

Model and Pathway Test Report

Model: FBSDK Downloads, July 2011

Pathway(s): Calculate probability of ignition from lightning (IFT-ignite)
Calculate probability of ignition from a firebrand (IFT-ignite)

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General Testing Procedures

All models and modules implemented in IFTDSS undergo two types of testing:

- **Scientific testing** to ensure that the outputs produced by the model are consistent with a range of expected values generated by the native desktop software application and/or provided by the scientific model developer(s). These tests include model comparisons for a range of predefined scenarios developed to exercise different parts of the model.

- **Software testing** to ensure that the model is functioning from a usability perspective, accepting model inputs, and producing model outputs without generating software error reports. These automatic tests also ensure that as updates are made to the model or modeling framework, each individual model produces correct data values.

This document describes Sonoma Technology, Inc.'s test cases.

Scientific Testing

Test Case #1: Probability of Ignition from Lightning

This test case compared the Probability of Ignition from Lightning model (Latham and Schlieter, 1989) in IFTDSS to the desktop version of BehavePlus 5.0.5 using three stands to test for data ranges commonly observed by users and allow the comparison of a variety of results. The output parameter, probability of ignition from lightning, was compared.

Inputs and Results File Name

- Probability of ignition test case results (included in the IFTDSS online help under **IFTDSS Compared with Other Systems > Module Test Cases**)
- [Probability of ignition test case summary](#) (Appendix)

Passed/Fail: Passed

Issues: None identified

Test Case #2: Probability of Ignition from a Firebrand

This test case compared the Probability of Ignition from a Firebrand model (Schroeder, 1969) in IFTDSS to the desktop version of BehavePlus 5.0.5 using three stands to test for data ranges commonly observed by users and allow the comparison of a variety of results. The output parameter, probability of ignition from a firebrand, was compared.

Inputs and Results File Name

- Probability of ignition test case results (included in the IFTDSS online help under **IFTDSS Compared with Other Systems > Module Test Cases**)
- [Probability of ignition test case summary](#) (Appendix)

Passed/Fail: Passed

Issues: None identified

References

- Documentation of BehavePlus operation and application:
<http://www.firemodels.org/index.php/national-systems/behaveplus>
- Latham, Don J.; Schlieter, Joyce A. (1989) [Ignition probabilities of wildland fuels based on simulated lightning discharges](#). Research Paper INT-411. USDA Forest Service, Intermountain Research Station, Ogden, UT. 20 p.

Appendix: Scientific Test Cases for the IFTDSS Calculate Probability of Ignition from Lightning Model and Calculate Probability of Ignition from a Firebrand Model as Implemented in BehavePlus

Summary of Findings

Both the Probability of Ignition from Lightning and Probability of Ignition from a Firebrand models as implemented in IFTDSS are a scientifically sound representation of the desktop version of BehavePlus 5.0.5. In both test cases, the output values from IFTDSS and desktop BehavePlus were identical.

Methods

Test Case 1: Probability of Ignition from Lightning

This test case compared the Probability of Ignition from Lightning model in IFTDSS to the desktop version of BehavePlus 5.0.5 using three simulations (Table 1) to test for data ranges commonly observed by users and allow the comparison of a variety of results.

Table 1. The input data used for the Probability of Ignition from Lightning model test case.

Input Parameter	Unit	Simulation 1	Simulation 2	Simulation 3
Lightning Ignition Fuel Type		Lodgepole pine duff	Lodgepole pine duff	Lodgepole pine duff
Duff & Litter Depth	inch	3	6	9
100-hr Moisture	percent	25	12	8
Lightning Strike Type		Unknown	Unknown	Unknown

Test Case 2: Probability of Ignition from a Firebrand

This test case compared the Probability of Ignition from a Firebrand model in IFTDSS to the desktop version of BehavePlus 5.0.5 using three simulations (Table 2) to test for data ranges commonly observed by users and allow the comparison of a variety of results.

Table 2. Input data used for the Probability of Ignition from a Firebrand model test case.

Input Parameter	Unit	Simulation 1	Simulation 2	Simulation 3
Air Temperature	Fahrenheit	75	80	85
Fuel Shading from Sun	percent	35	35	35
1-hr Moisture	percent	15	7	3

Results

Test Case 1: Probability of Ignition from Lightning

Results from the Probability of Ignition from Lightning model implemented in IFTDSS and the BehavePlus desktop version for the three stands tested were identical (Table 3).

Table 3. Results from the Probability of Ignition from Lightning model comparison.

Output Parameter	Unit	Simulation 1		Simulation 2		Simulation 3	
		IFTDSS	Behave Plus	IFTDSS	Behave Plus	IFTDSS	Behave Plus
Probability of Ignition from Lightning	percent	23	23	34	34	34	34

Test Case 2: Probability of Ignition from a Firebrand

Results from the Probability of Ignition from a Firebrand model implemented in IFTDSS and the BehavePlus desktop version for the three stands tested were identical (Table 4).

Table 4. Results from the Probability of Ignition from a Firebrand model comparison.

Output Parameter	Unit	Simulation 1		Simulation 2		Simulation 3	
		IFTDSS	Behave Plus	IFTDSS	Behave Plus	IFTDSS	Behave Plus
Probability of Ignition from a firebrand	percent	14	14	48	48	86	86