



Research Brief for Resource Managers

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Herpetofauna distribution across habitat gradients

Grundel, Ralph, David A Beamer, Gary A. Glowacki, Krystalnn J. Frohnapple, Noel B. Pavlovic. 2015. Opposing responses to ecological gradients structure amphibian and reptile communities across a temperate grassland-savanna-forest landscape. Biodiversity Conservation 24:1089-1108.

In the upper Midwest, the savanna-grassland biome is a conservation priority. Former grasslands have been converted for development and agriculture, and fire suppression in the region has led former grasslands to transition to forest, leading to a decline in native plants and animals.

There is limited quantitative information as to how the herpetofauna community (i.e., reptiles and amphibians, hereafter herp community) varies along the grassland – savanna- forest gradient. This **lack of baseline data makes it difficult to determine the impacts of management activities**, including prescribed fire.

The authors of this study surveyed the herp community along a prairie to forest gradient. Sites were established in northwest Indiana in 1999. Drift fence arrays with funnel traps were set up at 25 sites, for a total of 50 arrays. Sampling took place between March and November for four years.

To determine how the herp community responded to fire and changes in vegetation structures site variables were measured at each array. Site variables included environmental

Management Implications

- Herpetofauna communities are most diverse in savanna habitats
- The habitat needs of reptiles and amphibians differ, leading to differences in the herp community across a grassland to forest habitat gradient
- Maintaining diverse habitats, with a range of fire histories, can support a wider range of habitat needs

variables (e.g., % cover bare ground, stem density, canopy cover) and fire history (e.g., time since last fire). The herp communities were compared using methods that emphasized the ecological gradient (i.e., principal curve ordination). Researchers tested for differences in the herp communities among four habitat types: open, scrub, woodland, and forest.

Individuals representing 24 non-turtle species were captured during this study. Seven turtle species were noted during field work, but these individuals were excluded from the analysis because they were too large to be captured in funnel traps.

The strongest predictors of the herp communities were percent bare ground, downed logs, fire frequency, and time since last fire. However, patterns differed between the amphibian and reptile communities along the grassland – savanna – forest gradient. Researchers found that **grasslands had a higher reptile abundance**,

forests had a higher amphibian abundance, and savannas had the greatest diversity overall.

There were **opposing effects of fire on the herp community, with some species having strongly positive responses and other species strongly negative.** The authors suggest that this pattern is the result of frequent fire having a generally positive effect on herps by maintaining habitat being coupled with short term negative impacts of prescribed fire (e.g. decreased cover). Additionally, diversity in the habitat requirements of species, for example some reptiles seek out open areas while others avoid them, can lead to opposing trends in the data.

The complexities of these patterns demonstrate the value in assessing the herp community as a whole and over time. If research or monitoring efforts are focused on a single species or habitat type, the results may not represent the broader herp community or predict the response in neighboring habitat types. **The results of this paper highlight the importance of the intermediate habitat type, the savannas.** Savanna habitats had the greatest herp diversity overall, and suggest that savannas should be prioritized for conservation efforts to support the greatest number of herp species.