

Exercise Answers

1. Question – Develop a Worksheet that looks like this.

The screenshot shows the BehavePlus 4.0.0 interface. At the top left is the BehavePlus 4.0.0 logo and at the top right is 'Page 1'. The main area is titled 'Inputs: SURFACE'. Below this are several sections with input fields:

- Description**: A text input field.
- Fuel/Vegetation, Surface/Understory**: A section header.
- Fuel Model**: A dropdown menu.
- Fuel Moisture**: A section header.
- Dead Fuel Moisture**: A percentage input field.
- Live Fuel Moisture**: A percentage input field.
- Weather**: A section header.
- Midflame Wind Speed**: An input field with units 'mi/h'.
- Wind Direction (from north)**: An input field with units 'deg'.
- Terrain**: A section header.
- Slope Steepness**: An input field with units '%'.
- Aspect**: An input field with units 'deg'.

Below the input fields is a section titled 'Run Option Notes' containing the following text:

Maximum reliable effective wind speed limit is imposed [SURFACE].
Calculations are only for the direction of maximum spread [SURFACE].
Fireline intensity, flame length, and spread distance are always for the direction of the spread calculations [SURFACE].
Wind and spread directions are degrees clockwise from north [SURFACE].
Wind direction is the direction from which the wind is blowing [SURFACE].

At the bottom is a section titled 'Output Variables' with the following text:

Surface Rate of Spread (maximum) (ch/h) [SURFACE]

➤ Select only the SURFACE module.

The screenshot shows a panel with three options, each with a checkbox and an 'Options...' button:

- Surface Fire Spread (SURFACE) Options...
- Crown Fire (CROWN) Options...
- Safety Zone (SAFETY) Options...

- Select only **Surface Rate of Spread** as an output.

Fuel & Moisture | Wind Speed | Directions | Slope | **Basic Outputs**

- Surface Rate of Spread
- Heat per Unit Area
- Fireline Intensity
- Flame Length

- Select the SURFACE input options as follows:

On the **Fuel & Moisture** tab

Moisture is entered by

- individual size class.
- dead and live category.
- moisture scenario.

On the **Directions** tab

Wind is

- specified on the worksheet.
- upslope.

Wind & spread directions are

- degrees clockwise from upslope
(direction the wind is pushing the fire).
- degrees clockwise from north
(direction from which the wind is blowing).

2. Question – Develop a Worksheet that looks like this.

BehavePlus 4.0.0 Page 1

Inputs: SURFACE

Description

Map

| | | |
|-----------------------------------|----|----------------------|
| Map Representative Fraction (1:x) | | <input type="text"/> |
| Contour Interval | ft | <input type="text"/> |
| Map Distance | in | <input type="text"/> |
| Number of Contour Intervals | | <input type="text"/> |

Run Option Notes

None

Output Variables

Slope Steepness (%)

Slope Elevation Change (ft) [SURFACE]

Slope Horizontal Distance (ft) [SURFACE]

- Select only the SURFACE module.
- On the **Slope** tab select.

Slope steepness is

specified on the worksheet.

calculated from map measurements.

- On the **Basic Outputs** tab select only these outputs.

Slope Steepness

Slope Elevation Change

Slope Horizontal Distance

3. Question – Make a Worksheet like this.

BehavePlus 5.0.0
Page 1

Inputs: SPOT

Description

Fuel/Vegetation, Overstory

Downwind Canopy Height ft

Torching Tree Height ft

Spot Tree Species

D.B.H. in

Weather

20-ft Wind Speed (upslope) mi/h

Terrain

Ridge-to-Valley Elevation Difference ft

Ridge-to-Valley Horizontal Distance mi

Spotting Source Location

Fire

Number of Torching Trees

Run Option Notes

None

Output Variables

Spot Dist from Torching Trees (mi) [SPOT]

- Select only the SPOT module.

There is no reason to save this Worksheet, even if you use it a lot. It is easier to just select the SPOT module.

4. Question – Make a Worksheet like this.

BehavePlus 5.0.0
Page 1

Inputs: SURFACE, SPOT, IGNITE

Description

Fuel/Vegetation, Surface/Understory

Fuel Model

Fuel/Vegetation, Overstory

Downwind Canopy Height ft

Fuel Moisture

1-h Moisture %

10-h Moisture %

100-h Moisture %

Live Herbaceous Moisture %

Live Woody Moisture %

Weather

Midflame Wind Speed (upslope) mi/h

20-ft Wind Speed (upslope) mi/h

Air Temperature °F

Fuel Shading from the Sun %

Terrain

Slope Steepness %

Ridge-to-Valley Elevation Difference ft

Ridge-to-Valley Horizontal Distance mi

Spotting Source Location

Run Option Notes

Maximum reliable effective wind speed limit IS imposed [SURFACE].

Calculations are only for the direction of maximum spread [SURFACE].

Fireline intensity, flame length, and spread distance are always for the direction of the spread calculations [SURFACE].

Wind is blowing upslope [SURFACE].

Output Variables

Surface Rate of Spread (maximum) (ch/h) [SURFACE]

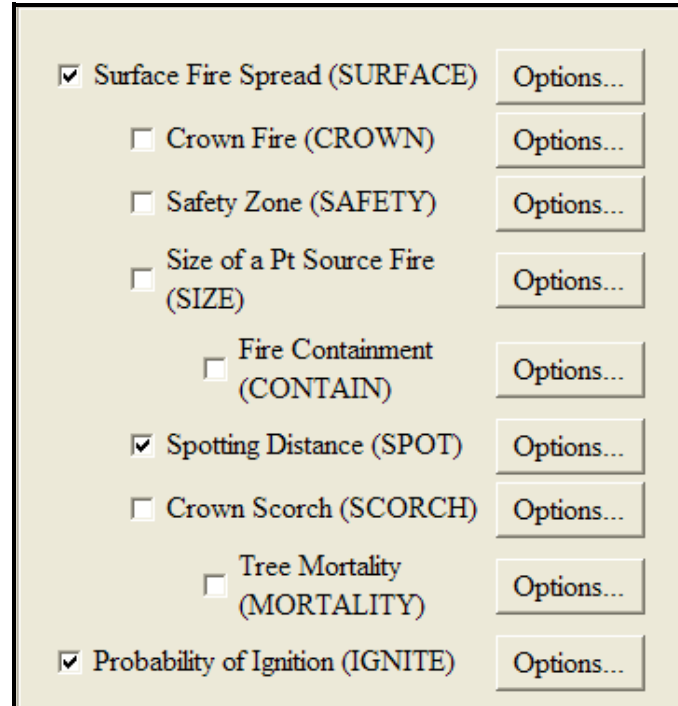
Flame Length (ft) [SURFACE]

Spot Dist from a Wind Driven Surface Fire (mi) [SPOT]

Probability of Ignition from a Firebrand (%) [IGNITE]

(continued on next page)

- Select the SURFACE, SPOT, and IGNITE modules.



| | |
|--|------------|
| <input checked="" type="checkbox"/> Surface Fire Spread (SURFACE) | Options... |
| <input type="checkbox"/> Crown Fire (CROWN) | Options... |
| <input type="checkbox"/> Safety Zone (SAFETY) | Options... |
| <input type="checkbox"/> Size of a Pt Source Fire (SIZE) | Options... |
| <input type="checkbox"/> Fire Containment (CONTAIN) | Options... |
| <input checked="" type="checkbox"/> Spotting Distance (SPOT) | Options... |
| <input type="checkbox"/> Crown Scorch (SCORCH) | Options... |
| <input type="checkbox"/> Tree Mortality (MORTALITY) | Options... |
| <input checked="" type="checkbox"/> Probability of Ignition (IGNITE) | Options... |

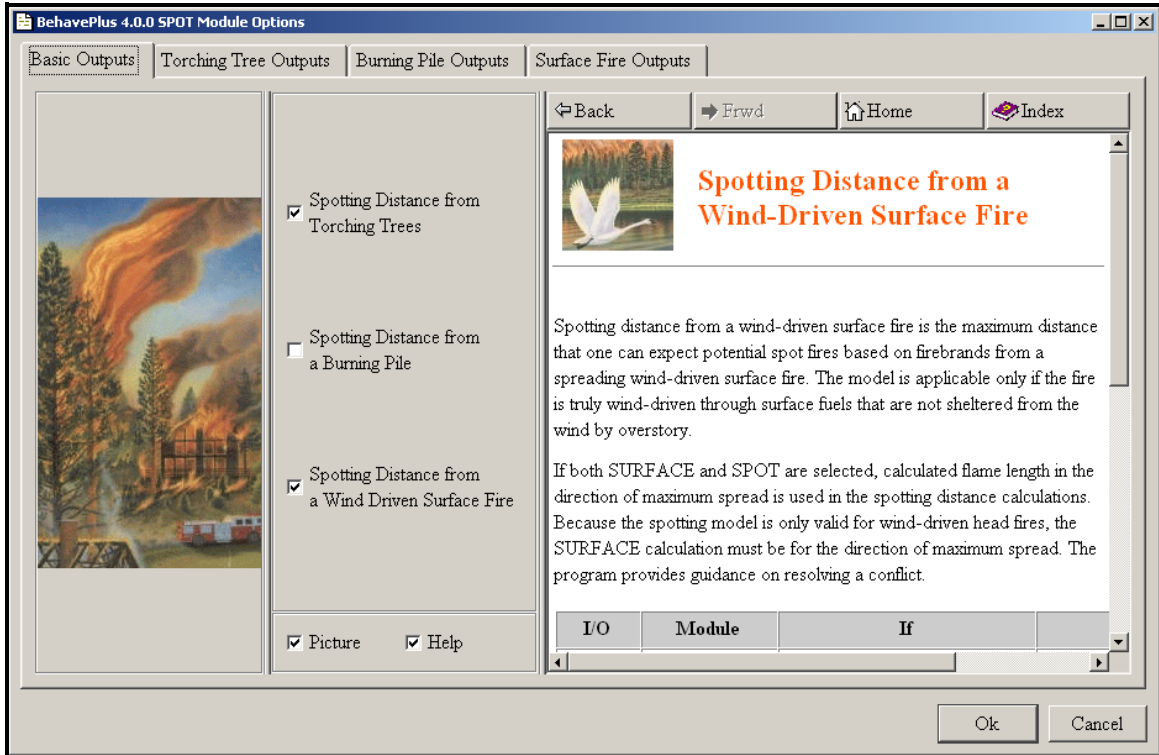
The indentation of SPOT under SURFACE indicates that output from SURFACE is used as input to SPOT. The calculations in IGNITE do not depend on either SURFACE or SPOT.

Change the selected output variable from the default of spotting distance from torching trees to spotting distance from a wind-driven surface fire.

- Click on the **Module Selection** button.
- Click the options button associated with SPOT.

The **Basic Outputs** tab is selected.

- Change the selected output as follows.



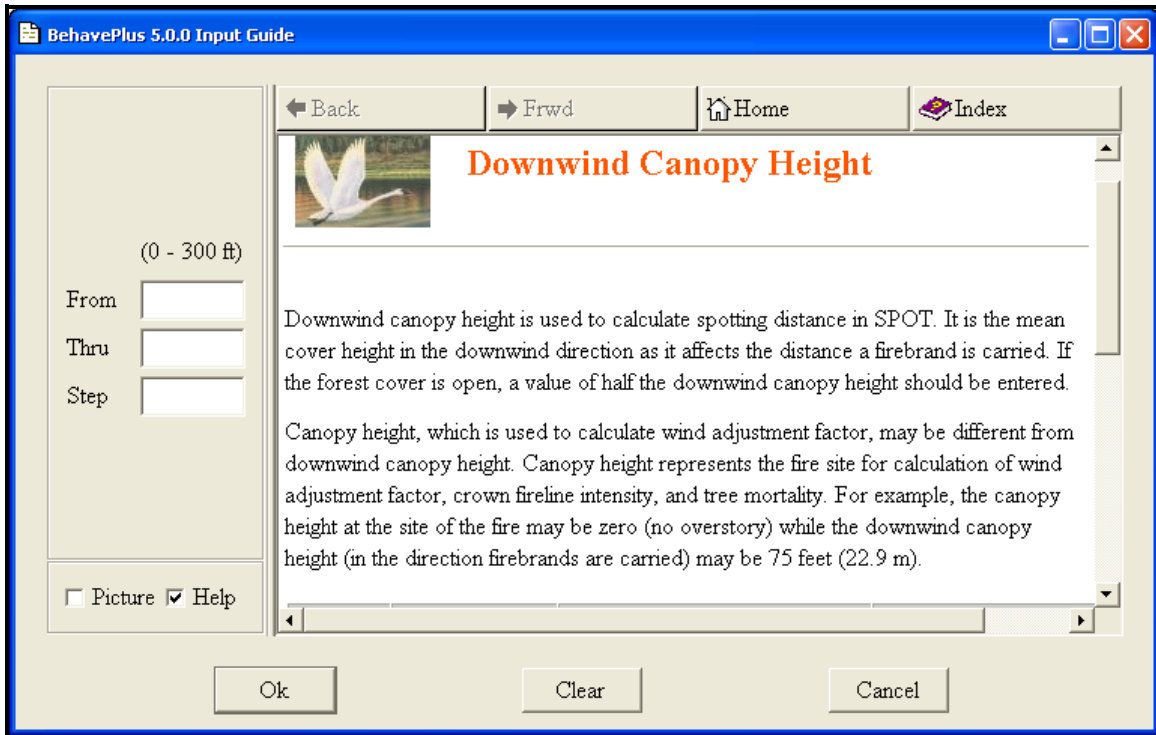
- Hold the cursor over the selected output variable and read the description.

Note that this model is applicable only if the burning surface fuels are not sheltered from the wind.

Note that the Flame Length of the head fire calculated in SURFACE is used to calculate spotting distance from a wind-driven surface fire.

Question – Is the variable “Downwind Canopy Height” different from “Canopy Height”?

- Press the Guide button associated with Downwind Canopy Height and look at the Help window.



NOTE: This is an example of the importance of understanding the models with all of their assumptions and limitations. It is your responsibility to provide valid input and to correctly interpret the results.

Remember that the four lessons in this Introduction Unit are aimed at teaching you operation of the program, not modeling concepts.