Wildfire Hazard Potential (WHP) for the conterminous United States (270-m GRID), v2014 classified [whp2014_cls]

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What does this data set describe?

Title:

Wildfire Hazard Potential (WHP) for the conterminous United States (270-m GRID), v2014 classified [whp2014_cls]

Abstract:

Federal wildfire managers often want to know, over large landscapes, where wildfires are likely to occur and how intense they may be. To meet this need we developed a map that we call wildfire hazard potential (WHP) – a raster geospatial product that can help to inform evaluations of wildfire risk or prioritization of fuels management needs across very large spatial scales (millions of acres). Our specific objective with the WHP map was to depict the relative potential for wildfire that would be difficult for suppression resources to contain. To create the 2014 version, we built upon spatial estimates of wildfire likelihood and intensity generated in 2014 with the Large Fire Simulation system (FSim) for the national interagency Fire Program Analysis system (FPA), as well as spatial fuels and vegetation data from LANDFIRE 2010 and point locations of fire occurrence from FPA (ca. 1992 – 2012). With these datasets as inputs, we produced an index of WHP for all of the conterminous United States at 270 m resolution. We present the final WHP map in two forms: 1) continuous integer values, and 2) five WHP classes of very low, low, moderate, high, and very high. On its own, WHP is not an explicit map of wildfire threat or risk, but when paired with spatial data depicting highly valued resources and assets such as structures or powerlines, it can approximate relative wildfire risk to those specific resources and assets. WHP 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 fuels management.

Supplemental_Information:

To check for the latest version of the WHP geospatial data and map graphics, as well as documentation on the mapping process, see:
<http://www.firelab.org/project/wildland-fire-potential>
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 , 20141222, Wildfire Hazard Potential (WHP) for the conterminous United States (270-m GRID), v2014 classified [whp2014_cls].

Other_Citation_Details:
Previous versions of this product were known as the Wildland Fire Potential (WFP) map.

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

West_Bounding_Coordinate: -127.972202
East_Bounding_Coordinate: -65.258792
North_Bounding_Coordinate: 51.632799
South_Bounding_Coordinate: 22.765684

3. **What does it look like?**
4. **Does the data set describe conditions during a particular time period?**

Calendar_Date: 31-Dec-2010
Time_of_Day: 120000
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 17133, 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: 29.5
Standard_Parallel: 45.5
Longitude_of_Central_Meridian: -96.0
Latitude_of_Projection_Origin: 23.0
False_Easting: 0.0
False_Northing: 0.0

   Planar coordinates are encoded using coordinate pair
   Abscissae (x-coordinates) are specified to the nearest
   0.000000037527980722984474
   Ordinates (y-coordinates) are specified to the nearest
   0.000000037527980722984474

The horizontal datum used is D North American 1983.
The ellipsoid used is GRS 1980.
The semi-major axis of the ellipsoid used is 6378137.0.
The flattening of the ellipsoid used is 1/298.257222101.

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

`wfp2014_cls.vat`
Classes of Wildlfire Hazard Potential (Source: None)
`COUNT`
Number of pixels in each class (Source: ESRI)

Number of pixels in each class.

`Rowid`
Internal feature number. (Source: ESRI)

Sequential unique whole numbers that are automatically generated.

`VALUE`
Numeric WHP class values (Source: None)

Value	Definition
7	Water
6	Non-burnable land
5	Very High WHP
4	High WHP
3	Moderate WHP
2	Low WHP
1	Very Low WHP

`CLASS_DESC`
Description of each wildfire hazard potential class.

Description of each wildfire hazard potential class.

Entity_and_Attribute_Overview:
This dataset represents wildlfire hazard potential (WHP) in six classes: 1) very low, 2) low, 3) moderate, 4) high, and 5) very high. In addition, non-burnable lands (6) and open water (7) are represented as separate classes.
Entity_and_Attribute_Detail_Citation:
Dillon, G.K.; Menakis, J.; and Fay, F. In press. Wildland Fire Potential: A Tool for Assessing Wildfire Risk and Fuels Management Needs. Proceedings from the Large Wildland Fire Conference, Missoula, MT, May 19-23, 2014.

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?**

    USDA Forest Service, Fire Modeling Institute

3. **To whom should users address questions about the data?**

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

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

    Contact_Instructions: <http://www.firelab.org/fmi>

Why was the data set created?

This dataset is the classified wildfire hazard potential (WHP). It is intended for use in strategic wildland fuels and land management planning at mostly regional to national scales. We have classified continuous WHP values into very low, low, moderate, high, and very high WHP classes, with national wildland fire and fuels planning objectives in mind.

How was the data set created?

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

    FSim Burn Probability (BP) (source 1 of 9)

    US Forest Service Missoula Fire Sciences Laboratory, 20140307, Burn Probabilities for the Conterminous US (270-m GRID) from Calibrated FSim Runs for the 2014 FPA Submissions [bp_20140307].

    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: hardDisk

Source_Contribution:
Burn probability modeled with FSim was a primary spatial input to calculating the large wildfire 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)

US Forest Service Missoula Fire Sciences Laboratory, 20140307, Conditional Probabilities of Fire Intensity Levels 1-6 for the Conterminous US (270-m GRIDs) from Calibrated FSim Runs for the 2014 FPA Submissions [fil1_20140307, fil2_20140307, fil3_20140307, fil4_20140307, fil5_20140307, fil6_20140307].

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: hardDisk
Source_Contribution:
Conditional flame lengths modeld with FSim were a primary spatial input to calculating the large wildfire 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.
FPA FOD (source 3 of 9)

US Forest Service Missoula Fire, Karen C. Short, 20140428, Spatial wildfire occurrence data for the United States, 1992-2012 [FPA_FOD_20140428].

Online Links:

- o <http://dx.doi.org/10.2737/RDS-2013-0009.2>

Other_Citation_Details:
Additional information is available in: Short KC. 2014. A spatial database of wildfires in the United States, 1992-2011. Earth Systems Science Data 6:1-27
Type_of_Source_Media: onLine
Source_Contribution:
The FPA point fire occurrence database (FPA FOD) was used to create a surface of small wildland fire potential. It was also used in the process of creating the burn probability (BP) and fire intensity level (FIL) rasters.
LANDFIRE FBFM40 (source 4 of 9)

LANDFIRE, U.S. Department of the Interior, Geo, 20130911, LANDFIRE 1.2.0 40 Scott and Burgan Fire Behavior Fuel Models layer.

Online Links:

- o <http://landfire.cr.usgs.gov/viewer/>
- o <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_Contribution:
The LANDFIRE Fire Behavior Fuel Models layer was a primary input to the FSim BP and FIL datasets. It was used as an input at various points in the WHP mapping process, including spatially applying resistance to control weights and bringing in non-burnable and water.

LANDFIRE CBH (source 5 of 9)

> LANDFIRE, U.S. Department of the Interior, Geo, 20130911,
> LANDFIRE 1.2.0 Forest Canopy Base Height layer.

> Online Links:

> - o [<http://landfire.cr.usgs.gov/viewer/>](http://landfire.cr.usgs.gov/viewer/)
> - o [<http://www.landfire.gov/fuel.php>](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_Contribution:
The LANDFIRE Canopy Base Height layer was used to identify forest pixels for crown fire potential.

LANDFIRE Forest CC (source 6 of 9)

> LANDFIRE, U.S. Department of the Interior, Geo, 20130911,
> LANDFIRE 1.2.0 Forest Canopy Cover layer.

> Online Links:

> - o [<http://landfire.cr.usgs.gov/viewer/>](http://landfire.cr.usgs.gov/viewer/)
> - o [<http://www.landfire.gov/fuel.php>](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_Contribution:
The LANDFIRE Forest Canopy Cover layer was used to identify forest pixels for crown fire potential.

LANDFIRE Forest CH (source 7 of 9)

LANDFIRE, U.S. Department of the Interior, Geo, 20130911,
LANDFIRE 1.2.0 Forest Canopy Height layer.

Online Links:

- o [<http://www.landfire.gov/fuels.php>](http://www.landfire.gov/fuels.php)
- o [<http://landfire.cr.usgs.gov/viewer/>](http://landfire.cr.usgs.gov/viewer/)

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_Contribution:
The LANDFIRE Forest Canopy Height layer was used to identify forest pixels for crown fire potential.
LANDFIRE EVT (source 8 of 9)

LANDFIRE, U.S. Department of the Interior, Geo, 20130911,
LANDFIRE 1.2.0 Existing Vegetation Type layer.

Online Links:

- o [<http://www.landfire.gov/vegetation.php>](http://www.landfire.gov/vegetation.php)
- o [<http://landfire.cr.usgs.gov/viewer/>](http://landfire.cr.usgs.gov/viewer/)

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_Contribution:
The LANDFIRE Existing Vegetation Data layer 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 9 of 9)

LANDFIRE, U.S. Department of the Interior, Geo, 20130911,
LANDFIRE 1.2.0 Existing Vegetation Cover layer.

Online Links:

- o [<http://www.landfire.gov/vegetation.php>](http://www.landfire.gov/vegetation.php)
- o [<http://landfire.cr.usgs.gov/viewer/>](http://landfire.cr.usgs.gov/viewer/)

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_Contribution:

The LANDFIRE Existing Vegetation Cover layer was used to identify chaparral pixels for crown fire potential.

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

Date: 20-Oct-2014 (process 1 of 6)
Step 1: Multiply overall burn probability for each flame length to get actual probabilities for each flame length class.

Data sources used in this process:

- o FSim FILs
- o FSim Burn Probability (BP)

Date: 20-Oct-2014 (process 2 of 6)
Step 2: 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:

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

Date: 20-Oct-2014 (process 3 of 6)
Step 3: 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:

- o FPA FOD

Date: 20-Oct-2014 (process 4 of 6)
Step 4: 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: 20-Oct-2014 (process 5 of 6)
Step 5: Apply a set of resistance to control weights based on fireline construction rates in different fuel types

Data sources used in this process:

- o LANDFIRE EVT

      o   LANDFIRE FBFM40

Date: 20-Oct-2014 (process 6 of 6)
Step 6: Convert WHP values to integers, then evaluate the statistical distribution of WHP values and classify them into fire classes: very high, high, moderate, low, very low. Add in non-burnable and water from the LANDFIRE FBFM40 layer to produce the final classified WFP.

Data sources used in this process:

      o   LANDFIRE FBFM40
3. **What similar or related data should the user be aware of?**

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

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

   WHP, 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 hazard potential. The FSim burn probability (BP) used as a primary input to the WHP 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. Some LANDFIRE fuels and vegetation data used as inputs have also been evaluated for efficacy and calibrated to meet the objectives of LANDFIRE. More information can be found at: <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-zero values.

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

   Values for non-burnable lands (6) and open water (7) were taken directly from the LANDFIRE 1.2.0 (2010) FBFM40 layer resampled to 270-m resolution. Water should also match exactly with all LANDFIRE 1.2.0 (2010) vegetation layers (e.g., Existing Vegetation Type) resampled to 270-m resolution.

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 WHP map, and therefore the WHP 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 WHP 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 WHP map can be used for particular areas of interest. The WHP 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 WHP map. Managers and planners must evaluate the WHP 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
   US

(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?**
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?**
   o **Availability in digital form:**

   Data format: Zipped ESRI Grid (version Arc 10.0 Grid, zipped with WinZip 14.0) Size: 22.8

   Network links: <http://www.firelab.org/project/wildland-fire-potential>

   o **Cost to order the data:** 0.00

Who wrote the metadata?

Dates:
    Last modified: 19-Dec-2014
Metadata author:
    Fire Modeling Institute (FMI), USDA Forest Service
    c/o Greg Dillon
    Spatial Fire Analyst
    Missoula Fire Sciences Lab

Missoula, MT 59808
US

(406) 329-4800 (voice)
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Contact_Instructions: <http://www.firelab.org/fmi>
Metadata standard:
FGDC Content Standard for Digital Geospatial Metadata (FGDC-STD-001-1998)

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