

Response of Oak-Pine Forests to Wildfire Severity in the Daniel Boone National Forest, KY

Large wildfires have been relatively uncommon in the Appalachians in the last 50-100 years. However, unprecedented 2016 fall fire season in the southern Appalachians is a reminder that large fires can occur during severe droughts, even in the fire suppression era. On October 24, 2010, The Fishtrap wildfire was ignited in the Red River Gorge Geological Area. This rugged landscape is in the Cliff Section of the Cumberland Plateau. Dry sandstone ridges and upper slopes are oak-dominated with yellow pines (pitch, shortleaf, Virginia pine). Until the fire was fully contained on November 9, it had burned through a large portion of the 1665-acre containment area. Fire intensity was variable across the rugged landscape and included some areas of moderate and high severity fire with significant overstory mortality. A paper in the latest issue of the journal *Fire Ecology*, authored by Devin Black, Zachary Poynter, Claudia Cotton, Suraj Upadhaya, David Taylor, Wendy Leuenberger, Beth Blankenship, and Mary Arthur, titled “[Postwildfire recovery of and upland oak-pine forest on the Cumberland Plateau, Kentucky, USA](#)”, describes how vegetation responded to varied fire severity over a 6-year period.

Methods:

- One year after the fire, 26 study plots were established to monitor the response of overstory trees, saplings, seedlings, and the understory vegetation (shrubs, forbs, grasses).
- Fire severity at each plot was quantified with the composite burn index (CBI).
- Field data were collected in post-burn years 1, 3, and 6.
- Data analyses focused on how vegetation attributes were related to fire severity.

Results:

- About one-third of the plots had significant overstory mortality, with residual basal area <math><50\text{ft}^2/\text{acre}</math>.
- As expected, basal area and stand density were inversely related to fire severity.
- Between years 1 and 6 the recruitment of oak and pine saplings was positively related to fire severity.
- There was also ample recruitment of red maple, blackgum, and sourwood saplings but these species did not increase with fire severity.
- Native understory species richness was positively related to fire severity, but so was the abundance of two non-native invasive species, Princess tree (*Paulownia tomentosa*) and Chinese silvergrass (*Miscanthus sinensis*).



Figure 1 High Severity burn area in the Fishtrap Fire, Red River Gorge, Daniel Boone National Forest Photo by Devin Black

Take Home Points:

- This study shows that areas of high severity fire, which can also be accomplished with prescribed fire (Lorber and others 2018), can favor the recruitment of oak and pine saplings, in addition to creating early successional habitat.
- High severity burn areas can also increase native species richness, but may promote the establishment of non-native invasive plants, if seed sources are present.
- In the longer term, additional fire or other treatments may be necessary to ensure oak and pine dominance, as well as the aggressive control of non-native species.