Updating LANDFIRE Fuel Data Assists Local Planning Efforts

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Keeping fuel data current over time is an issue faced by many wildland fire managers. Natural events like wildfires and hurricanes, and human activities, such as forest thinning, prescribed fire, and development constantly change the landscape and quickly render fuel data out of date. The LANDFIRE program provides a data safety net by producing biannually updated fuels products for all-lands in the United States. But even these data are two to three years old when they are delivered, and while they provide a good starting point, they are designed for national and regional level application. Local review and calibration is recommended to ensure that the data are suitable for smaller landscapes. An example from Idaho illustrates how adjusting LANDFIRE fuel data can ensure that current, accurate fuel information is ready to support fire and land management activities.

Big fire season reduces data utility

In summer 2013, four major fires burned 178,000 acres across the South Central Idaho Fire Planning Unit (hereafter the FPU), reducing the usefulness of the existing fuel datasets in the area for fire planning. The FPU is largely comprised of federally managed land, including the Sawtooth National Forest and Bureau of Land Management holdings. While individual federal units within the FPU maintain local fuel and vegetation spatial data, only LANDFIRE data provide complete coverage across all lands.

LANDFIRE is continually updates and releases data. However, the 2013 wildfire events would not be reflected before the circa 2014 version was completed and made available in 2017. Not able to wait that long, in 2015 the area fire staff began working with a team of LANDFIRE and Forest Service colleagues to bring LANDFIRE's 2012 fuel data current for the FPU. While they were in the process of updating, the team also decided that it was a good time to calibrate the fire behavior fuel models to better fit local conditions.

Update and calibration process

The team's process for updating the fire modeling data was similar to LANDFIRE's. First, the they used information from the Monitoring Trends in Burn Severity program to determine the location and severity of the 2013 large fires, and to reduce the forest canopy cover to reflect the post-fire condition.

Next, interagency fire planner Ian Rickert reviewed the LANDFIRE fire behavior fuel model layer outside of the wildfire footprints and found several areas for improvement. Specifically, in an area known as the Bennet Hills just north of Gooding, Idaho and on the southern part of the Sawtooth National Forest where sagebrush shrublands occur, Rickert felt that a grass-shrub fuel model better represented the potential range of fire behavior than the pure shrub models mapped in the two areas.

The team's spatial analyst took Rickert's feedback and translated it into a set of mapping rules in a geographic information system using the LANDFIRE Total Fuel Change Tool, a tool that is designed to edit LANDFIRE fuel data.

Post-fire fuel models were mapped within the areas burned in the 2013 wildfires using the updated forest canopy information and the default LANDFIRE mapping rules contained within the Total Fuel Change Tool. With these adjustments, the team produced both a circa 2015 fire behavior fuel model layer and the associated canopy fuel layers required for fire behavior modeling.

Updated data supports local planning

The updated fuel data quickly proved useful. For example, the rules developed on the FPU for mapping fuels were shared with the Bureau of Land Management to assist in its fuel calibration efforts on near-by units and to use in the Bureau's state-wide fire management plan.

Also, during the 2016 Grape Fire, the updated fuel data formed the basis for landscape rule changes in the Wildland Fire Decision Support System. The Long-Term Fire Analyst (LTAN) trainee used the locally adjusted fire behavior fuel model mapping rules to further calibrate the data for a near-term fire behavior projection and a fire spread probability analysis for the Grape Fire.

LANDFIRE spatial data and rules can provide an all-lands foundation for creating up-to-date local fuel data sets, such as in South Central Idaho. Rickert noted that it was "definitely helpful having a list of landscape rules to provide to LTANs when they come in. It gives them a jumpstart in places where they're unfamiliar with the fuel characteristics."

Leveraging national data for local use

Attempting to keep data current is an ongoing challenge and, while LANDFIRE fuel products provide a solid foundation, they cannot meet everyone's needs. However, when individual units adjust the products based on local knowledge, their usefulness can be enhanced. Although it took time and effort to update and calibrate the fuel data for the FPU, land managers in the region were rewarded with up-to-date and improved data for fire management and planning efforts that would work until the next version of LANDFIRE products became available.

What this kind of work takes….

- **Teamwork.** Updating and calibrating LANDFIRE data requires spatial analysis skills and knowledge of fire behavior and fire behavior modeling systems. In this case, a team consisting of a spatial analyst, a fuels planner and technical support staff from LANDFIRE and the Forest Service Enterprise Program worked together to produce the final products.
- **Affordable, accessible data.** The LANDFIRE data used in this project are available for free online for the entire United States and its island territories. Fire severity data suitable for this type of analysis are available through either the Monitoring Trends in Burn Severity (MTBS) or the Rapid Assessment of Vegetation Condition after Wildfire (RAVG) programs for fires greater than 1,000 acres in the west and 500 acres in the east. While both datasets work, RAVG data are available within 45 days of wildfire containment, but only for fires on National Forest System lands. MTBS products are not delivered as quickly post-fire, but

they are available for any fire meeting the size threshold in the United States.

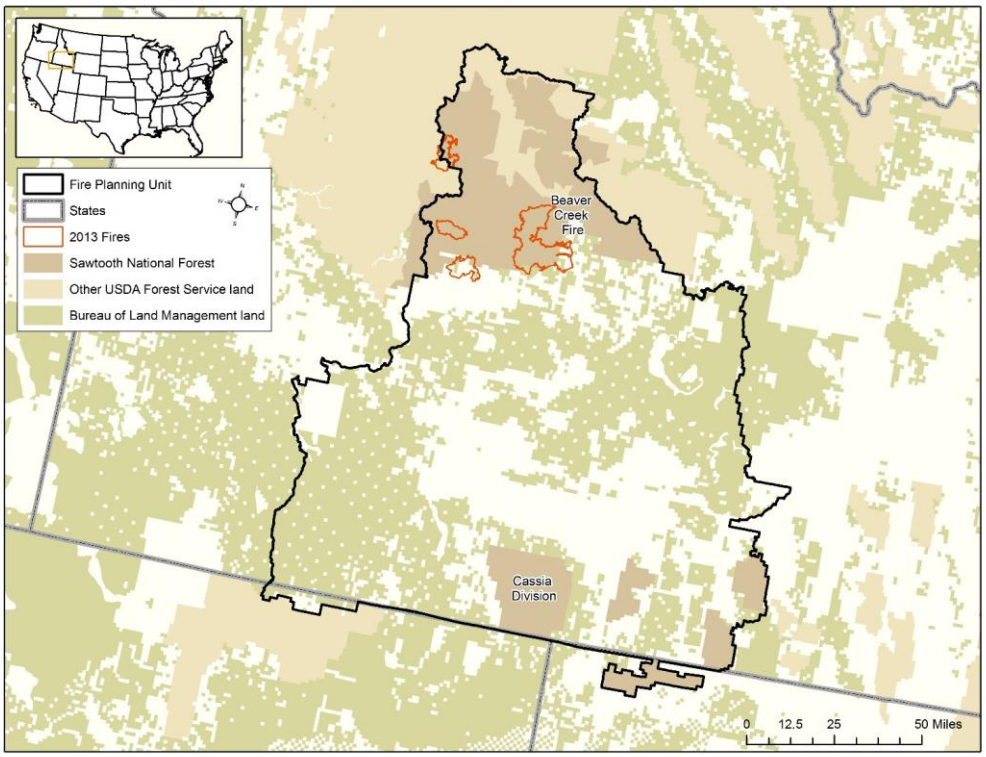
- **Tools.** The spatial data manipulation for this project was performed in ESRI's ArcMap software using common raster data tools and the LANDFIRE Total Fuel Change Tool, a free tool which allows the user to easily manipulate fuel data.

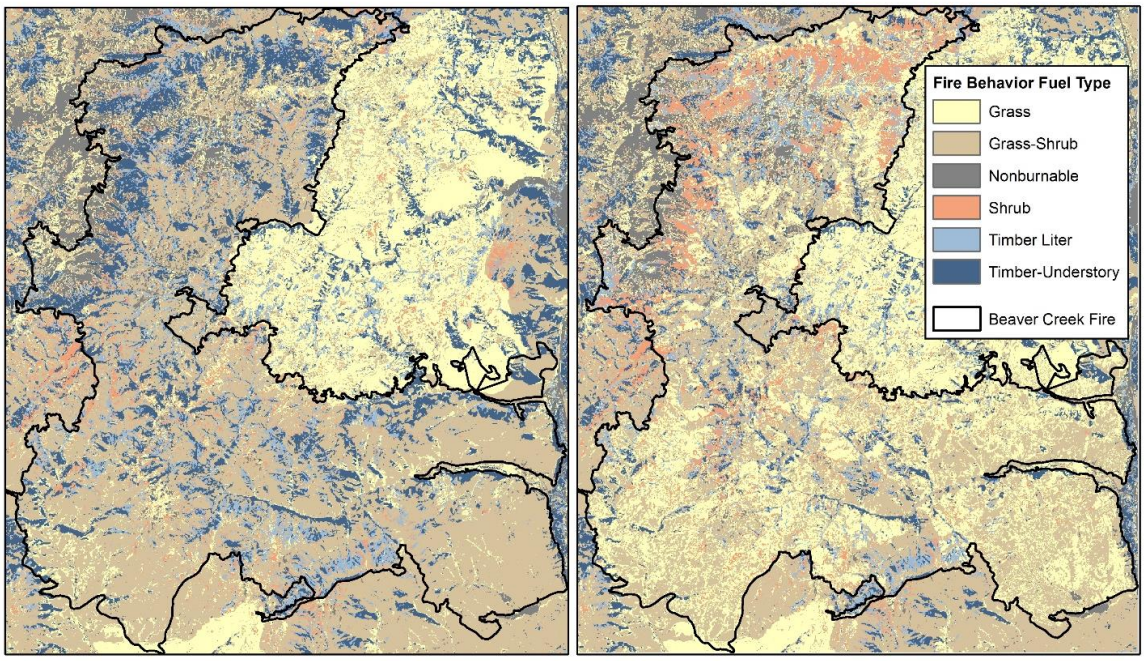
If you want to adjust LANDFIRE fuel data…

- Follow the step-by-step tutorial Updating LANDFIRE Fuels Data for Recent Wildfires, which documents the process used to adjust the fuel data for the South Central Idaho Fire Planning Unit.
- Tell LANDFIRE how you calibrated the fuel models for local conditions. Combined with comments from other users in the same area, LANDFIRE may be able to identify areas in need of improvement in the national data set.

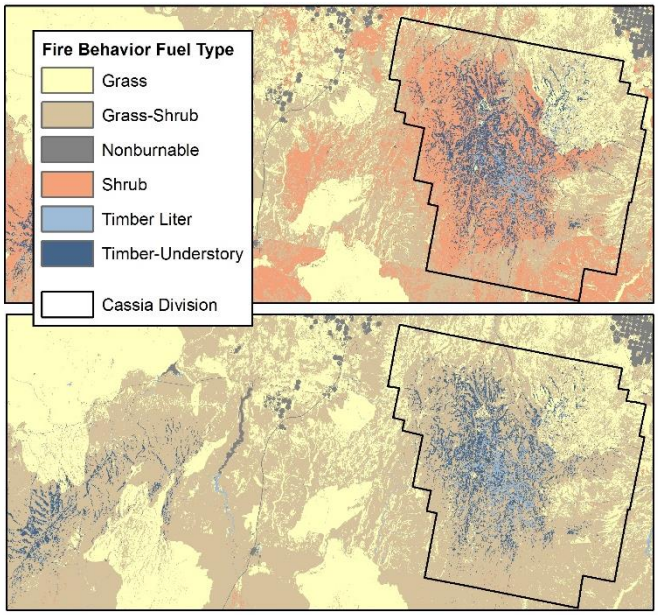
The McCann Fire was one of four large fires that burned through the South Central Idaho Fire Planning Unit in 2013 providing the impetus for the data update project.
Photo credit: Anthony Beauchaine

Right: four large fires burned in the South Central Idaho Fire Planning Unit in 2013. The Beaver Creek Fire and the Cassia Division of the Minidoka Ranger District on the Sawtooth National Forest are labeled here and referenced in later figures.





The LANDFIRE 2012 fire behavior fuel model layer (left) was updated to reflect the impact of the 2013 fires in the South Central Idaho Fire Planning Unit (right). Here, changes within the 2013 Beaver Creek Fire as a result of the update process are shown. Within the fire perimeter, Grass-Shrub fuel models changed to Grass models and Timber-Understory models changed to Shrub models in areas where fire severity was high. Fire behavior fuel models are grouped into fire-carrying fuel types for ease of visualization.



Local fire behavior fuel model calibration resulted in shifting areas mapped to Shrub models in the LANDFIRE 2012 fire behavior fuel model layer (top) to Grass-Shrub models in the updated 2015 product (bottom) developed by the FPU managers.

These maps show the changes in the area of the Cassia Division of the Minidoka Ranger District on the southern end of the Sawtooth National Forest and the FPU. Fire behavior fuel models are grouped into fire-carrying fuel types for ease of visualization.