Comparing LANDFIRE Vegetation Type, Cover, and Height Across Versions

Version Approach Overview

The key tenets of the LANDFIRE (LF) Program are data quality and objectivity-based products. The LF charter requires that deliverables be as compatible with previous products as possible to assist in monitoring changes over time with consistency across all lands in the Contiguous United States (CONUS), Alaska, Hawaii, and Insular Areas, including iterative data improvements. As such, data improvements will make comparing some data elements difficult and challenging. This paper is being provided by the program to help guide users in understanding some, but not all, the nuances that need to be understood before comparing LF versions. This paper is focused on vegetation type, cover, and height data across versions.

LF now has two types of product groupings: namely base maps and updates. Base mapping products are comprehensive mapping efforts using wall-to-wall imagery to produce mapped data for that period of time (e.g. LF National (V1.0.0) being a circa 2001 data set; LF 2016 Remap (V2.0.0) being a circa 2016 data set). Updates are also comprehensive mapping efforts but are focused on mapping areas of change or disturbance (e.g. LF 2008, 2010, 2012, and 2014 updates).

LF update versions were intended to represent contemporary conditions (capturing areas of change or disturbance) and include improvements for wildland fire and other natural resource management applications. As such, comparing data elements directly in a one-to-one comparison without understanding how data development processes have improved from one update to the next would not be appropriate. For example, the road network has been refined at times in response to concerns about fire behavior and what constitutes a fire break in various cover types.

Agriculture has been refined with each version using the latest available inputs to better reflect current (circa year) conditions. Therefore, users are encouraged to understand the characteristics of different LF versions before comparing them. The interpretation of the results of comparisons are impacted by these characteristics. Some differences between versions are due to actual landscape changes while some are due to process modifications (minor or major), which may be difficult to separate.

- LANDFIRE National (LF 2001)
  - Circa 2001 (imagery from 2000, 2001, and 2002) base map
  - Disturbances were not fully accounted for in the mapping work and as such some areas were mapped as grass types when indeed they were earlier successional forest types but based on the imagery the classification of grass was the correct assignment

- LF 2008, LF 2010, LF 2012, and LF 2014 Updates
  - Disturbed Areas
    - Identified as disturbed by LF (see Annual Disturbance products on www.landfire.gov) within the last 10 years
    - EVT, EVC and EVH were modified using transition rules developed by LF (available for download on www.landfire.gov)
  - Undisturbed Areas (LF 2008, LF 2010, LF2012 and LF 2014)
    - NOT identified as disturbed by LF within the last 10 years
    - EVC and EVH in forest types were grown using summarized results from the Forest Vegetation Simulator (available for download on www.landfire.gov)
    - EVC and EVH for shrub types were grown using rules developed by the LF Program. These rulesets are not currently in a form usable by the public. However, the LF program developed several rulesets over the years. One example of these rulesets is the Forest Vegetation Transitions Database (FVTDB) which contains information that describes post-disturbance vegetation changes through 2014 for EVT, EVC, and EVH

- LF Remap (LF 2016)
  - EVT, EVC and EVH spatial products were developed using new plots, new imagery, lidar, and new processing methods. Disturbances from 2015 and 2016 were incorporated into the mapping processes for LF Remap
  - Fuel products were adjusted in disturbed areas only to represent delivery year conditions. For example, fuel products for pixels mapped as disturbed by LF for GeoAreas delivered in CY2019 were adjusted to reflect conditions in 2019 (called Year Capable Fuels)

The table on the following page provides some, but not all, the nuances that need to be understood before comparing LF versions for vegetation type, cover, and height data.

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Version Comparison	Existing Vegetation Type (EVT)	Existing Vegetation Cover (EVC)	Existing Vegetation Height (EVH)
LF 2001 National (LF 1.0.5)	EVT was mapped for all pixels using available plot information at the time and best available processes. EVT was mapped to the mapzone level (area based on Bailey and Omernik).	EVC values were delivered in binned 10% classes. EVC was mapped to the mapzone level (area based on Bailey and Omernik).	EVH values were delivered in multi-meter categories. EVH was mapped to the mapzone level (area based on Bailey and Omernik).
LF 2008 (LF 1.1.0)	EVT was modified in areas mapped as disturbed by LF using transition rules. There were minor changes to the EVT legend. EVT was not changed in areas not mapped as disturbed by LF.	EVC was updated in disturbed areas using transition rules. EVC for forest types in undisturbed pixels was grown using results from variants of the FVS models. EVC for shrubs and herbaceous types in undisturbed pixels was not updated.	EVH was updated in disturbed areas using transition rules. EVH for forest types in undisturbed pixels was grown using results from variants of the FVS models. EVH for shrubs and herbaceous types in undisturbed pixels was not updated.
LF 2010 (LF 1.2.0)	EVT was modified in areas mapped as disturbed by LF. Minor changes were made to the EVT legend. EVT was not changed in areas not mapped as disturbed by LF.	EVC was developed using a unique production process, so differences that occur when comparing EVC from LF2010 to other versions may be due to landscape changes or process changes, which would be difficult to separate. We urge caution when comparing LF 2010 EVC to EVC in any other version.	EVH was updated in disturbed areas using transition rules. EVH for forest types in undisturbed pixels was grown using results from variants of the FVS models. EVH for shrubs and herbaceous types in undisturbed pixels was not updated.
LF 2012 (LF 1.3.00	EVT was modified primarily in areas mapped as disturbed by LF. There were minor changes to the EVT legend. EVT was not changed in areas not mapped as disturbed by LF.	EVC was updated in disturbed areas using transition rules. EVC for forest types in undisturbed pixels was grown using results from variants of the FVS models. EVC for shrubs and herbaceous types in undisturbed pixels was not updated.	EVH was updated in disturbed areas using transition rules. EVH for forest types in undisturbed pixels was grown using results from variants of the FVS models. EVH for shrubs and herbaceous types in undisturbed pixels was not updated.
LF 2014 (LF 1.4.0)	EVT was modified primarily in areas mapped as disturbed by LF. There were minor changes to the EVT legend. EVT was not	EVC was updated in disturbed areas using transition rules. EVC for forest types in undisturbed pixels was grown using results from variants of the	EVH was updated in disturbed areas using transition rules. EVH for forest types in undisturbed pixels was grown using results from variants of the

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Version Comparison	Existing Vegetation Type (EVT)	Existing Vegetation Cover (EVC)	Existing Vegetation Height (EVH)
	changed in areas not mapped as disturbed by LF.	FVS models. EVC for shrubs and herbaceous types in undisturbed pixels was not updated.	FVS models. EVH for shrubs and herbaceous types in undisturbed pixels was not updated.
LF 2016 Remap (LF 2.0.0)	EVT was remapped in all pixels using new plot information (significant increase of plots in some areas), processes, and classification models. There are major changes to the EVT legend.

The EVT legend was expanded to accommodate partner needs, such as disaggregating wetland and riparian types. Plant alliances are no longer mapped.

Remap EVT cannot be directly compared to previous versions without significant effort cross-walking the EVT legends. EVT was mapped within the Omernik level 3 areas. Updated Auto-keys and Sequence Tables were used in LF 2016. | LF Remap EVC products were developed from new data sets and using new production processes. Comparisons of LF Remap EVC and EVH to earlier versions will need to understand that differences could be due to improvements or actual landscape changes.

LF Remap, EVC values are continuous data (vs. LF 2001 binned 10% classes). When comparing EVC and UNDISTURBED areas across the pre-LF 2016 versions the differences should not be significant for shorter time spans because growth would need to cause a change in category. Actual differences in vegetation cover should more realistically represent landscape changes as the temporal comparison interval is lengthened. EVC was mapped within the Omernik level 3 areas. | LF Remap EVH products were developed from new data sets and using new production processes that included Lidar data. Comparisons of LF Remap EVC and EVH to earlier versions will need to understand that differences could be due to improvements or actual landscape changes.

LF Remap, EVH values are delivered as continuous data. When comparing EVH in UNDISTURBED areas across the pre-LF 2016 versions the differences should not be significant for shorter time spans because growth would need to cause a change in category. Actual differences in vegetation cover and vegetation height should more realistically represent landscape changes as the temporal comparison interval is lengthened. EVH was mapped within the Omernik level 3 areas. |

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