

Connected SCIENCE

October 2024

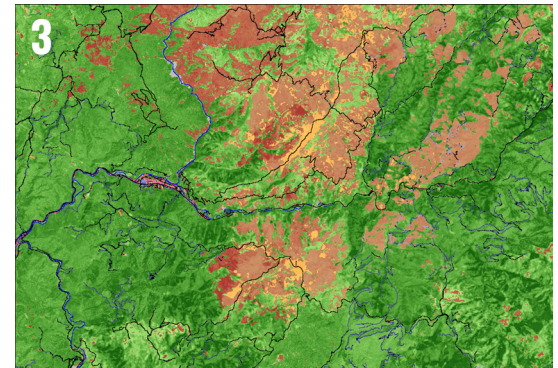
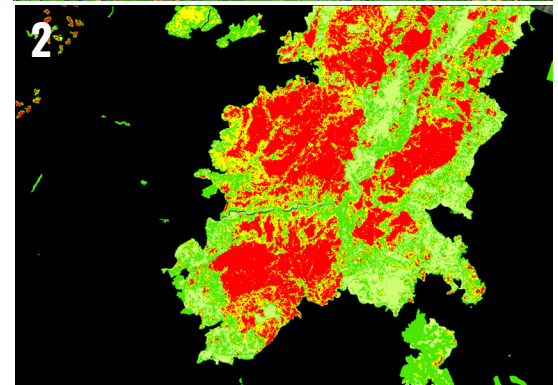
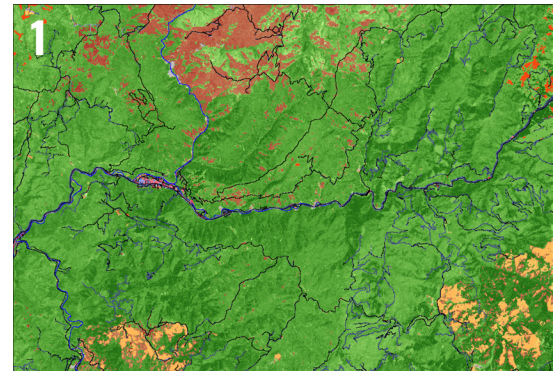
Twenty years of science and management with LANDFIRE

The Landscape Fire and Resource Management Planning Tools program (LANDFIRE) is a multi-agency (U.S. Department of Agriculture Forest Service and U.S. Department of the Interior) national geospatial suite of datasets. Born from the Congressional National Fire Plan in support of the National Cohesive Wildland Fire Management Strategy, LANDFIRE's prototype was launched in 2002. Chartered by the Wildland Fire Leadership Council in 2004, this year the program celebrates 20 years of applied science.

Across the country, a team of nearly 30 mapping experts, scientists, and data analysts work to provide land managers with a cohesive set of over 25 spatial data layers mapped at a 30m pixel resolution—capturing disturbances and the resulting changes to fuels and vegetation. This enables land managers to make decisions on fire risk, preparedness, response, and resource management plans. LANDFIRE is supported through the U.S. Department of Agriculture Forest Service and U.S. Department of Interior through each agencies labs, programs, and centers.

Inga La Puma, the Rocky Mountain Research Station LANDFIRE program lead, likes to think of the multitude of geospatial data sets as “the unsung hero of wildland fire science.” Many spatial analysis programs, IT applications, research analyses, and community assessments rely on LANDFIRE. Users of these applications are often unaware of the products’ dependence on LANDFIRE data. A few examples include:

- Wildfire Risk to Communities: [WildfireRisk.org](https://wildfireRisk.org) / Risk Management Assistance (RMA);
- Interagency Fuel Treatment Decision Support System: https://iftdss.firenet.gov/landing_page/;
- Agency performance measures / land management plans;
- Wildland Fire Decision Support System: https://wfdss.usgs.gov/wfdss/WFDSS_Home.shtml;
- Risk assessments, fire hazard, and potential maps;
- Wildfire simulation systems (e.g., FSim, FSPRO, FlamMap, FARSITE, and FuelCalc); and
- Wildlife habitat assessments, NEPA, carbon accounting, watershed condition, etc.



1. Prefire existing vegetation height (EVH) from LANDFIRE (LF) 2022 vegetation release.
2. Southern portion of Kelly fire from August of 2023 with severity included in LF2023 preliminary disturbance raster release.
3. Postfire existing vegetation height (EVH) from LF2023 vegetation release showing effects of Kelly fire. Note the lifeform changes mapped from green (tree) to brown and orange (shrub and herbaceous).

Over its 20-year history, LANDFIRE has made many improvements. Some of the key improvements involve:

- Clearer satellite image composites for better classification results;
- High performance computing with product mapping;
- Satellite imagery—Harmonized Landsat Sentinel and GEDI with LiDAR data; and
- Expansion of Events Geo-database.

La Puma finds people aren't as familiar with the Events Geo-database—one LANDFIRE product that is underused. "Events" can include a wide range of landscape changes from wild and prescribed fire to fuel treatments, insect events, herbicides, tornadoes, and disease. LANDFIRE cohesively compiles landscape data from not just the Forest Service, but individual States, USGS, Bureau of Land Management, National Park Service, and other agencies.

The program's ultimate mission is to map fuels that are used in fire behavior modeling, creating an all-lands data set. Looking forward, "The goals for future LANDFIRE work are wide-ranging," said La Puma. "Some of the things we've been talking about are more frequent seasonal updates, 3D fuels, and higher resolution imagery."

The LANDFIRE website has many resources for learning how to apply data layers correctly and ways to get in touch with questions. "Things are changing pretty quickly in a lot of areas," said La Puma, "so having feedback from users is huge. We need it, and we welcome it."

Featured Scientists

[Inga La Puma](#) is the LANDFIRE program lead for the USDA Forest Service Rocky Mountain Research Station.

[Greg Dillon](#) and [Tobin Smail](#)—Fire Modeling Institute—Missoula Fire Sciences Laboratory.

[Karen Schleeweis](#) and [Chris Toney](#)—Forest Inventory Analysis support.

[Jim Menakis](#) and [Henry Bastian](#)—LANDFIRE business leads.

[Josh Picotte](#), [Daryn Dockter](#) and [Brian Tolk](#)—USGS and Technical Services Support.



LANDFIRE tracks changes to landscapes like this one in the Mt. Hood National Forest in Oregon. USDA Forest Service photo.

MANAGEMENT IMPLICATIONS

- Review from local land managers has improved existing vegetation type mapping.
- Managers are using data layers for forest plan revisions and management plans.

FURTHER READING

Kumar, S.S.; Tolk, B.; Dittmeier, R.; Picotte, J.J.; [et al.]. 2024. [The Spatially Adaptable Filter for Error Reduction \(SAFER\) process: Remote sensing-based LANDFIRE disturbance mapping updates](#). *Fire*. 7: 51.

La Puma, I., ed. 2023. [LANDFIRE technical documentation: U.S. Geological Survey Open-File Report 2023-1045](#). 103 p.

La Puma, I.; Hatten, T.D. 2022. [LANDFIRE data and applications: U.S. Geological Survey Fact Sheet 2022-3034](#). 4 p.

Long, J.L.; Hatten, T.D. 2023. [LANDFIRE: U.S. Geological Survey Fact Sheet 2023-3044](#). 4 p. <https://doi.org/10.3133/fs20233044>.

Annabelle Moore is the author of this Connected Science.

Rocky Mountain Research Station researchers work at the forefront of science to improve the health and use of our Nation's forests and grasslands. More information about Forest Service research in the Rocky Mountain Region can be found on our website.

The United States Geological Service provides science for a changing world, which reflects and responds to society's continuously evolving needs. Learn more about USGS work to monitor, analyze, and predict current and evolving Earth-systems interactions at their website.



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