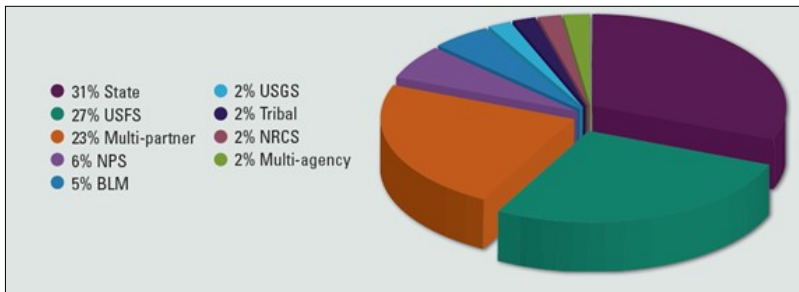




# LANDFIRE 2016 Remap: Improvements to the Reference Database



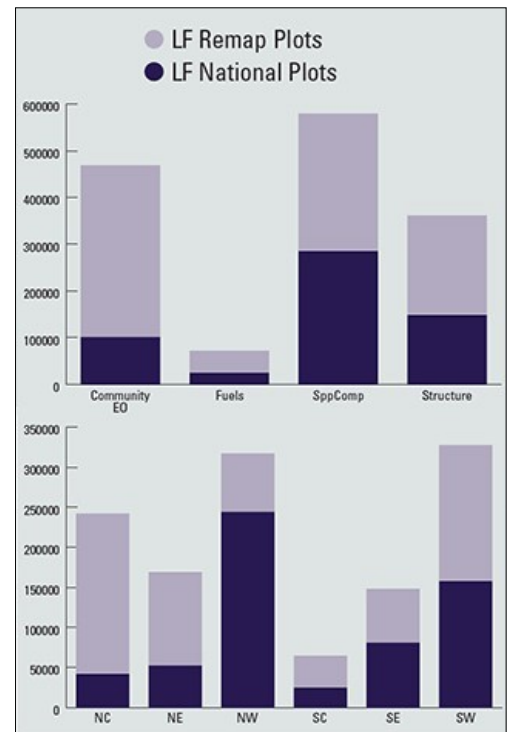
**Figure 1.** Contributions to LF Remap CONUS LFRDB by percentage for each federal, state, local, or private entity. Federal agencies include the U.S. Forest Service (USFS), National Park Service (NPS), Bureau of Land Management (BLM), US Geological Survey (USGS), and the Natural Resources Conservation Service (NRCS).

The LANDFIRE Reference Database (LFRDB) is a database of geo-referenced field data (plots) that describe vegetation and fuel attributes for a given area. The LFRDB is one of the most important elements in the LANDFIRE (LF) production process, because it provides “ground-truth” data for mapping and modeling vegetation. There are 775 different sources of data in LF 2016 Remap (LF Remap) Conterminous United States (CONUS) LFRDB. Figure 1 demonstrates the percentage break down of contributors.

Two key LF Remap improvements in the LFRDB include the addition of data from the Assessment Inventory and Monitoring program of the Bureau of Land Management (BLM) and the Natural Resources Inventory (NRI) program of the Natural Resources Conservation Service (NRCS).

## Data Types in the LFRDB

When data contributions for the LFRDB are received, they are brought into the LFRDB relational database containing 22 data tables and 36 lookup tables. Lookup tables decipher coded values found in some fields of the data tables, while data tables contain information on plant communities, surface and canopy fuels, tree and seedling data, species composition, vegetation structure, exotic plants, disturbances and treatment information, and ancillary data. Four main data types are stored in the LFRDB (Figure 2): 1) community element occurrence which features plots that only have cover type or Existing Vegetation Type (EVT) labels, 2) fuels data that provide fire behavior and fire effects modeling information, 3) species composition that offers plant species inventory and cover estimates, and 4) vegetation structure which provides plant height information for different lifeforms.



**Figure 2.** The number of LFRDB plots available for CONUS LF Remap by data types and GeoArea (light purple) compared to LF National (dark purple). Community EO depicts community element occurrence data, and SppComp depicts species composition data

## One Million Plots: A milestone for LANDFIRE

The number of plots compiled for LF Remap CONUS more than doubled the total number of plots available in the LFRDB, increasing the spread of plots throughout the country (Figure 2, Figure 3).

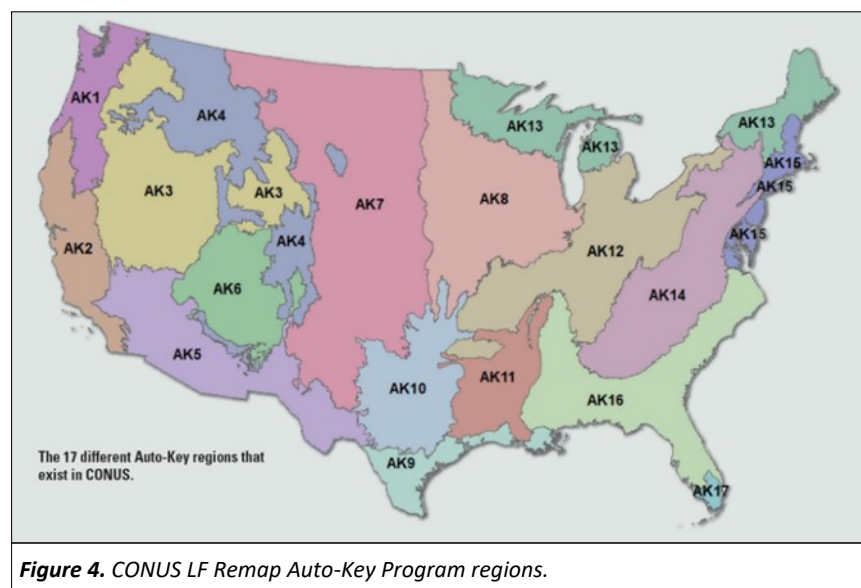
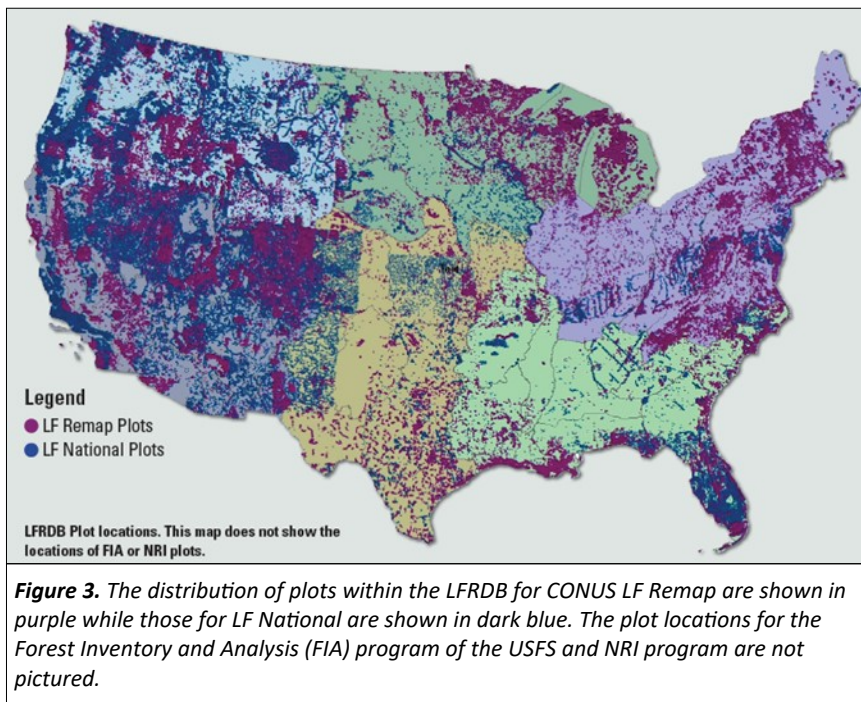
Starting with 599,166 geo-referenced plots for LF 2001 National (LF National), 666,763 more plots were added through the LF Remap CONUS effort, which means the LFRDB now contains a total of 1,265,929 plots. This number is still growing as LF Remap advances into Alaska and the insular areas. **Surpassing one million plots is a major milestone for the LFRDB!** More information about this exciting landmark will be coming soon.

## LFRDB Auto Keys

To inform vegetation mapping and modeling, LF assigns Ecological Systems (ES) and National Vegetation Classification Groups (NVC) to all the available plots in the LFRDB. Labels are assigned to LFRDB data by the LF Auto-Key Program, or they can be manually cross-walked by NatureServe ecologists.

The Auto-Key program, constructed by our partners at NatureServe, has been updated to increase the accuracy of plot labeling with ES, NVC, and to help identify ruderal systems. These Auto-Key labeled plots are then used as training sites to improve our machine-learning model which maps the existing vegetation type across the landscape.

LANDFIRE's updated and improved Auto-Key Program provides a consistent and repeatable method for assigning plots to vegetation types based on species composition. Using lifeform, cover and species present in the plots, the Auto-Key assigns ES and NVC categories which are specific to 17 different regions across CONUS (Figure 4). Auto-Key regions for LF Remap CONUS were created by NatureServe regional ecologists in consultation with USFS Ecological Classification and Mapping Task Team (ECOMAP) provinces. For areas within southern CONUS, EPA Level IV ecoregions are used to modify boundaries and finalize the Auto-Key regions.



In order to more accurately describe vegetation on the landscape Auto-Key ruleset updates were introduced that re-order how vegetation characteristics are identified with sequence tables. The sequence tables separate aggregated ES into 2 or more classifications (Figure 5). For example, the previously aggregated *Rocky Mountain Subalpine/Upper Montane Riparian Systems* is now 2 Ecological Systems due to the lifeform refinement in the Auto-Key: the *Rocky Mountain Subalpine-Montane Riparian Shrubland*

and *Rocky Mountain Subalpine-Montane Riparian Woodland*. Other Auto-Key improvements for LF Remap include current (2013) nomenclature for mapped species, geographic and geophysical variables, and expert reviewed sample plots used for validation and analysis.

## Summary

LF Remap improvements to the LFRDB include new data contributors, many more plots, increased distribution of plots, an updated Auto-Key Program, and the addition of geographic and geophysical variables. The public LFRDB for LF Remap will be made available for download upon the completion of the LF Remap effort.

The public version of the LF National LFRDB is available on the LF website (<https://landfire.gov/lfrdb.php>) and is comprised of a subset of the data and attributes used for LF production.

| EcoSys Code | EcoSys Name   | Total | Woody | Tree | Conifer | Shrub  | PHerb | Grass | spp1  | relcov1 | spp2   | relcov2 |
|-------------|---|-------|-------|------|---------|--------|-------|-------|---|---------|--|---------|
| 7125        | Inter-Mountain Basins Big Sagebrush Steppe                    | >10%  | >10%  |      |         | 10-60% | >15%  | >10%  | Artemisia tridentata ssp. tridentata, Artemisia tripartita, Chrysothamnus, Symphoricarpos | >50%    | Artemisia tridentata ssp. tridentata, Artemisia tripartita   | >25%    |
| 7149        | Western Great Plains Shortgrass Prairie                       | >10%  |       | <10% |         | <35%   | >25%  | >25%  | Artemisia frigida, Gutierrezia sarothrae, Cyllindropuntia imbricata, Yucca glauca         | >10%    | Aristida, Bouteloua, Elymus, Eragrostis, Koeleria, Lycurus, Hesperostipa, Muhlenbergia arenacea, Muhlenbergia torreyi, Pascopyrum, Pleuraphis jamesii, Schizachyrium scoparium, Scleropogon brevifolius, Sporobolus airoides, Sporobolus cryptandrus | >25%    |
| 7166        | Middle Rocky Mountain Montane Douglas-fir Forest and Woodland | >10%  |       | >10% | >10%    |        |       |       | Juniperus scopulorum, Pseudotsuga menziesii, Pinus flexilis                               | >75%    | Pseudotsuga menziesii  | >45%    |
| 7166        | Middle Rocky Mountain Montane Douglas-fir Forest and Woodland | >10%  |       | >10% | >10%    |        |       |       | Pseudotsuga menziesii   | >60%    | Abies, Alnus viridis ssp. sinuata, Betula papyrifera, Cornus sericea, Larix, Pinus monticola, Populus angustifolia, Taxus brevifolia, Tsuga, Thuja plicata   | absent  |

**Figure 5.** An example of LF Remap rulesets for Ecological Systems.