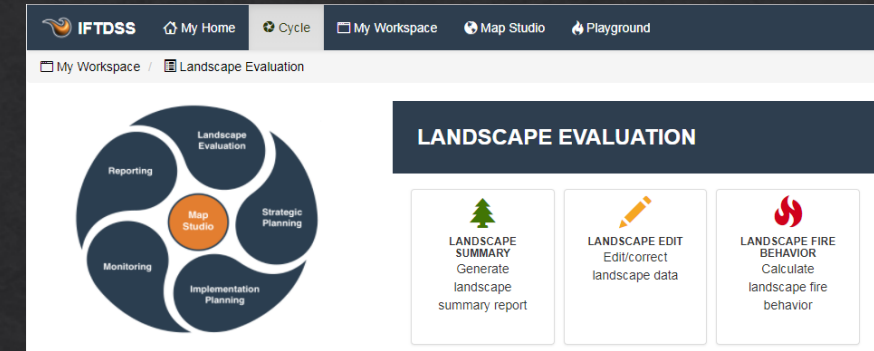
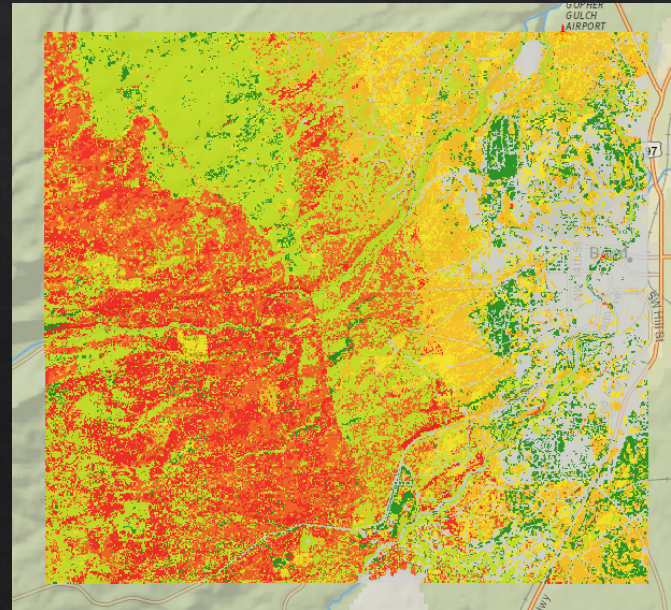


Fire Behavior Modeling in IFTDSS

Webinar Overview

1. Overview of 'Landscape Fire Behavior'
2. Model inputs
3. Auto97th
4. Coming to IFDSS soon
5. Demo in the application
6. ArcMap view of downloads



Landscape Fire Behavior Run - WestBendWUI

Run Creation

Run Name* WestBendWUI Date Mar 26, 2018 11:44:06 AM

Owner nvaillant Model Type Landscape Fire Behavior

Select Landscape

Select Landscape: WestBendWUI ✓

Or Create a New Landscape:

Create Here Create in Map Studio

✓ Wind

Wind speed (mph)* 20 Wind Direction (0 from north)* 220

✓ Crown Fire Inputs

Crown Fire Method* Scott/Reinhardt Foliar Moisture Content* 100

✓ Initial Fuel Moisture

Model	1hr FM	10hr FM	100hr FM	Herb FM	Woody FM
default	3	4	5	30	60
165 (TU5)	5	6	7	45	100

+ add row

Save Save and Run

Fire Behavior Modeling in IFTDSS

Landscape Fire Behavior

Landscape Fire Behavior

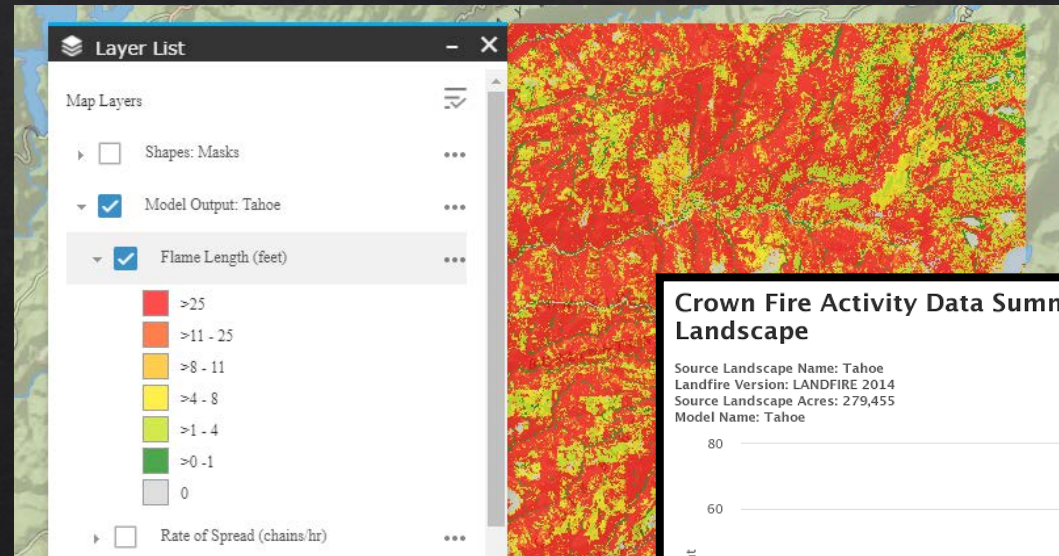
- Basic Fire Behavior from FlamMap5
- “Snap shot” of potential fire behavior
- Each pixel is burned independently of every other pixel

Model outputs

- Maps
- Reports
- GeoTiff for use outside of IFTDSS

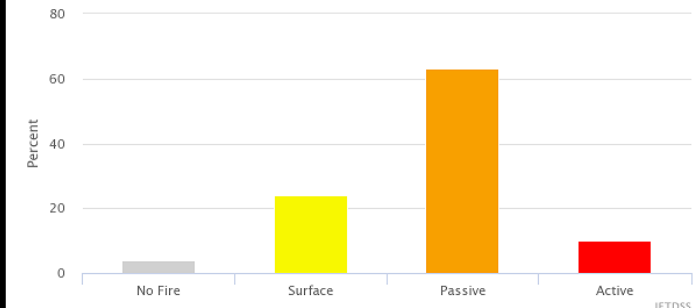
Model Inputs

- Landscape
- Wind
- Crown fire method
- Foliar moisture
- Initial surface fuel moisture



Crown Fire Activity Data Summary within "Tahoe" Landscape

Source Landscape Name: Tahoe
Landfire Version: LANDFIRE 2014
Source Landscape Acres: 279,455
Model Name: Tahoe



Fire Behavior Modeling in IFTDSS

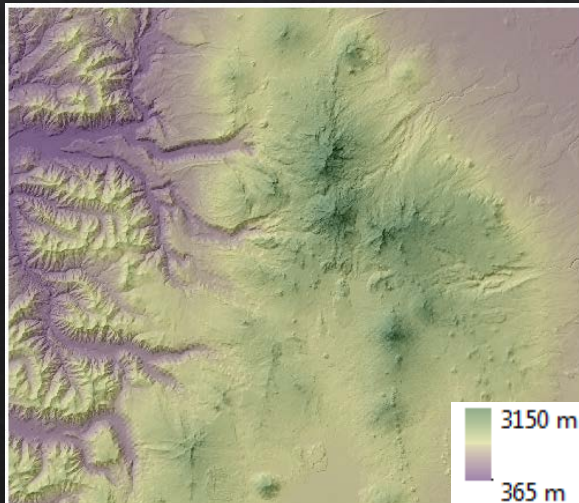
Wind Inputs

Wind speed

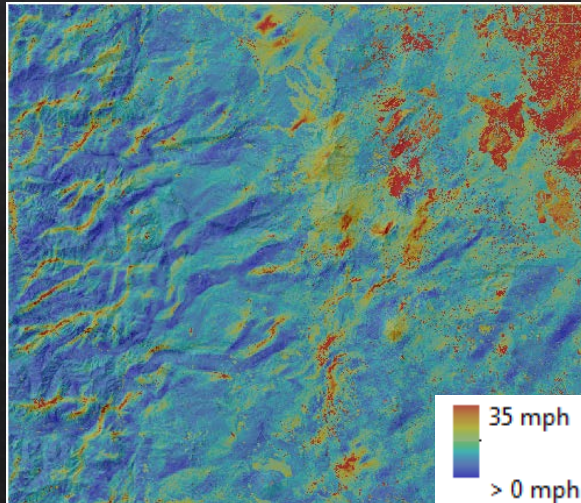
- 20 foot above vegetation or ground
- 0 – 100 mph

Wind direction

- Direction the wind is blowing from
- Degrees clockwise from north



Elevation



Midflame wind speed

Gridded winds

- Generated using WindNinja
- Broad scale wind patterns can be significantly modified in mountainous terrain generating complex speed and directional variations
- Fire behavior prediction accuracy increases when gridded wind inputs are used in modeling efforts
- Gridded winds are *always turned on*

Wind ?

Wind speed (mph)*	<input type="text" value="20"/>	Wind Direction (0 from north)*	<input type="text" value="220"/>
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Fire Behavior Modeling in IFTDSS

Crown Fire Inputs

Foliar Moisture Content

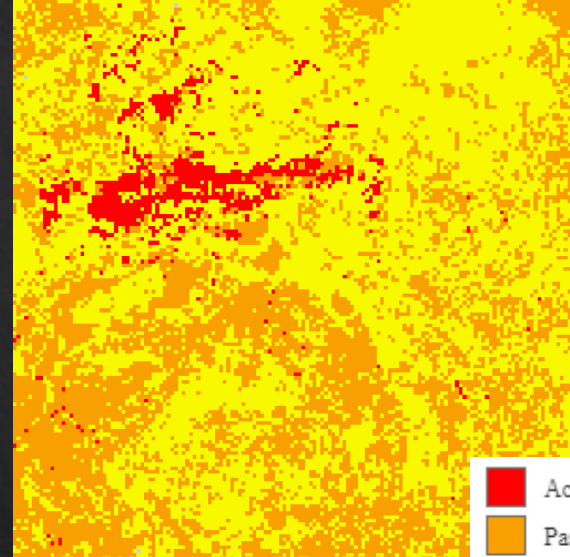
- Default value is set to 100%

Crown Fire Method

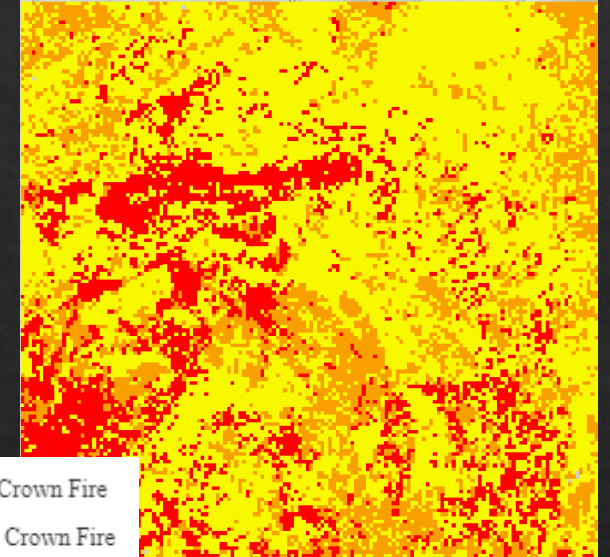
Finney vs Scott and Reinhardt

- Both use the same crown fire behavior models
- Minor differences in how they are applied (table below)
- *S/R results in more crown fire across a landscape all else held constant*

Finney Method



Scott & Reinhardt Method



Crown Fire Characteristic	Finney (1998)	Scott and Reinhardt (2001)
Active crown fire rate of spread (ROS)	ROS reduced to account for spotting modeled separately (based on Rothermel [1991]).	ROS not modified (based on Rothermel [1991]).
Passive crown fire ROS	Same as surface ROS.	ROS scaled to crown fraction burned (CFB).
Fire types	Surface, passive, and active.	Surface, passive, and active but conditional crown fire is not identified.

Fire Behavior Modeling in IFTDSS

Initial Fuel Moisture

Initial Fuel Moisture (%)

- Dead fuels: 1, 10, 100-hr
- Live fuels: herbaceous & woody
- One set for all fuel models
- *Or*
- Fuel model specific

Table 3—Dead fuel moisture content values (percent) for the dead fuel moisture scenarios.

	D1 Very low	D2 Low	D3 Moderate	D4 High
1-hr	3	6	9	12
10-hr	4	7	10	13
100-hr	5	8	11	14

Scott & Burgan 2005

Table 4—Live fuel moisture content values (percent) for the live fuel moisture scenarios.

	L1 Fully cured Very low	L2 Two-thirds cured Low	L3 One-third cured Moderate	L4 Fully green (uncured) High
Live herbaceous	30	60	90	120
Live woody	60	90	120	150

✓ Initial Fuel Moisture ?

Model	1hr FM	10hr FM	100hr FM	Herb FM	Woody FM
default	<input type="text" value="6"/>	<input type="text" value="7"/>	<input type="text" value="8"/>	<input type="text" value="60"/>	<input type="text" value="90"/>
<input type="text" value="122 (GS2)"/>	<input type="text" value="6"/>	<input type="text" value="7"/>	<input type="text" value="8"/>	<input type="text" value="90"/>	<input type="text" value="120"/>
<input type="button" value="+ add row"/>					

Fire Behavior Modeling in IFTDSS

“Auto97th”

Landscape Summary = Auto97th

- Good **starting place** for new landscapes
- Fire modeling done under 97th percentile
- Auto landscape & fire behavior reports
- Closest RAWS to landscape center
- Energy Release Component (ERC) calculated for each day to determine inputs

Wind speed & direction

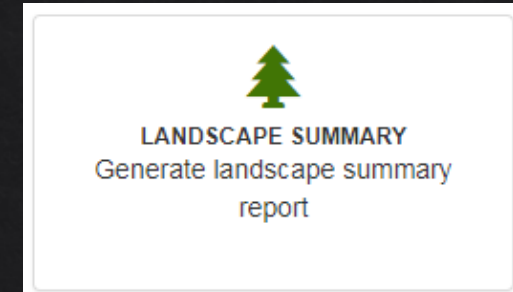
- ERC used to determine “peak fire season”
 - Month with highest ERC + 1 month before & after
- Determine 97th percentile wind speed
- Convert speed to 1 min max (Crosby & Chandler 2004)
- Wind direction = most frequent occurrence of 97th speed

Crown Fire Inputs

- Foliar moisture = 100%
- Crown fire method = S/R

Initial Fuel Moisture

- Dead and live fuel moistures averaged for all days where ERC is 97th percentile

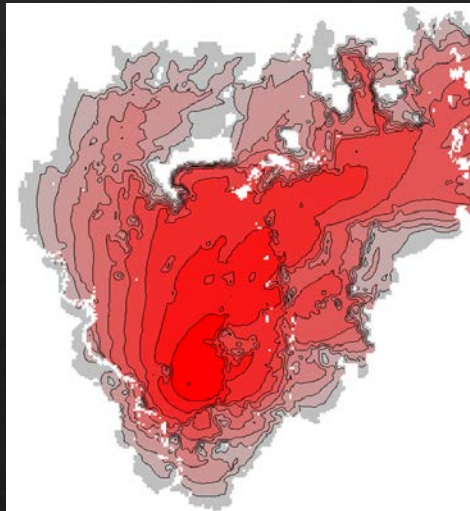
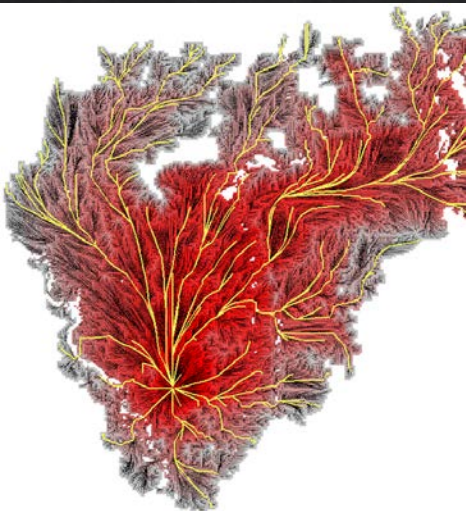


Fire Behavior Modeling in IFTDSS

Coming Later this Year

Short-Term Fire Behavior (STFB)

- Spread model - Minimum Travel Time (MTT) from FlamMap 5
- Single point or line ignition
- 1-3 days in duration
- Constant weather, wind, and fuel moisture
- Additional outputs: flow paths, arrival time
- Main use: short-term fire spread for set ignition and weather conditions, problem fire



Landscape Burn Probability

- Spread model - Minimum Travel Time (MTT) from FlamMap 5
- Thousands of random ignitions
- Single burn period
- Constant weather, wind, and fuel moisture
- Additional outputs: burn probability, conditional intensity
- Main use: wildfire risk assessments

