Analysis Tools
Guide

EXECUTIVE SUMMARY

The FIREMON Analysis Tools program is designed to let the user perform grouped or ungrouped summary calculations of single measurement plot data, or statistical comparisons of grouped or ungrouped plot data taken at different sampling periods. The program allows the user to create reports and graphs, save, and print them, or cut and paste them to a word processor.

INTRODUCTION

Analysis Tools

Fire effects monitoring is defined by two tasks: field data collection and evaluation. Field data collection has been discussed in detail in the **Integrated Sampling Strategy** and Field Assessment documentation. Discussed here is the software and procedures for the evaluation of the field data to assess fire effects.

The FIREMON Analysis Tools component encompasses two major tasks: 1) data entry and 2) data analysis. Data entry is accomplished in FIREMON by physically entering the collected field data into a set of standardized Microsoft Access ™ databases. Data analysis is accomplished using a set of database queries and computer programs developed specifically for FIREMON.

The FIREMON Analysis Tools program performs a variety of tasks. First, is a program that scans the Microsoft Access ™ databases and locates empty fields. The Analysis Tools program imports the database and performs common calculations on the data. For example, fuels data is entered by transect, but Analysis Tools program calculates the fuel loading from the raw transect data. Then the program summarizes results in a table. The analysis program summarizes all database entries into one report for storage as a computer file or paper report. The Microsoft Access ™ database also contains built in queries for computations at the plot level.

The statistics program performs the temporal monitoring analyses using Dunnett's t-test and provides output reports showing the results of statistical tests. The summary can be stratified by any macroplot-level field or by the user.

The analysis package can also produce the necessary files to run the Forest Vegetation Simulator and the associated Fire and Fuels Extension. Lastly, data can be exported in comma-delimited format for input into spreadsheets or statistical programs.

FIREMON ANALYSIS

Getting Help

FIREMON Analysis has three levels of help that are available while it is running:
1. Single line help is always shown on the main program window, just about the report window, whenever you click on a window item such as a list box, you will see a simple one line message explaining what the list box does. You'll notice it changing as you click on different items.
2. F1 help is also available, click on a screen item then hit the F1 function key, a small window will popup giving you a somewhat detailed explanation of the item you have clicked on.
3. Full help is available from the main menu, this is a complete and detailed help system.

Getting Started

The first time you start up the FIREMON Analysis program you will get a message instructing you to set a database and a project file, the message window that pops up will give you a list of short instructions to guide you.

A project file (.prj file extension) saves all of your screen settings. You can have as many project files, as you like. For example; if you have built a particular list of plots that you want to work with, save them to a project file, later you can use them again, by opening the project file and you won't have to create the list again.

Project files are also helpful in that they save your place when you leave FIREMON Analysis Tools program. The next time you enter the program your settings will be restored.

Once you have set your project file, the name and full directory (folder) path will be shown in the Project Window (just under the main menu). The path that is shown will be used as a default path whenever you go to open or save a file. You can set that path by using the "New" option under the Project main menu item.

The Settings Dialog Box

The Settings dialog box (figure AT-1) is available from the main menu Options → Settings. Use it to set the database you want to work with. Once you choose a database, select the Registration ID and Project ID from the list boxes provided adjacent to the Open button. Once back on the main screen, only plots within the selected Registration ID and Project ID will be shown.
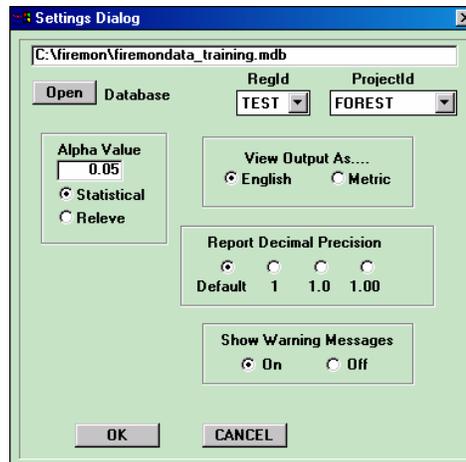
Figure AT-1. Example of Setting Dialog Box

This Settings dialog box also lets you set the alpha value (α) used in the report statistics. This should be set to match the Z_α level used when the sample size was calculated in the **Integrated Sampling Strategy**. This value should be recorded in the project notebook or Metadata table. If

not, use a conservative value (α=0.20). You can elect to see your output (report/graph) in English or Metric units, regardless of how the data was entered in the database.

Four buttons are provide that allow you to set the decimal precision you want to see on your reports. You can leave it set to Default, however there may be times when you find that you need more or less precision.

You can also turn the programs warning messages on or off. Warning message occur for invalid or missing data when you create a report or a graph. The program directs the messages to a text file and allows you to open it for viewing or printing.

Grouping Your Plots

You can group your plots by selecting an attribute from the Strata list box and then clicking the 'Strata by' button. The items in the list box correspond to the fields in the Plot Description database table. (example: Landform, Vertical Shape, etc.)

When you hit the 'Strata by' button you will see your selected plots in the Strata Window move into groups. For example if you selected Landform, you might see your plots grouped under #ALPA and #CIRQ. The '#' prefix helps distinguish group codes from plot numbers.

FIREMON Analysis also allows you to go into the Strata Window and type in your own codes. The Strata Window is a typical text edit window so you can go into it and cut and paste and build your own stratification groups. NOTE: If you do choose to go into the Strata Window and group your plots, do NOT hit the 'Strata by' button because it will erase your work. Instead you should use the 'Refresh' button just under the Strata Window, it will simply align your plots and codes in the window.

Some points to remember.
1. There is a 'None' item in the Strata list box, selecting it will un-group your plots.
2. All codes must have a '#' prefix, if you enter your own codes into the Strata Window, use it.
3. If missing data codes are found the associated plots will be grouped under #Missing

How to Run – A Brief Overview

The program is setup such that you can create reports and graphs, save, and print them, or cut and paste them to a word processor such as Microsoft Word.

In addition, as discussed above, you can group plots. For example, if you record your plots with a landform code, you can then use that for grouping.

Once you have the database set and have saved the setting to a project file you are ready to run using these five basic steps:
1. Select plots

2. Select Sample Events (Pre-Treatment, Remeasurement check boxes)
3. Select a report attribute (Shrub Cover, Height, Density, etc)
4. Select your Strata (optional)
5. Create your report/graph

Figure AT-2 shows the opening screen of the FIREMON Analysis Tools program. Select the plots you want by clicking them in the Plot Window and click the arrow button below and you will see the selected plots appear in the Strata Window to the right. Now, select the Pre-Treatment/Remeasurement check boxes for the sampling events you want. Select the Sample Method and Report Attribute you want. Lastly, select Report or Graph from the main menu and the Create. The results will appear in the lower window.
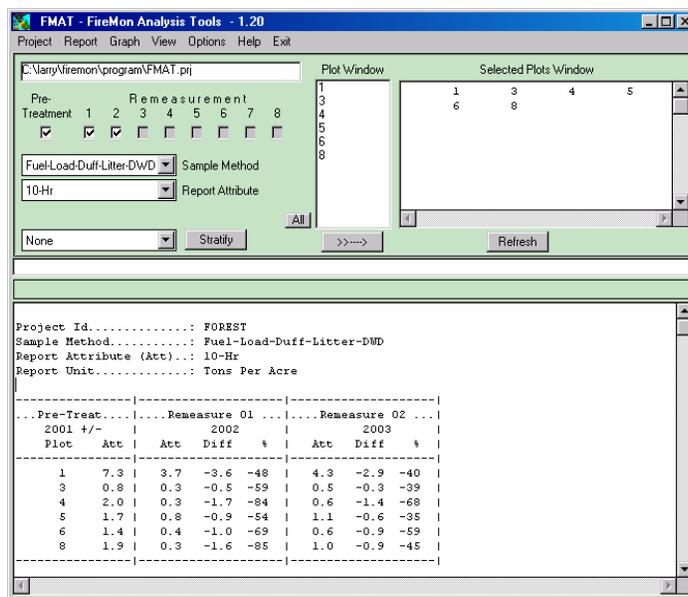

Figure AT-2 Example of the main screen

Example report

The FIREMON Analysis report uses a one-way ANOVA procedure to calculate a one-way analysis of variance for a single attribute between two or more sampling events. Analysis of variance is used to test the alternative hypothesis that at least of the means is different from the others.

In addition to determining that differences exist among the means, the FIREMON analysis program determines which means differ. A Dunnett's pair wise multiple comparison t-test is used to compare a set of treatments against a single control mean. (figure AT-3). The FIREMON analysis program uses the first sampling event (pre-treatment or first remeasurement) as the control and the subsequent sampling events as the set of treatments.

The FIREMON analysis report displays the attribute value for each plot and the absolute and percent difference for each value, relative to the first sampling event. The mean values and differences in mean values are displayed at the bottom of the plot attribute value table. The F-statistic and associated P-value for the ANOVA table are displayed below the plot attribute table.

A 'S' indicates a significant difference in mean values when compared to the first sampling event using Dunnett's t-test at the 0.05 significance level. When significant differences are noted at the 0.01 level a 's' is printed on the report.

```
Project Id..............: FOREST
Sample Method...........: Fuel-Load-Duff-Litter-DWD
Report Attribute (Att)..: Litter-Depth
Report Unit.............: Inches

----------------|--------------------|--------------------|
...Pre-Treat....|....Remeasure 01 ...|....Remeasure 02 ...|
    2001 +/-    |        2002        |        2003        |
   Plot    Att  |   Att   Diff    %  |   Att   Diff    %  |
----------------|--------------------|--------------------|
        1   0.8 |   0.2   -0.6  -77  |   0.2   -0.6  -74  |
        3   0.2 |   0.1   -0.1  -62  |   0.1   -0.1  -41  |
        4   0.8 |   0.0   -0.8 -100  |   0.1   -0.7  -88  |
        5   0.6 |   0.0   -0.6  -93  |   0.1   -0.6  -91  |
        6   0.2 |   0.0   -0.2 -100  |   0.1   -0.1  -67  |
        8   0.6 |   0.0   -0.6 -100  |   0.1   -0.5  -78  |
----------------|--------------------|--------------------|
N =  6      0.5 |   0.0   -0.5  -91 S|   0.1   -0.4  -80 S|
Std Dev     0.3 |   0.1              |   0.1              |
----------------|--------------------|--------------------|


    F-Stat:  13.047      P-Value:0.001633
'S' indicates the significant difference (PVal less than 0.01 level)
    when compared against the first column using Dunnett's test.
    User alpha was set at 0.05
+/- indicates that sampled years varied across plots
```

Figure AT-3. Example Report output

Summary type reports can be produced by selecting Summary-Report in the Sample Method drop down list box. You can copy and past the text from these reports, for example into an Excel spread sheet. In addition there is an Export Report menu feature that exports comma delimited files. The file will export as 'Export.txt'.

```
Project Id: FOREST
........Trees Per Acre
BA......Basal Area - Square Feet
LCBH....Average Live Crown Base Height - Feet
Height..Average Height - Feet
QMD.....Quadradic Mean Diameter inches
               Mature      BA    LCBH   Height    QMD   Saplng Seedlng   Total   Snags
     1      P1    50.0    27.4    27.2    63.0    10.0    50.0   500.0   600.0    0.0
     1      R1    30.0    22.4    51.7    72.7    11.7    50.0   500.0   580.0    2.0
     1      R2    30.0    22.4    51.7    72.7    11.7    50.0   500.0   580.0    2.0
     3      P1    50.0    69.2    26.4    66.6    15.9    50.0   500.0   600.0    0.0
     3      R1    40.0    67.4    34.8    78.0    17.6    50.0   500.0   590.0    1.0
     3      R2    30.0    63.9    38.0    89.0    19.8    50.0   500.0   580.0    2.0
     4      P1    50.0    44.6    24.8    63.2    12.8    50.0   500.0   600.0    0.0
     4      R1    40.0    40.3    33.0    70.8    13.6    50.0   500.0   590.0    1.0
     4      R2    30.0    30.2    31.0    75.7    13.6    50.0   500.0   580.0    2.0
     5      P1    50.0    26.6    27.6    58.0     9.9    50.0   600.0   700.0    0.0
     5      R1    40.0    25.1    35.0    64.0    10.7    50.0   600.0   690.0    1.0
     5      R2    30.0    23.2    36.7    72.0    11.9    50.0   600.0   680.0    2.0
     6      P1    50.6    50.0    27.6    76.1    13.5    50.6   505.9   607.0    0.0
     6      R1    50.6    67.9    37.4    77.8    15.7    50.6   505.9   607.0    0.0
     6      R2    50.6    70.0    35.6    68.2    15.9    50.6   505.9   607.0    0.0
     8      P1    40.5    17.1    29.4    62.1     8.8    50.6   404.7   495.8    1.0
     8      R1    20.2    10.9    34.8    68.9     9.9    50.6   505.9   576.7    3.0
     8      R2    20.2    10.9    34.8    68.9     9.9    50.6   505.9   576.7    3.0
```

Figure AT-3.5. Example Summary Report output

Example graph

The FIREMON analysis graph simply displays the mean values for the attribute by sampling event. Graphs may be copied to the clipboard and then pasted into word processing documents (figure AT-4).
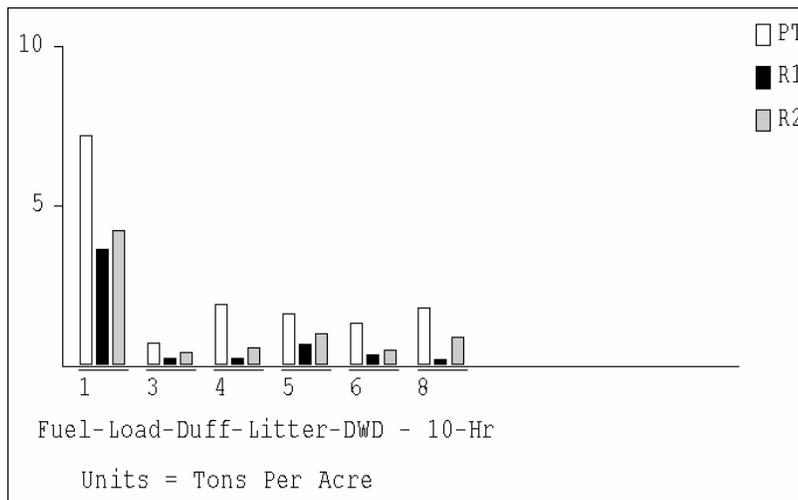

Figure AT-4. Example Graph output.

The Graphing Option dialog box lets you set options to arrange the overall look of the graph (figure AT-5). Multiple individual graphs are displayed in the graph window. The settings in the dialog box help you control how the graph window will look.
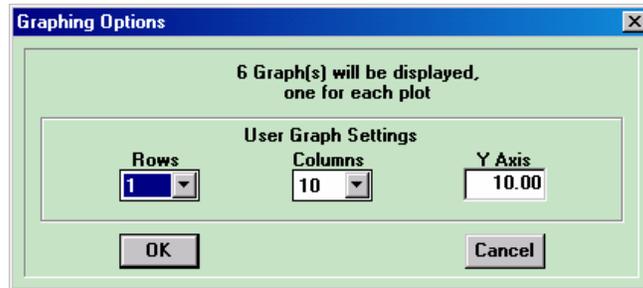

Figure AT-5 The Graphing Options dialog box

If you have elected to group your plots then a List Box will be shown in the upper left of the dialog box so that you can select a group to display, or 'All Strata' (show a graph for each stratification group). The List Box will not appear if you have not grouped your plots.

The Rows and Columns List Boxes control how the individual graphs will be arranged in the Graph Window. For example, if the dialog box informs you that 12 graphs will be created, you may want to select 2 Rows and 6 Columns. A little experimentation with the Rows and Columns options will help you get familiar with how they work.

Use the Y Axis edit text box to set the limit of the y-axis in your graphs.

Forest Vegetation Simulator option

FIREMON Analysis provides a means for users to convert and move data into the USDA Forest Service FVS File Formats. This is available under Options → Forest Vegetation Simulator on the main menu.

Before you choose this option you will need to select one plot and one remeasurement check box on the main window. The current version of the Analysis Tools only supports processing of one plot at a time.

When you select Forest Vegetation Simulator option a dialog box will open (figure AT-6). Set the plot number you want to use, FVS region and Forest information, the habitat type or plant association code for the plot and the filename you want use. Click the OK button and the files will be saved. Files with the same name will be overwritten without warning.

When you select the output file name you will only be asked to set the .tre file name, the other three output files will use the same base name but will be created with different file extensions. In total, four files will be created for each run.
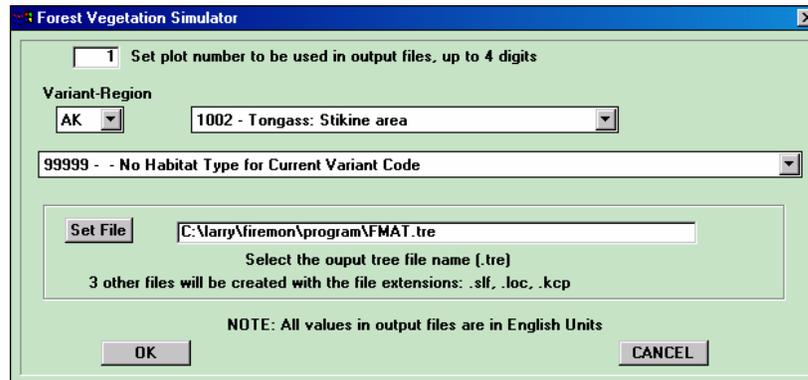
Figure AT-6. Example of a Forest Vegetation Simulator Dialog Box

Some Hints
➢ Always hit the 'Refresh' button after each time you select plots or click a Pre-Treatment / Remeasurement check box; doing so will force the Species list box and remeasurement check boxes to update, reflecting the new plots you have selected. In addition the 'Refresh' button will re-align your plots in the Strata Window.
➢ If you have your database open while you are running FIREMON Analysis and you make a change to your data, make sure to hit the Access Refresh option so that your changes will be detected by FIREMON Analysis Tools program.
➢ The Report Window is a text edit window, so you can go into it and cut, copy and paste. But be careful where you leave the cursor positioned as any new reports will be placed at the current cursor position, that could or couldn't be where you want it.
➢ If the Pre-Treatment and/or Remeasurement check boxes are grayed out, that means there is not Plot data for that sample event.
➢ The Species list box will only appear when it is appropriate for the Sample Method.
➢ Whenever you create a report or graph the program will gather and check the needed data from the database, the program will put up a warning window if it finds any problems or inconsistencies, for example: a missing transect length, no data for a selected remeasurement, or data values out of limits. You will need to correct these problems before analysis can be done.
➢ And, above all, have fun…