Landscape-scale Analysis Essential to Success of Watershed Projects

LANDFIRE Interviews Steve Bassett

Steve Bassett *is a Spatial Analyst and GIS Program Manager for The Nature Conservancy in Santa Fe, NM, where he has been for six years. He previously worked for the National Park Service in Yellowstone. Steve's work covers a variety of conservation projects ranging from optimizing investment in water source protection to measuring changes in aquatic habitats following the construction of dams.*

Many of his current projects support the Rio Grande Water Fund, a cross-boundary multi-stakeholder collaborative that is rapidly scaling up the pace and scale of forest restoration and wildfire risk reduction in the Rio Grande basin in New Mexico and Colorado. Contact Steve.

How does LANDFIRE fit into your work in New Mexico?

LANDFIRE (LF) has been essential for the rapid success of the Rio Grande Water Fund (RGWF). From 2014-2016, the RGWF tripled the annual area treated and quadrupled the number of acres in the NEPA clearance project pipeline on forest lands. None of this would have been possible without landscape-scale analysis built on the LF suite of data.

The RGWF is a small program with a start-up culture. By leveraging the existing LF vegetation and fuels data, analysis could be turned around rapidly. Following uncharacteristically large fires like Las Conchas in 2011 that burned 160,000 acres (including 60,000 acres at high severity), our program analyzed the areas in the upper Rio Grande Basin that are departed from their historically resilient condition and prone to future uncharacteristically high intensity fire. This led to the identification of 600,000 acres of high-priority forest restoration.

Identifying the problem areas was half the battle; the other half was motivating investment in reducing landscape-scale wildfire risk. To build the case for this large-scale project, we used LF data to produce return on investment studies demonstrating the reduction in expected fire hazard in high-value parts of the landscape. With these ROI studies helping to build the case, over $11 million of private and public funding has been invested in reducing wildfire risk these landscapes as of 2016.

Keeping the Jemez Mountains healthy means clean water for communities. ©Alan Eckert Photography, ©Shar Jimenez Romero

LF data have also provided the fuels and vegetation inputs required to conduct wildfire risk assessments following the Framework outlined in GTR315. These risk assessments have illustrated the threat posed by departed forests and sparked community support for forest restoration in community firesheds throughout the RGWF landscape.

What LF products work best, are most adaptable?

We rely on the fuels, canopy characteristics, and topography datasets. They allow us to conceptualize, design and conduct analysis on extremely short timelines. For example, the San Juan-Chama Project (SJCP) is a trans-basin diversion that provides water for irrigation and cities in the Rio Grande watershed including 1 million people in Santa Fe and Albuquerque, and more than 70,000 acres of farmland in the Middle Rio Grande Conservancy District.

LF data were used as the foundation of a wildfire risk assessment for the fireshed surrounding the source watersheds of the SJCP. In addition to wildfire, post-fire hazards like erosion and debris flow were also included in the wildfire risk assessment. This risk assessment took only a few months because the LF data was easy to modify to reflect local conditions.

Do you see opportunities for improvement in LF products?

Top: High-severity wildfire. ©Kari Greer/USFS
Bottom: Post-fire debris flows and flooding in the Cochiti Lake. ©US Army Corps of Engineers

Unfortunately, the RGWF program area intersects four of the ecoregions used for LF vegetation and fuels classification. The assumptions made during classification are unique to each ecoregion so we must spend time after each LF update and refresh modifying the LF datasets to reflect our understanding of reality. As we've become faster at modifying the raw datasets, we've realized the importance of reporting data back to the LF program to help improve the data for all users, especially National Analyses that don't have time or the local knowledge required to fine-tune the raw data. Most of the largest errors are along ecoregion boundaries, so we've started a campaign to collect plot-level vegetation, canopy, and surface fuels data to contribute back to the LF program.

Also, many forest treatments, including restoration and fuel reduction treatments in our landscape, are not included in the refresh process. To resolve this problem members of the RGWF are holding each other accountable for reporting treated areas to LF, and are developing a cross-boundary monitoring dataset to aggregate activities completed on the landscape and standardize the types of data collected across land ownership boundaries.

Because ecoregions have fuzzy boundaries, I wonder how feasible it would be for LF to clip to ecoregion boundaries at the end of analysis rather than near the beginning. If, during processing, ecoregion-based assumptions were applied to areas that extend beyond the delineated edge of each ecoregion to overlap other ecoregion areas so end users could choose which ecoregion's classification rules best represent the areas adjacent to the ecoregion boundary.

Steve's recommendations for further reading …

Understanding risk from post-fire hazards is sometimes more important than understanding fire risk. Anne Tillery and Jessica Haas' work mapping expected post-fire debris-flow hazard has helped us incorporate post-fire hazards in to our risk assessments (Tillery and Haas 2016). Their approach can be used for many other post-fire hazards like flooding and erosion.

The wildfire risk assessment framework that we've been using to guide our risk assessments has been widely used but I want to mention it in case anyone hasn't seen it yet (Scott et al. 2013).

Don Helmbrecht and Kori Blankenship's guide to modifying LANDFIRE data for local applications has been essential for appropriately using LANDFIRE data (Helmbrecht and Blankenship 2016).

NOTE: In addition to the work described above, Steve maintains the New Mexico Conservation Science website.