

FORBS

FUELS OUT-YEAR REQUEST AND BUDGET SYSTEM

USERS GUIDE

Software Version Version 1.1
Database Version 6

USDA Forest Service

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Chapter 1:

Background and Overview

Welcome to FORBS – Fuels Out-year Request Budgeting System.

The FORBS Program is based on the National Fire Management Analysis System (NFMAS). It utilizes existing Personal Computer Historical Analysis (PCHA), Interagency Initial Attack Assessment (IAAA), and Arc View processes. FORBS is tied to the Suppression Analysis developed in IAAA and PCHA. The objective is to model fire behavior, with and without treatments, and change over time as fuels decay or accumulate. It is a short-term solution used for programmatic, strategic planning.

FORBS describes four different fuels situations. These situations include current untreated; future untreated; current treated; and future treated.

Geographic layers utilized in FORBS are coordinated with other applications including PCHA and IAAA. These layers display the Fire Management Zone (FMZ), a basic geographical area for the analysis within a planning unit. It is represented by a single set of fire behavior characteristics, based on fuel, topography, and weather. The Representative Location (RL) is a portion of a FMZ that represents a unique set of data relating to dispatch, preparedness forces, potential Net Value Change (NVC), escaped fire size potential, and a defined fire occurrence rate. The Fire Occurrence Area (FOA) is an area of uniform fire occurrence rate and determines probability of an acre burning. Treatment Area Strategy (TAS) is an area of uniform fuel treatment strategy. Each geographic layer within FORBS is unique and is contained within a broader layer of data. There is no overlapping data between layers. If there is a need to overlap data, a new unit is created within the layer. Combinations of TAS in FORBS create a strategic fuels program.

Imported from the IAAA Database, FORBS utilizes Average Acre Cost (AAC); Net Resource Value Change (NVC); Inflation Factors; Fire Management Zone (FMZ) Attributes; Calibrated Fire Behavior Data (FBD); Calibrated Escaped Fire Table (EFT); and Run Data from Program Option.

FORBS provides data output including net benefit; total cost; first year benefit; last year benefit; and a strategic fuels program.

Limitations of FORBS include constant AAC and NVC. Only one RL can be used per FOA and one RL per TAS.

Chapter 2: Installation

In order to properly run FORBS (Fuels Out-Year Request Budgeting System), the following computer specifications are required. *Recommended* specifications are also listed:

Hardware Specifications

Item	Required	Recommended
Operating System	Windows 95 or Windows 98, Windows NT	Windows 95
CPU	80386	Pentium
Monitor Colors	256	65,536
Monitor Resolution	640 x 480	1024 x 786
RAM	4 MB	16 MB
Hard Disk Available	10 MB	(same)
Mouse	Yes	(same)
Printer	Any - configured for Windows	Laser

Software Specifications

Software	Required Version
IIAA	Version 1.10.22 or Greater
PCHA	Version 1.21.04 or Greater

Retrieval Instructions:

Downloading this application requires 2 MB of free space on the pc. This space will be free after the FORBS.exe file is transferred to the target PC.

From the web browser, navigate to

<http://www.fs.fed.us/fire/planning/nist/distribu.htm>

Scroll down the page to software, NFMAS modules. Double-click on the desired modules.

Follow the instructions for retrieving the release notice and the zip (FORBS.exe) file.

Introduction

Installation Instructions

This program has been compiled using the most current available Windows 95 features, however when installed on other than a standard Forest Service Corporate IBM PC, errors may be encountered. The errors noted will not affect the proper use of the software if the instructions are followed. The steps to install software on your Windows machine are described for two types of installs, Zip File format, or Floppy Disks format.

Zip file format

Step 1: Start Windows

Start your computer, and if necessary, start Windows running. Use of third party shells should be avoided. Close all applications before starting the install procedure.

Step 2: Expand ZIP file

On a Windows 95 machine click the START button, choose Windows Explorer, and navigate to the directory where FORBS.exe is stored. Double click on FORBS.exe to extract the needed components to install FORBS. The WinZip self-extractor dialog box will open. In the dialog box under unzip to folder, be sure the path lists is the same path where the du_install.exe is filed (i.e. c:\temp). Click unzip. After the 3 files have been unzipped close the WinZip self-extract window.

Step 3: Auto Install

Double-click on setup.exe and answer the questions as follows for loading. The user will be prompted to accept or enter a new directory structure for loading:
D:\fsapps\fam\nfmas\FORBS. Should the user install to a different dirve, the entire path will need to be typed into the location box.

Step 4: Respond to Prompts

The installation routine will ask a number of questions about things such as placement of files, icons, etc. For all these question accept the defaults (*except as noted in step 3 above*)

Step 5: Confirm Program Group

The default program group is NFMAS. Accept the default program group.

To start FORBS double click on the icon FORBS, or use START-Programs-NFMAS-FORBS

Introduction

Floppy Disk Format

Step 1: Start Windows

Start your computer, and if necessary, start Windows running. Use of third party shells should be avoided. Close all applications before starting the install procedure.

Step 2: Insert First Floppy, Start Installation

Insert "Disk 1" of the FORBS. On Windows 3.x, make sure the Windows Program Manager (not File Manager) window is showing. Click on the FILE menu, then on the RUN item on that menu. Type: A:SETUP.EXE in the box provided, and hit ENTER. On Windows 95, click the START button, then the RUN item on that menu. Type A:SETUP.EXE and hit ENTER.

Step 3: Respond to Prompts

The installation routines will ask you a number of questions about things such as placement of files, icons, etc. For all of these questions, accept the defaults by simply hitting ENTER. May have to re-boot during disk 2.

Step 4: Change Floppies As Requested

The installation software will copy information from each floppy to your hard disk, then ask you to insert the next floppy. Do so, then hit ENTER.

Step 5: Confirm Program Group

Accept the default program group when asked after the last floppy.

To start FORBS, you double-click on the "FORBS" icon, or use START-Programs-FORBS

To Remove FORBS

To deinstall FORBS from the PC, double click on my computer. Double click on Control Panel. Double click Add/Remove programs. Click on FORBS, click on add/remove. Click on Yes. This will remove the program from the PC.

Chapter 3: Navigating Around FORBS

Basic Elements of Navigation:

FORBS is an application that runs under the Windows graphical environment. FORBS is



started by double clicking on the FORBS icon located in the Program Manager.

Most windows have certain elements in common, such as the *Control Menu Box*, the *Title Bar*, and the *Menu Bar*.



The *Control Menu Box* is in the upper left-hand corner of the window. Click the Control Menu Box to open the Control Menu. The Control Menu is most useful as you use your keyboard to **M**ove, **S**ize, and **C**lose a window.

Control-Menu Commands

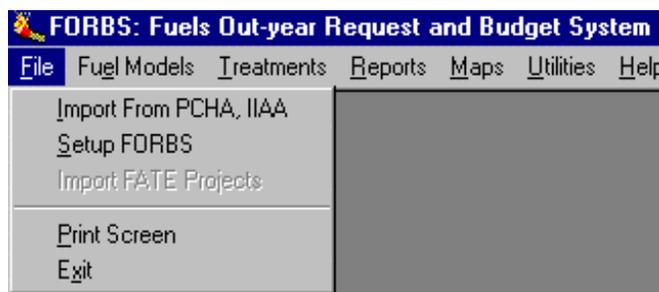
The following table describes the commands on the Control Menu.

Restore	Restore the window to its former size after you have enlarged (maximized) it or reduced (minimized) it to an icon.
Move	Move the window to another position by using the keyboard.
Size	Change the size of the window by using the keyboard.
Minimize	Reduce the window to an icon.
Maximize	Enlarge the window to its maximum size.

Close	Close the window or dialog box.
Switch To	Open Task List, which enables you to switch between running applications and to rearrange windows and icons.
Next	Switch between open document windows and icons.

Using the Menu

Commands are listed on *menus* which are located across the top of the FORBS Menu Bar. Below is the File Pull-Down Menu.



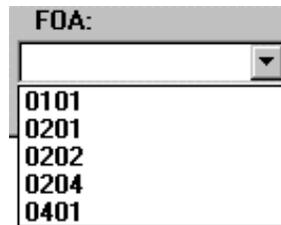
To open a menu, select it. When a menu is open you can choose an item from it.

1. Move the mouse pointer so that it points to the name of the menu on the menu bar and then click the left mouse button.
2. Click the menu item you want. Or drag the selection cursor down the menu until the menu item is highlighted and then release the mouse button.
3. To move directly to a command on the menu, type the letter that is underlined in the item name. If two commands have the same letter underlined, the selection bar will toggle between the two items. When the selection bar is highlighting the command you want, press the **Enter** key or click the mouse to make the selection.

Drop-Down List Boxes

A *drop-down list box* appears initially as a rectangular box containing the current selection. When you select the down arrow in the square box at the right, a list of available choices appears. If there are more items than can fit in the box, scroll bars are provided.

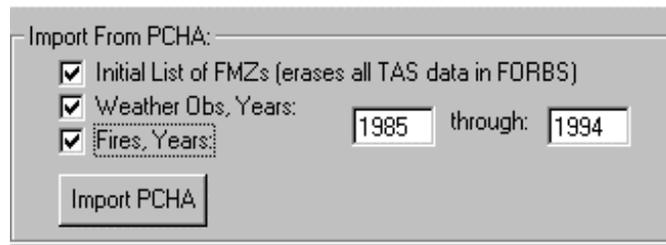
To open a drop-down list box, click on the arrow at the right of the box to open the box. Click the up or down scroll arrow, or drag the scroll box until the item you want to select appears. Click on the item.



Check Boxes

A *Check Box* present nonexclusive options; you can select as many check-box options as you need. When a check box is selected, it contains an **X** or . Names of unavailable options appear dimmed.

To select or clear a box, click in the check box or press the **Space Bar**.



Closing a Dialog Box

When you choose a command button, the dialog box closes and the command is carried out.

You can also close the dialog box to cancel a command. To close the dialog box without carrying out a command, simply choose the **Cancel** button, double-click the Control-Menu Box, or press **ESC**.

The Units Screen includes “navigation buttons” at the bottom



These buttons are used on many screens in FORBS, and are described below.

First	Move to the first record among those you have retrieved
Previous	Move to the previous record among those you have retrieved
Next	Move to the next record among those you have retrieved
Last	Move to the last record among those you have retrieved

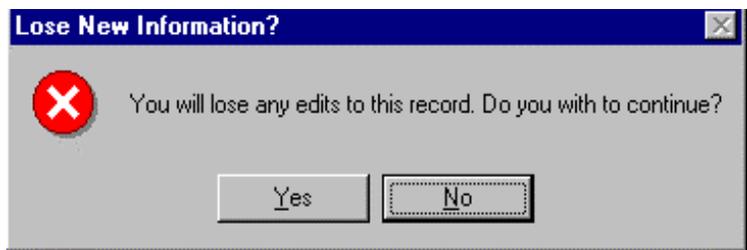
The above four buttons work only if you have retrieved some records from the database. To retrieve records, hit the “Begin Search” button. You will see a note “Edit nn” where nn is the number of records you have retrieved. You may now use First, Previous, Next and Last to move among these records.

Some screens in FORBS allow you to search for only one, or a few records, by using a concept known as “query by example”. Search Criteria can be used when records are highlighted in red. You may enter a specific value for which you wish to query after hitting “Search Criteria” but before hitting “Begin Search”.

If you have retrieved records, you must clear the screen if you wish to enter a new record.

Clear	Clears the screen in preparation for adding a new record.
Delete	Erases the current record.
Save	Saves the current record.
Print	Prints the screen directly to your printer.
Exit	Exits from this form.

Note: if you have made any changes to a record and then attempt to move to another record without saving, you will see a message asking you if you really want to “lose any edits”.



Tables include “ navigation buttons” to create, add, copy, paste, and delete

FuelModelCode	Describe	NFDRSFM	1HrSV	10HrSV	100HrSV	1000HrSV	WoodSV	HerbSV	1HrTA
RM2	Hardwood (summer)	R	0	109	0	0	1500	2000	0.5
S	Tundra	S	1500	109	30	8	1200	1500	0.5
SH1	Tundra	S	2500	109	30	8	1200	1500	0.67
SH2	Tundra	S	2500	109	30	8	1200	1500	0.67
SL1	Tundra	S	2500	109	30	8	1200	1500	0.34
SL2	Tundra	S	2500	109	30	8	1200	1500	0.34
SM1	Tundra	S	2500	109	30	8	1200	1500	0.5
SM2	Tundra	S	0	109	0	0	1200	1500	0.5
T	Sagebrush-Grass	T	2500	109	0	0	1500	2000	1
TH1	Sagebrush-grass	T	2500	109	0	0	1500	2000	1.33
TH2	Sagebrush-grass	T	2500	109	0	0	1500	2000	1.33
TL1	Sagebrush-grass	T	2500	109	0	0	1500	2000	0.67
TL2	Sagebrush-grass	T	2500	109	0	0	1500	2000	0.67
TL3	Sagebrush-grass	T	0	109	0	0	1500	2000	0.67
TM1	Sagebrush-grass	T	2500	109	0	0	1500	2000	1
TM2	Sagebrush-grass	T	2500	109	0	0	1500	2000	1
TM3	Sagebrush-grass	T	2500	109	0	0	1500	2000	1
U	Western Pines	U	1750	109	30	0	1500	2000	1.5
UH1	Western long-needle	U	1750	109	30	8	1500	2000	2
UH2	Western long-needle	U	0	109	0	0	1500	2000	2
UL1	Western long-needle	U	1750	109	30	0	1500	2000	1
UL2	Western long-needle	U	1750	109	30	0	1500	2000	1
UM1	Western long-needle	U	1750	109	30	0	1500	2000	1.5
UM2	Western long-needle	U	0	109	0	0	1500	2000	1.5
*	*								

Create or add Scroll to the bottom of the table and click on the box next to the * and enter new data.

Copy and Paste Scroll to the bottom of the table, enter new ID (ie UM3) on blank line next to the *. Click on the copy button. Then position the cursor on the far left margin of the row you want to copy. Highlight the line. Then position the cursor in the box next to the * and click on the Paste Button.

Delete To delete a line. Highlight and click on the delete key on your PC keyboard.

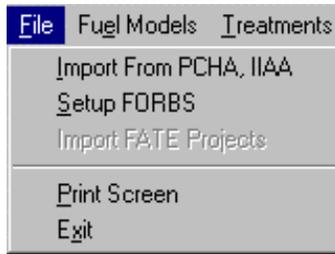
Chapter 4:

FORBS Checklist

- Validate PCHA and IIAA Data and make sure they match.
- Verify version of IIAA (1.10.22) or Greater
- Verify version of PCHA (1.21.04) or Greater
- Prepare IIAA run data
- Build Calibration Table in IIAA for the Program Option you will use in FORBS
- Print and Review Suppression Table 4
- Install FORBS Program
- Import PCHA data
- Import IIAA data
- Enter Analysis Monetary Base Year
- Select IIAA Program Option
- Select or Create Fuel Models
- Review Production Rates create if needed.
- Calculate Fire Behavior Data
- Create Fire Occurrence Areas (FOAs)
- Create Treatment Area Strategy (TAS)
- Calculate Benefits
- Run Reports
- Create Fuels Program
- Display Maps

Chapter 5: Menu Structure

File Menu



Import From PCHA, IIAA

This menu brings data from both the IIAA program and the PCHA program for use in the FORBS analysis. This includes Initial list of FMZ, weather observations and fire information from PCHA, and AAC, NVC, Inflation Factors, FMZ Attributes, Calibrated FBD, EFT, and Run data program options from IIAA. FORBS will not function without this information from the two planning programs.

Setup FORBS

This menu establishes the year the treatment costs are being reported in for the purpose of applying inflation factors for calculating other year values. This is referred to as the Analysis Monetary Base Year. The IIAA program option is also selected as part of the setup menu. The suppression analysis results from the IIAA program option selected are used from this point on in the FORBS calculations.

Import FATE Projects

Fuels Assessment Treatment Evaluation (FATE) is a program under development and not yet available. The primary purpose of FATE is to identify areas that will most benefit from fuels treatment by assessing Hazard, Risk and Value.

Print Screen

This menu item sends the active window to the printer. The active window is the one you most recently used or accessed, and will have a colored (usually blue) title bar.

Exit

Use Exit menu item to exit from FORBS. If you have not saved changes on one or more forms, you will be prompted to do so.

Introduction

Fuel Model Menu

This menu lets you enter information about the fuels program on your planning unit.



Fuel Models

This menu lists all the fuel bed parameters that make up the Fuel Models in FORBS. There are 20 (A-L and N-U) standard Fuel Models from the 1978 version of the National Fire Danger Rating System (NFDRS). There are an additional 203 Fuel Models which are deviations from the 20 NFDRS models and one zero spread model. The user has the ability to create custom Fuel Models for use in their analysis. FORBS has a copy and paste feature that allows the user to take fuel bed parameters from an existing fuel model and copy the fuel bed parameter information into a custom model. Once a new fuel model is created, the user can change any of the fuel bed parameters of that model. The 224 Fuel Models that come with FORBS are locked from editing any of the fuel bed parameters.

Production Rates

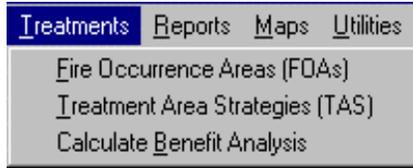
This menu lists all the one person production rates in chains per hour by NFDRS slope class for the fuel models used in FORBS. The program comes with one person production rates for the 224 fuels models that came with FORBS program. All the production rates are relative to each other and not necessarily absolute values. The user creates on this menu single person productions rates in chains per hour by NFDRS slope class for any additional fuel models created in FORBS. It is important that the production rates used in FORBS are relative to each other. It is not necessary to make sure that they represent the absolute value of production for that fuel profile. The 224 Fuel Model production rates that come with FORBS are locked from editing.

Calculate Fire Behavior Data

This menu performs the Fire Behavior calculations based on the Fuel Models, FMZs, and analysis years selected. The user has the ability to select all available Fuels Model (224 plus any custom models created by the user) for all FMZ, or individual Fuel Models and FMZs. Only Fuel Model, FMZ combinations for which calculations have been completed will be available for use in the fuels analysis.

Introduction

Treatments Menu



Define Fire Occurrence Areas (FOAs)

This menu displays the information necessary for the creation of FOA. The information needed is a user defined FOA Code, a description of the FOA, the FMZ and RL in which the FOA is found, the percent of fires in the RL that are represented by the FOA, and the total acres in the FOA. There are two options available within the program for developing this FOAs data.

Build Starting FOAs

This feature will create the minimum data requirements for developing FOAs. The information used is from imported data from IIAA and PCHA. The routine creates one FOA per RL. This feature sets the percent of fires to 100 and the acres to 100 as a starting point. The user would then edit the FOA to make additional FOAs and or update the percent of fires and acres information.

Edit FOAs

This feature allows direct entry of the data required in a FOA. The user can create a new FOA from scratch or edit an existing one.

Define Treatment Area Strategies (TAS)

This menu has 4 tabs, TAS, Acres \$\$, Fuels, and Photo. Each tab defines a certain aspect of the fuels treatments being proposed as part of a planning unit fuel program. The TAS tab defines a TAS code for user reference, the FOA and Benefit Duration in years of the treatment. The Acres \$\$ tab defines the type of activity (Planning, Fire, Mechanical) that is being proposed, the activities cost and acres effected. The Fuels tab defines 4 fuel conditions, untreated year 1, untreated final benefit year, treated year 1, treated final benefit year, and a graph of the total fuel load change over the benefit years. The Photo tab allows the user to display a picture of the TAS.

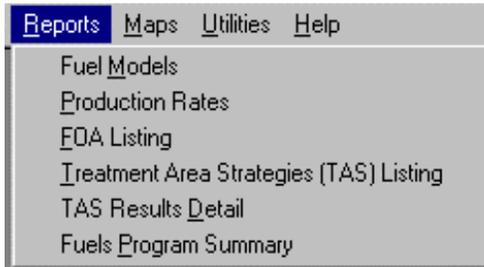
Calculate Benefit Analysis

This menu does the Benefit calculations for an individual TAS or multiple TAS. The menu has the ability to save a group of TAS as a Fuels Program. Individual TAS benefits can be graphed showing their benefits over time within this window.

Introduction

Reports Menu

A variety of reports are available. Each type of report is described in detail in Chapter 12. Each report contains the date and time it was created, the Planning Unit name, and report title. Each report is stored in the working directory and can be printed or viewed outside the FORBS program. The path and the file name of the report are displayed in the title bar of the window.



Fuel Models

This report allows the user to sort and display certain fuel model parameters. The report displays the fuel model code, the fuel model description, dead fuel loads, live fuel loads, fuel bed depth, wind reduction factor, and shaded condition. The report can be sorted by these same fields with the exception of fuel model description and with the addition of 0-3 dead fuel loading.

Production Rates

This report displays all the production rates for each fuel model by slope class.

FOA Listing

This report displays all the information entered for each FOA developed in FORBS.

Treatment Area Strategies (TAS) Listing

This report displays all the information entered for each TAS developed in FORBS.

TAS Results Detail

This report contains all of the technical details of how FORBS benefit calculations were derived. The report displays changes in Rate Of Spread (ROS), frequency, and Acres Burned at the 50th and 90th weather percentiles by FIL that resulted from the proposed TAS. The report also displays changes in Production, and the relationship between RL % Acres, FOA % Fires, TAS % Acres and TAS % FMZ Acres. The report displays all other information utilized in the benefit calculations.

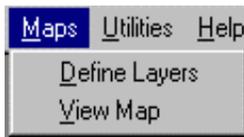
Introduction

Fuel Program Summary

This report recaps the information on the Calculate Benefit Analysis Window with some additional detail. This report includes TAS, FOA, treatment cost, acres treated, cost per acre, benefit years, benefit year 1, benefit final year, discounted benefit final year, discounted benefit all years, and net benefit.

Maps Menu

Provides opportunity to display GIS layers as part of your analysis.



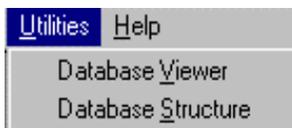
Define Layers

This menu allows the user to take shape or image files and incorporate them in to the program. The user must format the file, either shape or image, the color you want the outline of the file shown in, and the path to the file.

View Map

This menu allows the user to view any of the Maps previously defined in the Maps Menu, Define layers window.

Utilities Menu



Database Viewer

This program enables you to view, but not change, the actual data used by FORBS. By selecting from the list of table names on the left of the screen, you will be presented with the column names and data stored in that table. You will also be able to resort the data in each column in either ascending or descending order by clicking on the column heading. This routine may be helpful for those of you who wish to generate your own custom reports from ACCESS or from a third-party report writer software program. This feature is also very helpful in troubleshooting outputs from the program.

Database Structure

This function displays a report of the database structure of the Access database FORBS.MDB. The report displays the table name, field names within the table, the field type and the first record.

Introduction

Help Menu



Two routines are available.

User Guide

A “text only” version of the FORBS User Guide is available for you to view from the menu item.

About FORBS

This screen tell you the version of IIAA you are running, the date of the software, and whom you should contact for technical support.

Chapter 6:

Before You Begin

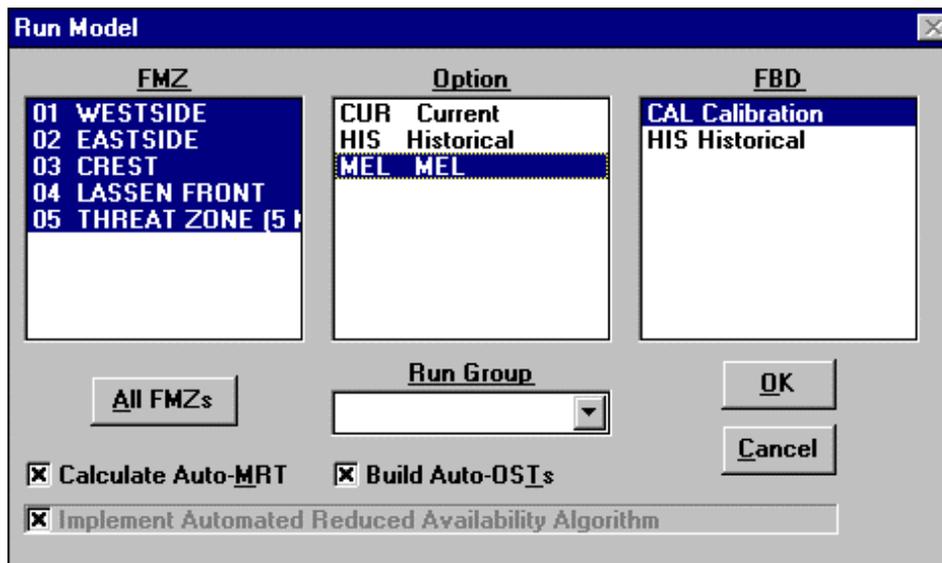
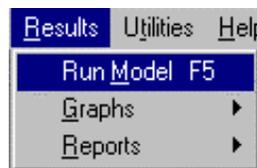
In preparation to begin your Fuels Analysis you will need to consider the following:

- Completed NFMAS (PCHA and IIAA) Analysis
- A printout of the IIAA Program Suppression Table 4
- Data Pertaining to Fuels Management Program
- Map of Fire Ignitions
- Map of Fire Management Analysis Zones and Representative Locations
- A methodology for Stratifying Fire Ignitions into Fire Occurrence Areas (FOAs)
- A methodology for delineating Treatment Area Strategy (TAS)
- A methodology for selecting fuel profiles for analysis

Chapter 7:

Linking to PCHA and IIAA Databases

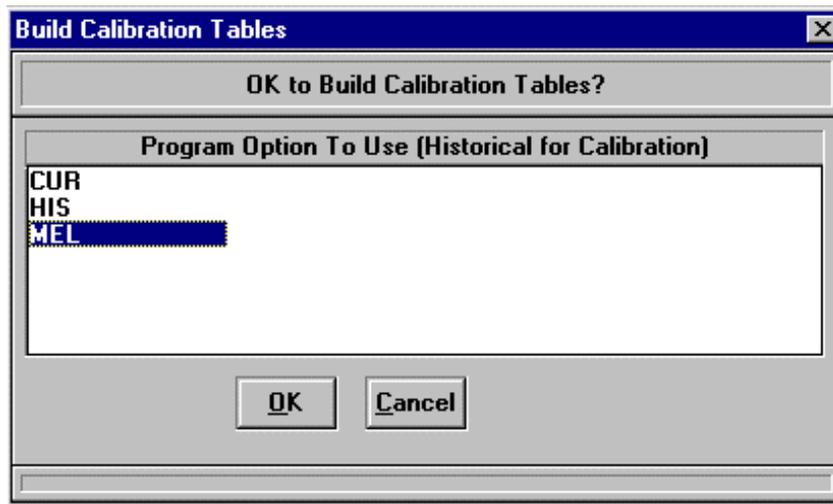
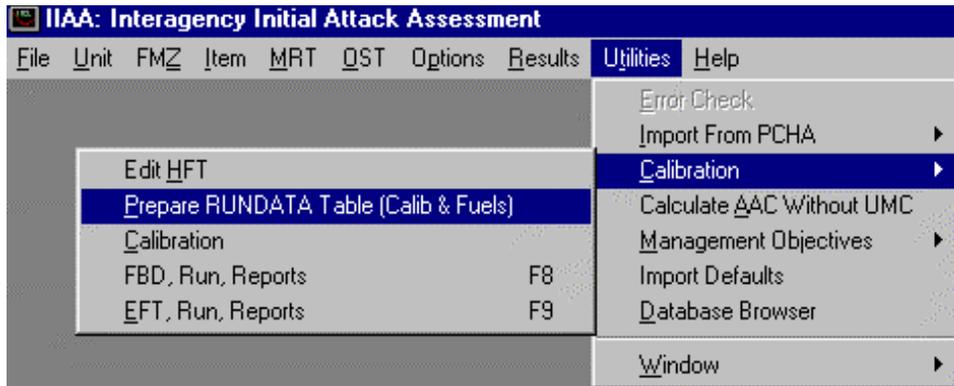
1. Verify that the FMZ numbers or names match in PCHA and IIAA. If not, only those FMZ's that do match will be imported from IIAA. This can be accomplished by checking the IIAA and PCHA Setup Menus. Validate that all fields in the FMZ Setup Screen are complete. Utilize the most current PCHA and IIAA database.
2. In the **IIAA Program** Prepare run data, Select Results, Run Model, Highlight all the FMZs and Options that you want to have available for analysis in FORBS. Use the CAL FBD.



A Program Option in IIAA is used to identify a collection of line items with their associated budgets and fire-fighting capabilities. The Program Option is then run through IIAA's fire simulator in order to determine the expected consequences relative to other Program Options. FORBS utilizes the results from the IIAA simulation to determine the additional benefit to initial attack efficiency from fuels treatments.

Initial Setup and Preparation

3. In the **IIA Program**, Build Calibration Table. Go to Utilities, Calibration, Prepare RUNDATA Table (Calib & Fuels) and select program option that you will be using in FORBS. Multiple options can be selected at this time for future use in FORBS. If you do not run an option here, it will not be available for use in FORBS.



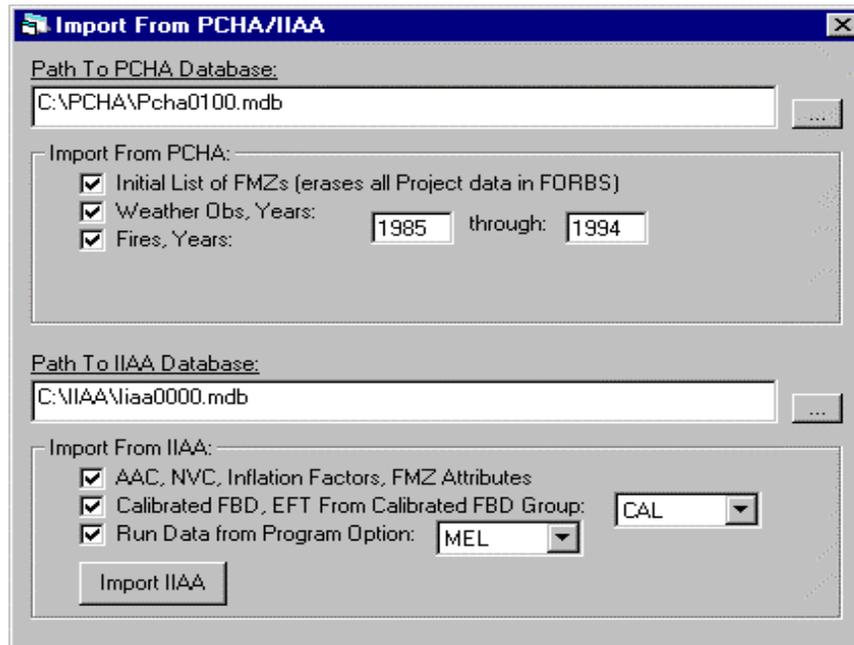
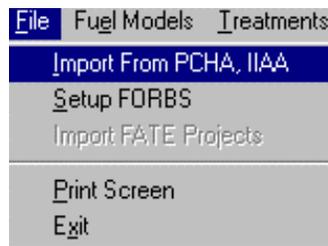
Initial Setup and Preparation to Develop a Fuels Analysis

4. Import From PCHA/IAA

Select **File** from the **FORBS** Menu and **Import From PCHA and IAA**. Click on the Browse Button located to the right of the “Path to PCHA Database” box. Navigate to the folder that contains your PCHA Database. Double click on the folder to open up it’s contents. Double click on the database file (Pcha0100.mdb).

Next, click on the check marks for the Initial List of FMZ’s, Weather Obs, Years, and Fires, Years. Select the years of data you wish to import. You may import more years of data for both fires and weather than is in your analysis period. However, later in the FORBS process, you will be able to use your analysis years only.

5. Navigate to your IAA database in the same way as described above for PCHA. Click on the check marks for AAC, NVC, Inflation Factors, FMZ Attributes, Calibrated FBD, EFT from Calibrated FBD Group, and Run Data from Program Option. Use the pull down menu to select the calibrated FBD Data Set. Select the program option (s) that you may want to use for the fuels analysis. Note: The drop down list for Run Data from Program Option: will only contain the options prepared in step3 above Prepare RUNDATA Table (Calib & Fuels) in the IAA Program.



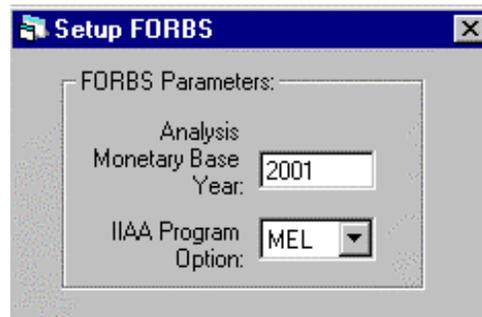
Initial Setup and Preparation

6. In the FORBS Program close all windows when data entry is complete. **Do not leave multiple windows open at one time.** Closing the windows will enable the program to update and back-up data.
7. Setup FORBS

Select File and Setup FORBS.



In the Analysis Monetary Base Year box, type in the year that your treatment dollars represent. In the IIAA Program Option box, select the program option that you want to complete your fuels analysis against. The IIAA Program Option is generally specified by the agency. FORBS has the ability to analyze any program option developed in IIAA. The list available to you in setup is based on the program options built in IIAA and imported into FORBS.



In IIAA certain years of information were used as you calculated Average Acre Costs, Unit Mission Costs, and Net Value Changes. These years may not be the same as the year which your agency has specified for reporting dollars in your FORBS analysis. They may be different than the monetary base year used in FORBS. FORBS will automatically inflate the dollars for you, based on information you provide on this screen and on the inflation factors developed by your agency.

Chapter 8:

Developing Fuel Profiles

1. Select Fuel Models from the main menu.



A. Fuel Models

The Fuel Model window displays the fuel model parameters for the predefined and user defined fuel models. These parameters for the predefined fuel models are locked and can not be changed. However, you may develop custom fuel models by entering the parameter information or using the copy and paste features provided.

The first way to develop a custom fuel model is to scroll to the bottom of the list and click on the box next to the *. Enter the fuel model parameters for a custom model. The second way, is to copy a predefined fuel model that is similar to many of the parameters of your custom model. Enter a new Fuel Model Code and click on the copy button. Then position the cursor on the far left margin of the fuel model you wish to copy. Highlight the line. Then position the cursor in the box next to the * and click on the Paste Button. Edit those items you wish to change for your custom model.

It is highly recommended that advanced knowledge of fuel modeling be obtained through training before creating custom fuel models.

FuelModelCode	Describe	NFDRSFM	1HrSV	10HrSV	100HrSV	1000HrSV	WoodSV	HerbSV	1HrTA
0	No Spread Fuel Model		0	0	0	0	0	0	0
21			0	0	0	0	0	0	0
A	Western Annual Grasses	A	3000	0	0	0	0	3000	0.2
AH1	Western annual grasses	A	0	109	0	0	0	3000	0.27
AH2	Western annual grasses	A	0	109	0	0	0	3000	0.27
AL1	Western annual grasses	A	3000	0	0	0	0	3000	0.13
AL2	Western annual grasses	A	3000	0	0	0	0	3000	0.13
AM1	Western annual grasses	A	0	109	0	0	0	3000	0.2
AM2	Western annual grasses	A	0	109	0	0	0	3000	0.2
B	California Chaparral	B	700	109	30	8	1250	0	3.5

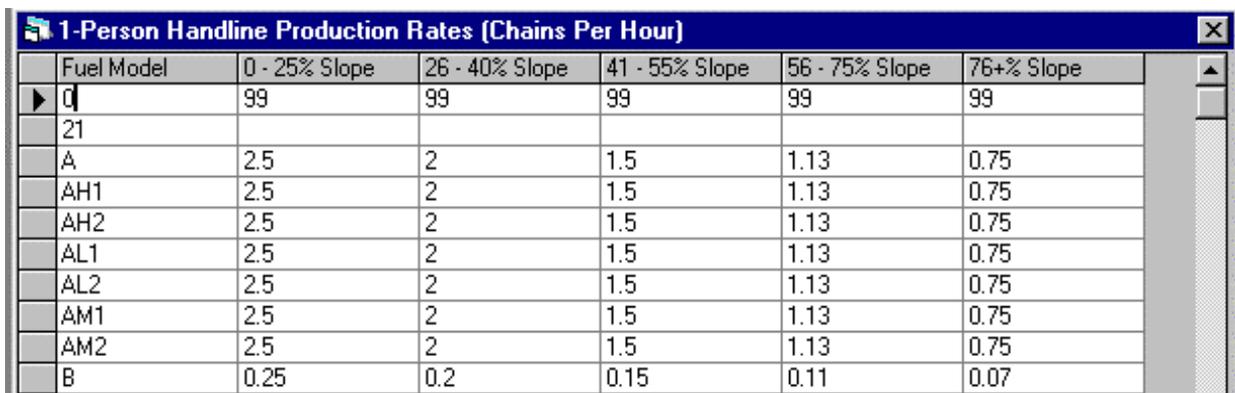
Initial Setup and Preparation

B. One Person Handline Production Rates (Chains Per Hour)

Production Rate, in chains per hour is the sustained line production rate.

Highlight row and move cursor to the box to edit. Ensure that you have a production rate assigned to each fuel model you are planning to analyze. You may choose to use the existing value.

You can only edit custom fuel model sets created by the user. All others are locked from editing.



Fuel Model	0 - 25% Slope	26 - 40% Slope	41 - 55% Slope	56 - 75% Slope	76+% Slope
0	99	99	99	99	99
21					
A	2.5	2	1.5	1.13	0.75
AH1	2.5	2	1.5	1.13	0.75
AH2	2.5	2	1.5	1.13	0.75
AL1	2.5	2	1.5	1.13	0.75
AL2	2.5	2	1.5	1.13	0.75
AM1	2.5	2	1.5	1.13	0.75
AM2	2.5	2	1.5	1.13	0.75
B	0.25	0.2	0.15	0.11	0.07

Initial Setup and Preparation to Develop a Fuels Analysis

C. Calculate Fire Behavior Data

This screen allows the user to choose Fuel Model/FMZ combinations that can be processed later in the FORBS process. Click on each combination you want to process so that an **X** appears in the box.

The All Button will automatically highlight all combinations. One advantage to this method is that you will not have to go back and process a fuel model that was not selected originally. The disadvantage is that the time to process all of these models may take up to several hours, depending on the speed of your computer. You could do this step at the end of the day or any other time you don't need access to the computer.

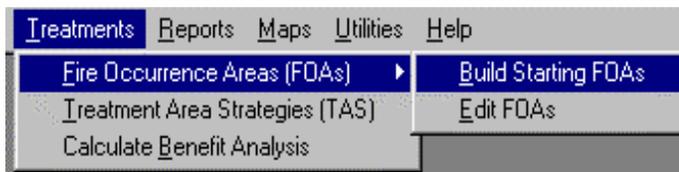
Select analysis years used in your IIAA. Click on the Calc Button to begin FBD calculations. The Clear Button clears the previously chosen fuel models. The Cancel Button appears after the Calc is started and will stop the Calc process.

		FMZs:				
	Fuel Model	01	02	03	04	05
<input type="checkbox"/>	CL2					
<input type="checkbox"/>	CM1					
<input type="checkbox"/>	D					
<input type="checkbox"/>	E					
<input type="checkbox"/>	F					
<input type="checkbox"/>	FM1					
<input type="checkbox"/>	G					
<input type="checkbox"/>	GH1	X	X	X	X	X
<input type="checkbox"/>	GM1					
<input type="checkbox"/>	H					
<input type="checkbox"/>	HH1	X	X	X	X	X
<input type="checkbox"/>	HH2					
<input type="checkbox"/>	HL1	X	X	X	X	X
<input type="checkbox"/>	HL2					
<input type="checkbox"/>	HL3					
<input type="checkbox"/>	HM1					
<input type="checkbox"/>	HM2					
<input type="checkbox"/>	I					
<input type="checkbox"/>	J					
<input type="checkbox"/>	JL1					
<input type="checkbox"/>	JL2					
<input type="checkbox"/>	JL3					
<input type="checkbox"/>	JL4					
<input type="checkbox"/>	JM1	X	X	X	X	X
<input type="checkbox"/>	JM2					
<input type="checkbox"/>	JM3	X	X	X	X	X
<input type="checkbox"/>	K					

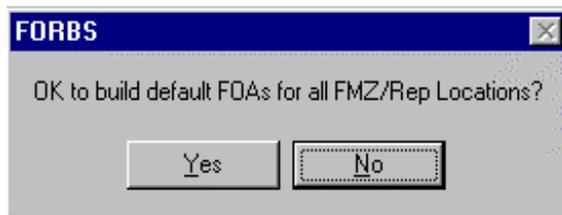
Chapter 9: Defining Fire Occurrence Areas

1. Fire Occurrence Area (FOA)

Fire Occurrence Areas (FOAs) are accessed from the Treatments Menu.



Default FOAs can be built for all FMZ/Rep Locations by selecting Yes in this screen.



Fire Occurrence Areas (FOA) are tied directly to representative locations (RLs). If the Fire Occurrence is uniform across the RL, then only one FOA is needed. If the occurrence is not equal, then divide the area into one or more FOAs. Divide the acres and fires accordingly. Calculate the % of the RL Fires that are in each of the FOAs. If your proposed treatment area crosses more than one RL, it will need to be subdivided for processing through the model.

FOA - Fire Occurrence Areas						
	FOACode	Describe	FMZ	RepLoc	% RL Fires	Acres
	▶ FMZ3RL1	nesbitt/single,rd	03	1	100	32010
	FMZ3RL2	nesbitt/mult,rd	03	2	100	32010
	FMZ3RL7	hilton/single,rd	03	7	70	57136
	FMZ3RL8	hilton/single,unrd	03	8	70	57136
	FMZ6RL5	yellow pine/single,rd	06	5	100	54152
	FMZ6RL6	yellow pine/mult,rd	06	6	100	54152
	FMZ6RL7	yellow pine/single,unrd	06	7	100	54152
	FMZ6RL8	yellow pine/mult,unrd	06	8	100	54152
	*					

Initial Setup and Preparation

2. Co-Located RLs in IIAA

If you have co-located RLs where you plan fuels projects, there will be some additional calculations needed to fill in the FOA screen.

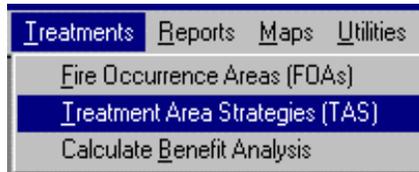
The first two lines depict a co-located RL with uniform fire occurrence. The total acreage is divided in half.

The second two lines depict a co-located RL where half of the RL contains 70% of the fire occurrence. The RL is 228,544 acres. Half of the acreage is then divided between the two FOA's.

The last set of four FOA's depict another uniform fire occurrence RL with the acreage divided equally between the four.

Chapter 10: Entering Treatment Area Strategy Data

1. Treatment Area Strategy (TAS)



A. Treatment Area Strategy (TAS) Tab

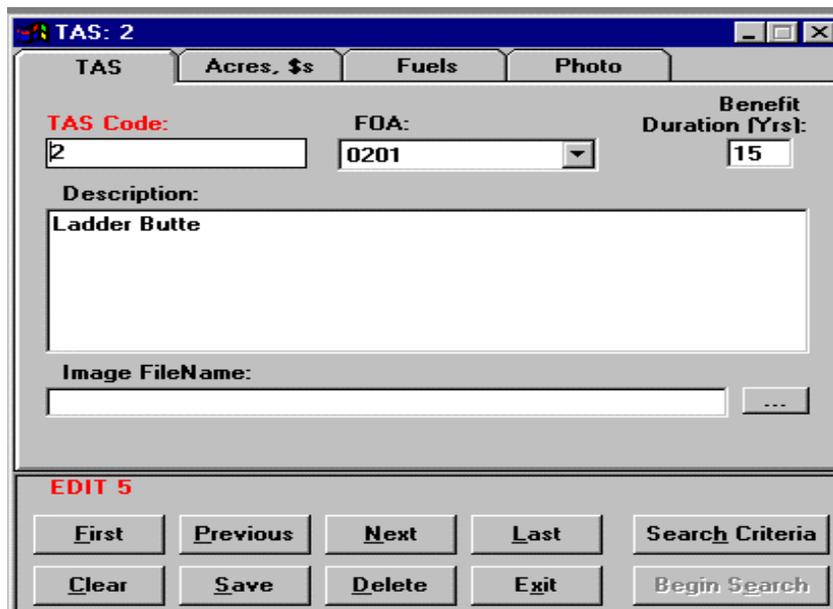
The TAS code is user defined. These codes are used in the reports and should be made distinctive so that you can distinguish between your various treatments.

Choose an FOA from the pull down menu that corresponds with the treatment.

The Benefit Duration default in the program is 20 years. If this does not apply, click on the box and type in the correct years.

The description box allows the user to fully describe the treatment.

The Image File Name allows the user to attach bitmap files to show what the treatment area is like. The image will then show when the photo tab is clicked.



Developing a Fuels Analysis

B. Acres Tab

The top part of the Acres screen has entries for planning, prescribed fire, and mechanical treatment acres and dollars. It is recommended that planning projects not be mixed in with the other two.

Enter the number of acres of treatment (s) and the total dollars (not cost/acre).

The bottom part of the screen is automatically filled in for you.

The screenshot shows a software window titled "TAS: 2" with a menu bar containing "TAS", "Acres, \$s", "Fuels", and "Photo". The main area contains a table with the following data:

Activity	Acres	Dollars
PF-21 Planning	550	27500
PF-242 Fire	4000	400000
PF-243 Mechanical	1000	250000

Below the table, there are two rows of input fields:

FOA:	<input type="text" value="12000"/>	<input type="text" value="100"/>
TAS:	<input type="text" value="5000"/>	<input type="text" value="41.67"/>

At the bottom, there is a control panel with the text "EDIT 5" and several buttons: "First", "Previous", "Next", "Last", "Search Criteria", "Clear", "Save", "Delete", "Exit", and "Begin Search".

Developing a Fuels Analysis

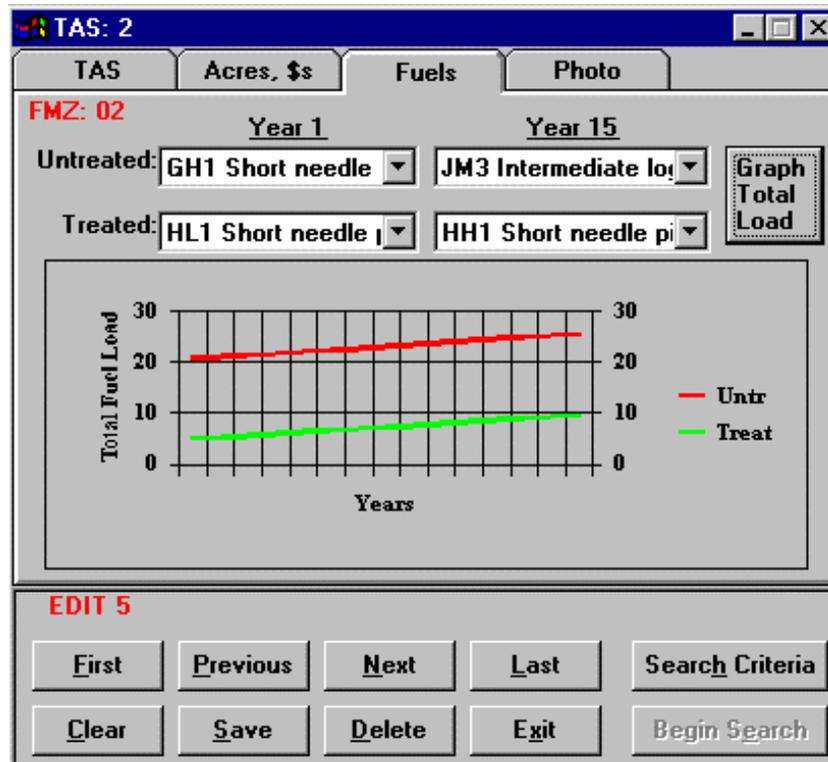
C. Fuels Tab

The user defines two scenarios on this screen. The first is to define what the fuel model is at Year 1 and then again at the end of the benefit duration if the area is left **untreated**. The second scenario defines what the fuel model is at year 1 and again at the end of the benefit duration if the area is **treated**.

Untreated, Year 1	The fuel model that best describes the area at present.
Treated, Year 1	The resulting fuel model after treatment.
Untreated, Year x	Duration of benefit = x, as defined on TAS Tab. The fuel model that will best describe the area if it is left untreated.
Treated, Year x	The treated fuel model after x years (duration of benefit).

Duration in years (from the TAS Tab) must be greater than one year to show a benefit and for the fuel load graph below to appear.

The Graph Total Load Button allows the user to see graphically how the two scenarios act over time (linear relationship only at this time).



Developing a Fuels Analysis

D. Photo Tab

The Photo Tab requires a bitmap file to be attached on the TAS Tab in order for a picture to be displayed.

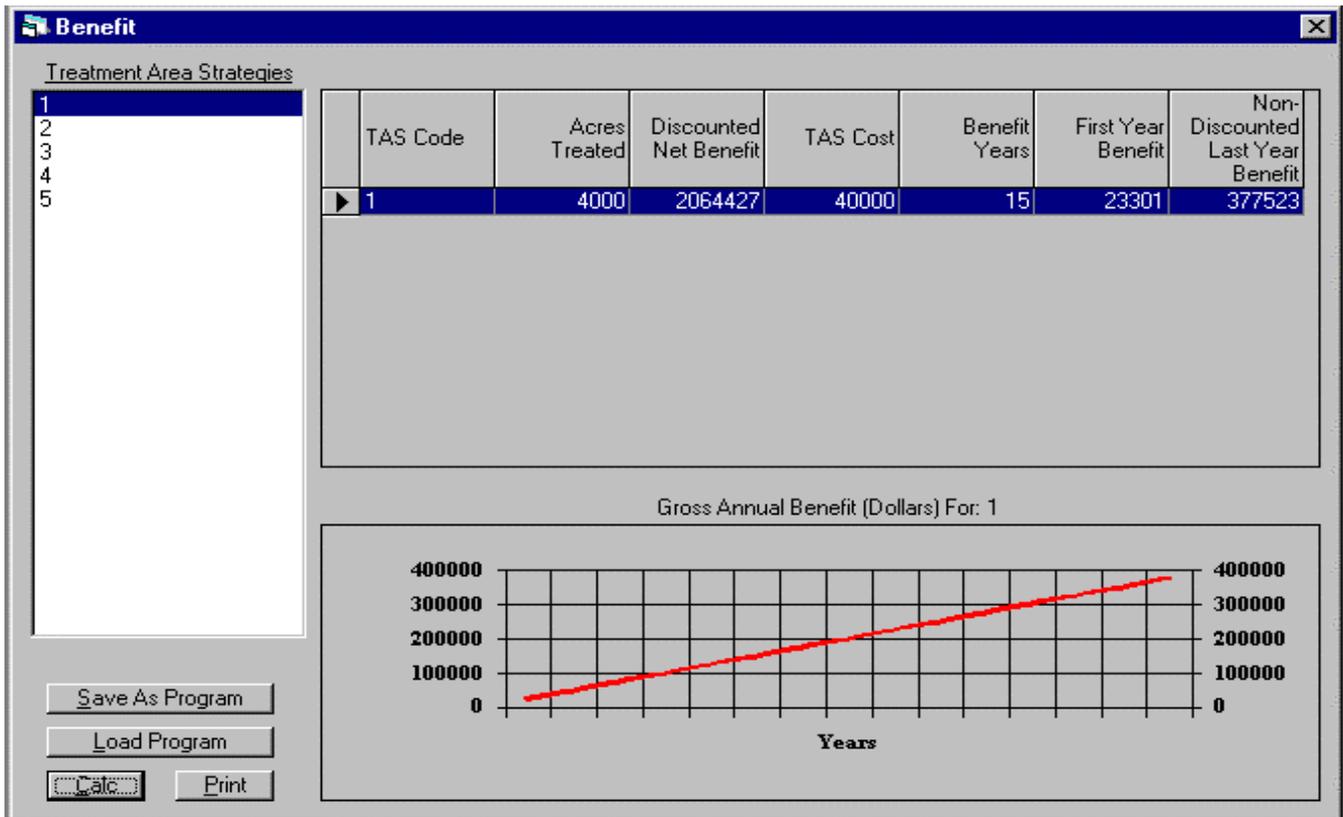


Chapter 11: Running the Model

1. Calculate Benefit Analysis is accessed from the Treatments Menu.

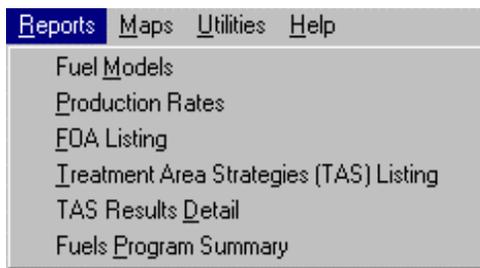


- Treatment Area Strategies: this column identifies all defined TASs. Select the TAS to be calculated.
- TAS code: your defined TAS # or description.
- Acres: acres of TAS
- Net Benefit: total net benefit in current year for treatment time.
- Cost: current year cost of project.
- Years: # of years the treatment is effective.
- First: first year benefit
- Last: last year benefit in current year dollars.
- Note: to display graphically, highlight the row.



Chapter 12: Reports and Graphs

Reports Menu



Fuel Models Report

Fuel Models
Sorted by: FuelModelCode

Fuel Model	1-Hr T/A	10-Hr T/A	100-Hr T/A	1000-Hr T/A	Herb T/A	Woody T/A	Wind Depth	Wind Factor	Shaded	Description
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	N	No Spread Fuel Model
21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	N	
A	0.20	0.00	0.00	0.00	0.30	0.00	0.80	0.36	N	Western Annual Grasses
AH1	0.27	0.00	0.00	0.00	0.40	0.00	1.07	0.60	Y	Western annual grasses
AH2	0.27	0.00	0.00	0.00	0.40	0.00	1.07	0.60	N	Western annual grasses
AL1	0.13	0.00	0.00	0.00	0.20	0.00	0.53	0.20	Y	Western annual grasses
AL2	0.13	0.00	0.00	0.00	0.20	0.00	0.53	0.50	N	Western annual grasses
AM1	0.20	0.00	0.00	0.00	0.30	0.00	0.80	0.60	Y	Western annual grasses

Developing a Fuels Analysis

Production Rates Report

Fuel Model Production Rates
(By Slope Class)

Fuel Model	0-25%	26-40%	41-55%	56-75%	76+%
0	99.00	99.00	99.00	99.00	99.00
21					
A	2.50	2.00	1.50	1.13	0.75
AH1	2.50	2.00	1.50	1.13	0.75
AH2	2.50	2.00	1.50	1.13	0.75
AL1	2.50	2.00	1.50	1.13	0.75
AL2	2.50	2.00	1.50	1.13	0.75
AM1	2.50	2.00	1.50	1.13	0.75
AM2	2.50	2.00	1.50	1.13	0.75
B	0.25	0.20	0.15	0.11	0.07

FOA Listing Report

Fire Occurrence Areas (FOAs)

FOA	FMZ	RL	Acres	%/Fires	Description
0101	01	1	10000	100	Westside
0201	02	1	12000	100	Eastside
0202	02	2	15000	100	Eastside
0204	02	4	11000	100	Eastside
0401	04	1	10000	100	Lassen Front

Treatment Area Strategies (TAS) Listing Report

Treatment Area Strategies (TASs)

TAS	FOA	Current Fuel Model		Duration	Final Fuel Model		Treated Acres	Planning Acres
		Untreated	Treated		Untreated	Treated		
1	0101	GH1	HL1	15	JM3	HH1	4000	0
1	0201	GH1	HL1	15	JM3	HH1	4000	0
1	0202	GH1	HL1	15	JM3	HH1	5000	0
1	0204	GH1	HL1	15	JM3	HH1	10000	0
1	0401	GH1	HL1	10	JM3	HH1	1000	0

Developing a Fuels Analysis

TAS Results Detail Report

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00.7

FORBS TAS: 1
Using Program Option MEL, Monetary Base Year 2001

A-21
Benefit Duration: 15 Years

RL	FOA	TAS	TAS
%	%	%	%
FMZ	RL	FOA	FMZ
Fires x	Fires x	Acres =	Fires
=====	=====	=====	=====
54%	100%	40%	21.6%

Activity	Dollars	Acres
=====	=====	=====
PF-21 Planning	25	30
PF-242 Fire	40000	4000
PF-243 Mechanical	0	0

Year 1 Analysis:

Untreated Fuel Model: GH1, Short needle pine -heavy dead
Treated Fuel Model: HL1, Short needle pine -normal dead

Fuel Bed		GH1	HL1	Change
=====		=====	=====	=====
FIL	%	Untreated (GH1) Freq ROS	Treated (HL1) Freq ROS	Change: Freq ROS
===	===	=====	=====	=====
1	50	2.875 .01	6.853 .01	3.978 .
1	90	.719 2.1	1.713 2.1	.994 .
2	50	1.693 1.8	.003 1.28	-1.69 -.52
2	90	.423 4.7	.001 2.41	-.422 -2.29
3	50	1.642 4.6	.003 3.27	-1.639 -1.33
3	90	.41 4.9	.001 2.52	-.409 -2.38
4	50	.432 6.65		-.432
4	90	.108 8.		-.108
5	50	.086 6.7		-.086
5	90	.022 11.7		-.022
6	50	.131 12.8		-.131
6	90	.033 19.92		-.033
=====				
Total:		8.574	8.574	0.

Fuel Bed		GH1	HL1	Change
=====		=====	=====	=====
FIL	%	Untreated (GH1) Event Annual Acres Acres	Treated (HL1) Event Annual Acres Acres	Change: Event Annual Acres Acres
===	===	=====	=====	=====
1	50	0 0	0 0	0 0
1	90	0 0	0 0	0 0
2	50	0 0	0 0	0 0
2	90	1 0	0 0	-1 0
3	50	0 0	0 0	0 0
3	90	0 0	0 0	0 0
4	50	0 0	0 0	0 0
4	90	0 0	0 0	0 0
5	50	0 0	0 0	0 0
5	90	2 0	0 0	-2 0
6	50	2 0	0 0	-2 0
6	90	18 1	0 0	-18 -1

Developing a Fuels Analysis

Fuels Program Summary Report

Using Program Option HIS, Monetary Base Year 1999

TAS (FOA)	Treatment	Acres	\$Per	Benefit	Benefit	Discounted	Discounted	Net	Planning	Planning
	Cost	Treated	Acre Yrs	Year 1	Final Yr	Benefit	Benefit	Benefit	Cost	Acres
Program Total:	0	0	0	0	0	0	0	0	0	0

Appendix 1:

Glossary of FORBS Terms

FUELS OUT-YEAR REQUEST BUDGET SYSTEM GLOSSARY

1 Hour Fuel	Fuels consisting of dead herbaceous plants and roundwood less than one-fourth inch in diameter. Also included is the uppermost layer of litter on the forest floor.
10 Hour Fuel	Dead fuels consisting of roundwood one-fourth to 1 inch in diameter and, very roughly, the layer of litter extending from just below the surface to three-fourths inch below the surface.
100 Hour Fuel	Dead fuels consisting of roundwood in the size range of 1 to 3 inches in diameter and, very roughly, the forest floor from three-fourths inch to 4 inches below the surface.
1000 Hour Fuel	Dead fuels consisting of roundwood 3 to 8 inches in diameter or the layer of the forest floor more than about 4 inches below the surface, or both.
10-Hour Timelag Fuel Moisture	The moisture content of the 10-hour timelag roundwood fuels.
1-Hour Timelag Moisture	The moisture content of the 1-hour timelag fuels.
AAC Average per Acre Costs	One component of the total emergency fire suppression costs in IIAA for fires contained at less than the escaped fire size (the other is UMC). Above the escaped fire size, AAC represents the total emergency fire suppression cost.
Analysis Year	The calendar year in which the particular IIAA budget, cost, and net resource value change data from an analysis will be used for budgeting or allocation purposes. All input cost and value data is inflated to this common year.
Brush	Scrub vegetation and stands of tree species that do not produce merchantable timber.
Calibration	The procedure by which the initial PCHA-calculated rates of spread and numbers of fires at each FIL are systematically adjusted as appropriate to conform IIAA simulated fire sizes and burned acreage with the historic record. The purpose of calibration is to correct errors in the calculated fire behavior due to inherent inaccuracies that result from the necessarily very broad representation of fuel, slope and weather data.
Dead Fuels	Naturally occurring fuels whose moisture content is governed by relative humidity and precipitation.

Discovery Size	This IIAA entry of the typical size at which fires are discovered in each FMZ, is intended to reflect the effectiveness of the planning unit detection system. The entry is used as the starting fire size in the fire growth simulation.
Duff	The partially decomposed organic material of the forest floor that lies beneath the freshly fallen twigs, needles, and leaves. (The F and H layers of the forest floor).
EFT Escaped Fire Table	A table of the final size of fires which are not contained by the simulation model (exceed time or size constraints). The EFT is developed from historical large fire data for the planning unit. Sizes may be defined for each RL, and each FIL.
EMC	Equilibrium Moisture Content (EMC) is the moisture content that a fuel particle will attain if exposed for an infinite period in an environment of specified constant temperature and humidity. When a fuel particle has reached its EMC, the net exchange of moisture between it and its environment is zero.
FBD Table Fire Behavior Data Table	A table of numbers of fires and 50 th and 90 th percentile rates of spread for each fire intensity level. It is used in IIAA in the simulation of fire occurrence and behavior.. The FBD is developed from historic fire occurrence and fire weather data for each FMZ in the PCHA program.
FIL Fire Intensity Level	A measure of fire behavior used in IIAA. (A NFMAS term) It is based on the calculated flame length. (FIL 1: 0-2 ft; FIL 2: 2-4 ft; FIL 3: 4-6 ft; FIL 4: 6-8 ft; FIL 5: 8-12 ft; FIL 6 >12 ft) The NFDRS Burning Index (BI) is the calculated flame length × 10. FIL is used in the IIAA model as an indicator of fire danger for dispatching purposes, to categorize rate of spread, and in the assessment of fire effects.
Fine Fuels	The complex of living and dead herbaceous plants and dead woody plant materials less than one-fourth inch in diameter.
FMZ Fire Management Zone	An area of the planning unit that can be represented by a single set of fire behavior data based on a single fuel model, slope class, and set of weather data.
FOA	Fire Occurrence Area
FORB	A non grass like herbaceous plant.
FORBS	Fuels Out-Year Request Budget System
Fuel Class	A group of fuels possessing common characteristics. In the NFDRS, dead fuels are grouped according to their timelag (1, 10, 100, and 1000 hr TL), and living fuels are grouped by whether they are herbaceous (annual or perennial) or woody.
Fuel Model	A simulated fuel complex for which all the fuel descriptors required by the mathematical fire spread model have been specified.
Herb	A plant that does not develop woody, persistent tissue but is relatively soft or succulent and sprouts from the base (perennials) or develops from seed (annuals) each year. Included are grasses, forbs, and ferns.
Herbaceous Fuel (Herb)	Undecomposed material, living or dead, derived from herbaceous plants.
HFT Historical Fire Table	The tabulation of historical numbers of fires and rates of spread by size and intensity for the planning unit.

IIAA Interagency Initial Attack Assessment model	The 1996 version of the NFMAS simulation model for fire planning. The IIAA provides a number of major enhancements to the original 1980 IAA program, which it replaces, but its calculations and outputs are fully consistent with the earlier version.
Inflation factor	A standard factor for each year that is used to inflate or deflate costs and values from different years to bring them to a common year.
Lesser Live Fuels	Grasses and forbs; low nonwoody plants, annual and perennial.
Litter	The top layer of the forest floor, typically composed of loose debris such as branches, twigs, and recently fallen leaves or needles; little altered in structure by decomposition. (The L layer of the forest floor).
Living Fuels	Naturally occurring fuels whose moisture content is controlled by physiological processes within the living plant. The NFDRS considers only herbaceous plants and woody plant material small enough (leaves and needles, and twigs) to be consumed in the flaming front of a fire.
Moisture of Extinction	The fuel moisture content, weighted over all the fuel classes, at which the fire will not spread.
NFMAS National Fire Management Analysis System	The fire management analysis process which evaluates the efficiency of fire management programs using an economic efficiency criterion. The process uses a simulation model to estimate effectiveness of the local initial attack organization and other fire management activities such as prevention and fuels management.
NVC Net resource Value Change	The measure of the economic impact of fire on resource outputs. It accounts for both positive and negative fire effects.
Option ID	The unique three character alphanumeric identifier given each Program Option.
Option, program	A set of IIAA inputs that characterize a unique fire budget and or fire program with a unique mix of components (kind, size, amount, location, or dispatch of fire forces) or other activities.
PCHA Personal Computer Historical Analysis	A PC program for processing historical daily weather observation and individual fire report data files to produce fire behavior and fire occurrence data for IIAA.
Perennial Fuel	A plant that lives for more than two growing seasons. For fire-danger rating purposes, biennial plants are classed with perennials.
Production Rate	In IIAA, the rate at which a fire line that will contain a fire's spread is produced by a particular type of initial attack force. For ground forces, the entry is chains per hour. For aerial delivered retardant or water, the entry is the typical aircraft load in hundreds of gallons (1200 gallons = 12).
Program Option	See Option, program

Rate of Spread (ROS)	The IIAA entry is the calculated (calibrated) steady-state fire spread rate for up to six FIL's for each FMZ. (The number of Fire Intensity Levels that any set of fire behavior data will have is determined by the fuel model and the weather used in the calculation.) Each FIL is represented by rate of spread values at the 50 th and 90 th percentiles of the range of spread rates calculated for the FIL.
RL Representative Location (Rep Location)	A delineated portion of an FMZ that represents an area for which a single NVC table and a single set of initial attack dispatch data will be used. It is the basic analysis area, and represents a defined number of annual fires (fire occurrence frequency).
Roundwood	Boles, stems, or limbs of woody material; that portion of the dead wildland fuels which are roughly cylindrical in shape..
Shrub	A woody perennial plant differing from a perennial herb by its persistent and woody stem; and from a tree by its low stature and habit of branching from the base.
Slash	Branches, bark, tops, cull logs, uprooted stumps, and broken or uprooted trees left on the ground after logging; also debris resulting from thinnings or wind.
Slope	Rise or fall (in feet) per 100 feet of horizontal measurement, expressed as a percentage.
Slope Class	A code designating the most common slope in the base area. There are five classes: 0-25, 26-40, 41-55, 56-75, and greater than 75 percent.
Spread Component (SC)	A rating of the forward rate of spread of a head fire.
Surface Area-To-Volume Ratio	The ratio of the area of the surface of a fuel particle (square feet) to its volume (cubic feet). The higher the ratio, the "finer" the particle; for example, for grasses this ratio ranges above 2,000; for a half-inch fuel moisture stick it is 109.
TAS	Treatment Area Strategy
Timelag	The time necessary for a fuel particle to lose approximately 63 percent of the difference between its initial moisture content and its equilibrium moisture content.
UMC Unit Mission Costs	An IIAA term for the typical (average) costs that would be charged to emergency fire suppression funds for a particular type of unit that are incurred by its use each time it is dispatched to fire that is controlled in initial attack. (Budgeted fire salary and travel/mileage costs are not included.) A component of the IIAA emergency fire suppression cost (the other is AAC)
Unit (Planning Unit) (Initial attack unit)	<ol style="list-style-type: none"> 1. An administrative or organizational entity. The Planning Unit is the administrative unit for which the analysis is carried out. 2. An individual component of the initial attack force. <p>The context in which the word is used usually makes it clear what the reference is to.</p>