

# The Use of Cattle-Grazing and Fire as Management Tools to Maintain Biodiversity on Grassland Reserves in Southern Iowa

**Principal Investigators:** James R. Miller, David M. Engle, Diane Debinski  
**Student Investigator:** Finn Pillsbury (Ph.D.), Devan McGranahan (M.S.), Sheri Svehla (Ph.D.)  
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## Goals and Objectives:

- Collect pre-treatment data on all sites for soil carbon, plants, invertebrates, and birds.
  - Conduct controlled experiments to test the effects of the fire-grazing model on species distribution patterns of both plant and animal taxa in Southern Iowa.
  - Quantify the response of invertebrates and prairie-obligate butterflies to changes in vegetation structure and composition.
  - Quantify response of grassland birds and changes in vegetation structure and composition, and to changes in invertebrate prey base.
  - Quantify the relationship between nesting success of grassland bird species and habitat conditions.
  - Identify other potential sites under public and private ownership in the Grand River Grasslands and surrounding region for possible inclusion in a follow-up regional study.
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## Progress:

In March 2008, one patch in each of four patch-burn pastures was burned. Plant, avian, and invertebrate sampling was conducted in all pastures between May and August. We observed 32 butterfly species in 2008. The most abundant species included some that are relatively common, but also habitat specialists such as the regal fritillary. Very few skippers were observed, possibly due to the extremely wet, cool spring. We observed 2,947 individual birds representing 45 species during the 2008 breeding season. These comprised seven grassland obligate bird species and 11 grassland facultative species, and included seven Species of Greatest Conservation Need in Iowa. Henslow's Sparrows occurred on every pasture in the patch-burn grazing treatment, but only two of the four graze-only pastures. Still, this species established breeding territories on only one patch-burn grazing treatment in 2008. We also located 77 Grasshopper Sparrow nests in 2008 and monitored 75 of them to completion.

Analyses of soil carbon samples collected in 2006 revealed a strong effect of prior land use on all sites, likely the result of heavy grazing and tillage. Ordination analyses suggested that the abundance of tall fescue, an invasive plant, exerts a strong influence on community composition for plants. Based on analyses of data collected in 2006 and 2007, butterfly guilds appeared to respond to treatment effects, but it seems more likely that the patterns we observed (i.e., fewer prairie specialists and more habitat generalists in grazed and patch-burn grazing pastures) were also strongly influenced by prior land use. In particular, we suspect that heavy grazing resulted in less litter and also affected plant composition, and this in turn influenced the composition of butterfly communities. Ordination analyses showed increasing separation of bird species by treatment from 2006-2008. Pastures in the patch-burn grazing treatment generally had higher abundances of Grasshopper Sparrows and Eastern Meadowlarks. We observed an apparent nest success rate of 45% for Grasshopper Sparrows, with overall nest success rates (Mayfield estimate) of 35% in the patch-burn grazing pastures and 24% in the grazed pastures.

We organized a workshop for private landowners in April 2008, and several of these individuals expressed interest in implementing patch-burn grazing on their properties. We also met with the science director of the Missouri Chapter of The Nature Conservancy in September 2008 and he identified several properties, both in private ownership and under the jurisdiction of Missouri TNC, which could be used as study sites in the future.

## Future Plans:

Data will again be collected using the methods described above in 2009. Data analyses will be conducted to gauge changes in response variables from the pre-treatment year through the 2008 field season that can be attributed to patch-burning and grazing.