Evaluating the Differences in Intensity of White-Tailed Deer (*Odocoileus virginianus)* Populations in Managed and Unmanaged Parks

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Introduction

White-tailed deer (*Odocoileus virginianus*) have always been a landmark animal in the US, providing a large revenue from hunting as well as providing enjoyment for nature watchers and residents alike. However, the increase in white-tailed deer have had negative impacts on forests, other wildlife, agriculture and human health, resulting in increasing conflicts with humans, costing approximately $2 billion per year in the United States (Boulanger et al., 2014). There are several ways to manage urban deer populations. In the Cincinnati, Ohio area the most common practice is bow hunting. There is also a sterilization project in the Clifton area of Cincinnati. Deer in other Cincinnati city parks are not managed. Our research team wanted to know if these methods of deer management make a significant difference in the deer intensity within these parks. Our team chose to use camera trapping to record deer movement because it is one of the only monitoring approaches that can measure the intensity of use of the habitat by wildlife populations and how it varies over space and time (Keim et al., 2018). We hypothesize that the parks that have either bow hunting or sterilization management will have a lower intensity of white-tailed deer than parks that are unmanaged.

Methods

To evaluate how white-tailed deer management strategies affect deer intensity, we placed camera traps in 13 Cincinnati parks (8 managed with sterilization or bowhunting and 5 non-managed). We set up at least one camera trap within the park that would automatically take a 3-picture burst whenever any movement was detected within the camera's range. We sampled using the camera traps from November 2020 to March 2021. Cameras were placed for approximately one week at each location. Intensity was recorded as the number of deer per burst per hour.

We used a generalized linear model to compare mean dear intensity (deer in burst/hour) in each park based on management practice because sterilization had only one replicate. We used Tukey's HSD to evaluate differences among factor levels.

Results

Preliminary data from this study shows that bow hunting is the most effective form of population control for white-tailed deer (*Odocoileus virginianus*) in Cincinnati Parks, having an intensity of use of less than 0.025 deer in image bursts per hour. Parks that were unmanaged were shown to have deer intensity of uses of between 0.025 and 0.050 image bursts per hour. The sterilization management technique had the highest deer intensity of use between the three management styles that were studied. The one park that used sterilization, rather than bow hunting for population management had an intensity of use of almost 0.1 image bursts per hour, which is over double the intensity of both bow hunted and unmanaged parks (Fig. 2.). Bow hunting is significantly lower than sterilization management (p-value of 0.0067), but not significantly different from no management (p-value of 0.5889). No management did not differ from bow hunting, but this is largely an artifact of management only occurring in parks where there are
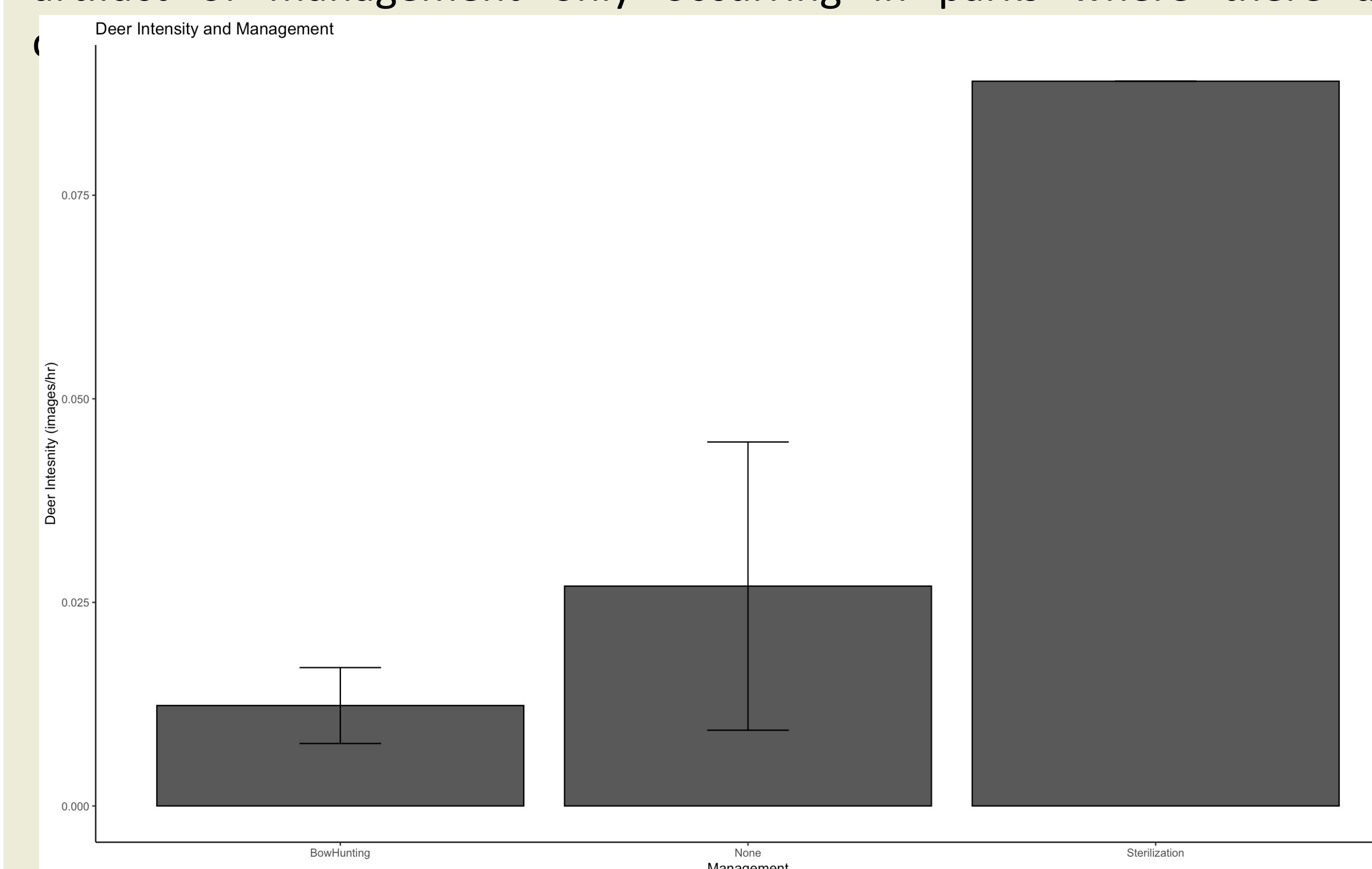

Figure 2: Plot of preliminary data, showing how deer management styles impact deer intensity of usage. Created in R Studio.

These results are part of a larger ongoing study, in conjunction between the University of Cincinnati, the Clifton Deer Program, and Cincinnati Parks, to discover which management style is the most effective for controlling urban white-tailed deer (*Odocoileus virginianus*) in Cincinnati Parks and what levels of deer abundance/intensity result in acceptable levels of impact and human interaction.

Figure 1: Example of a camera trap "burst" detecting movement, including white-tailed deer (Odocoileus virginianus).

Conclusions

As this is the beginning of a much larger ongoing study, these data are not necessarily the final result. The early data that has been gathered suggests bow hunting is the most effective management style for reducing white-tailed deer populations in urban park settings in Cincinnati. However, at this point, there is only one park that uses sterilization techniques for deer management, so there was no replication performed for the sterilization treatment, thus it is unclear if this is idiosyncratic to this site or reflective of the technique in general.

References

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