

# Wildland Fire Potential (WFP) for the conterminous United States (270-m GRID), v2012 continuous [wfp2012\_cnt]

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## What does this data set describe?

*Title:*

Wildland Fire Potential (WFP) for the conterminous United States (270-m GRID),  
v2012 continuous [wfp2012\_cnt]

*Abstract:*

The wildland fire potential (WFP) map is a raster geospatial product produced by the USDA Forest Service, Fire Modeling Institute that is intended to be used in analyses of wildfire risk or hazardous fuels prioritization at large landscapes (100s of square miles) up through regional or national scales. The WFP map builds upon, and integrates, estimates of burn probability (BP) and conditional probabilities of fire intensity levels (FILs) generated for the national interagency Fire Program Analysis system (FPA) using a simulation modeling system called the Large Fire Simulator (FSim; Finney et al. 2011). The specific objective of the 2012 WFP map is to depict the relative potential for wildfire that would be difficult for suppression resources to contain, based on past fire occurrence, 2008 fuels data from LANDFIRE, and 2012 estimates of wildfire likelihood and intensity from FSim. Areas with higher WFP values, therefore, represent fuels with a higher probability of experiencing high-intensity fire with torching, crowning, and other forms of extreme fire behavior under conducive weather conditions.

Using the FPA FSim products as inputs, as well as spatial data for vegetation and fuels characteristics from LANDFIRE and point locations of fire occurrence from FPA (ca. 1992 - 2010), we used a logical series of geospatial processing steps to produce an index of WFP for all of the conterminous United States at 270m resolution. The final WFP map is presented here in two forms: 1) continuous integer values, and 2) classified into five WFP classes of very low, low, moderate, high, and very high. We don't intend for the WFP map to take the place of any of the FSim products; rather, we hope that it provides a useful addition to the information available to managers, policy makers, and scientists interested in wildland fire risk analysis in the United States. On its own, WFP does not provide an explicit map of wildfire threat or risk, because no information on the effects of wildfire on specific values such as habitats, structures or infrastructure is incorporated in its development. However, the WFP map could be used to create value-specific risk maps when paired with spatial data depicting highly valued resources (Thompson et al. 2011). It is important to note that the WFP is also not a forecast or wildfire outlook for any particular season, as it does not include any information on current or forecasted weather or fuel moisture conditions. It is instead intended for long-term strategic planning and fuels management.

*Supplemental\_Information:*

To check for the latest version of the WFP geospatial data and map graphics, as well as documentation on the mapping process, see: <http://www.firelab.org/fmi/data-products/229-wildland-fire-potential-wfp>

For a technical overview of the Fire Simulation (FSim) system developed by the US Forest Service Missoula Fire Sciences Laboratory to estimate probabilistic components of wildfire risk see: Finney, M. A., C. W. McHugh, I. C. Grenfell, K. L.

Riley, and K. C. Short. 2011. A Simulation of Probabilistic Wildfire Risk Components for the Continental United States. *Stochastic Environmental Research and Risk Assessment* 25:973-1000.

The utility of the calibrated FSim BP and FIL data for quantitative geospatial wildfire risk assessment is detailed in a companion paper: Thompson, M. P., D. E. Calkin, M. A. Finney, A. A. Ager, and J. W. Gilbertson-Day. 2011. Integrated National-Scale Assessment of Wildfire Risk to Human and Ecological Values. *Stochastic Environmental Research and Risk Assessment* 25:761-780.

**1. How should this data set be cited?**

Fire Modeling Institute, USDA Forest Service, Rocky Mountain ,  
02/15/2013, Wildland Fire Potential (WFP) for the conterminous United States (270-m GRID), v2012 continuous [wfp2012\_cnt]: Fire Modeling Institute (FMI), Missoula Fire Sciences Laboratory, Missoula, MT.

Online Links:

- o <http://www.firelab.org/fmi/data-products/229-wildland-fire-potential-wfp>

**2. What geographic area does the data set cover?**

*West\_Bounding\_Coordinate*: -127.948502  
*East\_Bounding\_Coordinate*: -65.296368  
*North\_Bounding\_Coordinate*: 51.632799  
*South\_Bounding\_Coordinate*: 22.769813

**3. What does it look like?**

**4. Does the data set describe conditions during a particular time period?**

*Calendar\_Date*: ca. 2008  
*Time\_of\_Day*: unknown  
*Currentness\_Reference*: ground condition

**5. What is the general form of this data set?**

*Geospatial\_Data\_Presentation\_Form*: raster digital data

**6. How does the data set represent geographic features?**

**a. How are geographic features stored in the data set?**

This is a Raster data set. It contains the following raster data types:

- Dimensions 10803 x 17115 x 1, type Grid Cell

**b. What coordinate system is used to represent geographic features?**

The map projection used is Albers Conical Equal Area.

Projection parameters:

*Standard\_Parallel:* 29.500000  
*Standard\_Parallel:* 45.500000  
*Longitude\_of\_Central\_Meridian:* -96.000000  
*Latitude\_of\_Projection\_Origin:* 23.000000  
*False\_Easting:* 0.000000  
*False\_Northing:* 0.000000

Planar coordinates are encoded using row and column  
Abcissae (x-coordinates) are specified to the nearest 270.000000  
Ordinates (y-coordinates) are specified to the nearest 270.000000  
Planar coordinates are specified in meters

The horizontal datum used is North American Datum of 1983.  
The ellipsoid used is Geodetic Reference System 80.  
The semi-major axis of the ellipsoid used is 6378137.000000.  
The flattening of the ellipsoid used is 1/298.257222.

**7. How does the data set describe geographic features?**

**wfp2012\_cnt.vat**

Continuous Values of Wildland Fire Potential (Source: None)

**Rowid**

Internal feature number. (Source: ESRI)

*Sequential unique whole numbers that are automatically generated.*

**VALUE**

Continuous integer WFP values (Source: None)

<b>Range of values</b>	
<b>Minimum:</b>	0
<b>Maximum:</b>	98,368
<b>Units:</b>	dimensionless index

**COUNT**

Number of pixels with each value (Source: ESRI)

*Entity\_and\_Attribute\_Overview:*

This dataset represents wildland fire potential (WFP) as continuous integer values on a scale from 0 to 100,000.

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## Who produced the data set?

1. **Who are the originators of the data set?** (may include formal authors, digital compilers, and editors)
  - o Fire Modeling Institute, USDA Forest Service, Rocky Mountain Research Station and Fire and Aviation Management
2. **Who also contributed to the data set?**
3. **To whom should users address questions about the data?**

Fire Modeling Institute (FMI), USDA Forest Service  
Missoula Fire Sciences Laboratory  
Missoula, MT 59808  
USA

406-329-4800 (voice)  
fmi@fs.fed.us

Contact\_Instructions: <http://www.firelab.org/fmi>

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## Why was the data set created?

This dataset is the continuous WFP. It is intended for use in strategic wildland fire planning and land management planning at mostly regional to national scales.

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## How was the data set created?

1. **From what previous works were the data drawn?**

**FSim Burn Probability (BP)** (source 1 of 9)  
Fire Program Analysis (FPA) System and US Forest Service Missoula Fire Sciences Laboratory, 20120822, Burn Probabilities for the Conterminous US (270-m GRID) from Calibrated FSim Runs for the 2013 FPA Submissions [bp\_20120822].

Online Links:

- [<ftp://ftp2.fs.fed.us/incoming/wo\\_fam/FPA/GISData/FSim\\_Burn\\_Probability\\_FIL/FPA\\_FSim\\_CONUS\\_20120822/>](ftp://ftp2.fs.fed.us/incoming/wo_fam/FPA/GISData/FSim_Burn_Probability_FIL/FPA_FSim_CONUS_20120822/)

*Other\_Citation\_Details:*

Finney, M. A., C. W. McHugh, I. C. Grenfell, K. L. Riley, and K. C. Short. 2011. A Simulation of Probabilistic Wildfire Risk Components for the Continental United States. *Stochastic Environmental Research and Risk Assessment* 25:973-1000.

*Type\_of\_Source\_Media:* online

*Source\_Scale\_Denominator:* NA

*Source\_Contribution:*

A primary spatial input to calculating the large wildland fire potential. This layer provided information about the overall probability of any 270m pixel experiencing a large fire of any intensity.

**FSim FILs** (source 2 of 9)

Fire Program Analysis (FPA) System and US Forest Service Missoula Fire Sciences Laboratory, 20120822, Conditional Probabilities for Fire Intensity Levels 1-6 for the Conterminous US (270-m GRIDs) from Calibrated FSim Runs for the 2013 FPA Submissions [fil1\_20120822, fil2\_20120822, fil3\_20120822, fil4\_20120822, fil5\_20120822, fil6\_20120822].

Online Links:

- [<ftp://ftp2.fs.fed.us/incoming/wo\\_fam/FPA/GISData/FSim\\_Burn\\_Probability\\_FIL/FPA\\_FSim\\_CONUS\\_20120822/>](ftp://ftp2.fs.fed.us/incoming/wo_fam/FPA/GISData/FSim_Burn_Probability_FIL/FPA_FSim_CONUS_20120822/)

*Other\_Citation\_Details:*

Finney, M. A., C. W. McHugh, I. C. Grenfell, K. L. Riley, and K. C. Short. 2011. A Simulation of Probabilistic Wildfire Risk Components for the Continental United States. *Stochastic Environmental Research and Risk Assessment* 25:973-1000.

*Type\_of\_Source\_Media:* online

*Source\_Scale\_Denominator:* NA

*Source\_Contribution:*

Primary spatial inputs to calculating the large wildland fire potential. This set of layers provided information about the conditional probability of particular fire intensity levels (i.e., likelihood of a particular intensity level, given a fire) for every 270m pixel.

**LANDFIRE EVT** (source 3 of 9)

LANDFIRE, U.S. Department of the Interior, Geological Survey, 2011, LANDFIRE 1.1.0 Existing Vegetation Type layer.

Online Links:

- <http://landfire.cr.usgs.gov/viewer/>
- <http://www.landfire.gov/vegetation.php>

*Other\_Citation\_Details:*

Rollins, M. G. 2009. LANDFIRE: a nationally consistent vegetation, wildland fire, and fuel assessment. International Journal of Wildland Fire 18:235-249.

*Type\_of\_Source\_Media:* online

*Source\_Scale\_Denominator:* NA

*Source\_Contribution:*

This dataset was used to identify chaparral pixels for crown fire potential, and for spatially applying resistance to control weights to create the final WFP.

**LANDFIRE EVC** (source 4 of 9)

LANDFIRE, U.S. Department of the Interior, Geological Survey, 2011, LANDFIRE 1.1.0 Existing Vegetation Cover layer.

Online Links:

- <http://landfire.cr.usgs.gov/viewer/>
- <http://www.landfire.gov/vegetation.php>

*Other\_Citation\_Details:*

Rollins, M. G. 2009. LANDFIRE: a nationally consistent vegetation, wildland fire, and fuel assessment. International Journal of Wildland Fire 18:235-249.

*Type\_of\_Source\_Media:* online

*Source\_Scale\_Denominator:* NA

*Source\_Contribution:*

This dataset was used to identify chaparral pixels for crown fire potential.

**LANDFIRE FBFM40** (source 5 of 9)

LANDFIRE, U.S. Department of the Interior, Geological Survey, 2011, LANDFIRE 1.1.0 40 Scott and Burgan Fire Behavior Fuel Models layer.

Online Links:

- <http://landfire.cr.usgs.gov/viewer/>
- <http://www.landfire.gov/fuel.php>

*Other\_Citation\_Details:*

Scott, J. H. and R. E. Burgan. 2005. Standard fire behavior fuel models: a comprehensive set for use with Rothermel's surface fire spread model. General Technical Report RMRS-GTR-153, U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO.

*Type\_of\_Source\_Media:* online

*Source\_Scale\_Denominator:* NA

*Source\_Contribution:*

This layer was a primary input to the FSim BP and FIL datasets. It was used as an input at various points in the WFP mapping process, including spatially applying resistance to control weights and bringing in non-burnable and water.

**LANDFIRE Forest CC** (source 6 of 9)

LANDFIRE, U.S. Department of the Interior, Geological Survey, 2011, LANDFIRE 1.1.0 Forest Canopy Cover layer.

Online Links:

- <http://landfire.cr.usgs.gov/viewer/>
- <http://www.landfire.gov/fuel.php>

*Other\_Citation\_Details:*

Rollins, M. G. 2009. LANDFIRE: a nationally consistent vegetation, wildland fire, and fuel assessment. International Journal of Wildland Fire 18:235-249.

*Type\_of\_Source\_Media:* online

*Source\_Scale\_Denominator:* NA

*Source\_Contribution:*

This dataset was used to identify forest pixels for crown fire potential.

**LANDFIRE CBH** (source 7 of 9)

LANDFIRE, U.S. Department of the Interior, Geological Survey, 2011, LANDFIRE 1.1.0 Forest Canopy Base Height layer.

Online Links:

- <http://landfire.cr.usgs.gov/viewer/>
- <http://www.landfire.gov/fuel.php>

*Other\_Citation\_Details:*

Rollins, M. G. 2009. LANDFIRE: a nationally consistent vegetation, wildland fire, and fuel assessment. International Journal of Wildland Fire 18:235-249.

*Type\_of\_Source\_Media:* online

*Source\_Scale\_Denominator:* NA

*Source\_Contribution:*

This dataset was used to identify forest pixels for crown fire potential.

**FPA FOD** (source 8 of 9)

Fire Program Analysis (FPA) System and US Forest Service Missoula Fire Sciences Laboratory, 201207233, FPA Digital Fire Occurrence Database (FOD).

*Other\_Citation\_Details:*

Acquired database directly from Karen C. Short, US Forest Service, Missoula Fire Sciences Laboratory.

Includes fire occurrence records for 1992 - 2010.

*Type\_of\_Source\_Media:* disc

*Source\_Scale\_Denominator:* NA

*Source\_Contribution:*

This database of point fire occurrence was used to create a surface of small wildland fire potential.

**LANDFIRE Forest CH** (source 9 of 9)

LANDFIRE, U.S. Department of the Interior, Geological Survey, 2011, LANDFIRE 1.1.0 Forest Canopy Height layer.

Online Links:

- <http://landfire.cr.usgs.gov/viewer/>
- <http://www.landfire.gov/fuels.php>

*Other\_Citation\_Details:*

Rollins, M. G. 2009. LANDFIRE: a nationally consistent vegetation, wildland fire, and fuel assessment. *International Journal of Wildland Fire* 18:235-249.

*Type\_of\_Source\_Media:* online

*Source\_Scale\_Denominator:* NA

*Source\_Contribution:*

This dataset was used to identify forest pixels for crown fire potential.

**2. How were the data generated, processed, and modified?**

Date: Fall 2012 (process 1 of 6)

Multiply overall burn probability for each flame length to get actual probabilities for each flame length class.

Data sources used in this process:

- FSim Burn Probability (BP)
- FSim FILs

Date: Fall 2012 (process 2 of 6)

Weight the probabilities in each flame length class by the potential hazard they represent, including higher weights for places with crown fire potential, and sum them to derive a measure of large wildfire potential.

Data sources used in this process:

- LANDFIRE Forest CC
- LANDFIRE CBH
- LANDFIRE EVT
- LANDFIRE EVC
- LANDFIRE Forest CH

Date: Fall 2012 (process 3 of 6)

Create a separate surface of small wildfire potential based on ignition locations for fires smaller than 300 acres (generally not accounted for in FSim).

Data sources used in this process:

- FPA FOD

Date: Fall 2012 (process 4 of 6)

Integrate the large wildfire potential created in process steps 1-2 with the small wildfire potential created in process step 3. This was done by weighting each according to its relative contribution to total wildfire potential, then adding the weighted values.

Date: Fall 2012 (process 5 of 6)

Apply a set of resistance to control weights based on fireline construction rates in different fuel types

Data sources used in this process:

- LANDFIRE FBFM40
- LANDFIRE EVT

Date: Fall 2012 (process 6 of 6)

Convert WFP values to integers by multiplying by 10,000 and rounding to the nearest whole number (preserves four decimal places of precision).

### 3. What similar or related data should the user be aware of?

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## How reliable are the data; what problems remain in the data set?

### 1. How well have the observations been checked?

WFP, by its nature, is an abstract index of fire potential. Its accuracy, therefore, cannot be quantitatively measured. It is intended to be a relative measure of wildfire potential.

The FSim burn probability (BP) used as a primary input to the WFP map was objectively evaluated and calibrated for each Fire Planning Unit (FPU) in CONUS, using historic reference data on fire size distributions and annual area burned. More information can be found in the metadata for the BP dataset at:

[<ftp://ftp2.fs.fed.us/incoming/wo\\_fam/FPA/GISData/FSim\\_Burn\\_Probability\\_FIL/FPA\\_FSim\\_CONUS\\_20120822/>](ftp://ftp2.fs.fed.us/incoming/wo_fam/FPA/GISData/FSim_Burn_Probability_FIL/FPA_FSim_CONUS_20120822/)

Some LANDFIRE fuels and vegetation data used as inputs have also been evaluated for efficacy and calibrated based on to meet the objectives of LANDFIRE. More information can be found at: [http://www.landfire.gov/lf\\_evaluation.php](http://www.landfire.gov/lf_evaluation.php).

2. **How accurate are the geographic locations?**
3. **How accurate are the heights or depths?**
4. **Where are the gaps in the data? What is missing?**

All pixels that are part of the land and water of the conterminous United States have valid non-negative values. Zero values are valid and typically represent non-burnable land cover (water, snow/ice, developed, agriculture).

5. **How consistent are the relationships among the observations, including topology?**

Pixel values in this grid were used to create the classified version of 2013 WFP, using the following class breaks:

very low:  $\leq 51$   
low:  $>51$  and  $\leq 156$   
moderate:  $> 156$  and  $\leq 401$   
high:  $> 401$  and  $\leq 1935$   
very high:  $> 1935$

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## **How can someone get a copy of the data set?**

### **Are there legal restrictions on access or use of the data?**

*Access\_Constraints:* None.

*Use\_Constraints:*

This dataset is the product of modeling, and as such carries an inherent degree of error and uncertainty. Users must read and fully comprehend the metadata and other available documentation prior to data use. Users should acknowledge the Originator when using this dataset as a source. Users should share data products developed using the source dataset with the Originator. No warranty is made by the Fire Modeling Institute (FMI) or USDA Forest Service as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data, or for purposes not intended by FMI. Inputs to the WFP map, and therefore the WFP map as well, are intended to support 1) national (all states) strategic planning, 2) regional (single large states or groups of smaller states) planning, and 3)

strategic and possibly tactical planning for large sub-regional landscapes and Fire Planning Units (FPUs) (including significant portions of states or multiple federal administrative entities). The applicability of the WFP map to support fire and land management planning on smaller areas will vary by location and specific intended use. Further investigation by local and regional experts should be conducted to inform decisions regarding local applicability. It is the sole responsibility of the local user, using product metadata and local knowledge, to determine if and/or how the WFP map can be used for particular areas of interest. The WFP map is not intended to replace local products where they exist, but rather serve as a back-up by providing wall-to-wall cross-boundary data coverage. It is the responsibility of the user to be familiar with the value, assumptions, and limitations of WFP map. Managers and planners must evaluate the WFP map according to the scale and requirements specific to their needs. Spatial information may not meet National Map Accuracy Standards. This information may be updated without notification.

1. **Who distributes the data set?** (Distributor 1 of 1)

Fire Modeling Institute (FMI), USDA Forest Service  
Missoula Fire Sciences Laboratory  
Missoula, MT 59808  
USA

(406) 329-4800 (voice)  
fmi@fs.fed.us

*Contact\_Instructions:* <<http://www.firelab.org/fmi>>

2. **What's the catalog number I need to order this data set?**

Downloadable Data

3. **What legal disclaimers am I supposed to read?**

This dataset is in the public domain, and its users may not assert any proprietary rights thereto nor may they represent these data to anyone as other than an FMI and US Forest Service-produced dataset. These data are provided "as-is" and without express or implied warranties as to their completeness, accuracy, suitability, or current state thereof for any specific purpose. No agent of FMI or the US Forest Service shall have liability or responsibility to data users or any other person or entity with respect to

any loss or damage caused or alleged to be caused directly or indirectly by use or inability to use these data. These data and related graphics are not legal documents and are not intended to be used as such. Users take full responsibility for their applications of these data.

It is strongly recommended that these data are directly acquired from an official FMI distribution outlet and not indirectly through other sources which may have changed the data in some way. If you do transmit or provide these data (or any portion of them) to another user, these metadata must be included in their entirety.

#### 4. How can I download or order the data?

- **Availability in digital form:**

**Data format:** Zipped ESRI Grid (version Arc 9.3 Grid, zipped with WinZip 14.0) Size: 98.65

**Network links:** wfp\_2012\_continuous.zip

- **Cost to order the data:**

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## Who wrote the metadata?

Dates:

Last modified: 18-Apr-2013

Metadata author:

Greg Dillon  
Fire Modeling Institute (FMI), USDA Forest Service  
Spatial Fire Analyst  
Missoula Fire Sciences Lab  
Missoula, MT 59808  
USA

(406) 329-4800 (voice)  
fmi@fs.fed.us

*Contact\_Instructions:* <http://www.firelab.org/fmi>

Metadata standard:

FGDC Content Standards for Digital Geospatial Metadata (FGDC-STD-001-1998)

Metadata extensions used:

- <http://www.esri.com/metadata/esriprof80.html>

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