A Survey of Animal Diversity in a Transect of Post-Fire Deciduous Forest

Kayla Natelborg, Carter Newsome, Delilah Hughes, Dr. Matthew Becker, Dr. Kyle Harris

LIBERTY UNIVERSITY

Introduction

Some ecosystems are fire-dependent and diversity can benefit from wildfire. The deciduous forests of Virginia are not as accustomed to fire and it may have negative impacts on the ecosystem (Harper, et al., 2016). In November of 2023, a wildfire started in the Matt's Creek area next to the James River. Mammals, amphibians, and reptiles are normally abundant in this part of the forest. This study aims to investigate the lasting impacts of this wildfire on the animal population to better understand deciduous forest recovery and conservation implications for the ecosystem. By surveying the diversity and populations across a transect of different levels of burn intensity, observations can be made on animal behavior in response to the fire.

Research Question

How does wildfire disturbance affect mammal and herpetofauna abundance & diversity in temperate deciduous forest?

Methods

- Six Browning trail cameras were deployed across a transect of sites burned at different intensities (Figure 5)
  - Site 1- Severely burned
  - Site 4- Fire border
  - Site 6- Farthest from burn area
- Cameras were 1.5 meters off the ground, in a horizontal layout, and had a 20s capture delay
- An opportunistic survey was conducted for 15 minutes within 15 meters of the camera to assess herpetofaunal diversity, both during camera deployment and retrieval
- Cameras were retrieved after 4 weeks

Figure 1. Camera trap photo of the North American black bear.

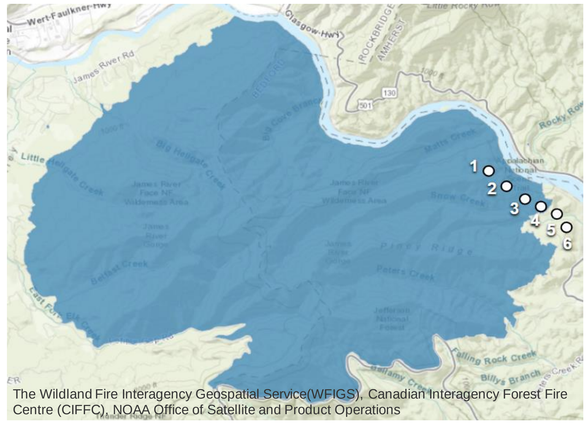

Figure 2. The Matt's Creek fire burned over 11,000 acres. Sites 1-6 were located equidistant from the James River for maximum homogeneity.

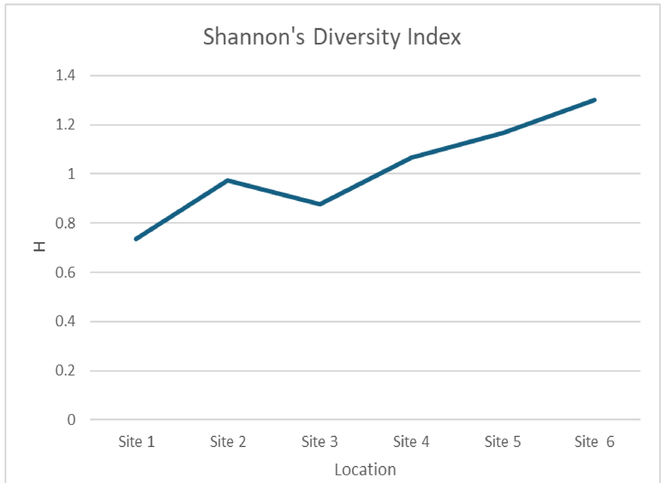

Figure 3. Expected results of Shannon's diversity index between sites. Diversity increased nearly linearly with increasing distance from the fire epicenter.

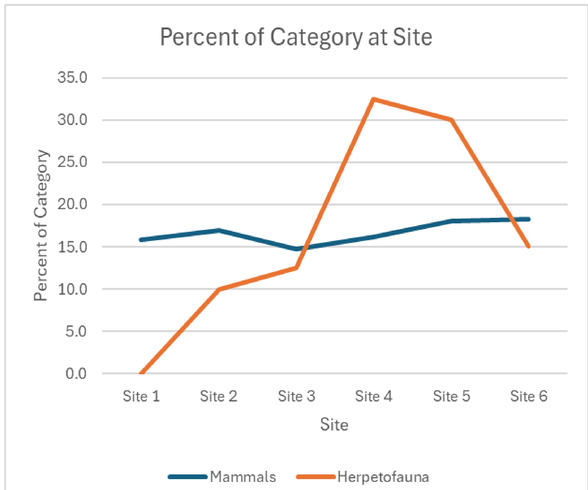

Figure 4. Percent of total abundance found at each site for both mammals and herpetofauna. Mammals have stable abundance, while herpetofauna prefer intermediate zones.

Figure 5. Ground cover from Site 1of high burn severity (far left) to Site 6 of no burn severity(far right). Site 4 was on the border of the burned area; an unburned portion is shown.

Expected Results

- There was no significant difference in overall and mammal abundance for any of the plots.
- Mammal diversity steadily increased from severely burned to unburned regions (Figure 3).
- Herpetofauna were significantly more abundant in intermediate burn zones than highly burned an unburned regions (Figure 4).
- Herpetological diversity was roughly equal at all six sites.
- Deer abundance was much lower in Sites 1 & 2, but comparable across the other plots.

Future Work

Continuing the study could reveal how the observed patterns change throughout site recovery. Additional studies could also investigate whether future understory growth is inhibited due to a decreased seed bank or promoted due to increased light exposure.

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