Conservation-Oriented Fuels Management

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Background:

The recent increase of wildfires in the southern Great Plains has illustrated a need for development and application of fuels (vegetation) management techniques in the region. Fuels management is crucial to fire suppression and firefighter safety, as the amount of fuel directly influences flame lengths. Flame lengths, in turn, are among the primary factors used to describe fire intensity, which has a direct impact on the ability to suppress wildfires.

In grasslands and shrublands, flame lengths greater than 11 feet make standard wildland fire-fighting techniques ineffective. Prescribed fire is likely to become the preferred long-term fuels management strategy on federal lands. However, in the highly productive Great Plains, fuels can return to pre-burn condition at a rapid rate. This rapid re-vegetation would require frequent, perhaps annual, burning in order to maintain fuels (and resulting flame lengths) low enough for standard wildland fire-fighting techniques to be effective. Yet, frequent large-scale fires tend to reduce the vegetation cover and variability which provides habitat for multiple wildlife species. Prairie-chickens, in particular, require variation in vegetation structure to meet their needs during different life stages (lekking, nesting, and brooding). Furthermore, it is widely accepted that increased variability in vegetation structure often corresponds to biological diversity.

Based on the habitat needs of prairie-chickens and the necessity to manage fuels to reduce wildfire risk, we are interested in assessing how various management techniques such as prescribed fire and grazing affect variation in vegetation structure, prairie-chicken habitat, and wildland fire behavior.

Methods:

We sampled vegetation within burn patches differing in time since fire at each of four study sites in the southern Great Plains (Figure 1). Fuel amounts corresponding to different time since fire were analyzed to determine what factors determine fuel differences between treatments at each site. Using fuel levels measured at each site, fire behavior was simulated to predict flame lengths that would be present during a fire.

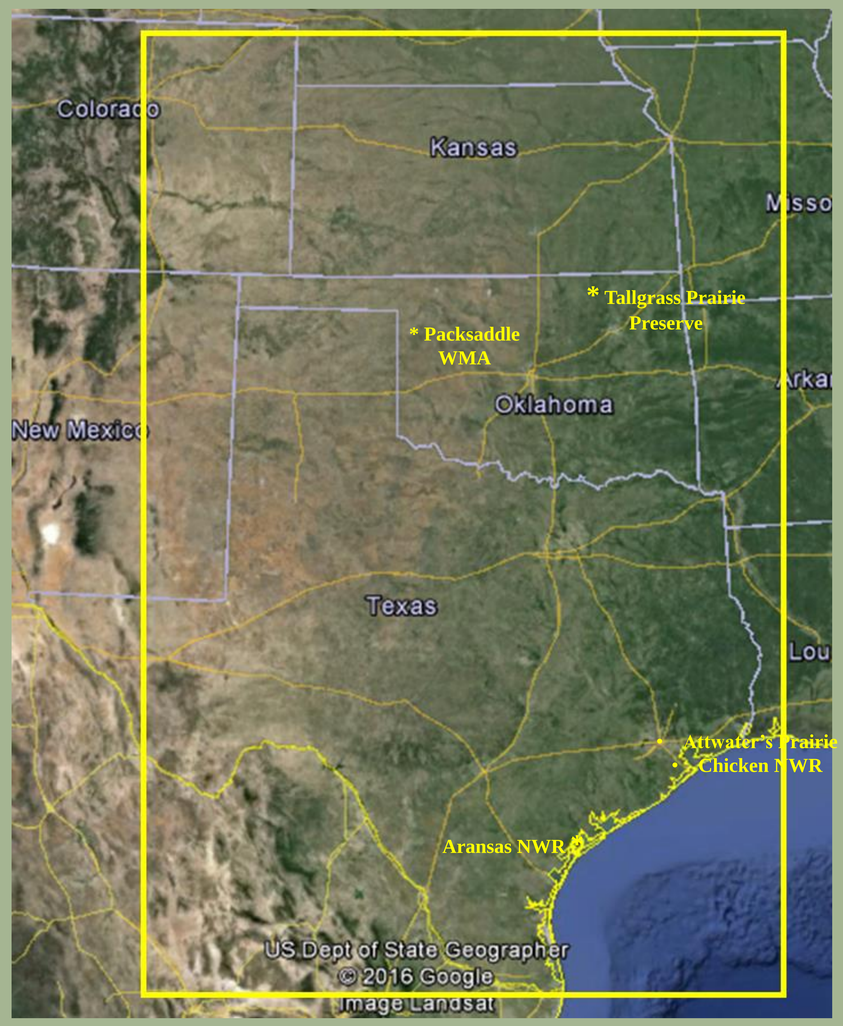

Figure 1. Map showing the relative locations of each study site within the southern Great Plains (yellow box).

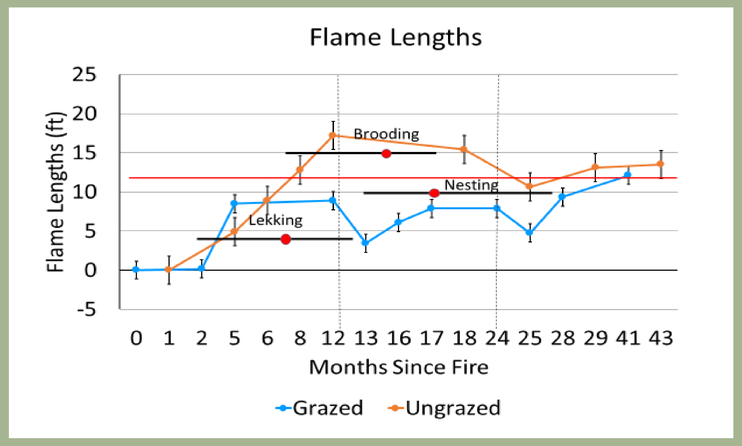

Figure 2. Simulated flame lengths corresponding to time since fire (in months) for both grazed and ungrazed areas. The horizontal red line represents the threshold (~11 feet) at which standard wildland firefighting techniques cease to be effective. Horizontal black bars illustrate life stages of prairie-chickens corresponding to time since fire that has been determined form previous research to illustrate that a variety of patches with various time since fire is necessary for prairie-chicken conservation.

Results:

Preliminary analyses indicate that time since fire is the dominant driver of differences in vegetation structure and the amount of fuel at each site. Presence or absence of grazing also contributes to these differences, as well as the rate of fuel accumulation (Figure 2). Areas that are grazed accumulate fuels at a slower rate than ungrazed areas. The ungrazed areas reach unsafe flame length potential in only 8 months post fire as opposed to the grazed areas which do not reach unsafe flame lengths until 41 months post fire.

Discussion:

These results suggest that grazing on burned areas may be a viable fuels management technique in the southern Great Plains region. Furthermore, landscapes managed with both fire and grazing maintains the diversity of vegetation structure required by prairie-chickens to carry out all life stages. This variation may support increased diversity of other grassland species as well.