

# Evaluating the Impacts of White-tailed Deer Management Strategies on Spring Ephemerals in Cincinnati Parks



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## Introduction

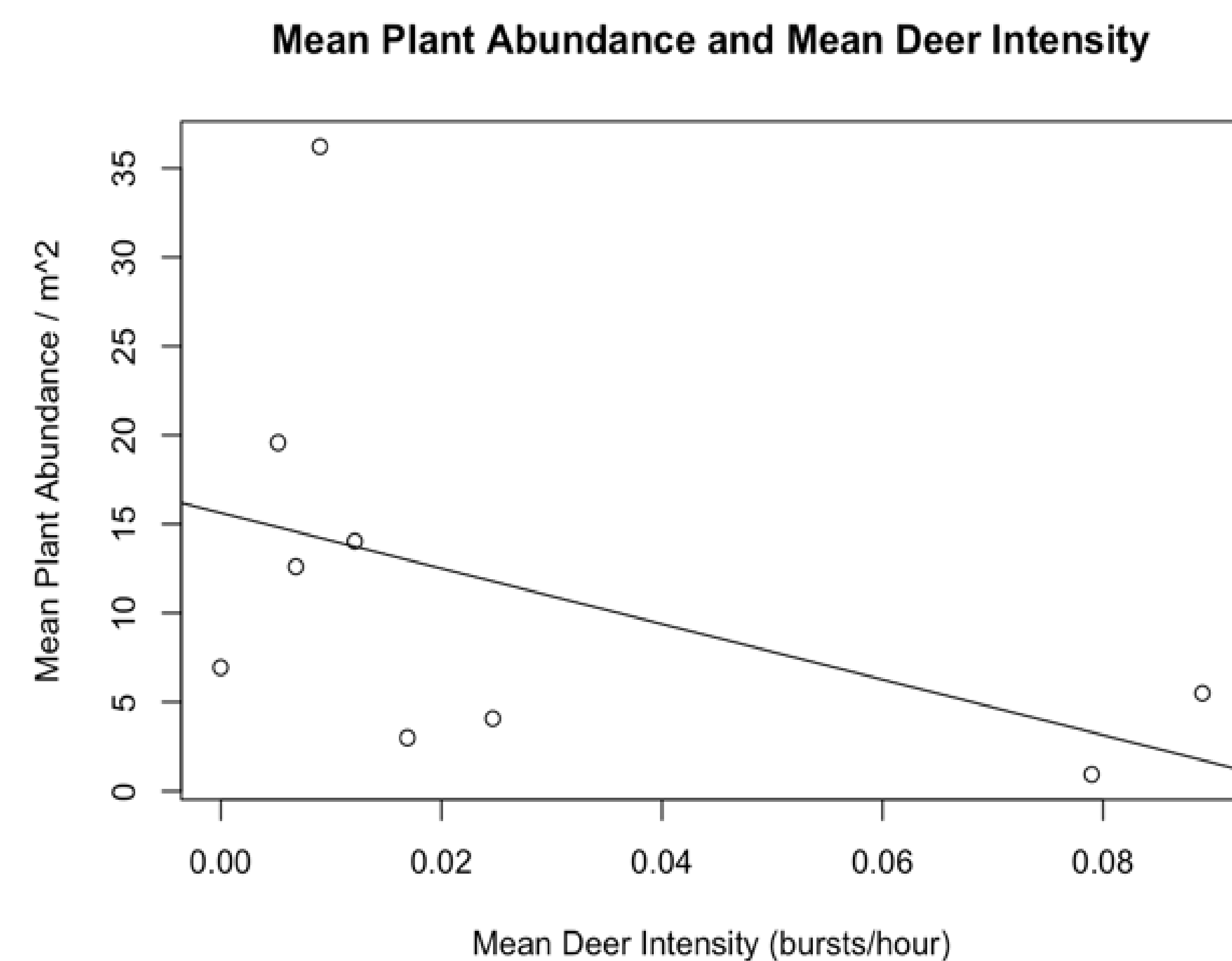
Urban and suburban deer population management is a problem that is more and more often landing on Parks Department desks. Deer may be *more* attracted to urban settings due to less prevalence of hunting (Conover, 1993). An overabundance of herbivorous white-tailed deer (*Odocoileus virginianus*) may have a negative effect on the abundance of native spring ephemerals (**Fig. 1**) in urban southwestern Ohio. In some Cincinnati parks bow-hunting or sterilization is used to manage deer populations. The efficacy of this practice is difficult to assess, as deer populations are very mobile and can live in thick growth, making sampling difficult (Kolowski et al. 2021). Simulations of bow-hunting have shown that 20-35 years of sustained, efficient hunting are necessary to control a deer population to a level that allows damaged forests to regenerate (Weckel & Rockwell 2013). As population control methods in Cincinnati Parks are approaching their 20<sup>th</sup> anniversary, our study seeks to investigate whether these management techniques affect the abundance of spring ephemeral plant species. We hypothesize that spring ephemeral abundance and diversity will be negatively related to the intensity of deer usage. We further hypothesize that intensity of deer will be lower in managed versus unmanaged parks.

## Methods

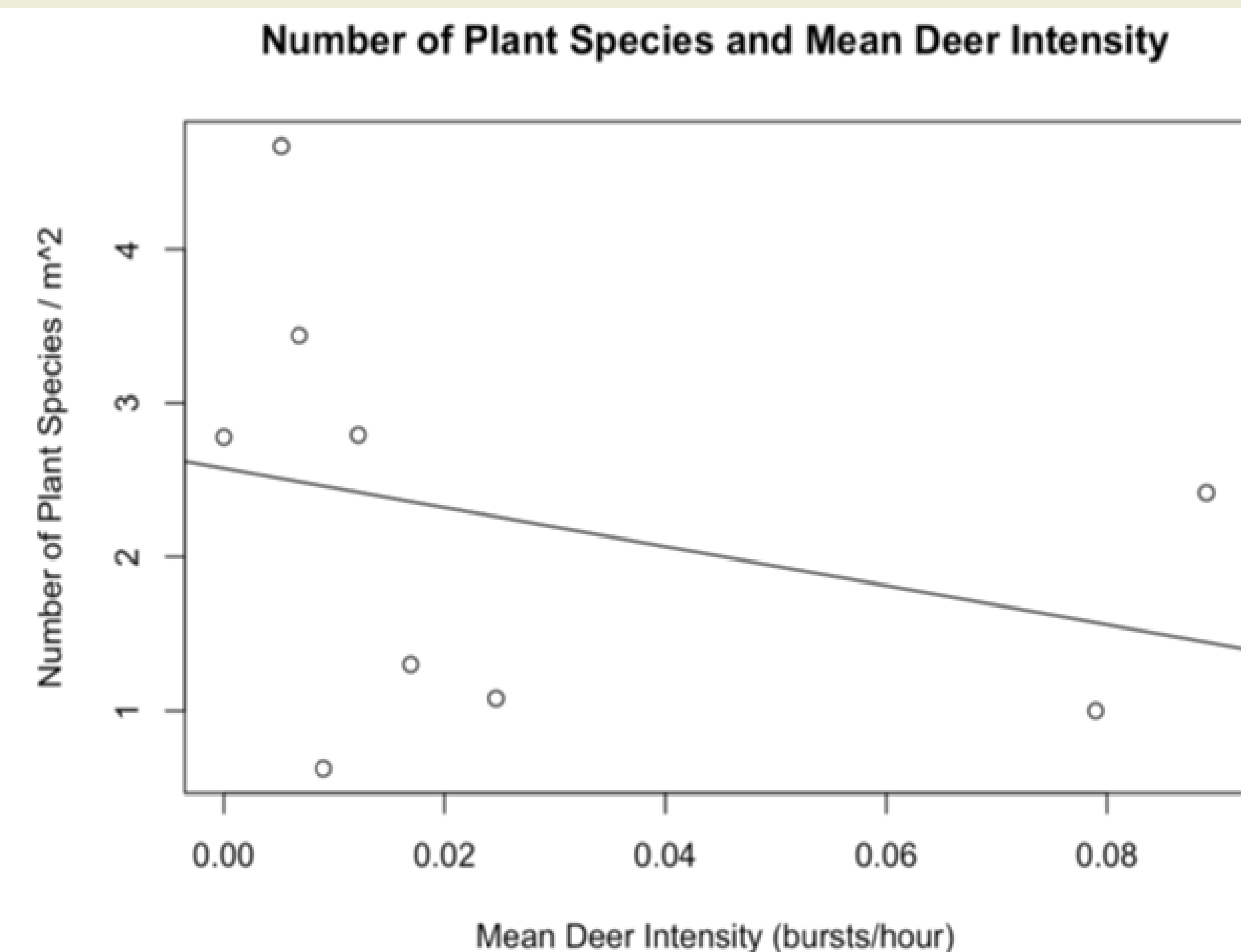
To evaluate the impact of white-tailed deer management strategies on spring ephemerals in 13 Cincinnati parks (8 managed with sterilization or bowhunting and 5 non-managed) we first placed camera traps to help estimate deer intensity in each of these parks for approximately 6 weeks in Spring 2021. When the spring ephemerals started to emerge in mid-March, we began collecting vegetation data. To do this we established 50m transects. The elevation, coordinates and bearing at the beginning and end of each transect were recorded. We sampled 6 1m<sup>2</sup> quadrats (**Fig. 2**) spaced every 10m along the transect. Within each quadrat we counted the number of individual plants of each species present and estimated the percent cover of plants that could not be counted. Some cameras were placed so a quadrat was in their field of photography. Efforts were made to conduct the sampling in managed and unmanaged parks at a similar date to minimize the effects of the advancing season and weather (Christopher et al., 2014).

Because the sample sizes were uneven (only 1 park uses sterilization), we used a general linear model (GLM) to compare species richness (species/quadrat sampled) and mean plant abundance (plants/m<sup>2</sup>) among management strategies. We related these variables to camera trap intensity (see companion poster for methods) using linear regression.

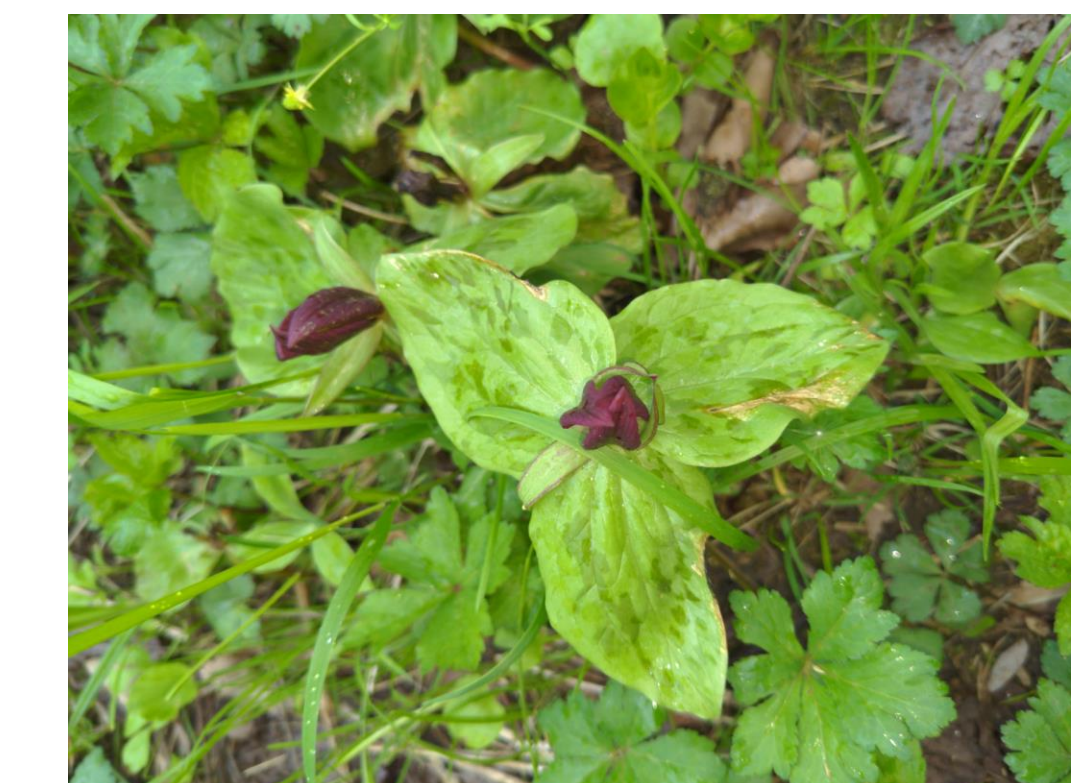
## Results



**Figure 3:** In our preliminary data, the evidence does not support a significant relationship between the mean deer intensity and the mean plant abundance ( $p = 0.203$ ); however, there is a trend between the two indicating that bow hunting may be an effective form of deer management throughout Cincinnati Parks increasing plant abundance.



**Figure 4:** The preliminary data does not show evidence of a significant relationship between the mean deer intensity and the mean number of species per square meter ( $p = 0.409$ ). There is a trend between the two indicating that bow hunting may be an effective form of management throughout Cincinnati Parks.



**Figure 1.** Spring ephemerals (Catchweed Bedstraw) (Toadshade).



**Figure 2.** 1m<sup>2</sup> PVC framed transect placed at 0m with beginning flag and measuring tape in the center.

## Conclusions

- Preliminary results show trends for greater spring plant abundance (**Fig. 3**) and species richness (**Fig. 4**) with decreasing deer intensity.
- Species richness may be more a function of park area than management strategy.
- Bow hunting (see companion posters) may be an effective strategy in Cincinnati to limit the effects of deer herbivory on vegetation as shown elsewhere (Weckel & Rockwell, 2013).
- Simulations of bow-hunting have shown that 20-35 years of sustained, efficient hunting are necessary to control a deer population down to a level that allows damaged forests to regenerate (Weckel & Rockwell, 2013).
- Data will continue to be collected and analyzed to better understand the impact white-tailed deer management strategies have on spring ephemeral abundance.

## References

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