LANDFIRE National Map Products	Source(s)	Description
LANDFIRE FARSITE Fuel Data		
13 Fire Behavior Fuel Models (Described by Anderson 1982)	Missoula Fire Sciences Laboratory (MFSL)	A standardized description of fuel available to be consumed by a wildland fire based on the amount, distribution, and continuity of live and dead vegetation and wood. These Standard 13 fire behavior fuel models serve as input for Rothermel's mathematical surface fire behavior and spread model (Rothermel 1972). Fire behavior fuel models represent distinct distributions of fuel loadings found among surface fuel components (live and dead), size classes, and fuel types. The fuel models are described by the most common fire carrying fuel type (grass, brush, timber litter, or slash), loading and surface area-to-volume ratio by size class and component, fuelbed depth, and moisture of extinction. These fire behavior fuel models can serve as input to the FARSITE fire growth simulation model (Finney 1998) and FlamMap fire potential simulator (Stratton 2004). Further detail about the original fire behavior fuel models can be found in Anderson (1982) and Rothermel (1983).
40 Scott/Burgan (2005) Fire Behavior Fuel Models	MFSL	New set of fire behavior fuel models that increase number of models in areas with generally higher fuel moisture, increase the number of timber litter models. The main objective of creating these new models was to increase the ability to illustrate the effects of fuel treatments using fire behavior modeling. These fire behavior fuel models can serve as input to the FARSITE fire growth simulation model (Finney 1998); FlamMap fire potential simulator (Stratton 2004); BehavePlus (Andrews and others 2005); NEXUS (Scott 2003); FFE-FVS (Reinhardt and Crookston 2003), FMAplus® (http://www.fireps.com/fmanalyst3/index.htm). Nomographs for estimating fire behavior for the new fuel models without the use of a computer are also in development. Further detail about the 40 new fire behavior fuel models can be found in Scott and Burgan (2005).
Forest Canopy Bulk Density	MFSL	Canopy bulk density (CBD) describes the density of available canopy fuels in a stand. It is defined as the mass of available canopy fuel per unit canopy volume. Geospatial data describing canopy bulk density supplies information for fire behavior models such as FARSITE (Finney 1998) to determine the initiation and spread characteristics of crown fires across the landscape (VanWagner 1977; 1993). The map of canopy bulk density was generated using a predictive modeling approach that related Landsat imagery and spatially-explicit biophysical gradients to calculated values of CBD from field training sites. Because of model requirements these data are only provided for forested areas.

Forest Canopy Base Height	MFSL	The lowest height above the ground at which there is a sufficient amount of forest canopy fuel to propagate fire vertically into the canopy. Canopy base height (CBH) describes the average height from the ground to the bottom of the canopy of a stand. Specifically it is the lowest height above the ground in a forest stand at which there is a sufficient amount of forest canopy fuel to propagate fire vertically into the canopy. Geospatial data describing canopy base height supplies information for fire behavior models such as FARSITE (Finney 1998) to determine where a surface fire will transition to a crown fire (VanWagner 1977; 1993). The map of canopy base height was generated using a predictive modeling approach that related Landsat imagery and spatially-explicit biophysical gradients to calculated values of CBH from field training sites. Because of model requirements these data are only provided for forested areas.
Forest Vegetation Height	National Center for Earth Resources Observation Science (EROS) MFSL*	The height of forest vegetation over a specific area. Forest vegetation height describes the average height of the top of the vegetated canopy. Geospatial data describing canopy height supplies information for fire behavior models such as FARSITE (Finney 1998) to determine the starting point for embers, calculate wind reductions, and compute the volume of crown fuels (VanWagner 1977, 1993). The map of canopy height was generated using a predictive modeling approach that related Landsat imagery and spatially-explicit biophysical gradients to calculated values of average dominant height from field training sites. Because of model requirements these data are only provided for forested areas.
Forest Canopy Cover	EROS, MFSL*	The vertical projection of the tree canopy onto an imaginary horizontal surface representing the ground surface. Canopy cover describes percent cover of tree canopy in a stand. Specifically, canopy cover describes the vertical projection of the tree canopy onto an imaginary horizontal surface representing the ground surface A spatially-explicit map of canopy cover supplies information for fire behavior models such as FARSITE (Finney 1998) to determine surface fuel shading for calculating dead fuel moisture and for calculating wind reductions. The map of canopy cover was generated using a predictive modeling approach that related Landsat imagery and spatially-explicit biophysical gradients to calculated values of average canopy cover from field training sites and digital orthophoto quadrangles.
Elevation	EROS, MFSL*	Elevation represents height in meters above mean sea level. Elevation data for LANDFIRE were provided by the Elevation Derivatives for National Applications (EDNA) database (www.edna.usgs.gov). EDNA topographic data were derived from the National Elevation Database (NED; www.ned.usgs.gov). NED represents merged 7.5 minute quadrangle topographic data to provide a high-resolution, best quality elevation dataset seamlessly across the entire United States.
Aspect	EROS, MFSL*	Aspect represents the azimuth of the sloped surfaces across a landscape. Aspect data for LANDFIRE were provided by the Elevation Derivatives for National Applications (EDNA) database (www.edna.usgs.gov). EDNA topographic data were derived from the National Elevation Database (NED; www.ned.usgs.gov). NED represents merged 7.5 minute quadrangle topographic data to provide a high-resolution, best quality elevation dataset seamlessly across the entire United States.

Slope	EROS, MFSL*	Slope represents the percent change of elevation over a specific area. Slope data for LANDFIRE were provided by the Elevation Derivatives for National Applications (EDNA) database (www.edna.usgs.gov). EDNA topographic data were derived from the National Elevation Database (NED; www.ned.usgs.gov). NED represents merged 7.5 minute quadrangle topographic data to provide a high-resolution, best quality elevation dataset seamlessly across the entire United States.
Fire Effects Data		
Fuel Loading Models	MFSL	A fuel model containing information about the specific live and dead fuel amounts that can be used to predict fire effects such as soil heating, vegetation mortality, and smoke. Fuel loading models characterize fuel conditions and may be used to simulate wildland fire effects using applications such as FOFEM (Reinardt and others 1997) and CONSUME (Ottmar and others 1993). Fuel Loading Models contain representative loadings for each fuel component (for example, woody and non-woody) for typical vegetation classification systems. They characterize fuel loading across all vegetation and ecological types. These Fuel Loading Models are assigned to the LANDFIRE vegetation classification systems. Geospatial representation of fire effects fuel models may be used to prioritize fuel treatment areas, evaluate fire hazard and potential status, and examine past, present, and future fuel loading characterizations.
Fire Regime Data		
FRCC	MFSL	Fire Regime Condition Class (FRCC) is a classification of the amount of current vegetation departure from the presumed historical vegetation reference conditions using three condition classes (Hann and Bunnell 2001; Hardy and others 2001; Hann and others 2004). The three condition classes describe low departure (FRCC I), moderate departure (FRCC II), and high departure (FRCC III) This departure results from changes to one or more of the following ecological components: vegetation characteristics including species composition, structural stage, and canopy closure and spatial fire regime characteristics including fire frequency and severity. LANDFIRE produces maps of FRCC using methods derived from the Interagency Fire Regime Condition Class Guidebook (Hann and others 2004). It is important to note that the LANDFIRE version of FRCC only represents departure of current vegetation conditions from simulated historical reference conditions, which is only part of the FRCC characterization outlined in Hann and others (2004). LANDFIRE simulates historical vegetation reference conditions using the vegetation and disturbance dynamics model LANDSUM (Keane et al. 2002). Current vegetation conditions are derived from a classification of LANDFIRE maps of existing vegetation type, cover, and height.

FRCC Departure	MFSL	Departure determined using the Interagency Fire Regime Condition Class Guidebook. Departure is grouped to produce the 3 classes of FRCC. Fire Regime Condition Class (FRCC) departure index is a classification of the amount of current vegetation departure from the presumed historical vegetation reference conditions using a 0 to 100 percent range (Hann and others 2004). This departure results from changes to one or more of the following ecological components: vegetation characteristics including species composition, structural stage, and canopy closure and spatial fire regime characteristics including fire frequency and severity. LANDFIRE produces maps of FRCC using methods derived from the Interagency Fire Regime Condition Class Guidebook (Hann and others 2004). It is important to note that the LANDFIRE version of FRCC only represents departure of current vegetation conditions from simulated historical reference conditions, which is only part of the FRCC characterization outlined in Hann and others (2004). LANDFIRE simulates historical vegetation reference conditions using the vegetation and disturbance dynamics model LANDSUM (Keane et al. 2002). Current vegetation conditions are derived from a classification of LANDFIRE maps of existing vegetation type, cover, and height.
Fire Regime Groups	MFSL	The fire regime group map represents an integration of the spatial fire regime characteristics of frequency and severity simulated using the vegetation and disturbance dynamics model LANDSUM (Keane et al. 2002). These groups are intended to characterize the presumed historical fire regimes within landscapes based on interactions between vegetation dynamics, fire spread, fire effects, and spatial context. The fire regime groups mapped by LANDFIRE are: Fire Regime I (0 to 35 year frequency, low to mixed severity), Fire Regime II (0 to 35 year frequency, replacement severity), Fire Regime III (>35 year frequency, mixed severity), Fire Regime IV (35 to 200 year frequency, replacement severity), and Fire Regime V (>200 year frequency, replacement severity) (Hann and others 2004).
Simulated Historical Fire Return Interval	MFSL	The mean fire return interval map quantifies the average period between fires under the presumed historical fire regime. This frequency is derived from vegetation and disturbance dynamics simulations using LANDSUM (Keane et al. 2002). This map is intended to represent one component of the presumed historical fire regimes within landscapes based on interactions between vegetation dynamics, fire spread, fire effects, and spatial context.
Percent of Non-lethal Fire	MFSL	Percent of the occurrence of a non-lethal fire for a specific area over the LANDSUM fire regime simulation period. The percent of low severity fires quantifies the amount of low severity fires relative to mixed and replacement severity fires under the presumed historical fire regime. Low severity is defined as less than 25% average top-kill within a typical fire perimeter for a given vegetation type (<cite guidebook??>). This percent is derived from vegetation and disturbance dynamics simulations using LANDSUM (Keane et al. 2002). This map is intended to represent one component of the presumed historical fire regimes within landscapes based on interactions between vegetation dynamics, fire spread, fire effects, and spatial context.

Percent of Mixed-severity Fire	MFSL	The percent of mixed severity fires quantifies the amount of low severity fires relative to low and replacement severity fires under the presumed historical fire regime. Mixed severity is defined as between 25 and 75% average top-kill within a typical fire perimeter for a given vegetation type (<cite guidebook??>). This percent is derived from vegetation and disturbance dynamics simulations using LANDSUM (Keane et al. 2002). This map is intended to represent one component of the presumed historical fire regimes within landscapes based on interactions between vegetation dynamics, fire spread, fire effects, and spatial context.
Percent of Stand-replacing Fire	MFSL	Percent of the occurrence of a stand-replacing fire for a specific area over the LANDSUM fire regime simulation period. The percent of replacement severity fires quantifies the amount of replacement severity fires relative to low and mixed severity fires under the presumed historical fire regime. Replacement severity is defined as greater than 75% average top-kill within a typical fire perimeter for a given vegetation type (<cite guidebook??>). This percent is derived from vegetation and disturbance dynamics simulations using LANDSUM (Keane et al. 2002). This map is intended to represent one component of the presumed historical fire regimes within landscapes based on interactions between vegetation dynamics, fire spread, fire effects, and spatial context.
Succession Classes	MFSL	Existing vegetation composition combined with vegetation height and density. Describes the current successional status of a specific area with regard to LANDFIRE vegetation models. Identical to vegetation-fuel classes as described at www.frcc.gov. Succession classes characterize current vegetation conditions with respect to the species composition, vegetation cover, and vegetation height ranges of successional states that occur within each Biophysical Setting. They are identical to the vegetation-fuel classes described in the Interagency Fire Regime Condition Class Guidebook (Hann and others 2004). The presumed historical reference conditions of these successional states are simulated using the vegetation and disturbance dynamics model LANDSUM (Keane et al. 2002). The current vegetation-fuel classes can also represent uncharacteristic vegetation components that are not found within the compositional or structural variability of successional states defined for a Biophysical Setting, such as exotic species. The area contained in vegetatation-fuel classes is compared to the simulated historical reference conditions to calculate measurements of vegetation departure, such as Fire Regime Condition Class. It is important to note that vegetation-fuel classes do not directly quantify fuel characteristics of the current vegetation, but rather represent vegetative states with unique successional or disturbance-related dynamics, such as structural development or fire frequency.
Vegetation Data		

Environmental Site Potential	MFSL	Named after Nature Serve's Ecological Systems. Represents the natural plant communities that could occur at late or climax stages of successional development in the absence of disturbance. Environmental site potential maps reflect the current climate and physical environment. The LANDFIRE environmental site potential (ESP) map represents the vegetation that could be supported at a given site based on the biophysical environment. This map is used in LANDFIRE to inform the existing vegetation and fuels mapping processes. Map units are named according to Nature Serve's Ecological Systems classification (http://www.natureserve.org/publications/usEcologicalsystems.jsp), which is a nationally consistent set of mid-scale ecological units (Comer and others 2003). Usage of these classification units to describe environmental site potential, however, differs from the original intent of Ecological Systems as units of existing vegetation. As used in LANDFIRE, map unit names represent the natural plant communities that would become established at late or climax stages of successional development in the absence of disturbance. They reflect the current climate and physical environment, as well as the competitive potential of native plant species. The ESP grid is similar in concept to other approaches to potential vegetation in the western United States, including habitat types (e.g., Daubenmire 1968; Pfister and others 1977) and plant associations (e.g., Henderson and others 1989). It is important to note that ESP is an abstract concept and represents neither current nor historical vegetation.
Biophysical Settings	MFSL	Named after Ecological Systems. Represent natural plant communities that would become established in later stages of successional development given natural ecological processes such as fire. Biophysical settings are matched one-to-one with the vegetation succession models used to simulate historical reference conditions. The biophysical settings (BpS) grid represents the vegetation that can potentially exist at a given site based on both the biophysical environment and an approximation of the historical fire regime. It is a refinement of the Environmental site potential map. Map units are named according to NatureServe's Ecological Systems classification (www.natureserve.org/publications/usEcologicalsystems.jsp), which is a nationally consistent set of mid-scale ecological units (Comer and others 2003). Usage of these classification units to describe biophysical settings, however, differs from the original intent of Ecological Systems as units of existing vegetation. As used in LANDFIRE, map unit names represent the natural plant communities that would become established in later stages of successional development given natural ecological processes such as fire. Each BpS map unit is matched with a model of vegetation succession and both serve as key input to the LANDSUM landscape succession model. The BpS grid is similar in concept to potential natural vegetation groups used in mapping and modeling efforts related to Fire Regime Condition Class (Schmidt and others 2002; www.frcc.gov).

Existing Vegetation	EROS, MFSL**	Existing vegetation composition described by Ecological Systems map units developed by NatureServe and the Missoula Fire Sciences Laboratory. http://www.natureserve.org/publications/usEcologicalsystems.jsp. The existing vegetation type (EVT) map represents the vegetation currently present at a given site. Map units take their names from Nature Serve's Ecological Systems classification, which is a nationally consistent set of mid-scale ecological units (Comer and others 2003). The map of existing vegetation was generated using a predictive modeling approach that related Landsat imagery and spatially-explicit biophysical gradients to field reference data that had been classified to Ecological System based on dominant vegetation on the plot. Information is provided that links the LANDFIRE EVT map units to existing classifications such as the National Vegetation Classification System, Society of American Foresters, and Society of Range Management classifications.
Existing Vegetation Height	EROS, MFSL**	Vegetation height represents the average height of the dominant vegetation over a pixel. The map of canopy height was generated using a predictive modeling approach that related Landsat imagery and spatially-explicit biophysical gradients to calculated values of average dominant height from field training sites.
Existing Vegetation Cover	EROS, MFSL**	Vegetation cover represents the average percent cover of existing vegetation over a pixel. The map of canopy cover was generated using a predictive modeling approach that related Landsat imagery and spatially-explicit biophysical gradients to calculated values of average canopy cover from field training sites and digital orthophoto quadrangles..
Vegetation Models (not geospatial)	TNC	Succession models for each biophysical setting in a mapzone. Used as initialization for historical fire regime modeling with LANDSUMv4.

* These layers are produced at EROS and prepared for FARSITE by the MFSL Fuel Team.

** These layers are produced at EROS. Existing Vegetation and Biophysical Settings are rectified at MFSL to ensure ecological consistency.

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