Short-term Response of Herpetofauna Following Prescribed Burning in the Southern Appalachians

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Abstract

Prescribed fire is a tool being increasingly used by forest managers to restore disturbance dependent ecosystems, such as the upland hardwood forests of the Southern Appalachians. Evidence supports the use of prescribed fires to promote hardwood tree regeneration. The effect of this restoration tool may impact ground dwelling wildlife. From May to August 2013 herpetofauna were trapped over a period of 3,120 nights using drift fence arrays to assess changes in population due to prescribed burns. A total of six sites were trapped, with two treatments (prescribed burn and control), each with three replications. All sites are approximately three hectares in size with the treatments randomly assigned throughout. Changes were evaluated on relative abundance, species richness, and species diversity of herpetofauna.

Introduction

- The Bent Creek Experimental Forest (BCEF) encompasses a 2500 ha watershed in western North Carolina. Annual precipitation averages 800 mm and is evenly distributed year around. Elevation ranges from 700 to 1070 m. Generally winters are short and mild, and summers are long and warm (Greenberg 2001).
- In the past fires set by Native Americans and settlers shaped much of the Southern Appalachian Forests by maintaining an open understory (Lorimer 1993).
- Today, prescribed fire is increasingly used by forest managers to restore and regenerate oak across the upland hardwood ecosystem, to enhance wildlife habitat, ecosystem restoration, and reduce fuels and risk of wildfire (Graham 2004).
- Species richness of herpetofauna in the southern Appalachian Mountains rivals any in the United States and makes up an important component of biological diversity for the region (Greenberg 2001).
- With this study we hope to gain a greater understanding of the relationship between the effects of prescribed fire and the changes in population and species diversity of herpetofauna.

Figure 1: Species captured in the Bent Creek Experimental Forest of Western North Carolina. (Pictured from left to right) Blackchin Red Salamander *(P. ruber schencki*), Eastern Fence Lizard (*Sceloporus undulates*), Snapping Turtle (*Chelydra serpentina*).

Methods

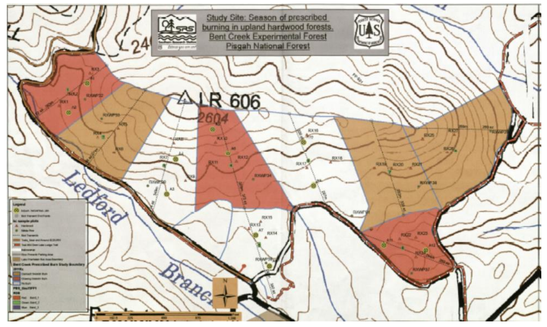

Figure 2: Study site map of seasonal prescribed burning and locations of herpetofauna traps in the Bent Creek Experimental Forest.

- A total of 9 units (2 treatments plus 1 control, 3 replicates), each approximately 3 hectares in size were located within the upland mixed hardwood forest of the Bent Creek Experimental Forest. Treatments were randomly assigned to each unit resulting in a completely randomized design. Units were separated by fires lines as needed
- The prescribed burning was conducted on April 23rd 2013 in three units. During this study no silvicultural manipulation occurred in the control sites.
- Within each 3 hectare unit, two drift fence arrays were positioned 100m apart near an existing bird transect. Each array's location was designated at a minimum of 50m from each unit's boundary, and at a randomly chosen direction and distance between 0-50m perpendicular to the pre existing bird transect.
- The orientation of each array was designated by the best available orientation option that minimized the removal of healthy upland hardwood species.
- A central 5 gallon paint bucket was buried flush to the ground at each point specifically designated for each array. From this central bucket three 7.6-m long, 0.5-m high drift fences were buried into the ground with approximately 120 degrees separation between them.
- Each bucket was drilled with holes into the bottom to help facilitate drainage after rain events. A sponge was placed at the bottom of each bucket and dampened each visit as necessary to reduce the probability of desiccation. Double-sided funnel traps were placed on both sides of and adjacent to each fence. Pitfall and funnel traps were shaded by squares of pressboard.
- Traps were open from 5 June-8 August 2013 totaling 3,120 trap nights. Traps were checked 6 times weekly. Reptiles and amphibians were identified, measured, weighed, and individually marked by toe- or scale-clipping, and released at point of capture. If applicable, toes were also clipped on one of the hind legs to designate unit of capture.

Methods-con't

Figure 3: Pictures of a prescribed burn (left) and control treatment (right) in the Bent Creek Experimental Forest study site.

Results

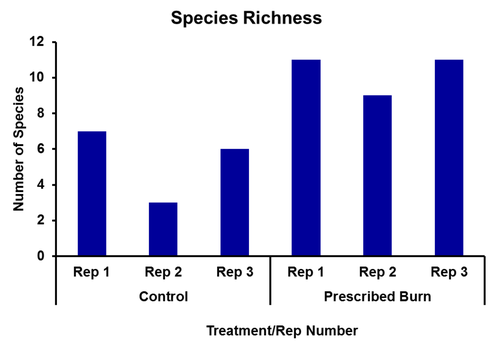

Figure 4: Number of species caught in each repetition of the control and prescribed burn treatments.

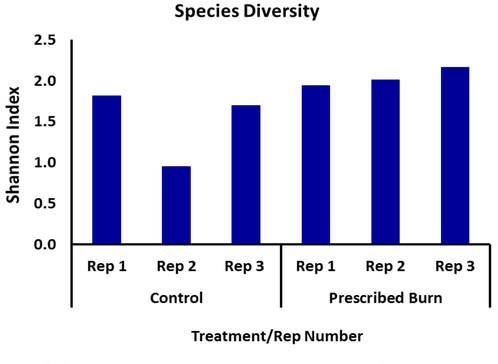

Figure 5: Species diversity calculated using the Shannon index in each repetition of the control and prescribed burn treatments.

Results-con't

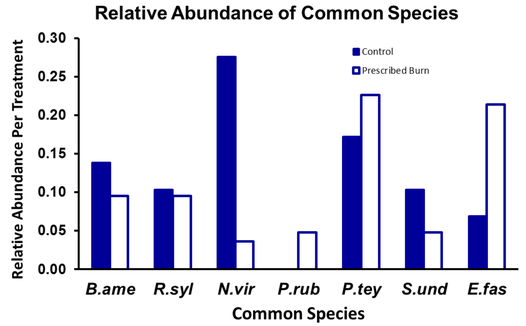

Figure 6: Relative abundance of common species caught within the control and prescribed burn treatments

Conclusions

- Species richness and diversity index results were noticeably higher in the prescribed burn treatments then that of the control treatments.
- There appears to be no visible difference in the overall relative abundance of the most common herpetofaunal species trapped between both treatments
- Further study and analysis of current data is required to understand the effects of prescribed burning on herpetofauna populations.

References

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