WFDSS *Automated* Basic Fire Behavior (BFB) and Short-Term Fire Behavior (STFB) Frequently Asked Questions

The Questions and Answers below are for the curious among you to provide a quick idea as to what the automated version of WFDSS Basic Fire Behavior (BFB) and Short-Term Fire Behavior (STFB) applications are about. For more detailed information about these applications as well as their assumptions and limitations, please see the following documents on WFDSS Home page under Related Resources | Fire Behavior:

Comparison of FLAMMap and WFDSS Basic and Short-term Fire Behavior (PDF)
Draft Basic and Short-Term Behavior (PDF)

Frequently Asked Questions:

What is the procedure for setting up and running Basic Fire Behavior (BFB) and Short Term Fire Behavior (STFB) analyses?

For instructions on how to set up and run BFB and STFB analyses, see "Basic and Short-Term Fire Behavior (PDF - 7.9 MB)" on the WFDSS Home page under Training | Webinars and Other Elearning.

What is the purpose of the Automated Basic Fire Behavior (BFB) and Short-Term Fire Behavior (STFB) and how can they be used?

The automated BFB and STFB applications within WFDSS are designed for use by non fire behavior specialists to quickly obtain outputs for a fire area using automatically supplied forecasted weather. These fire behavior outputs are available to provide insight into potential fire spread and fire behavior.

How valid are the fire behavior results from Basic Fire Behavior (BFB) and Short-Term Fire Behavior (STFB) and can they be used to support fire management decisions?

As with all models, the quality of the outputs are relative to the quality of the input data. Before using BFB and STFB outputs to support decision-making, the results should be critiqued and assessed for how well they represent reality.

How does the automated version of WFDSS Basic Fire Behavior (BFB) and Short-Term Fire Behavior (STFB) differ from the desktop version of FlamMap 3.0?

The differences are numerous and significant. Please see "Comparison of FLAMMap and WFDSS Basic and Short-term Fire Behavior.pdf" on the WFDSS Home site under Related Resources | Fire Behavior for a comprehensive comparison.

What is the difference between WFDSS Basic Fire Behavior (BFB) and Short-Term Fire Behavior (STFB)?

WFDSS provides most of the inputs (including forecasted weather) for both applications. BFB calculates and maps "snapshot in time" fire behavior outputs for an entire user-defined landscape extent. STFB calculates fire spread (arrival time) results as well as the fire's major paths for a user-defined simulation duration from a single ignition point.

Can local landscape data be uploaded into WFDSS for use in Basic Fire Behavior (BFB) and Short-Term Fire Behavior (STFB)?

The short answer at this time is NO. It is possible that will be an option in the future, but definitely not for the 2009 fire season.

What are the available landscapes that can be used for Basic Fire Behavior (BFB) and Short-Term Fire Behavior (STFB) and how do you choose the one you want?

As of late April 2009, there are 5 landscapes that can be used for WFDSS fire behavior applications. You can choose which landscape you want to use by selecting it on the Incident Information page. The LANDFIRE National landscape covers the entire conterminous United States. LANDFIRE Rapid Refresh is available for most of the western US. California has a state-wide landscape available in WFDSS and there are two Alaska landscapes (AK Tanana Zone and AK Yukon-Charley) that together only make up a small portion of the state. A landscape for (most of) the state of Alaska should be available by early summer, 2009.

How do you define your landscape analysis area (landscape extent) and how large should it be when doing Basic Fire Behavior (BFB) and Short-Term Fire Behavior (STFB) analyses?

You draw a rectangle using the Landscape Extent tool on the Assessment map. Since you should only be concerned with fire behavior characteristics or fire spread for a short time you need not draw a large analysis area. Typically an extent of 5-6 miles per side should suffice. If you run your STFB analysis and it seems too small you can always re-draw the landscape extent.

What resolution is used for the landscape data in Basic Fire Behavior (BFB) and Short-Term Fire Behavior (STFB) analyses?

The resolution of your landscape depends on its size. For extents that are 20 miles by 20 miles or smaller, 30 meter resolution is used. If you choose a larger extent WFDSS will automatically make the resolution courser (90 or more meter) to reduce calculation time.

Can the landscape data be modified for Basic Fire Behavior (BFB) and Short-Term Fire Behavior (STFB) analyses?

In the current automated version of BFB and STFB you cannot modify the landscape data. In the future when the Analyst-assisted version of BFB and STFB are available you will be able to use a Landscape Editor (like is used in FSPro) to make modifications to the landscape data.

Can the user choose which RAWS to use for weather and wind data for Basic Fire Behavior (BFB) and Short-Term Fire Behavior (STFB) analyses?

In the current automated version of BFB and STFB you cannot choose which RAWS to use, you can only use the WFDSS-selected RAWS. In the future when the Analyst-assisted version of BFB and STFB are available the fire behavior specialist will be able to select the RAWS from a list if it has the requisite observations.

How does WFDSS select the RAWS for Basic Fire Behavior (BFB) and Short-Term Fire Behavior (STFB) analyses?

WFDSS selects the RAWS by (1) identifying the center of the landscape extent, (2) calculating the distance from the center to the nearest RAWS using a horizontal/vertical (elevation) algorithm, (3) ranking the stations and (4) selecting the station which is the "closest" and has weather data requisite for conditioning (7 days of hourly weather observations).

What is the RAWS data used for in Basic Fire Behavior (BFB) and Short-Term Fire Behavior (STFB) analyses?

WFDSS BFB and STFB *automatically* conditions fuels by using weather observations from the RAWS. Dead fuel moistures are calculated for every cell in the analysis area using these RAWS data, however, in the automated versions the user can NOT view those observations nor can the user modify them to better reflect the weather in the area of the fire.

How does fuel moisture conditioning work in Basic Fire Behavior (BFB) and Short-Term Fire Behavior (STFB)?

The user chooses a date and time for which they want the analysis to start. WFDSS looks back the last 7 + days (up to 14 days) to obtain the necessary RAWS observations as well as the cell's aspect, elevation and canopy cover to automatically condition the dead fuels and determine dead fuel moisture values as of the analysis date and time. Those fuel moistures are then used to calculate fire behavior characteristics.

How does Basic Fire Behavior (BFB) and Short-Term Fire Behavior (STFB) get forecasted weather and can these data be changed?

In WFDSS BFB and STFB, forecasted weather is obtained from the National Digital Forecast Data (NDFD). NDFD uses RAWS location to derive forecasted weather data. These data can NOT be modified nor viewed by the user.

How does Basic Fire Behavior (BFB) and Short-Term Fire Behavior (STFB) get forecasted winds and can these data be changed?

In WFDSS BFB and STFB, forecasted wind speed and direction values are obtained from the National Digital Forecast Data (NDFD). NDFD uses the center of the landscape extent to derive the forecasted winds. Both the wind speed and wind direction values **CAN** be modified by the user.

Do the Basic Fire Behavior (BFB) and Short-Term Fire Behavior (STFB) applications use gridded winds?

Yes! The wind speed and direction values (from NDFD or user-determined) are used as inputs for WindNinja to create gridded winds at 200-meter resolution.

What fuel moisture values are used in the Basic Fire Behavior (BFB) and Short-Term Fire Behavior (STFB) applications?

Dead fuel moisture values are calculated using fuel moisture conditioning which is based on each cell's aspect, elevation and canopy cover as well as the previous seven days of RAWS weather data. BFB and STFB obtain live fuel moisture values from daily WFDSS ERC-G calculations via the WFDSS-selected RAWS. These values can not be modified nor can they even be viewed. Foliar moisture content is set to a default value of 100% and this can not be changed. Modifying live herbaceous, live woody and foliar moisture content will likely be available in the future within the Analyst-Assisted version of BFB and STFB.

How do you locate the fire ignition to do a Short-Term Fire Behavior (STFB) analysis?

In the automated version of WFDSS STFB, the user can input a latitude/longitude for the ignition or zoom to a location and create an ignition point by clicking on the WFDSS map. Only point locations can be used. When the Analyst-Assisted version is available the fire behavior specialist will be able to upload shapefiles of the point fire location or fire perimeters.

Is spread by spotting incorporated in WFDSS Short-Term Fire Behavior (STFB)?

Yes, spread by spotting has been incorporated in STFB.

What crown fire calculation method is used in Short-Term Fire Behavior (STFB)?

WFDSS uses the Finney (1998) crown fire calculation method for all fire behavior modeling.

What is the Date and Time used for in Basic Fire Behavior (BFB) and Short-Term Fire Behavior (STFB) analyses?

BFB uses the start date and time (and the previous 7 days of weather) to determine dead fuel moisture values and calculate fire behavior characteristics for that "snapshot in time". STFB uses the start date and time in the same way, but in addition, it uses that as the beginning of the fire spread simulation.

What is a burn period and why do you need it for a Short-Term Fire Behavior (STFB) analyses?

In STFB the burn period is the number of hours, per operational period, that will be used for the fire spread simulation. Because the STFB model uses only one set of fuel moisture and wind (speed and direction) conditions for the entire simulation it is important to choose the burn period carefully.

How many burn periods can be selected when running Short-Term Fire Behavior (STFB)?

The model will allow up to three burn periods, however, it is crucial to keep in mind that all environmental conditions (fuel moistures, wind speed and wind direction) are held constant for the duration of the simulation. Therefore, the user should carefully consider the number of hours to use per burn period as well as how many burn periods are appropriate. You may want to choose to do analyses using one or two burn periods since in reality, it is unlikely that fuel moistures, wind direction and wind speeds would remain constant for very many hours.

What Output results are available when Basic Fire Behavior (BFB) is run and what are the units for each output?

BFB provides many of the same fire behavior outputs as BEHAVE (and BehavePlus). Below are the outputs available in WFDSS BFB and their units:

Output	Display Units
Flame Length	meters
Fireline Intensity	kilowatts per meter (kW/m)
Rate of Spread	meters per minute (m/min)
Heat per Unit Area	kilojoules per meter squared (kJ/m^2)
Crown Fire Activity	0 (no fire), 1 (surface fire), 2 (torching), 3 (active crown fire)
Maximum Spread Direction	radians

WFDSS BFB also calculates the following environmental outputs:

Output	Display Units
1 hour fuel moisture	fraction (e.g., 0.06 = 6%)
10 hour fuel moisture	fraction (e.g., 0.18 = 18%)
Solar radiation	watts per meter squared (W/m^2)

Can the Basic Fire Behavior (BFB) or Short-Term Fire Behavior (STFB) output legends be changed, for instance – can the units or colors be modified by the user?

No, in the automated version of WFDSS BFB and STFB neither the units nor the color choices can be changed. The fire behavior specialist will have the option to change the legend when the Analyst-Assisted version is available.

Can Basic Fire Behavior (BFB) and Short-Term Fire Behavior (STFB) analyses results be saved and downloaded to GIS?

No, in the automated version of BFB and STFB the results can not be saved nor downloaded, they can only be displayed within WFDSS; however, the user could save screen captures to be used in the Decision Document.

Can the Basic Fire Behavior (BFB) and Short-Term Fire Behavior (STFB) analyses be saved?

No, an analysis will be available for an incident for 20 days and then it will automatically be deleted.

When will the Analyst-Assisted version of WFDSS Basic Fire Behavior (BFB) and Short-Term Fire Behavior (STFB) be available?

Good question. The hope is that it will become available sometime by the middle of the 2009 fire season, but it will depend on what other WFDSS functionality is deemed most important!