Updated April 2016

LANDFIRE Data Product Descriptions with References

Reference

LANDFIRE Reference Database

The LF Reference Database (LFRDB) includes vegetation and fuel data from approximately 800,000 geo- referenced sampling units throughout the United States. These data are amassed from numerous sources and in large part from existing information resources of outside entities, such as the USFS Forest Inventory and Analysis (FIA) Program, the USGS National Gap Analysis Program, and state natural heritage programs.

Vegetation data drawn from these sources and used by LF include natural community occurrence records, estimates of canopy cover and height per plant taxon, and measurements (such as diameter, height, crown ratio, crown class, and density) of individual trees. Fuel data used include biomass estimates of downed woody material, percentage cover and height of shrub and herb layers, and canopy base height estimates. Digital photos of the sampled units are archived when available. Toney and others (2007) explain in detail how these types of field data, specifically those collected by FIA, have been acquired, incorporated into the LFRDB, and used in LF. Several key attributes are systematically derived from the acquired data and included in the LFRDB. These attributes include existing and potential vegetation type in the form of NatureServe's Ecological Systems (Comer and others 2003; Toney and others 2007), uncompacted crown ratios (Toney and Reeves 2009), and several canopy fuel metrics (such as bulk density) derived from the FuelCalc program (Reinhardt and others 2006).

Records are carefully screened for information or spatial errors. Accepted data points are processed for associations with ancillary data via a series of spatial overlays, including a Landsat image suite, the National Land Cover Database (Homer and others 2004), the digital elevation model and derivatives (USGS 2005), soil depth and texture layers (for example, USDA NRCS 2005), and a set of 42 simulated biophysical gradient layers (such as evapotranspiration, soil temperature, and degree days). These biophysical gradient layers were generated using WX-BGC, an ecosystem simulator derived from BIOME-BGC (Running and Hunt 1993) and GMRS-BGC (Keane and others 2002). Extracted values from each of these overlays are archived in the LFRDB as predictor variables for LF mapping.

Public Events Geodatabase

The Public Events geodatabase is a collection of recent natural disturbance and land management activities used to update existing vegetation and fuel layers during LF Program deliverables. Public Events exclude proprietary and/or sensitive data.

This geodatabase includes three feature classes - Raw Events, Model Ready Events, and Exotics. The Public Raw and Model Ready Event feature classes include natural disturbance and vegetation/fuel treatment data. The Public Exotics feature class contains data on the occurrence of exotic or invasive plant species. There is also a look up table for the source code (lutSource_Code), an attribute found in all three feature classes. The source code is a LF internal code assigned to each data source. Consult the table "lutSource_Code" in the geodatabases for more information about the data sources included in, and excluded from, releases.

The data compiled in the three feature classes are collected from disparate sources including federal, state, local, and private organizations. All data submitted to LF are evaluated for inclusion into the LF Events geodatabase. Acceptable Event data must have the following minimum requirements to be included in the Events geodatabase: 1) be represented by a polygon on the landscape and have a defined spatial coordinate system 2) have an acceptable event type (Appendix B) or exotics plant species, and 3) be attributed with year of occurrence or observation of the current data call.

Forest Vegetation Simulator Ready Database

A public version of the FVS Ready Database (FVSRDB) is available containing attributes for FVS simulations. The Public FVSRDB includes plot level data for all FVS variants nationwide. All data were collected from the LFRDB and contain no proprietary and/or sensitive information.

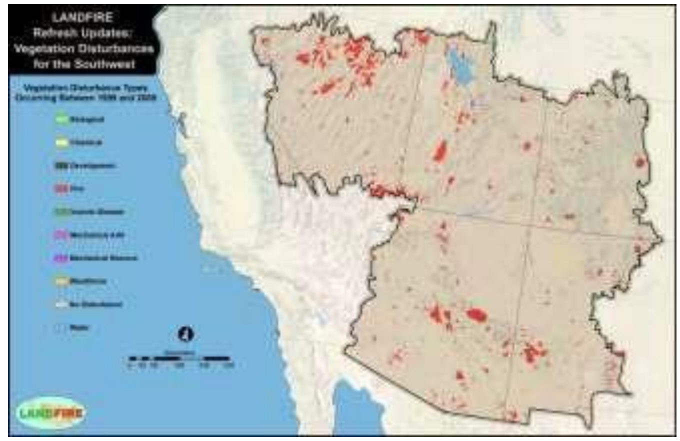
Data archived in the Public FVSRDB includes predefined input tables used for initializing stand/plot information (StandInit and TreeInit tables).

Disturbance

Disturbance 1999-Current Year

Disturbance (DYEAR) products reflect change on the landscape caused by management activities and natural disturbance and are developed through a multistep process using a number of varied geospatial datasets to identify and label changes in vegetation cover. This process utilized:

Landsat change detection methods; Landsat-derived indices (e.g., NDVI, dNBR); disturbance Event perimeters; fire severity and extent mapping from MTBS (Monitoring Trends in Burn Severity), BARC (Burned Area Reflectance Classification), and RAVG (Rapid Assessment of Vegetation Condition after Wildfire) fire mapping; PAD (Protected Area Database) ownership data; and burned area essential climate variable (BAECV) data.



MTBS, BARC and RAVG data provide extent, cause, and severity of fire-related disturbance. Event perimeters collected from local, state, and federal agencies and other cooperators were integrated into the LF Events Geodatabase. They were processed by disturbance type priority and rasterized to provide disturbance-specific causality. PAD data provided management-level information and BAECV offered a possible causality to disturbances detected using processed Landsat imagery.

Disturbances not identified by Events or fire mapping efforts were mapped by processing Landsat best- pixel image composite tiles (98 tiles covering the contiguous United States, and 4 tiles covering Hawaii. Image tiles were also created for selected areas to address MTBS gap filling in Alaska). Change was primarily identified using the Multi-Index Integrated Change Algorithm (MIICA) methods (Jin, et. al. 2013). This process identified changed pixels. Landsat-derived dNBR provided an estimate of severity for all changed pixels including LF Events. dNBR data were also used to mitigate the SLC-off and cloud gap issues within the MTBS datasets. These data and additional Landsat scenes were used in combination to create regression-based models. In areas where modeling could not be used a 12x12 focal majority process was used to fill MTBS data gaps. The final disturbance products are grid files, defined by year (i.e., 2013, 2014).

Disturbance raster attributes include; year, type (causality, if known), severity (low, medium, and high), data source(s), and additional attributes associated with causality and severity confidence.

Vegetation and Fuel Disturbance

Fuel Disturbance (FdistYEAR) are composites of the disturbance grids recoded by disturbance type, disturbance severity, and time since disturbance YEAR to meet LF fuel mapping needs and serve as input to the LF Total Fuel Change Tool. FdistYEAR is a subset of the Vegetation Disturbance

(VdistYEAR) and does not include chemical, biological, or development disturbances. Filtering to remove logically inconsistent disturbance/EVT combinations such as insect and disease within herbaceous landscapes was implemented. Fire occurrences take precedence, followed by the most recent disturbance.

VdistYEAR are composites of the disturbance grids recoded by disturbance type, disturbance severity, and time since disturbance YEAR to meet LF vegetation transition modeling needs. Precedence is determined first by Fire occurrences, followed by the most recent disturbance.

Vegetation Transition Magnitude

The LF Vegetation Transition Magnitude (VTM) layer describes the relative magnitude of change applied to a particular pixel during the LF vegetation updating process. Information about the disturbance type and the resulting change to vegetation life-form or tree canopy cover are used to characterize this change. This layer is generated concurrent with the updating process using tables and a series of database queries on a spatial overlay of vegetation and disturbance raster data. In order to keep LF vegetation data products current, subsequent versions of these data are updated with mapped occurrences of known disturbance and severity. The mapping process integrates disturbances mapped using remote sensing of landscape change paired with user contributed polygons with management activities over this two year period.

The effect of these disturbances on the vegetation are modeled or predicted using a series of tables that link pre-disturbance existing vegetation type, height, and cover and a range of possible disturbance types and severities with post-disturbance existing vegetation type, height, and cover. For forested vegetation, these tables are informed by computer simulations in the Forest Vegetation Simulator (FVS, www.fs.fed.us/fmsc/fvs/) while non-forest vegetation are informed by a series of simple rule-sets generated heuristically for each individual map zone. Final updating occurs when the tables are linked with a spatial overlay of vegetation and mapped occurrences of disturbance and used to assign existing vegetation, height, and cover. Finally, a unique code is assigned to all pixels that associate them with a particular disturbance type as well as categories of change magnitude expressed either in a change in vegetation life-form or a change in tree cover.

Forest Vegetation Transition Database (FVTDB)

The Forest Vegetation Transitions Database (FVTDB) contains information that describes post-disturbance vegetation changes. The forest vegetation is described by Existing Vegetation Type (EVT), Existing Vegetation Cover (EVC) and Existing Vegetation Height (EVH). Information archived in the FVTDB includes the disturbance tables and tools to summarize and sort.

Non-forest Vegetation Transition Database (NFVTDB)

The Non-forest Vegetation Transitions Database (NFVTDB) contains information that describes both post-disturbance vegetation changes and vegetation changes resulting from succession without disturbance. The non-forest vegetation is described by Existing Vegetation Type (EVT), Existing Vegetation Cover (EVC) and Existing Vegetation Height (EVH). Information archived in the NVSTDB includes the disturbance and no disturbance data tables and tools to summarize and sort.

Forest Vegetation Simulator Disturbance Database (FVSDDB)

A public version of the FVS Disturbance Database (FVSDDB) is available containing FVS disturbance simulation outputs. The database contains no proprietary and/or sensitive information and is derived from FVS analysis of the FVSRDB. The Public FVSDDB includes disturbance analysis outputs covering all FVS Variants at multiple severities and time-steps.

Vegetation

Environmental Site Potential

The LF Environmental Site Potential (ESP) layer represents the vegetation that could be supported at a given site based on the biophysical environment. This layer is used in LF to inform the existing vegetation and fuel mapping processes. Map units are based on NatureServe's Ecological Systems classification, which is a nationally consistent set of mid- scale ecological units (Comer and others 2003). LF's use of these classification units to describe environmental site potential differs from their intended use as units of existing vegetation.

As used in LF, 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 LF ESP concept is similar to that used in classifications of potential vegetation, including habitat types (Daubenmire 1968; Pfister and others 1977) and plant associations (Henderson and others 1989). The ESP layer is generated using a predictive modeling approach that relates spatially explicit layers representing biophysical gradients and topography to field training sites assigned to ESP map units. It is important to note that ESP is an abstract concept and represents neither current nor historical vegetation.

Biophysical Settings

The Biophysical Settings (BpS) layer represents the vegetation that may have been dominant on the landscape prior to Euro-American settlement and is based on both the current biophysical environment and an approximation of the historical disturbance regime. It is a refinement of the Environmental Site Potential layer; in this refinement, we attempt to incorporate current scientific knowledge regarding the functioning of ecological processes – such as fire – in the centuries preceding non-indigenous human influence. Map units are based on NatureServe’s Ecological Systems classification, which is a nationally consistent set of mid-scale ecological units (Comer and others 2003). LF’s use of these classification units to describe biophysical settings differs from their intended use as units of existing vegetation.

As used in LF, map unit names represent the natural plant communities that may have been present during the reference period. Each BpS map unit is matched with a model of vegetation succession, and both serve as key inputs to the LANDSUM landscape succession model (Keane and others 2002). The LF BpS concept is similar to the concept of potential natural vegetation groups used in mapping and modeling efforts related to fire regime condition class (Schmidt and others 2002).

Existing Vegetation Type

The Existing Vegetation Type (EVT) layer represents the species composition currently present at a given site. LF vegetation map units are derived from NatureServe’s Ecological Systems classification, which is a nationally consistent set of mid-scale ecological units (Comer and others 2003). Existing vegetation is mapped through a predictive modeling approach using a combination of field reference information, Landsat imagery, and spatially explicit biophysical gradient data.

Field data keyed to dominant vegetation type at the plot level were used as "training data" to drive the modeling process. Attribute information is provided that links the LF EVT map units to existing classifications such as the National Vegetation Classification System and those of the Society of American Foresters and Society of Range Management.

Existing Vegetation Height

Existing Vegetation Height (EVH) represents the average height of the dominant vegetation for a 30-m grid cell. The EVH layer is 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

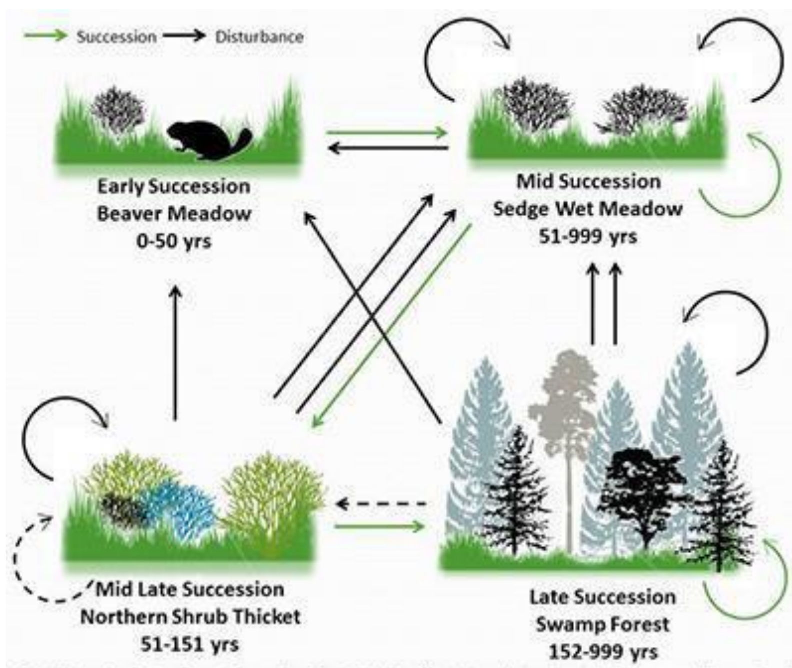
Existing Vegetation Cover (ECV) represents the vertically projected percent cover of the live canopy layer for a 30-m grid cell. The ECV layer is generated using a predictive modeling approach that related Landsat imagery and spatially explicit biophysical gradients to calculated values of average canopy cover from field training sites and digital orthophoto quadrangles.

Biophysical Settings Models and Descriptions

Biophysical Settings Models and Descriptions for LF National helped to synthesize the best available knowledge of vegetation dynamics and quantify the natural range of variability in vegetation composition and structure. Models consist of two components: (1) a comprehensive biophysical setting (BpS) model description and (2) a quantitative, state-and-transition BpS model, created in the public domain software VDDT (Vegetation Dynamics Development Tool; ESSA Technologies Ltd. 2007). Each model represents a BpS. A BpS represents the vegetation that may have been dominant on the landscape prior to Euro-American settlement and is based on both the current biophysical environment and an approximation of the historical disturbance regime. BpS modeling units are based on NatureServe's Ecological Systems classification, which is a nationally consistent set of mid-scale ecological units (Comer et al. 2003). LF's use of these classification units to describe BpS differs from their intended use as units of existing vegetation. As used in LF, model unit names represent the natural plant communities that may have been present during the reference period.

Models were developed during workshops where regional vegetation and fire ecology experts synthesized the best available data on vegetation dynamics and disturbances for vegetation communities in their region. Experts created a BpS model description for each BpS using a customized Access data base application called ModelTracker Data Base (MTDB). Experts used NatureServe's Ecological Systems (Comer et al. 2003) as a starting point for describing BpS, but modified them as needed to represent pre-European, reference conditions and added additional information to ModelTracker to create a comprehensive BpS description document. Experts used the VDDT (ESSA Technologies Ltd. 2007) to quantify the vegetation dynamics of each BpS. Quantitative models were based on inputs such as fire frequency and severity, the probability of other disturbances and the rate of vegetation growth and succession. Models were used to simulate several centuries of vegetation dynamics and produce outputs such as the percent of the landscape in each class and the frequency of disturbances. Outputs were checked against available data whenever possible.

ModelTracker descriptions and VDDT inputs were derived from literature review and expert input during and after modeling workshops. A model review process during and/or following workshops garnered additional expert input and offered an opportunity to refine models.



Credit: Jessica Price, Forest Scenarios Project, http://faculty.nelson.wisc.edu/silbernagel/scenarios/

BpS model descriptions and quantitative BpS models, were used in LF 1) to help define and map BpS; 2) to help map succession classes; and 3) as inputs to the spatial fire and succession simulation model, LANDSUM (Keane et al. 2002), which generates reference conditions used to calculate Fire Regime Condition Class (FRCC), a standardized, interagency index to measure the departure of current conditions from reference conditions (Hann et al. 2004).

For a complete description of the methodology used to develop LF vegetation models, consult the "LANDFIRE Vegetation Dynamics Modeling Manual" (The Nature Conservancy et al. 2006).

LF Data Product Descriptions

Fuel

13 Anderson Fire Behavior Fuel Models

Fire behavior fuel models represent distinct distributions of fuel loading 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 standard 13 Anderson Fire Behavior Fuel Models (FBFM13) serve as input to Rothermel's mathematical surface fire behavior and spread model (Rothermel 1972). The FBFM13 layer can serve as input to the FARSITE fire growth simulation model (Finney 1998) and FlamMap fire potential simulator (Stratton 2004). Further detail on these original fire behavior fuel models can be found in Anderson (1982) and Rothermel (1983).

40 Scott and Burgan Fire Behavior Fuel Models

This recently developed set of standard fire behavior fuel models represents more fuel models in every fuel type (grass, shrub, timber, and slash) than does Anderson's set of 13 fuel models. The main objective in creating the 40 Scott and Burgan Fire Behavior Fuel Models (FBFM40) is to increase the ability to illustrate the effects of fuel treatments using fire behavior modeling. The FBFM40 can serve as input to the FARSITE fire growth simulation model (Finney 1998), FlamMap fire potential simulator (Stratton 2004), BehavePlus fire behavior model (Andrews and others 2005), NEXUS crown fire potential model (Scott 2003), and FFE-FVS forest stand simulator (Reinhardt and Crookston 2003).

Nomographs for estimating fire behavior using the new fuel models without the use of a computer are now available (through Rocky Mountain Research Station Publications). Further detail about these 40 fire behavior fuel models can be found in Scott and Burgan (2005).

Forest Canopy Bulk Density

Canopy Bulk Density (CBD) describes the density of available canopy fuel in a stand. It is defined as the mass of available canopy fuel per canopy volume unit. 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 landscapes (VanWagner 1977, 1993). The CBD layer is generated using a predictive modeling approach that relates Landsat imagery and spatially explicit biophysical gradients to calculated values of CBD from field training sites. Because of model requirements, these data are provided for forested areas only. The units of measurement for the LF CBD layer are kg m-3 * 100.

Forest Canopy Base Height

Canopy Base Height (CBH) describes the average height from the ground to a forest stand's canopy bottom. Specifically, it is the lowest height in a 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 provides information for fire behavior models, such as FARSITE (Finney 1998), to determine areas in which a surface fire is likely to transition to a crown fire (VanWagner 1977, 1993). The CBH layer is generated using a predictive modeling approach that relates Landsat imagery and spatially explicit biophysical gradients to calculated values of CBH from field training sites. Because of model requirements, these data are provided for forested areas only. The units of measurement for the LF CBH layer are meters * 10.

Forest Canopy Height

Forest Canopy Height (CH) describes the average height of the top of the vegetated canopy. Geospatial data describing canopy height supplies information to fire behavior models, such as FARSITE (Finney 1998), to determine the probability of crown fire ignition, calculate wind reductions, and compute the volume of crown fuel (VanWagner 1977, 1993). The CH layer is generated using a predictive modeling approach that relates 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 provided for forested areas only. The units of measurement for the LF CH layer are meters * 10.

Forest Canopy Cover

Forest Canopy Cover (CC) describes the percent cover of the tree canopy in a stand. Specifically, canopy cover describes the vertical projection of the tree canopy onto an imaginary horizontal surface representing the ground's surface. A spatially explicit map of CC supplies information to fire behavior models, such as FARSITE (Finney 1998), to determine surface fuel shading for calculating dead fuel moisture and for calculating wind reductions. The CC layer is generated using a predictive modeling approach that relates Landsat imagery and spatially explicit biophysical gradients to calculated values of average canopy cover from field training sites and digital orthophoto quadrangles. The units of measurement for the LF CC layer are percent.

Canadian Forest Fire Danger Rating System

These fuel types are defined "as an identifiable association of fuel elements of distinctive species, form, size, arrangement, and continuity that will exhibit characteristic fire behavior under defined burning conditions" (Pyne, Andrews, and Laven, 1996; Stocks and others 1989). The CFFDRS arranges fuel types into five major groups with 16 discrete fuel types that are qualitatively distinguished by variations in their forest floor and organic layer, their surface and ladder fuels, and their stand structure and composition. The Canadian Forest Fire Danger Rating System (CFFDR) is created for Alaska only.

The CFFDRS assignments for Alaska are made by fire behavior and fuels experts based on Existing Vegetation Type (EVT) descriptions and representative photos.

Fuel Loading Models

Fuel Loading Models (FLM) characterize fuel conditions and may be used to simulate wildland fire effects using applications such as FOFEM (Reinhardt and others 1997) and CONSUME (Ottmar and others 1993). FLM contain representative loading 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 FLM are assigned to the LF vegetation map unit 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.

Fuel Characteristics Classification System Fuelbeds

The Fuel Characteristic Classification System (FCCS) – developed by the USDA, Pacific Northwest Experiment Station, Pacific Wildland Fire Sciences Laboratory (PWFSL) in Seattle, WA – is a system for describing wildland fuels. Fire managers can use the FCCS to assign fuelbed characteristics for the purposes of predicting fuel consumption and smoke production through PWFSL's CONSUME software. Upon full implementation, the LF team plans to work with FCCS staff to provide crosswalk assignments of FCCS fuelbed numbers to LF existing vegetation layers.

Fuel Rulesets Database

This is an intermediate product of fuel layer production. It consists of a compilation of all surface fuel rulesets for disturbed and non-disturbed Existing Vegetation Types (EVT's) for CONUS, AK, and HI in Microsoft Access Database format. The data can be sorted by Existing Vegetation (EV) or by disturbance-- type, severity, or time since. The data can also be filtered by LF map zone and provides information on how the fuel models are assigned vegetation type, cover, and height. Information regarding whether canopy is available for crown fire activity is also provided

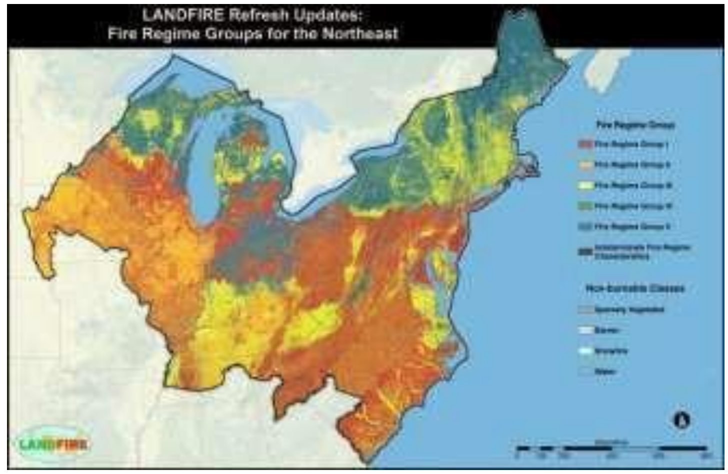
Fire Regime

Fire Regime Groups

The Fire Regime Groups (FRG) layer represents an integration of the spatial fire regime characteristics of frequency and severity simulated using the vegetation and disturbance dynamics model LANDSUM (Keane and others 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 (Hann and others 2004). FRG definitions have been altered from previous applications (Hann & Bunnell 2001; Schmidt and others 2002; Wildland Fire Communicator's Guide) to best approximate the definitions outlined in the Interagency Fire Regime Condition Class Guidebook (Hann and others 2004). These definitions were refined to create discrete, mutually exclusive criteria appropriate for use with LF's fire frequency and severity data products.

Mean Fire Return Interval

The Mean Fire Return Interval (MFRI) layer 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 and others 2002, Hann and others 2004). The MFRI layer 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 Low-severity Fire

The Percent of Low-severity Fire (PSL) layer quantifies the amount of mixed -severity fires relative to mixed- and replacement-severity fires under the presumed historical fire regime. Low severity is defined as less than 25 percent average top-kill within a typical fire perimeter for a given vegetation type (Hann and others 2004). This percent is derived from vegetation and disturbance dynamics simulations using LANDSUM (Keane and others 2002). The PLS layer 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 Mixed-severity Fire

The Percent of Mixed-severity Fire (PMS) layer 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 percent average top-kill within a typical fire perimeter for a given vegetation type (Hann and others 2004). This percent is derived from vegetation and disturbance dynamics simulations using LANDSUM (Keane and others 2002). The PMS layer 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 Replacement-severity Fire

The Percent of Replacement-severity Fire (PRS) layer 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 percent average top-kill within a typical fire perimeter for a given vegetation type (Hann and others 2004). This percent is derived from vegetation and disturbance dynamics simulations using LANDSUM (Keane and others 2002). The PRS layer 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

Succession Classes (SCLASS) categorize current vegetation composition and structure into up to five successional states defined for each LF Biophysical Settings (BpS) Model. An additional category defines uncharacteristic vegetation components that are not found within the compositional or structural variability of successional states defined for each BpS model, such as exotic species. These succession classes are similar in concept to those defined in the Interagency Fire Regime Condition Class (FRCC) Guidebook (http://www.fs.fed.us/rm/pubs/rmrs_gtr292/2010_barrett.pdf). This layer is created by linking the BPS layer with the SCLASS rulesets. This geospatial product should display a reasonable approximation of SCLASS, documented in the LF Vegetation Dynamics Models. The current successional classes and their historical reference conditions are compared to assess departure of vegetation characteristics; this departure can be quantified using methods such as FRCC.

Five successional classes, "A" (1) - "E" (5) define successional states represented within a given BpS model. 'UN' (6) represents uncharacteristic native vegetation for the BpS model on which these vegetation conditions are found. These are taken to represent vegetation cover, height, or composition that would not have been expected to occur on the BpS during the reference condition period. 'UE' (7) represents uncharacteristic exotic vegetation for the BpS model on which these vegetation conditions are found. Additional data layer values were included to represent Water (111), Snow / Ice (112), Barren (131), and Sparsely Vegetated (132). Non-burnable Urban (120), Burnable Urban (121), Non-burnable Agriculture (180), and Burnable Agriculture (181) are provided to mask out such areas from analysis of vegetation departure. To use this layer for assessing vegetation departure from historical reference conditions, it is necessary to combine this layer with BPS and LF map zone data layers. The subsequent combination of map zone, Bps, and SCLASS can then be found within LF Historical Reference Condition tables. Caution is warranted in assessing vegetation departure across map zone boundaries, as the classification schemes used to produce BPS and SCLASS may vary slightly between adjacent map zones. Furthermore, reference conditions are simulated independently for each map zone, resulting in potentially unique measurements of reference conditions for a given BPS between adjacent map zones.

Vegetation Condition Class

Vegetation Condition Class (VCC) is a reclassification of the Vegetation Departure layer. VCC is a discrete metric that quantifies the amount that current vegetation has departed from the simulated historical vegetation reference conditions (Hann and Bunnell 2001; Hardy and others 2001; Hann and others 2004; Holsinger and others 2006). Refer to the Data Summary and metadata for the Vegetation Departure layer (VDEP) to review how that data is created.

Vegetation Condition Classes are defined in two ways, the original 3 category system from Fire Regime Condition Class (FRCC), and a new 6 category system. For the original 3 category system, the VDEP value is reclassified as follows: Condition Class I: VDEP value from 0 to 33 (Low Departure), Class II: VDEP value between 34 - 66 (Moderate Departure), and Condition Class III: VDEP value from 67 to 100 (High Departure). The new 6 category system is defined to provide more resolution to VCC and be collapsible to the old 3 category system. New VCC categories are defined as follows: Condition Class I.A: VDEP between 0 and 16 (Very Low Departure), Condition Class I.B: VDEP between 17 and 33 (Low to Moderate Departure); Condition Class II.A: VDEP between 34 and 50 (Moderate to Low Departure); Condition Class II.B: VDEP between 51 and 66 (Moderate to High Departure); Condition Class III.A: VDEP between 67 and 83 (High to Moderate Departure), and Condition Class III.B: VDEP between 84 and 100 (High Departure). Current vegetation conditions are derived from a classification of LF layers of existing vegetation type, cover, and height.

Vegetation Departure

The Vegetation Departure (VDEP) data layer categorizes departure between current vegetation conditions and reference vegetation conditions using a range from 0 to 100 according to the methods outlined in the Interagency Fire Regime Condition Class Guidebook (Hann and others 2004). Technical Methods: "Summary units" for the departure computation were defined as a BioPhysical Setting (BpS) with identical reference condition values regardless of map zone. This is a change from previous versions of LF. For example, speculate that a particular BpS is present in map zone 1, 2, 4, 5, 6 and 8. The reference conditions for this BpS are identical in map zones 1, 2, 4, 5 and 8 so those map zones become a "summary unit" for the departure computation (VDEP) in LF2012. Since reference conditions are unique for this BpS in map zone 6, it is a separate summary unit for calculating departure (VDEP) in LF2012. Within each biophysical setting in each summary unit, we compare the reference percentage of each succession class (SClass) to the current percentage, and the smaller of the two is summed to determine the similarity index for the BpS. This value is then subtracted from 100 to determine the departure value. Departure value is between 0 - 100, with 100 representing maximum departure.

The LF VDEP approach differs from that outlined in the Interagency Fire Regime Condition Class Guidebook (Hann and others 2004) as follows: LF VDEP is based on departure of current vegetation conditions from reference vegetation conditions only, whereas the Guidebook approach includes departure of current fire regimes from those of the reference period. The reference conditions are derived from quantitative vegetation and disturbance dynamics models developed in VDDT/ST-Sim. The current conditions are derived from the corresponding version of the LF Succession Class data layer; please refer to the product description page at landfire.gov for more information. The proportion of the landscape occupied by each SClass in each BpS unit in each summary unit is used to represent the current condition of that SClass in the VDEP calculation. The areas currently mapped to agriculture, urban, water, barren, or sparsely vegetated BpS units are not included in the VDEP calculation; thus, VDEP is based entirely on the remaining area of each BpS unit that is occupied by valid SClasses.

Refer to the VDEP product page for version comparisons. Current vegetation conditions are derived from a classification of LF layers of existing vegetation type, cover, and height.

Topographic

Elevation

The National Elevation Dataset (NED) is the primary elevation data product produced and distributed by the USGS. The DEM layer is a derivative of the NED. The NED provides the best available public domain raster elevation data of the conterminous United States, Alaska, Hawaii, and territorial islands in a seamless format. The NED is derived from diverse source data, processed to a common coordinate system and unit of vertical measure. All NED data are distributed in geographic coordinates in units of decimal degrees, and in conformance with the North American Datum of 1983 (NAD 83). All elevation values are provided in units of meters, and are referenced to the North American Vertical Datum of 1988 (NAVD 88) over the conterminous United States. The vertical reference will vary in other areas. NED data are available nationally at resolutions of 1 arc-second (approx. 30 meters) and 1/3 arc-second (approx. 10 meters), and in limited areas at 1/9 arc-second (approx. 3 meters). For the LF product the 1 arc second NED digital elevation model (DEM) was projected from Geographic to Albers and clipped out to the LF boundary.

Aspect

This file is generated from NED DEM that has been clipped to the LF boundary. The aspect grid defines downslope direction. Non-defined aspect (slope is less than or =2) are assigned a value of -1. Aspect values range from 0.0 to 359.0 degrees. -9999 indicates NoData. Values have been adjusted to account for the Albers projection. The aspect grid was computed using the aspect function in ArcGIS 10.1.

Slope

Slope (SLP) is generated from NED DEM that has been clipped to the LF boundary. The slope grid was generated using the "slope" function. The slope grid was created using the degree option and not with using percent in ArcGIS 10.1.

References

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