



LF 2023: Updating Our Vegetation Focus

Explaining New Methods to Update Vegetation Products

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QUICK SUMMARY: For the first time since LF 2016 Remap, LANDFIRE is using current satellite imagery, satellite based lidar, and current plot data with machine learning algorithms to update dominant lifeforms (tree, shrub, or herb) in areas that have been disturbed over the last two decades. Additionally, LANDFIRE is using these data to update the existing vegetation cover (EVC) and existing vegetation height (EVH) of the dominant lifeform for disturbed areas. The plan is to do this on an annual basis.

WHY THE CHANGE? Previous LANDFIRE updates used millions of rulesets meticulously developed from local and national experts across the United States to update mapped vegetation where

disturbances occurred. These rulesets considered the initial vegetation type, cover and height and applied a transition rule using the disturbance type, severity, and length of time since the disturbance occurred to produce updated vegetation for each new release. However, since circa LF 2016 Remap, these rules have required using Remap Existing Vegetation Type (EVT), EVC and EVH as inputs. This requirement created challenges for the update process because areas that had been disturbed in the few years prior to 2016 remained unchanged from that snapshot in time. For example, a pine forest in the Southeast US may have been harvested in 2016 and mapped as recently disturbed herbaceous for LF 2016

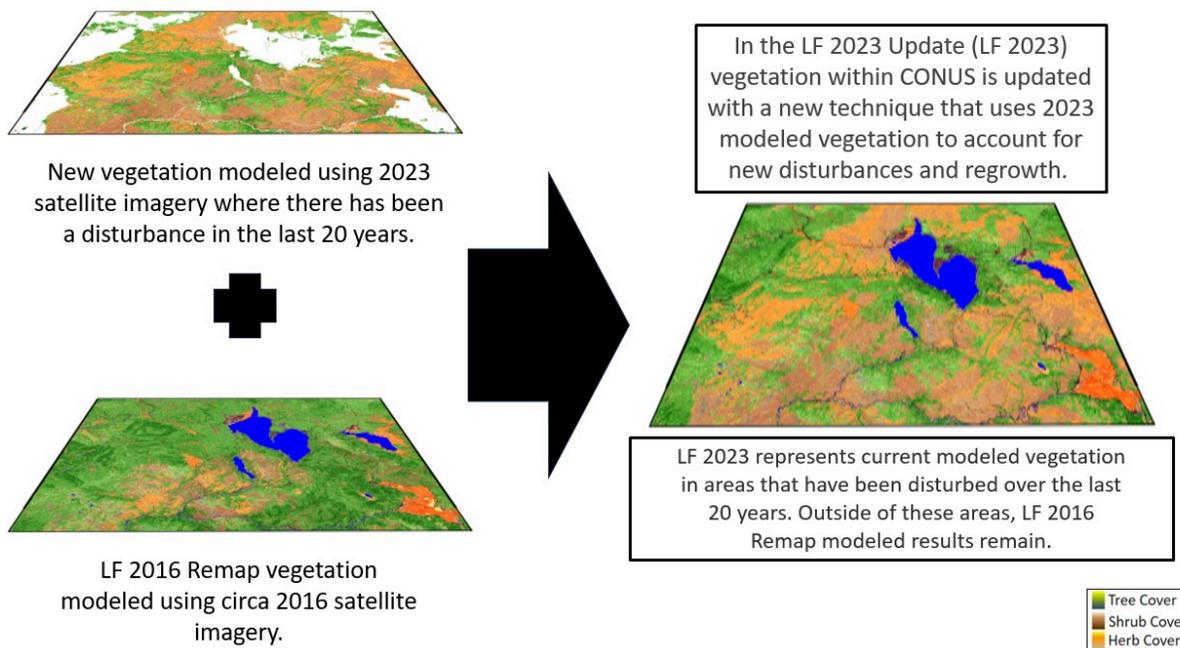


Figure 1: Visual representation of how LANDFIRE is overlaying new modeled vegetation in areas that have been disturbed.



Remap. This harvested area remained classified as herbaceous throughout the LF 2020 and LF 2022 updates because there was no way to account for regrowth in the vegetation transition rules for disturbances prior to 2017; the vegetation transition rules as developed and applied after LF 2016 Remap ONLY accounted for areas disturbed AFTER 2016.

WHAT WILL HAPPEN NOW?

LANDFIRE utilized machine learning for vegetation mapping with its initial release of LANDFIRE National, and again with LF 2016 Remap. With the advent of faster computing, more frequent and available satellite imagery, and more recent plot and lidar data, LANDFIRE will now map current vegetation on an annual basis using machine learning methods. For the LF 2023 update, LANDFIRE will map the lifeform, cover, and height of existing vegetation in areas mapped as disturbed over the last 20 years using machine learning methods. By focusing efforts on areas disturbed over the last 20 years, LANDFIRE will provide more accurate updates for landscapes that have changed the most.

WHAT IS NOT BEING UPDATED?

Many users would like the EVT classes updated. These would include the [ecological systems \(ES\)](#) and [national vegetation classifications \(NVC\)](#) in addition to the lifeform, cover and height. Currently updating EVT is not feasible on an annual basis and the classifications themselves are in flux. For example, ES is no longer being updated and the NVC classification is

undergoing finalization. Additionally, updating EVT would require the development of new species and cover keys for assigning plot data to a specific class as well as the establishment of new relationships to surface fuels. However, it should be noted that IF the lifeform of a particular pixel is updated in the LF 2023 update, then the EVT will reflect the lifeform present based on previously modeled EVT/lifeform relationships for that pixel.

WHAT CHALLENGES IS LANDFIRE FACING?

RULESETS: One challenge in moving towards annual mapping based on current data and imagery is that several of the LANDFIRE fuel maps, such as canopy cover, canopy height and surface fuels were built from an entirely separate set of transition rulesets than the vegetation transition rules. The 'fuel rules' account for disturbances since 2014, whereas the vegetation transition rules account for disturbances since 2016.

LANDFIRE understands the need and logic of harmonizing vegetation layers and fuel layers, especially canopy cover and height, and is working toward a solution that reconciles the mismatch of vegetation and fuels data. For example, site conditions (e.g. several dry years) may impact the regrowth of an area after disturbance, causing a previously forested area to remain shrub dominated 10 years post-fire. Despite this, the fuel rules may suggest otherwise and assume that most systems will grow back to an approximation of what was present prior to the disturbance by the 10-year mark. However, since the fuel rules only cover year 0-10 of time since disturbance, the areas that



were disturbed 11-20 years ago will have updated vegetation AND be harmonized with fuel layers.

LIFEFORM: Another challenge with using current data to update vegetation is that the most recent disturbances, such as those occurring late in the growing season of 2023, may not be as accurately mapped for lifeform, cover and height compared to disturbances from early in the growing season, or earlier years. This is because the imagery used to map vegetation must be clear and is created from a range of dates to minimize cloud contamination. Fall composites of imagery may encompass both pre- and post-disturbance dates, muddling the lifeform, cover, and height reflectance signals post-disturbance. However, next year's annual update will capture these late season disturbances more accurately.

TAKE HOME MESSAGE: Although there are challenges to moving to annual updates with current data for vegetation, there are many advantages as well. These improvements will provide LANDFIRE users with the most current and accurate data available for the upcoming field season, whether trying to understand habitat or landscape conditions with the vegetation layers, or modeling fire with the fuel layers.

With the advent of cloud-computing and better data, LANDFIRE is poised to take this initial step into 'live annual updates' with improved (and current) vegetation predictions.

Please contact (helpdesk@landfire.gov) if you have any questions on updates to methodology for the LF 2023 update.