From LANDFIRE Roots to Addressing Wildfire Risk Across the Nation

LANDFIRE Interviews Spatial Fire Analyst Greg Dillon

Greg Dillon, Forest Service spatial fire analyst with the Rocky Mountain Research Station's Fire Modeling Institute (FMI), works on various projects that use geospatial technology to address land management and fire management questions. Two projects involve assessing wildfire risk across National Forest System lands in the United States. and producing and maintaining the Wildfire Hazard Potential map that depicts potential wildfire hazards across the U.S. Greg's research centers around geospatial analysis, vegetation ecology, and fire ecology. In his current position with FMI, he applies recent advances in fire science and geospatial technology to address management questions from the national level down to local districts.

Greg was the team leader for mapping potential vegetation on the national LANDFIRE project from 2004 to 2009. Prior to that, he was a GIS Analyst for the Forest Service Region 6 Area Ecology Program, the National Forests in North Carolina, and the George Washington National Forest.

You were working with LANDFIRE when it began as a prototype in 2004 to 2009. What was that like? What were your expectations? What accomplishments are you particularly proud of?

It was an exciting (and daunting) time to be working for LANDFIRE. We had a very ambitious production schedule and the hardest part was meeting all the product delivery deadlines. At one point, another LANDFIRE colleague developed a slide that showed statistics about our production rates – to map the roughly 1.8 billion acres in CONUS, we had to map about 8.7 million acres per week. Being a bit of a perfectionist at times, it was challenging to stay on schedule and learn when to call things done. Whenever people were critical of LANDFIRE products, I tried to remind them of the tradeoffs that come with such an accelerated production schedule.

On the flip side, it was an incredible opportunity to get to map the potential vegetation of the entire conterminous U.S., one map zone at a time. As the leader of the potential vegetation mapping team, I worked in some capacity on every map zone in CONUS. That was an exciting and unique experience and I received a tremendous education on the vegetation and ecology of the U.S. I particularly enjoyed interacting with ecologists from around the country and from a diverse array of federal, state, and local government agencies, universities, and non-profit organizations. We tried very hard to solicit local expert review on most of our mapping, and those contributors really helped to make our products better.

Overall, I'm very proud of the potential vegetation products that LANDFIRE produced. It's very gratifying to see how much work today, both in research and applied land management, benefits from products like the LANDFIRE biophysical settings (BpS).

You're currently busy with other projects. Are you using LANDFIRE data? If so, in what way?

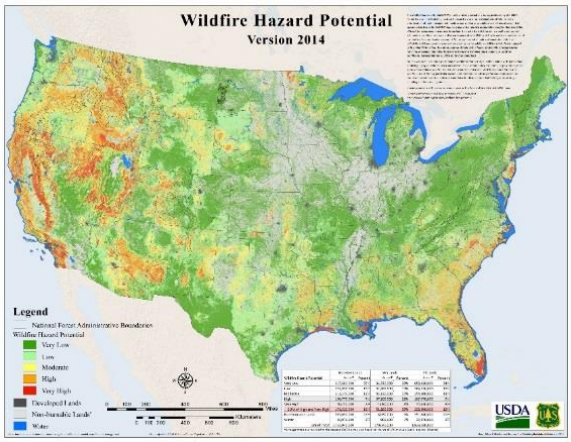
I use LANDFIRE data in almost all my work, most of which is related to spatial wildfire risk assessments. The key components of risk are the probability of fire occurrence, the likely intensity of fire if it does occur, and the susceptibility of things that we value to the effects of wildfire. Probability and intensity, two elements of risk, are derived from spatial fire behavior modeling that depends on LANDFIRE's full suite of fuels data. I have worked on risk assessments at scales from a single county up to the entire conterminous U.S., and all have used LANDFIRE fuels data as input to the fire behavior modeling.

LANDFIRE data can also be used in determining the third element of risk – susceptibility. Many risk assessments include the effects of wildfire on general ecosystem functioning which provides a means to account for beneficial, as well as neutral or negative, consequences of wildfire from an ecological perspective. In most assessments I've been involved with, the best foundation for this information is LANDFIRE BpS data and the associated vegetation dynamics models.

The Wildfire Hazard Potential map, a national product that I'm responsible for, has gained a fair amount of popularity, is built almost entirely from LANDFIRE data. This map leans heavily on national-scale modeling outputs that are only possible because of LANDFIRE fuels data. I also use most of the existing vegetation products (type, height, cover) in producing the map. The LANDFIRE fire regime group data are also useful for prioritizing Forest Service fuel management needs and summarizing the Wildfire Hazard Potential into vegetation communities that are adapted to frequent vs. infrequent fire historically.

In fact, most of the work I do just wouldn't be possible without LANDFIRE data.

Does any application stand out from the others?



LF 2014 Wildfire Hazard Potential map

The Wildfire Hazard Potential map has received broad attention and has been used within the Forest Service and Department of the Interior either to inform allocation of fuels funding or select and prioritize fuels projects. The insurance industry has been giving the map attention, particularly following the devastating fires in California last year. There was even reference to the Wildfire Hazard Potential map in the recent Omnibus budget bill; I think legislators like how clearly it conveys information about wildfire hazard.

Another application that I'm particularly proud of is the use of BpS to represent ecosystem functioning in a national wildfire risk assessment for the Forest Service. Working with Forest Service Fire Ecologist Beth Buchanan from the Southern Region, and consulting with ecologists from around the country, we arranged BpS into groups specific to the risk assessment and developed "response functions" that estimate the positive and negative effects of fire of

different intensities. It was great to have an opportunity to expand on my previous work with BpS and come up with something that greatly improves the quality and depth of our risk assessment.

What LANDFIRE products are particularly important in your work?

I would say that the whole suite of fuels layers, the existing and potential vegetation products (including the BpS models), as well as the fire regime group and mean fire return interval layers are all important to the work I do.

New base maps are being developed for the LANDFIRE suite (LF Remap). What improvements might enhance LANDFIRE's usefulness?

There are a few existing vegetation layers that could add a lot of benefit to LANDFIRE data users. Specifically, a map of cover type would be particularly useful. This is different from the current Existing Vegetation Type that uses the Ecological Systems classification. That classification works well for the potential vegetation products, but is less useful for existing vegetation because some Ecological Systems are broadly defined and can have a diversity of dominant species. Other layers that would be useful in forested areas would include an approximate stand age map and/or a mean diameter map. These types of layers, combined with a true cover type layer, would make it possible to produce a much better successional class layer than LANDFIRE is currently able to produce.

Revisiting BpS data might also be warranted, due to disturbances, type conversions, and climate change. We often equated BpS with pre-settlement reference conditions. But in applications of BpS like what we're doing in the risk assessment, sometimes the pre-settlement condition is less relevant than what a current reference condition might be. Due to changes and events over the past century, or sometimes just the last decade or even year, ecosystems have shifted to a "new normal" and the historic reference is no longer relevant. Moving forward, it would be extremely useful to have a "historic BpS" and a "current BpS" to capture these types of changes and provide a layer that would be more applicable for supporting management decisions.

For your information

- Dillon, G.K.; J. Menakis; and F. Fay. 2015. Wildland Fire Potential: A Tool for Assessing Wildfire Risk and Fuels Management Needs. pp 60-76 In Keane, R. E.; Jolly, M.; Parsons, R.; and Riley, K. Proceedings of the large wildland fires conference; May 19-23, 2014; Missoula, MT. Proc. RMRS-P-73. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 345 p.
- Profile page on the USDA FS Fire, Fuel, Smoke Science Program website:
- Wildfire Hazard Potential web page
- A video describing how Greg is moving geographic technologies into the world of mobile devices so firefighters can provide real-time information to fire managers at the fire camp:
- Google Scholar with specific references

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