



Developers

Last updated: January 28, 2002

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BehavePlus Developers

The BehavePlus feature list, functionality, and user interface was designed by **Pat Andrews**, USDA Forest Service, Rocky Mountain Research Station, Fire Sciences Lab, Fire Behavior Research Work Unit, Missoula, MT.

The BehavePlus software was designed and programmed by **Collin D. Bevins**, Systems for Environmental Management (SEM), Missoula, MT.

The BehavePlus user documentation and on-line help system was developed by **Don Carlton**, Fire Program Solutions, Estacada, OR.

The BehavePlus web site was designed, developed, and is supported by **Matt Hunter**, SEM, Missoula, MT.

Funding for the development of BehavePlus was provided by:

- **USDA Forest Service, Fire & Aviation Management**, Washington, DC, and by the
- **Joint Fire Sciences Program.**

Additional support is provided by

- **Rocky Mountain Research Station** and
- **Systems for Environmental Management**, a Montana nonprofit research organization.

Development Tools

All BehavePlus code was developed on a personal computer running the open source Mandrake Linux operating system. Program code was created via the Crisp® editor and maintained by the open source CVS version control system. The open source, cross-platform Qt 2.3 GUI libraries from TrollTech® were used to develop all the user interface elements. The open source C++ compiler from GNU (g++) was used to compile, debug, and test the program. The open source image manipulation program GIMP was used to scan, resize, and crop the artwork.

Once the code was running properly under Linux, it was moved to a Windows 2000® computer and recompiled using the proprietary Microsoft Visual C++® compiler. The executable program and all supporting files were then packaged into the proprietary Windows

® installation package format using the proprietary InstallShield ® software.

End of *BehavePlus Developers*

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Last updated: February 20, 2002

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BehavePlus 1.0.0 Release Notes

The *BehavePlus Fire Modeling System Version 1.0.0* and supporting material is now available for download from www.fire.org or from www.fs.fed.us/fire/planning/nist.

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1. Introduction

BehavePlus predicts various fire behavior characteristics of interest to wildland fire management specialists. It replaces the venerable 1984 DOS version of the *BEHAVE Fire Behavior Prediction and Fuel*

Modeling System.

BehavePlus uses a minimal amount of site-specific input to predict fire spread rate, area, perimeter, intensity, flame length, scorch height, spotting distance, tree mortality, etc. under uniform conditions at a point in time.

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2. Features

BehavePlus is a Windows ® application using a modern graphical user interface (GUI) to solicit inputs from the user, provide input guidance and error checking, and display results in tables, graphs, and diagrams.

Unlike most other Windows ® programs, **BehavePlus** is *page oriented* rather than *screen oriented*. The input worksheets and output tables, graphs, and diagrams are displayed on multiple US letter-sized pages which are easily printed for documentation and distribution.

Behind the GUI is a new *equation tree* computation engine specifically designed to enable users to create their own "BEHAVE". Users may mix and match input options, fire modules, and output variables in a large variety of combinations to suit their own requirements rather than selecting from a few pre-defined options.

Once the user configures **BehavePlus** for a specific purpose, the configuration can be saved as a *worksheet*. Any number of worksheets (configurations) can be defined and reused as needed. Several *standard worksheets* are included in the distribution for the most common uses, including basic fire spread prediction, linked spread-scorch-mortality, spotting distance, custom fuel modeling, slope calculation from map measurements, and others.

When entering values into the worksheet, zero, one, or two input fields can have multiple values, yielding simple, one-way, or two-way results tables, graphs, and diagrams. Input variables can have a maximum of 1000 values (memory permitting), and even discrete input variables such as fuel model or weather scenario can have multiple values. Users can now, for example, generate a single table containing estimates of fire spread rate for a set of fuel models under several weather scenarios.

BehavePlus includes a robust units conversion system. The user has control over all input and output units of measure, which are stored as part of the run or worksheet information. Now you can express spread rate in ch/h, ft/min, m/s, mm/year, and furlongs/fortnight. Furthermore, users can define and save their own set of custom units of measure and apply it to any run or worksheet. Standard *English* and *Metric* units sets are provided with the distribution.

BehavePlus 1.0.0 contains the following modules:

- Surface Module (like the BEHAVE DIRECT module) predicts fire spread rate, intensity, and flame length in any direction. Directions can be expressed as degrees from upslope or from North. Weather can be entered as individual parameters or as complete *weather scenarios* (great for comparing fire behavior between various weather percentile levels). The Surface Module supports a choice of wind input methods, optional custom fuel modeling, and optional automatic slope calculation from map measurements.
- Size Module predicts fire area, perimeter, length, and width at any elapsed time or times.
- Spot Module predicts maximum spotting distance from a burning pile, from torching trees, and/or from a wind-driven surface fire.
- Crown Scorch Module predicts tree crown scorch height in any fire spread direction.
- Mortality Module estimates bark thickness and fire-induced mortality rate for over 200 tree species.
- Ignition Module predicts fire ignition probability from a firebrand.
- Relative Humidity Module derives dew point temperature and relative humidity.

Modules can be run *stand alone*, in which case the user provides all the required inputs, or they can be *linked*, in which case outputs from one module automatically flow as inputs into the next module. Furthermore, all distance outputs may optionally be displayed in map scale units.

Finally, a Tools section provides special tools for

- converting arbitrary amounts between different units of measure,
- displaying calendars and charts of sunrise, sunset, moonrise, moonset, civil dawn, and civil dusk for any geographic location on earth (includes a catalog of thousands of US geographic place names), and
- editing the units of measure associated with any **BehavePlus** input or output variable.

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3. System Requirements

The following system requirements must be met to successfully install and run **BehavePlus**:

- Operating System Windows 2000 ®
- Windows NT ®
- Windows XP ®
- Windows Me ®
- Windows 98 ®
- Windows 95 ®

WINDOWS 95 98

Memory 32 Mb (10 Mb free)
 Storage 20 Mb
 Display Minimum 800 x 600 pixels, 256 color
 Recommend 1024 x 768 pixels, 64K (16-bit) color
 License Postcard depicting a scene of your local area sent to:
 Systems for Environmental Management
 P.O. Box 8868
 Missoula, MT 59801

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4. Download

All BehavePlus programs and documents are available at www.fire.org. First click on the [BehavePlus](#) page, then click on the [Download](#) link.

From the Download page you can retrieve

- the **BehavePlus** installation program, a self-extracting installation program for Windows ® operating systems,
- the *BehavePlus User Guide* in Microsoft ® Word format, and
- the *BehavePlus User Guide* in Adobe ® PDF format.

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5. Installation

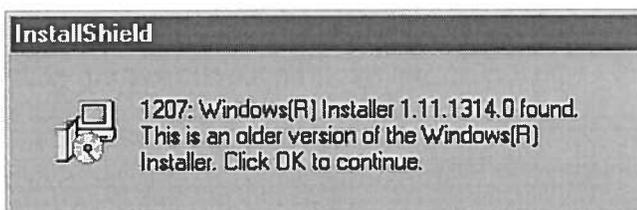
5.1 Installing from Scratch

If you have a **BehavePlus** Beta version on your computer, please read section [5.2 Upgrading from a Beta Version](#) first.

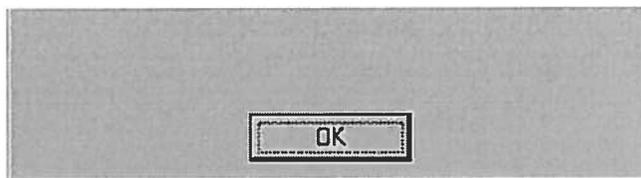
Once you have downloaded the installation program **bp_1_0_0.exe**, execute it by

- clicking *Start* and *Run*, browse to locate the program, and press *OK*, or
- using Windows Explorer ® to locate **bp_1_0_0.exe** and double click on its name or icon.

Early in the install process you may see a dialog similar to that on the right. Simply click the **OK** button and the



installation should continue.



The install program consults the Windows Registry ® for the default program file installation folder. On most Windows ® computers this is usually *C:\Program Files*. On USDA Forest Service computers, the default location may (or may not) have been changed to *C:\fsapps\fsprod\fam*; if not, you should change the installation location to *C:\fsapps\fsprod\fam* when given the opportunity on the *Destination Folder* dialog during installation.

If you are using Windows 95 ® or Windows 98 ®, and Windows Installer ® has not already been installed on your computer, the **BehavePlus** installation program will install it for you. After installing Windows Installer ® you must reboot your computer and then run the **BehavePlus** installation program a second time to actually install **BehavePlus**.

When completed, a **BehavePlus** icon should appear on your desktop; click the icon to start **BehavePlus**.

Don't forget to send the postcard!

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5.2 Upgrading from a Beta Version

BehavePlus has undergone an extensive beta test period during which major improvements and bug fixes were implemented. If you installed either **Beta Release 1** or **Beta Release 2**, there are two important items to note.

Item 1: First Remove Any Existing BehavePlus Beta Versions

It is important that you *first remove the Beta version of BehavePlus from the computer before installing Version 1.0.0*. Failure to first remove the old Beta version can cause complications when installing Version 1.0.0.

To remove the old Beta:

- click the *My Computer* icon,
- click the *Control Panel* icon,
- click the *Add/Remove Programs* icon, and
- locate the **BehavePlus** entry in the program list and click *Remove* (Windows 2000) or *Add/Remove* (Win9x)..

Item 2: Beta Files Do Not Work Under Version 1.0.0

Beta testing uncovered several shortcomings of the **BehavePlus** data file formats, so they have undergone significant changes since Beta 2 to accomodate future expansion. Unfortunately, this means the old files cannot be used with Version 1.0.0.

If you saved *run* (*.bpr), *worksheet* (*.bpw), *fuel model* (*.bpf), *units set* (*.bpu), or *moisture scenario* (*.bpm) files under a Beta version that you wish to use with Version 1.0.0, your only option is to print out their worksheet pages while the Beta program is still on your computer, then manually re-create them after installing Version 1.0.0. We apologize in advance for this inconvenience.

Once you have printed copies of the files you wish to save, ensure they are deleted from your system. We recommend you use Windows Explorer ® to delete the entire *C:\[InstallPath]\BehavePlus* folder and all its files and subfolders *before installing* Version 1.0.0.

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5.3 Uninstalling

The **BehavePlus** installation program **bp_1_0_0.exe** uses InstallShield ® and Microsoft Windows Installer ® technology to ensure **BehavePlus** is correctly registered with your Windows ® operating system. The only correct way to uninstall **BehavePlus** is via the *Add/Remove Programs* dialog:

- click on the *My Computer* icon,
- click on the *Control Panel* icon,
- click on the *Add/Remove Programs* icon,
- highlight the **BehavePlus** entry, and click *Remove* button.

The Windows ® uninstaller only removes files that were originally put there by the installation program. Any files you created or saved in the **BehavePlus** default workspace are stored in the installation directory, and are not removed by the uninstaller. Therefore any *run* (*.bpr), *worksheet* (*.bpw), *fuel model* (*.bpf), *units set* (*.bpu), or *moisture scenario* (*.bpm) files you saved in the *default workspace* will remain in *C:\[INSTALLDIR]\BehavePlus*. We recommend you delete these files or the entire *C:\[InstallPath]\BehavePlus* folder using Windows Explorer ®.

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6. Support

The following sources of technical support and training are available.

6.1 US Government National Support

Support for US federal and state agency personnel is provided by the USDA Forest Service Fire and Aviation Management Help Desk via phone at (800) 253-5559 and via e-mail at fire_help@dms.nwcg.gov.

6.2 Self-Study Lessons

A series of self-study lessons covers most aspects of **BehavePlus** usage. This link to www.fire.org provides a short description of each lesson and further links to download the lessons in Adobe ® PDF or Microsoft ® Word format.

6.3 User Guide

The BehavePlus User Guide covers all aspects of the program and is available from www.fire.org in Microsoft ® Word or Adobe ® PDF formats.

6.4 FAQ

The Frequently Asked Questions at www.fire.org address various aspects of **BehavePlus** installation and usage.

6.5 Bug Reports, Known Bugs, & Suggestions

Bug reports and suggestions can be made at www.fire.org. Before making a bug report, please check the list of known bugs for fixes and work-arounds.

6.6 Registration

You may register your e-mail address at www.fire.org to receive notification of the occasional **BehavePlus** updates and news. Your email address will not be used for any other purpose or disclosed to any other parties.

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Requirements

Last updated: January 25, 2002

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BehavePlus Requirements

System Requirements

- Operating System Windows 2000 ®
- Windows NT ®
- Windows XP ®
- Windows Me ®
- Windows 98 ®
- Windows 95 ®
- Memory 32 Mb (10 Mb free)
- Storage 20 Mb
- Display Minimum 800 x 600 pixels, 256 color
Recommend 1024 x 768 pixels, 64K (16-bit) color
- License Postcard depicting a scene of your local area sent to:
Systems for Environmental Management
P.O. Box 8868
Missoula, MT 59801

User Requirements

Users are responsible for supplying valid input, correctly interpreting the fire behavior predictions, and understanding the assumptions and limitations of the models used in **BehavePlus**.

Warning

Be sure to check the list of known bugs before using BehavePlus. If you find a new bug, please be sure to report it (see **Bug reports** topics at left).

End of *BehavePlus Requirements*



What is It?

Last updated: February 22, 2002

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BehavePlus is a Windows application to predict wildfire behavior for fire management purposes. It is designed for use by wildfire managers who are familiar with fuels, weather, topography, wildfire situations and the associated terminology.

BehavePlus uses a minimum amount of site-specific input data to predict fire behavior for a single point in time and space.

The *BehavePlus Fire Modeling System* replaces the 1984 DOS version of the *BEHAVE Fire Behavior Prediction and Fuel Modeling System* with a new computation engine and graphical user interface.

BehavePlus 1.0.0, the most recent version, uses essentially the same mathematical models as the original **BEHAVE**. Versions 2.0 and beyond are planned to incorporate new fire models.

Home

Last modified: February 02, 2002

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Information Systems -- online

FMT Online

Fire Management Tools Online provides access to a broad collection of documentation, visuals, graphics, notices, and software contributed by and for the wildland fire management community.

Software Products -- information and download

BehavePlus

The BEHAVE Fire Behavior Prediction and Fuel Modeling system is undergoing a make-over. To reflect its expanded scope, it is called the BehavePlus Fire Modeling System. This page will have the latest documentation, screen shots, and downloads as they become available. (Information on the old BEHAVE is available at [FMT Online](#))

FARSITE

Version 3 of the fire behavior and growth simulator used by Fire Behavior Analysts from the USDA FS, USDI NPS, USDI BLM, and USDI BIA, and taught at S493.

FIREFAMILY+

The fire climatology and occurrence program that combines and replaces the PCFIRDAT, PCSEASON, FIRES, and CLIMATOLOGY programs into a single package with a graphical user interface for Windows 95/98/NT.

FOFEM

FOFEM (a First Order Fire Effects Model) is a computer program for predicting tree mortality, fuel consumption, smoke production, and soil heating caused by prescribed fire or wildfire.

fireLib

A C function library for predicting wildland fire behavior using the BEHAVE algorithms, fireLib is for programmers who need a highly optimized API for developing fire behavior growth simulators.

NEXUS

An Excel(tm) spreadsheet linking surface and crown fire prediction models, NEXUS is useful for evaluating alternative treatments for reducing crown fire risk and assessing the potential for crown fire activity.



Overview

Last updated: January 25, 2002

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BehavePlus Overview

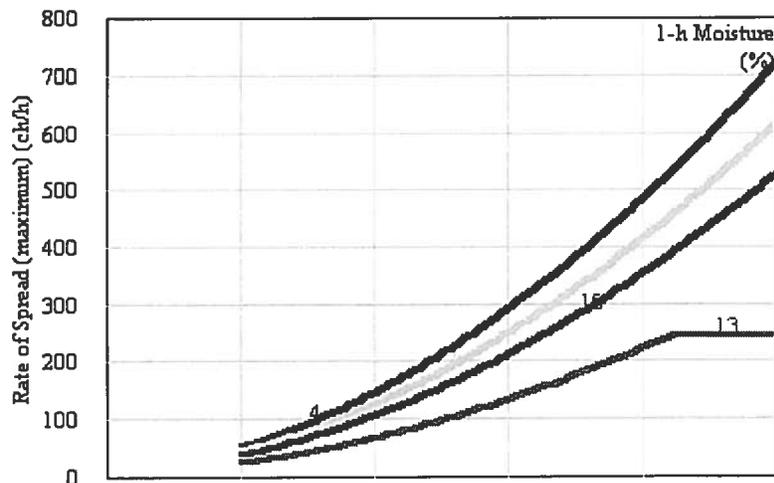
BehavePlus replaces and improves upon the 1984 *BEHAVE Fire Behavior Prediction System*. **BehavePlus** runs in the Windows ® 95/98/Me or NT/2000/XP environment and currently utilizes the same models as the older BEHAVE:

- Surface fire spread, intensity, flame length
- Area and perimeter of a point source fire
- Spotting distance
- Probability of ignition
- Scorch height
- Tree mortality

Predictions of wildland fire behavior are still made at one point in space and time given simple user defined fuel, weather, and topography. This is unlike the *FARSITE* fire simulator which predicts fire behavior while allowing for variable fuel, weather, and topography. **BehavePlus** inputs can be determined easily in the field while *FARSITE* inputs require extensive GIS support and map theme development.

BehavePlus improvements include:

- Windows environment user interface,
- an "equation tree" computation engine,
- tabular and graphical outputs,
- many user selected options and features.





Sample graph output.

Future versions of **BehavePlus** are planned to include new wildland fire behavior models under development.

End of *BehavePlus* Overview



BehavePlus Features

BehavePlus is a Windows ® application using a modern graphical user interface (GUI) to solicit inputs from the user, provide input guidance and error checking, and display results in tables, graphs, and diagrams.

On-line help is available from the menu bar, and all dialogs and wizards include a help browser pane. All input fields include a *Guide Button* for help in entering range inputs or selecting one or more discrete choices.

Unlike most other Windows ® programs, **BehavePlus** is *page oriented* rather than *screen oriented*. The input worksheets and output tables, graphs, and diagrams are displayed on multiple US letter-sized pages which are easily printed for documentation and distribution.

Behind the GUI is a new *equation tree* computation engine specifically designed to enable users to create their own "BEHAVE". Users may mix and match input options, fire modules, and output variables in a large variety of combinations to suit their own requirements rather than selecting from a few pre-defined options.

Once the user configures **BehavePlus** for a specific purpose, the configuration can be saved as a *worksheet*. Any number of worksheets (*configurations*) can be defined and reused as needed. Several *standard worksheets* are included in the distribution for the most common uses, including basic fire spread prediction, linked spread-scorch-mortality, spotting distance, custom fuel modeling, slope calculation from map measurements, and others.

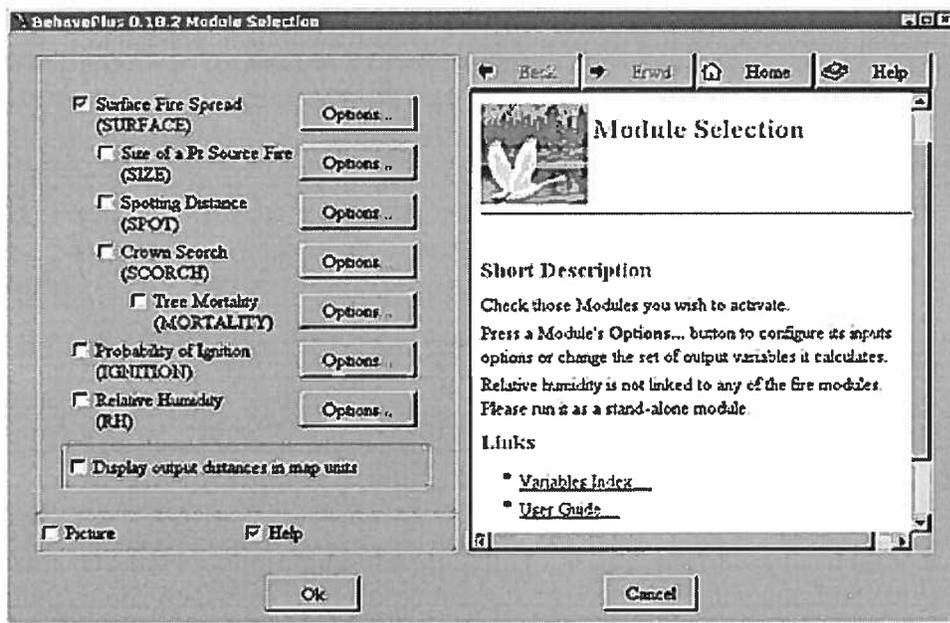
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BehavePlus 1.0.0 contains the following modules:

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- **Size Module** predicts fire area, perimeter, length, and width at any elapsed time or times.
- **Spot Module** predicts maximum spotting distance from a burning pile, from torching trees, and/or from a wind-driven surface fire.
- **Crown Scorch Module** predicts tree crown scorch height in any fire spread direction.
- **Mortality Module** estimates bark thickness and fire- induced mortality rate for over 200 tree species.
- **Ignition Module** predicts fire ignition probability from a firebrand.
- **Relative Humidity Module** derives dew point temperature and relative humidity.

Modules can be run *stand alone*, in which case the user provides all the required inputs, or they can be *linked*, in which case outputs from one module automatically flow as inputs into the next module. Furthermore, all distance outputs may optionally be displayed in map scale units.



BehavePlus Module Selection Dialog Box

Finally, a **Tools** section provides special tools for

- converting arbitrary amounts between different units of measure,
- displaying calendars and charts of sunrise, sunset, moonrise, moonset, civil dawn, and civil dusk for any geographic location on earth (includes a catalog of thousands of US geographic place names), and
- editing the units of measure associated with any BehavePlus input or output variable.

Future Updates

- Fire/wind/slope direction output diagrams
- Fire size and shape output diagrams
- Fire characteristics chart output diagrams
- Lightning fire ignition probability model
- Flame height model
- Fire safety zone model
- Containment module supporting multiple containment resource types arriving at scheduled times
- Dynamic modeling of palmetto-gallberry fuels
- Crown fire spread
- Transition to crown fire
- Fuel moisture from diurnal weather
- Burnout of fuel behind the fire front
- Smoke production
- Soil heating
- Hauling chart plotting tool

End of *BehavePlus Features*

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News

Last updated: January 25, 2002

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BehavePlus News

Jan 24, 2002

BehavePlus Version 1.0.0 Released

BehavePlus Version 1.0.0 is now available for [download](#) from www.fire.org.

If you have been using a Beta Release, you are strongly encouraged to upgrade. Please refer to the [Release Notes](#) for instruction on download and installation.

Jan 24, 2002

BehavePlus Tutorials Available

A series of self-teaching tutorials is being developed for **BehavePlus**. The first seven are now available for download from the www.fire.org [Tutorial](#) page.

End of BehavePlus News



Known Bugs

Last updated: March 05, 2002

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BehavePlus List of Known Bugs

If you find bugs in the program, please check this list to see if it has already been reported. If your own special bug is not listed, please report it and we'll even name it after you.

Many thanks to those users who took the time to report bugs and annoyances with Beta Releases!

Version 1.0.0

Item 001 Andrews Alpha

Desc The "Initialize from a Fuel Model" button text doesn't scale properly when the View is changed.

Status Fixed in the next release.

Item 002 Andrews Beta

Desc The Windows Print Dialog doesn't allow checking the "Pages" radio button, and checking the "Selection" radio button prints all the pages.

Status This is an ongoing issue between the unpredictable behavior of the Windows Print Dialog and the Qt library, which hopefully will be resolved by the next release. In the meantime, you'll have to print "All" pages.

Item 003 Burgan Alpha

Desc Changing a custom fuel model then saving it to the same name, while saving it on disk file, does not save the changes in memory.

Status This will be fixed in the next release. In the meantime, the work-around is to either (1) save the changes under a new name, or (2) re-attach the custom fuel model directory.

Item 004 Hood Alpha

Desc The y-axis label text is reflected when printing graphs on some printers (HP Laser 5M, HP Color Laser 5M, HP Laser Jet 8100 CN)

Status This is an acknowledged bug in the Qt library used by BehavePlus, and will hopefully be fixed for the next release.

Item 005 Lavoie Alpha

Desc BehavePlus will sometimes crash the first time a worksheet is closed using the right-click context menu.

Status This has been reported by two users, but I have been unable to duplicate it on my Windoze 95, 98, 2000 or Linux machines. If it happens to you, please let me know. Work-around is to close the worksheet using File->Close (at least the first time!).

Version 1, Beta Release 2

Item 001 Bevins Alpha

Desc MORTALITY module predictions are untested for certain species.

BehavePlus supports more tree species than BEHAVE. The bark thickness parameters for some of the newly added species are borrowed from previously documented species. The MORTALITY module predictions for these species are therefore suspect:

- ponderosa pine (uses Douglas-fir/larch parameters)
- western white pine (uses Engelmann spruce parameters)
- grand fir (uses subalpine fir parameters)
- balsam fir (uses subalpine fir parameters)
- slash pine (uses lodgepole pine parameters)
- longleaf pine (uses lodgepole pine parameters)
- pond pine (uses lodgepole pine parameters)
- shortleaf pine (uses lodgepole pine parameters)
- loblolly pine (uses lodgepole pine parameters)

Status Version 1.0.0 will use newly developed parameters from FOFEM 5.0.

Item 002 Bevins Beta

Desc The installation program doesn't automatically remove an existing version of BehavePlus (or, the installation program runs, but doesn't appear to actually do anything useful).

Status You can work around this problem by first removing any existing version of BehavePlus via *My Computer -> Control Panel -> Remove/Add Programs*. This removes the executable program and original installation files only, and does not remove any Run or Worksheet files you've created and saved.

Alternatively, you can run the install program and select the Remove button. Note that, as per Bug 003 below, this method does not appear to work on some USDA Forest Service computers; you must use the method described above.

Once the previous version is removed, run the install program a second time to actually install Beta Release 2.

Item 003 Tirmenstein Alpha

Desc During installation an error message appears about the unavailability of network resources.

Status This problem occurs on USDA Forest Service computers that are part of a network (and may occur on other networked computers?). It occurs when a previous version of BehavePlus exists on the computer.

You can work around this problem by first removing any existing version of BehavePlus via *My Computer -> Control Panel -> Remove/Add Programs*. This removes the executable program and original installation files only, and does not remove any Run or Worksheet files you've created and saved.

This is further discussed in [FAQ 2.3](#).

Item 004 Andrews Alpha

Desc Fire spread rate, fireline intensity, flame length, and scorch height values are wrong for directions less than 29 degrees from the direction of maximum spread; they all have the same value as for the direction of maximum spread.

Status Fixed in the next release.

Item 005 Andrews Beta

Desc When there is more than one document open, focus sometimes gets passed between them when pressing the First, Last, Next, and Previous buttons.

Status Fixed in the next release.

End of *BehavePlus List of Known Bugs*

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BehavePlus

Release Notes

Last updated: February 20, 2002

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BehavePlus 1.0.0 Release Notes

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1. Introduction

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Behind the GUI is a new *equation tree* computation engine specifically designed to enable users to create their own "BEHAVE". Users may mix and match input options, fire modules, and output variables in a large variety of combinations to suit their own requirements rather than selecting from a few pre-defined options.

Once the user configures **BehavePlus** for a specific purpose, the configuration can be saved as a *worksheet*. Any number of worksheets (configurations) can be defined and reused as needed. Several *standard worksheets* are included in the distribution for the most common uses, including basic fire spread prediction, linked spread-scorch-mortality, spotting distance, custom fuel modeling, slope calculation from map measurements, and others.

When entering values into the worksheet, zero, one, or two input fields can have multiple values, yielding simple, one-way, or two-way results tables, graphs, and diagrams. Input variables can have a maximum of 1000 values (memory permitting), and even discrete input variables such as fuel model or weather scenario can have multiple values. Users can now, for example, generate a single table containing estimates of fire spread rate for a set of fuel models under several weather scenarios.

BehavePlus includes a robust units conversion system. The user has control over all input and output units of measure, which are stored as part of the run or worksheet information. Now you can express spread rate in ch/h, ft/min, m/s, mm/year, and furlongs/fortnight. Furthermore, users can define and save their own set of custom units of measure and apply it to any run or worksheet. Standard *English* and *Metric* units sets are provided with the distribution.

BehavePlus 1.0.0 contains the following modules:

- Surface Module (like the BEHAVE DIRECT module) predicts fire spread rate, intensity, and flame length in any direction. Directions can be expressed as degrees from upslope or from North. Weather can be entered as individual parameters or as complete *weather scenarios* (great for comparing fire behavior between various weather percentile levels). The Surface Module supports a choice of wind input methods, optional custom fuel modeling, and optional automatic slope calculation from map measurements.
- Size Module predicts fire area, perimeter, length, and width at any elapsed time or times.

- Spot Module predicts maximum spotting distance from a burning pile, from torching trees, and/or from a wind-driven surface fire.
- Crown Scorch Module predicts tree crown scorch height in any fire spread direction.
- Mortality Module estimates bark thickness and fire-induced mortality rate for over 200 tree species.
- Ignition Module predicts fire ignition probability from a firebrand.
- Relative Humidity Module derives dew point temperature and relative humidity.

Modules can be run *stand alone*, in which case the user provides all the required inputs, or they can be *linked*, in which case outputs from one module automatically flow as inputs into the next module. Furthermore, all distance outputs may optionally be displayed in map scale units.

Finally, a Tools section provides special tools for

- converting arbitrary amounts between different units of measure,
- displaying calendars and charts of sunrise, sunset, moonrise, moonset, civil dawn, and civil dusk for any geographic location on earth (includes a catalog of thousands of US geographic place names), and
- editing the units of measure associated with any **BehavePlus** input or output variable.

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3. System Requirements

The following system requirements must be met to successfully install and run **BehavePlus**:

Operating Windows 2000 ®

- System Windows NT ®
- Windows XP ®
- Windows Me ®
- Windows 98 ®
- Windows 95 ®

Memory 32 Mb (10 Mb free)

Storage 20 Mb

Display Minimum 800 x 600 pixels, 256 color
 Recommend 1024 x 768 pixels, 64K (16-bit) color

License Postcard depicting a scene of your local area sent to:
 Systems for Environmental Management
 P.O. Box 8868
 Missoula, MT 59801

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4. Download

All BehavePlus programs and documents are available at www.fire.org. First click on the BehavePlus page, then click on the Download link.

BehavePlus page, then click on the Download link.

From the Download page you can retrieve

- the **BehavePlus** installation program, a self-extracting installation program for Windows® operating systems,
- the *BehavePlus User Guide* in Microsoft® Word format, and
- the *BehavePlus User Guide* in Adobe® PDF format.

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5. Installation

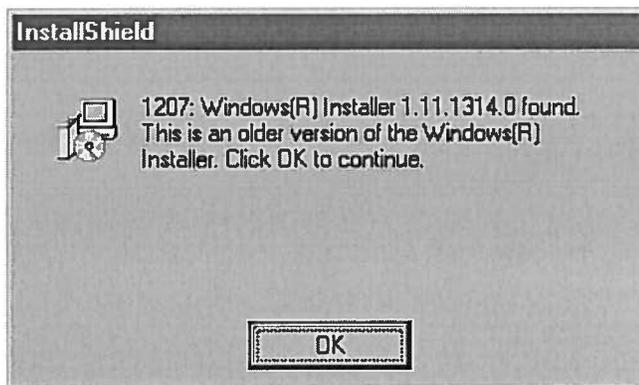
5.1 Installing from Scratch

If you have a **BehavePlus** Beta version on your computer, please read section [5.2 Upgrading from a Beta Version](#) first.

Once you have downloaded the installation program **bp_1_0_0.exe**, execute it by

- clicking *Start* and *Run*, browse to locate the program, and press *OK*, or
- using Windows Explorer® to locate **bp_1_0_0.exe** and double click on its name or icon.

Early in the install process you may see a dialog similar to that on the right. Simply click the **OK** button and the installation should continue.



The install program consults the Windows Registry® for the default program file installation folder. On most Windows® computers this is usually *C:\Program Files*. On USDA Forest Service computers, the default location may (or may not) have been changed to *C:\fsapps\fsprod\fam*; if not, you should change the installation location to *C:\fsapps\fsprod\fam* when given the opportunity on the *Destination Folder* dialog during installation.

If you are using Windows 95® or Windows 98®, and Windows Installer® has not already been installed on your computer, the **BehavePlus** installation program will install it for you. After installing Windows Installer® you must reboot your computer and then run the **BehavePlus** installation program a second time to actually install **BehavePlus**.

When completed, a **BehavePlus** icon should appear on your desktop; click the icon to start **BehavePlus**.

Don't forget to send the postcard!

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5.2 Upgrading from a Beta Version

BehavePlus has undergone an extensive beta test period during which major improvements and bug fixes were implemented. If you installed either **Beta Release 1** or **Beta Release 2**, there are two important items to note.

Item 1: First Remove Any Existing BehavePlus Beta Versions

It is important that you *first remove the Beta version of BehavePlus from the computer before installing Version 1.0.0*. Failure to first remove the old Beta version can cause complications when installing Version 1.0.0.

To remove the old Beta:

- click the *My Computer* icon,
- click the *Control Panel* icon,
- click the *Add/Remove Programs* icon, and
- locate the **BehavePlus** entry in the program list and click *Remove* (Windows 2000) or *Add/Remove* (Win9x)..

Item 2: Beta Files Do Not Work Under Version 1.0.0

Beta testing uncovered several shortcomings of the **BehavePlus** data file formats, so they have undergone significant changes since Beta 2 to accommodate future expansion. Unfortunately, this means the old files cannot be used with Version 1.0.0.

If you saved *run (*.bpr)*, *worksheet (*.bpw)*, *fuel model (*.bpf)*, *units set (*.bpu)*, or *moisture scenario (*.bpm)* files under a Beta version that you wish to use with Version 1.0.0, your only option is to print out their worksheet pages while the Beta program is still on your computer, then manually re-create them after installing Version 1.0.0. We apologize in advance for this inconvenience.

Once you have printed copies of the files you wish to save, ensure they are deleted from your system. We recommend you use Windows Explorer ® to delete the entire *C:\[InstallPath]\BehavePlus* folder and all its files and subfolders *before installing* Version 1.0.0.

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5.3 Uninstalling

The **BehavePlus** installation program **bp_1_0_0.exe** uses InstallShield ® and Microsoft Windows Installer ® technology to ensure **BehavePlus** is correctly registered with your Windows ® operating system. The only correct way to uninstall **BehavePlus** is via the *Add/Remove Programs* dialog:

• click on the *My Computer* icon

- click on the *My Computer* icon,
- click on the *Control Panel* icon,
- click on the *Add/Remove Programs* icon,
- highlight the **BehavePlus** entry, and click *Remove* button.

The Windows ® uninstaller only removes files that were originally put there by the installation program. Any files you created or saved in the **BehavePlus** default workspace are stored in the installation directory, and are not removed by the uninstaller. Therefore any *run* (*.bpr), *worksheet* (*.bpw), *fuel model* (*.bpf), *units set* (*.bpu), or *moisture scenario* (*.bpm) files you saved in the *default workspace* will remain in *C:\[INSTALLDIR]\BehavePlus*. We recommend you delete these files or the entire *C:\[InstallPath]\BehavePlus* folder using Windows Explorer ®.

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6. Support

The following sources of technical support and training are available.

6.1 US Government National Support

Support for US federal and state agency personnel is provided by the USDA Forest Service Fire and Aviation Management Help Desk via phone at (800) 253-5559 and via e-mail at fire_help@dms.nwcg.gov.

6.2 Self-Study Lessons

A series of [self-study lessons](#) covers most aspects of **BehavePlus** usage. This link to www.fire.org provides a short description of each lesson and further links to download the lessons in Adobe ® PDF or Microsoft ® Word format.

6.3 User Guide

The [BehavePlus User Guide](#) covers all aspects of the program and is available from www.fire.org in Microsoft ® Word or Adobe ® PDF formats.

6.4 FAQ

The [Frequently Asked Questions](#) at www.fire.org address various aspects of **BehavePlus** installation and usage.

6.5 Bug Reports, Known Bugs, & Suggestions

[Bug reports](#) and [suggestions](#) can be made at www.fire.org. Before making a bug report, please check the list of [known bugs](#) for fixes and work-arounds.

6.6 Registration

You may register your e-mail address at www.fire.org to receive notification of the occasional

~~For any updates, you can email us at fire@fire.org to receive notification of the upcoming~~
BehavePlus updates and news. Your email address will not be used for any other purpose or disclosed to any other parties.

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