On behalf of the TNC LANDFIRE Team and the entire LANDFIRE Program, Kori and I thank you for the opportunity to present this webinar describing the status and plans for the LANDFIRE Program.
Review agenda
Who is LANDFIRE?

An innovative program designed to create and periodically update comprehensive vegetation, fire, and fuel characteristics data using a consistent process for the entire U.S.

LANDFIRE is a partnership between the U.S. Forest Service and the U.S. Department of Interior, and TNC. On the left is a significant part of the LF Production team at EROS, and the right is the TNC team.
Past: The LANDFIRE Foundation

LANDFIRE Charter establishes 4-C’s:

• Comprehensive
• Compatible
• Consistent
• Current

…. which are our design criteria/design constraints for

20+ current and historic vegetation/fuels/condition 30m, spatial data layers and 800+ quantitative state-and-transition BpS models and descriptions.


LANDFIRE program products
• are created for every acre in CONUS, AK, HI and the Island Territories - comprehensive
• match thematically and geometrically - compatible
• are produced using similar data sets and processes across time and space - consistent (there are changes due to feedback and product improvement desires
• are produced and delivered as rapidly as possible - current

These criteria have tangible impacts on what the products are, when we can deliver them, and how well they represent ground conditions.

The LANDFIRE product suite consists of nearly 2 dozen 30-meter spatial data sets (veg, fuels, etc.) and 800+ quantitative state-and-transition models in 5 (1 original + 4 temporal updates) completed delivered versions, and 1 partial delivery (Remap)
I don’t expect you to read this, but to appreciate the depth and breadth of program products
Remap is NOT an update...it is a re-creation of the majority of the product suite from scratch...new plots, new imagery, new processes, etc.

NW, SW, and South Central U.S. GeoArea Vegetation and Fuels (EVT, EVC, EVH, FBFM, Canopy Fuels, BpS) have been delivered.

Fire Regime data will be created and delivered when veg and fuels are complete for CONUS.
LF Remap – What Remains the Same?

LANDFIRE Program has the same design criteria/constraints: comprehensive, compatible, consistent and current.

The basic product suite is the same, but there are changes to mapping processes and thematic content intended to improve product usability.

Should still be considered a large landscape, regional, national data set as delivered out-of-the-box.

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LF Remap – What’s New?

- Mapping footprints based on Omernik Level III ecoregions instead of NLCD Map Zones.
- New compositing/tiling/masking methods that provide an improved and more consistent image base.
- New, improved plot “Auto-Keys” for assigning vegetation type to field plots.
- Landsat 8 imagery and Landsat Analysis Ready Data Sets (image stacks).
- Included external review of the Existing Vegetation Type legend and draft products.
- Independently mapped NVC Group.
LF Remap – What’s New?

• Many more field-plots and more diverse field-plots to support mapping.
• Incorporation of lidar data sets to improve the thematic resolution of structure products.
• Incorporation of NLCD Continuous Shrub Cover mapping project processes/products.
• Review of Biophysical Settings models and descriptions.
• New products: Historic disturbance, Year-Capable Fuels Products.
• New, backwardly compatible Fire Regime Group schema.
Based on user comments from previous versions the FRG schema was often problematic....insufficient FRI resolution

Wendel Hann LF did an analysis of FRG, and then developed a new, backwardly compatible FRG definitions that we hope is more useful.

<table>
<thead>
<tr>
<th>Original Fire Regime Group</th>
<th>New Group Designation</th>
<th>All Fire Return Interval</th>
<th>% Replacement Fire</th>
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</thead>
<tbody>
<tr>
<td>I</td>
<td>I-A</td>
<td>0 - 5 years</td>
<td>Less than 66.7%</td>
</tr>
<tr>
<td></td>
<td>I-B</td>
<td>6 - 15 years</td>
<td></td>
</tr>
<tr>
<td></td>
<td>I-C</td>
<td>16 - 35 years</td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>II-A</td>
<td>0 - 5 years</td>
<td>66.7% or greater</td>
</tr>
<tr>
<td></td>
<td>II-B</td>
<td>6 - 15 years</td>
<td></td>
</tr>
<tr>
<td></td>
<td>II-C</td>
<td>16 - 35 years</td>
<td></td>
</tr>
<tr>
<td>III</td>
<td>III-A</td>
<td>36 - 100 years</td>
<td>Less than 80%</td>
</tr>
<tr>
<td></td>
<td>III-B</td>
<td>101- 200 years</td>
<td>Less than 66.7%</td>
</tr>
<tr>
<td>IV</td>
<td>IV-A</td>
<td>36 - 100 years</td>
<td>80% or greater</td>
</tr>
<tr>
<td></td>
<td>IV-B</td>
<td>101- 200 years</td>
<td>66.7% or greater</td>
</tr>
<tr>
<td>V</td>
<td>V-A</td>
<td>201 to 500 years</td>
<td>Any severity</td>
</tr>
<tr>
<td></td>
<td>V-B</td>
<td>501+ years</td>
<td></td>
</tr>
</tbody>
</table>
LF Remap Quality

- EVT assessments for Ecological Systems, NVC Group, NVC Macrogroup, and SAF/SRM cover type.
- Thousands of independent plots.
- Traditional Contingency Table.
- Example of how to collapse categories in the

![Contingency Table Diagram]

- Working on Vegetation Cover (EVC)
Vegetation Height (EVH)---and exploring FBFM
LF Remap Quality

- Category Agreement Table

<table>
<thead>
<tr>
<th>Study Area</th>
<th>Percent Agreement</th>
<th>Percent Mismatch</th>
<th>Percent Undetermined</th>
<th>Source</th>
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<tbody>
<tr>
<td>SF Bay Area</td>
<td>0.92%</td>
<td>1.0%</td>
<td>0.0%</td>
<td>SAF/SRM 2013 Forest Inventory and Analysis (2013)</td>
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<tr>
<td>Northern CA</td>
<td>0.80%</td>
<td>1.2%</td>
<td>0.0%</td>
<td>SAF/SRM 2013 Forest Inventory and Analysis (2013)</td>
</tr>
<tr>
<td>Central CA</td>
<td>0.75%</td>
<td>1.0%</td>
<td>0.0%</td>
<td>SAF/SRM 2013 Forest Inventory and Analysis (2013)</td>
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<tr>
<td>Southern CA</td>
<td>0.69%</td>
<td>1.4%</td>
<td>0.0%</td>
<td>SAF/SRM 2013 Forest Inventory and Analysis (2013)</td>
</tr>
</tbody>
</table>

- Planning on an assessment of Vegetation Cover (EVC) and Vegetation Height (EVH), and perhaps FBFM.
Vegetation Height (EVH)---and exploring FBFM
LANDFIRE Future

- Remap 2016 will wrap up in CONUS during the summer of 2020, and then Alaska, Hawai‘i, and the island territories over the following months.
- Because “remapping” is more expensive than “updating,” we may not be able to conduct another remap in the future.
- The goal is to find a way to provide more frequent updates (annually, delivered within a few months) along with more complete updates, perhaps bi-annually.

- We expect to complete Remap in CONUS, followed by AK, HI and Insular areas
- Then we will begin an update cycle, final plan impacted by budget
- Updating alternatives being explored
  - Annual, next year rapid updates based on submitted disturbances/landscape changes
  - Bi-annual updates based on submitted disturbances + remotely sensed landscape change
- Communications and support---listening as much as talking
- Now I will turn over the presentation duties to Kori Blankenship, Fire Ecologist on our team and a NW native
Remap Improvements
Fewer Seamlines
- As mentioned previously by Jim, the way we process the imagery now (e.g., using tiling, larger processing unit) leads to fewer seamlines.
- Here you can see a seamline created at the mapzone border where shrub cover abruptly changes in the 2014 cover product.
- In Remap, the seamline is not evident due to improvements in how LANDIFRE mapping teams process the imagery.
Improved Shrub Cover

- NLCD produces a continuous shrub cover product based on very high resolution imagery that LF has incorporated into its process for Remap.
- Here you can see an area mapped in 2014 as herb is mapped as shrub in Remap.
- In arid areas, like the one shown here, we are doing a better job of identifying low shrub cover using new methods.

Note: “NLCD 2016 Shrub Component products characterize the percentage of each 30-meter pixel in the Western United States covered by shrub, herbaceous, bare ground, litter, sagebrush, big sagebrush and annual herbaceous, along with estimating shrub height and sagebrush height.”
Improved EVT Mapping in Disturbed Areas

- In previous LF versions natural EVTs were mapped regardless of disturbance history.
- We’ve changed that in Remap to more accurately reflect the vegetation on the ground post-disturbance.
- In this example, starting on the right you can see an area mapped as shrub by NLCD. In 2014, shown in the middle, we mapped the area as CA Montane Woodland and Chaparral.
- Based on LF disturbance data we know that this area was recently burned and so in the Remap product, shown on the left, we have assigned it to the EVT class Recently Burned – Shrub Cover, more accurately reflecting the vegetation currently on the ground.
Finer Level Distinctions in Aggregate Types

- In previous LANDFIRE versions riparian and wetland types were aggregated into coarse types.
- Here you can see how we have split out some previously aggregated types: for example what we mapped in 2014 as N.A. Warm Desert Riparian Forest and Woodland is now mapped as Riparian Woodland, Lower Montane Riparian Woodland and Riparian Mesquite Bosque Woodland types.
- A similar change was made to aggregate Barren types. In the Remap legend you’ll find areas previously mapped as Barren mapped into finer classes such as Bedrock and Scree or Playa.
Improved EVT
• In previous LF versions Greasewood Flat was mapped in higher slope positions where other shrub types are more appropriate. In Remap, mappers restricted it to lower slopes.
Improved Mapping of Invasives

- Mappers made an effort to improve the mapping of invasive species such as cheatgrass.
- Here you see a comparison of Remap (left) and 2014 EVT (middle) to the Near Real Time Annual Herbaceous Cover product (on the right; Boyte and Wylie). You can see the Remap product aligns more closely with the Near Real Time product.
• LANDFIRE EVH (left) and EVC (right) are now delivered in continuous classes. Previously the data were binned into broader classes; e.g. 10% classes for EVC.
• Graphic shows partial legends, too many classes to display.
Continuous Height Comparison

- 2014 EVH data on the left is dominated by two shades of green representing forest.
- Remap EVH data on the right show many shades of green representing more fine scaled variation in height.
- Similar patterns are shown in the brown tones that represent shrubs.
BpS Review

- BpS updated with new science
- Succession class mapping rules completed
- New model description document
- User-friendly data access website

In 2015 LANDFIRE initiated a review of the BpS descriptions and models. The BpS Models include a description and a quantitative model describing pre-European American vegetation structure, compositions, and disturbance dynamics. During the review:

- Models were updated with new science.
- The rules for mapping the BpS seral states, called succession classes, were completed.
- New model description documents were created and now include succession class mapping rules and state- and transition model parameters.
- A new model delivery site was developed.
• We made a special effort to get review of major western rangeland types.
• 4 BpS were part of a what we call a “macro review” effort where we looked at the logical consistency between models for widespread systems.
• For example, LANDFIRE mapped the Inter-Mountain Basins Big Sagebrush Shrubland BpS (show here in brown) on nearly 52 million acres. We created 12 unique BpS models to represent the system throughout its range.
• We felt it was important to review all the models for this type as a set.
• The review focused on several key questions:
  • Does the set of models encompass the full range of variability we see across the range of the type?
  • Do the models accurately reflect ecological differences?
  • Is the relationship between models logically consistent? For example, does the fire regime change as expected as models change north to south and east to west?
• Many improvements were made to the BpS models.
• I’ll illustrate the types of changes users can expect using one example – Inter-Mountain Basins Big Sagebrush Shrubland in the great basin
The big sage brush shrubland BpS for the Great Basin was reviewed by a group of Nature Conservancy scientists. They indicated that the original model encompasses a lot of variability and would be more useful for managers if it were divided into two types.

Based on this feedback we split the model into two variants:

1) Upland Soils type - receives enough moisture (>10 inches annual) to support pinyon and juniper trees.
2) Semi-Desert soils - found in areas with 8-10 inches of annual precipitation, generally too dry to support trees

The two types have different indicator species, different fire frequencies, different management strategies.

The models were refined to reflect these differences.
• LANDFIRE has developed a new, searchable, user interface for downloading model information.
• The reviewed and updated BpS model dataset for CONUS and HI are complete, but not publicly available yet.
• AK models are still being finalized.
• The Rio Grande Water Fund is an effort in New Mexico to protect municipal water supplies through improved management of the watershed.

• The Nature Conservancy and partners developed the “Rio Grande Comprehensive Plan for Wildfire and Water Source Protection.”

• The Plan uses the best available data to describe the current wildfire threat to water sources and forested watersheds and prioritizes where treatments will help reduce wildfire
impacts such as post-fire erosion.
• LANDFIRE spatial data were key this effort providing ready to go data for the entire state.
• A focal areas analysis was used to identify areas where water supply were at risk.
• Data about forest conditions, water supplies and users, potential for wood use, and social and economic importance to the state were the bases for identifying focal areas
• LANDFIRE fuels data were used in the wildfire risk portion of the analysis to model fire behavior.
• Here you see areas in need of restoration treatment to protect water supplies shown in red and areas with a lower need for treatment in
green.
• The focal areas map can be used to ensure that the water funds are allocated to the areas where the risk to water supplies is greatest and where restoration actions have the highest probability of success.
Take-home Messages

LANDFIRE products

- are comprehensive, compatible, consistent and current.
  (4 C’s)
- are designed for use at regional and national scales.
- can be modified for local use.

LF Remap incorporated new processes and data sets to improve usability of the products, and represents conditions in 2016.

Users can help improve LANDFIRE products by providing plots and data + feedback.
LANDFIRE welcomes feedback. Contact the helpdesk and/or provide feedback via the LANDFIRE website.
Our Contact Information

Jim_Smith@tnc.org

kblankenship@tnc.org