



Worksheets Lesson

Exercise Answers

1. Open a new **BasicStart.bpw** Worksheet. Develop a Worksheet that looks like the following.
Question: If Wind Direction (from north) is 90° , which way is the wind blowing?

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Inputs: SURFACE

Description []

Fuel/Vegetation, Surface/Understory

Fuel Model []

Fuel Moisture

Dead Fuel Moisture % []

Live Fuel Moisture % []

Weather

Midflame Wind Speed mi/h []

Wind Direction (from north) deg []

Terrain

Slope Steepness % []

Site Aspect deg []

Run Option Notes

Maximum effective wind speed limit IS imposed [SURFACE].

Fire spread is in the HEADING direction only [SURFACE].

Wind is in specified directions [SURFACE].

Wind and spread directions are degrees clockwise from north [SURFACE].

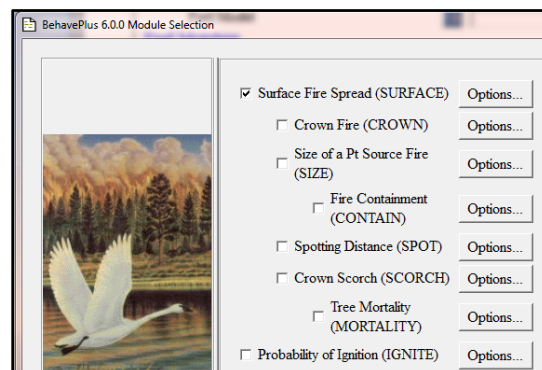
Wind direction is the direction from which the wind is blowing [SURFACE].

Output Variables

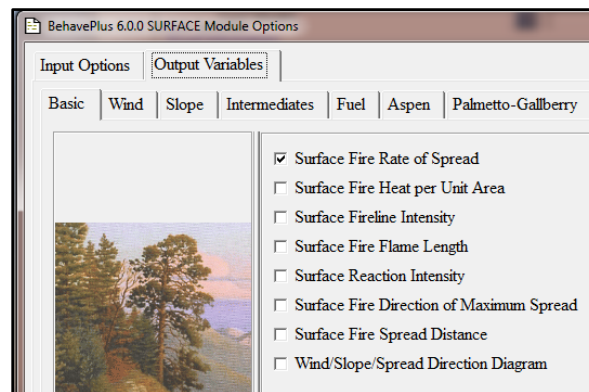
Surface Fire Rate of Spread (ch/h) [SURFACE]

The following steps were used to create the Worksheet.

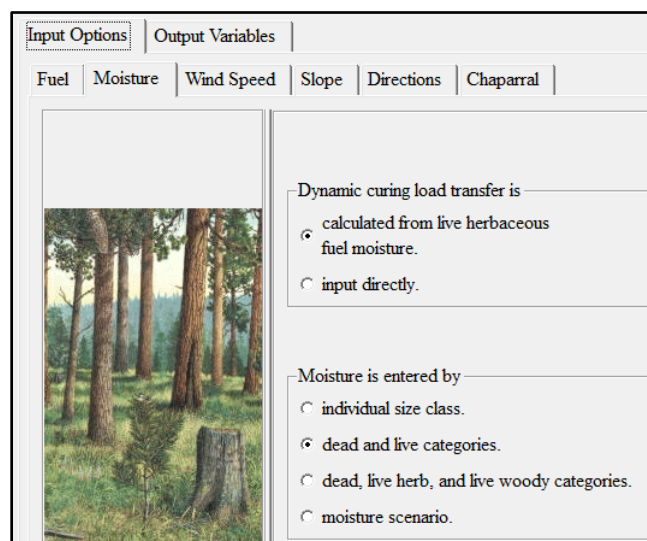
- Go to **Configure > Module Selection**.
- Confirm that only the SURFACE module is selected.



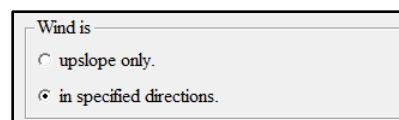
- Go to **SURFACE Options... > Output Variables > Basic.**
- Select only **Surface Fire Rate of Spread.**



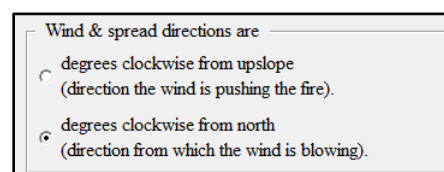
- Click on the **Input Options** tab.
- On the **Moisture** tab, select **Moisture is entered by dead and live categories.**



- On the **Wind Speed** tab, select **Wind is in specified directions.**



- On the **Directions** tab, select **Wind & spread directions are degrees clockwise from north.**



If Wind Direction (from north) is 90°, then the wind is blowing from the east to the west. This is found at the bottom of the Help file for Wind Direction, which was accessed using the **Guide** button. There is a graph to help determine the correct wind direction.

2. Develop a Worksheet that looks like this one.

Question: How does this Worksheet compare to the related tool (Tools > Slope from map measurements)?

The following steps were used to create the Worksheet.

- Go to **Configure > Module Selection**.
- Select only the SURFACE Module.
- Click on to **SURFACE Options....**
- On the **Input Options > Slope** tab, select **Slope steepness is calculated from map measurements**.

- Go to **Output Variables > Basic**. Uncheck all output variables.
- Go to **Output Variables > Slope**. Select all three available output variables: **Slope Steepness**, **Slope Elevation Change**, and **Slope Horizontal Distance**.

This Worksheet is set up and includes the same information as the Tool. Both of them require the same inputs and provide the same outputs. The tool allows you to more easily specify the units (English or metric). It also calculates the slope steepness in both percent and degrees.

Map Representative Fraction Selector

1:x	in/mi	mi/in	cm/km	km/cm
1980	32.0000	0.03125	50.5051	0.019
3960	16.0000	0.06250	25.2525	0.039
7920	8.0000	0.12500	12.6263	0.079

Map Rep Fraction:

Units:

Contour Interval: ft

Map Distance: in

Number of Contours:

Calculate

Slope Steepness: %

Slope Steepness: degrees

Slope Elevation Change: ft

Slope Horizontal Distance: ft

Description:

☒ Picture ☒ Help

Dismiss **Export**

Slope from Map Measurements Tool

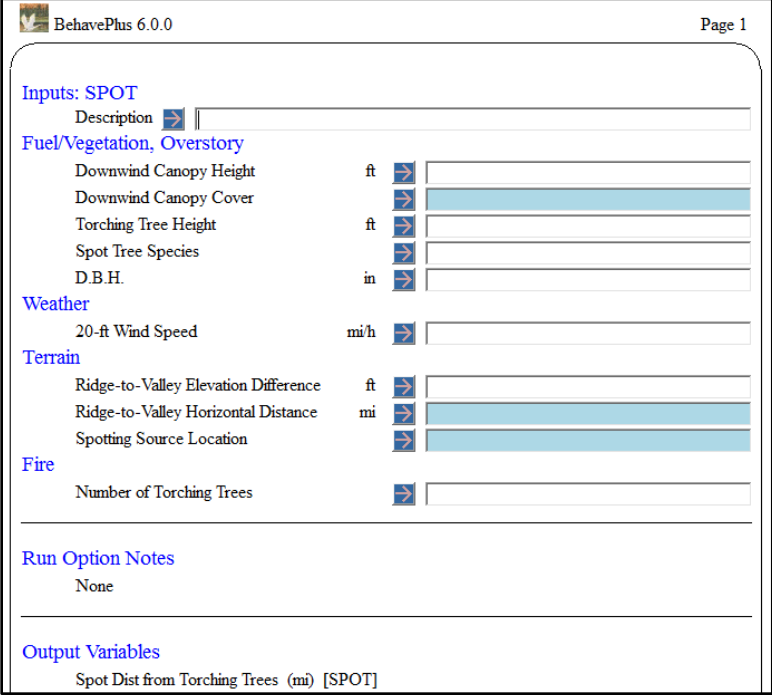
This page determines the slope of a selected area based on map measurements. It provides the same outputs as the SURFACE module when the input option *Slope steepness is calculated from map measurements* is selected.

Controls

- Map Representative Fraction (1 x)**
 The map representative fraction of the site is entered by double-clicking on the value in the selector box (top) or typing it directly into the data entry box (bottom). For example, type 24000 for a map representative fraction of 1:24,000. The value in the data entry box is used in the calculations.

3. Create this Worksheet.

Question: How many Spot Tree Species are there?



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Inputs: SPOT

Description []

Fuel/Vegetation, Overstory

Downwind Canopy Height ft []

Downwind Canopy Cover []

Torching Tree Height ft []

Spot Tree Species []

D.B.H. in []

Weather

20-ft Wind Speed 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

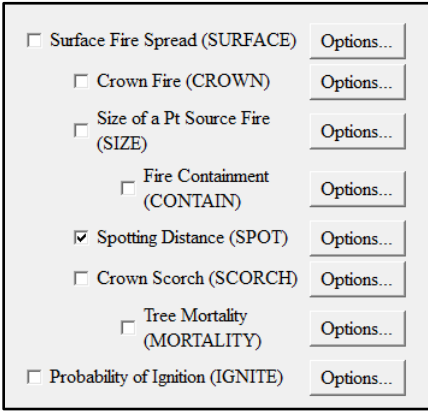
None

Output Variables

Spot Dist from Torching Trees (mi) [SPOT]

The following steps were used to create the Worksheet.

- Go to **Configure > Module Selection**.
- Uncheck the SURFACE module.
- Select the SPOT module.



☐ Surface Fire Spread (SURFACE) Options...

☐ Crown Fire (CROWN) Options...

☐ Size of a Pt Source Fire (SIZE) Options...

☐ Fire Containment (CONTAIN) Options...

☒ Spotting Distance (SPOT) Options...

☐ Crown Scorch (SCORCH) Options...

☐ Tree Mortality (MORTALITY) Options...


☐ Probability of Ignition (IGNITE) Options...

According to the help file, there are 14 Spot Tree Species, all of which are coniferous tree species.


4. Finally, open the 0Default.bpw Worksheet and change it to look like the following.
Question: How does the variable Downwind Canopy Height differ from Canopy Height?

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Inputs: SURFACE, SPOT, IGNITE


Description  ||

Fuel/Vegetation, Surface/Understory


Fuel Model 


Fuel/Vegetation, Overstory


Downwind Canopy Height ft 


Downwind Canopy Cover 


Fuel Moisture

1-h Fuel Moisture % 


10-h Fuel Moisture % 


100-h Fuel Moisture % 


Live Herbaceous Fuel Moisture % 


Live Woody Fuel Moisture % 

Weather


20-ft Wind Speed (upslope) mi/h 


Wind Adjustment Factor 


Air Temperature oF 


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 effective wind speed limit IS imposed [SURFACE].

Fire spread is in the HEADING direction only [SURFACE].

Wind is blowing upslope [SURFACE].

Wind and spread directions are degrees clockwise from upslope [SURFACE].

Direction of the wind vector is the direction the wind is pushing the fire [SURFACE].

Output Variables

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

Surface Fire Flame Length (ft) [SURFACE]

Spot Dist from a Wind Driven Surface Fire (mi) [SPOT]
(continued on next page)

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Input Worksheet (continued)

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

Notes

The following steps were used to create the Worksheet.

- Go to **Configure > Module Selection**.
- Select the SURFACE, SPOT, and IGNITE modules.

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.

- On the **Wind Speed** tab, select **Wind speed is entered as 20-ft wind and Input wind adj factor**.

Wind speed is entered as

- ☐ midflame height.
- ☒ 20-ft wind and Input wind adj factor.
- ☐ 20-ft wind and Calculated wind adj factor.
- ☐ 10-m wind and Input wind adj factor.
- ☐ 10-m wind and Calculated wind adj factor.

- Click on **SPOT Options... > Basic Outputs**.
- Select only **Spotting Distance from a Wind Driven Surface Fire**.

- ☐ Spotting Distance from Torching Trees
- ☐ Spotting Distance from Active Crown Fire
- ☐ Spotting Distance from a Burning Pile
- ☒ Spotting Distance from a Wind Driven Surface Fire

- Look at the help file for this variable. There are two important things to note.
 - This model is only applicable if the burning surface fuels are *not* sheltered from the wind.
 - Flame Length of the head fire calculated in SURFACE is used to calculate spotting distance from a wind-driven surface fire. Therefore, the SURFACE calculation must be for **HEADING** only.
- No other changes need to be made, so select **Ok** twice.

To answer the question, look at the Help file for **Downwind Canopy Height**. Downwind Canopy Height is the cover height in the downwind direction from the spotting source. Canopy Height represents the height of the canopy at the fire site, not downwind.

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

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