS) stand growth model. Inventory data is assembled to represent various forest strata. These data sets are run through FVS on a per plot/stand basis. The FVSSTAND Alone post processor (refer to associated Select Topic for further description) aggregates the individual stand profiles into a composite yield file. YEP reads columnar data from the output text files to populate the data sources for the scatter plots. A trendline is overlaid through the data points to assist visual inspection of the development profile. There are 15 different trendlines available for viewing. Resultant scatter plots can be printed on the default local printer.

Initial YEP

Following installation of the Yield Examination Program, an icon for the YEP program should be located off the Start Menu, Programs Group, FVS Group. Clicking the YEP icon will execute the program {create a Desktop Shortcut for easy access}.

An 'Open' File dialogue box will immediately appear on the screen and point to the C:\Fvsdata folder. Navigate to the subfolder that contains the vegetation yield text files. Generally, these will reside in a folder subordinate to the Fvsstand folder. YEP looks for 'Files of type: Yield Files (*.yld)'. It is not mandatory that the vegetation yield files have a filename extension *.yld. If not, simply click the down arrow associated with the file listbox and choose 'All Files (*.*)'. Mouse click the file to open.

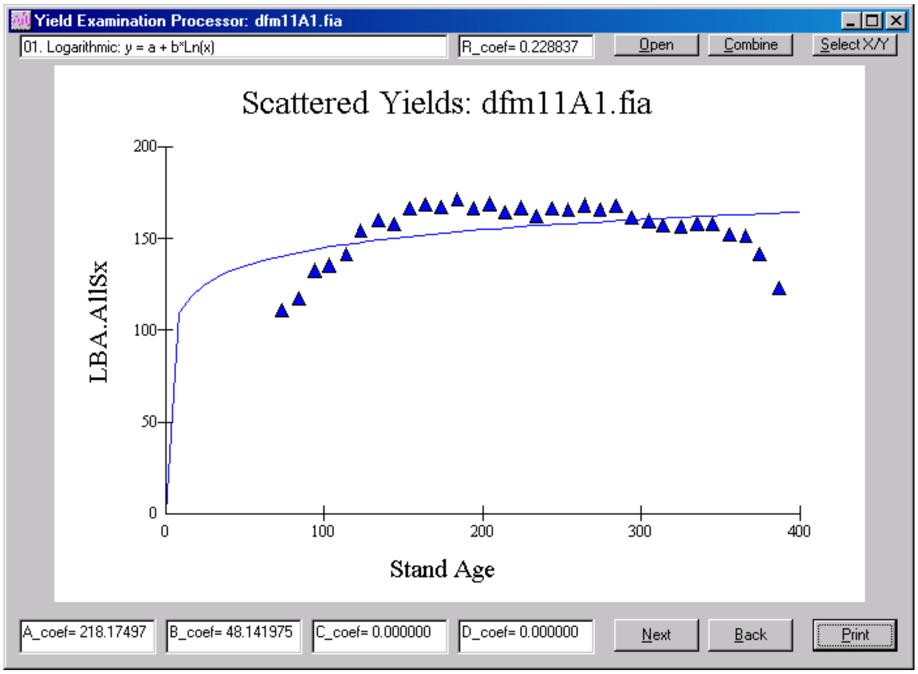


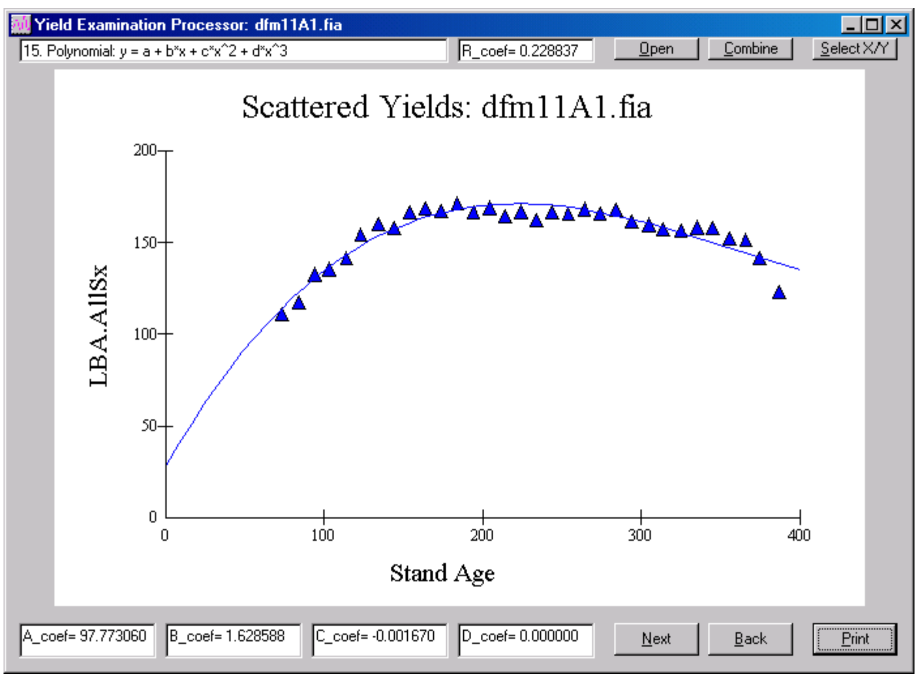
Yield File Layout

Composite yield files developed by the FVSSTAND Alone post processor are formatted as 'Flat Files'. This common file structure refers to ASCII text files that are column delimited. There are 10-digits per column (example file layout presented in the Wrap Up section of this Topic). *It is necessary to use the "Create Spectrum Import Files?" option upon exiting FVSSTAND*. This enables the creation of *.spc files that contain a one-row header. Any *.spc file can be read by YEP. The Combine post-post processor program (refer to associated Select Topic for further description) can read input from the FVSSTAND, Compute, and Fire Table post processing program. Combine will concatenate columns from each or all of these programs and output files compatible with YEP. The Sequential Processing Routine Arraying Yields (SPRAY) program (refer to associated Select Topic for further description) may use any one of the FVS post processing programs followed by the Combine program and rename the resultant yield file with the proverbial *.yld filename extension. Spray also will create an 'Yld' folder subordinate from the Fvsstand folder. These files can be opened by the YEP program.

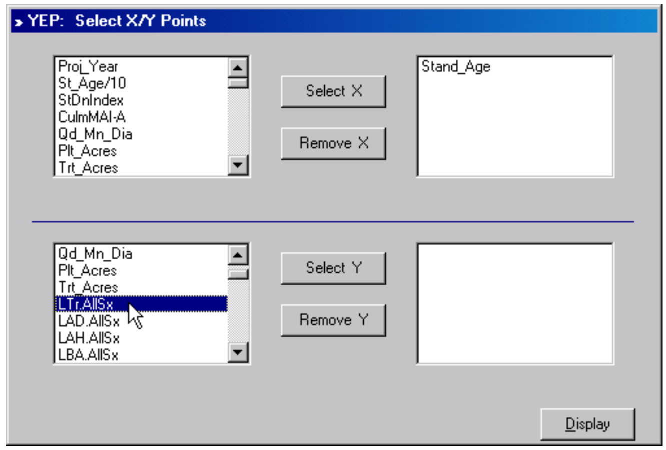
Pressing YEP Buttons

Once the proper vegetation yield file has been selected, YEP automatically produces a scatter plot of the stand Live Basal Area per acre versus the Stand Age. These columns are read directly from the yield input file. A natural log trendline is fit to the data. The trendline is included for visual interpretation only. Select the ***'Next'*** and ***'Back'*** command buttons at the bottom right portion of the YEP screen to cycle through the 15 available trendlines as reported in the top left textbox. Associated coefficients are presented per trendline at the bottom left of the display screen. The 'R-Coef' is the coefficient of correlation related to the least-squares regression of the Y over X values for the current data set. It does not change for the various trendlines.

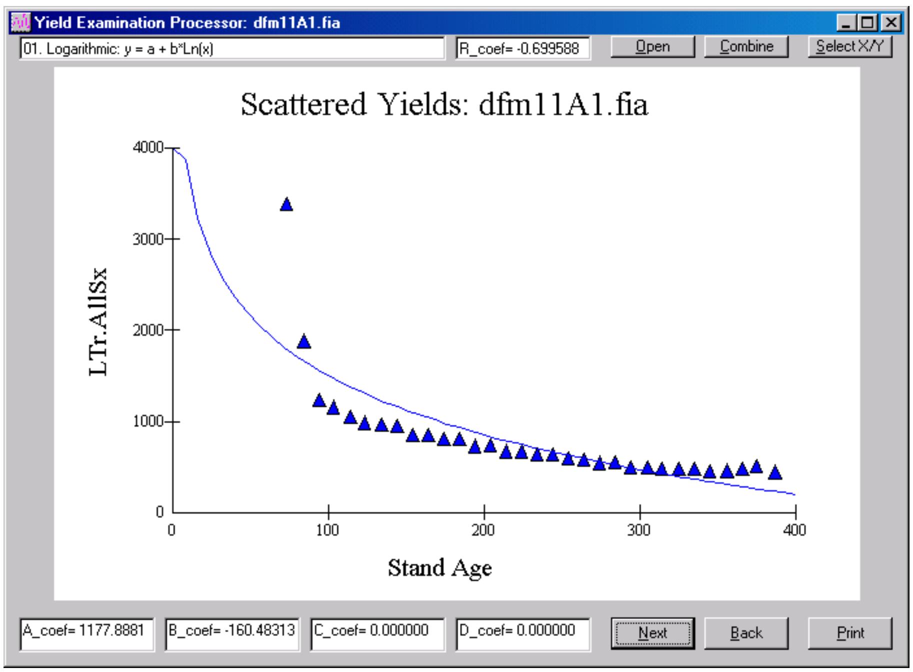




The ***'Select X/Y'*** command button at the top right allows choosing any available data columns within the yield files. Simply highlight the desired variable and either press the 'Select X' or 'Select Y' command buttons or double-click to move the variable from left to right. Variables in the right listboxes will be presented in the scatter plot. Only one variable per 'X' and 'Y' should be chosen for display. For convenience, the Stand_Age variable is listed for the X-axis. Other variables could be selected. Simply discard variables by using the 'Remove X' or 'Remove Y' command buttons.



Once satisfied with the variable selected, click the 'Display' command button to enable drawing of the scatter plot. It's just that simple!



A hard copy of the scatter plot can be obtained by mouse clicking the ***'Print'*** command button on the main form. The scatter plot will be capture and sent directly to the default printer specified for the computer. Only one plot per page can be printed.

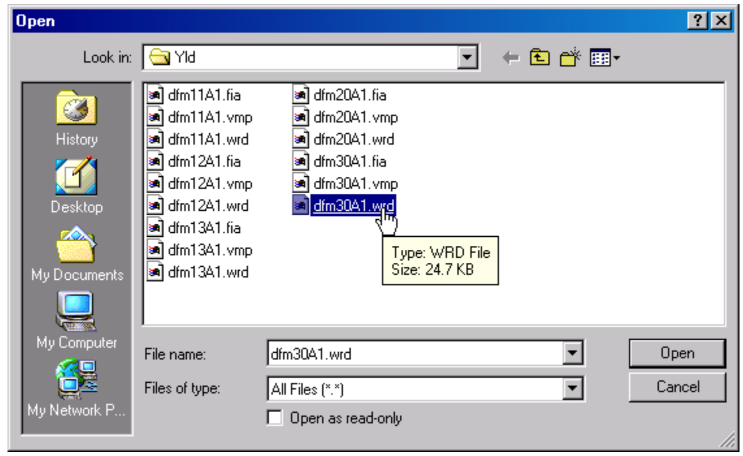
Special Note: To capture the scatter plot to insert into a Word Document, use the following steps:

1. Press the 'Ctrl' key on the keyword with the 'Print Screen' key {usually, adjacent to the Function Keys – Right top of keyboard} to send a copy of the screen Desktop to the Clipboard.
2. Open the Paint program {usually found under the Start Menu/Programs/Accessories Group}.
3. Select the 'Edit' menu, 'Paste' option. Go ahead and enlarge the palette to include the entire desktop image.
4. Click on the 'Select' area icon button {in Paint, that is the dotted-square tool in the upper right corner of the toolbox}.
5. Enlarge a box around the graph.
6. Select the 'Edit' menu, 'Cut' option to clip the graph from the screen capture.
7. Select the 'File' menu, 'New' option, 'No' to Save Changes prompt.
8. Select the 'Edit' menu, 'Paste' option, 'Yes' to enlarge the Paint Palette.
9. Select the 'File' menu, 'Save' option and save as type bitmap {*.bmp}.
10. Name the file appropriately.

That should do it! Now, the bitmap can be brought into any Word Document by using the 'Insert' menu option, 'Picture', 'From File…' choice. Navigate to the bitmap to include.

Getting the YEP's

The ***'Open'*** command button located at the upper right-center on the main window of the Yield Examination Program can be used to open other vegetation yield files. The common Windows dialogue box for opening files appears, pointing initially to the current directory. If needed, move to the folder that contains the yield profiles for graphing. The default file type is *.yld. Click the down arrow adjacent to the 'Files of type:' textbox to choose 'All Files (*.*)' if needed. Select a file to open.

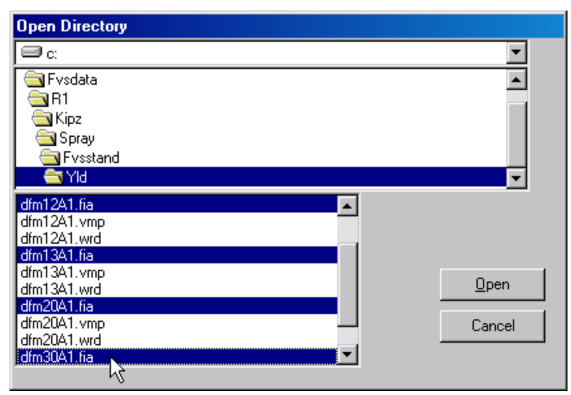


The ***'Combine'*** command button located right of the Open button can be used to merge several yield files into one composite for graphing. This can be a useful feature in cases where the vegetation yield tables are delineated by size or structure class. For example, for the KIPZ project, the first three characters of the Stand Type designation were used to identify the vegetation type. Douglas-fir resident on Moist habitat types used a 'dfm' declaration. The next two characters were numeric symbols for size class. The following assignments were use:

- 11 = Large-Very: 20"+ diameter trees dominated the stand structure
- 12 = Large-Large: 15"-20" diameter trees dominated the stand structure
- 13 = Large-Medium: 10"-15" diameter trees dominated the stand structure
- 20 = Medium: 5"-10" diameter trees dominated the stand structure
- 30 = Small: 0"-5" diameter trees dominated the stand structure

The sixth character position in the Stand Type designation indicated the silvicultural regime. An "A" was used to declare Natural Growth runs. The last digit symbolized the timing option. A "1" represents the base timing choice.

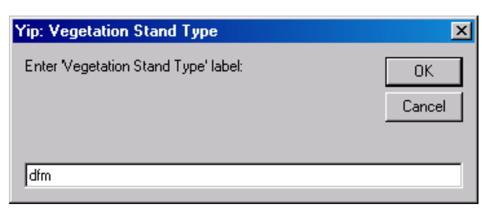
To examination the overall Stand Type, one file needs to be created for YEP. Once the 'Combine' button has been selected, an 'Open Directory' window appears. By default, the current Drive/Directory/Folder is displayed. If needed, navigate to the desired folder containing the vegetation yield files. Once there, select the files to join together. Use the 'Ctrl' key on the keyboard to make multiple selections that are not listed consecutively. Otherwise, the 'Shift' key can be use to select multiple files. Probably best to stay within the same Stand Type/Silvicultural Prescription/Timing Option so as not to confound the results.



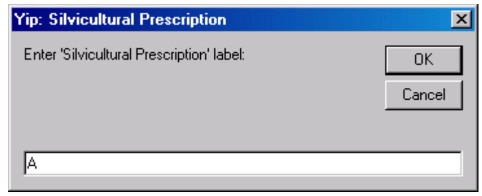
For the KIPZ project, three yield file types were developed. The first was based on the vegetation type as determined by the Forest Inventory Analysis (FIA) algorithm (*.fia). The second was based on the vegetation type assigned through satellite mapping (*.vmp). The third file type was based on the V-Map vegetation typing also, but used the Western Root Disease model extension of the Forest Vegetation Simulator to derived the yield profiles (*.wrd). It's a good idea to stay within the same realm of inventory assignment and FVS model use to show reasonable trends.

Click the 'Open' command button on the Open Directory window to proceed. Four Inputboxes will appear prompting for needed information. They are as follows:

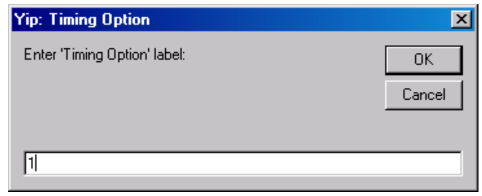
- Enter 'Vegetation Stand Type' (i.e. "dfm")



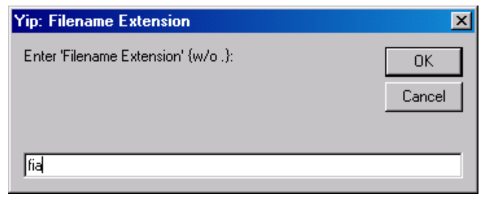
- “Enter ‘Silvicultural Prescription’ (i.e. “A”)



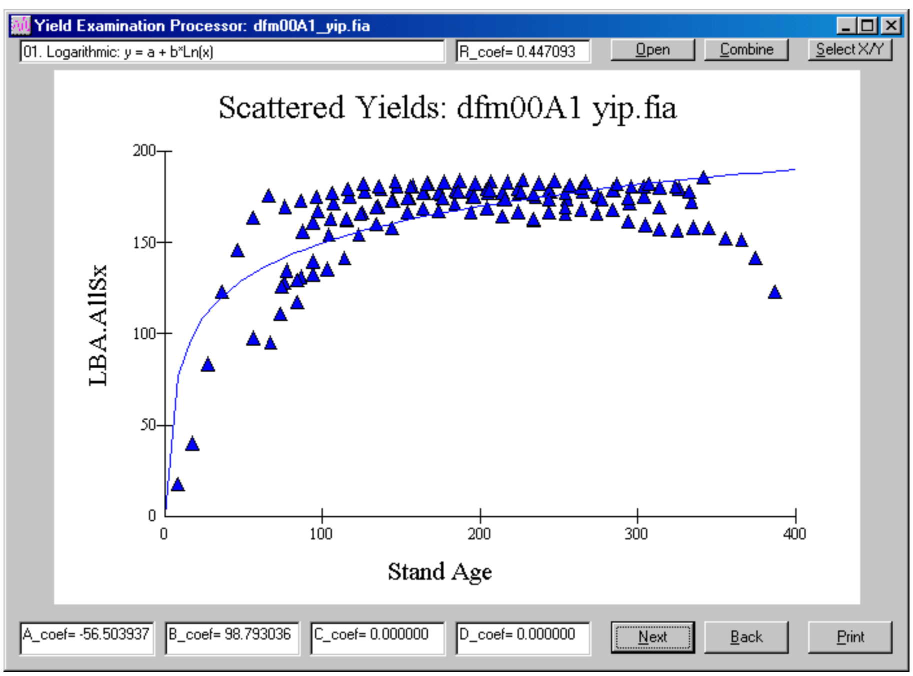
- Enter ‘Timing Option’ (i.e. “1”)



- Enter ‘Filename Extension’ (i.e. “fia”)

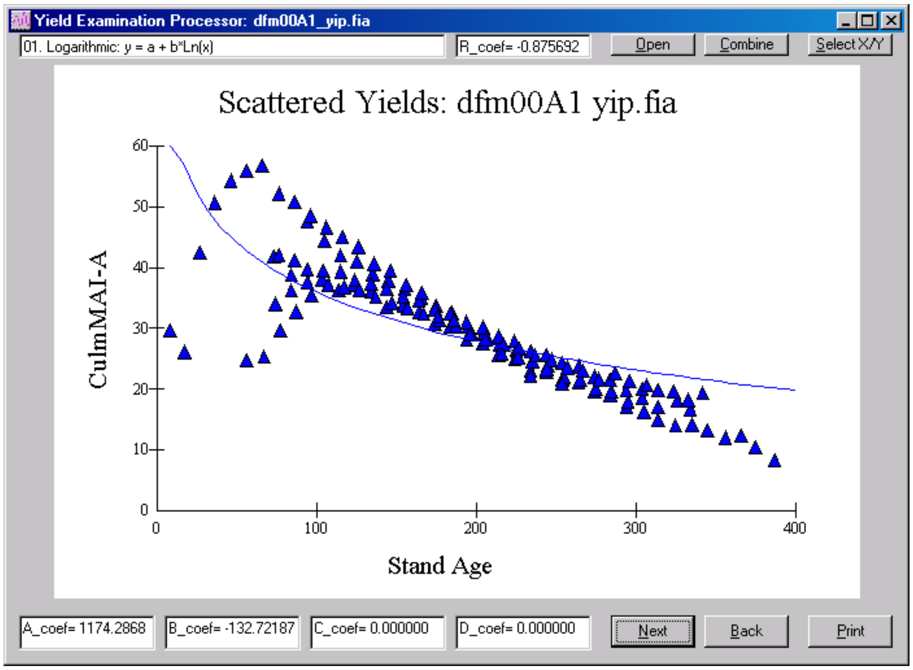


The Yep program uses this input to label the associated composite yield file. For this example, the aggregated vegetation yield file is named: dfm00A1_yip.fia. The “00” represents a combining of all size classes. The “_yip” (yield integration process) is added to indicate the composite file was created by the YEP program. The resultant composite scatter plot appears after the ‘Filename Extension’ Inputbox has been properly declared.



By default, the Stand Age is displayed on the X-Axis and the stand Live Basal Area per acre on the Y-Axis.

An interesting depiction is the Culmination of Mean Annual Increment versus the Stand Age {essentially, growth over age}. This graph can help in determining the optimal rotation age for a stand type. Clicking the ‘Select X/Y’ command button on the main form and choosing the ‘CulmMAI_A’ variable {culmination mean annual increment – merchantable cubic foot volume – all trees}, then selecting ‘Display’ will render the following scatter plot:



Like all graphs displayed by YEP, it is only as good as the inventory data used to develop the yield profile. Since this scatter plot is based on trees of cubic foot volume size (trees >= 5"), it would be expected that the CMAI for trees of board foot volume size (trees >= 9") would have an apex at an older stand age. Something to remember. The CulmMAI_S variable {culmination mean annual increment – merchantable cubic foot volume – sawtimber trees} is available only for Eastern FVS Variants.

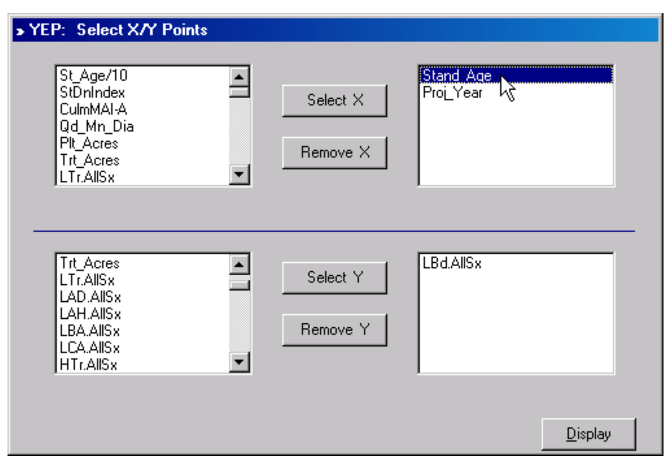
Cutting to the Point

Previous graphs presented were based solely on Natural Growth development of the vegetation over an age range. To assist in examining yield profile from stands that will receive silvicultural thinnings, a slightly different view is needed. Let's start by looking at an even-aged prescription for the Douglas-fir Dry strata on the KIPZ. Basically, the treatment schedule is as follows:

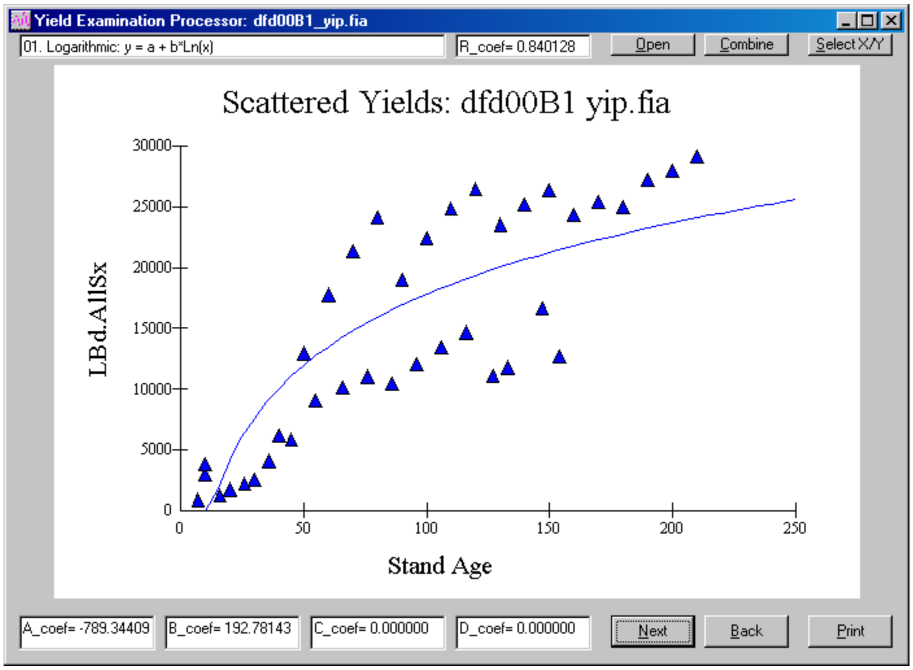
1. Existing Stand: Age 30, Precommercially Thin
2. Existing Stand: Age 80, Commercially Thin
3. Existing Stand: Age 120+, Regeneration Harvest
4. Regenerated Stand: Age 0, Favor Ponderosa Pine
5. Regenerated Stand: Age 30, Precommercially Thin
6. Regenerated Stand: Age 80, Commercially Thin
7. Regenerated Stand: Age 150, Commercially Thin
8. Regenerated Stand: Age 210+, Regeneration Harvest

Using the 'Select X/Y' and picking Stand Age for the X-Axis and Live Board Foot volume for the Y-Axis displays a nesting of data points from the Existing Stand development and Regenerated Stand development. Interpretation is limited. Going back into the 'Select X/Y' option and picking Proj_Year (projection year) for the X-Axis and sticking with Live Board Foot volume for the Y-Axis provides a more meaning display.

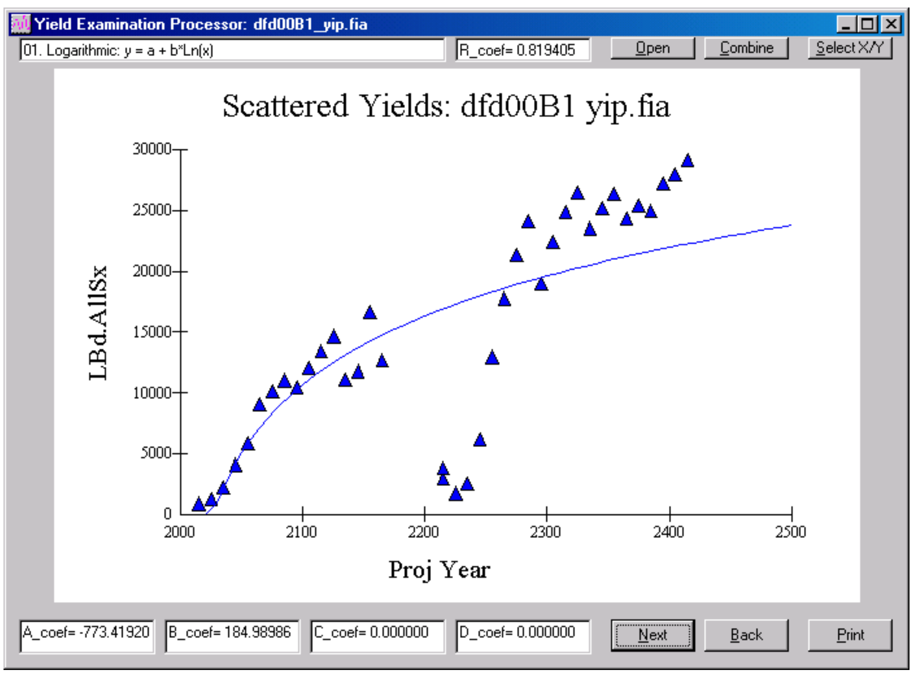
NOTE: Be sure to ***remove*** the Stand_Age variable from the X-Axis listbox on the right side of the Select X/Y Points window. Simply double-click Stand_Age to move it from the right side to the left.



- Live Board Foot Volume versus Stand Age:



- Live Board Foot Volume versus Projection Year:



The graph of live board foot volume over projection cycle clearly shows the Existing Stand progression in contrast to the Regenerated Stand development. The stand age is reset back to zero following the regeneration harvest. Showing the Existing and Regenerated profile over stand age intertwines the data points. By augmenting the stand age for the Regenerated Stand and using the Projection Year variable as the time basis, a defined separation is noted. Dips in the development curve indicate thinning entries. The Existing Stand profile terminates at age 120 but includes initial stand conditions for plots over 120 years old. The Regenerated Stand extends to age 210, then repeats development.

Wrap Up

For reference sake, the following is a listing of the contexts of the dfd00B1_yip.fia ("dfd"=Douglas-fir Dry / "00"=All size classes / "B"=Even-aged Silvicultural Prescription / "1"=Base Timing Option / "_yip"=Combined by YEP program / ".fia"=FIA Cover Typing Routine) vegetation yield file:

Strata	Proj_Year	St_Age/10	Stand_Age	StDnIndex	CulmMAI-A	Qd_Mn_Dia	Plt_Acres	Trt_Acres
dfd_rx_eae	2015	1	7.00	47.00	24.23	4.60	8.00	0.00
dfd_rx_eae	2025	2	16.00	87.00	18.29	4.22	12.00	0.00
dfd_rx_eae	2035	3	26.00	174.00	27.01	3.48	12.00	9.00
dfd_rx_eae	2045	4	36.00	214.00	31.89	5.38	14.00	0.00
dfd_rx_eae	2055	5	45.00	244.00	34.27	5.72	17.00	0.00
dfd_rx_eae	2065	6	55.00	290.00	36.22	6.06	19.00	0.00
dfd_rx_eae	2075	7	66.00	308.00	33.04	6.03	24.00	0.00
dfd_rx_eae	2085	8	76.00	267.00	38.54	7.09	47.00	36.00
dfd_rx_eae	2095	9	86.00	223.00	30.97	8.58	67.00	0.00
dfd_rx_eae	2105	10	96.00	241.00	31.10	8.00	75.00	0.00
dfd_rx_eae	2115	11	106.00	264.00	30.66	7.54	81.00	0.00
dfd_rx_eae	2125	12	116.00	275.00	46.42	7.23	86.00	85.00
dfd_rx_eae	2135	13	127.00	237.00	45.77	8.31	3.00	3.00
dfd_rx_eae	2145	14	133.00	244.00	56.69	7.18	3.00	3.00
dfd_rx_eae	2155	15	147.00	305.00	72.61	8.43	5.00	5.00
dfd_rx_eae	2165	16	154.00	260.00	78.15	10.18	1.00	1.00
dfd_rx_ear	2015	1	10.00	55.00	997.00	9.89	98.00	0.00
dfd_rx_ear	2025	2	20.00	75.00	490.58	3.31	98.00	0.00
dfd_rx_ear	2035	3	30.00	189.00	347.06	5.17	98.00	97.00
dfd_rx_ear	2045	4	40.00	164.00	273.85	8.16	98.00	0.00
dfd_rx_ear	2055	5	50.00	278.00	242.38	10.13	98.00	0.00
dfd_rx_ear	2065	6	60.00	283.00	215.44	10.15	98.00	0.00
dfd_rx_ear	2075	7	70.00	311.00	192.44	9.29	98.00	0.00
dfd_rx_ear	2085	8	80.00	294.00	192.49	8.94	98.00	97.00
dfd_rx_ear	2095	9	90.00	217.00	158.38	8.92	98.00	0.00
dfd_rx_ear	2105	10	100.00	230.00	147.64	7.76	98.00	0.00
dfd_rx_ear	2115	11	110.00	273.00	137.55	7.52	98.00	0.00
dfd_rx_ear	2125	12	120.00	273.00	128.06	7.85	90.00	0.00
dfd_rx_ear	2135	13	130.00	260.00	114.30	7.84	86.00	0.00
dfd_rx_ear	2145	14	140.00	263.00	108.09	8.07	86.00	0.00
dfd_rx_ear	2155	15	150.00	293.00	105.59	8.25	84.00	81.00
dfd_rx_ear	2165	16	160.00	220.00	96.12	10.81	81.00	0.00
dfd_rx_ear	2175	17	170.00	242.00	91.64	9.29	79.00	0.00
dfd_rx_ear	2185	18	180.00	232.00	86.31	8.99	74.00	0.00
dfd_rx_ear	2195	19	190.00	258.00	83.65	8.87	51.00	0.00
dfd_rx_ear	2205	20	200.00	263.00	80.17	8.83	31.00	0.00
dfd_rx_ear	2215	21	210.00	276.00	88.11	8.96	23.00	17.00
dfd_rx_ear	2015	1	10.00	40.00	1435.08	7.49	17.00	0.00

Strata	Proj_Year	Stand_Age	LTr.AllSx	LAD.AllSx	LAH.AllSx	LBA.AllSx	LCA.AllSx	LBd.AllSx
dfd_rx_eae	2015	7.00	2011.32	10.20	51.79	11.19	172.81	905.16
dfd_rx_eae	2025	16.00	2034.60	8.36	42.03	23.32	285.16	1252.56
dfd_rx_eae	2035	26.00	1633.32	7.52	41.12	57.94	691.05	2211.60
dfd_rx_eae	2045	36.00	1446.68	7.24	44.20	74.90	1136.72	4099.70
dfd_rx_eae	2055	45.00	1369.48	7.84	48.53	89.75	1552.32	5858.74
dfd_rx_eae	2065	55.00	1560.28	8.45	51.70	108.97	1999.89	9067.17
dfd_rx_eae	2075	66.00	1573.65	8.98	55.41	115.95	2168.25	10097.02
dfd_rx_eae	2085	76.00	996.78	9.60	58.19	111.54	2258.84	11028.92
dfd_rx_eae	2095	86.00	1072.90	11.07	64.14	86.42	2003.10	10441.06
dfd_rx_eae	2105	96.00	1108.71	11.60	67.27	94.96	2327.57	12053.29
dfd_rx_eae	2115	106.00	1113.19	11.30	66.76	104.95	2589.33	13469.85
dfd_rx_eae	2125	116.00	1005.91	11.24	66.43	111.89	2813.40	14656.20
dfd_rx_eae	2135	127.00	892.51	11.95	57.99	99.68	2049.84	11077.62
dfd_rx_eae	2145	133.00	561.51	11.26	61.43	113.72	2246.64	11776.30
dfd_rx_eae	2155	147.00	1244.66	12.70	65.63	140.32	3096.41	16617.23
dfd_rx_eae	2165	154.00	252.71	9.63	56.54	142.85	2572.45	12673.02
dfd_rx_ear	2015	10.00	608.11	20.74	95.81	16.48	503.74	2946.75
dfd_rx_ear	2025	20.00	924.29	9.17	43.06	22.28	345.02	1745.40
dfd_rx_ear	2035	30.00	763.43	6.70	36.99	73.87	945.21	2561.17
dfd_rx_ear	2045	40.00	229.43	8.04	47.77	82.97	1487.39	6148.58
dfd_rx_ear	2055	50.00	886.54	10.21	62.74	114.46	2652.47	12952.41
dfd_rx_ear	2065	60.00	620.88	12.03	74.38	127.27	3459.81	17754.64
dfd_rx_ear	2075	70.00	841.99	13.66	83.85	132.65	4004.47	21334.49
dfd_rx_ear	2085	80.00	592.97	15.02	90.78	135.04	4383.93	24129.63
dfd_rx_ear	2095	90.00	718.37	18.61	105.40	88.41	3239.29	18959.24
dfd_rx_ear	2105	100.00	539.64	16.62	91.41	101.94	3748.54	22419.50
dfd_rx_ear	2115	110.00	815.03	12.78	69.48	113.99	4115.83	24843.29

dfd_rx_ear	2125	120.00	599.47	11.16	61.31	122.99	4351.66	26437.60
dfd_rx_ear	2135	130.00	750.36	10.75	60.00	109.59	3843.98	23524.42
dfd_rx_ear	2145	140.00	549.81	10.70	60.51	119.87	4117.31	25203.45
dfd_rx_ear	2155	150.00	737.76	11.08	63.09	127.62	4318.77	26347.57
dfd_rx_ear	2165	160.00	439.86	14.48	81.87	102.03	3858.55	24322.69
dfd_rx_ear	2175	170.00	539.23	15.59	87.72	108.45	4057.62	25363.43
dfd_rx_ear	2185	180.00	472.90	15.12	83.70	107.05	4015.02	25010.62
dfd_rx_ear	2195	190.00	547.65	13.41	74.18	117.21	4373.66	27173.38
dfd_rx_ear	2205	200.00	505.54	12.17	67.54	122.91	4512.81	27940.62
dfd_rx_ear	2215	210.00	541.77	11.75	65.36	127.44	4691.96	29135.16
dfd_rx_ear	2015	10.00	596.93	31.33	145.97	11.28	543.24	3822.27

Strata	Proj_Year	Stand_Age	HTr.AllSx	HAD.AllSx	HAH.AllSx	HBA.AllSx	HCA.AllSx	HBd.AllSx
dfd_rx_eae	2015	7.00	0.00	0.00	0.00	0.00	0.00	0.00
dfd_rx_eae	2025	16.00	0.00	0.00	0.00	0.00	0.00	0.00
dfd_rx_eae	2035	26.00	1141.25	5.90	39.30	9.27	0.00	0.00
dfd_rx_eae	2045	36.00	0.00	0.00	0.00	0.00	0.00	0.00
dfd_rx_eae	2055	45.00	0.00	0.00	0.00	0.00	0.00	0.00
dfd_rx_eae	2065	55.00	0.00	0.00	0.00	0.00	0.00	0.00
dfd_rx_eae	2075	66.00	0.00	0.00	0.00	0.00	0.00	0.00
dfd_rx_eae	2085	76.00	283.44	8.47	54.39	42.98	652.82	3338.14
dfd_rx_eae	2095	86.00	0.00	0.00	0.00	0.00	0.00	0.00
dfd_rx_eae	2105	96.00	0.00	0.00	0.00	0.00	0.00	0.00
dfd_rx_eae	2115	106.00	0.00	0.00	0.00	0.00	0.00	0.00
dfd_rx_eae	2125	116.00	984.90	10.22	63.17	82.22	1902.79	9411.88
dfd_rx_eae	2135	127.00	883.99	10.61	54.34	69.67	1192.27	5973.45
dfd_rx_eae	2145	133.00	549.74	10.20	59.26	85.15	1545.74	8007.62
dfd_rx_eae	2155	147.00	1231.89	11.81	63.66	110.32	2298.91	12139.75
dfd_rx_eae	2165	154.00	229.57	9.06	54.90	112.85	1874.22	9130.31
dfd_rx_ear	2015	10.00	0.00	0.00	0.00	0.00	0.00	0.00
dfd_rx_ear	2025	20.00	0.00	0.00	0.00	0.00	0.00	0.00
dfd_rx_ear	2035	30.00	455.36	5.24	31.55	10.25	0.00	0.00
dfd_rx_ear	2045	40.00	0.00	0.00	0.00	0.00	0.00	0.00
dfd_rx_ear	2055	50.00	0.00	0.00	0.00	0.00	0.00	0.00
dfd_rx_ear	2065	60.00	0.00	0.00	0.00	0.00	0.00	0.00
dfd_rx_ear	2075	70.00	0.00	0.00	0.00	0.00	0.00	0.00
dfd_rx_ear	2085	80.00	213.45	13.15	83.28	54.94	1548.31	8177.42
dfd_rx_ear	2095	90.00	0.00	0.00	0.00	0.00	0.00	0.00
dfd_rx_ear	2105	100.00	0.00	0.00	0.00	0.00	0.00	0.00
dfd_rx_ear	2115	110.00	0.00	0.00	0.00	0.00	0.00	0.00
dfd_rx_ear	2125	120.00	0.00	0.00	0.00	0.00	0.00	0.00
dfd_rx_ear	2135	130.00	0.00	0.00	0.00	0.00	0.00	0.00
dfd_rx_ear	2145	140.00	0.00	0.00	0.00	0.00	0.00	0.00
dfd_rx_ear	2155	150.00	214.46	8.06	46.96	26.29	505.44	3037.19
dfd_rx_ear	2165	160.00	0.00	0.00	0.00	0.00	0.00	0.00
dfd_rx_ear	2175	170.00	0.00	0.00	0.00	0.00	0.00	0.00
dfd_rx_ear	2185	180.00	0.00	0.00	0.00	0.00	0.00	0.00
dfd_rx_ear	2195	190.00	0.00	0.00	0.00	0.00	0.00	0.00
dfd_rx_ear	2205	200.00	0.00	0.00	0.00	0.00	0.00	0.00
dfd_rx_ear	2215	210.00	398.27	10.72	60.92	71.24	2291.25	13183.66
dfd_rx_ear	2015	10.00	0.00	0.00	0.00	0.00	0.00	0.00

In actuality, the section breaks were put in to separate the listing by Stand Attributes, Live Tree Metrics, and Harvest Tree Information. These columns are appended horizontally in the yield file. Pretty mundane unless you know what you are looking for. The YEP program brings these columns to life.

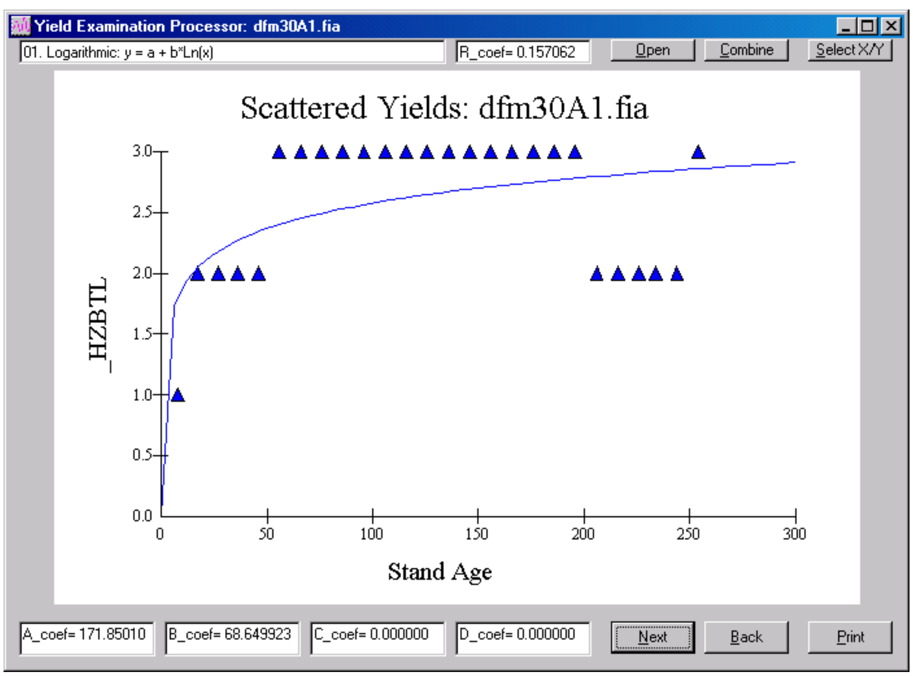
A template for the various column headings as used for the KIPZ project is included next:

Accounting Variables for KIPZ Forest Plan Revision

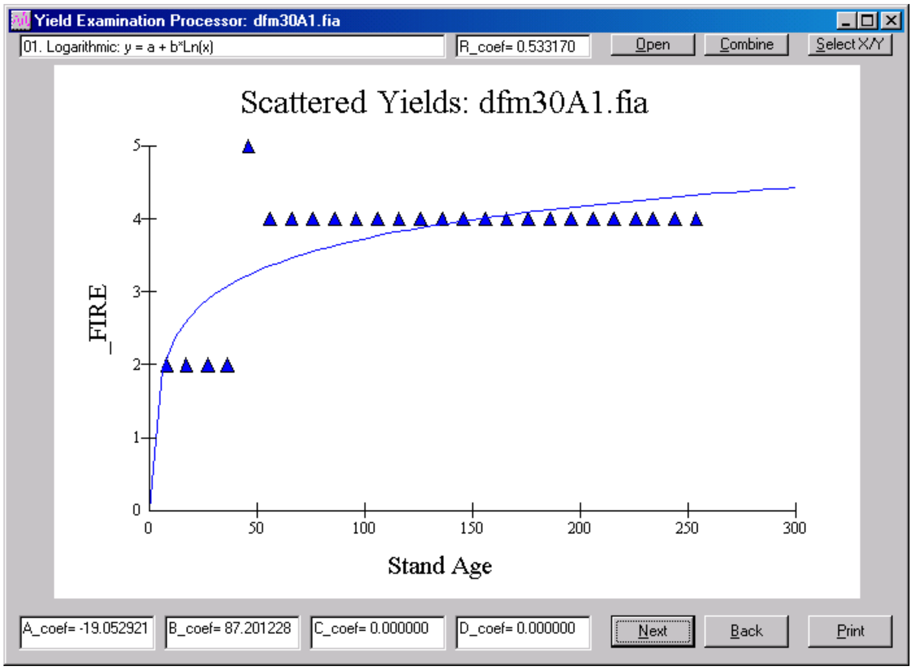
```
*Base Model Output Variables: Fvsstand Alone Post Processor
1  - Strata    = Stand Type/Rx/Timing Choice Label
1  - Proj_Year = Projection Cycle Year
1  - St_Age/10 = Stand Age/10 years
1  - Stand_Age = Stand Age
1  - StDnIndex = Stand Density Index
1  - CulmMAI-A = Culmination Mean Annual Increment - Merchantable Cubic Feet, All Trees
1  - Qd_Mn_Dia = Quadratic Mean Diameter
1  - Plt_Acres = Plot Acres (Count)
1  - Trt_Acres = Treatment Acres (Count)
1  - LTr.AllSx = Live/Trees per Acre/All Species/All Size Classes
1  - LAD.AllSx = Live/Average DBH/All Species/All Size Classes
```

```
1  - LAH.AllSx = Live/Average Height/All Species/All Size Classes
1  - LBA.AllSx = Live/Basal Area per Acre/All Species/All Size Classes
1  - LCA.AllSx = Live/Cubic Feet per Acre/All Species/All Size Classes, All Trees - Cubic Top
1  - LBd.AllSx = Live/Board Feet per Acre/All Species/All Size Classes
1  - HTr.AllSx = Harvest/Trees per Acre/All Species/All Size Classes
1  - HAD.AllSx = Harvest/Average DBH/All Species/All Size Classes
1  - HAH.AllSx = Harvest/Average Height/All Species/All Size Classes
1  - HBA.AllSx = Harvest/Basal Area per Acre/All Species/All Size Classes
1  - HCA.AllSx = Harvest/Cubic Feet per Acre/All Species/All Size Classes, All Trees - Cubic Top
1  - HBd.AllSx = Harvest/Board Feet per Acre/All Species/All Size Classes
1  - LTr.Gp1Xx = Live/Trees per Acre/All Species/Mature Size Classes
1  - LAD.Gp1Xx = Live/Average DBH/All Species/Mature Size Classes
1  - PCA.AllSx = Proportion Cut/Cubic Feet per Acre/All Species/All Size Classes, All Trees - Cubic Top
1  - PBd.AllSx = Proportion Cut/Board Feet per Acre/All Species/All Size Classes

*Structure Variables: Compute Post Processor
2  - _STNDAGE  = Stand Age
2  - _AGEINT   = Stand Age Interval - 10 years
2  - _FORTYP   = Forest Cover Type (FIA Algorithm)
2  - _CMPSC    = Computed Stand Size Class (FIA Algorithm)
2  - _CC00P    = Canopy Cover 0" plus
2  - _CC09P    = Canopy Cover 9" plus
2  - _CC15P    = Canopy Cover 15" plus
2  - _CC20P    = Canopy Cover 20" plus
2  - _LYNX     = Lynx Habitat

*Fire Variables: Compute Post Processor
3  - _CRBD     = Crown Bulk Density
3  - _TRIDX    = Torching Index - Severe Fire
3  - _CRIDX    = Crowning Index - Severe Fire
3  - _FIRE     = Fire Hazard Rating - Torching x Crowning Index Matrix
3  - _SNAG10T  = Snags 10"-20"
3  - _SNAG20P  = Snags 20" plus


*Pest Variables: Compute Post Processor
4  - _ESBTL    = Spruce Beetle
4  - _DFBTL    = Douglas-fir Beetle
4  - _PPBTL    = Ponderosa Pine (MPB/WPB)
4  - _WPBTL    = Western White Pine (MPB)
4  - _LPBTL    = Lodgepole Pine (MPB)
4  - _HZBTL    = Composite Beetle Hazard
4  - _BDWTSM   = W. Spruce Budworm/DF Tussock Moth
```

Classification variables that describe insect and wildfire hazard can also be displayed by the YEP program. For example, bark beetle rating system of 1=low, 2=moderate, 3=High appears as follows:



Wildfire hazard based on a low rating of 1 to high rating 5 also have a stair-step pattern:

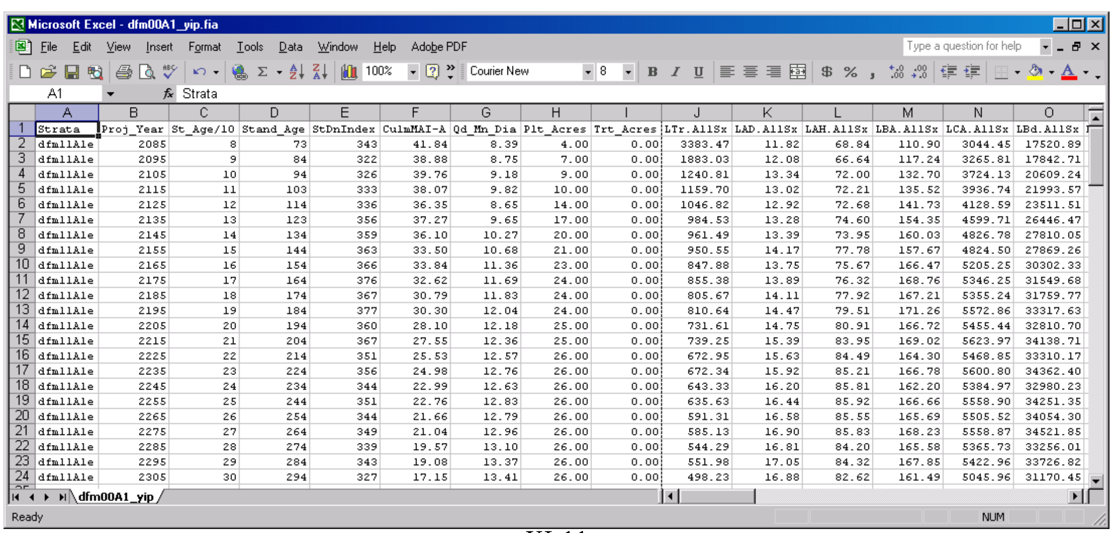


Extra Credit

Further interpretation of the vegetation yield files can be gleamed using a spreadsheet program such as MS-Excel. To import the yield files into MS-Excel, use these steps:

1. Fire up the MS-Excel program via clicking its associated icon.
2. Select the 'File' menu, 'Open' option to bring up the file open dialogue box.
3. Select the down arrow to the right of the 'Files of type:' listbox and choose 'All Files (*.*)'.
4. Burrow to the folder that contains the relevant yield file.
5. Select file and click the 'Open' command button.

The 'Text Import Wizard' appears on the screen. In the first step of three, use the 'Fixed width' option which is the default to indicate how MS-Excel should import the file. Click the 'Next' button to proceed to step two. Confirm that MS-Excel has properly set the field widths. Vertical bars show the column breaks. Should be good to go. Click 'Next' to specify data formats. No need to do anything here. Click 'Finish' to import the yield file. That is all there is to it. Now the power of MS-Excel is at your fingertips. You may want to format the spreadsheet using a fixed-width font such as Courier New. You could also declare the number of decimals as two places for consistency of use and viewing.


Microsoft Excel - dfm00A1_yip.fia

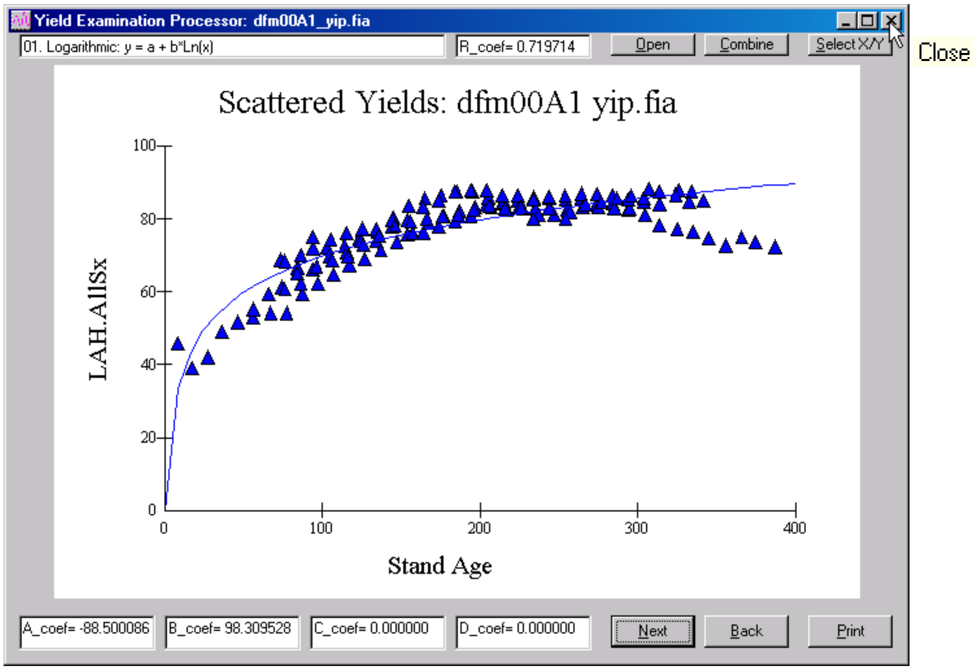
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	Strata	Proj_Year	St_Age/10	Stand_Age	StDnIndex	CulmMAI-A	Qd_Mn_Dia	Plt_Acres	Trt_Acres	LTr.AllSx	LAD.AllSx	LAH.AllSx	LBA.AllSx	LCA.AllSx	LBd.AllSx
2	dfmllAle	2085	8	73	343	41.84	8.39	4.00	0.00	3383.47	11.82	68.84	110.90	3044.45	17520.89
3	dfmllAle	2095	9	84	322	38.88	8.75	7.00	0.00	1883.03	12.08	66.64	117.24	3265.81	17842.71
4	dfmllAle	2105	10	94	326	39.76	9.18	9.00	0.00	1240.81	13.34	72.00	132.70	3724.13	20609.24
5	dfmllAle	2115	11	103	333	38.07	9.82	10.00	0.00	1159.70	13.02	72.21	135.52	3936.74	21993.57
6	dfmllAle	2125	12	114	336	36.35	8.65	14.00	0.00	1046.82	12.92	72.68	141.73	4128.59	23511.51
7	dfmllAle	2135	13	123	356	37.27	9.65	17.00	0.00	984.53	13.28	74.60	154.35	4599.71	26446.47
8	dfmllAle	2145	14	134	359	36.10	10.27	20.00	0.00	961.49	13.39	73.95	160.03	4826.78	27810.05
9	dfmllAle	2155	15	144	363	33.50	10.68	21.00	0.00	950.55	14.17	77.78	157.67	4824.50	27869.26
10	dfmllAle	2165	16	154	366	33.84	11.36	23.00	0.00	847.88	13.75	75.67	166.47	5205.25	30302.33
11	dfmllAle	2175	17	164	376	32.62	11.69	24.00	0.00	855.38	13.89	76.32	168.76	5346.25	31549.68
12	dfmllAle	2185	18	174	367	30.79	11.83	24.00	0.00	805.67	14.11	77.92	167.21	5355.24	31759.77
13	dfmllAle	2195	19	184	377	30.30	12.04	24.00	0.00	810.64	14.47	79.51	171.26	5572.86	33317.63
14	dfmllAle	2205	20	194	360	28.10	12.18	25.00	0.00	731.61	14.75	80.91	166.72	5455.44	32810.70
15	dfmllAle	2215	21	204	367	27.55	12.36	25.00	0.00	739.25	15.39	83.95	169.02	5623.97	34138.71
16	dfmllAle	2225	22	214	351	25.53	12.57	26.00	0.00	672.95	15.63	84.49	164.30	5468.85	33310.17
17	dfmllAle	2235	23	224	356	24.98	12.76	26.00	0.00	672.34	15.92	85.21	166.78	5600.80	34362.40
18	dfmllAle	2245	24	234	344	22.99	12.63	26.00	0.00	643.33	16.20	85.81	162.20	5384.97	32980.23
19	dfmllAle	2255	25	244	351	22.76	12.83	26.00	0.00	635.63	16.44	85.92	166.66	5558.90	34251.35
20	dfmllAle	2265	26	254	344	21.66	12.79	26.00	0.00	591.31	16.58	85.55	165.69	5505.52	34054.30
21	dfmllAle	2275	27	264	349	21.04	12.96	26.00	0.00	585.13	16.90	85.83	168.23	5558.87	34521.85
22	dfmllAle	2285	28	274	339	19.57	13.10	26.00	0.00	544.29	16.81	84.20	165.58	5365.73	33256.01
23	dfmllAle	2295	29	284	343	19.08	13.37	26.00	0.00	551.98	17.05	84.32	167.85	5422.96	33726.82
24	dfmllAle	2305	30	294	327	17.15	13.41	26.00	0.00	498.23	16.88	82.62	161.49	5045.96	31170.45

dfm00A1_yip

Ready

X-it Top Right

To close the Yield Examination Program, click the "X" in the upper right corner of the main window. Yep, an affirmative reply to the scatter plot observation tool.



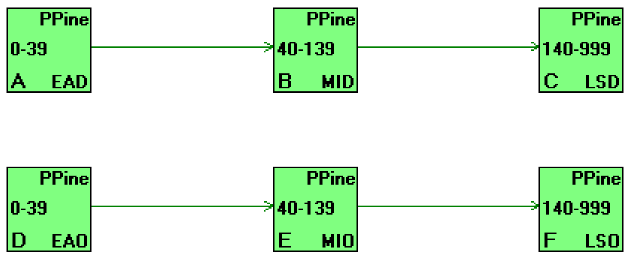
Notes:

<u>Topic Preside:</u> **Process Residence Times**

Concepts: Proceed to classify inventory data into vegetation states for initial conditions and subsequent projection cycles.

State and transition models (STM) are being used to project the effects of disturbance and management on forested landscapes. The Vegetation Dynamics Development Tool (VDDT) developed by ESSA Technologies Ltd. that is in general use for National Forest planning is an example of an STM. An STM treats vegetation as combinations of cover type and structural stages linked by pathways resulting from natural succession, disturbances events, or management actions (example, figure 1). The cover type/structural states (boxes) represent the most important developmental stages. Pathways (arrows) are the linkages between the states. Residence time is the average length of time that vegetation typically remains in the same class before transitioning to another state through successional dynamics. For disturbance pathways, transition probabilities control the frequency with which movements between states occur.

Successional Pathways



Stochastic Pathways

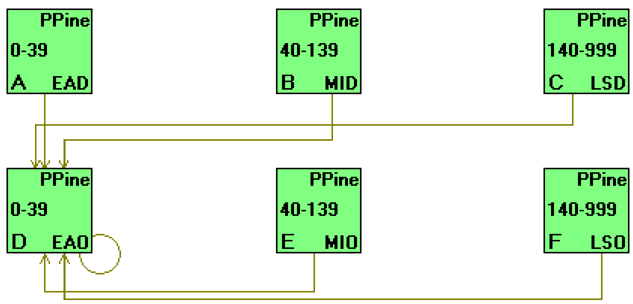


Figure 1 – Pathway diagram for the Warm Dry Ponderosa Pine VDDT STM, Blue Mountains modeling region. Boxes represent cover type/structural stages, and arrows represent transitions. Green arrows depict successional pathways resulting from natural growth dynamics. Brown arrows depict stochastic pathways following disturbance events such as insect/disease outbreaks, stand replacing wildfire, or commercial thinning. A key to state box codes follows:

Covertype definitions:

PPine Ponderosa pine cover type

State class definitions:

EAD Early seral, Dense (0-10 inches qmd, > 40% canopy cover)
MID Mid seral, Dense (10-20 inches qmd, > 40% canopy cover)
LSD Late seral, Dense (> 20 inches qmd, > 40% canopy cover)
EAO Early seral, Open (0-10 inches qmd, 10-40% canopy cover)
MIO Mid seral, Open (10-20 inches qmd, 10-40% canopy cover)
LSO Late seral, Open (> 20 inches qmd, 10-40% canopy cover)

An STM modeler specifies parameters that control states, pathways, and transition probabilities. Typically, model users obtain as much information as possible on vegetation dynamics and disturbance ecology from the literature; however, expert opinion is often heavily relied upon. Stand projections of inventory data with the Forest Vegetation Simulator (FVS) provide another important source of information for helping make state and transition models behave in a more realistic manner. This approach was first proposed by Stage (1997), in an effort to provide "an empirical link between the Columbia River Basin Successional Model (CRBSUM) and the real world". The idea was that current vegetation inventories representing different stages of stand development could be integrated with the insect, disease, fire, and management effects available in the FVS system to empirically inform parameters and outputs in an STM. In concept, pursuit of such an analysis is particularly appealing because large amounts of vegetation data from regional strategic inventories (e.g. CVS, FIA plots) are available for projection. Thus, it is likely that representative samples exist for most or all modeled states in the STM.

The Preside program is capable of determining mean residence times and transition probabilities for state and transition models. For each inventory plot used in the analysis, its vegetation class is determined for initial inventory conditions and for subsequent projection cycles. Preside summarizes the various vegetation classes into states and calculates average time in a particular state and the probability of movement to associated states.

Vegetation Classification

Landscape assessments are often organized hierarchically around geographic and ecological study units. The subsequent example will refer to the 13.1 million acre Blue Mountains project area that encompasses the Wallowa Whitman, Umatilla, and Malheur National Forests. This landscape is divided into ecological strata called potential vegetation types (PVTs). A PVT represents a particular combination of site productivity and disturbance regimes. Unique VDDT state and transition models are designed for each PVT. The Blue Mountains project area has been stratified into eight PVTs that are depicted by separate VDDT models (figure 2). Within each model, combinations of cover type (i.e. tree species dominance) and structural stage (i.e. size class, canopy density, canopy layering) define the state boxes (figure 3).

Figure 2 – Biophysical settings of potential vegetation types within the Blue Mountains project area.

Existing Cover Type	**Size Class**	**Canopy Cover**	**Canopy Layers**
- One Species Dominance	- Seedling/Sapling (0-5" qmd)	- Non-Tree (0-10 %)	- Single
- Two Species Dominance	- Small Tree (5-10" qmd)	- Open (10-40%)	- Multiple
- Three Species Dominance	- Medium Tree (10-15" qmd)	- Medium (40-70%)	
- Mixed Species Dominance	- Large Tree (15-20" qmd)	- Closed (70%+)	
- Non-Vegetated	- Very Large Tree (20-25" qmd)		
	- Giant Tree (25"+ qmd)		

Figure 3 – Cover type and structural stages that define states in the VDDT models.[1]

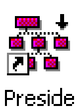
Currently, the FVSSTAND post processing program has been configured to report vegetation attributes in accordance with regionally accepted algorithms. Metrics for potential vegetation type, existing dominance type, size class, density class, canopy stories, and stand age are listed by inventory plot or stand polygon for each FVS projection cycle. Several other data items related to stocking are computed such as trees per acre, stand basal area, and stand density index. A complete list of output variables is displayed in Figure 4. The various rule sets used to compute the vegetation variables are assembled in a separate document that can be obtained by contacting the author.

[1] The current vegetation classification system was developed from National Standards (USDA FS 2003) and supplemented with Standards for Mapping of Vegetation in the Pacific Northwest Region (USDA FS 2004). The Preside program provides a flexible interface that allows setting class boundaries beyond the standards specified.

No.	Code Name	Description
01.	PLOT_ID	FIA Codes: State/Survey Unit/County/Plot Number
02.	CY	FVS Projection Cycle
03.	ST_AGE	FIA Stand Age
04.	PVT	Potential Vegetation Type
05.	DOM_TYPE	Dominance Type: R3 and R6 rulesets
06.	TREES/AC	Trees per acre (including seedlings and stems)
07.	QMD_TOP20	Quadratic-Mean-Diameter: Top 20% by diameter
08.	QMD_SIZCL	QMD by 5" interval (i.e. 0-5", 5-10", 10-15", 15-20", 20"+)
09.	CAN_SZMMP	Canopy Cover dominant size class: R2Veg Species Calcs, R3 mid-scale mapping
10.	CAN_SZTMB	Canopy Cover dominant size class: R2 HSS size classes, R3 timberland types
11.	CAN_SZWDL	Canopy Cover dominant size class: R3 woodland types
12.	CAN_COV	Canopy Cover corrected for overlap
13.	CAN_CLASS	Canopy Cover by 30% interval (i.e. 10-40%, 40-70%, 70%+)
14.	CAN_STORY	Canopy Layers/Stories: R6 ruleset; canopy cover per subordinate layers
15.	BA_STORY	Canopy Layers/Stories: R3 ruleset; basal area per 8" sliding diameter range
16.	VRT_STORY	Canopy Layers/Stories: R1 ruleset; basal area per size class
17.	SDI_STORY	Canopy Layers/Stories: R3 ruleset; canopy cover
18.	R3_VSS	R3 Vegetative Structural Stage: Goshawk guidelines
19.	FIA_FTYP	Forest Inventory Analysis (FIA) forest cover type
20.	QMD_AGE	Stand Age of QMD_TOP20
21.	CAN_AGE	Stand Age of CAN_SZMSM
22.	SEEDS/AC	Seedlings per acre (trees < 1.0” diameter)
23.	STEMS/AC	Trees per acre (trees ≥ 1.0” diameter)
24.	QMD_STM	Quadratic-Mean-Diameter, Tree ≥ 1.0” diameter
25.	BA_STM	Basal Area per Acre, Tree ≥ 1.0” diameter
26.	SDI_SUM	Stand Density Index, Summation method, Tree ≥ 1.0” diameter

Figure 4 – Vegetation classification variables reported by the FVSSTAND post processing program.

The use of stand age has specific significance within the realm of state and transition models. Stand age is used to index vegetation states and as such needs explicit consideration by model developers. Stand age provides a general measure of important processes of forested landscapes. The FVSSTAND program computes two estimates for stand age: 1) the origin date of the oldest canopy layer; and 2) the origin date of the dominant canopy layer. The origin date of the oldest cohort is an inference of time since last stand replacement disturbance and the best measure for ecological stand age. The origin date of the dominant cohort marks the time since the last major disturbance or otherwise is indicative of general stand age.



Proceed to PRESIDE

The Preside program classifies the current tree list for each inventory plot at each cycle boundary into the cover type, size class, canopy closure, and canopy layer that define the possible VDDT states. Estimates of mean residence times and transition probabilities are summarized by use of an array of all possible combinations from one state to another. For each plot at each cycle, its source (that is what state it began the cycle in) and destination (that is what state it ended the cycle in) are recorded. The length of time each plot remains within a vegetation state between cycles is accumulated and the mean and variance of this residence times is summarized over all the cycles in the projection. The pathways (direction of movement between source and destination) between states are also summarized using the relay matrix.

An example set up for the VDDT model that represents the Warm Dry Ponderosa Pine PVT from the Blue Mountains project area will be presented to demonstrate the functionality of the Preside program. This STM uses vegetation classes defined by cover type (DOM_TYPE), trees per acre (TREES/AC), size class (QMD_TOP20), canopy cover (CAN_COV) and canopy layers (VRT_STORY). The DOM_TYPE and VRT_STORY are discrete attributes whereas the TREES/AC, QMD_TOP20, and CAN_COV are continuous attributes. Refer to table 1 for vegetation attribute definitions.

Vegetation Attribute	Discrete Class or Range Width	Class or Code Assignment	Labels Assigned in the "Groups" Tab	Description
DOM_TYPE	ABGR	Grand Fir	DP	Warm Dry Ponderosa Pine
	LAOC	Western Larch	DP	Warm Dry Ponderosa Pine
	PICO	Lodgepole Pine	DP	Warm Dry Ponderosa Pine
	PIPO	Ponderosa Pine	DP	Warm Dry Ponderosa Pine
	PSME	Douglas-fir	DP	Warm Dry Ponderosa Pine
	TEDX	Evergreen-Deciduous Mix	DP	Warm Dry Ponderosa Pine
	NVG	Non-vegetated	DP	Warm Dry Ponderosa Pine
TREES/AC	0-100 tpa	1	1	Non-Stocked
	100-400 tpa	2	2	Stocked
	400-900 tpa	3	3	Over-Stocked
QMD_TOP20	0-5"	1	E	Seedlings/Saplings
	5-10"	2	S	Small Tree
	10-15"	3	M	Medium Tree
	15-20"	4	L	Large Tree
	20-25"	5	V	Very Large Tree
	25-100"	6	G	Giant Tree
CAN_COV	0-10%	0	0	Non-Stocked
	10-40%	1	1	Open
	40-70%	2	2	Medium
	70-100%	3	2	Closed
VRT_STORY	0	0	S	Single-Storied
	1	1	S	Single-Storied
	2 or more	2	M	Multi-Storied

Table 1 – Vegetation components comprising the Warm Dry Ponderosa Pine PVT.

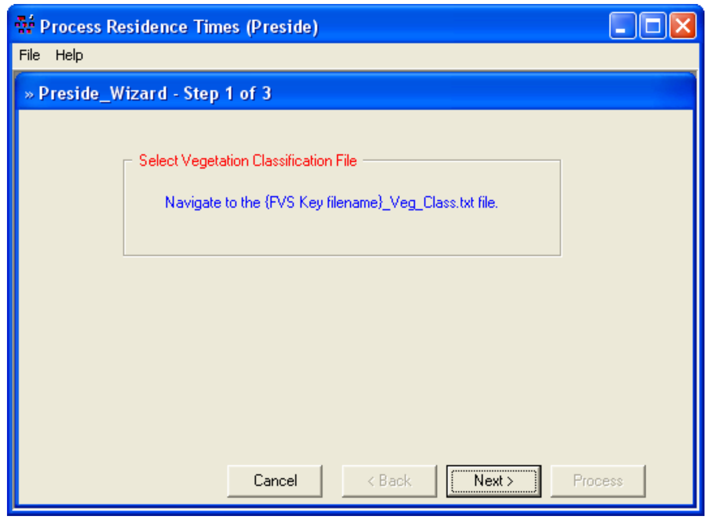
The schema in table 1 results in the list of possible attribute combinations displayed in table 2. Each and every combination must be assigned to one of the vegetation state classes (yellow column). To simplify this example, all Dominance Types were collapsed into a single Dominance Group labeled "DP". The total number of potential vegetation combination can be computed by multiplying the number of vegetation attributes by the number of associated Group labels. For this example, there are one dominance type label, three trees per acre labels, six size class labels, three canopy cover labels, and two canopy layer labels. This is a total of 108 potential vegetation combinations resulting from various mixes of the inventory attributes for the vegetation components.

State	**Cover Type/Structure Stages – All possible combinations (shown here for Warm Dry Ponderosa Pine PVT)**															
A_GFB	DP1E0S	DP1E0M	DP1S0S	DP1S0M	DP1M0S	DP1M0M	DP1L0S	DP1L0M	DP1V0S	DP1V0M	DP1G0S	DP1G0M	DP2E0S	DP2E0M	DP2S0S	DP2S0M
B_EAA	DP1E1S	DP1E1M	DP2E1S	DP2E1M	DP1E2S	DP1E2M	DP2E2S	DP2E2M	DP3E0S	DP3E0M	DP3E1S	DP3E1M	DP3E2S	DP3E2M		
C_SAA	DP1S1S	DP1S1M	DP2S1S	DP2S1M	DP1S2S	DP1S2M	DP2S2S	DP2S2M	DP3S0S	DP3S0M	DP3S1S	DP3S1M	DP3S2S	DP3S2M		
D_MAA	DP1M1S	DP1M1M	DP2M0S	DP2M0M	DP2M1S	DP2M1M	DP1M2S	DP1M2M	DP2M2S	DP2M2M	DP3M0S	DP3M0M	DP3M1S	DP3M1M	DP3M2S	DP3M2M
E_LAA	DP1L1S	DP1L1M	DP2L0S	DP2L0M	DP2L1S	DP2L1M	DP1L2S	DP1L2M	DP2L2S	DP2L2M	DP3L0S	DP3L0M	DP3L1S	DP3L1M	DP3L2S	DP3L2M
F_VAA	DP1V1S	DP1V1M	DP2V0S	DP2V0M	DP2V1S	DP2V1M	DP1V2S	DP1V2M	DP2V2S	DP2V2M	DP3V0S	DP3V0M	DP3V1S	DP3V1M	DP3V2S	DP3V2M
G_GAA	DP1G1S	DP1G1M	DP2G0S	DP2G0M	DP2G1S	DP2G1M	DP1G2S	DP1G2M	DP2G2S	DP2G2M	DP3G0S	DP3G0M	DP3G1S	DP3G1M	DP3G2S	DP3G2M
A_GFB	DP1E0S	DP1E0M	DP1S0S	DP1S0M	DP1M0S	DP1M0M	DP1L0S	DP1L0M	DP1V0S	DP1V0M	DP1G0S	DP1G0M	DP2E0S	DP2E0M	DP2S0S	DP2S0M
B_EAA	DP1E1S	DP1E1M	DP2E1S	DP2E1M	DP1E2S	DP1E2M	DP2E2S	DP2E2M	DP3E0S	DP3E0M	DP3E1S	DP3E1M	DP3E2S	DP3E2M		

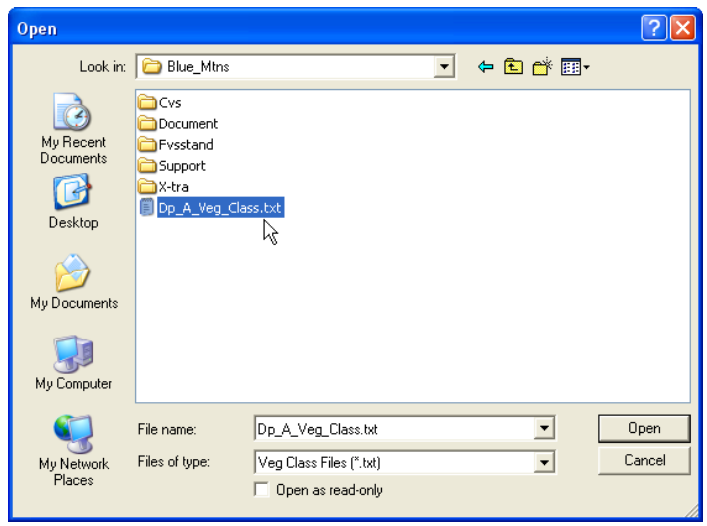
Table 2 – Vegetation combinations that form Warm Dry Ponderosa Pine VDDT model states.

Preside provides a "Step Wizard" to sequentially proceed between input and output windows. The screen captures on the following pages will display the utility of each window.

1. Step 1 of the Preside_Wizard prompts for the location of the Vegetation Classification text file that the FVSSTAND post processing program produced.

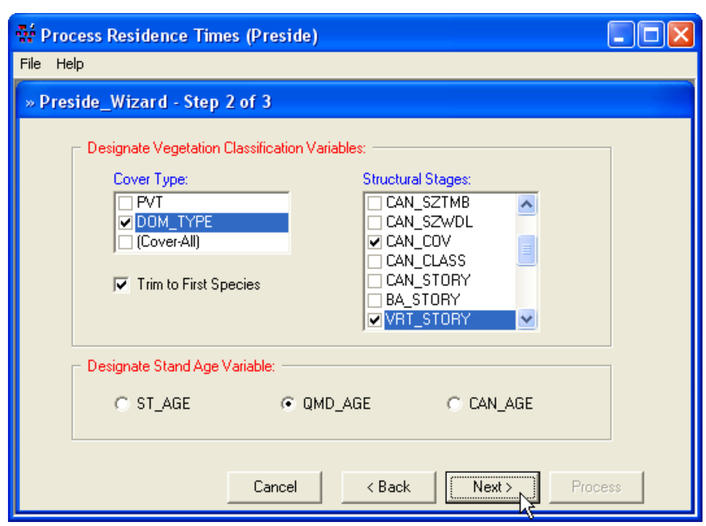


2. This file resides in the working folder that contains the FVS keyword file. Note that Preside uses this folder as the location for all output files.

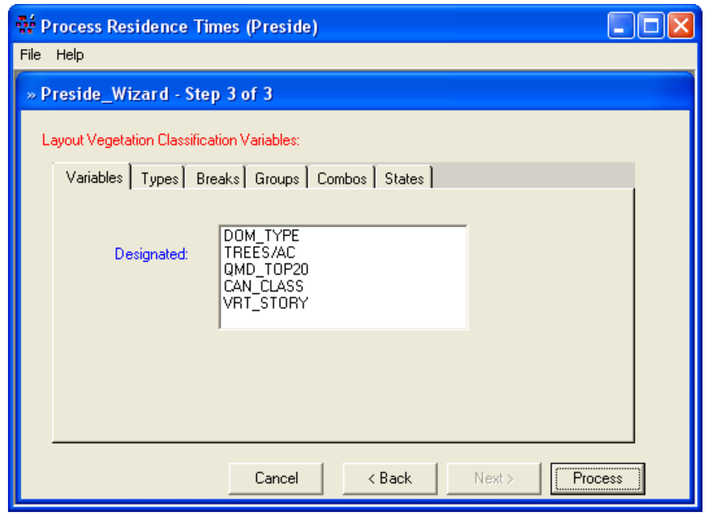


3. Step 2 of the Preside_Wizard allows for input of the cover type and structural stage attributes that comprise the STM boxes. Dominance types can be truncated to the primary tree species type. This aids in limiting the potential combinations of type/size/density/stories. There is a "catch-all" option for Cover Type and Structural Stages. The {Cover-All} and {Structure-All} items, located at the bottom of their respective list boxes, indicates no differentiation of cover or structure is required.

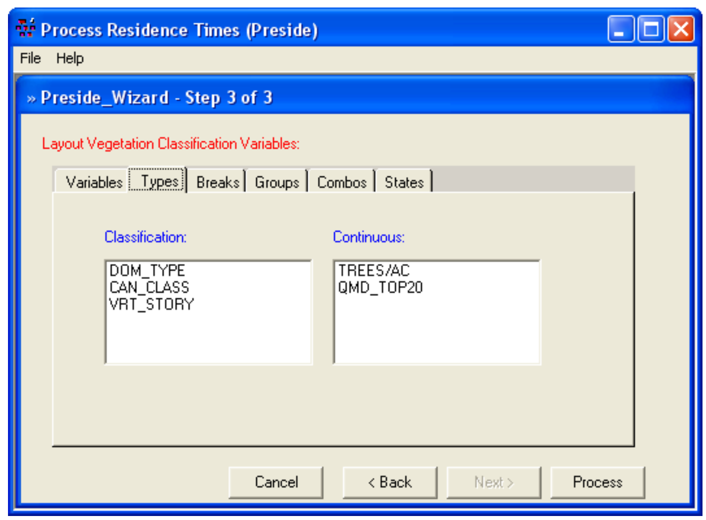
4. Three options are available for assigning stand age. ST_AGE is the stand age supplied in the inventory data set. QMD_AGE equates to the age of the oldest cohort. CAN_AGE is equivalent to the stand age of the dominant cohort.



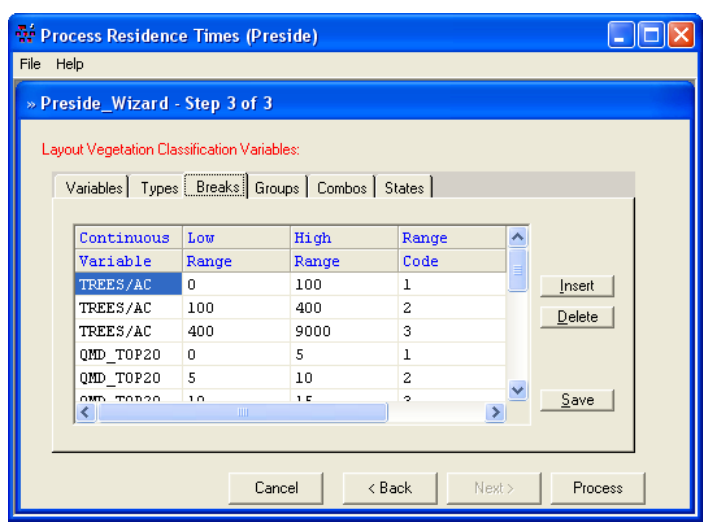
5. Step 3 of the Preside_Wizard walks through several tabs that will assist in transforming inventory attributes into VDDT states. The “Variables” tab simply lists the checked selections from the previous step.



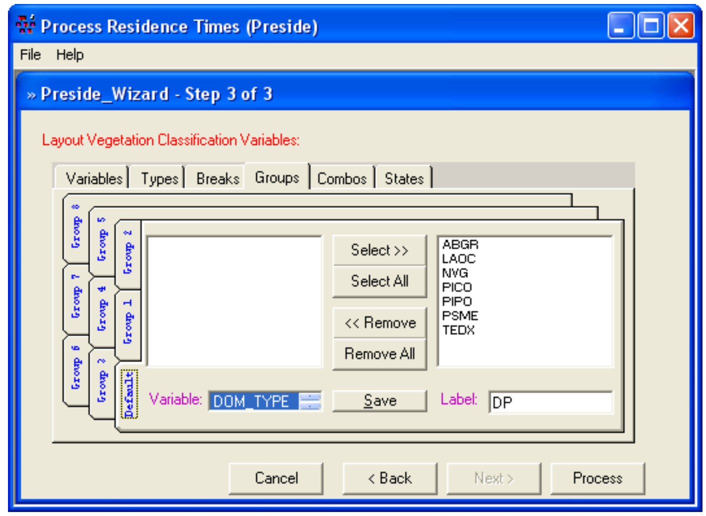
6. The “Types” tab distinguishes classification (i.e. discrete values) variables from continuous (i.e. range of values) variables. Preside knows the difference and reports accordingly.



7. The “Breaks” tab allows subdividing continuous values into subsets by class widths. Essentially, this is a method to classify the range variables. The low and high boundaries need to be set and an associated code label needs to be defined. For example, here we’ve created three classes for the TREES/AC variable (0 -100, 100-400, and 400-9000 tpa, labeled 1, 2, and 3, respectively).

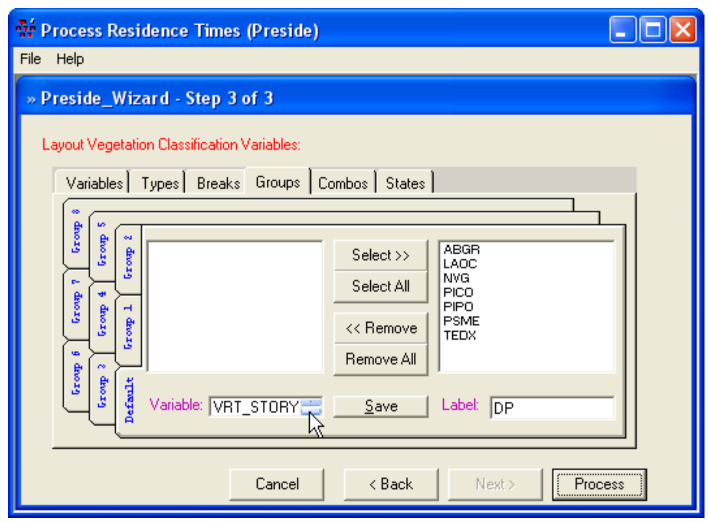


8. Now that the continuous variables have been assigned to classes, all variables can be further grouped. For example, the Warm Dry Ponderosa Pine PVT within the Blue Mountains project area is comprised of grand fir (ABGR), western larch (LAOC), non-vegetated (NVG), lodgepole pine (PICO), ponderosa pine (PIPO), Douglas-fir (PSME), mixed evergreen-deciduous (TEDX) cover types (recall from table 1). Here, all dominance types are assigned to the label 'DP'.

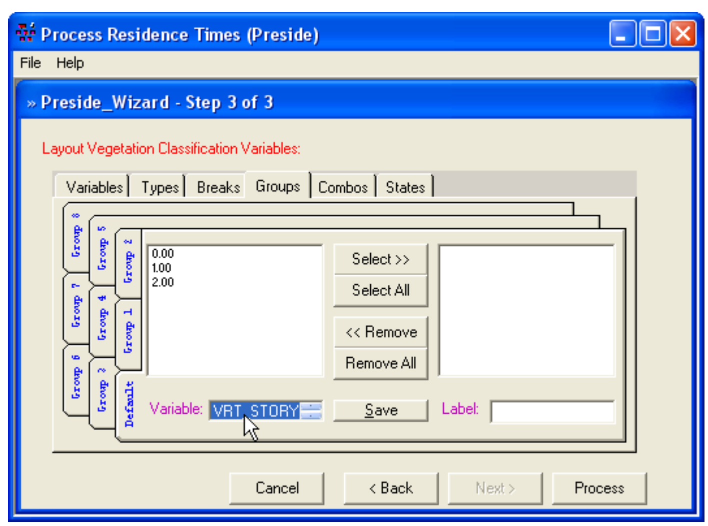


Note: As a general rule, it is beneficial to select the "Save" buttons within each tab as the input window is completed, so that work will be captured and conveyed to subsequent tabs.

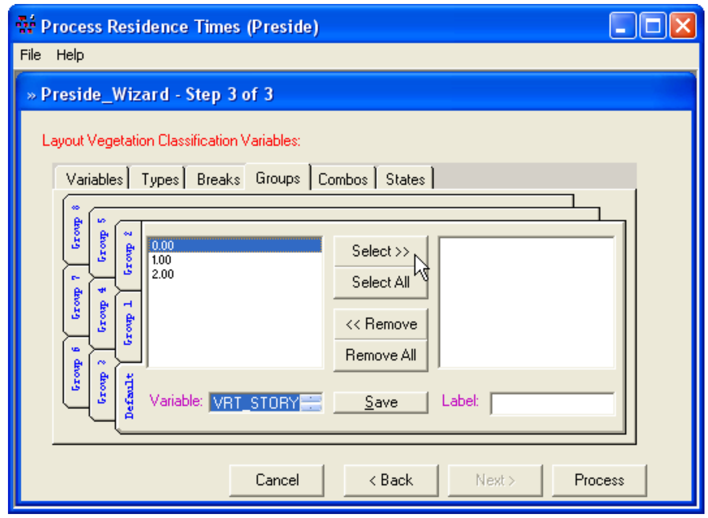
9. To provide group labels for the remaining vegetation variables, click the down arrow right of the list box, adjacent to the "Variable" caption. Scroll to the variable of interest and double-click to select.



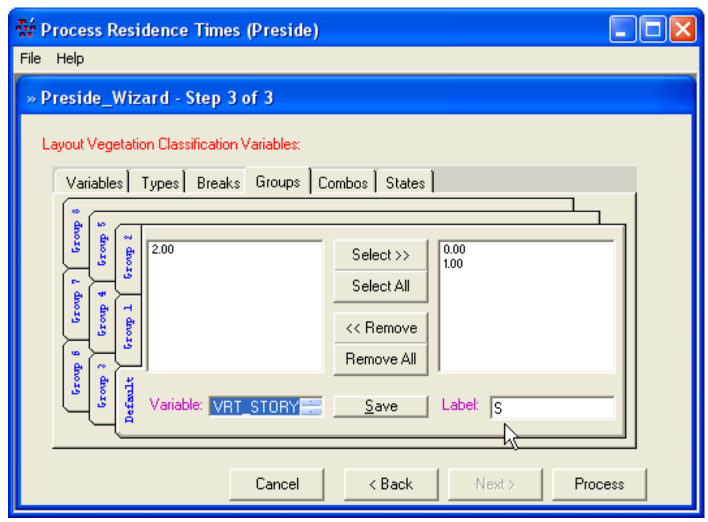
10. The selected variable will be highlighted. All available code values will be displayed in the left window pane within the "Default" group tab.



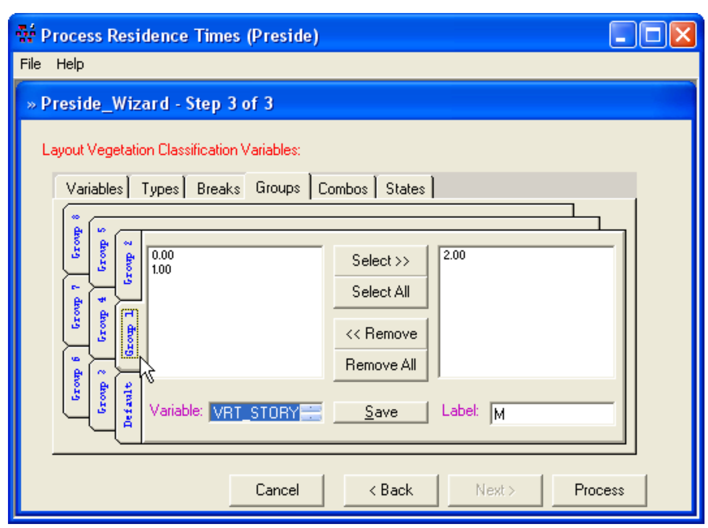
11. Click on the code value to highlight, then the “Select” button to move the item from the left to the right window pane. Codes that are place to the right belong to a designated group. Items can be selected singly or en masse by clicking the “Select All” button.



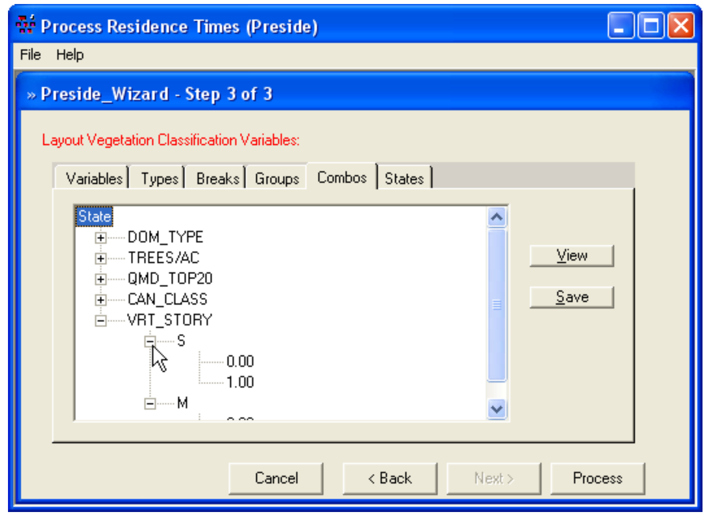
12. For this example, inventory codes 0.00 and 1.00 for canopy layering have been selected and moved to the right window pane. A label of “S” has been assigned that designates these vegetation attributes to the ‘Single-Storied’ group.



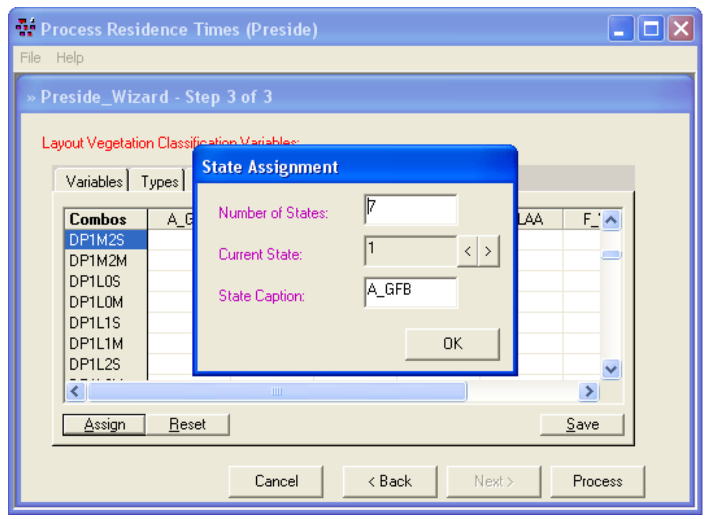
13. In order to define the ‘Multi-Storied’ group, the Group 1 tab residing left of the left window pane needs to be selected. Initially, all code attributes are displayed in the left window. Repeat the process of select the variable item, then click the “Select” button to move to the right window pane. Be sure to include a “Label” for this group. For this example, the letter “M” will represent code items for multi-storied stands. Once all groups have been defined. Click the “Save” button to capture the vegetation attribute combinations.



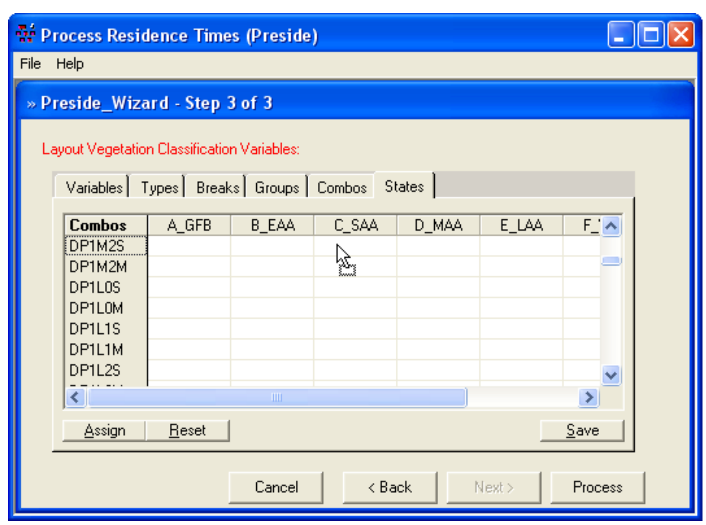
14. The “Combos” tab provides a quick view of compilations of the vegetation attributes into combinations that will form the VDDT state boxes. Clicking the “+” symbol adjacent to the vegetation variable label will expand the selection to display component of the higher level. For example, the vertical story contains class labels of “S” for single and “M” for multiple stories. Further, single-storied is defined by codes of “0.00” or “1.00” as derived from the vegetation classification text file.



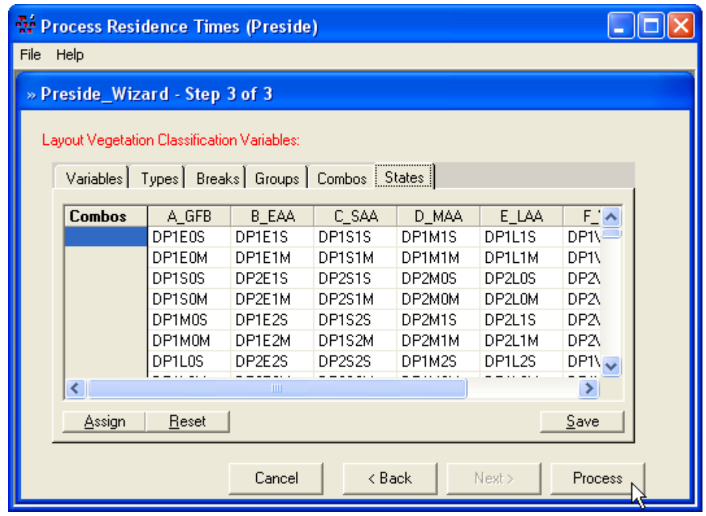
15. The “States” tab enables assigning all combinations of inventory attributes to VDDT state boxes. To use the “State Assignment” window, sequentially enter the number of the state; then provide a state caption. Click the “>” arrow and increment the Number of States (i.e. start with 1, then 2, then 3 …) text box and enter a label in the State Caption text box. Repeat the process until all VDDT model states have been entered.



16. Inventory attribute combinations can be dragged and dropped by right-clicking on a combo in the left column and moving the cursor to the appropriate VDDT model state.



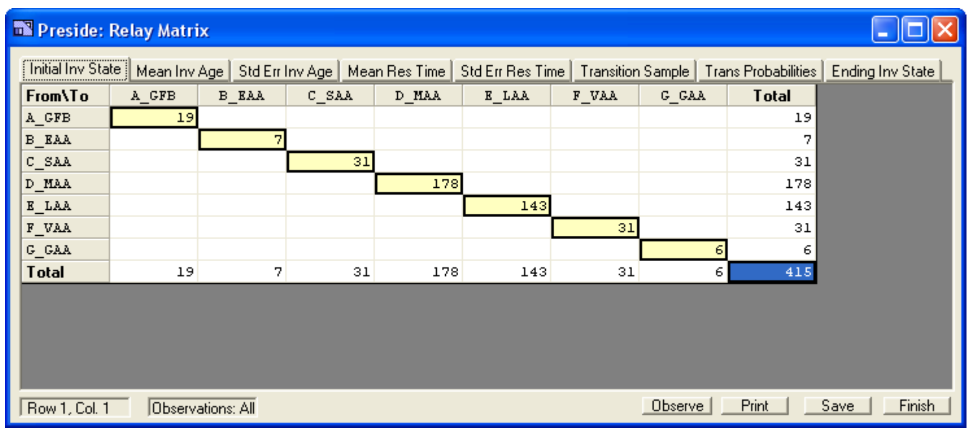
17. Repeat the process until all combos have been placed into their respective states. Save this window. Selecting the “Process” button will invoke Preside to compile the Relay Matrix.



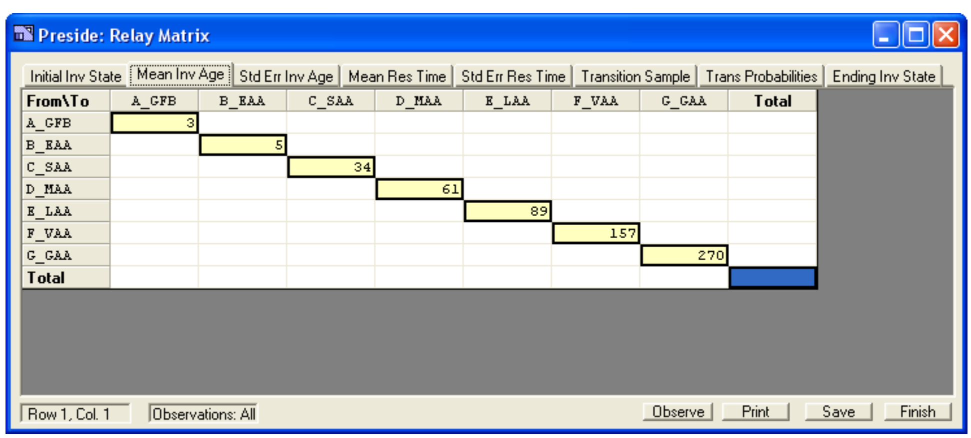
Preside: Relay Matrix

Using the class definitions specified by the user within the Preside_Wizard steps, the Preside program winnows the vegetation attributes that are output by the FVSSTAND program for each projection cycle into the appropriate cover type and structural stage. As a particular plot is analyzed, if it moves from one state to another, the transition is recorded. In the Relay Matrix, the rows correspond to the originating state (‘from’) and the columns correspond to the destination state (‘to’). The cell values are an accumulation of the time within a state. When all plots in the projection have been processed for all cycles, values for the mean inventory age, mean residence time, and transition probabilities are computed.

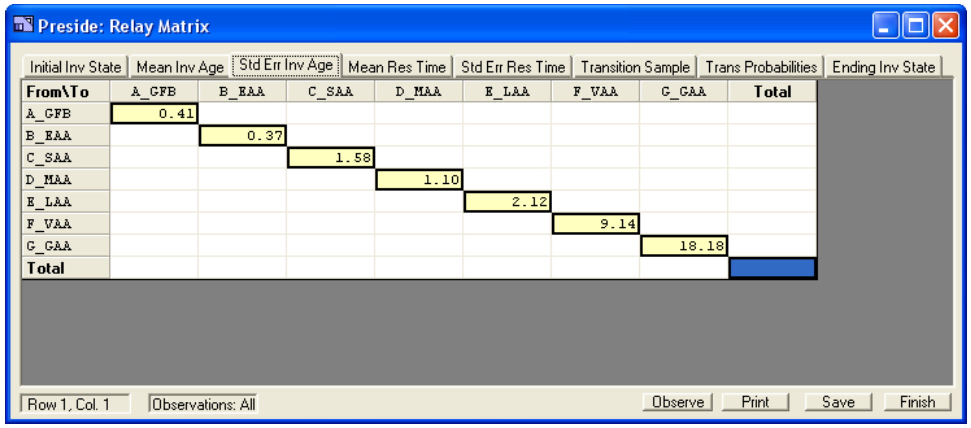
Initial Inv State: This tab displays a snapshot of the PVT’s existing (initial) condition. It also provides a quick check that all inventory plots that were processed in FVS made their way through Preside. For the Blue Mountain project area, Warm Dry Ponderosa Pine PVT, currently, 43 percent of the plots (178 of 415 total) reside in the “Medium Tree” size class (labeled ‘D_MAA’).



Mean Inventory Age: The average stand age for a vegetation state box is calculated from the sum of all plots within the state at the time of inventory (initial conditions). The basis is determined from the “Stand Age Variable” designation on the Step 2 window of the Preside_Wizard. Origin date of the oldest cohort was used in this example (‘QMD_AGE’ option).

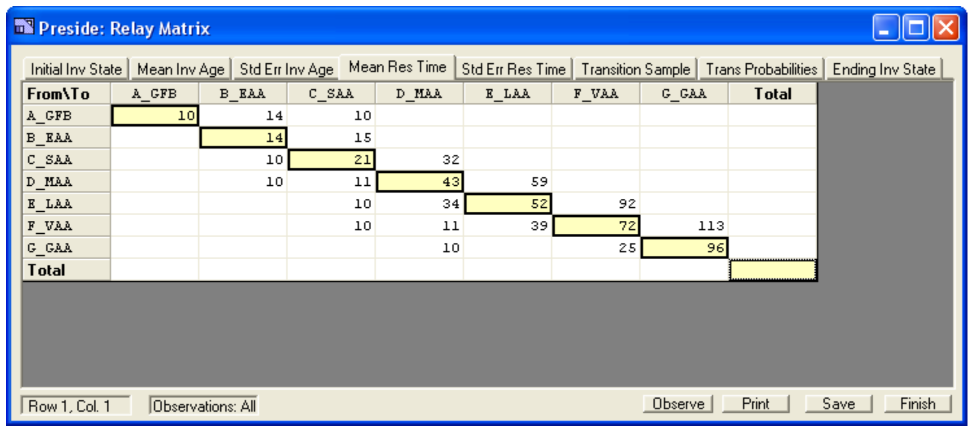


Standard Error of Mean Inventory Age: Computed as the coefficient of variation divided by the square root of the initial inventory sample within a vegetation state. This metric provides an indication of the variance around the mean inventory age.



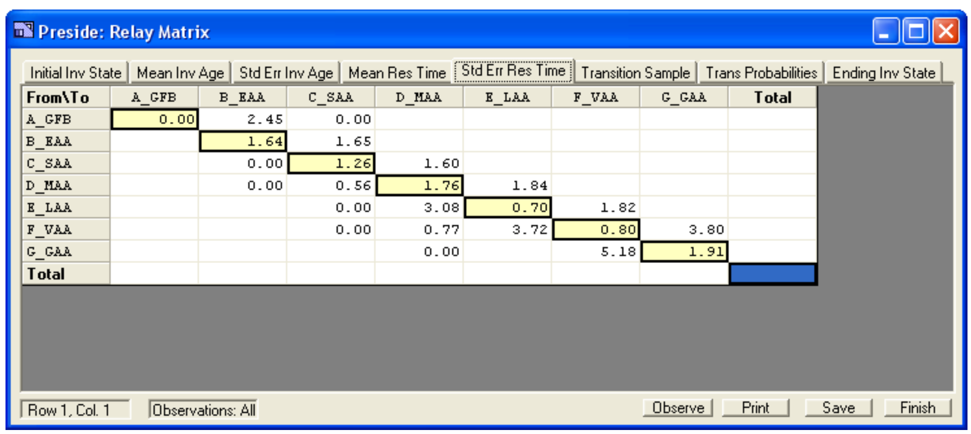
From\To	A_GFB	B_EAA	C_SAA	D_MAA	E_LAA	F_VAA	G_GAA	Total
A_GFB	0.41							
B_EAA		0.37						
C_SAA			1.58					
D_MAA				1.10				
E_LAA					2.12			
F_VAA						9.14		
G_GAA							18.18	
Total								

Mean Residence Time: This tab summarizes, for all projected samples (Transition Sample), the time-in-state. Along the diagonal, this is the average length of time in years that a plot stayed within a particular state before transitioning to another state. Above the diagonal, this is the average number of years before a plot progressed to a later structural stage. Below the diagonal, this is the average number of years before a plot retrogressed to an earlier structural stage.



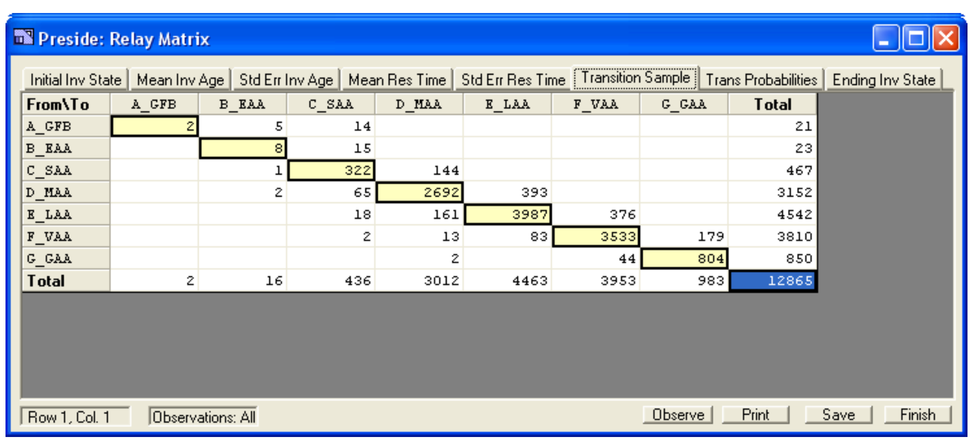
From\To	A_GFB	B_EAA	C_SAA	D_MAA	E_LAA	F_VAA	G_GAA	Total
A_GFB	10	14	10					
B_EAA		14	15					
C_SAA		10	21	32				
D_MAA		10	11	43	59			
E_LAA			10	34	52	92		
F_VAA			10	11	39	72	113	
G_GAA				10		25	96	
Total								

Standard Error of Mean Residence Time: Computed as the coefficient of variation divided by the square root of the transition sample. This metric provides an indication of the variance around the mean residence time. This window has proven beneficial for uncovering data or modeling errors. Standard errors in the double-digit range generally indicate a raw data issue or a FVS model configuration problem. Review the discussion of the Veg_Group.txt file later in this document.

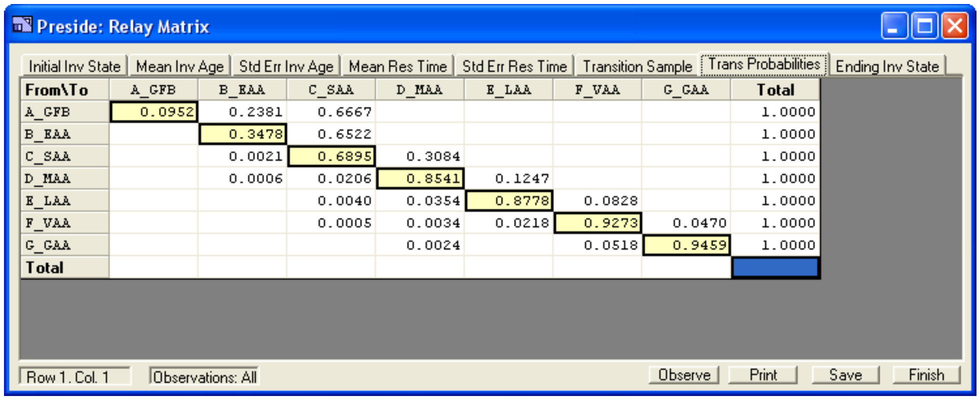


From\To	A_GFB	B_EAA	C_SAA	D_MAA	E_LAA	F_VAA	G_GAA	Total
A_GFB	0.00	2.45	0.00					
B_EAA		1.64	1.65					
C_SAA		0.00	1.26	1.60				
D_MAA		0.00	0.56	1.76	1.84			
E_LAA			0.00	3.08	0.70	1.82		
F_VAA			0.00	0.77	3.72	0.80	3.80	
G_GAA				0.00		5.18	1.91	
Total								

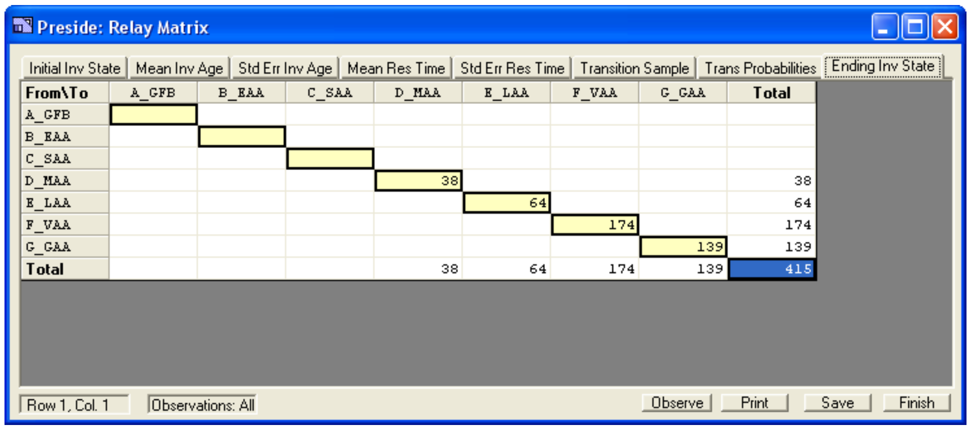
Transition Probability Sample: This tab summarizes vegetation classes by the state each sample originated from (the rows) and transitioned to (the columns). The total sample count (12,865) is simply the number of inventory plots (415) multiplied by the number of FVS projection cycles (31). At each cycle boundary, FVSSTAND reports the vegetation classification attributes. These are then summarized by Preside to track movements within and between states.



From\To	A_GFB	B_EAA	C_SAA	D_MAA	E_LAA	F_VAA	G_GAA	Total
A_GFB	2	5	14					21
B_EAA		8	15					23
C_SAA		1	322	144				467
D_MAA		2	65	2692	393			3152
E_LAA			18	161	3987	376		4542
F_VAA			2	13	83	3533	179	3810
G_GAA				2		44	804	850
Total	2	16	436	3012	4463	3953	983	12865

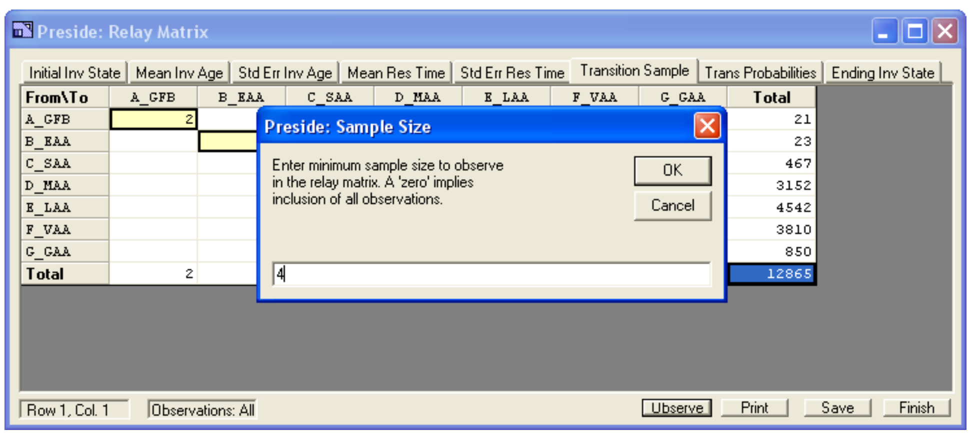


Transition Probabilities: Values are computed by taking the transition sample per cell and dividing by the total sample across a row. Factors along the diagonal indicate the probability of staying within a state during a projection cycle (10 year in this example). Values above and below the diagonal represent movement probabilities into those states.

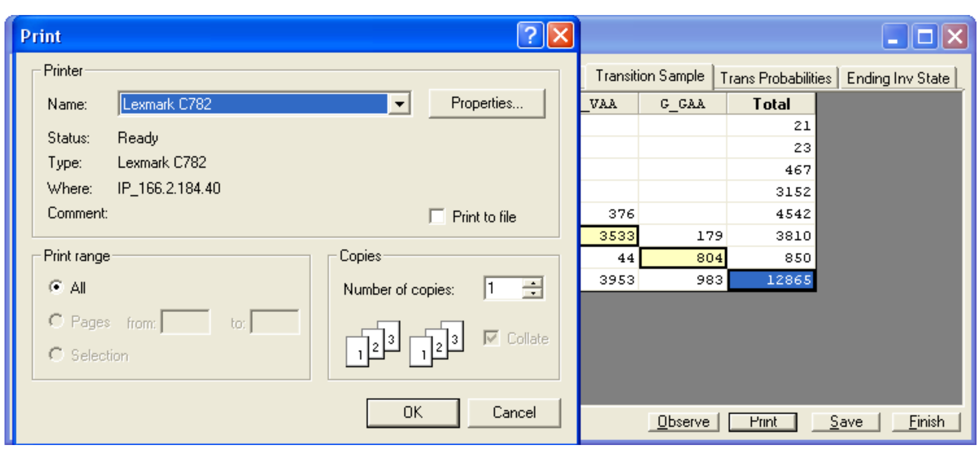


Ending Inventory State: As suggested, this is the vegetation state of each inventory plot at the end of the FVS projection run. For this example, the time period would be 310 years hence (31 10-yr cycles). Setting up a VDDT model and letting it run 'to equilibrium' and comparing the results to these ending states can verify proper concurrence between projections made with the STM versus FVS.

Additional Options:

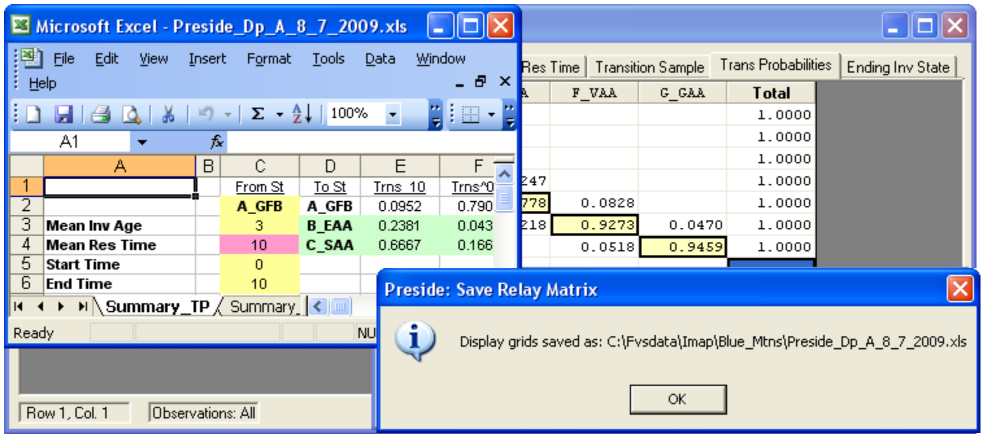


Observe Button: A minimum sample size can be specified to filter random events. Any cells having fewer samples than the input value are eliminated. Tabs relying on the Transition Sample (Transition Probabilities, Mean and Std. Error of Residence Times) are re-calculated for the reduced sample. A general rule of "1% of the initial inventory sample" appears to carry merit. The actual value to specify is dependent on modeler's comfort and confidence in the associated output.

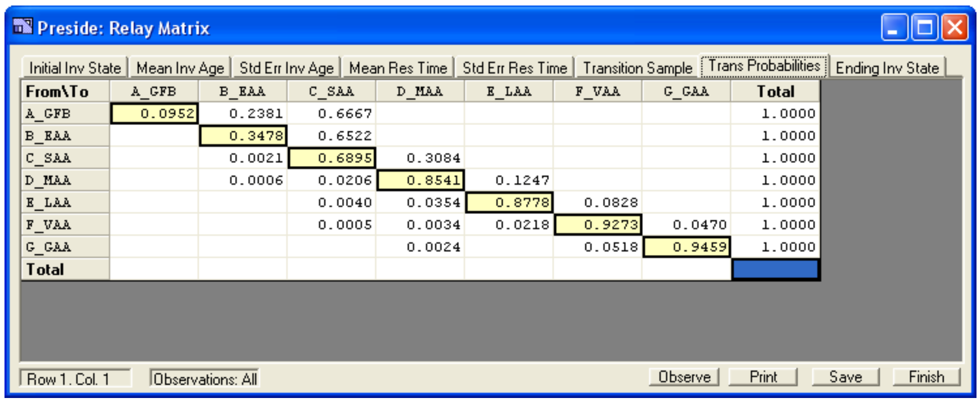


Print Button: This option will print a copy of the particular Relay Matrix tab to the default system printer. A different system printer can be selected prior to printing if desired.

Save Button: The Relay Matrix and each of its associated tabs can be saved in a MS-Excel spreadsheet. The file name will be "Preside_{Keyword file name}_{Date}.xls". The path to the recipient folder is also displayed. More details regarding the output spreadsheet will be provided later in this document.



Finish Button: Use to exit Preside.



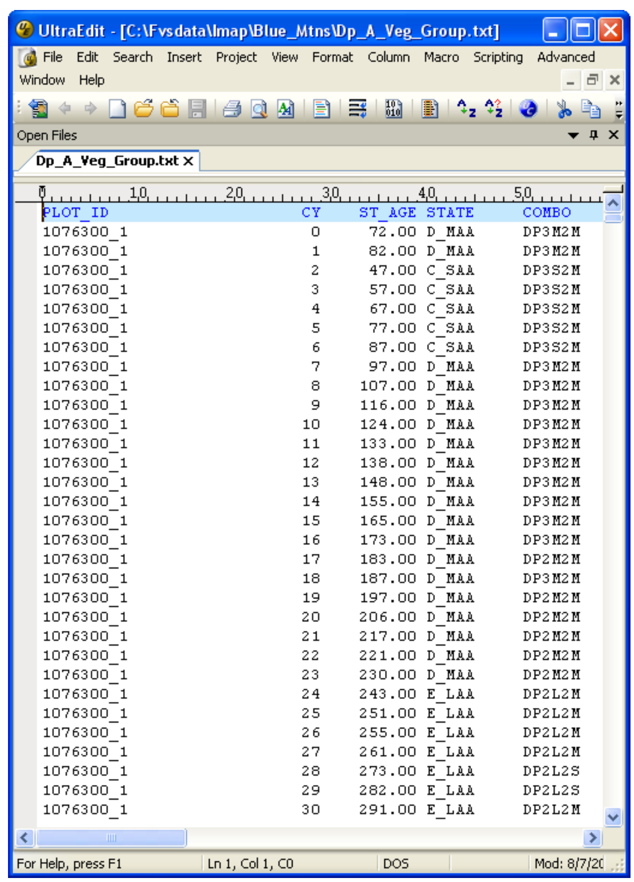
Auxiliary Output Files

For reference purpose, Preside creates three ancillary files:

**_Veg_Group.txt file*

As Preside is processing individual plots by projection cycle, the {Keyword file name}_Veg_Group.txt file is created. This file tracks the progression of stand development and records the vegetation attributes (i.e. Combos column) and associated VDDT box (i.e. State column). The Plot_ID column lists the plot number. The Cy column indicates the FVS projection cycle. The St_Age column is the representative stand age, using the basis from the "Stand Age Variable" selected on the Step 2 window of the Preside_Wizard.

This file can be used for diagnostic purposes. As mentioned prior, if the standard error of the mean residence time for a particular cell is inordinately larger in magnitude than for others listed, chances are there is a problem with the input data or the FVS model run. Look for plots that reside in the vegetation state with the row label, that either never leave or remain for many projection cycles. These may be the culprit for high standard errors.



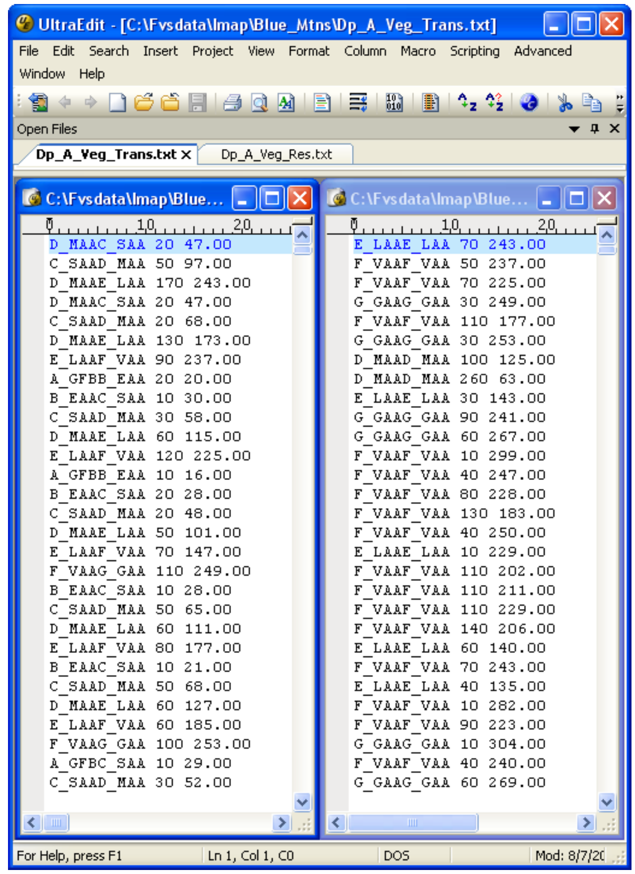
_Veg_Trans.txt file

The {Keyword file name}_Veg_Trans.txt file provides an accounting record of the vegetation state transitions as they occur. Examine the first row in the example Dp_A_Veg_Trans.txt file. The "D_MAAC_SAA" splits into two vegetation states: "D_MAA" and "C_SAA". Review the first three records in the Dp_A_Veg_Group.txt file. Plot_ID 1076300_1 began in vegetation state "D_MAA" for the first two cycles (i.e. 20 years) before transitioning to vegetation state "C_SAA". Back to the Dp_A_Veg_Trans.txt file. The value listed after the "D_MAAC_SAA" label is 20 for 20 years. The last value listed, 47.00 is the stand age from the Dp_A_Veg_Group.txt file for the "C_SAA" vegetation state.

_Veg_Res.txt file

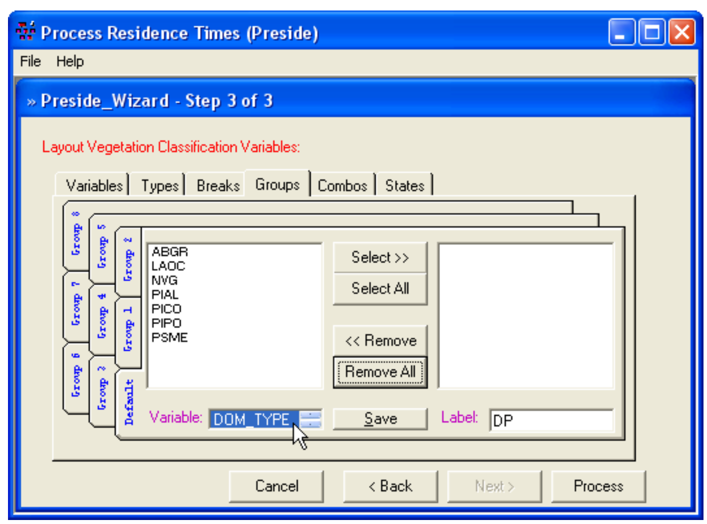
The {Keyword file name}_Veg_Res.txt file records the vegetation state at the tail end of the FVS projection. Notice in the Dp_A_Veg_Group.txt file that Plot_ID 1076300_1 final vegetation state is "ELAA" and it lasts for seven cycles (i.e. 70 years). This value is listed adjacent to the first record in the Dp_A_Veg_Res.txt file along with the stand age at the beginning, when vegetation state "E_LAA" first appeared.

Both of these files are used for computational diagnostics relative to values reported in the Relay Matrix. Most users of Preside will not need this detail, thus the crude but functional format for these files.

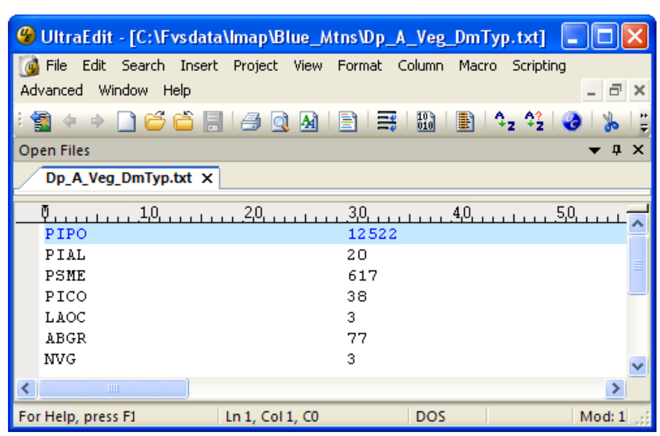


_Veg_DmTyp.txt file

Often times, a potential natural vegetation type can render several Dominance Types. Grouping of the Dominance Types within larger forest cover types is required. To assist in this endeavor, the Preside program will create the {Keyword file name}_Veg_DmTyp.txt file within the working folder whenever the DOM_TYPE variable is *double-clicked* while displayed in the list box.



The {Keyword file name}_Veg_DmTyp.txt file can be opened with a text editor. This first column lists the various Dominance Types found within the {Keyword file name}_Veg_Class.txt file. If "Trim to First Species" is selected on Step 2 of the Preside Wizard, only the primary tree species will be recorded. The second column contains a count of the occurrence of the particular Dominance Type. This provides an indication of the relative importance of a listed Dominance Type. Printing the {Keyword file name}_Veg_DmTyp.txt file can assist in defining Dominance Types to Group Labels.

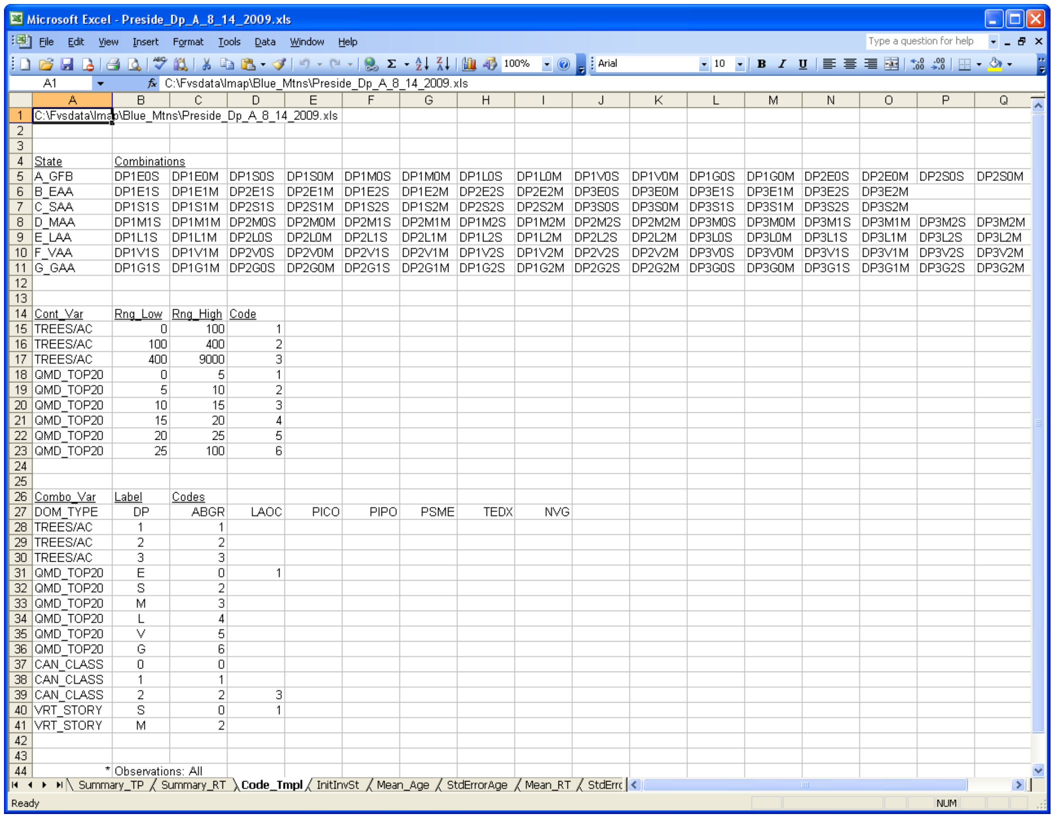


Preside MS-Excel Spreadsheet

The ability to create a MS-Excel spreadsheet that contains the information portrayed in the Relay Matrix is a valuable feature of the Preside program. Notice that each tab from the Relay Matrix is stored as separate worksheets within the exported workbook.

Code Template Spreadsheet

Preside builds three additional spreadsheets beyond those displayed in the Relay Matrix. The “Code_Tmpl” spreadsheet provides precise documentation of the configuration of the Preside run. Listed are the vegetation attribute combinations that comprise the VDDT model states. Individual components of the continuous variables and combinations are displayed. Lastly, a note is provided to indicate whether any observations were filtered from the analysis.



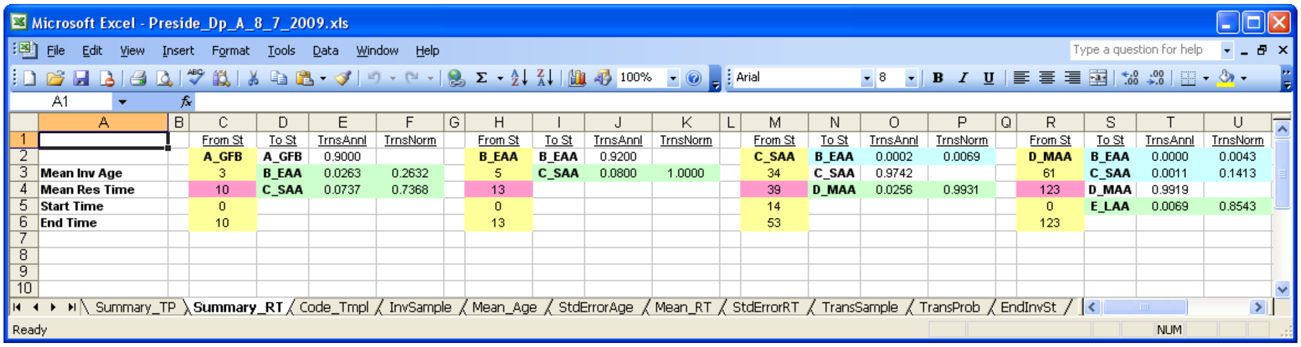
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1	C:\Fvsdata\Imap\Blue_Mtns\Preside_Dp_A_8_14_2009.xls																
2																	
3																	
4	State	Combinations															
5	A_GFB	DP1E0S	DP1E0M	DP1S0S	DP1S0M	DP1M0S	DP1M0M	DP1L0S	DP1L0M	DP1V0S	DP1V0M	DP1G0S	DP1G0M	DP2E0S	DP2E0M	DP2S0S	DP2S0M
6	B_EAA	DP1E1S	DP1E1M	DP2E1S	DP2E1M	DP1E2S	DP1E2M	DP2E2S	DP2E2M	DP3E0S	DP3E0M	DP3E1S	DP3E1M	DP3E2S	DP3E2M		
7	C_SAA	DP1S1S	DP1S1M	DP2S1S	DP2S1M	DP1S2S	DP1S2M	DP2S2S	DP2S2M	DP3S0S	DP3S0M	DP3S1S	DP3S1M	DP3S2S	DP3S2M		
8	D_MAA	DP1M1S	DP1M1M	DP2M0S	DP2M0M	DP2M1S	DP2M1M	DP1M2S	DP1M2M	DP2M2S	DP2M2M	DP3M0S	DP3M0M	DP3M1S	DP3M1M	DP3M2S	DP3M2M
9	E_LAA	DP1L1S	DP1L1M	DP2L0S	DP2L0M	DP2L1S	DP2L1M	DP1L2S	DP1L2M	DP2L2S	DP2L2M	DP3L0S	DP3L0M	DP3L1S	DP3L1M	DP3L2S	DP3L2M
10	F_VAA	DP1V1S	DP1V1M	DP2V0S	DP2V0M	DP2V1S	DP2V1M	DP1V2S	DP1V2M	DP2V2S	DP2V2M	DP3V0S	DP3V0M	DP3V1S	DP3V1M	DP3V2S	DP3V2M
11	G_GAA	DP1G1S	DP1G1M	DP2G0S	DP2G0M	DP2G1S	DP2G1M	DP1G2S	DP1G2M	DP2G2S	DP2G2M	DP3G0S	DP3G0M	DP3G1S	DP3G1M	DP3G2S	DP3G2M
12																	
13																	
14	Cont_Var	Rng_Low	Rng_High	Code													
15	TREES/AC	0	100	1													
16	TREES/AC	100	400	2													
17	TREES/AC	400	9000	3													
18	QMD_TOP20	0	5	1													
19	QMD_TOP20	5	10	2													
20	QMD_TOP20	10	15	3													
21	QMD_TOP20	15	20	4													
22	QMD_TOP20	20	25	5													
23	QMD_TOP20	25	100	6													
24																	
25																	
26	Combo_Var	Label	Codes														
27	DOM_TYPE	DP	ABGR	LAOC	PICO	PIPO	PSME	TEDX	NVG								
28	TREES/AC	1	1														
29	TREES/AC	2	2														
30	TREES/AC	3	3														
31	QMD_TOP20	E	0	1													
32	QMD_TOP20	S	2														
33	QMD_TOP20	M	3														
34	QMD_TOP20	L	4														
35	QMD_TOP20	V	5														
36	QMD_TOP20	G	6														
37	CAN_CLASS	0	0														
38	CAN_CLASS	1	1														
39	CAN_CLASS	2	2	3													
40	VRT_STORY	S	0	1													
41	VRT_STORY	M	2														
42																	
43																	
44	*	Observations: All															

Summary Mean Residence Time

The “Summary_RT” and “Summary_TP” spreadsheets were created in support of VDDT state and transition models. These worksheets represent two approaches for transforming the FVS-Preside results for FVS cycles (typically 10 years) to annual transition probabilities. VDDT operates on an annual time step. The primary basis for the “Summary_RT” spreadsheet is the mean residence time (RT) per vegetation state. The primary emphasis of the “Summary_TP” spreadsheet is the transition probabilities (TP) that are reported for each vegetation state. The latter will be discussed in the following section.

There are two methods for construction of VDDT models: either by “Deterministic” transitions or by “Probabilistic” transitions. Both are useful in different modeling situations and model developers are encouraged to read the VDDT documentation for further details. For the deterministic approach, pixels that represent acres reside in a vegetation state for the duration of the mean residence time; then disperse to the adjacent vegetation states in accordance with prescribed pathways. Thus, mean residence time is focal. To this end, the “Summary_RT” spreadsheet pulls information from the “Mean_RT”, “TransProb”, and “Summary_TP” spreadsheets. The Normalize Factor (Trns_10 column) listed within the “Summary_TP” spreadsheet is the sum of progressive and retrogressive decadal transitions. The TrnsNorm (i.e. Transitions_Normalized) columns within the “Summary_RT” spreadsheet are computed by taking the individual Trns_10 progressive and retrogressive cells from the “Summary_TP” spreadsheet and dividing by the Normalize Factor. The TrnsAnnl for the base cell (i.e. remaining within a cell) equals one minus the quantity of one divided by the Mean Residence Time. The TrnsAnnl for the progressive and retrogressive decadal transitions are equals the quantity of one minus the value of the base cell TrnsAnnl multiply by the TrnsNorm for that cell.

For VDDT modeling based on mean residence time, the "Mean Res Time" values would be used for the time in a specified vegetation state. Once this time limit has been eclipsed, the pixels would move in proportion to the TransNorm values to adjacent vegetation states.



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
1			From St	To St	TrnsAnnl	TrnsNorm		From St	To St	TrnsAnnl	TrnsNorm		From St	To St	TrnsAnnl	TrnsNorm		From St	To St	TrnsAnnl	TrnsNorm
2			A_GFB	A_GFB	0.9000			B_EAA	B_EAA	0.9200			C_SAA	B_EAA	0.0002	0.0069		D_MAA	B_EAA	0.0000	0.0043
3	Mean Inv Age		3	B_EAA	0.0263	0.2632		5	C_SAA	0.0800	1.0000		34	C_SAA	0.9742			61	C_SAA	0.0011	0.1413
4	Mean Res Time		10	C_SAA	0.0737	0.7368		13					39	D_MAA	0.0256	0.9931		123	D_MAA	0.9919	
5	Start Time		0					0					14					0	E_LAA	0.0069	0.8543
6	End Time		10					13					53					123			
7																					
8																					
9																					
10																					

Summary Transition Probabilities

The VDDT model can be set up to run stochastically, meaning that transitions are controlled by probabilities. For example, if a user specified a probability of 0.05 for a transition from State A to State B, then in any given annual time step, the sample would stay in State A 95% of the time and transition to State B 5% of the time, on average. Acres, represented by pixels, disperse between sates in proportion to an exponential decay function as described by Fried (2008). For pixels remaining within a cell, the formula is:

$$P(B)_t = (1 - p)^t$$

Where:

P(B)$_t$ is the proportion of the original state **B** pixels remaining after **t** years
and **p** is the probability of transitioning to another state in any one year.

To convert from the FVS 10-yr time cycle to an annual probability (Trns^0.1), this equation can be modified by raising the decadal transition probability to the 0.1 power. That is:

Remaining: Trns^0.1 = Trns_10^$^{0.1}$

For pixels transitioning to other vegetation states, the formula is:

$$P(C)_t = 1 - (1 - p)^t$$

Where:

P(C)$_t$ is the proportion of the original state **B** pixels that transitioned after **t** years
and **p** is the probability of transitioning to state **C** in any one year.

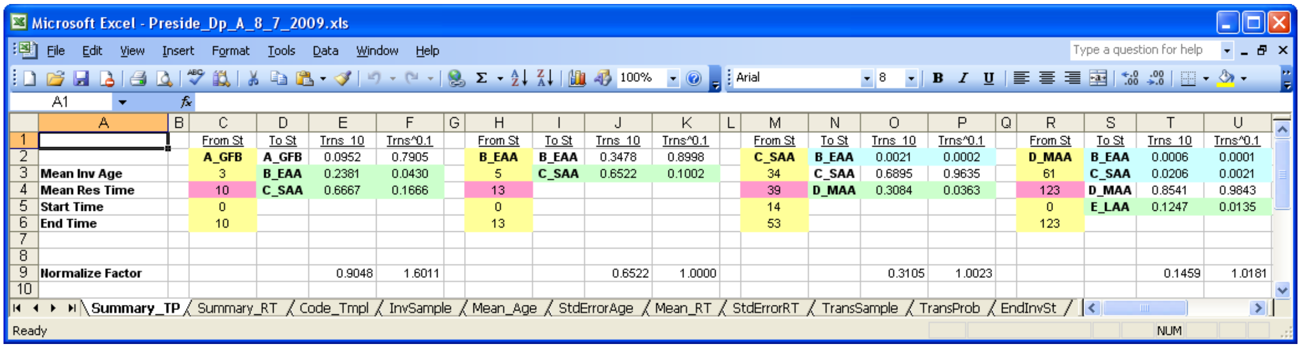
For the progressive and retrogressive cells, the annual probability (Trns^0.1) equals one minus the quantity one minus Trns_10 raised to the 0.1 power multiplied by the Normalize Factor (Trns^0.1 column). The Normalize Factor (Trns^0.1 column) equals the quantity one minus the remaining within cell Trns^0.1 value divided by the sum of the quantity one minus the progressive and retrogressive cells Trns_10 raised to the 0.1 power. This adjustment enables summing the Trns^0.1 cells to equal one, thus accounting for all pixel movement.

Transitioning: Trns^0.1 = (1-(1-Trns_10)^$^{0.1}$)*NormFact_Trns^0.1

Where:

NormFact_Trns^0.1 = (1-Trns^0.1$_{|remain|}$)/∑(1-(1-Trns_10)$_{|pro\&retro|}$^$^{0.1}$)

For VDDT modeling based on transition probabilities, the values for Trns^0.1 can be used directly for each vegetation state. As time sequences along annually, pixels move from their source state to adjacent states in proportion to the transition probabilities. This process could be described as a conveyor belt moving in multi-dimensional space shifting acres amongst the predefined progressive and retrogressive cells.

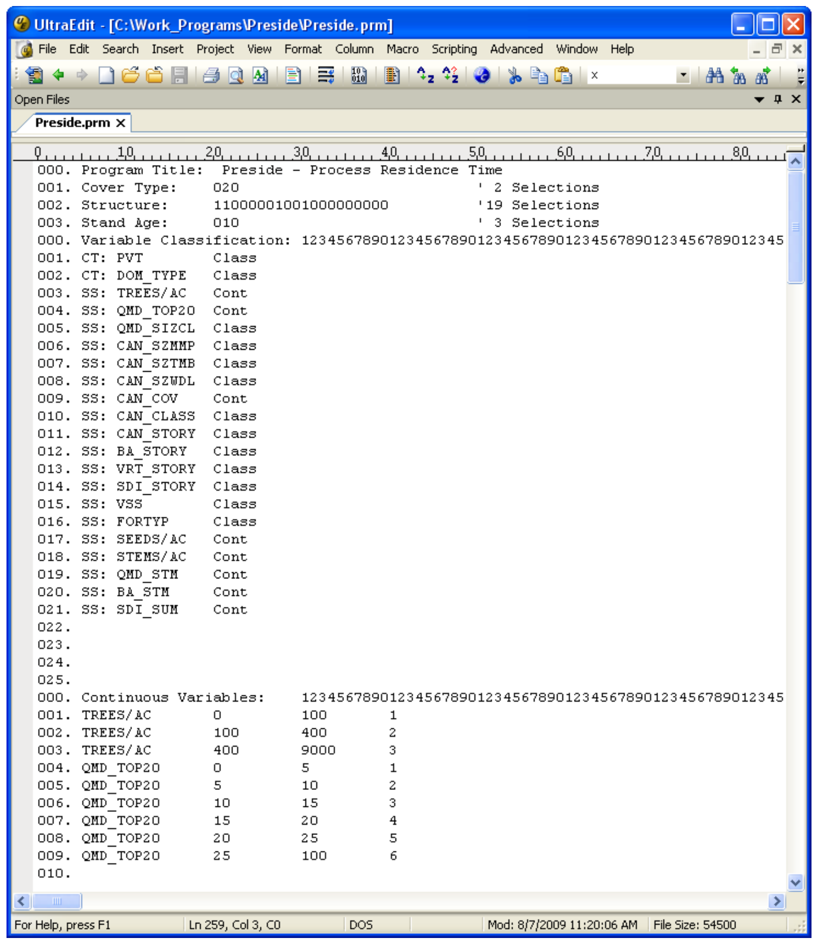

Microsoft Excel - Preside_Dp_A_8_7_2009.xls

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
1			From St	To St	Trns 10	Trns^0.1		From St	To St	Trns 10	Trns^0.1		From St	To St	Trns 10	Trns^0.1		From St	To St	Trns 10	Trns^0.1
2			A_GFB	A_GFB	0.0952	0.7905		B_EAA	B_EAA	0.3478	0.8998		C_SAA	B_EAA	0.0021	0.0002		D_MAA	B_EAA	0.0006	0.0001
3	Mean Inv Age		3	B_EAA	0.2381	0.0430		5	C_SAA	0.6522	0.1002		34	C_SAA	0.6895	0.9635		61	C_SAA	0.0206	0.0021
4	Mean Res Time		10	C_SAA	0.6667	0.1666		13					39	D_MAA	0.3084	0.0363		123	D_MAA	0.8541	0.9843
5	Start Time		0					0					14					0	E_LAA	0.1247	0.0135
6	End Time		10					13					53					123			
7																					
8																					
9	Normalize Factor				0.9048	1.6011				0.6522	1.0000				0.3105	1.0023				0.1459	1.0181
10																					

Summary_TP / Summary_RT / Code_Tmpl / InvSample / Mean_Age / StdErrorAge / Mean_RT / StdErrorRT / TransSample / TransProb / EndInvSt

Preside.prm File

In the background, the Preside program maintains a parameter file that contains all of the settings captured by the Preside_Wizard. Advance users of Preside can use a text editor to modify the Preside.prm file directly, thus bypassing the input windows. The Preside.prm file resides in the folder that contains the Preside.exe application file, which according to default installation procedures would be the C:\Fvsbin folder.


UltraEdit - [C:\Work_Programs\Preside\Preside.prm]

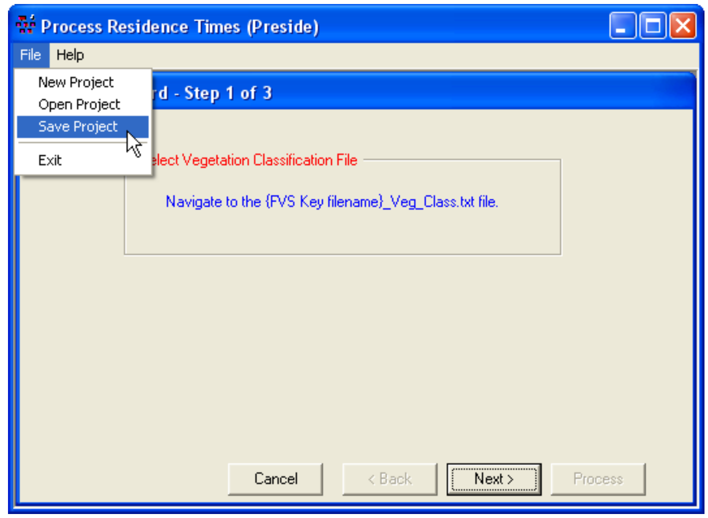
```
000. Program Title:  Preside - Process Residence Time
001. Cover Type:    020                              ' 2 Selections
002. Structure:     1100000100100000000 0            '19 Selections
003. Stand Age:     010                              ' 3 Selections
000. Variable Classification: 1234567890123456789012345678901234567890123456789012345
001. CT: PVT        Class
002. CT: DOM_TYPE   Class
003. SS: TREES/AC   Cont
004. SS: QMD_TOP20  Cont
005. SS: QMD_SIZCL  Class
006. SS: CAN_SZMMP  Class
007. SS: CAN_SZTMB  Class
008. SS: CAN_SZWDL  Class
009. SS: CAN_COV    Cont
010. SS: CAN_CLASS  Class
011. SS: CAN_STORY  Class
012. SS: BA_STORY   Class
013. SS: VRT_STORY  Class
014. SS: SDI_STORY  Class
015. SS: VSS        Class
016. SS: FORTYP     Class
017. SS: SEEDS/AC   Cont
018. SS: STEMS/AC   Cont
019. SS: QMD_STM    Cont
020. SS: BA_STM     Cont
021. SS: SDI_SUM    Cont
022.
023.
024.
025.
000. Continuous Variables:    1234567890123456789012345678901234567890123456789012345
001. TREES/AC       0          100        1
002. TREES/AC       100        400        2
003. TREES/AC       400        9000       3
004. QMD_TOP20      0          5          1
005. QMD_TOP20      5          10         2
006. QMD_TOP20      10         15         3
007. QMD_TOP20      15         20         4
008. QMD_TOP20      20         25         5
009. QMD_TOP20      25         100        6
010.
```

For Help, press F1 | Ln 259, Col 3, C0 | DOS | Mod: 8/7/2009 11:20:06 AM | File Size: 54500

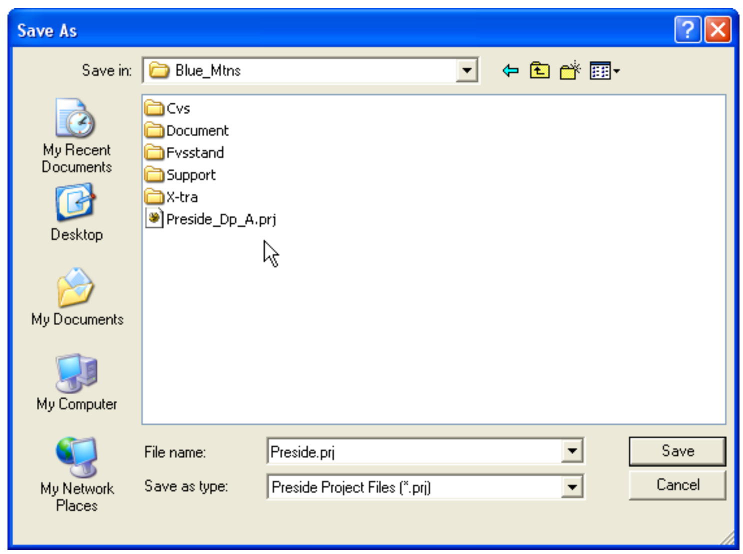
Preside Project Files

To aid in the management of large landscape assessments, the Preside program enables users to save the Preside.prm file as a project file. These files can then be retrieved for use later.

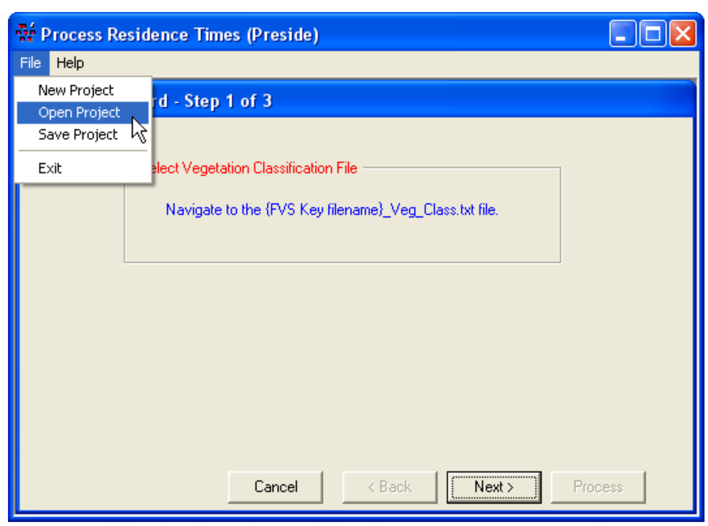
The process begins by selecting the File menu and choosing the Save Project option. A message window will prompt whether to "Save default values as a Project", referring to capturing the settings within the Preside.prm file and making a project file.



Select "Yes" to invoke the file save dialog window. From here, navigate to the folder of choice for storing Preside project files. The default folder will be the working directory. Use the File name text box to rename the 'Preside.prj' label to a more descriptive title. For the example presented in the text, the Preside_Dp_A.prj project file was created to save the configurations for the Warm Dry Ponderosa Pine PVT within the Blue Mountains modeling region.



To retrieve a project file, use the menu File/New Project option to clear current Preside.prm settings. Then, select the menu File/Open Project option to display the file open dialog window. If necessary, navigate to the folder containing the project files and select the filename desired. Proceed through the Preside_Wizard in normal fashion as described in the text.

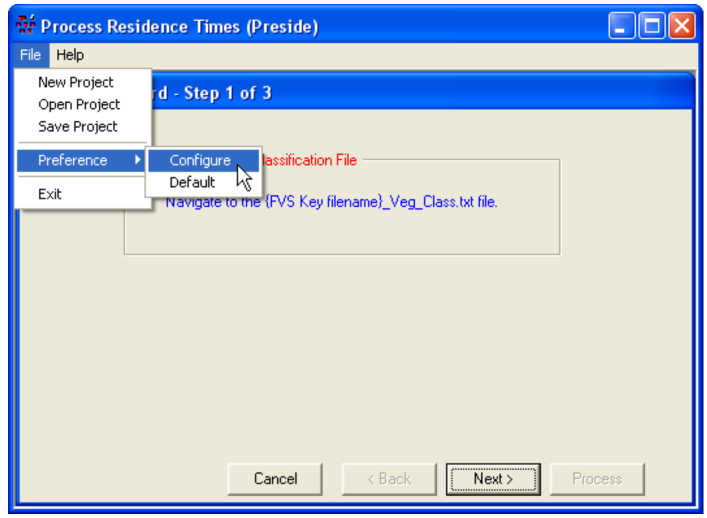


The "Help" menu is simply a splash screen containing general source information.

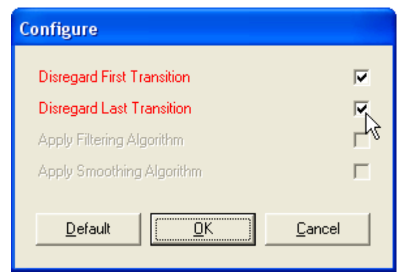
Preside Preference

The Preside Preference menu option allows setting program configurations or resetting to default values. First and/or last transitions can be screened from calculations used to determine mean residence time and transition probabilities. The transition sample will be reduced to reflect discounting the first transition encountered and/or the last transition that carries beyond the FVS projection.

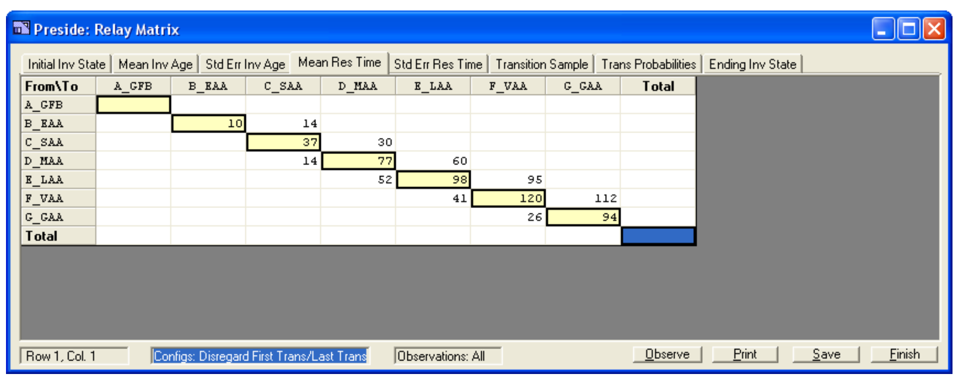
Selecting the Default configuration will deselect any screens or filters applied to Preside processing.



Users have the option of disregarding the first transition and/or the last transition. Simply selecting the check box adjacent to the associated text will enable screening initial and ending vegetation states.



Configuration settings are noted in the text window of the Relay Matrix. This script will also appears in the Code Template Spreadsheet that is generated by choosing the *Save Button*.



Skill Challenge:

Reuben Wiseman wishes to short-cut the process of navigating through the Preside_Wizard input windows. He is good at sensing patterns in the Preside.prm file. Using his favorite Text Editor, he modifies the existing Preside.prm file to include two canopy density classes, open and closed, to the structural stage descriptions. The open canopy group will include canopy cover less than 40 percent. The closed canopy group will include canopy cover greater than or equal 40 percent. There should be thirteen vegetation states described by the new VDDT model. Can you proceed with Preside to perform this work? Carry on and good luck!

Notes:

Topic Prep: Prepare FIA data for use with Pre-Suppose

Concepts: create an input database file from FIA for use with the Pre-Suppose program.

Forest Inventory and Analysis (FIA) data per State can be downloaded from the Web. The Prep program can be used to build a MS-Access database from the FIADB database State files. The Pre-Suppose program is designed to query the Prep database to assist in examining potential forest strata for inventory compilation and vegetation projection in the Forest Vegetation Simulator (FVS). As an example, FIA data from the Cibola National Forest in New Mexico will be retrieved from the Web and set up by the Prep program for use by Pre-Suppose.

Initial Steps:

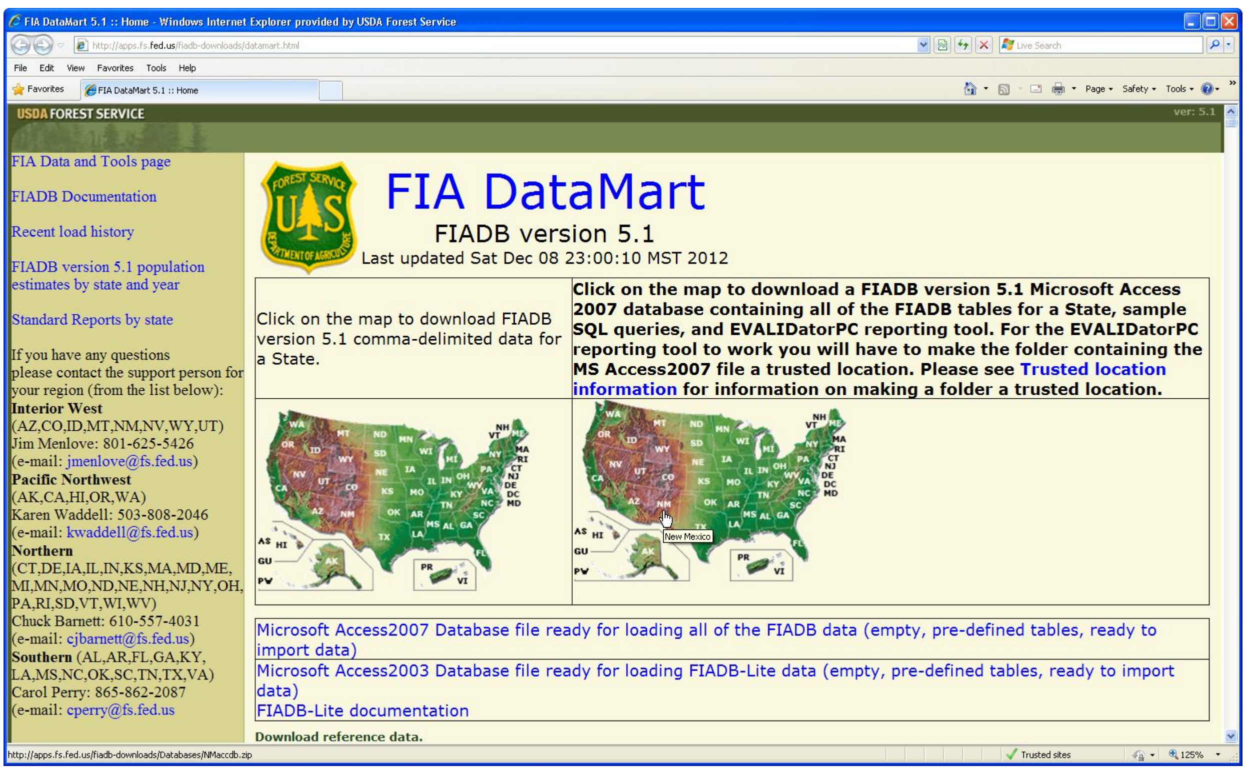
1) Create a subfolder under the \FVSdata folder called \FIA.
   - This folder will be used as the parent folder to store FIA data.
2) Create a State subfolder under the \FIA folder such as \Nm. Use the State abbreviation code to name the folder.
   - This folder will be used to save the FIADB database file downloaded from the Web for New Mexico.
   (i.e. C:\Fvsdata\FIA\Nm).

FIADB Retrieval Steps:

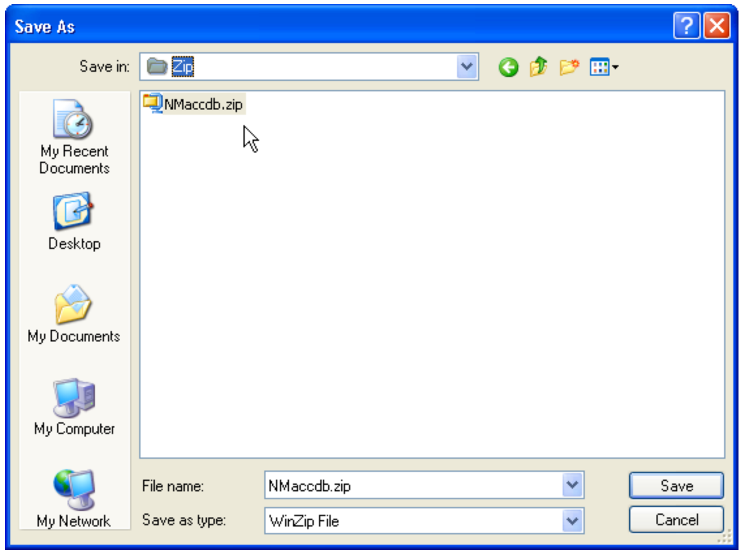
3) Follow this internet address to access the FIADB database files:

   http://www.fia.fs.fed.us/tools-data/default.asp

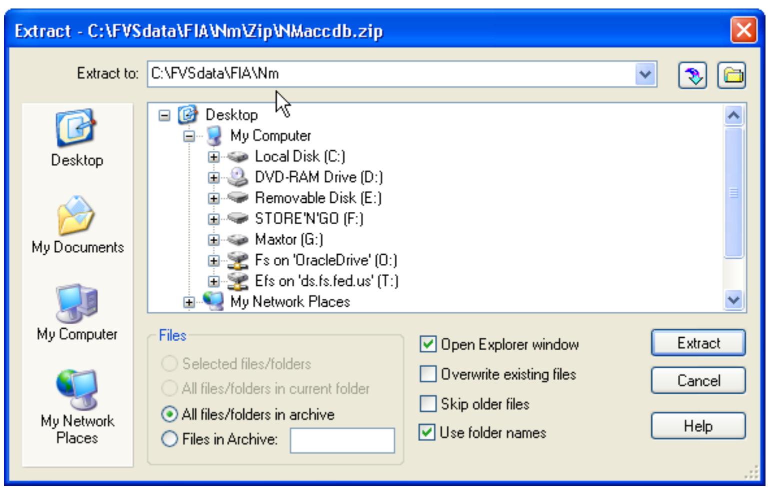
4) Select the "FIA Data Mart" button. The FIA Data Mart will appear in a new window.
5) Using the U.S. map in the right window pane of the FIA Data Mart, select the State of interest.
   - New Mexico will be used for this example.



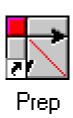
6) When prompted by the "File Download" window, choose to "Save" the zip file of the FIADB database.
   - Navigate to the FIA State folder using the "Save As" dialog box (i.e. C:\Fvsdata\FIA\Nm).
7) Create an additional folder to store the zip file.
   - Use \Zip as the folder name.



8) Make sure to click the \Zip folder in order to move into it prior to clicking the “Open” button.
9) Save the “NMaccdb.zip” file to the C:\Fvsdata\FIA\Nm\Zip folder.
   - The State database file may take several minutes to download depending on its size and the speed of the Internet.
10) Using Windows Explorer, navigate to the \Zip folder and click on the zip file.
11) Extract the database to the \FIA\{State} folder (i.e. C:\Fvsdata\FIA\Nm).



Prep Program Steps:



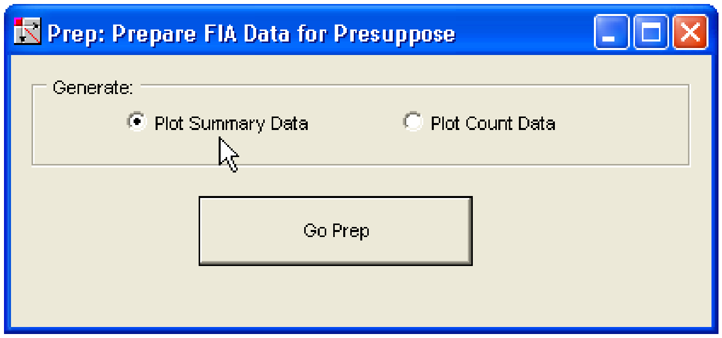
The “Prep” program was developed to pull values from the State FIADB database file and build a MS-Access database that could be used by the Pre-Suppose program. Pre-Suppose dynamically works with forest inventory data that is stored within the Prep database to provide querying capability and analysis reporting. The Prep program condenses the various FIADB tables into four data tables: Plot Classification, Plot Summary, Tree Measurement, and Tree Calculated. The plot summary table is created by summing the individual tree calculated values per plot to a per acre basis. Pre-Suppose uses the plot summary table to generated preliminary statistics on a proposed data group. If the specified plot set is sufficient, Pre-Suppose generates a listing of plots that could be used as input to the FIA2FVS program. FIA2FVS translates data from the State FIADB database into a MS-Access database that can be used by the FVS Suppose interface. Separate Topics (a.k.a. Users Guides) are available for the Pre-Suppose and FIA2FVS programs.

12) Retrieve the Prep installation program by selecting the following Web address:

   http://www.fs.fed.us/fmsc/fvs/software/postprocessors.php

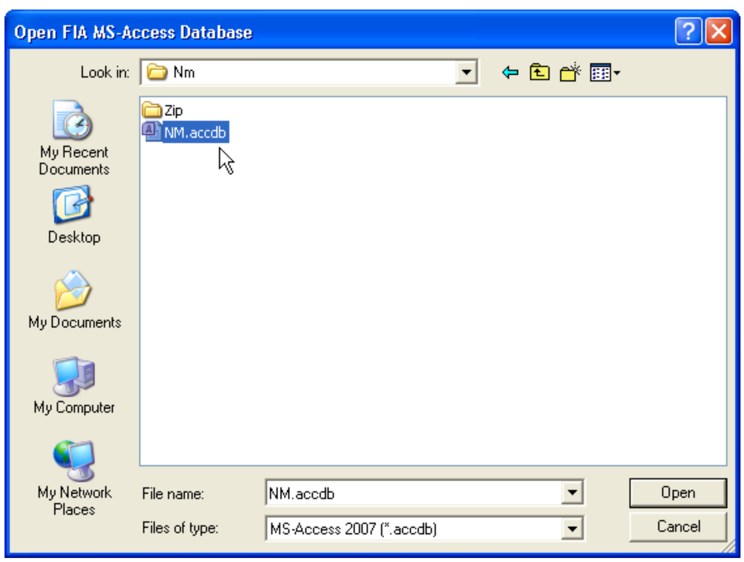
13) Locate the “Prep” listing on the Web page.

14) Download the "Prep_Data_Install.exe" file to the C:\FVSbin folder and execute. Follow the setup program prompts.
- Ensure that extracted files are placed in the C:\FVSbin folder.
15) From the Windows Start Menu, locate the FVS program group. Click the "Prep Data" icon.



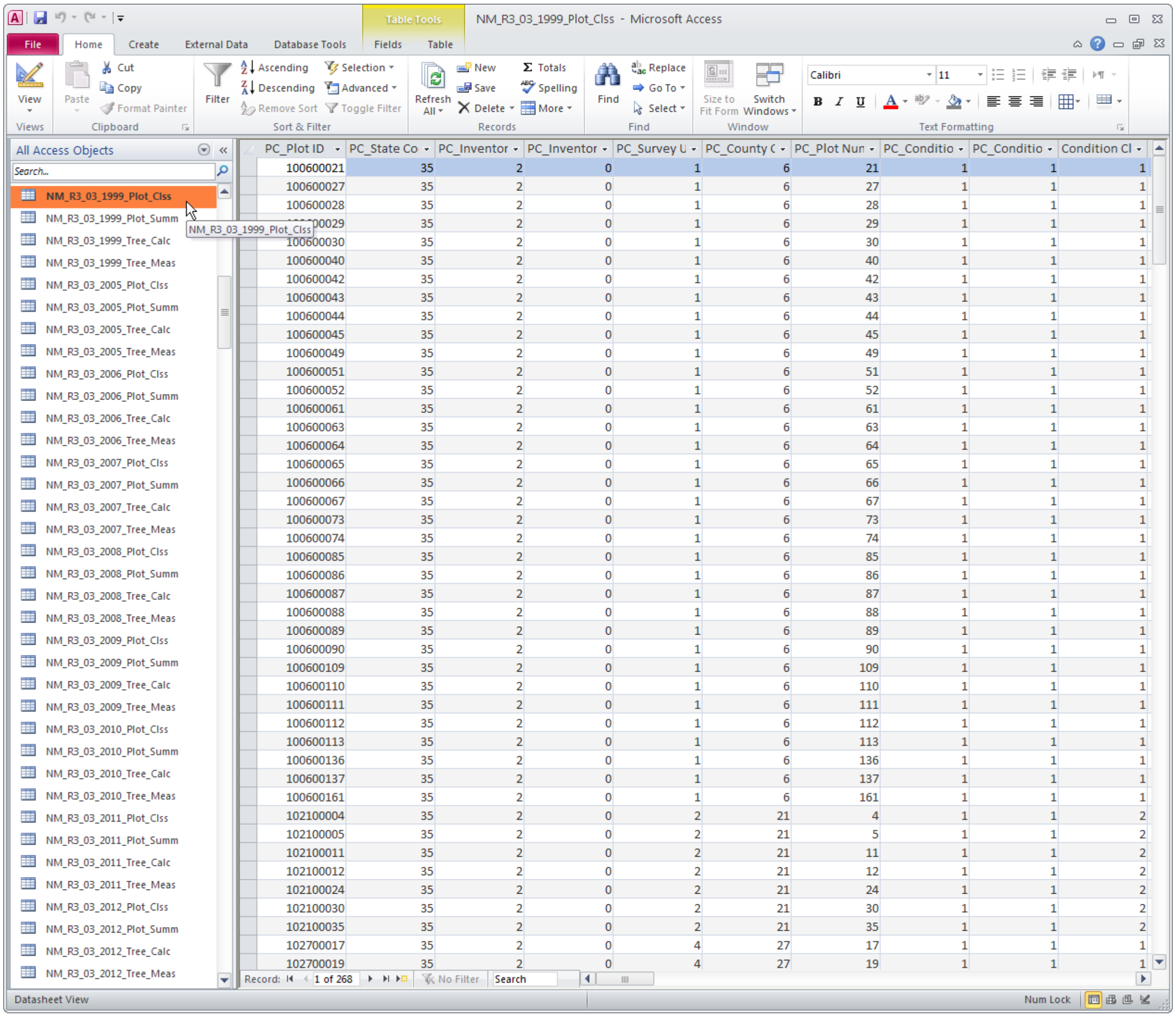
Note: Two options are available from the main Prep Data window: Generate Plot Summary Data or Generate Plot Count Data. As stated prior, the Pre-Suppose program uses the database create by Prep. Depending on selected criteria, Pre-Suppose will display the FIA plot sample size rendered. Fundamentally, this is all that is needed to pass on to the FIA2FVS translation program for further processing through the FVS system. Additionally, Pre-Suppose is capable of computing statistical output for numbers of trees, basal area, and cubic and board foot volume on a per acre basis. Pre-Suppose can also render the average quadratic-mean-diameter for all trees and annual cubic and board foot growth rates. However, in order to provide statistical inferences, the Prep program requires longer processing time to generate various attributes. If time is limited, choosing the Generate Plot Count Data option has the quickest turnaround time. Consequently, statistical information through Pre-Suppose will be limited to reporting just the number of FIA sample plots within a data sort. To receive a full statistical summary from Pre-Suppose, the Generate Plot Summary Data option should be selected.

16) Chose the appropriate option for generating either plot summary or plot count data depending on time constraints.
17) Click the "Go Prep" button to initiate processing.
18) Navigate to the \FIA\{State} folder that contains the State FIADB database file (i.e. C:\Fvsdata\FIA\Nm).



Note: The Prep program will build the database required by the Pre-Suppose program (i.e. Pre-Suppose.mdb). The database file will contain a Plot Classification, Plot Summary, Tree Measurement, and Tree Calculated table for each subdivision of National Forest within a State. FIA plots not residing within National Forests are assigned to their respective FIA Survey Unit.

19) The Pre-Suppose data tables for the Cibola National Forest are displayed in the following graphic:



Pre-Suppose Setup Steps:

20) Retrieve the Pre-Suppose installation program from the same Web address as the Prep program by following this link:

http://www.fs.fed.us/fmsc/fvs/software/postprocessors.php

21) Locate the "Pre-Suppose" listing on the Web page.
22) Download the "Pre-Suppose _Install.exe" file to the C:\FVSbin folder and execute. Follow the setup program prompts.
    - Ensure that extracted files are placed in the C:\FVSbin folder.
23) From the Windows Start Menu, locate the FVS program group. Click the "Pre-Suppose" icon.

Final Steps:

State FIA data is now ready for the Pre-Suppose program. Pre-Suppose can be used to query FIA data into user defined groups. A listing of the plot sort can be used by the FIA2FVS program to produce an input database for the Forest Vegetation Simulator. Users Guides for Prep, Pre-Suppose, and FIA2FVS are contained in the document "Advance FVS Tools for Landscape Planning" located at this Web address:

http://www.fs.fed.us/fmsc/ftp/fvs/docs/gtr/Advance_Topics.pdf

Notes:

Topic Support: Organize FVS Project Files with the SUPPORT Program

Concepts: invoke the SUPpose PORTing program to modify *.loc and *.slf files based on project alternatives.

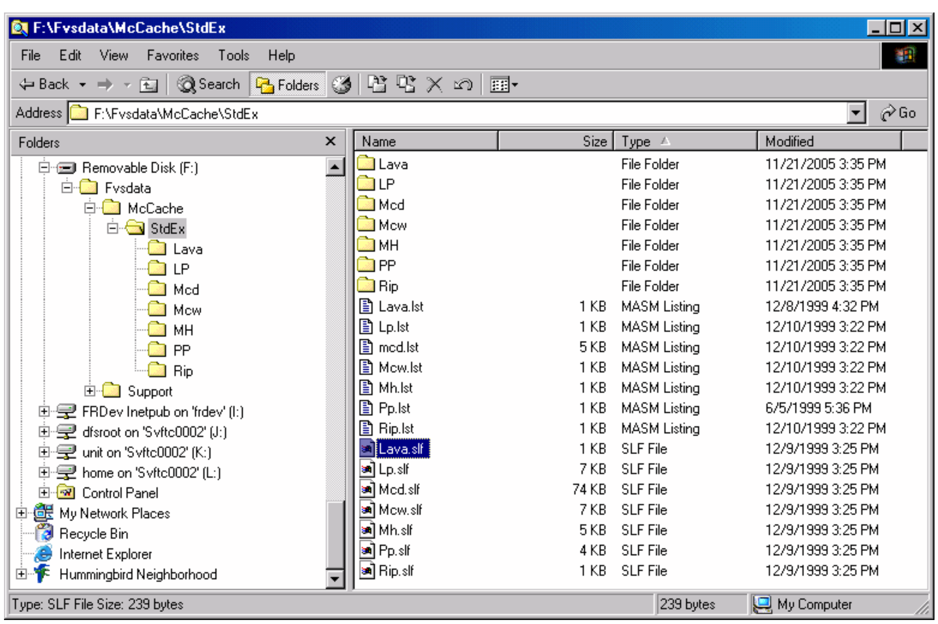
The Suppose Location File (*.loc) contains the *geographic labels* that appear in the left windowpane of the "Select Simulation Stands" window within SUPPOSE. These location labels usually designate project areas (i.e. forests, watersheds, compartments). The Stand List File (.slf) contains the *grouping labels* that appear in the center windowpane of the "Select Simulation Stands" window within SUPPOSE. These grouping labels usually identify stands with similar attributes (i.e. cover type, size class, stocking density). All stands that comprise a geographic location listed in the Suppose Location File are assembled in separate Stand List Files. Grouping labels can also be used to assign Keyword Component Files (*.kcp) to particular stands. These modular *addfiles* contains various keyword commands to instruct the Forest Vegetation Simulator how to conduct a stand projection. The Suppose Porting program was developed to assist project planners in assigning geographic labels as management alternatives in the Suppose Location File. Further, associated group labels with their corresponding addfiles can be designated in the Stand List File. An example, based upon the McCache Late Successional Reserve on the Deschutes National Forest, will be presented to demonstrate program operation.

In Need of Support

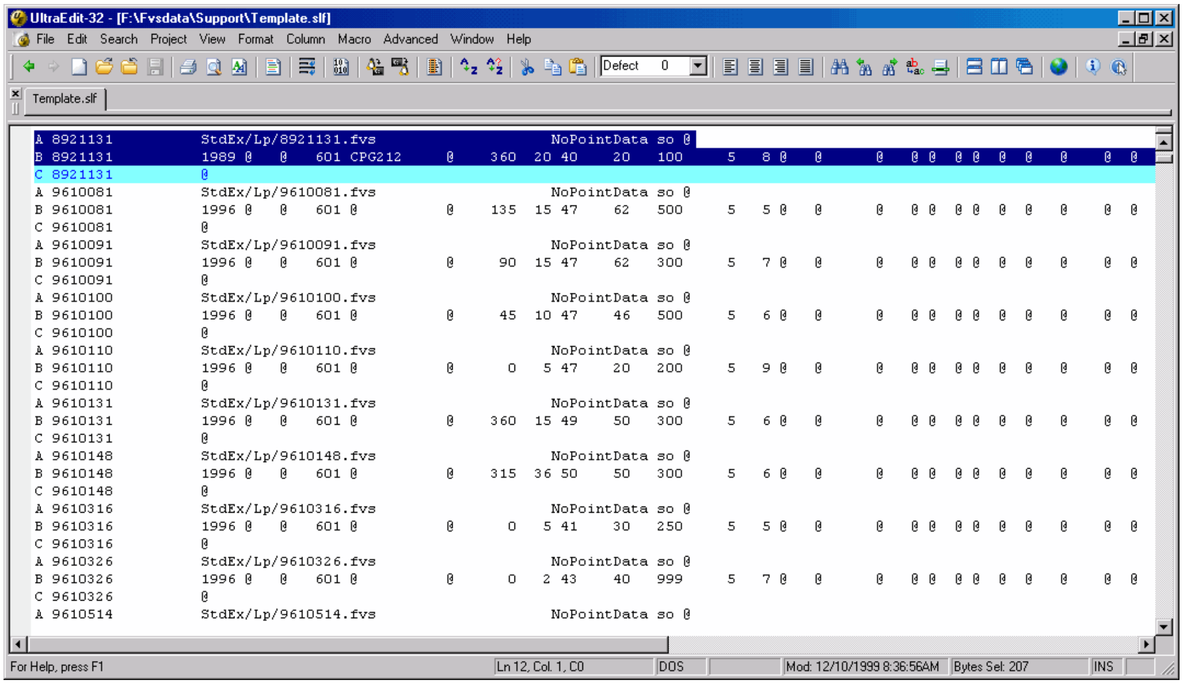
With project level planning, several management alternatives are proposed for analysis and comment. Goals and constraints are postulated to characterize the differences amongst the alternative actions. These attributes are generally of a developmental, physical, or vegetative nature. Administrative availability and technological accessibility define developmental characteristics. Productive capacity and ecological resiliency distinguishes the physical aspects. Dominant overstory canopy, its relative size and density, classify the vegetative components. Developmental and physical characteristic of the forest landscape are generally captured using spatial tools such as a geographic information system in the form of stand polygon data. Vegetative characteristics are gathered during a field inventory measurement and take form as per acre estimates of stand composition values. The Support program links spatial detail through the use of geographic and group labels with *available stands* that appear in the right windowpane of the "Select Simulation Stands" window within SUPPOSE.

Setup Structure

Prior to running the Support program, basic project layout needs to be designed. Inventory data sets that contain stand inventory information need to be translated and available for the Forest Vegetation Simulator. For the McCache project, five vegetation types were identified: LP=Lodgepole Pine; Mcd=Mixed Conifer, dry sites; Mcw=Mixed Conifer, wet sites; MH=Mountain Hemlock; PP=Ponderosa Pine. An associated file structure aided data processing:



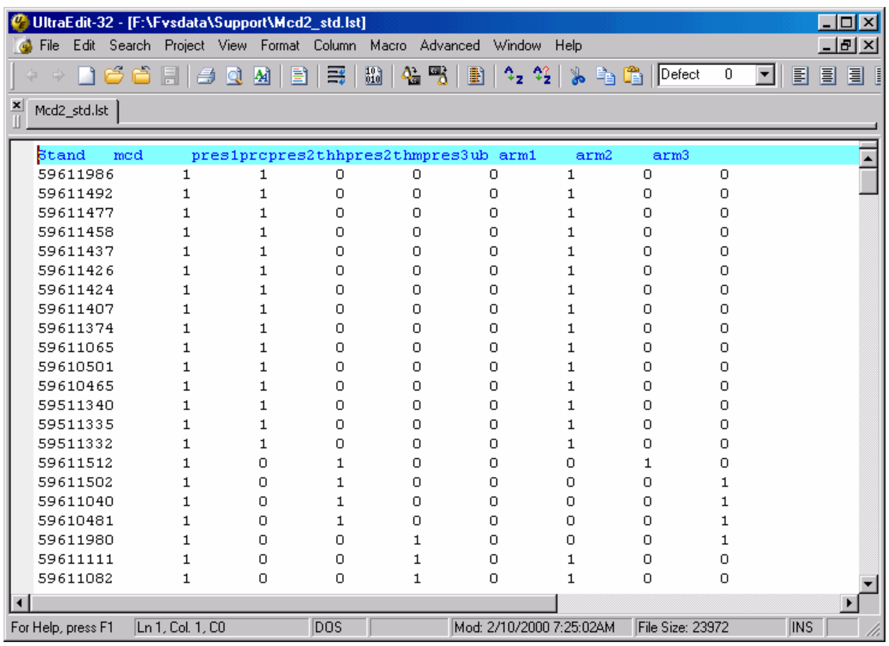
A "Template.slf" file needs to be built. This file is simply a concatenation of the individual vegetation strata Stand List Files. The existing Record_C lines need to be stripped of any grouping codes. The Template.slf file for McCache was as follows:


UltraEdit-32 - [F:\Fvsdata\Support\Template.slf]

```
A 8921131      StdEx/Lp/8921131.fvs               NoPointData so @
B 8921131      1989 @   @   601 CPG212    @   360  20 40    20   100    5   8 @   @      @   @ @  @ @  @  @   @    @  @
C 8921131      @
A 9610081      StdEx/Lp/9610081.fvs               NoPointData so @
B 9610081      1996 @   @   601 @         @   135  15 47    62   500    5   5 @   @      @   @ @  @ @  @  @   @    @  @
C 9610081      @
A 9610091      StdEx/Lp/9610091.fvs               NoPointData so @
B 9610091      1996 @   @   601 @         @    90  15 47    62   300    5   7 @   @      @   @ @  @ @  @  @   @    @  @
C 9610091      @
A 9610100      StdEx/Lp/9610100.fvs               NoPointData so @
B 9610100      1996 @   @   601 @         @    45  10 47    46   500    5   6 @   @      @   @ @  @ @  @  @   @    @  @
C 9610100      @
A 9610110      StdEx/Lp/9610110.fvs               NoPointData so @
B 9610110      1996 @   @   601 @         @     0   5 47    20   200    5   9 @   @      @   @ @  @ @  @  @   @    @  @
C 9610110      @
A 9610131      StdEx/Lp/9610131.fvs               NoPointData so @
B 9610131      1996 @   @   601 @         @   360  15 49    50   300    5   6 @   @      @   @ @  @ @  @  @   @    @  @
C 9610131      @
A 9610148      StdEx/Lp/9610148.fvs               NoPointData so @
B 9610148      1996 @   @   601 @         @   315  36 50    50   300    5   6 @   @      @   @ @  @ @  @  @   @    @  @
C 9610148      @
A 9610316      StdEx/Lp/9610316.fvs               NoPointData so @
B 9610316      1996 @   @   601 @         @     0   5 41    30   250    5   5 @   @      @   @ @  @ @  @  @   @    @  @
C 9610316      @
A 9610326      StdEx/Lp/9610326.fvs               NoPointData so @
B 9610326      1996 @   @   601 @         @     0   2 43    40   999    5   7 @   @      @   @ @  @ @  @  @   @    @  @
C 9610326      @
A 9610514      StdEx/Lp/9610514.fvs               NoPointData so @
```

For Help, press F1 | Ln 12, Col. 1, C0 | DOS | Mod: 12/10/1999 8:36:56AM | Bytes Sel: 207 | INS

A list of available stands for a particular vegetation type by management alternative needs to be constructed. For the McCache project, this task was accomplished by querying the Deschutes National Forest geographic information system (GIS) and exporting a database file with the relevant data. For example, using Mixed Conifer on dry sites for management alternative 2, the available stand file was as follows:

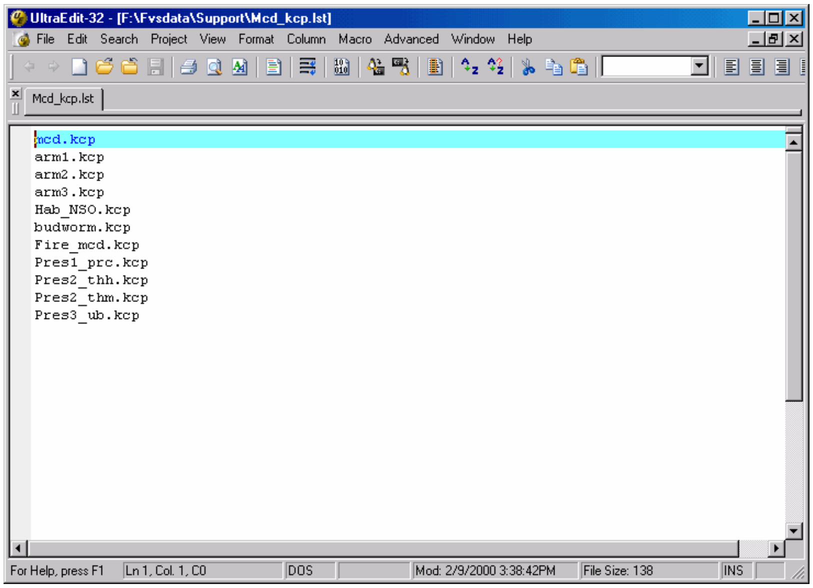

UltraEdit-32 - [F:\Fvsdata\Support\Mcd2_std.lst]

```
Stand    mcd    pres1prcpres2thhpres2thmpres3ub arm1    arm2    arm3
59611986      1       1       0       0       0       1       0       0
59611492      1       1       0       0       0       1       0       0
59611477      1       1       0       0       0       1       0       0
59611458      1       1       0       0       0       1       0       0
59611437      1       1       0       0       0       1       0       0
59611426      1       1       0       0       0       1       0       0
59611424      1       1       0       0       0       1       0       0
59611407      1       1       0       0       0       1       0       0
59611374      1       1       0       0       0       1       0       0
59611065      1       1       0       0       0       1       0       0
59610501      1       1       0       0       0       1       0       0
59610465      1       1       0       0       0       1       0       0
59511340      1       1       0       0       0       1       0       0
59511335      1       1       0       0       0       1       0       0
59511332      1       1       0       0       0       1       0       0
59611512      1       0       1       0       0       0       1       0
59611502      1       0       1       0       0       0       0       1
59611040      1       0       1       0       0       0       0       1
59610481      1       0       1       0       0       0       0       1
59611980      1       0       0       1       0       0       0       1
59611111      1       0       0       1       0       1       0       0
59611082      1       0       0       1       0       1       0       0
```

For Help, press F1 | Ln 1, Col. 1, C0 | DOS | Mod: 2/10/2000 7:25:02AM | File Size: 23972 | INS

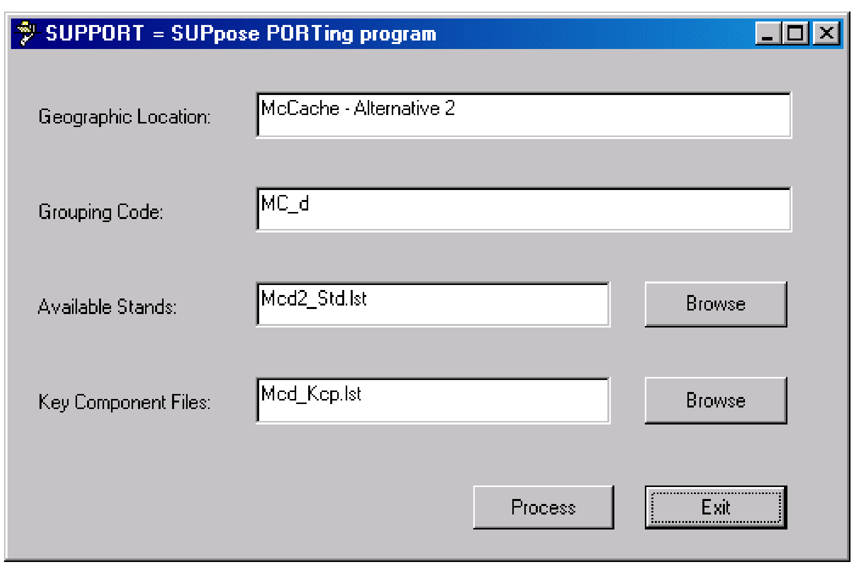
The header record is important. The first column contains the stand number. The second column contains the vegetation strata label. Columns three through six were indicator variables for silvicultural prescription choices. The number "1" signified that a particular stand under this management option would receive this silvicultural treatment. The number "0" indicated that the prescription option did not apply for the given management alternative. Note that the four silvicultural prescriptions are mutually exclusive, only one treatment can apply per stand. Columns seven through nine were used to assign which Armillaria root rot effects addfile to append to a particular stand.

Lastly, a text file that list all of the potential FVS addfiles that could be used for a strata needs to be developed. For the McCache project this entailed addfiles that described strata specific keywords, the Armillaria root rot keywords, Spotted Owl keywords, Spruce Budworm keywords, fire hazard keywords, and silvicultural prescription keywords. Review the following:

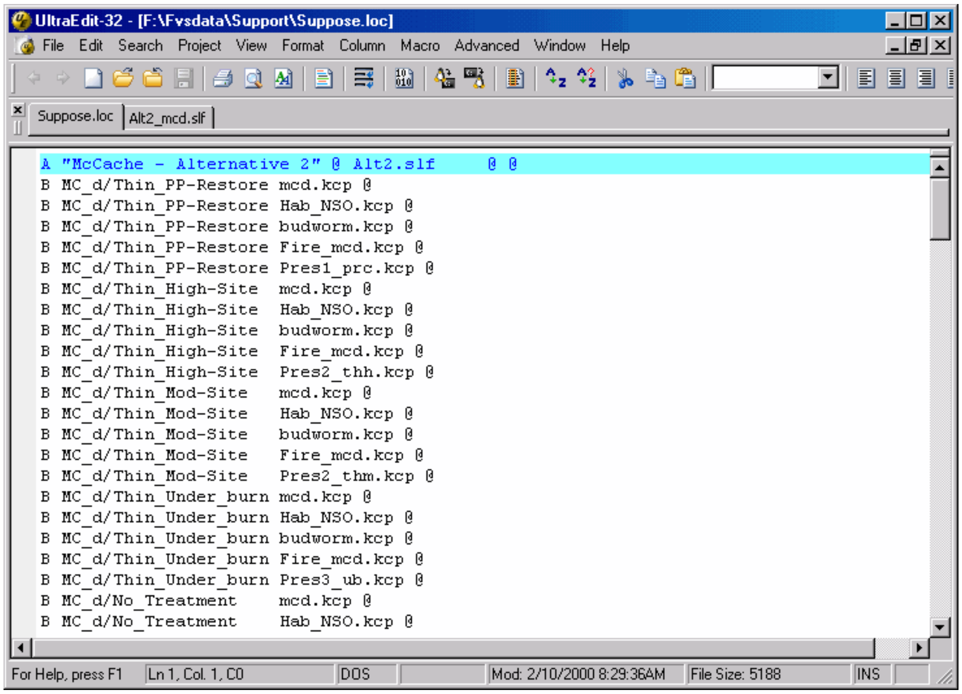


Run Support

The Support program interface requires four inputs: Geographic Location; Grouping Code; Available Stands; Key Component Files. The geographic location is used to build the Record_A lines in the Suppose.loc file. The grouping code is associated with the silvicultural prescription label from the available stands list to form a composite group label used to built Record-B lines in the Suppose.loc file and Record_C lines in the Stand List File. The available stands file makes the connections between the stand numbers and various assignments of treatments and addfile associations. The key component files list is a file that contains all potential addfiles for a vegetation stratum. The setup screen for the McCache project for Mixed Conifer on dry sites, Management Alternative 2, was as follows:



The browse buttons can be used to navigate to the folder that contains the Available Stands and Key Component Files lists. Use the process button to initiate building the Suppose.loc and Stand List File for the vegetation type/management alternative combination. The following displays show the output files from Support:



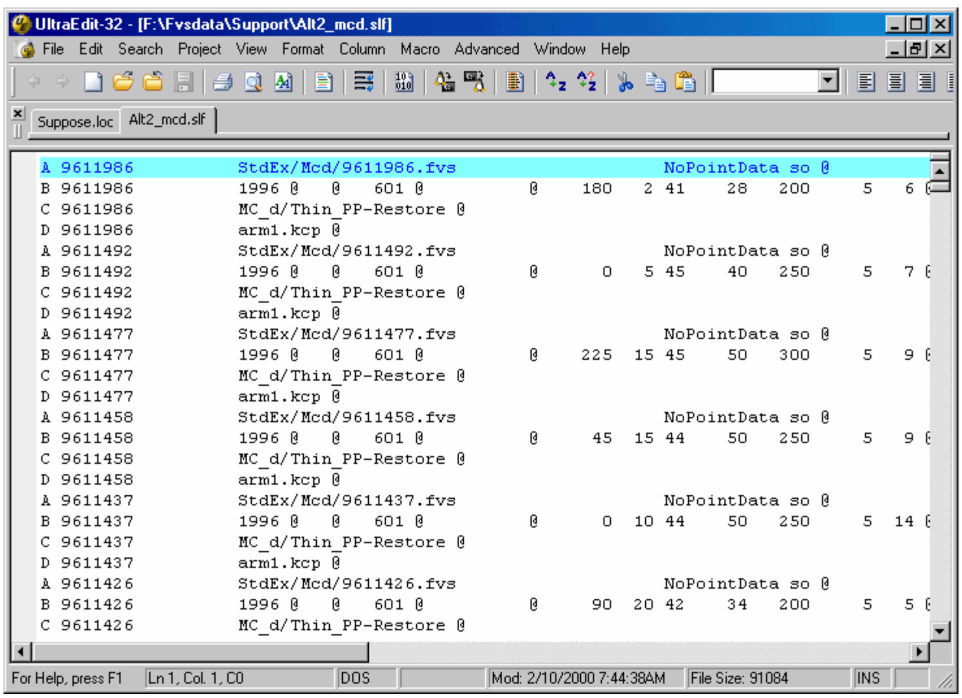
UltraEdit-32 - [F:\Fvsdata\Support\Suppose.loc]

File Edit Search Project View Format Column Macro Advanced Window Help

Suppose.loc | Alt2_mcd.slf

```
A "McCache - Alternative 2" @ Alt2.slf      @ @
B MC_d/Thin_PP-Restore mcd.kcp @
B MC_d/Thin_PP-Restore Hab_NSO.kcp @
B MC_d/Thin_PP-Restore budworm.kcp @
B MC_d/Thin_PP-Restore Fire_mcd.kcp @
B MC_d/Thin_PP-Restore Pres1_prc.kcp @
B MC_d/Thin_High-Site  mcd.kcp @
B MC_d/Thin_High-Site  Hab_NSO.kcp @
B MC_d/Thin_High-Site  budworm.kcp @
B MC_d/Thin_High-Site  Fire_mcd.kcp @
B MC_d/Thin_High-Site  Pres2_thh.kcp @
B MC_d/Thin_Mod-Site   mcd.kcp @
B MC_d/Thin_Mod-Site   Hab_NSO.kcp @
B MC_d/Thin_Mod-Site   budworm.kcp @
B MC_d/Thin_Mod-Site   Fire_mcd.kcp @
B MC_d/Thin_Mod-Site   Pres2_thm.kcp @
B MC_d/Thin_Under_burn mcd.kcp @
B MC_d/Thin_Under_burn Hab_NSO.kcp @
B MC_d/Thin_Under_burn budworm.kcp @
B MC_d/Thin_Under_burn Fire_mcd.kcp @
B MC_d/Thin_Under_burn Pres3_ub.kcp @
B MC_d/No_Treatment    mcd.kcp @
B MC_d/No_Treatment    Hab_NSO.kcp @
```

For Help, press F1 | Ln 1, Col 1, C0 | DOS | Mod: 2/10/2000 8:29:36AM | File Size: 5188 | INS



UltraEdit-32 - [F:\Fvsdata\Support\Alt2_mcd.slf]

File Edit Search Project View Format Column Macro Advanced Window Help

Suppose.loc | Alt2_mcd.slf

```
A 9611986          StdEx/Mcd/9611986.fvs                 NoPointData so @
B 9611986          1996 @   @    601 @        @    180   2 41    28   200     5   6
C 9611986          MC_d/Thin_PP-Restore @
D 9611986          arm1.kcp @
A 9611492          StdEx/Mcd/9611492.fvs                 NoPointData so @
B 9611492          1996 @   @    601 @        @      0   5 45    40   250     5   7
C 9611492          MC_d/Thin_PP-Restore @
D 9611492          arm1.kcp @
A 9611477          StdEx/Mcd/9611477.fvs                 NoPointData so @
B 9611477          1996 @   @    601 @        @    225  15 45    50   300     5   9
C 9611477          MC_d/Thin_PP-Restore @
D 9611477          arm1.kcp @
A 9611458          StdEx/Mcd/9611458.fvs                 NoPointData so @
B 9611458          1996 @   @    601 @        @     45  15 44    50   250     5   9
C 9611458          MC_d/Thin_PP-Restore @
D 9611458          arm1.kcp @
A 9611437          StdEx/Mcd/9611437.fvs                 NoPointData so @
B 9611437          1996 @   @    601 @        @      0  10 44    50   250     5  14
C 9611437          MC_d/Thin_PP-Restore @
D 9611437          arm1.kcp @
A 9611426          StdEx/Mcd/9611426.fvs                 NoPointData so @
B 9611426          1996 @   @    601 @        @     90  20 42    34   200     5   5
C 9611426          MC_d/Thin_PP-Restore @
```

For Help, press F1 | Ln 1, Col 1, C0 | DOS | Mod: 2/10/2000 7:44:38AM | File Size: 91084 | INS

There is a need to append all of the vegetation types by all of the management scenarios together in a global Suppose.loc and Stand List File. Use your favorite text editor to do so.

<u>Topic FIA2FVS</u>: Translate FIA data from the World Wide Web into FVS format

Concepts: Create FVS input database from FIA data available on the Web.

Forest Inventory and Analysis (FIA) data can be downloaded from the Internet in the form of a MS-Access database. The FIA2FVS program can be used to build an input database for the Forest Vegetation Simulator (FVS) from the FIADB database. As an example, FIA data from Colorado will be retrieved from the Web and set up for FVS.

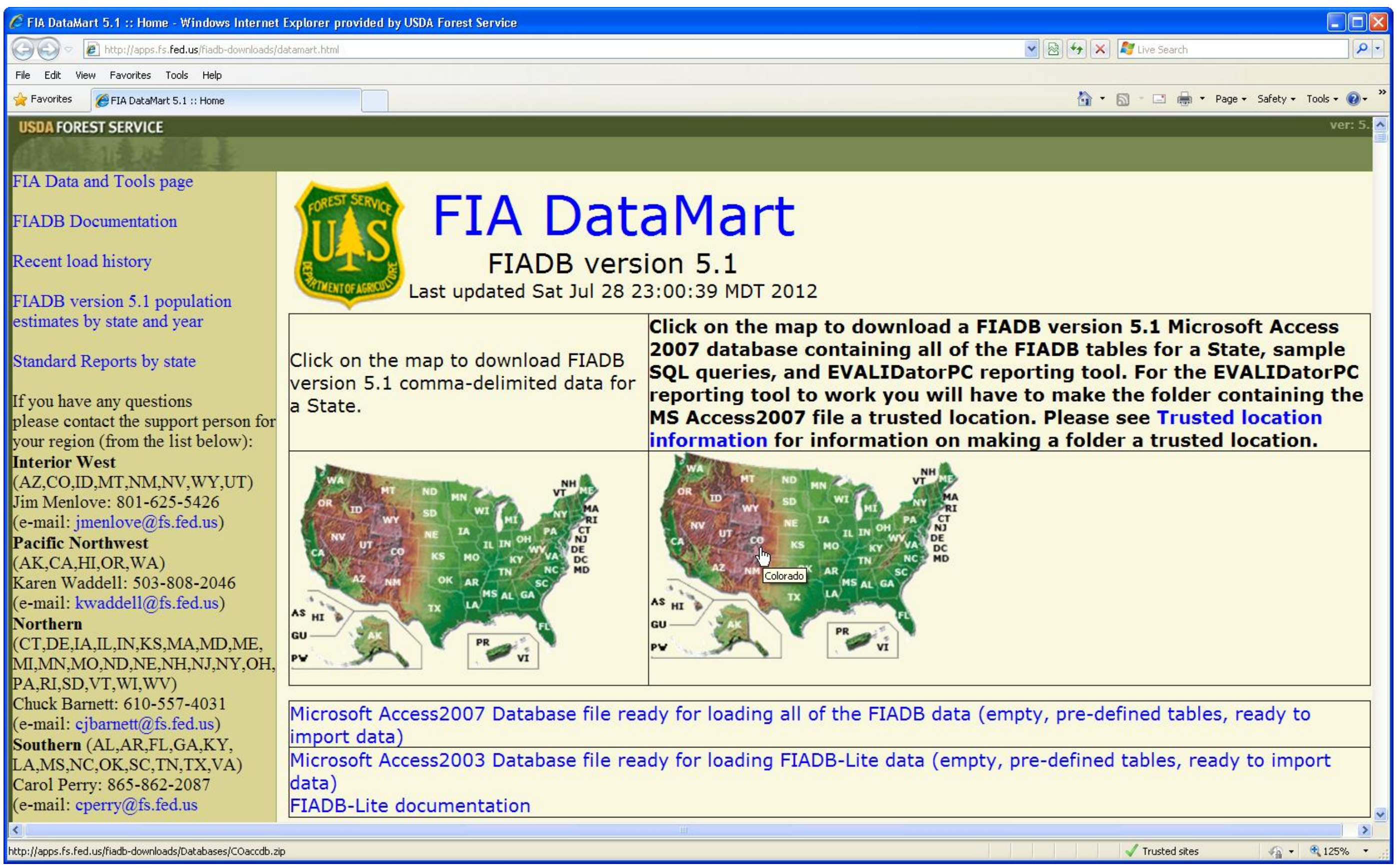
<u>Initial Steps</u>:

1) Ensure that "**Administrative Privileges**" are invoked on the personal computer.
2) Create a subfolder under the C:\Fvsdata folder called \FIA.
   - This folder will be used to store FIA data.
3) Create a State subfolder under the \FIA folder such as \Co. Use the State abbreviation code to name the folder.
   - This folder will be used to save the downloaded FIADB file for Colorado: C:\Fvsdata\FIA\Co.

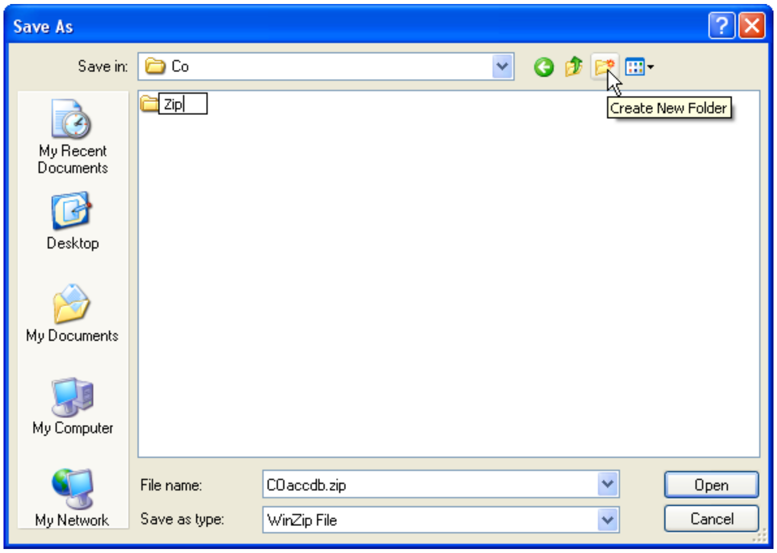
<u>FIA Data Retrieval Steps</u>:

4) Key the following internet address into a Web browser.
   http://www.fia.fs.fed.us/tools-data/default.asp

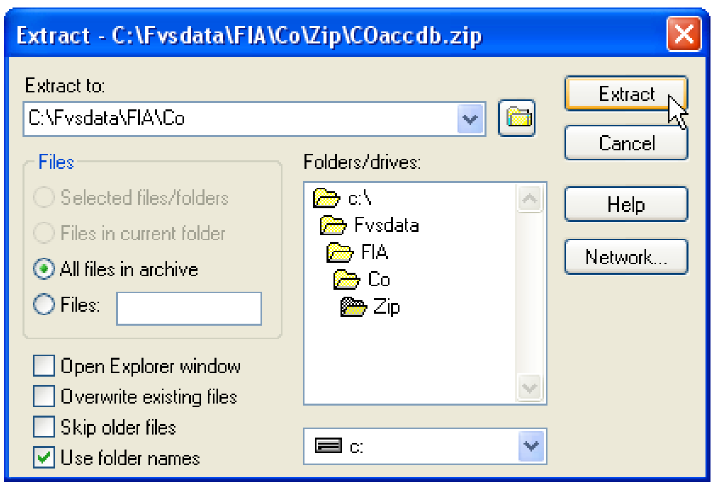
5) Click the "FIA Data Mart" button on the Web Page. The FIA Data Mart window should appear.
6) Using the U.S. map in the right window pane, select the State of interest.
   - Colorado will be selected for this example.



7) When prompted by the "File Download" window, choose to "Save" the downloadable database.
   - Navigate to the FIA State folder using the "Save As" dialog box (i.e. C:\Fvsdata\FIA\Co).
8) Create an additional folder to store the downloaded zip file.
   - Use \Zip as the folder name.



9) Make sure to select and move into the \Zip folder prior to clicking the "Open" button.
10) Save the "COaccdb.zip" file to the C:\Fvsdata\FIA\Co\Zip folder.
    - The file may take several minutes to download depending on its size and your Internet browser capabilities.
11) Using Windows Explorer, navigate to the \Zip folder and click on the zip file.
12) Extract the database to the \{State} folder (i.e. C:\Fvsdata\FIA\Co).



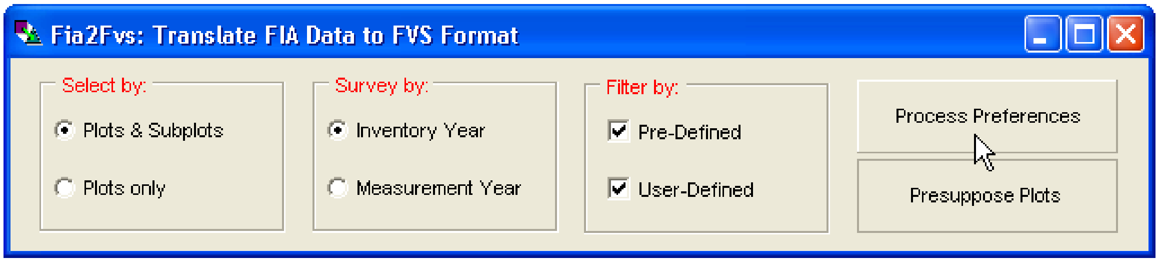
__FIA2FVS Program Steps__:

The FIA2FVS program reads data from the tables stored within the downloaded FIADB MS-Access database and translates it into an input FVS database. Users can choose to convert either "Plots & Subplots" or "Plots only" into separate tables for FVS. Within FVS, FIA plots are considered stands. Subplots are referred to as plots. As such, FIA plot data is stored in the FVS_StandInit table. Subplot data resides in the FVS_PlotInit table. Individual tree measurements from FIA are housed in the FVS_TreeInit table. Additionally, there is an auxiliary table titled FVS_GroupAddfilesAndKeywords that contains SQL commands that connect the FVS_StandInit or FVS_PlotInit table to the FVS_TreeInit table. These are the base tables that comprise the FIA2FVS.accdb database file.

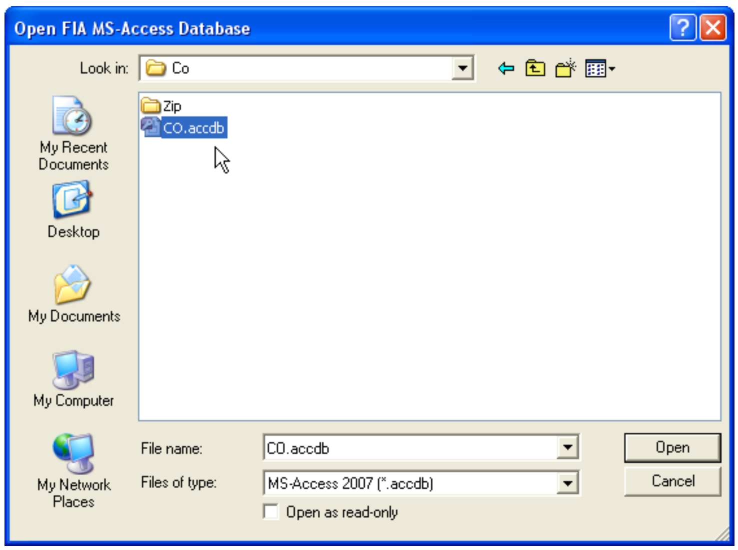
13) Retrieve the FIA2FVS setup package by keying the following Internet address into a Web browser {Forest Management Service Center (FMSC), Forest Vegetation Simulation (FVS) Web site}.

    http://www.fs.fed.us/fmsc/fvs/software/data.shtml

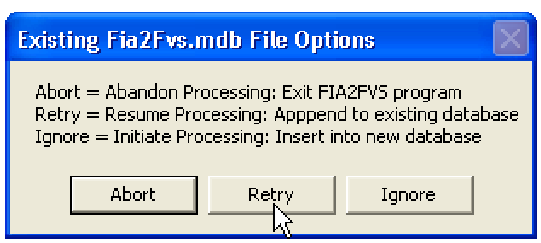
14) Download the "Fia2Fvs_Install.exe" file to the C:\Fvsbin folder and execute. Follow setup program prompts.
    - Ensure that the extracted files are directed to the C:\Fvsbin folder.
15) Execute the program by using the Start Menu, All Programs, FVS group, Fia2Fvs option.
    - Alternatively, create a Desktop shortcut by right mouse click and directing to the desktop.



16) Select either the "Plots & Subplots" or "Plots only" option.
17) Plots can be filtered by "Inventory Year" or "Measurement Year". Inventory year is the year that best represents when the majority of plots were collected. Measurement year is the year in which the plot was sampled.
18) Click the "Processing Preference" button to continue. If the Fia2Fvs.accdb file exists from a previous execution of the program, a message box will prompt whether to delete this file. Select "Yes" to proceed.
19) FIA2FVS will display the Open File dialogue box. Navigate to the working folder.
    - (i.e. C:\Fvsdata\FIA\Co)



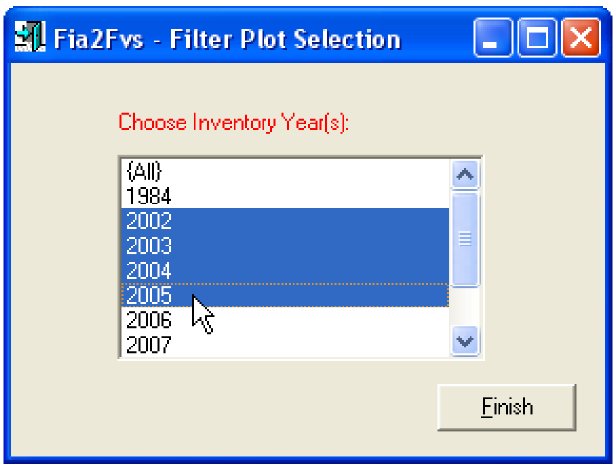
20) If the Fia2Fvs.accdb file exists in the working folder, the following prompt will appear:

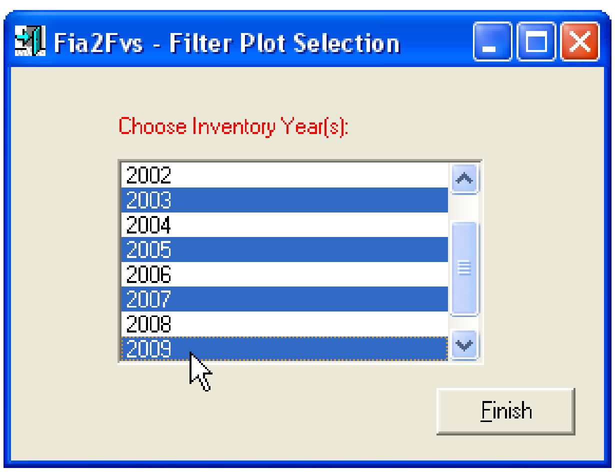


- Selecting the "Abort" option will terminate the FIA2FVS program. The user can examine the existing Fia2FVS.accdb file to determine the next course of action.
- Selecting the "Retry" option will pick up the translation processing where it left off. New records will be appended at the end of the Fia2Fvs.accdb file.
- Selecting the "Ignore" option will delete the existing Fia2Fvs.accdb file and create a new one. New records will be inserted from the beginning of the database.

21) If the Fia2Fvs.accdb file does not exists in the working folder, the "Filter Plot Selection" window will appear. Either the "Inventory Year(s)" or "Measurement Year(s)" will be displayed in the list box depending on prior selection. Choosing "{All}" will invoke the FIA2FVS program to translate the entire data set including Periodic and Annual measurements.

22) Individual years (select one), sequential series (Shift Key to select), or discontinuous series (Ctrl Key to select) of years can be chosen. The FIA2FVS program will process the subset of plots.





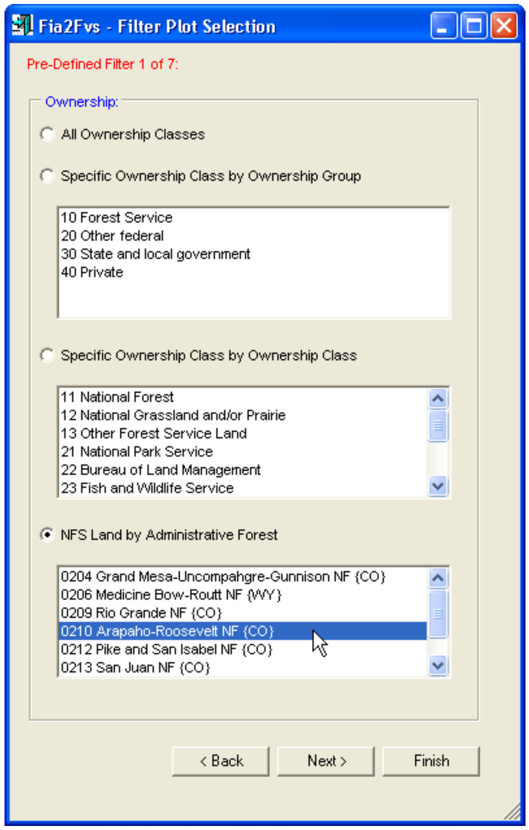
23) Click the "Finish" button to continue.
24) Filters can be used to screen the data to isolate particular plot sets. The FIA2FVS program provides "Pre-Defined" and "User-Defined" filtering options.

<u>Pre-Defined Filters</u>: There are seven pre-defined filters.

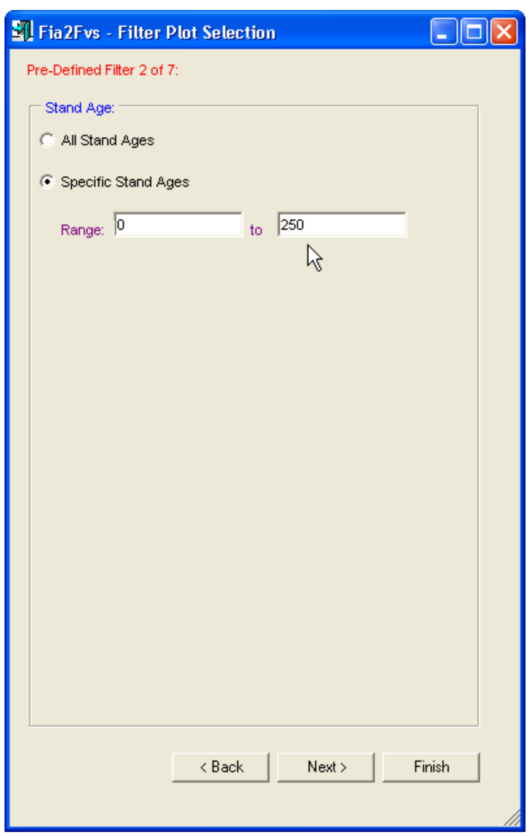
1. Ownership
2. Stand Age
3. Slope
4. Forest Type

5. Stand Origin
6. Site Class
7. Physiographic Class

Users can accept the default setting which is to select all attributes of a given data field or alternatively, they can choose individual members or specify a range of data values to accept.

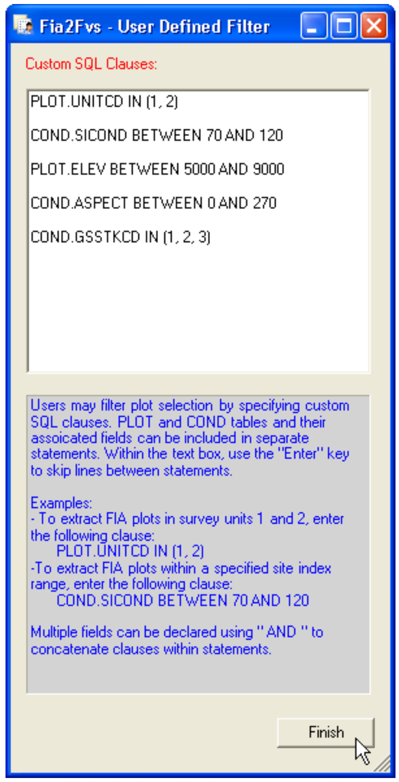


Once a selection has been specified, click the "Next" button to move to the next pre-defined filter.



Use the “Back” button to edit a selection and the “Next” button to move forward through the pre-defined filters. Click the “Finish” button once ready to proceed.

User-Defined Filters: Those familiar with the data fields within the PLOT and COND tables in the FIADB database and also skilled in using the Structured Query Language (SQL) are provided the option of declaring their own data filters.



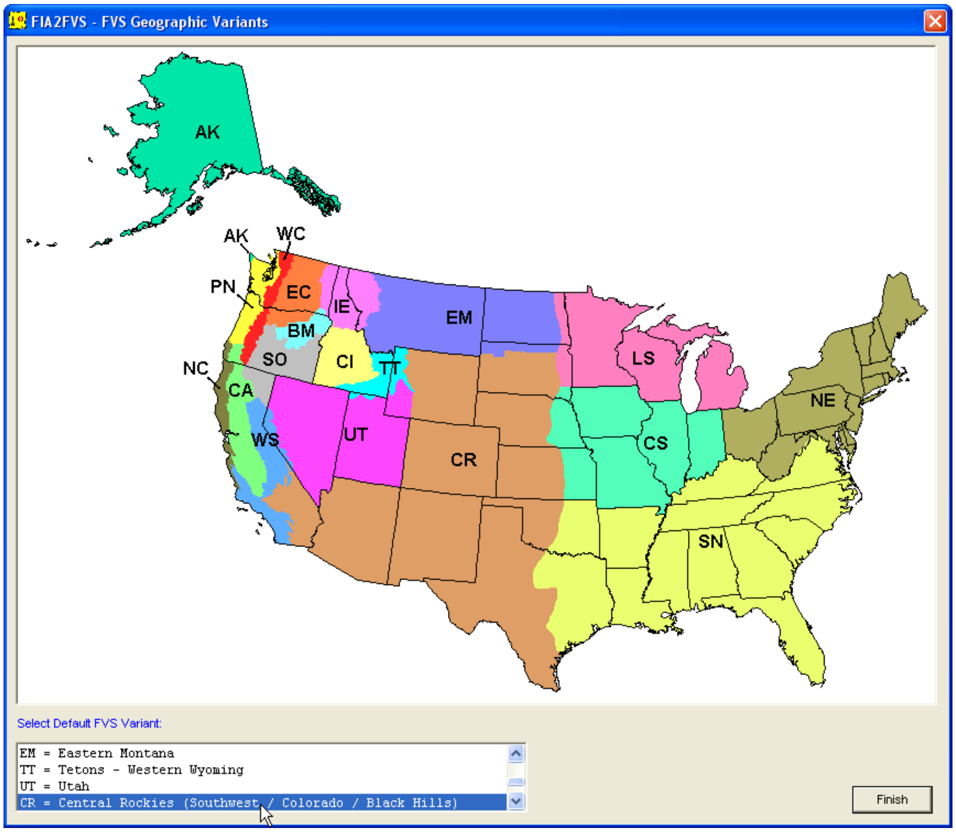
Caution needs to be used in declaring SQL statements. Table name (i.e. PLOT or COND) followed by a “period” followed by Field names defined the variable of interest. Use the “IN” qualifier to extract individual data elements. Text fields (e.g. Plant Associations - HabTypCD1) need to be delimited by single quotes. Use the “BETWEEN” qualifier to declare a data range to extract. Separate SQL statements by using the “Enter” key to skip lines. Consult the “FIA Database Description and Users Manual for Phase 2, version #.#.#, *Date/Year*” available on the Web at: http://www.fia.fs.fed.us/library/database-documentation/

Cite data fields in the PLOT and COND for valid variable names.

Choose the “Finish” button when complete.

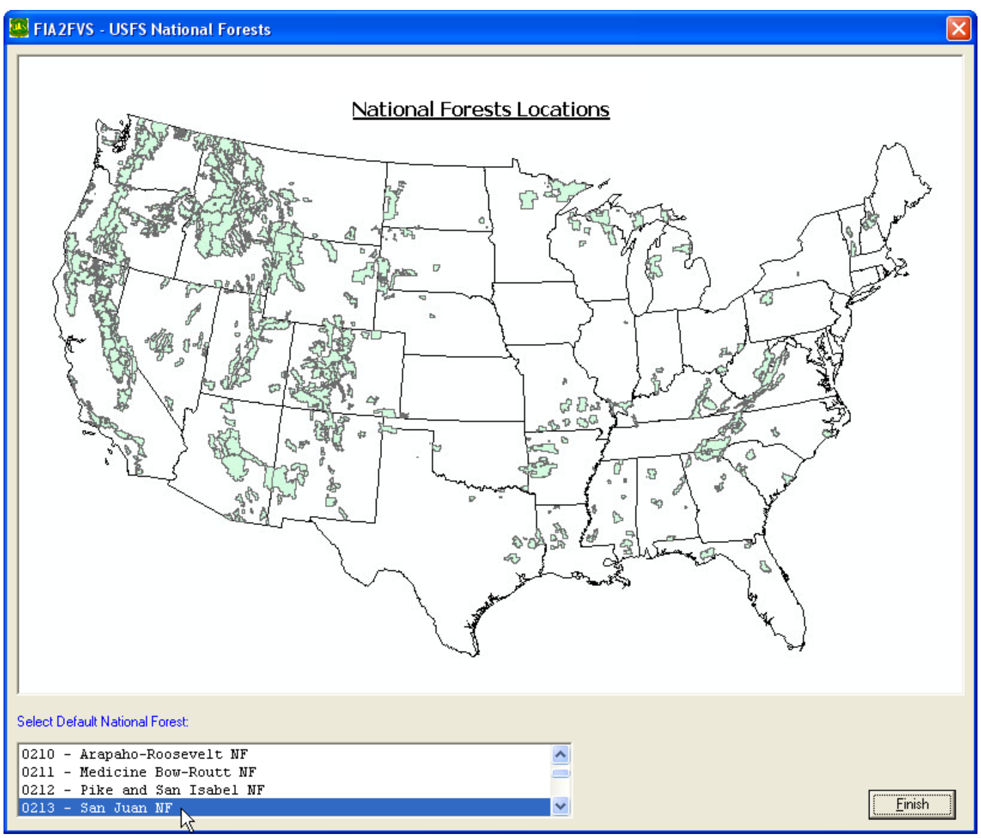
25) Next, FIA2FVS will prompt for the default FVS Geographic Variant.

- Note: Behind the scene, the FVS geographic variant map object is used to assign the variant code to plots as they are processed. The FVS geographic variants have been expanded to cover all lands in the continental U.S. and Alaska. Map utilities are embedded in the FIA2FVS program to directly extract the preferred FVS variant. The selected “Default FVS Variant” is only used in cases where open pockets may exist in the FVS geographic variant map (e.g. islands in the Puget Sound). This should be a rare occasion and should be reported to the FVS staff for identification and correction.



26) FIA2FVS will also prompt for the default National Forest Location to assign to plots that do not have Administrative National Forest assigned within the FIADB.

- Note: National Forest Location is used by FVS to set default site index, stand density maximums, and volume equations. Spatial selection of the National Forest Location is also accomplished using a map object referenced by the program. The selected "Default National Forest" serves as a fallback assignment in cases where location cannot be properly determined from the map object. Users should report these occasions for correction.



27) Click the “Finish” button to initiate processing.

- The FIA2FVS program will build a new database file that contains the FVS_GroupAddfilesAndKeywords, FVS_StandInit, FVS_PlotInit (if requested), and FVS_TreeInit tables.

NOTE: FIA data sets are quite large. Translating data fields from the FIA database into the FVS format often requires extended periods of time. Initially, the main FIA2FVS window is presented as a scrolling log of the various FVS tables as they are created. Generally, a listing of the State/County/Plot/{Subplot}/{Tree} records is displayed in the caption of the main FIA2FVS window as they are being processed. However, due to the computational demands of data translation, if another process is initiated on the personal computer (PC), the main FIA2FVS window will stop displaying this information. FIA2FVS may appear to be “frozen”. Be assured that the program is indeed still processing data records. To confirm, check Windows Task Manager (i.e. Ctrl-Alt-Del: Task Manager) and look under the “Applications” tab for FIA2FVS program. The listing should reveal a scrolling sequence of State/County/Plot/ {Subplot}/{Tree} records. Another method that will verify that the FIA2FVS program is running is to use Windows Explorer and navigate to the working folder. Be sure to view the file list box using “Details”. Observe the file size associated with the Fia2Fvs.accdb database. After a few moments, press the F5 key to refresh the Windows Explorer display. The Fia2Fvs.accdb file size should progressively increase. This indicates that the FIA2FVS program is working in the background to create the Fia2Fvs.accdb database. Also, the repetitive flashing light of the PC hard disk ensures activity. Terminal program errors will produce a message window that displays the apparent problem. At that point, report the error encountered to the FVS Staff. Regardless whether the main FIA2FVS program presents record processing detail, a message window will always display “Fia2Fvs.accdb has been created!” upon successful completion of the translation process. Be patient; just wait for it.

Depending on the chosen State and the number of FIA measurement cycles, the FIA2FVS program may require significant time to process the input FIA database and build the output FVS database. Based on the prototype Colorado data set that contained one periodic measurement and seven panels of annual measurement (approximately 15,000 plot records), FIA2FVS took 10 hours to create the FVS database. It is recommended that users download the FIA database, install the FIA2FVS program, and execute just prior to departing for the evening. Without interruption, the newly built FVS files (Fia2Fvs.loc, Fia2Fvs.accdb) will be available the next morning in the work folder.

Presuppose Program

Presuppose is a user friendly front-end program that builds data queries prior to processing translation requests. Presuppose allows users greater ability to select subsets of plots within a given State. Input windows prompt for plot and tree level filters enabling finer selection detail. This feature significantly decrease FIA2FVS processing time for smaller data extracts. The Presuppose program is available upon request to the FVS staff.

Grouping Group Assignments

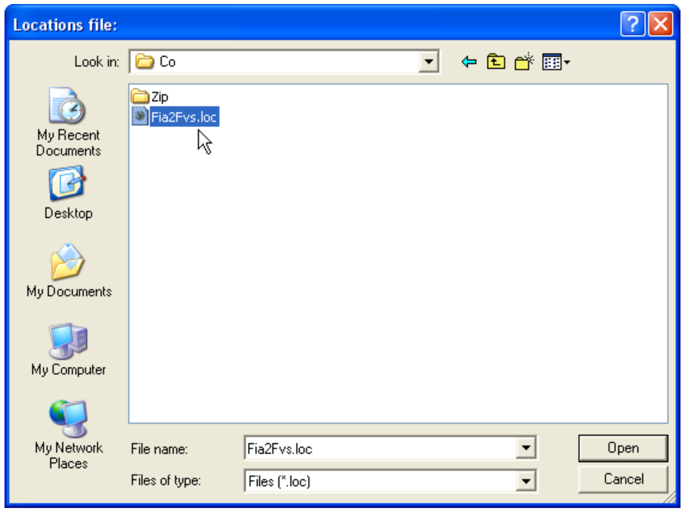
Execute the Suppose interface. Use the File menu/Select Location File option and proceed to the work folder. Pick the “Fia2Fvs.loc” file. Upon doing so, the Select Simulation Stands window will be displayed. Selecting the “FIA_to_FVS” label in the left window pane will prompt Suppose to populate the center window pane with “Grouping Codes”.

There are three global grouping codes:

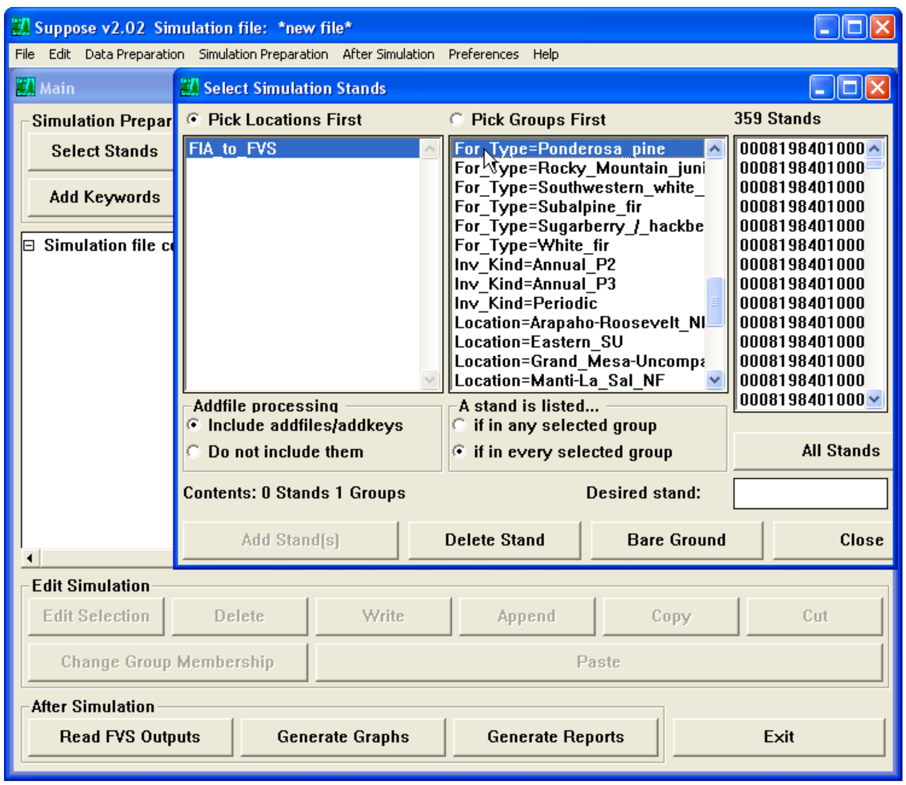
- All_Stands or All_Plots (i.e. Plot or Subplot, User Input)
- State (i.e. Survey Table: State Code)
- Variant (i.e. FVS Geographic Variant, User Input)

There are seven location specific grouping codes:

- FIA_Inv_Yr (i.e. Survey Table: Inventory Year)
- FIA_Meas_Yr (i.e. Plot Table: Measurement Year)
- For_Type (i.e. Condition Table: Forest Type)
- Inv_Kind (i.e. State Table: Notes - Annual or Periodic)
- Location (i.e. Condition Table: Administrative National Forest or FIA Survey Unit)
- Single/Multiple Plot Conditions (i.e. Condition Table: Condition Class Number)
- Forest/Nonforest Status (i.e. Condition Table: Condition Status Code)



Grouping Code labels provide utility to select plots with common attributes.



Follow standard FVS procedures to process the data. In order to run FIA subplots individually, users will first need to choose the Preferences Menu/Suppose Preferences and modify the "Process plots as stands" option to "Yes". Click the "Apply" button, then "Close" prior to picking the "Select Locations File" choice from the File menu.

Fuel Load Data

Down Woody and Fine Materials collected on Phase 3 installations have been translated into Fuel Load information for FVS. Note that the sampling intensity for Phase 3 plots is sparse: 1 out of 16 Phase 2 plots.

FIA2FVS Future Developments

Users should not assume that site index values derived from FIA are those needed by FVS. In many case, they are not. For most FVS variants, site index is a primary predictive variable (for diameter, height, and crown development). The FVS model does not allow direct input of tree age and tree height in order to compute site index in accordance with its reference equations. Users have been responsible for supplying the proper site index value. An effort is under way to compute site index from the input data. A library of site index equations is being built to cover the entire country. This will be a gradual process and only progress as FVS staff time becomes available. Users should be aware of the source of the site index value and make adjustments within the database if needed.

Although not utilized by the FVS model presently, inclusion of understory vegetation in the input database is being considered. Grasses, herbs, forbs, and shrubs are important components of the complete vegetation profile. As FVS continues to evolve, these important features will be brought into the model. Storing data records with this information is an essential starting point.

Decode Template for Stand(Plot) ID's

Use the following template to decode the Stand and StandPlot ID fields within the Fia2Fvs.accdb file:

			Cumulative Position	
			Beginning	Ending
Stand	State	4	1	4
	InvYr	4	5	8
	Cycle	2	9	10
	Subcycle	2	11	12
	Unit	2	13	14
	County	3	15	17
	Plot	5	18	22
		22		
Plot	Underscore	1	23	23
	Subplot	3	24	26
		4		
		26		

FIADB Tables Accessed by the FIA2FVS Program

COND = Condition Table
DWM_COARSE_WOODY_DEBRIS = Down Woody Material Coarse Woody Debris Table
DWM_DUFF_LITTER_FUEL = Down Woody Material Duff, Litter, Fuel Table
DWM_FINE_WOODY_DEBRIS = Down Woody Material Fine Woody Debris Table
DWM_TRANSECT_SEGMENT = Down Woody Material Transect Segment Table
PLOT = Plot Table
PLOTSNAP = Plot Snapshot Table
REF_FOREST_TYPE = Reference Forest Type Table
REF_SPECIES = Reference Species Table
REF_UNIT = Reference Unit Table
SEEDLING = Seedling Table
SITETREE = Site Tree Table
SUBPLOT = Subplot Table
SUBP_COND = Subplot Condition Table
SURVEY = Survey Table
TREE = Tree Table

Self-Register FIA2FVS dll Files

Handling errors reported by the program may be a result of unregistered "Dynamic Link Libraries" (*.dll) within the Windows Registry that support FIA2FVS processing. Although great effort is expended by the install utility to register all program files, unanticipated system features could disallow registering certain dll's. Users can "self-register" dll's by inserting the follow command in the "Run" window {i.e. Start Menu/Run}:

Regsvr32 C:\Fvsbin\{*.dll}

Replace {*.dll} with:

dao360.dll
msador15.dll
msadox.dll

Notes: